

REPORT OF THE PRESIDENT 2015



TECHNION. *together.*

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From the President

During all of its long history the Technion has aspired to a standard of excellence that has required constant vigilance and considerable effort to maintain. It has always achieved the highest level that the circumstances of history and of economics would allow. This has been essential to the development of our institution as well as to the advancement of the State of Israel. Occasionally circumstances require that we take a deep breath and attempt to advance to the next level. We are now entering upon such a stage, a new and essential phase in the development of the Technion, one which can be classified under the heading of *Renewal*: renewal of staff, renewal of studies and renewal of physical structure. There comes a time in the life of every living organism when there is a need for regeneration; the old frameworks are no longer adequate, there is a generational upheaval, there is a different level of expectation and achievement, there are increased possibilities and opportunities – all these and more make it essential that a new agenda be adopted with enhanced thinking, planning, strategies and corresponding implementation.

This report contains much information and many graphs and figures that bear out the exceptional changes that the Technion is undergoing. In broad strokes the path of renewal embraces a redoubled striving for excellence, augmented multidisciplinary trends, repeated emphasis on research as well as on the quality of teaching, an increasingly global perspective, a more student-friendly environment and an underscoring of long-term, strategic planning. These are the components that will take the Technion to new heights and will assure that the institution maintains and indeed enhances the excellent reputation and results which have always embellished the Technion name.

Staff Development - The Technion's academic staff is undergoing a very dramatic metamorphosis. The newcomers during the past ten years come from a different world, and their new spirit is having, and will continue to have, a far-reaching influence on the institution. Staff members who began their academic careers after the onset of the age of computers were born into a different world and are fundamentally different in their approach. The graphs in the Faculty Recruitment section of the Academic Affairs report provide a solid graphic representation of the breakdown of Technion staff ten years ago as

compared to the current academic year. The academics who have joined the Technion staff in the past ten years have degrees from Israel, the United States, the United Kingdom, Russia, the European Union, indeed from all over the globe, and they have studied at some of the best institutions: Stanford, MIT, Columbia, Carnegie–Melon, Johns Hopkins, Weizmann Institute, the Hebrew University, Princeton, some of the top Institutes in Russia and, of course, a large number of them are our own graduates. They are different in their academic and professional profiles as well, with a growing number embracing interdisciplinary fields. Most vividly, the average age of our academic staff has decreased considerably with the gradual retirement of academic staff members who joined at the time of the massive expansion and the Technion’s move to the Neve Sha’an an campus in the early 60s. In addition to the faculty recruitment effort, the current aim is to double the number of postdoctoral fellows on campus; postdoctoral fellows are making an important contribution to the quality of research at the Technion.

Teaching – The quality of teaching is a major component of the student experience at Technion and one of our foremost challenges. While research excellence is vital to our growth and position as a major university, good teaching is no less important and is far more directly responsible for the eventual success and current satisfaction of our students.



This Year's Yanai Prize Winners

The Yanai Prize for Excellence in Academic Education was awarded for the first time in 2011 and has proven to be an outstanding tool for highlighting the importance of teaching among Technion academic staff and for creating an environment in which teaching skills and talents can be appreciated, prized and rewarded.

There has been a commensurate steady improvement in the grades that students assigned to their courses and teachers in the annual assessment of teaching, so that in this past year one third of Technion courses received top-level grades. An additional, significant change has been the change in semester length, which has been shortened to 13 weeks instead of 14 weeks, and no longer runs into the exam period.

Students' Quality of Life – The students are the beating heart of the Technion and a crucial part of our renewal effort is addressing their quality of life and their learning experience. The campus offers a huge array of services and leisure time activities: sports facilities, discounted laundry and grocery, cafes, pizzerias and pubs; cinemas, dance groups, festivals and fairs; printing, copying, scanning, fax services, banks, travel agencies, shops, insurance. This array is constantly improving and is among the best and cheapest available on Israeli campuses. The dormitories, too, are cheaper than at other universities and their 4500 beds are the largest number available on any campus in the country - (even so, they are not sufficient and 75 percent of our dorms need renovating). Five hundred additional beds are currently under construction and will be ready within the next two years.

With the active cooperation of the Technion Student Association we are constantly striving to improve these services, which are especially vital in view of the reputed difficulty of studies at the Technion. There are also many social services available including frameworks for volunteering, aid for holiday meals, sponsored Sabbath meals, participation in missions to Poland and in Birthright missions, psychological services and more – all described in more detail in the following pages.

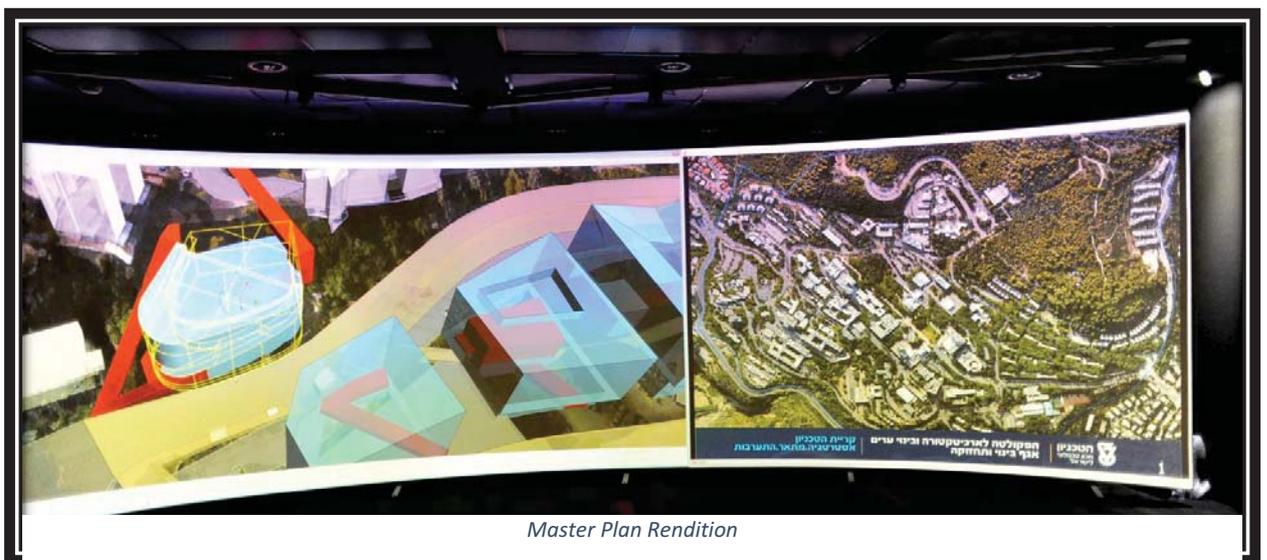
The most difficult issue remaining for Technion students is their level of satisfaction with teaching and with academic staff attitudes towards students and towards grading. Many steps have been taken to improve the situation and the Technion Student Association has undertaken to follow up specifically on the implementation of the resolutions of the committee set up to examine the study load.

These are strategic targets for the Technion, but basic changes in teaching, in campus culture and in education generally take a long time and although first results are already noticeable, much more will be felt in two to three years. There is no doubt in our mind however that excellence in quality of life is as important a goal for renewal as is excellence in teaching.

Master Plan – A twenty-year Master Plan for the development of the Technion campus has been formulated. Based in the Technion’s Faculty of Architecture and Town Planning, the plan, the home-grown product of our own students’ vision and efforts, was headed by Visiting Professor Shamay Assif, formerly Tel Aviv’s Chief Municipal Architect and the planner of the Cross-Israel Highway - Road 6 - which has revolutionized road travel in Israel. The Technion Master Plan’s very ambitious goal states:

The Technion Campus is designed to inspire an alignment, an identity and a setting that will optimally, consistently and over time support the implementation of the Technion’s vision: to become a scientific, technological research university, among the top ten in the world in the development of human potential and leadership and in the creation of knowledge designed to advance the State of Israel and mankind.

In general lines, the plan has highlighted the unique green character of the Technion with special emphasis on preservation of nature, foliage, trees and other features unique to our campus. Areas are to be specifically set aside for buildings, and other special spaces will



Master Plan Rendition

maintain their green character, while others still will be set aside for leisure activities.

These features were elicited among students in a research project asking what they would like to see on the Technion campus.

More specifically, the master plan is designed to create, within twenty years, a campus intended to encourage the development of group and individual interaction; to promote an atmosphere of innovation and excellence; to foster a friendly, open, international ambience; to encourage new technologies; to establish an eco-campus friendly to the environment; to create a dynamic flow of traffic enabling total accessibility; to blend in with the neighboring environment of Haifa and the North of Israel; to identify and develop economic opportunities; to constitute a leading link in Israel's academic campus chain; to create a unique campus image echoing the surroundings; to provide a welcoming space for new developers and a laboratory for innovators; and to create a community where scholars, students and researchers can find a warm home.

An additional, crucial element is the construction of new entrance gates to the campus. The process is in its initial stages and will eventually create suitably impressive approaches at both ends of the Technion, worthy of the institution and its renewed campus.

The Technion Master Plan is a major component in the Technion's design for renewal and will constitute one of the foremost focal points in our deliberations at the 2015 session of the Board of Governors as well as in other forums throughout the year.

Technion International - This most impressive newcomer, Technion International, has exceeded all expectations and is an outstanding success. The variety of programs it offers, including accredited undergraduate degree courses, semester abroad, summer programs and research opportunities, all taught in English, give overseas students an opportunity to experience an exceptional Technion education in Israel. Beginning with 23 students in 2009, the number has mushroomed and includes students from 34 foreign countries - from Albania to Venezuela and from Canada to Congo. Three-quarters of the 2013-2014 graduates continued to advanced studies; five remained at Technion while others went on to prestigious institutions including Stanford, MIT, Imperial College, Johns Hopkins, Cornell, Berkeley and others. The welcome presence of international students in this and other frameworks on the Technion campus reinforces our reputation as an increasingly

cosmopolitan institution and gives our Israeli students a chance to meet and become acquainted with people from many different countries and cultures.

International Students Accepted

<i>Year</i>	<i>Number</i>
2009	23
2010	37
2011	31
2012	33
2013	40
2014	48

Countries of Origin – International School Students

Uruguay	Ghana	South Africa	Brazil	Luxembourg	Colombia
India	Congo	Costa Rica	Canada	Albania	USA
Spain	Slovakia	Venezuela	Swiss	Greece	Guinea
Sweden	Mexico	Ukraine	Turkey	Israel, E. Jerusalem	Morocco
Nepal	Panama	Peru	France	China	Malta
Germany	Italy	Denmark			

New York Campus – The New York campus is becoming a reality and students, staff and post-doctoral students are already hard at work in borrowed space in Google’s Manhattan offices. I recently visited the campus, which is rapidly rising on Roosevelt Island, on the East River. The first buildings should be ready by 2017. It is an amazing campus! The feeling of pride and accomplishment on my visit to the site is indescribable. We are part of an historic partnership which will enhance New York City’s capacity to become the



President Lavie at Roosevelt Island

entrepreneurship capital of the world, as New York’s Mayor Bloomberg dreamed, will cement the relationship between Israel and the United States and will undoubtedly advance scientific and technological research and innovation. The Jacobs Technion-Cornell Institute has become a magnet; many universities and research institutions are seeking involvement in the project, appreciating its huge potential. A recent article in the Wall Street Journal (February 13, 2015) by Alexandra Wolfe began: *What Stanford University is to Silicon Valley, the Technion-Israel Institute of Technology is to Israel’s booming tech sector. Technion President Peretz Lavie is now working to bring some of that experience to the U.S. In partnership with Cornell University, the Technion recently broke ground on a new technology-focused campus in New York City. Named the Jacobs Technion-Cornell Institute, the campus will be on Roosevelt Island.*

Our New York campus will provide the Technion with an added stratum of international prestige, and our having been selected among a multitude of very worthy competitors to realize Mayor Bloomberg's dream, is in itself a measure of our accomplishments. The New York campus is a tremendous step forward in Technion's development and inaugurates a new era of international cooperation.

China Campus – “What Technion has done to advance the Israeli economy through student and staff research and innovation is an example for Chinese universities to follow. If many universities in Guangdong and China do the same as Technion has been doing in Israel, an innovation-based economy will emerge.” Professor Peihua Gu, Provost of Shantou University.

The program to establish the Guangdong-Technion Israel Institute of Technology (GTIIT) campus is progressing according to plan. The program has been approved by the Federal Government in Beijing and the province has completed the tender for selecting a campus architect. The Israeli firm of Dagan-Mochly was selected to accompany the detailed planning of the campus. In consultations with Shantou University and the Li ka Shing Foundation, we are in the process of selecting a Chancellor and Vice Chancellor and appointing the joint board that will be responsible for the three-year “preparatory phase” of building Guangdong Technion-Israel Institute of Technology (GTIIT).

The Technion's expansion into China was made possible by an extraordinary gift by Chinese billionaire Li Ka-shing. Mr. Li's funding includes a \$130 million donation toward the Technion in Haifa. The Guangdong Technion – Israel Institute of Technology is due to open fully to students in 2017 with an initial focus on environmental studies.

Activities at Technion-Guangdong began recently with an initial research focus on Environmental Engineering and Biomedical Sciences. Teaching and research will be in English. The Technion is currently seeking tenured and tenure-track faculty for the new campus and is also recruiting top postdoctoral fellows who will be trained to become future faculty. The new institute's future faculty members will spend their first year at the



Technion Speakers at Guangdong-Technion Event

Technion campus in Haifa. They will be expected to develop curricula and enter into new research collaborations with Technion faculty. These will eventually serve as the basis for independent research programs for Shantou.

Entrepreneurship and Innovation – The Entrepreneurship Center at Technion sponsors many and varied activities designed to take advantage of Technion's outstanding capabilities in innovative technologies and applications. The center is charged with the mission to develop and disseminate entrepreneurial know-how and skills to students, faculty and alumni through research, education and the practice of entrepreneurship.

Rafi Nave, manager of the center, is a Technion alumnus, with a distinguished career as a leader of Israel's applied technology sector. Most recently he was Senior Vice President

of Research and Development at Given Imaging Ltd., where he headed the development and delivery of the famed PillCam video-capsules and of a wide range of other imaging and functional diagnostic products.

Students flock to the center each summer (including this past summer during the war) for continuing-education programs within the center's framework. This is a rare, hands-on opportunity to participate in an educational and practical experience commensurate with Israel's outstanding reputation for entrepreneurship and innovation. It also runs an annual



Technion Students Enjoying Biz-Tec

national competition, Biz-Tec, designed to identify the best ideas and to provide a platform for start-ups.

Start-up Support – **The Technion Accelerator**, established by the Technion on its campus, is designed to support would-be Technion entrepreneurs with good ideas

in bringing these ideas from the conceptual stage into reality. The accelerator provides support and advice on business plans, runs relevant courses, sponsors meetings and events with successful business leaders.

Significant Accomplishments – We have undertaken a substantial commitment to our Massive Online Open Courses (MOOCS) program and will be expanding our list of

offerings in Hebrew, English and Arabic. Our first course, initiated last year, in Arabic and English by Prof. Hossam Haick, continues to run successfully and, as detailed in the Academic Affairs section in this report, there are other MOOCs on the drawing board.

Our international cooperation agreements are broad and are expanding. In 2013 we signed a key agreement with France's l'Ecole Polytechnique. The 2014 agreement with Canada's University of Waterloo has led to important collaborations in water, nanotechnology and quantum computing. The utilization of resources during national crises is the theme of a collaboration this year with Northeastern University in the United States, with which we signed a research agreement in 2010. The Technion together with Weizmann Institute are negotiating an agreement with the University of Michigan on a three-way collaboration in several fields of research including secure software for medical devices, healthcare delivery systems and big data in health science; personalized/precision medicine and drug discovery; robotics and autonomous systems; protein folding in disease and aging; and quantum science, technology and engineering. These themes will continually evolve as transformational opportunities emerge.

Each year the Technion welcomes internationally renowned scientists and postdoctoral students from these and other universities in Europe, the United States, Australia and Asia with which we have signed collaborative agreements. These arrangements are mutually enriching and bring to the Technion much-needed international contact and enrichment.

VERA – I was recently selected to head VERA, the Forum of Heads of Israel's Universities. My agenda during my term will focus on improving research facilities and renewing the infrastructure of Israel's university campuses. It has been more than thirty years since there has been serious work done on most campuses and the government must be prepared to invest funds in campus renewal. This will require a change in government attitude towards funding of higher education, which currently relies heavily on philanthropy to survive.

In closing, this past year has been a tumultuous one. It began with last summer's war, which had a considerable impact on campus – a very large number of students were drafted,

some for extended periods. There was a general Technion-wide enlistment to provide for the soldiers when they returned – in studies, financial aid, mental-health support and in every other way needed. As always, the Technion cared for its student-soldiers when they returned and did much to enable them to return to normal functioning as soon as possible. This is in line with our duty to keep Israel strong and support those who defend the state against attack. However, our deep involvement with our soldiers does not in any way detract from our duty to encourage regional cooperation and share our innovations and accomplishments with our neighbors.

With all the dramatic developments which are currently affecting the Technion – from international campuses to on-line courses; from war to boycotts; from Haifa campus renewal to major shifts in curricula – keeping a steady hand on the direction and pace of progress is a vital priority. We must remain anchored in our local and national realities and contribute our part to Israel's eventual peaceful incorporation into our troubled region. Technion continues to play a vital role in Israel's efforts to bring progress, peace and prosperity to the Middle East and in our state's unique contributions to global development in technology, medicine, science and quality of life.

Technion Governance - 2015

Technion Management

Prof. Peretz Lavie - President

Prof. Moshe Sidi - Senior Executive Vice President

Prof. Gadi Schuster - Executive Vice President for Academic Affairs

Prof. Wayne Kaplan - Executive Vice President for Research

Mr. Matanyahu Englman - Executive Vice President and Director General

Prof. Boaz Golany - Vice President for External Relations and Resource Development

Prof. Paul Feigin – Vice President for Strategic Projects

Technion Deans

Prof. Yachin Cohen - Dean of Undergraduate Studies

Prof. Prof. Ben-Zion Levi - Dean of the Irwin and Joan Jacobs Graduate School

Prof. Moris Eisen - Dean of Students

Prof. Zeev Gross – Dean of the Unit for Continuing Education and Foreign Studies

Prof. Dan Zilberstein – Head of the Center for Pre-University Education

Deputies of the Executive Vice Presidents

Prof. Daniel Rittel - Deputy Senior Executive Vice President

Prof. Moshe Shpitalni - Deputy Executive Vice President for Academic Affairs

Prof. Noam Adir - Deputy Executive Vice President for Research

Prof. Reuven Cohen - Deputy Executive Vice President for Information Systems

Prof. Yaacov Mamane - Deputy Executive Vice President for Safety Affairs

Ms. Zehava Laniado - Deputy Director General, Operations

Ms. Dganit Shindelman - Deputy Director General, Finance

Mr. Ariel Hazan – Deputy Director General, Human Resources

Heads of the Academic Units

Prof. Yaakov Cohen - Faculty of Aerospace Engineering
Prof. Yehuda Kalay - Faculty of Architecture and Town Planning
Prof. Yehuda Assaraf - Faculty of Biology
Assoc. Prof. Amir Landesberg – Department of Biomedical Engineering
Prof. Yuval Shoham - Faculty of Biotechnology and Food Engineering
Prof. Raphael Semiat – Wolfson Faculty of Chemical Engineering
Prof. Alon Hoffman – Schulich Faculty of Chemistry
Prof. Oded Rabinovitch - Faculty of Civil and Environmental Engineering
Prof. Irad Yavneh - Faculty of Computer Science
Prof. Orit Hazzan - Department of Education in Science and Technology
Prof. Ariel Orda - Faculty of Electrical Engineering
Assoc. Prof. Efraim Lev - Department of Humanities and Arts
Prof. Avishai Mandelbaum – Davidson Faculty of Industrial Engineering and
Management
Prof. Eugen Rabkin - Faculty of Materials Science and Engineering
Prof. Eli Aljadeff - Faculty of Mathematics
Prof. Yoram Halevi - Faculty of Mechanical Engineering
Prof. Eliezer Shalev – Rappaport Faculty of Medicine
Prof. Noam Soker - Faculty of Physics

The Technion International School (TI)

Prof. Anat Rafaeli - Head of the Technion International School (TI)

The Jacobs Technion-Cornell Innovation Institute (JTCII)

Prof. Adam Schwartz - Director, Jacobs Technion-Cornell Innovation Institute (JTCII)

Academic Affairs

Professor Moshe Sidi, Senior Executive Vice President, continued to focus on a number of key projects and issues which are currently on the Technion's agenda, some of which have also been mentioned in other sections of this report.

Undergraduate Program Structure and Study Load

The present academic year marks the first formal implementation of the recommendations of the Committee on Program Structure and Study Load, aimed at enhancing the quality of learning at the Technion. The academic semesters were shortened from fourteen to thirteen weeks, to remove any overlap between study and examination periods. Accordingly, a major effort was undertaken by the faculties to adjust the courses to this change. This was done successfully in most cases, with some exceptions. In order to enhance the preparedness level of students entering the Technion in the basic mathematics and science subjects, we implemented formal requirements for achievement level in high school matriculation, or passing of a competency examination, in mathematics, physics and chemistry (the latter only for relevant students), before starting the studies of the relevant courses at the Technion. Internet-based courses in these subjects are offered in the framework of the Technion Center for Pre-University Education as preparation for the competency examinations.

Attention is now focused on evaluation of student achievements, with particular emphasis on validity, reliability and fairness of examinations. An evaluation unit has been set up in the Center for Promotion of Learning and Teaching, and activity is ongoing both on an individual basis with selected teachers as well as by workshops. More effort needs to be extended in the future. A comprehensive academic evaluation of the undergraduate studies program is now being carried out by many faculties. Some changes are already implemented in the present academic year, and this careful process will continue in coming years.

On July 8, 2014, Israel launched a military operation designated *Operation Protective Edge* (“Tzuk Eitan” in Hebrew), following rocket attacks from the Hamas-ruled Gaza Strip. Thereafter, over seven weeks of bombardment, rocket attacks and ground

fighting ensued. About 1,000 students were drafted into the reserves. Other students were also affected, having family or significant persons in service or in afflicted areas. Students serving in the reserves were provided with financial support (between \$500 and \$1000 per student) and academic assistance. This is an excellent opportunity to once more thank all our friends who contributed to the Reservist Fund from all over the world for their generous support. The decision process leading to the academic adjustments, involving the dean of undergraduate studies, student representatives and Technion management, was not an easy



Technion Student-Soldiers, Summer 2014

one and may be reassessed. Recommendations for better future preparedness will be deliberated.

Recently the Council of Higher Education (CHE) enforced new regulations starting from the next academic year. These regulations forbid the Technion to award its graduates dual degrees under the current study programs. This will require the adaptation of several of the dual-degree programs at the Technion to conform to the new regulations.

MOOCs (Massive Online Open Courses)

The development of MOOCs and MOOC-style courses has become part of the strategy of the Technion and is being managed by the Vice President for Strategic Projects. The objectives for the current year include the following:

1. Define online learning and the creation of MOOCs as a strategic goal of the Technion;
2. Establish a well-organized framework in the Technion for the development of online learning;
3. Expand the creation of MOOCs and MOOC-style courses to various fields representing the Technion;
4. Promote the development of MOOCs in Hebrew;
5. Harness MOOC activities in order to promote the Technion in China;
6. Encourage and support research in the field of innovative pedagogy through MOOCs.

The strategy involves deepening our partnership with Coursera (the educational technology company that works with universities to make some of their courses available online), further developing the resources of the Center for the Promotion of Learning and Teaching, setting guidelines with the Elyachar Library staff to address the resolution of potential copyright infringements, and investigating other resources for the production of high quality online courses.

With respect to Coursera, Technion has signed an updated service agreement which now provides for enhancing course content by providing crowd-sourced translations, the establishment of "private communities" for improved in-house use of MOOCs, the new "on-demand" format, and clarifications concerning the use of data for research on learning processes. A new cluster of two Coursera MOOCs by Prof. Shlomo Maital will teach about "Cracking the Creativity Code" and we are confident that it will be a very significant contribution to Technion's branding in the area of entrepreneurship. Another MOOC in the Aerospace Engineering field is in the development phase and will start by mid-2015. The flagship MOOC by Prof. Hossam Haick on nanotechnology and nanosensors is being

run for the third time, both in English and in Arabic. This course has served to attract top post-doctoral researchers to Prof. Haick's laboratory. Prof Miriam Barak represented Technion at the annual Coursera Partners' Conference in March which included a special session on “Reaching Chinese Learners”.

The Technion has agreed to participate, as a trial, in a new venture called “Shvilei Yeda” (Paths of Knowledge). “Shvilei Yeda” is an initiative of Prof. Yoav Shoham (Prof. of Computer Science from Stanford University), and is sponsored by the prime minister's office, the Planning and Budgeting Committee and the Israel Open University. The rationale is to create a common shared platform and facility for the development and management of online university courses in Hebrew and to enable cooperation between Israeli universities. “Shvilei Yeda” will provide high-level production services (technical team, graphics, film director, etc.) as well as a pedagogic advisor and the technological platform. The MOOCs produced will belong to the Technion, and their use by other universities will require appropriate Technion approval. The first pilot courses (2 or 3) are expected to be in the fields of computer science and chemistry.

According to a Coursera report, China is one of Coursera’s largest sources of learners (over 800,000 Chinese learners). This scale suggests that MOOCs can provide a relevant channel to promote awareness of the Technion in China – and indeed to thereby promote the Technion Guangdong project for establishing a Technion campus in China. We plan to exploit this avenue, with new courses and sub-titled courses directed to the Chinese student population.

The area of online education is also a research topic for the Department of Education in Science and Technology. The "Flipped Classroom" pilot by Prof. Danny Lewin of the Faculty of Chemical Engineering, represents an example of advanced innovation in pedagogy, and will be the subject of pedagogical research. In addition, two studies led by Prof. Miriam Barak of the Department of Education in Science and Technology examine the design, development, and delivery of MOOCs among culturally diverse populations of both English and Arabic speakers. The studies examine social and cultural aspects of online learning, focusing on students' knowledge acquisition, motivation to learn, and innovative thinking.

Department of Humanities and Arts and Enrichment Studies

Professor Efraim Lev, seconded from Haifa University, is successfully meeting the challenges as head of the department. In particular he is stewarding the introduction of new humanities courses, taught largely by Haifa University senior faculty, and which form the set of "enrichment courses" amongst which students must choose at least three courses (6 credit points) during their degrees. Based on the first two years' experience, both students and teachers have provided very positive feedback concerning this new mode of cooperation between the Technion and Haifa University. In fact, the Council of Higher Education (CHE), in its second round of calls for proposals on promoting enrichment programs, has endorsed this mode of cooperation by suggesting it as an option for other universities and colleges to adopt.

The Technion and Haifa University are working to develop a further set of courses for the enrichment program beyond the 45 approved so far. This year alone, 25 courses are being taught by scholars from the University of Haifa and over 30 new courses have been sent to the CHE for approval.

In addition, due to a huge demand by the students, about 20 of the humanities courses in the department have been upgraded, thus supplying a wider variety of enrichment courses to support the increasing demand. Moreover, thanks to the support of the Tikva Foundation, seven courses dealing mainly with Jewish culture and history and the State of Israel, have been added to the courses that the department offers Technion students. A further substantial donation has been pledged to the music section of this department, for instruments and equipment for both the orchestra and the jazz band. Purchases are being made for both music groups and students are feeling the benefits already.

International Review Committees

This year, two types of International Review Committees provided evaluations of six Technion faculties; two were initiated by the Technion (the Faculty of Biology and the NanoMed Program), and the other four by the CHE (the Faculty of Medicine, the Faculty of Computer Science, the Faculty of Materials Science and Engineering and the Department of Education in Science and Technology).

Faculty of Biology

The committee, headed by Prof. David Stern (Boyce Thompson Institute for Plant Research) convened in May 2014. The committee concluded that the faculty has “achieved dramatic increases in quality and visibility”, in the “context of the unique technological atmosphere at the Technion”. The committee recommends that, in addition to incremental hiring, the broader vision of a Faculty of Life Sciences and Bioengineering of about 120 principal investigators should be adopted. This new faculty would include the current Faculty of Biology, Biotechnology and Food Engineering and Biomedical Engineering. The committee also suggested that the number of graduate students should be increased with cross-disciplinary training, together with a reduction of time-consuming teaching work and related chores.

NanoMed Program

The committee, headed by Prof. Wolfgang Baumeister (Max Planck Institute of Biochemistry) convened in December 2014. Here too, the report underlines the unique and excellent cross-disciplinary nature of the program at Technion. To reach its full potential, the NanoMed program will need additional infrastructure and also will need to develop a strong leadership and a distinct scientific vision.

Faculty of Medicine

This CHE review committee convened in March 2014 under the leadership of Prof. Stephen Schoenbaum (The Josiah Macy Jr. Foundation).

The committee issued a 61 page report with detailed recommendations on the mission, organizational structure, study programs, faculty/personnel, students, teaching and learning outcomes, research, infrastructure and self-evaluation.

Faculty of Materials Science and Engineering

This CHE review committee convened in April 2014 under the leadership of Prof. Enrique J. Lavernia (University of California). At the time of writing this report, the committee has not yet submitted its evaluation and recommendations.

Faculty of Computer Science

This CHE review committee convened in May 2014 under the leadership of Prof. Maurice Herlihy (Brown University). The report praises the faculty highly. It also calls for the consideration of computer science as an experimental discipline rather than a purely theoretical one. The report acknowledges the excellence of the undergraduate program, but warns of the high stress and high attrition rate of students, together with a very long time to degree, as compared with other institutions.

Department of Education in Science and Technology

This CHE review committee of our program “**Science Education**” took place in December 2014 under the leadership of Prof. Sam Wineburg (Stanford University). At the time of writing this report, the committee has not yet submitted its evaluation and recommendations.

Programs for Ultra-Orthodox Students

A full report on these programs appears under the Center for Pre-University Education.

Equal Opportunities for Arab Students

The Assistant to the Senior Vice President for Promoting Minorities at the Technion continues advancing an intervention program among minority students at the Technion aimed at decreasing drop-out rates and enhancing academic excellence. The CHE continues supporting and funding our program. Moreover, we launched a new program for promoting excellence among minority students. The program was designed with the extensive participation of minority students in order to address their specific academic and social needs. The program includes specific seminars and workshops to enhance life and

academic skills as well as empowerment and communication. In order to promote employment among Arab graduates, the Assistant to the Senior VP for Minority Affairs conducted a study among Technion Arab graduates in order to examine their employment status and conditions. Moreover, some meetings with key figures in the industry and the government were conducted in order to promote employment among Technion minority graduates.

Pre-Academic Studies and Youth Division

The Unit for Pre-Academic Studies is responsible for the preparation of students to study at the Technion. It offers many different programs such as Ofakim for High Technology that supports potential students from the periphery, the ultra-Orthodox programs, the Atidim and Atidim for industry, the Kidma program for female students before the army, Na'am for minorities and more.

The unit also includes the youth division which carries out a wide variety of annual activities whose goal is academic excellence in the areas of science and technology. The students enrolled in the various programs seek to continue in the study of engineering and the unit exposes high school pupils to an enriched program in the area of science and technology.

For more details, please see the pre-academic unit chapter in this report.

The Irwin and Joan Jacobs Graduate School

During the last Board of Governors meeting, the Dean of the Graduate School, Ben-Zion Levi, reiterated the main goal of the graduate school development plan: "Strengthen the Technion as a Leading Research University": the derived action plan - increasing the volume of research students at the Technion in general, and Ph.D. students in particular. The latter comprise only eight percent of the total student body (undergrad and grad students), a percentage which is by far lower than leading universities in the United States. To accomplish this, several measures are being either implemented or explored: i) The graduate school guidelines were changed to encourage more M.Sc. with thesis students to

switch to the direct Ph.D. track; ii) Active encouragement of the academic units to increase the value of fellowships, i.e. from 4 portions to 5 for M.Sc. students and from 5 portions to 6 for Ph.D. students; iii) Offer new interdisciplinary study programs; iv) New marketing approach to be implemented offering a comprehensive package to graduate students that includes generous fellowships, housing, on-campus kindergarten classes and help in job opportunities for spouses; v) Actions towards intensive recruitment of international students – graduate study program to be taught in English.

For more details, please see the graduate school chapter in this report.

Natural Gas and Petroleum Engineering

In 2012 GTEP (Nancy and Stephen Grand Technion Energy Program), together with The Wolfson Department of Chemical Engineering, launched a unique M.E. graduate study program in natural gas and petroleum engineering. This program continues to expand. The first cohort of 20 students graduated in 2013; two students graduated Cum Laude and one graduated Summa Cum Laude. The second cohort of 17 students completed their final projects in November 2014; and in October 2014, the third class opened with 13 students. The response of both students and guest lecturers has been very positive – so much so that three graduates have received invitations to pursue Ph.D. studies in Houston and one in the University of Stavanger in Norway. Six graduates are employed by the gas companies; two are studying towards their Ph.D. degrees at Texas A&M University in Houston with scholarships from the Ministry of Energy and Water; others are employed in the refineries, electric company, engineering companies, private consultancies and others. Overall, 13 students won scholarships from the Ministry of Energy and Water Resources. A team of four students from the second class won third place at the international EAGE challenge at the 76th EAGE (European Association of Geoscientists and Engineers) conference and exhibition 2014, in Amsterdam. This was the largest conference worldwide in geoscience. The program places the Technion in a position to develop both technical and research capabilities in this important industry for the future of the State.

Off-Budget and Off-Campus Programs

The Technion, as part of its mission to maintain the skills of graduates through *life-long-learning*, offers a variety of non-thesis master's degree programs in Tel Aviv: Master of

Engineering (ME) in several areas, Master of Real Estate (MRE), Master of Industrial Design (MID) and Master in Business Administration (MBA). These programs were designed for professionals from industry, are taught part-time (condensed into 2 days/week), usually for two years, and include a 5-credit final project (out of a total of 40 credits). Except for the MBA, all other programs are budgeted by the PBC (Planning and Budgeting Committee) and taught in Tel Aviv as well as in Haifa's main campus. Teaching in the Tel-Aviv area is important for making the programs accessible to the very large number of engineers, architects and science graduates who live and work there. This outreach provides an immeasurable service to Israeli industry, as well as to Israel's Department of Defense – saving many person-years of work and travel. The Division for Continuing and External Studies moved in July 2014 to the Technion - Azrieli Sarona Campus in central Tel Aviv. This 19th century campus with its unique atmosphere has already encouraged a large increase in enrollment and interest by prospective students.

Apart from being taught also in Tel Aviv, all programs are managed by the Technion's Irwin and Joan Jacobs Graduate School exactly like any other master's degree program, and admissions and student progress strictly follow graduate school regulations.

Two programs are not budgeted by PBC: the M.B.A. program in Tel Aviv and the New StartUp M.B.A. that is taught full time, in English, also in Tel Aviv. However, in all academic aspects these programs are run by the Division of Continuing Education and External Studies and by the graduate school in the same manner as the budgeted programs. There is no difference in the admission standards, the required grades and averages and the degree requirements.

The Technion International School (TI)

The Technion International (TI) was established in October 2012 in a merger of the Technion International School and the Office of International Academic Relations. Professor Anat Rafaeli replaced Professor Arnon Bentur as the Head of Technion International in January 2014. TI handles the development, management and marketing of multiple programs in which international students are hosted by Technion. TI also manages academic agreements between Technion and international universities and Technion membership in multi-university and multi-country umbrella organizations. In 2014

Technion International also became highly instrumental in the development of the Technion Guangdong program.

The goal of Technion International is to attract international students to Technion and also to offer Israeli students an opportunity to study in English alongside international students, promoting Technion's multicultural and global nature. The original TI vision was of programs and courses in English identical to programs and classes routinely taught in Hebrew, to be offered in English at Technion. The first such program - a full undergraduate program in civil engineering - is currently in its sixth year, and includes 93 students. The curriculum of this program served as the foundation of the chemical and environmental engineering degree to be offered in the Technion Guangdong program.

TI is now building a transfer track that will allow international students who start their studies at Technion International to transfer to one of the regular Hebrew programs of Technion. Students can study a set of required credits (in English or Russian) while also studying Hebrew, and then transfer to one of the Technion faculties. In addition, Technion International offers several summer programs in English: A Summer School of Engineering and Science, offering academic courses in various faculties, and a summer school in entrepreneurship and innovation. As of October 2014, Technion International also took responsibility for the (non-academic) support of postdoctoral scholars at Technion, joining forces with the Vice President for Academic Affairs. The goal of all involved is to increase the number of international postdocs at Technion.

TI supports and assists the international post docs themselves, their families and their hosting Technion faculty members. Through TI, Technion currently maintains academic collaboration agreements with 210 universities in 38 countries, including both university-wide agreements (enabling student exchange and other forms of collaboration with any of the Technion faculties and departments), and also faculty-specific agreements. TI also maintains agreements with umbrella organizations, such as CLUSTER (Consortium of Leading Universities of Science and Technology), GE3 (Global Engineering Educational Exchange), and CMU (Community of Mediterranean Universities). Agreements with universities in China, India, Korea, Singapore, Taiwan and Thailand offer fellowships to encourage academic visitors from these countries.

For several years TI has been a hub of multi-university programs sponsored by the European Union and by the Israeli government. TI hosted over 200 students from China and India, using funding acquired from the Planning and Budgeting Committee (PBC) of the Israel Council for Higher Education (CHE). In collaborative efforts with 88 universities



Technion International Students

from 46 countries, TI participated in three EU academic programs: the ECOMMIS project focused on the teaching of electronic commerce; the SYSERMO project focused on the teaching of space system engineering; the EMAIL III Erasmus Mundus Program provided funding for student and researcher mobility.

In 2013/14 (the last academic year for which complete data is available), Technion hosted a total of 519 international students, including 22 full-time undergraduate and 100 full-time graduate students studying in regular Hebrew programs, 118 students in full-time TI

programs (B.Sc. in English and first year in Russian), 149 study-abroad students and visiting research students and 130 post-docs.

TI also strives to enrich the global experience of Technion students. The outgoing student-exchange program allows excellent undergraduate students to spend a semester abroad in one of the Technion partner universities. In 2013/14, fifty Technion students spent a semester in one of our partner universities in Europe, North America, South America, Australia and Asia; additional students participated in special summer programs offered by partner universities. In addition, five students visited China to study Chinese and 65 Technion students participated in the IAESTE summer internship program, which allows students to spend a summer working in another country.

Technion International also supports initiatives allowing joint projects with partner universities. A successful collaboration continued in 2013/14, connecting students and faculty members interested in bio-technology from Technion, University of Technology Sydney, KAIST in Korea and Stanford University. In this program students and faculty meet in one of the partner locations for an intensive course in bio-tech entrepreneurship.

Technion International continues to seek new venues; a new initiative offers English classes of entrepreneurship to international high school and college students; 54 students recently visited Technion to take these courses. A second new initiative is "study tours," which allow groups of students from a specific university or high school to visit Technion for short visits ranging from 1 day to 11 days. Over 100 students already visited Technion for such tours, and approximately 200 students are scheduled to visit in the coming months. A third initiative entails promoting Technion as a location for study abroad of students from the United States. With the generous support of the Neubauer family, the Neubauer American Study Abroad Semester program will allow TI to increase the number of courses taught in English at Technion; in the future, courses will be offered in engineering, sciences, medicine and entrepreneurship. Full-time Technion students will be encouraged to take these courses along with students from American universities visiting the Technion. To promote the Neubauer program TI increased its presence in leading American universities, such as Johns Hopkins University, Brandeis University, Tufts, Cornell, Columbia and the University of Florida.

The Jacobs Technion-Cornell Innovation Institute (JTCI)

The Joan and Irwin Jacobs Technion-Cornell Institute is a key component of Cornell Tech. The unique part of its mission, as approved by the Technion Board of Governors (in 2014) is to be a sandbox for experimentation, thus leading innovation at Cornell Tech, and to drive the partnership between Cornell and Technion - this, in addition to taking part in the education activities of Cornell Tech.

The Jacobs Institute offers two interdisciplinary dual-degree programs leading to a Master of Information Systems. A dozen students started the program in August 2014 - twice our target - in the connective media hub, and we are currently recruiting for the second cohort of this hub, as well as for the hub in health technology (called Healthier Life), both to commence in August.

The Jacobs Institute created a unique "startup postdoc" program, which allows aspiring entrepreneurs to convert deep technology into impact on the world - possibly through commercialization. Six candidates were accepted to the program in January 2014. They receive an extensive education and support infrastructure - in a gradual transition from education to business, and a one - or two - year program. Of those six, one now has a viable company, one moved to an accelerator, the other four incorporated companies and three of those raised initial funding. The second cohort joined in August, and one of them has already raised funding.

The Jacobs Institute is first and foremost an academic organization: to establish our leadership we recruit top faculty. In the last year we recruited three candidates - one a senior leader, the other a young promising candidate. Two are affiliated with the Technion - and are a welcome addition to the Cornell - affiliated faculty members at Jacobs, bringing the total number of tenure track faculty to four. We also have four Visiting Professors from Technion, in addition to shorter term visitors, postdocs and Ph.D. students (registered at Cornell). Hiring for this year is in process and our goal is to hire two new faculty members every year for the foreseeable future.

A "Future of Money" workshop was organized by Prof. Ari Juels, of the Jacobs Institute, in November. The workshop was held at Cornell Tech, and brought together academic

researchers from Jacobs, Cornell Tech, Cornell and Technion, as well as from other universities, and industry experts. Collaboration between Cornell and Technion in the area of security was initiated and continues, with support from the Jacobs Institute.

The Jacobs Institute initiated a number of innovative grants in order to drive collaboration between Cornell and Technion, with special emphasis on relations with Jacobs and Cornell Tech researchers. To date we have a couple of dozen such collaborations, and we intend to continue and facilitate such activities. Additional mechanisms are also contemplated. Recently Cornell and Technion signed a Memorandum of Understanding and student exchange agreements, which include the three most relevant Colleges at Cornell - Engineering, Computing and Information Sciences, and the new Cornell Tech campus. This is complemented by a Technion process to allow the supervision of Technion graduate students by Jacobs' faculty.

The Jacobs advisory council holds regular meetings - three to four per year, in which key activities are discussed. The Board of Directors meets quarterly to provide oversight and guidance. At the invitation of Technion Senior Vice President (a member of the board ex officio), the board convened at the Technion in February 2015. In addition to the meeting of the board, members held a number of meetings at the Technion with senior management as well as with several relevant deans. In addition to exclusive Jacobs' business, the meeting resulted in a stepped up effort to create a synergy between Cornell and Technion. This attempt, which has been initiated mostly at the Jacobs Institute, is unprecedented and could have significant impact.

Relationships with industry are based on a new model of collaboration, seeking to treat industry as equal partners, contributing not only resources but also expertise. Prof. Mor Naaman of the Jacobs Institute led the first such relationship in Cornell Tech, through an agreement between Jacobs and AOL. In addition to substantial funding for a group at Cornell Tech as well as a group at Technion, the collaboration includes joint work with AOL research and development personnel, located in New York City and Tel Aviv respectively.

The Jacobs Institute has completed its branding process, is developing management and administrative procedures, and continues to work closely with management and faculty from Cornell and Technion, in order to fulfill its promise.

The New Curriculum in Architecture

Background

Over the past seven years, two evaluation committees, one convened by the Technion in 2008, the other by CHE in 2009, evaluated the architecture program at the Faculty of Architecture and Town Planning. Both recommended that the curriculum, which was first established in the 1960s, be extensively updated and made commensurate with the changes and opportunities that have affected the profession of architecture and the world over the intervening years.

Following these recommendations, the faculty established an in-house committee, headed by Associate Professor Itzik Hirsch, which concluded that the incremental changes made to-date could no longer sustain the program, and wholesale revision of the curriculum was needed. A new dean, Professor Yehuda Kalay, was appointed in 2010, and tasked with the job. Professor Kalay appointed a task force, headed by Visiting Professor Shamay Assif, to make recommendations for a revised curriculum.

As a first step, the task force drafted a Vision Statement, which was formally endorsed by the Faculty. The task force proceeded to consult with faculty, students, alumni and leading professionals in Israel, to analyze similar programs around the world, and to establish the principles for an architecture curriculum fit for the 21st century at the Technion. Included in this effort was a workshop, convened in 2012, where architectural educators from leading programs around the world were invited to present and discuss their programs. These included chairs and former chairs of architecture programs from Harvard, University of Pennsylvania, the Technical University of Delft in the Netherlands and the Catholic University of Leuven, in Belgium. The workshop was followed by an open symposium, with participation of all heads of the architecture programs in Israel, as well as the chair of the Israeli Architects Association (the leading professional body).

The workshop and symposium yielded the principles on which a comprehensive new curriculum could be built. These were debated by the faculty of the architecture program, which established four dedicated task forces to develop the major components of the program. The program as a whole was completed and endorsed by the faculty, the appropriate Technion committees, by the Senate Standing Committee and by the Technion's Board of Governors. The program was approved by the Registrar of Engineers and Architects (the licensing authority for architects), and the CHE.

Principles

The main conclusion of the preparatory work was the need to clearly distinguish between the disciplinary and the professional aspects of the curriculum. This distinction stems from the very nature of architecture, which—much like medicine—is both a discipline (a way of thinking) and a profession (a way of doing). Heretofore, the two were connected, leading to the 5-year undergraduate professional degree of B.Arch, as is common in other schools of architecture in Israel. The differentiation, which is common practice in schools of architecture both in Europe and in the United States, allows deeper development of both disciplinary architectural knowledge, and better preparation of practicing architects. In addition, the differentiation builds upon and accentuates the traditional strengths of the architecture program at the Technion, where more than 80 percent of the faculty hold professional (B.Arch or M.Arch) degrees, as well as research (Ph.D.) degrees—a ratio unparalleled even in the best architecture schools in the world.

The New Program

The new curriculum thus forged is composed of two parts:

- A 4-year undergraduate program, leading to the (non-professional) degree of *Bachelor of Architectural Studies*.
- A 2-year graduate program, leading to the (professionally accredited) degree of *Master of Architecture and Town Planning*.

The first degree introduces students to the discipline of architecture, through a structured 'core' curriculum in the first two years, and to the breadth of the discipline through

'themes' and allied topics, in the second two years. It thus builds a strong foundation for the following professional program, for those students who wish to continue their studies and become practicing architects. It also provides a broad-based education in spatial design for those students who choose not to continue their studies in architecture.

Those students who wish to continue, and are deemed qualified, will enroll in the two-year graduate professional program. There they will be introduced to the practice of architecture through a structured sequence of courses which include a year-long final project.

Benefits

In addition to the major benefits listed above, the new curriculum addresses all the criticism leveled against the old curriculum:

- It provides a more comprehensive education, both disciplinary and professional.
- It affords the student more freedom of choice, as befitting an academic program. For example, students who wish to deepen their understanding of energy-efficient buildings can choose to take more courses in that track, whereas those who wish to focus on digital technologies can take additional courses in that track (currently, we offer emphasis in five tracks, with the intent to add more as we recruit additional faculty members).
- The content of most courses was examined and updated.
- New courses were added where needed.
- The study load has been evened-out across the program.
- The program and the degrees it awards are now commensurate with those awarded by leading schools in Europe and the United States, (i.e., they are master's degree programs), thus making it possible for graduates to cross-train abroad and in Israel.
- Students who wish to, and are capable, may finish their studies towards the M.Arch degree in five years, rather than six.

Overall, we believe the new curriculum (program) in architecture will serve the students, the faculty, the Technion, the profession of architecture and the society better than the old program could in the 21st century, whose challenges and opportunities differ markedly from those faced by the school in the 1960s, when the old curriculum was developed.

Training High School STEM Teachers – The MABATIM Program

Since 2011, in an unprecedented move designed to train a new and talented cohort of science and technology teachers, the Technion's Department of Education in Science and Technology is offering the MABATIM (Views) program. MABATIM is a tuition-free program, over two years, part-time, for former graduates of the Technion who wish to obtain an additional B.Sc. degree in Science and Technology Education. This training includes the requirements for obtaining a high school teaching certificate. The response continues to be overwhelming in the program's third and fourth years – with about 330 Technion graduates enrolling over the first eight semesters. This influx has the potential to significantly improve STEM education in Israeli. MABATIM is only one initiative that the Technion promotes to solve the lack of qualified science and technology high-school teachers.

Changing the Program of Medical Studies

The Faculty of Medicine decided to change the program of medical studies in order to address the following points:

1. to adapt medical studies to the modern medical arena and challenges.
2. to capitalize on the Technion's advantages in the areas of engineering and exact sciences in the education of future M.D.s.
3. to spark curiosity for research in medical students and increase the number of Ph.D. and M.D./Ph.D. students in the research conducted in the Faculty of Medicine.
4. to improve the selection process, both for the faculty and the students, for becoming physicians or scientists.

Accordingly, after careful evaluation, a new program path and curriculum has been created, and will start in full during the 2015-2016 academic year. In the new curriculum, courses have been added to emphasize areas of exact sciences (such as two integrative courses in analysis of signals and processes in medicine, which will be taught by members of the faculty of medicine and will be adapted to the area of medicine), industrial engineering and management (two new courses in decision-making and project planning and management,

which will be specifically geared to the area of medicine), as well as expanding basic and molecular biology (four new courses in molecular biology, molecular basis of cancer, developmental biology and evolution). All these are in addition to the refreshing and modifying of syllabi in all other courses. We believe that the content of this new program facilitates a unique medical program that will educate a new generation of physicians with broad knowledge and understanding of modern technology and basic sciences, with a drive for carrying out research and an ability to face the challenges posed by the modern medical arena.

The total length of the program is six years: three years pre-clinical and three years clinical. The pre-clinical studies contain two major tracks - medical and scientific. The first two years are identical for both tracks. Students will be accepted to the medical track from two possible routes: 1) those with exceptional cognitive and non-cognitive grades will be accepted from the first year, or 2) those who started in the scientific track and obtained best academic achievements during the first two years. All students accepted to the medical track (from year one and after year two) will continue with medical studies in the medical track to complete year three and go on to the clinical part of the program. Students in the scientific track will be offered a research-oriented third year in terms of dedicated courses and opportunities for fast track graduate studies, including a direct Ph.D. track. In addition, the M.D./Ph.D. track will be enhanced dramatically, as it is our conviction that this is the most relevant track for future academic medicine.

International Genetically Engineered Machine (iGem) - Undergraduate Competition

In 2014 the Technion competed for the second time in the iGEM jamboree. iGEM is the leading undergraduate competition in bioengineering, synthetic and quantitative biology, and has become a new paradigm for cross-cultural multi-university undergraduate research and education. In 2014 iGEM celebrated its 10th year anniversary, and as a result a giant jamboree was conducted in Boston, MA during the last week of October. Two hundred and fifty teams from universities world-wide participated in the competition, and the Israeli

delegation included the Technion and BGU teams. In brief, iGEM requires a group of undergraduate students to devise a synthetic and quantitative biology project, execute it in the lab, and conduct social outreach to examine ethical issues that arise from synthetic biology and to educate the general public. Projects often involve experimental aspects, a theoretical/modeling element, and a software development sub-project.

Our team included 11 students from four different faculties (eight from biotechnology and food engineering, one from chemical engineering and chemistry, one from physics and one from the excellence program). The multidisciplinary team chose a challenging project of trying to engineer bacteria to detect allergens or other contaminants at really low level. Their solution brought to light their respective and orthogonal backgrounds. The basic idea relied on tethering to the bacterial membrane a molecule called azobenzene (produced in-house) which changes conformations in response to certain visible wavelengths. The transition induced by light causes the bacteria to become sticky and to form synthetic multicellular biofilm structures. To make this happen the group engineered a genetic circuit that will produce that light within bacteria if the allergen contaminant was detected. Thus detection by a single bacteria can start a cascade biochemical reaction, which will lead to a formation of a biofilm that is detectable to the naked eye. As a result the project has the potential to form a cheap and affordable solution that can be used in households routinely.

During the past summer the group made substantial progress in proving that their concept can work, by showing, using both models and experiments, that azobenzene can induce biofilm formation using light as input. Substantial progress was also made on the genetic circuit, but it was not completed. The group received many accolades and praises from judges during the competition, and won a gold medal. It is my belief that with a successful circuit, the group would have been a strong candidate for one of the grand prize awards.

AUVSI Annual Competition

A joint team of students from the Faculties of Aerospace Engineering (AE) and Computer Science under the supervision of Mr. Dror Artzi, an adjunct senior teaching fellow from Aerospace Engineering, has developed within nine months a complete autonomous airborne system. The team participated in the annual competition, organized by the

Association for Unmanned Vehicle Systems International (AUVSI) that took place in Webster Field, MD on June 2014, and won 5th place out of 48. The airborne system is capable of carrying out reconnaissance missions, targets acquisition, communication and dropping payloads on ground targets, all completely autonomously. The development work included aerodynamic configuration and building of a full-scale wooden model airplane in the AE faculty workshop. The airplane accumulated many flight hours through which all the system's components (photographing, computing, communications etc.) were tested. The full design and analysis were performed and presented by the students of the two faculties in a Preliminary Design Review (PDR). The Technion team surprised the other contestants and the judges by ranking so high in its first participation in the competition. The team demonstrated the high academic level of the Technion's future graduates, and once again showed Israel's abilities in developing combined systems and unmanned aircrafts.

iPodia – Principles and Application of Global Innovation as Part of iPodia Alliance via Viterbi iPodia Program

The 2015 participants are 20 Technion students in advanced semesters, whose GPA is 80 and above, who are from the Faculties of Electrical Engineering, Computer Science, Mechanical Engineering, Civil and Environmental Engineering, Physics and Industrial Engineering and Management. The course structure consist of six on-line lectures to which the students listen on their own, and respond to on-line quizzes and exercises, and eight class meetings, using audio-visual equipment which makes it possible to study synchronically with 20 students from the University of Southern California, Los Angeles, (USC) and 20 students from BITS - The Birla Institute of Technology and Science, India. The students are assigned to six-person work groups, two students from each institution, to work together on joint projects. In parallel to consortium A, in which Technion students participate, there is a second consortium of students from USC, Korea and China. At the end of the course, all students meet face-to-face in Tsinghua University, China, for one to two weeks of a joint learning experience. The Technion students get a subsidy from the Technion to attend for one week. This is the third year that the Technion is participating in the iPodia program.

iPodia Alliance via USC Viterbi iPodia Program

The iPodia Alliance via USC Viterbi iPodia Program (www.ipodiallaince.org) is an independent global consortium among leading universities, which aims to promote the iPodia pedagogy and establish a "classrooms-without-borders" paradigm for 21st century higher education. iPodia's principles of: *Innovation, International and Inverse learning (listening to lectures at home and coming to class for discussions and cross fertilization)* enable students to learn together across disciplinary, physical, institutional and cultural boundaries, to develop innovative products and systems and to harness the class diversity to enhance innovation of new products and systems. As MOOCs (massively open online courses) moves classroom lectures from campuses to the Cloud, iPodia moves student interactions from the Cloud to classrooms on campus.

Center for the Promotion of Learning and Teaching (CPT)

The CPT mission aims to support and promote the Technion's commitment to excellence in teaching and learning, to promote a cultural shift to student-centered learning and to encourage and support educational innovations which will improve instruction and advance student learning. There are several new or ongoing projects in progress, among them:

Learning and Teaching Activities: Each year, the CPT provides workshops for new staff (~25/year) and new Teaching Assistants (TAs) (~300/year), individual consultation including class observation for TA's and staff (especially for those who score lower than 3.5 on their teaching survey), faculty-tailored workshops on teaching and learning (3-4/year) and workshops for expert TA's (6/year) to increase the involvement of students in the tutorial and change the format of the traditional tutorials to active tutorials.

Evaluation and Exam Center: One of the main thrusts on activity is the Exam Center, which aims at improving the alignment between teaching and evaluation, especially focusing on large core courses, with special emphasis on first-year service courses. The current capacity is adequate to support 10-15 courses per semester. Teaching objectives are defined in terms of desired course outcomes, and these are subsequently used to formulate exams designed to better match student evaluation with the level at which the

course was taught. The center designed assessment tools to support the process. Results indicate that the courses in which most, if not all, of the features of this matching approach were implemented scored higher, both in the exam performance of the students, and also in their degree of satisfaction with the evaluation procedure. The center implemented new technology for exam scrambling, exam grading and statistical analysis of exam result (120 multiple choice exams/semester). The center provided workshops for faculties (9/year) and TA's, addressing issues such as syllabus design, formulation of learning outcomes and test design. The center promotes the use of alternative assessment by providing help in designing and implementing rubrics for the evaluation of studio projects in the Faculty of Architecture and for the evaluation of lab performance and reports in the Faculty of Physics.

Educational Technology Support: The CPT provides assistance to support the design and the management of Moodle websites for 2,500 courses, as well as the development and integration of online and hybrid courses for Technion undergraduate, GTIIT and Coursera courses. Support is provided for active learning and peer instruction with clickers (~20 – 25 courses/year). The CPT is also responsible for the production of video clips for regular courses (~20/year) and for courses intended for GTIIT and Coursera (~8 courses to date).

Educational Innovations: A one-day event was organized to spotlight novel approaches in teaching at the Technion. Talks were given on several exciting new approaches, including a report on the impact of massive online courses (MOOCs), including the on-line courses now being offered to pre-freshmen on chemistry and calculus, and on “flipping the classroom,” which is at the forefront of new teaching initiatives on campus. A pilot flipped course was run this year successfully to replace the conventional capstone design course at the Faculty of Chemical Engineering, in which students covered specially-prepared lecture material in interactive format at home, and then came to class to participate in open-ended problem-solving activities. The student performance in the final exam was significantly improved. We will be offering workshops and technical support to actively encourage lecturers to flip!

Teaching Materials on Engineering Ethics: The center has been developing generic course materials to enable engineering faculties to incorporate the teaching of ethics within

the framework of existing engineering design courses. Elements of these materials were successfully class-tested as part of the flipped experiment at chemical engineering, and were very well received by the students. We continue to work on generalizing these materials to enable a comprehensive package to be offered within the next year to other engineering faculties.

Mentor Program: Following on the success of the mentor program in support of minorities that has been running at the Technion very successfully for many years, this year we expanded the pilot program that has run in biotechnology for two years to a more comprehensive pilot involving five faculties (computer science, biotechnology, chemical engineering, bio-medical engineering and physics). The effort, which involved 60 mentors, provided assistance in the form of campus information, study tips and a shoulder to lean on from a “big-brother /big-sister” to some 350 freshman students (about 15 percent of the total annual intake). Good initial responses were reported, and we plan to continue to expand this very successful program next year to additional faculties.

Faculty Recruitment

Recruiting and retaining excellent young faculty members remains one of the most important issues the Technion is facing. During recent Board of Governors meetings, the Executive Vice President for Academic Affairs reported on the efforts to facilitate the recruitment process and to make it possible for the Technion to enlist the best faculty.

The faculties are using wide-spread advertising and proactive recruitment. The Technion has made several post-doctoral fellowships available to excellent candidates, who will be the future recruitments as faculty members. Accordingly, an agreement with MIT has been signed, in which six post-docs in engineering and sciences from Technion will be funded every year for the next ten years, and they will then be recruited as faculty members (if they excel in their post-doctorate studies). The Technion participated in very successful career fairs in the last five years in the Boston area, where several excellent candidates were identified. The Technion has established several interdisciplinary programs, some of them in the framework of ICore, which will be supported by VATAT. In some cases, the Technion provided significant help in identifying employment alternatives for spouses.

With the help of special programs such as nanotechnology, life sciences, autonomous systems and energy programs, the number of faculty members that are recruited could be increased. The government of Israel has begun implementing a long-term policy which will provide significant additional resources to the Technion, thus allowing an increase in the number of excellent young faculty members we could recruit. In addition, we continue developing new fundraising programs such as the Career Advancement Chair, and we have renewed the Leaders in Science and Technology program which allows us to recruit additional excellent faculty members and repeat the trend of recent years, of increasing the number of faculty to around 600 over the next five years. In fact, during the last academic year we recruited more than 30 new faculty and during the current academic year, we continue our success by recruiting a similar number without compromising the quality of the new recruits. We plan to continue recruiting about 25-30 new faculty each year over the next five years.

A very positive aspect in the recruitments of the past few years, this year included, is the excellent crop of brilliant young faculty members who joined us, even though most of them had attractive offers from other universities or industry, abroad and in Israel. It took significant efforts on behalf of faculty deans and Technion management, as well as substantial resources, to attract them to the Technion. *The Leaders in Science and Technology Program*, initiated and supported by the late Mr. Henry Taub, and the *Shillman Career Advancement Chair*, *Chaya Career Advancement Chair*, *Andro Deloro Career Advancement Chair*, *Leona Chanin Career Advancement Chair*, *Shalon Career Advancement Chair*, *David and Inez Myers Career Development Chair in Life Science*, *Career Advancement Chair in Economy and Finance*, *Ravitz Foundation Career Advancement Chair*, *Jacques Lewiner Career Advancement Chair*, *Women Division Career Advancement Chair* and *The Young Investigators Fund for Innovative Collaborative Multidisciplinary Biomedical Engineering Research* played an important role in making this a reality.

The brilliance of our young faculty members is apparent by the fact that each year, several of them are awarded various prizes and distinctions, including the prestigious Allon Fellowship. In 2014, one of our new faculty members won this Fellowship, Assistant Prof.

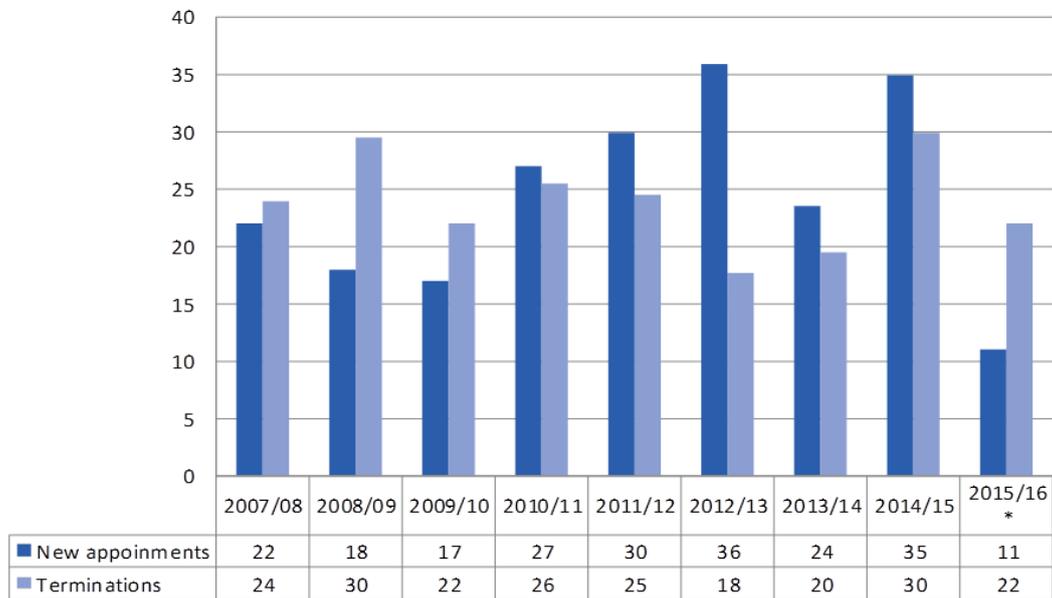
Alex Hayat from the Faculty of Electrical Engineering, and we just learned that in 2015 three of our young recruits won the prize: Matthew Suss from the Faculty of Mechanical Engineering, Yaron Fuchs from the Faculty of Biology, and Reut Shalgi from the Faculty of Medicine.

Our *Leaders in Science and Technology Program* and the Career Advancement Chairs have been assisting us in recruiting 4-6 new faculty members a year since 2002, enabling the recruitment of outstanding young faculty members and providing them with the required support, infrastructure and equipment.

This year, two of our young faculty, **Assistant Prof. Moran Bercovici** from the Faculty of Mechanical Engineering and **Assistant Prof. Uri Shapira** from the Faculty of Mathematics, were awarded the prestigious national Krill Prize, which is supported by the Wolf Foundation. This prize is for excellence in scientific research of young faculty, before they receive tenure.

In addition to the young faculty who were recruited to the Technion at the start of their academic career, one senior scientist transferred to the Technion and was recruited within the framework of our mission to enlist senior, established scientists, in addition to new and young faculty members. **Prof. Eyal Gottlieb** from Cancer Research UK at Glasgow will join the Faculty of Medicine. Prof. Gottlieb is a distinguished world-class scientist in the research of metabolism of cancer cells. He will join the new established Cancer Research Institute in the Faculty of Medicine, headed by Distinguished Prof. Aaron Ciechanover.

New Appointments vs. Retirements & Departures

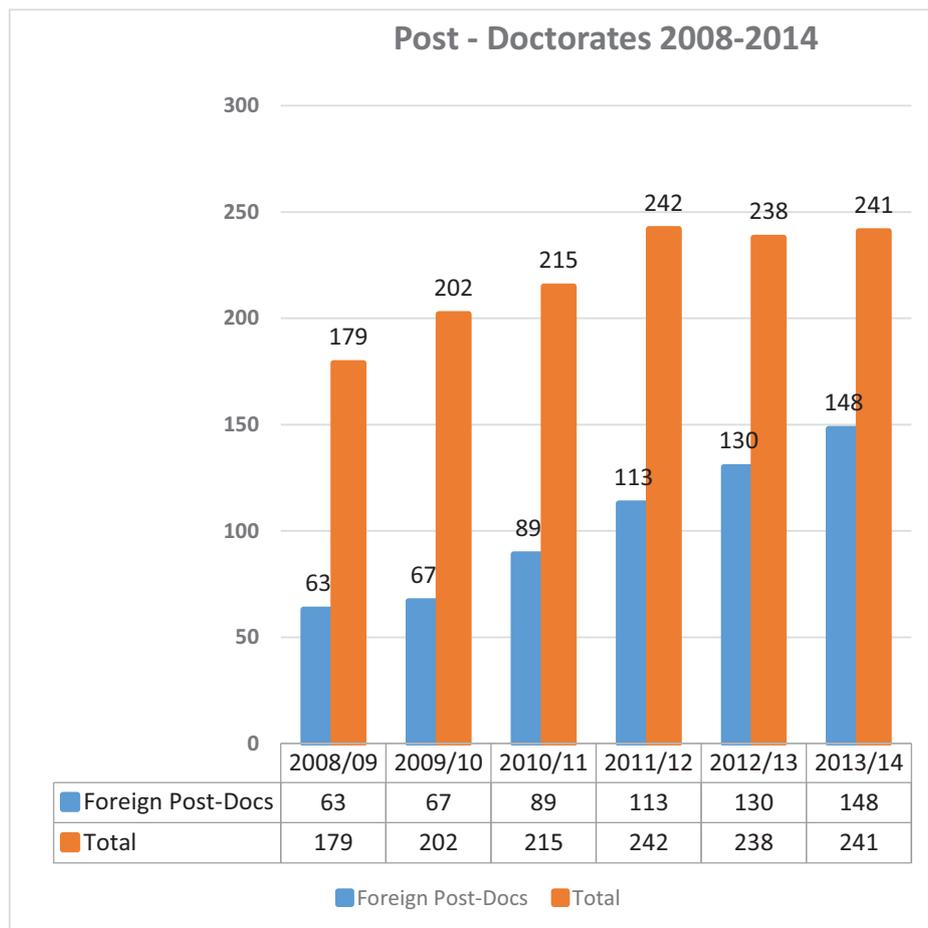


* updated to May 2015

The retirement of faculty members provides us with the opportunity to bring to the Technion the most brilliant and innovative minds. However, we have to be in a position to offer them an attractive "package". The Technion is facing tough competition, both domestically and internationally, in terms of faculty recruitment. In order for the most brilliant and innovative minds to join the Technion, we literally have to "make an offer they can't refuse". In fact, my approach in this matter is very hands-on. If I find a suitable candidate whom I wish to recruit to the Technion, I believe that a personal approach is warranted. I will travel to wherever the candidate is and persuade him or her to join the Technion. This illustrates my conviction that it should be of the utmost priority to the Technion and I will pursue it diligently. Other steps we have taken to help in recruitment include making offers of higher starting academic ranks, sometimes with tenure, attractive start-up packages, establishing laboratories prior to the arrival of the new faculty member, encouraging our faculties to be more proactive and involved in the recruiting process, allowing new recruits a reduced teaching and administrative load for the first two years, providing each new recruited faculty member with a Technion mentor, and helping with the transition process of new faculty members and their families (i.e., offering them on-

campus housing at the *Stanley Shalom Zielony Graduate Student Village* for a certain period, to facilitate and ease their transfer).

Our recruitment efforts are extremely focused and planned, regarding the disciplines for which we attempt to recruit. Such prioritizing of recruitment has to be in sync with another priority - to develop new and cutting-edge disciplines at the Technion. Our obligation is to constantly see the larger picture and steer towards our ultimate goal. With this mission in mind, several years ago we started to significantly increase the number and the academic quality of foreign scientists who come to the Technion for their post-doctoral training. Indeed, the number of post-docs from abroad has almost doubled in recent years, and there is also a marked increase in their scientific and academic excellence. We have set up a strategic plan to continue in this vein so as to reach 500 foreign post docs by 2020.



Prizes and Honors

Our faculty members are in the front line of academics in Israel and in the world. The following list is a selection of the many prizes and honors which they were awarded in the past year:

Prof. Emeritus Ishaiah Kopelman, Faculty of Biotechnology and Food Engineering was awarded an Academic Life Achievement Award by the Association of Food Industries.

Prof. Gadi Eisenstein, Faculty of Electrical Engineering, received the 2014 IEEE Photonics Society William Streifer Scientific Achievement Award.

Prof. Ashraf Brik, Faculty of Chemistry, received the Hirata Award.

Prof. Emeritus David Hasson, Faculty of Chemistry, received a Life Achievement Award.

Prof. Rami Atar, Faculty of Electrical Engineering, became a Fellow of the Institute of Mathematical Statistics.

Prof. Jack Haddad, Faculty of Civil and Environmental Engineering, and **Asst. Prof. Daniel Ramez**, Faculty of Biomedical Engineering, received a Maof Fellowship.

Distinguished Prof. Shlomo Shamai, Faculty of Electrical Engineering and **Prof. Michael Elad**, Faculty of Computer Science, were included in the list of the “Most Influential Scientific Minds in the World”. The list, compiled by the Thomson Reuters Corporation, consists of 3,200 individuals who published the greatest number of highly cited papers in one of 21 broad fields.

Dr. Noga Fridman-Bishop, Faculty of Chemical Engineering, received a President’s Fellowship.

Prof. David Gershoni, Faculty of Physics, was awarded the Mifal Hapayis Landau Prize for the Arts.

Prof. Emeritus Boris Shapiro, Faculty of Physics, became a Fellow of the American Physical Society.

Prof. Yeshayahu Talmon, Faculty of Chemical Engineering, was awarded an Honorary Doctorate by the Faculty of Science of Lund University in Sweden.

Distinguished Prof. Mordechai Segev, Faculty of Physics, became a Foreign Associate of the United States National Academy of Science (NAS).

Prof. Emeritus Aharon Ben-Tal, Faculty of Industrial Engineering and Management, became a Fellow of the Society for Industrial and Applied Mathematics (SIAM).

Distinguished Emeritus Prof. Daniel Weihs, Faculty of Aerospace Engineering, received a prize for creative thinking from the head of the Armaments Research and Development and Infrastructure Administration.

Assist. Prof. Moran Bercovici from the Faculty of Mechanical Engineering and **Assistant Prof. Uri Shapira** from the Faculty of Mathematics, were awarded the prestigious national Krill Prize, supported by the Wolf Foundation.

The winners of the **2015 Yanai Prize for Excellence in Academic Education** are:

Assoc. Prof. Eduardo Mayer-Wolf, Faculty of Mathematics

Assoc. Prof. Mark Gandelman, Faculty of Chemistry

Assoc. Prof. Reuven Bar-Yehuda, Faculty of Computer Science

Assoc. Prof. Eran Yahav, Faculty of Computer Science

Assoc. Prof. Guedi Capeluto, Faculty of Architecture and Town Planning

Assist Prof. Yizhar Or, Faculty of Mechanical Engineering,

Prof. Dan Givoli, Faculty of Aerospace Engineering

Assist. Prof. Yiska Goldfeld, Faculty of Civil and Environmental Engineering

Prof. Ester Segal, Faculty of Biotechnology and Food Engineering

Prof. Miles Rubin, Faculty of Mechanical Engineering

The prize for the Outstanding Faculty goes to the **Faculty of Physics**.

Three Technion alumni lit torches at the opening event for Independence Day at Mt. Herzl this year. They were among 14 “trailblazing Israelis who made the world a better, safer, more interesting and more advanced place” who were chosen to light the torches:

Raphael Mehoudar, for his pioneering development in the field of water and drip irrigation;

Dr. Gavriel Idan for his amazing invention, the PillCam diagnostic capsule camera;

Alice Miller who fought for and won the right of women to become pilots in the Israel Air Force.

Research at the Technion

Funded Research

Research contracts signed in 2014 by the Research Authority amounted to \$86.3 million. In the last two years the Technion's research contracts totaled \$71.4 million in 2012 and \$83.8 million in 2013.

Activities to encourage the submission of research proposals to competitive scientific funds continue. In the past few years there has been an increase in submissions, grants and budgets from the three main competitive funds (ISF-Israel Science Foundation, BSF-Bi-National Science Foundation, and GIF- German Israeli Foundation). From the ISF the Technion received a total sum of approximately \$24 million in grants in the past year.

On January 1, 2014 the new funding framework (Horizon 2020) from the European Commission was launched. Horizon 2020 is the largest EU Research and Innovation program ever initiated, with nearly €80 billion available over seven years (2014 to 2020). The first calls under H2020 had deadlines in early 2014 so only limited results were given during the 2014 academic year. All winning projects from the European Union's Seventh Framework Program for Research and Development were contained in the previous report.

During 2014, fourteen Technion scientists were awarded €4 million (together) in technological scientific projects with industry and three researchers received Marie Curie Mobility Research Grants for a total of €1.25 million.

Since 2002, when the liaison office for promoting projects in the Office of the Chief Scientist of the Ministry of Economics and Planning began functioning, the research budgets from these sources have increased four-fold. In 2014, the Technion received research grants amounting to NIS 43 million as compared to NIS 41 million in 2013. These include 22 projects in the "Kamin" program that received NIS 8 million.

From October 2013 to September 2014, the total amount of contracts for research and development activities funded directly from industrial, commercial and business sources in the framework of the Research Authority reached \$9.1 million.

External Aid for Research

In addition to the external funding mentioned above, consisting of research contracts signed within the framework of the Research Authority (as described above), the Technion received contributions from donors (for specific individual researchers or for the creation of research infrastructures) for a total amount of \$15.43 million, and assistance for purchasing equipment for new faculty members in the amount of \$14.57 million. In addition, the Technion received assistance from the government for programs for new immigrant absorption (Shapiro, Giladi, and KAMA) totaling \$4.47 million.

Internal Technion Financing

Over the past year the Technion allocated close to \$1.13 million to encourage competitive research activities (including internal grants, bonuses for researchers submitting proposals to competitive funds and the promotion of research among new faculty). The sum of \$1 million was granted via academic chairs and approximately \$28.8 million was allocated to finance fellowships for graduate students engaged in research. The total investment in research, including all sources (external funding, contributions from donors, external aid, internal funds and graduate fellowships) amounts to \$151.8 million.

International and Industrial Collaboration

The Singapore Project: In 2009, a research cooperation agreement was signed with the Singapore National Research Foundation (NRF), the Singapore Ministry of Education and two Singapore universities (Nanyang Technical University and National University of Singapore) for \$20 million Singapore (~\$15 million US). Research activity began in October 2009, in the field of tissue engineering. This project is now in its final phase, and is due to end in December 2015.

The Umbrella Program (Aachen University, the Jülich Research Institute and the Technion): Last year's symposium was held at Aachen University, Germany in March 2014, on the subject of "*Biomaterials and Biohybrids from Basic Research to Medical Applications*". After the symposium a number of seed research grants were awarded to research teams from the three participating universities. This year's symposium was held at the Technion in February 2015 on a follow-up topic: "When Life Sciences and Engineering Converge". A call for proposals will be issued shortly. Next year's symposium will be held in Jülich, Germany and the topic will be "From Quantum Matter to New Materials".

Northeastern University Research Collaboration: The collaboration began in 2010, and it continues this year, focusing on issues related to the utilization of national resources during the time of national crisis.



Prof. Wayne Kaplan at the 2015 Umbrella Symposium

The Technion Center of Excellence in Exposure Science and Environmental Health was established at the end of 2010. The Technion was awarded \$1 million for five years in funding from the Foundation for Environment and Health for establishing a Center of Excellence: "From Airborne Stressors through Risk Assessment to Health Outcomes". This is a joint center for scientists from various Technion departments run by the Faculty of

Civil and Environmental Engineering and the Faculty of Medicine. The center's activities in the past four years included preparing its five-year research plan and leading research in four areas: exposure to air pollution in the heterogeneous urban environment, the effect of air pollution from agricultural sources on the population of neighboring communities, air pollution within the built environment and developing systems and methods for remote detection of air pollutants and for analyzing air quality data bases from monitoring systems in order to evaluate the level of exposure of the public to air-borne pollutants.

The center directs research in a wide variety of subjects, among them wireless distributed sensor networks for air pollution monitoring, the use of satellite remote sensing of aerosols for environmental management and public health applications, development of advanced models for assessing the effect of traffic on air quality in urban areas, developing methods for evaluating the influence of exposure to residues, control substances in agricultural sprays, establishing a national database of air pollutant concentrations and developing methods for evaluating the effects of exposure to traffic using video cameras.

The center consists of five Israeli post-doctoral researchers, approximately ten graduate students and a number of faculty members. In the four years in which the center has functioned, center members have published about 45 papers in leading academic journals (peer-reviewed), and were active participants in approximately 60 national and international conferences.

Agreement between the Technion and the Agency for Management of University and Research Grants (AGAUR): This collaboration was implemented through the Catalonia-Israel joint program, called TWINS (Towards Interrelations in Science). TWINS is based on the promotion of collaboration between two research teams from the two countries (Catalonia is an autonomous region in Spain) to strengthen relationships and develop strong ties to advance the commercialization of research results.

Joint Symposia grants are part of the Catalonia-Israel TWINS Program which will be developed over a period of two years (2014-2015) to promote networking through events

around a specific scientific topic of interest, to explore, develop, strengthen and exchange knowledge that leads to future scientific collaborations. Allocations for workshops were approved and they took place, or will take place, during 2014-2015.

Waterloo - Technion Cooperation: The University of Waterloo (Canada) and the Technion have undertaken a number of highly successful reciprocal visits led by the respective presidents, and directors of the institutions' leading research institutes. In addition, scientists from both institutions have participated in several joint Canada-Israel conferences and workshops to explore collaborative research and commercialization opportunities in priority areas of national and international importance, namely Water, Nanotechnology and Quantum Computing and Technology. Both institutions have identified this collaboration as being strategically important.

A call has been issued in order to foster and enhance the cooperation in research between the two institutions. The program's time-scope is planned for three years. The priority areas of joint collaboration include, but are not limited to, the multi-faceted aspects of:

- Quantum Computing and Technology
- Water
- Nanotechnology

This year ten collaborative projects were approved for funding.

Significant Agreements

- In the framework of the Center for Research in Electronic Commerce, with the funding and cooperation of Microsoft and the Faculty of Industrial Engineering and Management, ten research grants were continued this year and one new research grant was awarded.
- The wide-ranging research center in cooperation with Intel, the Hebrew University and the Technion continues its activity. The activities in the center are mainly conducted by faculty members from the Faculty of Electrical Engineering and the Faculty of

Computer Science in the field of computational intelligence. Within this framework in 2014 a third portion of research grants (10 research grants) was received.

- There is continued intensive activity in the building of three nanosatellites within the framework of the Asher Space Research Institute (Samson Project).
- The Focal Technology Area (FTA) Program, with a total investment of \$11 million (of which 60 percent is Technion funds), continued its activities within the framework of RBNI on the subject of: "Nanophotonics Research Fund for Advanced Light Detection and Sensing".
- A focused and vigorous drive has been launched to receive accreditation from the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC) for the Pre-Clinical Research Authority at the Technion. In the near future accreditation will be imperative for the submission of research. This issue has been labeled as critical for life-science oriented research on campus. In order to ensure accreditation and efficient management of the Pre-Clinical Research Authority, a Deputy Executive Vice President for Research was appointed starting January 1, 2015.
- The Technion Center for Computer Engineering (TCE) is functioning dynamically, including the organizing of numerous conferences and seminars on cutting edge topics. Over 50 Technion researchers and 20 companies operate within the framework of TCE. TCE academic members are in the final phases of many grant applications, such as an anticipated collaboration with the prime Minister's Office on cyber security.

Research Institutes

The construction of three nanosatellites (the Samson Project) by the Asher Space Research Institute is continuing at a vigorous pace.

The Nancy and Stephen Grand Technion Energy Program (GTEP)

Since its establishment in 2007, the Nancy and Stephen Grand Technion Energy Program (GTEP) has supported fundamental and applied engineering research to develop clean and efficient energy technologies. The GTEP established state-of-the-art central energy research facilities, initiated a unique graduate program in energy studies that is now home to 44 graduate students, and funded ambitious activities in interdisciplinary areas which have led to cross-campus collaborations.

The following GTEP central laboratories are equipped and fully active:

- The Ed Satell Family Nitrogen/Hydrogen Alternative Fuels Research Laboratory (NHAF)
- The Photovoltaics Central Laboratories (a joint project of GTEP and RBNI)
- The Leona M. and Harry B. Helmsley Charitable Trust Energy Storage Complex
- The Hydrogen Technologies Research Laboratory (temporary location)
- A greenhouse for modern plant genetic testing

GTEP is in the process of setting up a new central facility for fuel cells research and a permanent laboratory for hydrogen technologies. A central laboratory for cellulose conversion is in final stages of construction and expected to be opened in 2015 in the Biotechnology Building.

Today, there are nearly 50 Technion faculty members partially supported through GTEP's various funding channels such as seed money grants, support of graduate students fellowships and use of GTEP central laboratories. In addition, GTEP researchers participate in various national collaborations funded by competitive and philanthropic sources such as:

- A project on PV (photovoltaics), biofuels and optics with the Weizmann Institute of Science (WSI), supported by The Helmsley Charitable Trust
- A project on renewable energy technologies with Ben-Gurion University (BGU), supported by the Adelis Foundation

- A national solar fuels project (I-CORE) with WIS and BGU supported by the Israel Science Foundation (ISF)
- A national electrochemical propulsion project (INREP) supported by the ISF

During the 2014 academic year, GTEP researchers received over \$8 million in external research funds and industrial support for research. Nearly 75 publications/scientific papers and patents on energy research were reported by GTEP researchers. This level of external funding and scientific papers would not have been possible without the infrastructure that GTEP has created on campus.

One of the program's major achievements has been its effective role in the recruitment of eleven excellent new faculty members who joined Technion with GTEP support since 2010. Three new members have joined us in 2014: Roy Kishoni (biology), Mathew Suss (mechanical engineering) and Yoash Levron (electrical engineering).

GTEP's unique Graduate Program in Energy Studies has grown to 44 excellent students from Technion and other academic institutions. One measure of the student quality is the 12 competitive external scholarships won by them last year and eight prizes in the current academic year (which is still ongoing). Presently the program includes 41 percent Ph.D. and 59 percent M.Sc. students. This year, 24 students are expected to graduate. The program is supervised by a 12-member faculty committee, headed by Prof. Yoed Tsur from the Faculty of Chemical Engineering.

In 2012 the GTEP and the Wolfson Department of Chemical Engineering launched a unique M.E. graduate study program in natural gas and petroleum engineering. This program continues to expand. Thus far, 37 students graduated the program and a third class was opened in October 2014.

The next target of the GTEP is to promote research in emerging fields such as smart grids, system integration and life-cycle analysis. Towards this goal a call for proposals on smart grids was recently initiated.

GTEP supports projects in outreach and general education as an integral part of its global mission. Faculty and students are involved in projects to promote energy awareness at

Technion, throughout Israel and across the world. This year, GTEP supports the following outreach projects:

- Support of youth energy activity through the Technion Center for Pre-University Education
- Support to the Technion Formula Student Competition
- Support to the $\frac{1}{4}$ Scale Tractor International Student Design Competition

Finally, the GTEP provides an essential framework for data-sharing through seminars, workshops and academic guests. This enrichment is open to faculty, graduate students and guests from industry and academia. In the 2014 academic year, the GTEP held and supported 17 seminars and workshops.

The Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering

Prof. Yoram Reiter, Director

The Technion has long recognized the value of interdisciplinary research in advancing scientific discovery and its applications. Important research ideas often transcend the scope of a single discipline or program. Interdisciplinary research is the pillar of modern scientific research, as the borders of scientific disciplines converge, merge and are intimately dependent on each other.

Mr. Lokey's monumental gift to the Technion and the vision behind this - stewarded by Nobel Laureate Prof. Aaron Ciechanover - has made possible the establishment of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering that was launched in 2006. In February 2013, Prof. Yoram Reiter took up his appointment as managing director of the Lokey center.

The center integrates knowledge, tools, and ways of thinking from life and health sciences, physical, mathematical and computational sciences, engineering disciplines, and beyond to form a comprehensive synthetic framework for tackling scientific and societal challenges that exist at the interfaces of multiple fields. This convergence has led to the emergence of new disciplines in the center such as biomedical optics and imaging, systems biology, synthetic biology, bioinformatics and computational biology, metabolomics among others, which are a reflection of how convergence is a serious and increasingly important development in science. In 2014 we strengthened the synthetic biology field, tissue regeneration and stem cells and added a new area called biological chemistry.

Aiming to facilitate convergence endeavors and to develop partnerships, synergies and collaborations with universities across the world, we hosted, in February, the Umbrella Symposium - Cooperation that was launched back in 1983 by RWTH Aachen University, Forschungszentrum Jülich and the Technion to support and strengthen the research alliance between Israel and Germany – under the theme: "When Life Sciences and Engineering Converge". 35 researchers participated in this symposium and covered a wide range of issues in the heart of the convergence revolution.

In its efforts to expand its global reach, this year the Lokey Distinguished Lecture Series hosted world scientists: Prof. Carlos Bustamante from the University of California Berkeley, Prof. Lewis Kay from the University of Toronto, Prof. Richard Lenski from the University of Michigan, Prof. Pamela Silver from the Harvard Medical School and Prof. Susan Margulies from the University of Pennsylvania.

The center management understands the need for engineers and for technological advances – the promise to provide Technion students with an exciting education that will prepare them for emerging technologies and to be adaptable and flexible for the rapidly changing world. This year the center partially funded a Technion student delegation to the iGEM 2014 - the International Genetically Engineered Machine competition. The 2014 iGEM competition, held in October at The Massachusetts Institute of Technology (MIT), aimed to encourage students to independently advance a complete research project in the area of synthetic biology, an emerging field combining knowledge from multiple disciplines in science and engineering, to develop genetically engineered systems that respond to their environment.

At the frontline of technology for the service of researchers in life sciences and engineering, we continued this year to focus on the development of the various units within the clusters: Technion Genome Center, the Infrastructure Center including the Microscopy and Imaging Unit, the Flow Cytometry Unit, the Bioinformatic Unit and the Structural Biology Center. These units have been growing rapidly over the years and are one of the main triggers for the blossoming of life sciences at the Technion. Our achievements over the last year are many, and include the following:

- Purchasing an additional high-throughput next-generation sequencing system with new capabilities for more reads (data) at less time, at the Technion Genome Center, and the purchase of a new data server and storage system for the Technion Genome Center.
- Purchase of a high-end new confocal microscope dedicated for live cell imaging with high sensitivity detector for the microscopy unit.

- Organizing workshops and seminars in the fields of light microscopy, flow cytometry and next generation sequencing, bioinformatics, a three-day course on molecular modeling techniques and long-term dynamics and analyzing ChIP-seq data.
- Increased number of publications were published in peer-reviewed papers, utilizing the Infrastructure Center for their research.
- The number of labs and research groups using the Infrastructure Center has grown to more than 122 in 2014, with more than 500 users.

The Lokey Center team comprises 19 people who are highly trained and experienced and are dedicated to delivering all necessary support and knowledge to the Technion research community, primarily to students, post-doctoral fellows, and other users including from other institutions and industry.

In December we had an international review committee for the Technion Nanomed Initiative Program, a joint collaboration with the Russell Berrie Nanotechnology Institute (RBNI). The NanoMed program is envisioned as a cross-disciplinary venture that could take advantage of the unique attributes of the Technion: world-class engineering and physical sciences programs, a thriving medical school, and opportunities offered by 21st century biology and biomedicine. The objective is to have scientists from various engineering, physical sciences, medical and biological disciplines working together under a single roof on a common set of problems. The committee praised the initial stages fostering the nanomed initiative. Specifically, the committee praised the significant strengthening of the biology/life sciences program, the activity of the Emerson building as a venue for supporting the cross-disciplinary science of nanomed, the equipped Emerson and other campus facilities with some state-of-the-art core resources such as an imaging facility, a genomics and proteomics facility, and a biomolecular crystallography resource. Most importantly, the quality of the life sciences faculty at Technion has risen dramatically. The faculty members that have been hired into nanomed by various departments are excellent, and some of the hires surely would not have happened without the compelling nanomed vision and support from the LSE and RBNI. There is now a core set of a dozen

or so Technion faculty who view the success of nanomed as central to their career path. Building a large and high quality group of stakeholders is going to be essential for the next phase of nanomed and the committee provided recommendations to strengthen and enhance the program as part of the campus-wide attempts to foster interdisciplinary research and new faculty recruits using the scientific and engineering strength and leadership of the Technion.

There are additional activities on campus coordinated by the Lokey Center and the Russell Berrie Nanotechnology Institute (RBNI) such as providing general guidelines for optimizing the impact of large scale equipment on campus and providing centers of expertise. The centers also help to support users by making financial matches available. This year we continued with the centers' initiative of monthly joint lectures on topics related to the interface between life science and engineering. These lectures exposed students, scientific staff, faculty members and the public to interdisciplinary research on campus.



Fingertip Nanobubble

The Russell Berrie Nanotechnology Institute (RBNI)

RBNI is a joint endeavor of the Russell Berrie Foundation, the Government of Israel and the Technion. The center's operation started its third phase on October 1, 2014. RBNI constitutes the largest research entity on campus comprising over 150 faculty members and more than 300 graduate students and postdoctoral fellows from 14 faculties. The center's activities are extremely broad covering topics ranging from nanoelectronics, nanophotonics, nanomaterials, nanomechanics, to the interface between those fields and the life sciences.

RBNI attempts to maintain most activities established in the first phase, while initiating new activities. A large government-supported project called the FTA (Focal Technological Area) on nanophotonics for detection and sensing, is in its fourth year (out of five). Eleven researchers from four departments are engaged in this successful program.

During the past year, RBNI researchers engaged in numerous discussions among themselves and with the Technion management as to future activities within the center. The consensus decision was to have two main research tracks. The first is quantum science matter and engineering which will tackle some of the most pressing problems facing the scientific and technological communities the world over. Technion has a large community of quantum experts and possesses much of the infrastructure needed to start the program. However, a large infusion of funds will be necessary to have this new activity flourish.

The second main direction is an enhanced NanoMed program. NanoMed is an ongoing activity established in collaboration with the Lorry I. Lokey Center for Life Science and Engineering. NanoMed had special funding which was recently exhausted. An international evaluation committee for the NanoMed program visited Technion in late 2014 and its recommendations will guide the continuation of the development of this important activity.

The vibrant multidisciplinary nano community is maintained via high-level seminars, the bi-annual winter school (the fourth, held in February 2014, was an unprecedented success), monthly seminars and various research funding plans offered annually to enhance multidisciplinary nano activity on campus.

RBNI's international activities have flourished with four joint symposia taking place in Denmark, Germany and Haifa involving major nano centers which continuously court RBNI. Similar international activities are scheduled for 2015. RBNI researchers won important awards in 2014 highlighted by Professor Moti Segev who won the Israel Prize and the Quantum Electronics Prize of the Institute of Electrical and Electronics Engineers (IEEE) and Professor Gadi Eisenstein who won the IEEE William Streifer Award.

RBNI has continued to collaborate with industry on various levels ranging from direct industrial support of research to joint programs funded by the government.

The RBNI educational program has undergone major changes in the curriculum, mainly in the required courses taken by students in the first stages of their education.

The Technion Autonomous Systems Program

Autonomous systems represent the next great step forward in engineering, by fusion of mechanics with sensors, computers and communication capabilities. The objective is to develop intelligent systems that can interact dynamically with the complexities of the real world, releasing humans from dangerous, dirty and dull duties.

The Autonomous Systems Program was founded in 2008 in order to form a melding point for studies in different disciplines, thereby gaining from the synergies and bringing the Technion to the forefront of this exciting field. Over 80 faculty members from nine faculties are associated with this program. The program has three major divisions in operation at present (air and space systems, ground systems and marine systems) and is in the process of setting up a medical robotics division. We rely on initial donations, enabling a buildup of expertise and infrastructure, and we are attracting later funding from government and industry to sustain the center.

This year we started extensive activity in the marine and ground divisions with several major projects:

- An autonomous underwater vehicle. The project goal is to develop and produce a miniature, modular, autonomous marine underwater vehicle, which will serve as a technology demonstrator and platform for various research programs. This unclassified project is equally funded by TASP, Rafael and the Israel Ministry of Defense. Eight faculty and adjuncts, and five graduate students are involved in various aspects.
- Autonomous landing of a Quad-Copter on a moving marine platform: we are building a hybrid system combining an unmanned surface marine vehicle and a flying “eye in the sky” that will eventually act as a virtual fence protecting and monitoring a marine or coastal asset, or will perform search missions.
- Autonomous Ground Vehicle adapted to be a smart stretcher: the aim is to provide a system for rapid evacuation amid continued medical treatment and remote monitoring of an injured soldier without endangering others to carry the casualty. This system, Micro Unmanned Ground Vehicle (MUGV), would approach a

frontline location without risking more lives and extract the wounded soldier to a safe location, all while initial medical care is administered.

In addition, we are supporting over a dozen smaller research projects in the three activity areas. The program is monitored by a five-member board headed by the executive vice president for research, with two non-Technion members.

Research agreements were signed with Israel Aerospace Industries, Rafael and the Israeli Ministry of Defense for several million shekels. This is a good sign for the future sustainability of the program.

We have an outstanding graduate studies program, with almost 50 students, most of them full-time, including several Ph.D. students. The first three M.Sc. students have graduated.

Technion Computer Engineering Center (TCE)

The Technion Computer Engineering Center (TCE) was inaugurated during the 1st annual TCE conference in June 2011. It is now open for new members and more than 60 faculty members of the Technion and other universities are TCE members.

A significant effort has been put into reaching out to leading companies in Israel and to date over 20 companies are industrial members of TCE, among them Intel, Amdocs, Qualcomm, Rafael and more. Research and development staff from these companies may bring up new research agendas and they enjoy the wealth of knowledge available at the Technion. TCE calls these researchers ‘agents of knowledge’ who can benefit both industry and academia and on whose collaboration the center relies.

In October 2014 Prof. Raphi Rom of the Faculty of Electrical Engineering stepped in as the new TCE head replacing Prof. Assaf Schuster of the Faculty of Computer Science who completed his successful term of three years as the first TCE head. To crown the cooperation between the two faculties, Assistant Prof. Eitan Yaacobi of Computer Science joined as TCE vice chair.

In June 2015 TCE will hold its 5th international conference. As of 2014, the conferences are named after Henry Taub, a great friend and benefactor of the Technion. This year the conference focuses on Scalable, Reliable and Secure Systems and will feature speakers in these areas from international and Israeli universities, as well as industry representatives. The conference was awarded a grant from the Israel Science Foundation. Last year’s conference on Trends in Signal Processing was a major success and drew over 600 participants, a record number for an academic conference at Technion.

During 2015, TCE continued its goal of knowledge dissemination with numerous workshops and talks. A winter school with the newly founded Israel Bell Labs was held in December on NFV (Networks Functions Virtualization) and included a hackathon. Some conferences have turned into an annual tradition and are back this year, such as two Crypto Days, one featuring Prof. Adi Shamir of the Weizmann Institute, a Turing Award laureate. The 3rd Summer School on Computer Security took place in September 2014.

The Henry Taub Distinguished Visitor Program continues this year with distinguished speakers such as Kaisa Nyberg from Aalto University in Finland who visited TCE and met with students and faculty. The Viterbi Leaders in Science Program continues in supporting new faculty members, and the Viterbi Faculty Chair is bringing in two prominent researchers this year, for a semester-long visit: Prof. Jacob Benesty of the University of Quebec and Prof. Paul Segal of UC San Diego. TCE was awarded a research donation from AOL, and will work on a joint venture with JTCI (Jacobs Technion Cornell Institute) in New York.

The Samuel Neaman Institute for National Policy Research

Prof. Omri Rand, Director

The Samuel Neaman Institute for National Policy Research (SNI) focuses on promoting educated decision-making at the national level, through research and analysis of well-established information produced by the best researchers in Israel. The Samuel Neaman Institute for National Policy Research identifies policy issues of critical importance to the state's national resilience and analyzes them. It leads research and publishes position papers in an effort to stimulate educated public debates in order to promote and assist Israel's decision-making process. SNI focuses mainly on delineating national policy on the subjects of science and technology, industry, education and higher education, physical infrastructure, the environment and energy, and other subjects of national importance to which SNI makes a unique contribution.

In 2014, the Samuel Neaman Institute researchers were engaged in the entire range of issues mentioned above. The researchers' joint efforts led to the creation of the "Israel's Wheels of Life Index," aimed at measuring and examining Israel's competitiveness in a variety of areas. The index compares Israel with 60 other countries in the global markets, over time, using the parameters of innovation, science and technology, society, energy, and the environment, estimating the changes that occurred over time.

In 2014, the Samuel Neaman Institute led collaborations with the Ministry of Environmental Protection and other organizations in industry on policy issues such as technologies to produce fuel substitutes for transportation from waste, recording greenhouse gas emissions in Israel, reducing the loss of food and agricultural overproduction, electric and hybrid vehicles, and the implementation of energy-saving technologies in the construction and upgrading of residential buildings. The Energy Forum at SNI led several meetings of Israeli experts on subjects that require policy formulation, and their recommendations were delivered to the policy makers.

There was extensive activity within the Center for Industrial Excellence at the Samuel Neaman Institute that focused on applied research toward upgrading the economic system in the north of the country, as part of a joint venture with the Ministry of the Economy. The center also promoted the expansion of the Israeli water industry in the global world as part

of a joint venture with the unit for the promotion of water and renewable energy industries at the Ministry of Economics. In addition, a strategy was formulated for a commercial space industry in Israel in cooperation with the Ministry of Science, and national policies concerning the use of natural gas for the local market and for export were also formulated.

The researchers on science and technology subjects published papers in collaboration with the Ministry of Science on the subject of the ministry's examination of the infrastructure projects and the continued comparative analyses of innovation, patent invention, and technological developments in Israel. The Council for Higher Education (CHE) continued its activity as part of which comprehensive research, examining the status of research universities in Israel and detailing their development, was conducted. Furthermore, the SNI hosted a variety of projects on outlining educational policy in mathematics and physics, and science in general.

During 2014, the Samuel Neaman Institute continued to operate its information center in the fields of science and technology, which is one of the largest in Israel, and the MAGNET information centers of the Ministry of Economics. As part of a seven-member consortium (Italy, Germany, France, Spain, Poland, Israel, and United Kingdom), the Institute led significant collaborations with the European Union as part of the EU's 7th Framework Program.

As previously, in 2014 too, the institute's findings were published in the mass media and gained wide public exposure, in the form of both articles and researchers' appearances in the media, as well as editorial columns focused on issues on the public agenda. The institute reports and their conclusions also made their way to the discussion tables of the various committees of the Knesset and the government.

Outstanding Research and Scientific Achievements in the Past Year

First Detection of Hawking Radiation

Black holes have long been a mysterious concept in physics. The theory is that these black holes existing in space are completely dark, as their name implies. In 1975, the famed British physicist Stephen Hawking theorized that black holes emitted a faint glow - which became known as Hawking radiation. Because of the difficulty in accessing black holes, very little progress was made in proving or disproving this theory although attempts were made to create laboratory conditions in which the phenomenon could be studied. It was suggested that it might be possible to do so by means of sound in what was called a “dumb hole”.

Prof. Jeff Steinhauer, an experimental physicist at Technion's Faculty of Physics reported in 2009 that he had detected Hawking radiation for the first time in experimental lab conditions through the use of sound. Since then he has proceeded methodically to create conditions to be able to observe Hawking radiation and has documented each step along the way. In October 2014, in his latest publication in *Nature Physics*, Prof. Steinhauer says, "In general, an experimental measurement of something heretofore predicted is very important for pushing physics forward. I showed that the Hawking mechanism really works."

He is currently involved, in collaboration with international scientists, in enhancing the conditions under which the observation of black holes can take place. He anticipates that his work has opened up possibilities of further study and observation of black holes and their functioning, in laboratory conditions.

Silicon Carriers for the Delivery of Cancer Drugs

Prof. Ester Segal, of the Faculty of Biotechnology and Food Engineering and head of the Technion's Multifunctional Nanomaterials Laboratory, is studying the behavior of a silicon material used to deliver cancer drugs when the material functions in a diseased environment. Apparently the material behaves differently in a malignant environment than

it does in the laboratory, thereby effecting therapeutic activity. A joint study conducted by Prof. Segal together with colleagues at MIT and at Harvard, showed that there is a difference in the degradation process of the silicon within a healthy cell and within a diseased cell and shedding light on this difference can lead to improved treatment. The study was published recently in the prestigious journal *Nature Communications*. “We have shown for the first time that biomaterials in general, and nanostructured porous silicon in particular, behave differently when they are injected (or implanted) at the tumor microenvironment”, Prof. Segal says. “Over the last few years, we successfully engineered silicon to be used as a carrier of anticancer drugs that releases its contents in a controlled manner, and now we are focusing on the degradation mechanism of the silicon at the diseased tissue.”

The material used to deliver these therapeutic materials is called nanostructured porous silicon. It was developed by Prof. Segal and her doctoral student, Adi Tzur-Balter, as an optimal container for drug delivery. It contains nanoscale holes especially suited for drug delivery and is seen as especially suited because of its



Prof. Ester Segal in her Lab

unique porous qualities. It is also biocompatible and bio degradable.

New Materials for Protective Gear

Associate Professor Stephan Rudykh, of the Technion’s Faculty of Aerospace Engineering and head of the Mechanics of Soft Materials Lab, has developed a new material which combines flexibility and strength to an optimal degree. This material is potentially useful in uniforms, space suits and other wearable gear that are required to provide protection. Prof. Rudykh says that he was inspired in the creation of this material by fish. “Fish are flexible creatures, but are protected by hard scales. Their ‘secret’ is the

combination of the scales and the soft tissue beneath them, and that is what I tried to mimic here. The materials that I am designing are also made of two layers – one soft (the ‘body’) and the other (‘scales’) constitutes the ‘armor’. These two components provide the combined property of protecto-flexibility that we want.”

Prof. Rudykh came to the Technion directly after his postdoctoral studies at MIT where he started experimenting with complex special soft materials. His work with 3-D printers enabled him to experiment with different formulas to create materials that he could formerly only consider in theory. He has focused on the trade-off between flexibility and penetrability and is attempting to maximize the combined features in his material. Prof. Rudykh will not speculate on the potential uses for this material and wishes to focus on its development. In tests conducted on the 3-D printed material it was indicated that penetration resistance was increased by a factor of 40 while flexibility was only reduced by a factor of five. It now should be possible to create uniforms custom-made to the wearer’s size and shape and customized for the conditions to be countered, whether space radiation, metal projectiles or others.

Sniffing Out Disease

Prof. Hossam Haick, of the Faculty of Chemical Engineering and a researcher at the Technion’s Russell Berrie Nanotechnology Institute, has received wide acclaim and scientific recognition for his “electronic nose” research. Since he joined the Technion staff in 2006, Prof. Haick has been focusing on developing breathalyzer technology which is capable of detecting signs of cancer and other diseases through smell. The technology can identify individuals who may be more prone to developing a specific disease and thus they can receive treatment at an earlier stage. Supported by a €6 million grant from the European Commission, the multi-national research consortium headed by Prof. Haick has now combined the electronic nose with smartphone technology thereby rendering the resulting instrument capable of screening the user’s breath. The result is a non-invasive simple and cheap method of disease detection. By reading the exhaled breath using nanosensors, the information can then be transferred by phone to other devices for interpretation and detection. “The Sniffphone is a winning solution. It will be made tinier and cheaper than disease detection solutions currently available, consume little power, and

most importantly, it will enable immediate and early diagnosis that is both accurate and non-invasive,” says Prof. Haick. “Early diagnosis can save lives, particularly in life-threatening diseases such as cancer.” Prof. Haick has received more than 40 prestigious prizes and awards for his research and an Israeli company Nano-Vation has been established by two of his students.

The Stable Radical

In the field of chemistry a radical is an atom, molecule or ion with unpaired valence electron(s), that is likely to take part in chemical reactions. Radicals have an important role to play in the human body and their study has proven to be challenging and rewarding. Most radicals are unstable, free; that is they have unpaired electrons. The few stable radicals that have been developed in the past have led to very valuable applications in agriculture, medicine and other fields. **Associate Professor Alex M. Szpilman** from the Schulich Faculty of Chemistry and **Dr. Mark Iron** of the Weizmann Institute of Science, have developed a new class of radicals with stable structure, as was recently reported in the respected journal *Nature Communications*. The concept of the radical which they have developed has the potential for revolutionizing the way in which radicals are used, with multiple applications in medicine and biology. The new class of radicals may also be useful as catalysts and in detection of potentially dangerous radicals in biological systems. “Because the synthesis is so flexible we are now able to prepare tailor-made radicals for different applications. For example, water soluble radicals for biological studies or more efficient catalysts for oxidation or polymerization (in plastic production) and other industrially important uses. The possibilities are endless. From the scientific point of view, we have the possibility of studying radical processes in biological systems. The understanding of these potentially harmful processes may eventually lead to the development of ways to treat or prevent disease.” Prof. Szpilman is a native of Denmark who first came to Israel as a kibbutz volunteer when he was 18. He completed his studies in chemistry in Denmark, in Switzerland and at the Weizmann Institute in Israel before joining the Technion staff in 2009.

Deciphering Cell Layers

Understanding the process whereby embryos develop into human bodies has been a very difficult puzzle for a long time. The embryo has three layers of cells: the endoderm, the ectoderm and the mesoderm, and science does not know which one evolved first. **Associate Professor Itai Yanai**, from the Faculty of Biology and his colleagues have found evidence that the layer called the endoderm evolved first, followed by the ectoderm layer and finally the mesoderm layer. Understanding how evolution has altered cells in the past can also “reveal to us what is easily changeable and what is not changeable in a cell”, Yanai added. “If a cell goes into a disease state, for instance, we might know more about what we could do to reverse this state and what might be more difficult to reprogram in the cell.”

The discovery was achieved thanks to the development at the Technion of a powerful method called CEL-Seq which can look into the activity of every gene within a cell at once. Understanding the order of cell layers will help in deciphering the secrets of evolution and may have additional benefits in understanding diseases, such as cancer, which result from the cell division process.

The paper discussing the evolution of the layers of cells was published in the on-line edition of *Nature* earlier this year. Prof Yanai is currently on sabbatical at the Radcliffe Institute of Advanced Study at Harvard University and he is continuing his research there using the CEL-Seq on other fundamental issues in biology.

Alzheimer's - Related Proteins

The research team of Technion's **Prof. Michael Glickman**, of the Faculty of Biology, **Dr. Daria Krutauz and Noa Reis** together with the labs of University of Maryland's Prof. David Fushman, Harvard Medical School's Prof. Steve Gygi and Prof. Ashraf Brik of Ben Gurion University and the Technion, has discovered a key mechanism in the accumulation of protein plaque in the tissue of Alzheimer patients. “Proteins that constitute major building blocks of our body cells continuously pass through quality control”, explains Prof. Glickman. “Defective proteins are sent to the proteasome, a molecular machine (found in all of our cells) that eliminates defective proteins by recycling them back to their building blocks. But a small number of them slip through this process. Proteins that evade the

proteasome accumulate, and may be harmful when they reach a critical mass, which is often the case at an advanced age.”

The mechanism which they discovered is implicated in the filtration of defective proteins and causes the accumulation of plaque in Alzheimer’s disease patients. This accumulation is ultimately the result of a mutation which impairs ubiquitin, a protein which marks other proteins and is essential in the control of diseased proteins. Distinguished Professors Avram Hershko and Aaron Ciechanover of the Technion were awarded a Nobel Prize in 2004 for their discovery of ubiquitin. “Because our findings run contrary to what was previously believed, this discovery opens new venues for intervention in the hope of developing a cure for Alzheimer’s disease”, says Prof. Glickman. The findings were published online recently by *Nature Chemical Biology*.

Some Impressive Student Achievements

Student Car Wins Best Design Trophy

"It has been an incredible learning experience for me. Putting into practice all our classroom knowledge and interacting with students from all over the world was an invaluable challenge." The Technion Formula Student team competed on the international circuit in August at the Formula SAE championship in Italy. Their spectacular red car was rewarded with the trophy for Best Style and Execution, awarded



Trophy-Winning Technion Formula Student Team.

by the Fiat Group. It was also crowned the one that showed the greatest improvement since 2013, when the Technion entry achieved the highest rank among rookie teams, and it was the fastest among all the competing cars from Israel. Members of the team were: **Raz Schweitzer, Maxim Shulman, Vitali Haim Skvirsky, Mor Herman, Ahmad Omari, David Amarilio, Michael Kootzenko, Alan Abboud, and Doris Pitilov.**

Following their impressive win, members of the team spent a week in Germany exchanging ideas with their counterparts from Weingarten University, who also spend a week each year at Technion in April. The team is co-sponsored by GTEP - Grand Technion Energy Program, and by local industries and benefactors.

Cleaning Up in the Arava

The Evrona Nature Reserve in southern Israel's Arava region was severely damaged in early December 2014, as a result of an oil pipeline rupture. This event, described as one of the worst ecological disasters in Israel's history, was caused by a pipeline breach that leaked five million liters of crude oil, leading to soil contamination and extensive environmental damage. Technion students volunteered to assist in disaster-relief efforts, all of them members of the Ma'alah project (future engineers for the environment).

The Ma'alah project, comprised of over 20 students from different Technion faculties, was founded in January, 2014 in an effort to harness the knowledge gained at the Technion for the betterment of the environment. Young researchers and faculty members from the Environmental, Water and Agricultural Engineering Unit offered to lead the group in the professional aspects of the project. The students volunteering on this initiative are operating under the guidance of faculty mentors, Prof. Uri Shavit from the Environmental, Water and Agricultural Engineering Unit, and Assoc. Prof. Sima Yaron from the Faculty of Biotechnology and Food Engineering.

A Gold Medal at iGEM

Technion's team won a gold medal at the iGEM (International Genetically Engineered Machine) competition in October 2014 held at MIT (Massachusetts Institute of Technology). The team, based in the Faculty of Biotechnology and Food Engineering and mentored by Prof. Roei Amit, developed a biological system that uses bacteria to detect the presence of substances such as allergens, toxins, and heavy metals in food and water.

The Technion Research and Development Foundation (TRDF)

There are five bodies administering different types of activities that come under the umbrella of the TRDF: the Research Authority which handles Technion-sponsored research; the Liaison Office which handles research ties with the European Union, industry, universities abroad and the Ministry of Economics programs; the Unit for Continuing Education and External Studies; the Israel Institute of Metals and the Technion Technology Transfer (T³) Office which deals with the commercialization of intellectual property and patents which are developed at the Technion. These five TRDF units are complemented by a TRDF Human Resources team and a TRDF Financial Management team. More detailed information about research activities and the Research Authority can be found in the report on research at the Technion.

Finances

In accordance with the instructions of the Ministry of Finance and of the Budget and Planning Committee, the balance sheets of the Technion and the TRDF are integrated as of September 30, 2010. The projected profit for the period October 1, 2013 to September 30, 2014 is approximately NIS 23 million, not including the estimate for the actuarial maintenance of pensions. The financial balance of this period is influenced by the nearly NIS 31 million in pension payments to 375 retired workers. The continued improvement in the financial situation is a result of the growth in income from intellectual properties and of increased research activity.

The Israel Institute of Metals

The role of the Institute of Metals is to serve local industry in the development of modern material systems. While in the past this focused on metals and alloys, modern materials engineering now includes, for example, corrosion and batteries, high performance ceramic systems and microelectronic materials. As a result, the Institute of Metals has several activities within the framework of its laboratories such as corrosion, metallurgy, casting, tribology, surface treatments and vehicles, and additional functions in the areas of quality control and authorization, and steel testing. Most of the activities at the institute are conducted with the active participation of industry. About 45 percent of the institute's income is derived from research funded by government offices, industry, the European Union and international

industrial projects. Approximately 55 percent of the income comes from testing for industry. In 2014, the institute's turnover stood at approximately NIS 18.2 million and the operational profit stood at NIS 2 million.

In order to play a pivotal role in materials development in Israel, towards the end of 2014 the Metals Institute purchased an industrial level 3-D printing system for printing metal alloys. The system uses an electron beam to melt metal powders, and can be utilized to fabricate intricate shapes from a multitude of metal alloys. The staff at the institute are currently training on the system and working with local industry on planning future projects based on use of the system.

The Azrieli Division of Continuing Education and External Studies

The Azrieli Division of Continuing Education and External Studies specializes in organizing and developing advanced study programs for university graduates in various engineering and science domains. It also grants diplomas to high-ranking professionals in different fields of engineering, architecture, medicine, administration and teaching through specially designed courses. All advanced courses and programs for Master in Engineering (ME), Master of Business (MBA), Master of Real Estate (MRE) or Master of Industrial Design (MID) are carried out in collaboration with the relevant Technion faculties and interdisciplinary committees. In January 2015, Prof. Zeev Gross replaced Prof. Yoram Halevi who served as the dean of the division during 2014.

The division's goals are to promote, update and enrich the knowledge of engineers, scientists, doctors and other professionals in accordance with the needs of industry and trends of the marketplace. The division has an academic council that oversees the academic aspects of the division's activities, e.g. approval of all the programs and courses offered by the division and maintaining its high academic standards. The council, appointed by the Coordinating Committee of the Technion Senate, following a recommendation of the Senior Vice President, consists of professors from different faculties as well as office-holders such as the deans of undergraduate and graduate studies. Over the years the

division has grown considerably, providing professionals with the opportunity to promote their education and careers.

The division operates out of three centers: the Technion campus in Haifa, the Technion-Azrieli Sarona Campus in Tel Aviv, and at the Azrieli College of Engineering in Jerusalem. This geographical distribution offers accessibility to a large population of Technion graduates and other professionals in different parts of the country. The Technion-Azrieli Sarona Campus in Tel Aviv was opened in July 2013 and teaching began soon after. The campus consists of three buildings in historic Sarona, a unique German Templar colony established in 1871. The Municipality of Tel Aviv has invested in restoring and developing the site in order to create a cultural and academic environment. After close to sixty years of operating in Tel Aviv in various ad-hoc locations, the division finally has a home and a real campus.



The Sarona Azrieli Campus in Tel Aviv

The response of students is very positive and preliminary data indicates a substantial increase in prospective students for the summer and fall of 2015. Up through January 2015 more than 1,000 students have used the facilities in the campus.

The programs offered in the current academic year are:

Programs leading to academic degrees:

- MBA – Master in Business Administration, with emphasis on high-tech companies.
- Azrieli StartUp MBA– Full time unique program, given in English, with strong emphasis on innovation and entrepreneurship.
- ME – Master in Engineering in:
 - Systems Engineering
 - Biomedical Engineering
 - Civil Engineering, with emphasis on development and business management in construction
- MID – Master of Industrial Design
- MRE – Master of Real Estate
- MUE - Master of Urban Engineering

All the programs, except MUE, are offered in Tel Aviv and the programs in MRE, MUE and ME in System Engineering are offered at the Haifa campus as well. More than 600 students are currently studying in the eight master's degree programs that are offered by the Azrieli Division of Continuing Education and External Studies. In the last graduation ceremony in June, 2014 the students that studied at the Division of Continuing Education and External Studies were about 35 percent of all master's degree graduates, excluding direct Ph.D. In the June 2015 ceremony, we expect a similar number.

Programs leading to a certificate:

The Azrieli Division of Continuing Education and External Studies offer a large variety of programs and single courses that are non-degree. These courses are typically intended for graduates of the Technion, or other universities, who are working in industry and wish to extend their knowledge in a certain area. The courses are divided into six main categories.

- Computers
- Design
- Management
- Coaching
- Photography
- Real Estate

Within those groups there exist unique courses, which were carefully designed to match the industry needs, such as Introduction to Oil and Gas Technologies, International Negotiation, Construction Project Management and Software Security.

In addition to programs that are open to the general public, the division has taught tailored programs for various companies and organizations such as the Ministry of Defense, Israel Railways, Rafael, HP and Israel Aircraft Industry.

About 2,600 students studied last year in more than 30 diploma courses in both the Haifa and the Tel Aviv campuses. On average we have about 1300 diploma students at any given time.

The Continuing Education School for Medical Doctors, in collaboration with the Faculty of Medicine, offers nine programs in areas such as gynecology, pain medicine, cardiology and orthopedics. About 400 medical doctors study in these programs whose duration ranges from one semester to three years. In addition, the division offers a separate, long-

running program in family medicine that is conducted at our center in Haifa and has 120 MD students.

The division conducts three diploma programs that are sponsored by MASA and NATIV agencies, for students from Russia and the former Soviet republics, holding a bachelor's degree in information management, computer science or related fields. During 2015 more than 350 students will graduate these programs and more than 50 percent will make Aliya (immigrate to Israel).

The Unit for Business Development and Commercialization of Intellectual Property: T³ - Technion Technology Transfer Unit

The year 2014 featured deployment in preparation for the expected expiration (in the beginning of 2017) of the patents protecting the medication Azilect, whose income has comprised a large part of the TRDF's income. As part of this deployment, infrastructure activities were carried out to expand T³'s operational scope and mandate in a way that the unit can serve, in addition to Technion faculty members and researchers, both undergraduates and graduates.

These activities were reflected mainly in establishing an operational model for a new Technion accelerator, and obtaining the required approvals (legal and infrastructure) to launch its activity. The expansion of T³'s activities was also reflected in the engagement with a number of universities around the world, to examine possibilities for technology commercialization cooperation. At the same time the unit has pursued its activities as in previous years, including:

- a. protecting the share of Technion ownership in existing companies (particularly companies in the field of life sciences);
- b. giving priority on commercialization of technologies featuring life-science elements;
- c. broadening activities aimed at identifying patents that are suitable for sale on the "fast track", i.e. via direct sales and not through commercialization;

- d. broadening activities to identify sources of funding from the European Union that offer the possibility of assisting in activities aimed at initiating and establishing new companies;
- e. broadening activities aimed at securing the Technion's rights in intellectual properties through alternative means (including examining the possibility of instituting legal procedures in relevant cases).

In addition to activities in the field of commercialization, the unit moved to the Center for Industrial Research Building (Malat), which thus became the Technion's commercialization building (five out of the six floors of the building accommodate various commercialization activities). We expect that the enhanced visibility and physical expansion will also further improve commercialization outcomes.

The number of applications for patents: - During the past year, 96 Technion researchers' discovery disclosure forms were submitted. Of these, 78 were approved for registration. Unfortunately, this year as well there was a significant lack of applications in the fields of life sciences (particularly medical equipment and new molecules), fields that traditionally provide a central source of commercial success for academic institutions in Israel and in the world. As in the past, this year the split between T³ and the Rappaport Institute and BioRap on the one hand, and the Rambam Medical Center on the other, creates difficulties in protecting Technion IP. This fragmentation leads to serious inroads in the scope of the properties at the disposal of the unit for commercialization.

Licensing Agreements: We signed 43 agreements for commercializing technologies developed by Technion researchers. Of these, 14 MOU's (Memorandum of Understandings) were signed in various fields: lung cancer diagnosis; security of distribution system; biomarkers for Parkinson; virtual patient project; sling load system; bacterial diagnostics; razor blade assembly with friction surface; face recognition sensor; cardiovascular disorders and renal failure; natural machine interface system; passive optical imaging and ranging and explosive detection. Six were licensing agreements with companies established on the basis of Technion knowledge in different fields (three just

began functioning), including: analysis for software development; encapsulation; robotic system for precise percutaneous needle placement for biopsy and therapeutic treatment; radar antenna; computational model for medical analysis and gel fuel. Seven "Magnetron" agreements were signed with leading companies in Israel, among them GE and Elbit and eight "Nofar" agreements were signed with companies such as Applied Materials and Totech.

Cooperation with the Alfred Mann Institute at the Technion (AMIT): The year 2014 was marked by the intensification of activities of the institute's companies. This was especially apparent for Accellta (a stem cell company) which during 2014 signed a number of licensing agreements and raised \$1.9 million. Sealantis (biomimetic glue) completed an MOU for raising approximately \$3 million from local and foreign investors. Sanoculis (novel glaucoma treatment) completed during this year its preparations towards entering clinical trials.

It must be noted that because of the need for the institute to clear out existing projects before it can take on new ones, the amount of work of the unit with the institute has decreased to a certain extent. Concomitantly, the volume of this activity with incubators and non-Technion bodies has increased.

Income from Commercialization: In the past year, the TRDF's income from commercialization and/or the actualization of the Technion's intellectual property rights amounted to approximately \$29.4 million (including the researchers' share). It is important to note that this income does not include income arising from the actualization of intellectual property rights following legal procedures, income from research agreements resulting from commercialization agreements, income arising from the refund of patent expenses and more. Income from these sources totaled \$2 million in 2014.

Investment in Projects: Considerable funds were invested this year in the enhancement of the Technion's intellectual property in order to bring it to the point where it can be funded by outside sources. The funds invested for this purpose amount to \$561,000. The

investment included \$521,000 from a fund earmarked for improving intellectual property (four projects); \$40,000 were invested from the Uzi and Michal Halevy Fund (two projects). Additionally, \$88,000 were invested in six different projects from an internal fund of the unit (Proof of Concept Fund). We hope that this new stream of investments in applied research projects will contribute in the coming years to a quicker and bigger maturation process for project commercialization.

As in previous years, this year the importance of the "Kamin" Fund, which functions under the R&D regulations and is administered by the Chief Scientist's Office, was notable. This year (2014), 22 Technion projects were supported by the "Kamin" Fund (new and continuing projects) for a total annual amount of NIS 8 million, a fact that underlines the importance of the fund as well as the scope of the potential of technologies developed by Technion researchers.

Fund-Raising by Technion Companies: This year considerable funds were raised by Technion portfolio companies (or those commercializing Technion-based technologies). It is noteworthy that the cumulative sum of the investments during the past four years for companies established on the basis of technologies developed at the Technion and at Technion incubator companies, amounted to \$260 million. These investments accentuate the faith of industry and investors in the potential of Technion-produced technologies.

During the year, 18 Technion companies, or those commercializing Technion-based technologies, raised a total sum of \$71.75 million. Among the companies which raised considerable amounts, the following were especially prominent: ReWalk Robotics (developing a walking device for the handicapped); Applied Immune Technologies - AIT (developing antibodies for cancer); Avraham Pharma (developing drugs to combat Alzheimer's disease and mild cognitive impairment (MCI)); and Cortica (developing image identifying technology).

As in previous years, this year the TRDF made efforts to protect its relative share in the various companies by participating in investments in keeping with its concomitant share.

The full amount invested by the TRDF within this framework in affiliated companies totaled more than \$661,000. Additionally, the Technion Investment Opportunities Fund, whose function is to invest in Technion-related companies in order to preserve the scope of Technion's holdings, invested approximately \$1.5 million in four companies. The largest investment this year was in Applied Immune Technologies (AIT), which is developing antibodies for cancer (developed by Prof. Yoram Reiter).

Infrastructure and Construction: As mentioned previously, during this year T³ moved to the Center for Industrial Research Building (Malat). The 5th floor was fully renovated and adjusted to the unit's needs. T³'s offices occupy 280 square meters. Thus, five out of the six floors of the building accommodate commercialization activities.

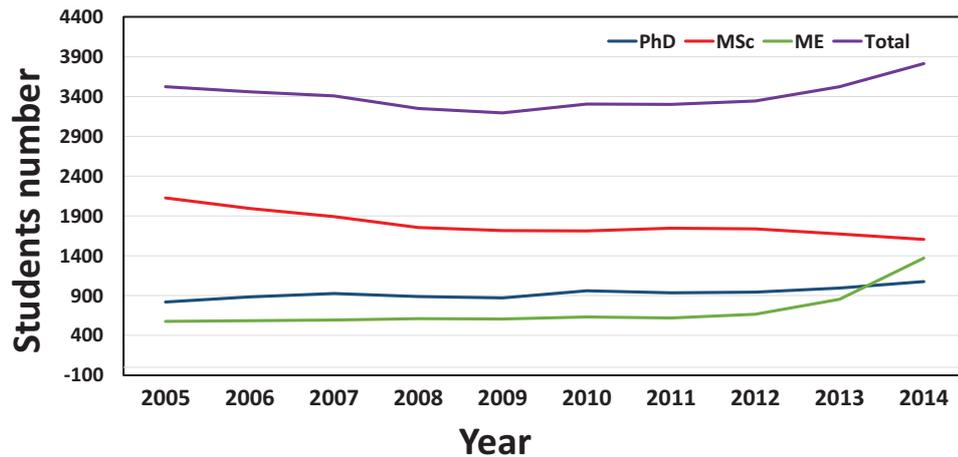
The Irwin and Joan Jacobs Graduate School

A strategic goal of the Technion is attaining a ranking among the top ten technological institutions in the world. Strengthening the Technion's position as a leading research university goes hand in hand with the graduate school's main goal, i.e. increasing the number of research students at the Technion in general, and Ph.D. students in particular. In this report, the current state of the graduate school student body is detailed and the actions needed for the graduate school to facilitate an increase in the number of Ph.D. students are outlined.

The current state of the graduate school student body:

1. *Very slow increase in the number of Ph.D. students in the past ten years* - As of March 2015 the Technion's graduate school body comprises 4,165 graduate students, of which 1,088 are doctoral students and 3,077 are master's degree students. During the past ten years we have witnessed a very slow increase in the number of Ph.D. students as evident in the figure below. Unfortunately, all the measures taken thus far to recruit outstanding graduate students to the Technion did not result in the desired change. Additionally, only 22 percent of the graduate students at the Technion are graduates of other universities. This is also true for flagship departments of the Technion, such as electrical engineering and computer science, which are rated among the top departments worldwide. This means that either: i) The Technion should be more proactive and competitive in recruiting Israeli students, or ii) The Technion has already reached the maximal number of Israeli students it can realistically recruit. It is indeed possible, that due to the relatively small population size of the State of Israel and the fact that the Technion has to compete with other top Israeli universities, a plateau in student numbers has been reached.

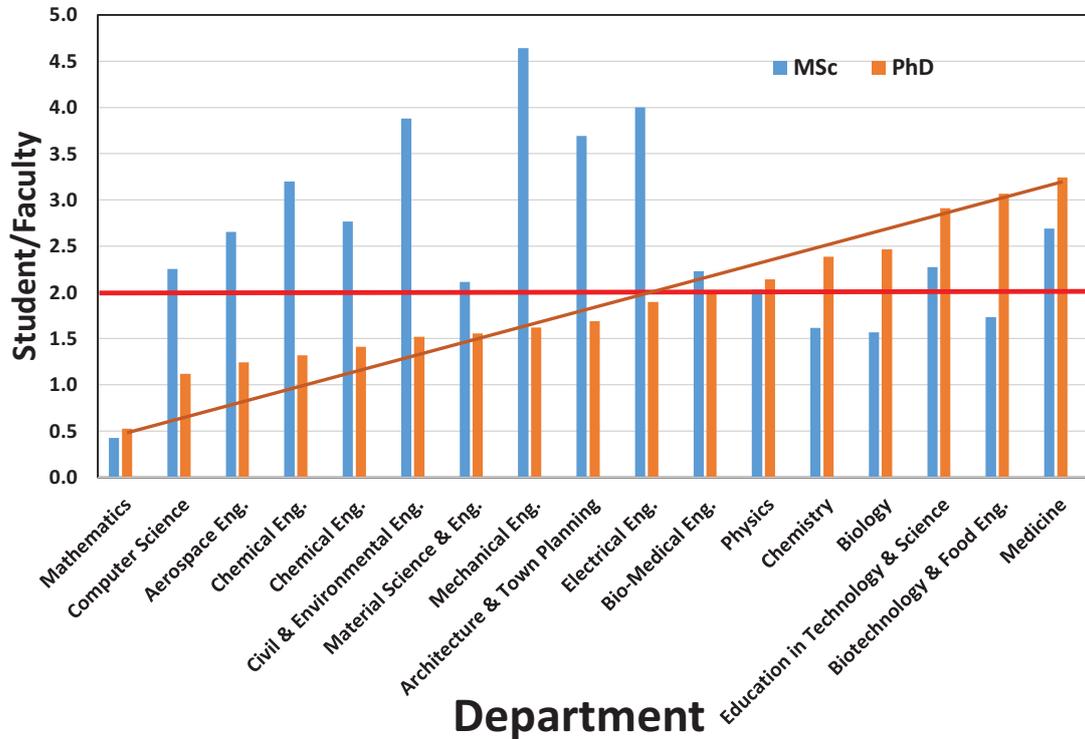
Technion Graduate Students 2005-2014



2. *Unhealthy ratio between Ph.D. students and faculty members* – Of the current 4,165 graduate students at the Technion, 1,690 are M.Sc. (with thesis) students and 1,088 are Ph.D. students. This means that the graduate school research students make up ~ 31 percent of the total Technion body. This ratio between graduate and undergraduate students is close to that reported for top-rated technical universities such as Georgia Institute of Technology (33 percent). However, the majority of the graduate students at Georgia Institute of Technology are Ph.D. students, while at the Technion, Ph.D. students constitute only eight percent. Additionally, the current number of post-doctorate fellows at the Technion is approximately 250. This means that the major graduate research force, i.e. Ph.D. students, are a rare “commodity” at the Technion.

There are close to 550 faculty members at Technion, which suggests that the Ph.D. student-to-faculty member ratio is ~2. This is not a healthy situation for a research university aspiring to be among the top-rated universities in the world. As seen in the figure below, the situation is somewhat less severe in the life-science faculties and more acute in the engineering and exact sciences faculties.

Student Faculty Ratio



In order to increase the number of research students at the Technion in general and of Ph.D. students in particular, several measures are either being implemented or explored.

Measures that were implemented

- i) *The graduate school guidelines were changed to encourage more M.Sc. (with thesis) students to transfer to the direct Ph.D. track*
 - Until recently, the official status of a student transferring from the M.Sc. to the direct Ph.D. track was changed only after passing the pre-doctoral exam. Under the new guidelines approved by the Technion's senate this academic year, a student is considered to be a Ph.D. student once candidacy for the transfer is proposed by the academic unit and approved by the graduate school. This resulted in a change in the students' self-perception, and entitled them to an

immediate raise in the scholarship level and an increase in salary as teaching assistants.

- Modern research is characterized by interdisciplinary collaborations. Consequently, there are increasing numbers of students who turn to research areas different than their undergraduate degree's specialization. As a result, these students are required to study supplementary courses, in addition to the required graduate courses. These are usually undergraduate courses that are quite demanding and challenging for graduate students coming from another discipline. This may lower their total GPA (grade point average), which might not meet the required GPA for the transfer to the direct Ph.D. track. Our new regulations enable the academic units to exclude these supplemental course grades from the GPA of the M.SC. degree. This minor change in guidelines enables more excellent students who have changed their specialization track to be eligible for transfer to the direct Ph.D. track.

ii) Increase in scholarship level

- The scholarship level at the Technion is not the same for all graduate students. Scholarships at the Technion vary from four to six monthly portions per student, where each monthly portion for a Ph.D. student is equivalent to NIS 1,280. The graduate school has recently changed its policy to enable the academic units to allocate up to seven or eight monthly scholarship portions to outstanding Ph.D. students. This level of scholarship is highly competitive nationwide for attracting excellent students.
- The graduate school has started to actively encourage the academic units to increase the starting value of scholarships. Namely, from four monthly portions to five for M.SC. students and from five monthly portions to six for Ph.D. students. This became possible due to a steady increase in the Technion's scholarships budget and due to an "active encouragement" of faculty members to allocate research funds toward financing part of their students' scholarships.

iii) New interdisciplinary study programs

Interdisciplinary graduate degree programs such as those in the fields of nanoscience and nanotechnology and energy are blessed with excellent students,

some of whom applied for graduate studies at the Technion specifically because of the interdisciplinary nature of these programs. Therefore, the graduate school supports and encourages initiatives for new study programs. New graduate degree programs in marine engineering and in innovation and entrepreneurship engineering are expected to materialize in the next academic year.

Measures to be implemented:

i) New graduate school marketing approach

Israeli graduate students are older than their counterparts around the world. Quite often they are married with small kindergarten-aged children. Both spouses must work for a living and they are often supported by their immediate family (child care, etc.). The Technion's location in the northern part of Israel, away from the heavily populated greater Tel-Aviv area, is disadvantageous in this respect. Living in Haifa is challenging for graduate students whose supporting family, in many cases, doesn't reside in the area. In order to compensate partially for the lack of immediate family support, the graduate school has to offer a comprehensive package to these graduate students. The package should include generous scholarships, subsidized housing, excellent kindergarten classes on-campus, and help in job opportunities for spouses. This package will be marketed next year, once the new kindergarten classes under construction at the graduate student village will be completed. Additionally, an initiative is in place for launching the construction of additional on-campus graduate students' apartments within the next four years.

ii) Actions towards intensive recruitment of international students – graduate study program to be taught in English.

As mentioned above, the number of research graduate students at the Technion is increasing at a very slow rate. Additionally, the low ratio between numbers of research students and faculty members places a constraint on the promotion of more research activities on campus. Furthermore, job opportunities for Ph.D. level graduate students in certain disciplines in Israel are limited. This means that the Technion should open its gates and be more attractive to international

students seeking graduate studies at the Technion, which is ranked very highly among the world's leading technical universities (ranked #78 overall and #42 in Engineering, Shanghai Ranking 2014). However, in order to actively recruit international students, the Technion must offer graduate studies in English. Currently, the official teaching language is Hebrew, and teaching in English is either at the will of the lecturer or the class. This leads to difficult situations in which international students need to actively ask for courses to be taught in English and when denied, are reluctant to confront the teacher or their classmates. The faculties are not able to impose teaching in English and therefore the Technion must use a proactive approach and change the academic guidelines. We think that the Technion is ready to teach in English. Most faculty members were trained abroad and almost all grant proposal and publications are submitted in English. In addition, it's beneficial for the graduate student to be taught in English as part of their professional training towards positions and occupations in the global environment characterizing the Israeli economy. Interestingly, close to 90 percent of the Ph.D. theses and 70 percent of the M.Sc. theses are submitted in English. Additionally, in a recently conducted survey that included over a thousand graduate students, more than 75 percent of them were either in favor or did not object to graduate studies in English. Moreover, about 60 percent of the undergraduate students did not object to studying in English in joint courses with graduate students (a survey of over 2000 students). Switching to studies in English will be beneficial not only for international students. It will also be very valuable to the success of Israeli graduate and undergraduate students in this "flat world" described by the Technion's honorary doctorate, Thomas L. Friedman. Switching to teaching in English is in line with the globalization policy of the current Technion management. Clearly, transition from teaching in Hebrew to English should be implemented gradually. Yet, the decision in favor of teaching in English should be made in the very near future.

Undergraduate Studies

The main effort this year was to implement the recommendations of the Committee for Review of Undergraduate Program Structure and Study Load, so as to achieve the expected positive impact on undergraduate learning at the Technion. Modification of the academic calendar to separate the periods of examination and studies has already been implemented this academic year, mainly by shortening the academic semesters from fourteen to thirteen weeks. Care was taken to ensure proper modification of the academic course load. Mid-term tests were reduced significantly. Measures to improve the preparedness of incoming students in the basic mathematics and science subjects were implemented and will apply to students starting their studies in the coming academic year. In order to review and improve evaluation methods and examinations an evaluation unit was set up in the Center for Promotion of Learning and Teaching, and activity is ongoing both on an individual basis with selected teachers as well as by workshops. A comprehensive academic evaluation of the undergraduate studies program has been initiated by several faculties, and will continue in the coming years.

On the administrative side, we extended the service provided by the centralized unit for scanning service of examinations to nearly half the faculties, with full coverage expected in about eighteen months. The “Big Brother” project, in which senior undergraduate students mentor the incoming students, was expanded to five faculties in the last winter semester and will be extended further in the coming academic year. In conjunction with the dean of students, a student accessibility center is being set up, which will include spaces for counseling, studies, and examination (computerized), as apt for students with disabilities.

The academic studies were set back this summer during military hostilities and *Operation Protective Edge* following rocket attacks from the Hamas-ruled Gaza Strip. This caught us at the beginning of the spring semester’s final examinations. About 1,000 students, mostly undergraduates, were called for reserve military duty. Students on reserve duty were provided with financial support and several aspects of academic assistance: remedial lessons and individual tutorials; an additional (third) examination period in all courses; the

possibility to choose the best of two grades in any course for which two examinations were taken; the possibility to request a textual grade (“pass”) instead of a numerical passing grade in two courses; and more. Some of these academic adjustments were also provided to the entire student body. In retrospect, some adjustments, in particular those provided for the entire student body, may be assessed as inappropriate academically. Recommendations in view of further occurrences will be undertaken.

The Center for Pre-University Education

Within the framework of its two units, the Unit for Pre-Academic Studies and the Youth Division, the Unit for Pre-Academic Studies carries out a wide variety of annual activities whose goal is academic excellence in the areas of science and technology. The students enrolled in the various programs seek to continue in the study of engineering and the unit exposes high school pupils to an enriched program in the area of science and technology.

The Unit for Pre-Academic Studies

The central activity of the pre-academic unit is the preparatory school which currently has an enrollment of approximately 550 students.

One quarter of the students in the preparatory school arrive independently to that framework of study. The remaining three quarters belong to programs supported by various philanthropic bodies.

Programs Receiving Support

1. **Ofakim for High Technology** – The students enrolled in this program come from peripheral areas of the country and their families are on a low socio-economic level; they are after military service and have completed 12 years of study, but they do not have matriculation certificates and have not yet taken the psychometric examination. This program is marketed by the Ministry of Defense – The Fund for Demobilized Soldiers. The essential criterion for being accepted to this program is to pass a personality test administered by the Adam Milo Institute as well as the results of a mini psychometric examination. Those who are accepted to the program begin a four month pre-preparatory course in order to prepare them to participate in the subsequent preparatory course. After completion of examinations at the end of the pre-preparatory course, the eligible students are accepted into the preparatory program where they also participate in a course to prepare them for the psychometric examination which they take toward the end of the preparatory program. Approximately 100 students each year are admitted to the Ofakim for High Technology Program. They are supported by the Ministry of Defense, the

Rashi Foundation and Yehuda Zisapel. These students receive a monthly stipend for living expenses as well as a framework of general support including tutoring, counseling and employment guidance.

- 2. Religious Yeshiva Students (Haredim)** – The students applying to this program must be “Haredim” (ultra-Orthodox) according to the definition of the Ministry of Education in order to be considered for acceptance. This program is marketed by the Pre-Academic Unit’s staff in cooperation with an external representative who is familiar with the various ultra-religious frameworks. These students undergo a four month pre-preparatory program following which the eligible graduates of the four month program are accepted into the Unit for Pre-Academic Studies program. The weaker students are referred to the preparatory program of the School of Practical Engineering of the Technion, thus all of those who begin the program will complete it with some sort of training in the scientific or technical field. At the Technion campus there are currently 45 male and 11 female students enrolled in this program. At the Bnei Brak College for religious students there are



Ultra-Orthodox Students at Technion Class

an additional 45 students who will continue their studies in the geo-information course. Furthermore, 18 students have completed the pre-academic program at the Technion this year and 13 of them have been accepted for study at the Technion according to the following breakdown: electricity and physics - 1, electrical engineering – 3, computer science - 2, civil engineering - 4, industrial management - 2, mechanical engineering - 1. This program is supported by the Technion as well as the non-profit organization KAMAH and Atidim HALAMISH.

3. **Atidim Leta'asiya (A Future of Engineering)** – In this program there are students from peripheral areas after their military service who have completed their matriculation studies, though with a low grade, and they have taken the psychometric examination. These students study for a period of 12 months. The program includes 35 students who are supported by the Technion “Atidim” program under the auspices of the Rosman Foundation. The students receive a grant for daily living expenses as well as extensive support to aid them in their studies.
4. **Atidim** – These students are graduates of high schools in peripheral areas who have matriculation certification and psychometric examination scores, but their grades do not allow them to be accepted to academic study. Consequently, they require an additional year of preparatory study in order to improve their grades. Sixty students study in this program and are supported by “Atidim” under the auspices of the Ministry of Defense. Because of their young age, these students are supported by a staff of counselors who accompany them in the after school hours, give them appropriate support, and help them in finding the best academic and free time combination of activities.
5. **The Co-eds of “Kidma”** – similar to the program mentioned immediately above, the group consists of 15 young women who are 18 years old and have completed their high school studies and are planning to complete their academic studies before enlisting for their military service. They come from all parts of the country, and

not only from development areas. This is a part of the Ministry of Defense program to select appropriate future female soldiers for the pre-army academic technological studies.

6. **NA”M** - Outstanding Arab Youth – Following six years of experience working with Arab students from Galilee villages, this year the “Atidim” organization (civil division) has ceased its support for this program as a result of the government not lending its support to the program (for those who have completed the program and have been accepted to the Technion). It is expected that in the coming academic year the “Atidim” organization will renew its annual support for this program which includes 50 students.

It should be mentioned that 65-70 percent of those who complete the Unit for Pre-Academic Studies are accepted for continuing study by the Technion. Of the students accepted to the Technion each year, 17-20 percent are graduates of the pre-academic program.

The Program for the Druze Community – In addition to the pre-academic program which is intended primarily for army veterans or high school graduates, the Unit for Pre-Academic Studies has spearheaded a program together with the Ministry of Education for the Druze community whose goal it is to achieve a number of Druze academic students which is proportional to the size of the Druze population. Approximately 600 students participate in this program from grades 7-12, while each of the six age groups has 100 participants. The activities of this program are carried out with the cooperation of the Division of Youth for Science. During their weekly visits to the unit, these young people receive enrichment in the fields of science and technology, research, mathematical thinking and improved language skills.

The Program for Students from the Ethiopian Community – Approximately 100 students from the greater Haifa area participate in this weekly program. They receive enrichment in several areas of study in order to advance them to the highest levels of their

schools. This program is supported by a private individual, and last year the Technion agreed to join in the financial support of the program.

Internet Courses – The Unit for Pre-Academic Studies in cooperation with faculty members from the faculties of chemistry, mathematics and physics has initiated an on-line course for students who have been accepted for Technion studies in order to assist them in certain academic areas which require strengthening. The course in chemistry is intended for students who have been accepted to faculties in which chemistry is a required subject so that these students will acquire the necessary tools in order to proceed with their studies. The mathematics course is designed for students who have not achieved the level of five units matriculation in mathematics and its goal is to raise the student's level of knowledge in this area before beginning Technion studies. This is intended to limit excessive pressures during the academic year and to limit the number of students who are not able to maintain an acceptable academic standing. The physics course is intended for students who have not achieved a five unit matriculation level in physics.

The staff of The Unit for Pre-Academic Studies includes 30 administrative staff, 32 instructors and approximately 40 tutors who provide students with additional academic support as well as 60 staff members in the Division of Youth for Science.

The Harry and Lou Stern Family Science and Technology Youth Center

The Harry and Lou Stern Family Science and Technology Youth Center aims to make science and technology attractive to youth and to enhance learning for middle school and high school age youngsters. The activities take place in the morning in the framework of special science days and in after-school clubs and courses. This is the eighth year in which the center is operating in the Arie and Jacqueline Carasso Youth Wing with nine well-equipped laboratories, modern classrooms and the large Amos and Shoshana Horev Auditorium, all of which enable the center to expand and enrich its programs. This year more than 30,000 students took part in a variety of science activities. There were 300 special science days in the morning and 60 groups that took part in after-school clubs and courses.

Additional Special Projects

The Future Scientists and Inventors Program - This program was inspired and endorsed by the former President of Israel, Mr. Shimon Peres, as a path to promoting scientific, engineering and technological excellence in Israel. Under the leadership of the Rashi Foundation and in cooperation with the Ministry of Education, the vision has been developed into an ambitious program to cultivate the next generation of research and development leaders in universities and in industry. The program identifies exceptionally brilliant and creative 8th grade students, who show strong motivation and a passion for science and technology, along with social commitment. They are offered the optimal conditions for realizing their potential through challenging academic studies combined with hands-on work in research laboratories. They acquire tools and skills for coping with complex programs in a cross-disciplinary approach, while also enjoying personal and group empowerment. Highly talented students from the northern part of Israel participate in a special program for future inventors aimed at fostering the best science-oriented students in junior-high schools. They study at the Technion one-and-a-half days every week for a four-year period. This year 51 students participated in this special program (26 students from the 9th grade; 14 students from the 10th grade and 11 students from the 11th and 12th grades).



The Future Scientists and Inventors Program

Sci-Tech - This annual international research summer camp for 11th and 12th graders, held at the Technion, is now in its 21st year. This is an opportunity of a lifetime for gifted

students to experience serious research opportunities guided by top-notch Technion researchers. The 43 participants in summer 2014 from nine different countries also enjoyed the sports facilities at the Technion as well as touring Israel.

Sci-Tech



TeLeM - Technion Promotes Mathematics - The TeLeM program is a joint program between the Pre-Academic Center and the Department for Education in Technology and Sciences. It aims to persuade children in grades six and up to study mathematics at the

highest level, to enhance their understanding of the subject and to encourage them to study at the Technion later on. This is the 16th year of the program's operation. Mathematics teachers who participate in the program receive special training on a regular basis. There are 600 pupils participating from eight schools in the north; the program is sponsored jointly with the Ministry of Education. The program also sponsors special competitions and a Math Olympics for all its students. Graduates of this program in the 11th and 12th grades are offered a chance to participate in academic studies at the Technion within the special framework for gifted high school students.

The Program for Integrating Exceptional High School Students into Technion Studies

– This program concentrates on the development of exceptional high school students in order to prepare them for academic study in the Technion in parallel with their high school curriculum, and allows them to receive credits toward an academic degree. We are aware of the great importance of the school environment and its central function in the framework of 12 years of mandatory study leading toward success in matriculation examinations. The academic integration of exceptional high school pupils is designed for those who are truly outstanding and are able to successfully integrate both high school and Technion studies. This is an especially challenging program and requires maximum effort on the part of the pupil in order to meet the demanding requirements of both high school and academic study. Participating in this special framework this year were 100 students who took a variety of academic courses.

This program includes the "from high school to Technion" program which is carried out in cooperation with the Faculty of Mathematics. Similarly, this program includes a cooperative effort with the Faculty of Chemistry in the framework of the "Archimedes Program".

The Ort - Technion Classroom - This is a joint program between the Technion and Ort Schools for outstanding pupils. In 2014 there were 13 classrooms in the framework of the program with a total of 400 pupils. The program takes the pupils from 7th to 10th grades until they enroll as full time Technion students and it includes preparation courses for academic studies such as scientific research skills, logical thinking, scientific and

mathematical thinking, introduction to the Technion and academic courses in biology. Some of the high school participants will be admitted to the Technion as regular students in a special early-registration process for gifted students.

The youth center expanded this special program for an additional two schools in the northern part of Israel. This year there were four classrooms in the framework of the program with a total of 100 pupils.

World Ort – Kadima Mada - Anier Program - The idea of this program is to expose pupils from grades 9 to 12 to pre-academic scientific content and, together with the Ort – Kadima – Mada Program and Nahalal High School, it is slated to continue for 10 years.

This program begins in 9th grade with immigrant groups of boys and girls who come to Israel without their parents and live in a residential setting in the Nahalal Youth Village. In 10th grade this group is joined by an additional group which comes from the peripheral areas of Israel.

Other Youth Advancement Programs

The Center for Pre-Academic Studies sponsors several other outstanding programs aimed at enhancing academic potential among a variety of groups. Some are sponsored jointly with other organizations and institutions and together they are making a difference for many talented and disadvantaged groups of middle and high school students in their aptitudes and attitudes towards the study of science, math and technology.

Mathematics Summer Camp - A two-week camp for 9th—11th graders, in cooperation with the Technion's Faculty of Mathematics and the Youth Activities Center, aimed at advancing the level of talented pupils. This year 20 students participated in this summer camp.

The Ofanim Science Program - Inaugurated last year, this program is sponsored jointly with the Ofanim Organization and is designed to encourage scientific and technological studies for 5th and 6th graders in outlying towns. There were 97 participants this year from

Tiberius and Acre that took part in activities held in the Technion youth laboratories as well as in a bus that has been re-fitted as a robotics lab and travels to outlying towns.



Summer Science Activities

Summer science activities - Special intensive summer study for two and a half weeks for 5th to 12th graders from all over the country, aimed at familiarizing participants with academic science studies and with the Technion. This year 900 students participated in the summer activities in 50 different groups.



Summer Science Activities

Student Affairs

The Dean of Students has the responsibility of dealing with issues relating to the welfare of Technion students. The current dean for the last two years is Prof. Moris S. Eisen from the Schulich Faculty of Chemistry.

The Office of the Dean of Students activates six professional units whose responsibilities are to support and help the advancement of the students. In all the activities, these units serve approximately half of the student population. Among our goals are: helping to ease the gap for minority groups, helping students deal with difficult times and crises, increasing the number of students from peripheral areas, decreasing the dropout rate, raising point averages and integration into the marketplace.

We do our best to assist as many students as possible in all possible ways, including, tutorial programs, counseling, housing and financial assistants.

The Unit for Personal Assistance offers help and guidance to students in financial distress. We have a unique project for high potential new students, which has proven successful by personally accompanying the new students from the registration stage till the end of first academic year.

Among the aid that the unit offers to all undergraduate students: scholarships for students from low socio-economic background, loans at no interest, special help and personal consultation for students who are called to IDF (Israel Defense Forces) reserve duty.

Beatrice Weston Unit for the Advancement of Students offers counseling services to students who have difficulty studying due to difficulty in adjustment, lack of study skills, heavy study loads, vocational choice, personal or family problems, learning disabilities or physical disabilities. In addition, the counselors give support and advice to new immigrants and students serving in the army reserves. The counselors help the students to identify sources of distress and advise them in finding efficient ways to cope with the academic requirements. The services include personal counseling, workshops, tutorial programs,

special accommodation for physically challenged and learning disabilities, special meetings and lectures.

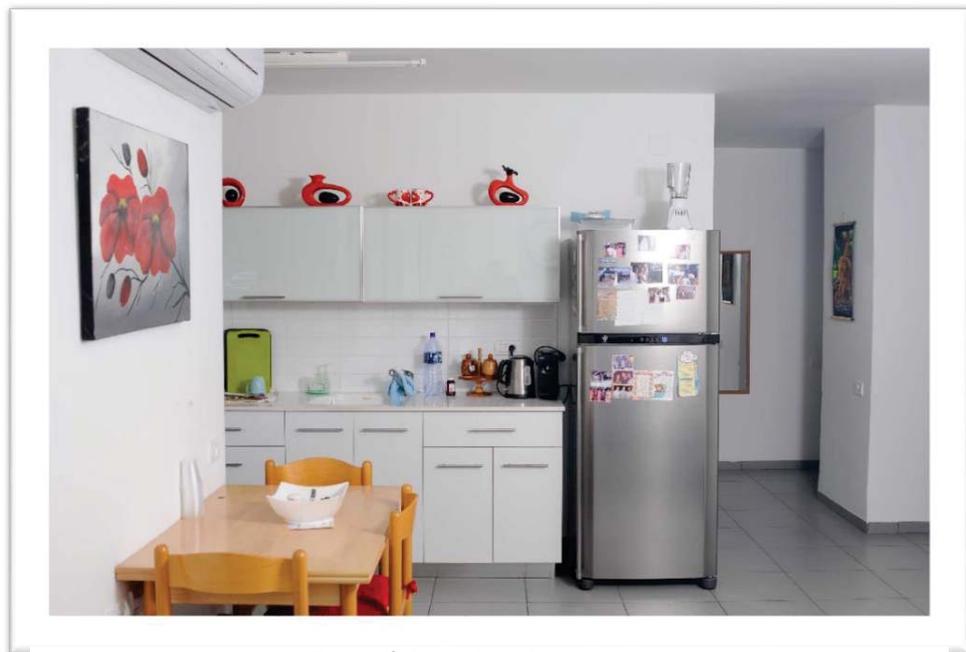
In addition to the individual counseling the unit's staff operates a number of social projects aimed to minimize academic and social gaps between freshmen at the Technion. A unique comprehensive model of absorption was developed to meet students' special needs. The model of absorption is based on three elements - personal tutor (mentor), academic workshops and individual counseling

Professional Career Unit and IAESTE (International Association for the Exchange of Students for Technical Experience) provides professional and career guidance to students and graduates. The unit organizes job fairs, career spot days and many major activities.

The Phillip and Francis Fried Counseling Center offers a professional team of skilled clinical counselors, therapists, social workers and a psychiatrist for the benefit of the student population. Over the last few years there has been an increase in counseling requests from students and therefore we urgently need an expansion of the center. With the support of the Southern Palm Beach Chapter of the American Technion Society, we are in the process of adding an adjacent building to the center thus doubling its working area and enabling us to serve the students faster.

The Unit for Social and Cultural Activities works in collaboration with the Technion Student Association to provide social and cultural activities for both undergraduate and graduate students. Many programs are run daily including evening clubs. It is our vision to continue these important social operations in order to ease the academic pressure and to enhance the Technion's students' leisure time.

The Student Housing Unit offers housing solutions to about 3,800 students. Although the Technion is a leading university giving housing to its students, we are missing many beds to accommodate the need. By increasing the number of housing solutions, we will be able to increase the number of undergraduate and graduate students at the Technion. The new TGIT (Technion-Guangdong Institute of Technology) project requires that we be ready with accommodations for the new students/faculties.



Kitchen/Dining Area in New Dorms

Ongoing Special Projects

Student Housing – A new undergraduate village housing project is underway; a major intersection has been completed at the entrance to the new village, foundations have been laid and there are new plans for additional housing solutions for our Technion students. We continue our long-term project to upgrade the old dormitories and finish the air-conditioning of all dormitories.



New Dorm Project Rendition

Scholarships – As a result of the global financial situation, we have awarded scholarships, all sponsored by donations, to approximately 30 percent of undergraduate students. The maximum amount that can be covered by Technion scholarships is 80 percent of the tuition fee. Many students receive additional financial aid from external non-profit private organizations and foundations. These organizations have actually increased their grants for Technion students in recent academic years, due to our initiative and effort to enhance these sources. Unique scholarships are provided to our students who are discharged soldiers and reservists as a result of our successful partnership with outsourced funds.

Over the past few years, students with excellent abilities from lower socio-economic backgrounds and/or from the periphery of Israel have been admitted to the Technion. They have been enabled to start their studies at the Technion due to their applying for and receiving financial aid (scholarship assistance). Most of these students receive general assistance throughout their studies.

Loans – The Technion offers student loans of NIS 15,000 without interest. Last year we awarded loans to 320 undergraduate students. In addition, Magbit Foundation loans in the amount of \$2,500 each were awarded to 60 students.

Reservists – The Technion is recognized by the student community as a supportive institution. This past year we assisted approximately 1000 students taking part in *Operation Protective Edge* and about 1,400 students serving in the reserves throughout the academic year. We provide a wide range of services through the academic year and unique services on special operations, as was the case this summer. The services are provided beginning with the period before their service (V.A.L.T.A.M), during their reserve service (Net Sticks), and after their return to the Technion. We offer a wide variety of special services such as personal consultations, tutoring to help out with the study material that the gap created, academic credits, non-tuition summer semesters and scholarships. We offer our students Net Sticks, which are cell modems with a secure ID for remote access to the Technion, to be connected to all internet services that are provided to students on campus including online lectures, videos, mail etc. We continue working towards implementing the reserve-duty website.

Operation Protective Edge – Tzuk Eitan - This summer, 1000 of our students took part in *Operation Protective Edge*. Side by side with the wide range of benefits given by the Technion to reservists, we provided additional support to our reserves students who took part in the operation. The services were provided on their return from the battle and included: special scholarships, individual tutorials, tutoring in classes, counseling services and rent reimbursement for dormitories. Our counselors provided broad educational and emotional support services in order to meet the reservists' special needs and minimize academic gaps. We helped the students refresh their knowledge by individual tutoring and workshops. The academic assistance was given to the reservists as well as to students whose family residence is in the south of Israel, near the battle zone. Counseling support was provided to many reservists in need.

The ATIDIM (Futures) Project – This project assists high school graduates from Israel's periphery with low socio-economic backgrounds who have received permission to postpone their military service in order to attain an academic education in engineering or

science. This program is in collaboration with the IDF. This year approximately 75 students started the program at the Technion.

Students from Ethnic Minorities – A special project is underway to help ease the absorption and adjustment process of first-year students from minorities. These students face many difficulties due to language problems, cultural unfamiliarity, feelings of alienation and lack of learning skills. The goal of the project is to reduce first-year dropout rates among these populations and help them to excel. In the current academic year, 400 students were assisted by this project. Our model for absorption of these students was adopted as a working model for all Israeli universities by the Israel's Council for Higher Education. Last year we translated into Arabic our special “Study Differently” booklet and distributed it to all our students whose mother tongue is Arabic. This year we carried out a special program aimed to encourage outstanding Arab students.

The Support Center for Students with Disabilities - The Technion, in cooperation with the National Insurance office, will establish a support center for students with physical, mental and cognitive disabilities. The center will include staff professional members who specialize in helping individuals with disabilities. The center will contain classrooms with the unique necessary equipment.

The "Ofakim" (Horizons) Project – This project was described in the section on the Center for Pre-university Education (see page 94). It is targeted at discharged soldiers from the periphery who have completed the Technion preparatory program. The project is co-funded by the Ministry of Defense and the Zisapel families. This year 35 students were admitted to the Technion under this program. The unit's staff runs a special project to support these students, which includes academic and social tutors.

Rosman Atidim for Industry - The project aimed to facilitate the absorption of discharged soldiers from the periphery and underprivileged backgrounds. It operates with the collaboration of various industries and companies members of the Israeli private and public sector. In the current year 45 students were assisted by this unique program (see page 96).

Haredim (ultra-Orthodox) Students - The counselors support this special group of students to adjust to the Technion's heavy study load and give them individual counseling, tutoring and group discussions.

Freshmen Mentoring Project - According to the resolutions taken by the committee of study load, a special new mentoring project aimed to facilitate the adjustment of freshmen is carried out in the following faculties: computer science, physics, biotechnology and food engineering, biomedical engineering and chemical engineering. The counselors support the project by providing training of mentors, guidance and follow-up.

Professional Employment Projects - This year we organized two technical job fairs with the participation of 100 companies. These employment fairs are among the largest in the country, reflecting the Technion's leading position as a major human resource provider for the high-tech industry. In addition, nine Career Spot Days for recruiting and interviewing potential employees were held. Seven workshops for resumé writing and job interviewing were run. One company tour and two employment preparation lectures were also given.

Technical Training Abroad - The IAESTE exchange students program unit helps to place students who wish to go for technical training abroad over the summer months. Last summer, 71 students went abroad on professional training. The same program allows students from abroad to gain experience at the Technion and in Israel. Unfortunately due to *Operation Protective Edge* the program couldn't operate in Israel during the summer of 2014.

Social and Cultural Activities – This year our activities included student bus trips and excursions to the Golan Heights and the Upper Galilee. We continued Kabbalat Shabbat events and faculty parties and initiated a Students Improvisation Club that, due to its success, meets 3-4 times a week. In addition, we initiated get-together events and parties for Israeli and international students

Computer Labs and Lounge at the Dormitories - The computer labs and community centers at the Canada dormitories and Heller center are equipped with updated technology and networking to provide the best environment for the students and the dormitory tenants

24/7. The computer labs and study area are in high demand throughout the school year and especially for final exams at the end of the semester.

“Lively Campus” – This year the Lively Campus project promoted a second-hand yard sale, an outdoor music show, a Chanukah event, an international students evening and more. The interactive map's locations database was embedded into the Technion App.

Community Projects – About 350,000 hours of community service were contributed by about 30 percent of the undergraduate student population. The community-related activities were associated with various frameworks such as PERACH – Big Brother program.

K.A.A.T is one of the programs operating, in which Technion students reach out to about 300 junior high and high-school students from lower socio-economic groups and peripheral areas. The Technion students assist them with their science and technology-related studies.

The M.A.T.A initiative, a collaborative effort shared by the Haifa Municipality, the Ministry of Education and the Technion, sends 40 students to provide assistance in mathematics to students in 4th and 5th grades from various Haifa elementary schools. All our projects aim to reach weak population and minorities in the Haifa region.

Technion Student Association - TSA

TSA – The Technion Student Association has been working tirelessly during the past year for the benefit of the students in multiple channels:

Operation Protective Edge – (see also page 15) The operation began in the midst of the 2014 spring semester's first examination period. Nearly a thousand students were drafted to reserve duty and were thus unable to attend exams, while rocket fire and fragile security conditions disrupted the lives of most of the remaining students. Though understaffed during the operation as a result of drafting of many of the officers and representatives, the TSA operated intensively throughout July and August to assist students and support other causes.

- The TSA maintained constant contact with the students in reserve duty and at home and reflected needs and difficulties to the Technion management that arose as a result of the situation. Based on this information, the TSA handed the Technion management its recommendations for coping with the situation during the operation and afterwards to minimize negative academic effects on students.
- During the operation the TSA supported the nationwide effort through several initiatives. These helped some causes that arose during the conflict, and provided a means for students wishing to contribute:
 - Using thousands of shekels collected from students and Technion workers, TSA activists prepared hundreds of packages for soldiers containing underwear, energy bars, personal hygiene products and more. The packages were delivered to units serving at the front.
 - Support was organized by various means to families (spouses and children) of student reservists who were drafted.
 - Packages with treats and games for children living near the frontline were prepared and delivered in collaboration with our colleagues at Sapir College in Sderot.
- Following the operation, the TSA organized groups of tutors to help students who were enlisted during the exams to prepare for the second exam period in September. In addition, the TSA aided the Technion in recruiting extra personal tutors for the reservists to satisfy the overwhelming need.

- “Welcome back” packages, with various gifts and benefits were prepared for students who served in the reserves during the operation to acknowledge their



Preparing Packages



And Receiving Them

contribution and sacrifice. The packages were distributed personally, and TSA representatives met with hundreds of reservists consulting with them on their benefits and rights.

Academics –

- During the summer of 2014 the first station for free viewing of scanned exam books was set up in the Shalom Zielony Student Union Center. The station was set up by the TSA in collaboration with the Technion's Division of Computing and Information Systems, following the TSA's request. Nonetheless, it should be noted that it was plagued with delays, and the relatively simple project took nearly a year

to complete with several disabling failures occurring after installation. Needless to say, more stations are required to properly meet the needs of all the students. It should also be noted that some academic institutions in Israel allow exam books to be viewed from any computer (and not just from special stations).

- Following the recommendation of the Technion Committee for Review of the Undergraduate Program Structure and Study Load, the reduction of the academic semester from 14 weeks to 13 weeks became effective in the 2014 fall semester. The historic reform was embraced by the TSA, but is yet to be properly applied. While some course staffs took proper measures to accordingly reduce course materials, many staffs did not do so and courses remained with a 14 week curriculum, actually increasing study work load during the semester rather than reducing it. Effective regulation needs to be implemented to ensure that curriculums are adapted to the shorter semester to properly reduce the study work load, as intended by the committee.
- Following TSA request, the permitted leave for students giving birth was lengthened to meet the requirement of the Israel Council for Higher Educations. The reform was approved by the Senate committee with the support of the Dean of Students Office.
- The TSA undertook to tackle the widespread issue of tardy publication of exam results. Although recently revised and updated to a realistic 10 days, with the consent of the TSA, the regulation stating the maximum period of time for exam grades to be posted following an exam is regularly disrespected. As course results are needed to properly plan study schedules, this has a very negative effect on students. The TSA has been leading a campaign to better enforce the regulation and sanction lecturers who do not fulfill the requirement. In early 2014, the TSA compiled and posted a list of lecturers who broke the regulation and delivered exam results with delays of up to several weeks. The list was reported to the Technion management along with a request to address the issue.
- Following a TSA request, "Upgrade", the Technion's system for posting exam and course grades, has been upgraded with the help of the Division of Computing and Information Systems. The upgrade improved the interface, and in the new version

delivers e-mails to students notifying them of new updates to their grade sheet. The new features are of great service to the students.

- As a result of dissatisfaction with the current methods for evaluating teaching staff, the TSA has begun research on the subject, in collaboration with the Center for Promotion of Learning in Teaching. The TSA will present the Technion management with recommendations for reforms that will better incorporate various criteria that are currently disregarded in the present evaluation process.

Everyday Life – The TSA has continued its efforts to improve the everyday life of students on the campus, amongst them:

- The TSA continues to keep its prices the lowest nation-wide in the following: laundry, soft drinks, coffee, sandwiches, photocopying and printing.
- The TSA initiated a Technion-wide upgrade of all 200 automatic vending machines that was completed in the spring of 2014. The upgrade features new machines, a wider variety of products (soft drinks and snacks) and lower prices. The yearly student survey conducted by the National Union of Israeli Students cited the Technion as boasting significantly lower prices than all other institutions in the country – e.g. Coca Cola cans for NIS 3.50 (~\$0.90) and mineral water for NIS 2.80 (~\$0.70). The last phase of the upgrade is about to take place, with installation of machines which dispense freshly ground coffee for a mere NIS 2.50 (~\$0.60).
- The upgrade of the entire photocopy-printing network was commenced. The new services are now slightly cheaper, with an added discount for duplex printing to encourage paper usage reduction. A new feature enabling students to print documents and files from any computer or mobile device, at any location, is the highlight of the upgrade.
- Reforms in the Shalom Zielony Student Union Center were commenced with new vendors chosen for some establishments. Notably, a new coffee shop ("Coffee's") has opened doors and features an entire menu at NIS 5 (~\$1.30) – including quality coffee products, hot and cold beverages, sandwiches and pastries. Also, a mobile accessories-and-repair shop and a branch of the Technion print shop opened for

business. The TSA continues to monitor the needs of students to properly adapt the Student Center for their needs.

- The TSA maintains efforts to improve public transportation to the Technion. The end of 2014 saw the inauguration of a new public bus line connecting the Technion with the central bus and train station for southbound commuters (Carmel Beach station) via the Carmel tunnel, offering a quicker route for students and workers. The project was enabled thanks to collaboration between the Technion transport officials and the TSA. Currently, focus has been put on adjacent neighborhoods lacking direct bus lines. The TSA conducted a survey and proposed an improvement to transportation to the neighborhoods.
- In accordance with requests in the previous BOG, the TSA is now formally a part of tender committees for all food service businesses in the Technion, in order to properly represent students' needs in the selection process of food services around campus.
- Plans for renovation of the 4th floor of the Shalom Zielony Student Union Center are well under way. The new level will increase the total public space available for students on campus, with an emphasis on productive study areas, which at times are at a premium.
- The TSA-Store was launched - an online sales platform, with a new and branded system (store.asat.org.il). All online transactions (e.g. party tickets, study courses) are conducted through the modern website which features up-to-date security. The website was also utilized to sell Technion-TSA branded products such as jackets and shirts, and more products are planned, promoting school pride.

Sports – The Technion’s sports unit, which is fully operated by the TSA and is a shining model to other universities in Israel, has continued its diverse activities to promote sportsmanship amongst the students.

- The sports unit now operates 140 sports courses, each worth one academic credit, and 64 competitive sport teams each worth 1.5 academic credits. This past year, 5,000 students took part in these sports courses. In 2014 a new kart racing course and team was opened in addition to the dozens of existing sports.

- The TSA sports teams took part in all national tournaments, winning first prize in men's, women's and general rankings for the second year in a row. In a ceremony for outstanding athletes a total of NIS 90,000 was given away as scholarships with the cooperation of the Dean of Students Office.
- "Technion Challenge" – A faculty wide sports tournament was held in nine different sports fields with a thousand students participating. At its height, the Technion's president gave the winning faculty the President's Cup and a prize of NIS 15,000 to be used for cultural events. Scholarships were distributed amongst the winners of the different competitions in a sum of NIS 45,000 by the Dean of Students Office.
- As part of the "Technion Challenge", the sports unit sponsored the participation of Technion students in the Haifa race. Eight hundred students participated in the race, an astounding 20 percent of all runners, and the Technion's presence in the regional event was dominant. In April 2015, the first race within the Technion campus took place with thousands of students, workers and visitors participating



in the event, which was very successful.

Social Life and Community -

- The TSA continues its commitment to the environment. In every TSA event a stand is in place that encourages students to recycle their plastic cups in return for prizes – with thousands of cups recycled in events in the past year. The TSA maintains the can collection system throughout the campus, and a beach cleaning initiative commenced during the summer, with litter collected from a stretch of beach south of Haifa by dozens of students.
- The computer renovation program conducted by the TSA ("Melech") recycles old computers and donates them. Old and malfunctioning computers collected from students and workers are refurbished and donated to various institutions or students unable to purchase personal computers. Nearly 200 computers were refurbished and donated in the past year.
- The TSA has engaged in various voluntary activities for the benefit of the students and the community as a whole. A "volunteering festival" took place at the beginning of the fall semester, with the support of the Technion and the Haifa City Council in which students were exposed to a number of associations and volunteer groups in order to encourage them to volunteer as part of the "Volunteering=Credits" project (in which a student receives an academic credit point for volunteering). The TSA is also connecting students who want to volunteer once with institutions in need of help.
- A volunteer camp for youth was held in the Technion campus during the summer in collaboration with a youth center from the Hadar neighborhood and several external organizations. The camp, for under-privileged children and teens, included activities in the Technion pool, creative workshops, games and more. The camp was led by the TSA and supported by the Technion pool and the physical education unit.
- The Shabbat on campus program continues to prosper. Every couple of weeks a Shabbat dinner with a sing-along is held for students who stay on campus during weekends. The project is carried out with the Dean of Students Office and the Technion's Rabbi and has been very successful, with feasts organized of up to a hundred diners, hosting local as well as international students.

- Field trips in collaboration with the Dean of Students Office were organized in the past year, bringing together dozens of local and international students in a unique social atmosphere, visiting sites around the north of Israel.
- Several classes of activities appealing to a more mature crowd have been added to the TSA's activity list, mainly to cater to graduate students who are generally older in age. These activities include wine and cheese tastings, sushi workshop, bowling evenings (usually in small groups) and more.
- The TSA's Student Support Fund which is funded by the TSA itself as well as donors has been helping students to purchase medication that isn't covered by health services when needed, to purchase hearing aids for hearing-impaired students and in collecting furniture and baby products for student-parents in need of such help.

Cultural Life – The TSA has continued its efforts to give the students a rich cultural life right on campus.

- Now fully licensed, the Shalom Zielony Student Union Center event area hosted monthly parties throughout the spring and fall semesters of 2014, some events hosting nearly 3,000 students. The 2015 New Year's Eve party was cited as the largest party held that night in Northern Israel, and the largest self-produced by a student association.
- To meet the strictest safety requirements, an emergency lighting system was installed at a cost of NIS 90,000 with the aid of the Technion.
- The 2014 Student Festival was a great success in which top performers from Israel took part, and it was attended by over 20,000 students for over two days. In the 2014 festival the TSA teamed up with student unions from the University of Haifa and from three local colleges (Oranim, Gordon and WIZO). The collaboration enabled the TSA to organize a top-class music event, arguably the largest student event in the country, while maintaining a symbolic fee for Technion students.
- Alongside the huge party events, the Shalom Zielony Student Union Center hosted dozens of small events to cater to a wide variety of tastes. Among them are enrichment lectures in various topics, recent and classic film screenings, dance

evenings and small parties. The lectures are traditionally without charge for the students, and during 2014 the entrance charge for movie screenings was cancelled, relying on confectionary sales to cover costs.

- The past year saw a significant increase in activities for children of students, such as activity days, animated film screenings, holiday children parties, afternoon activities for young children and babies, and more. The TSA utilizes existing tools and resources to organize these activities, and the increase is part of the ongoing effort to improve services to graduate students, many of them parents.

Administration and Finance

Israel's Economy in 2014 ¹

Even for Israel, the year 2014 was especially eventful. According to the Central Bureau of Statistics, Gross Domestic Product (GDP) increased by 2.6 percent, down slightly from the 3.2 percent growth of 2013 but still above the 1.8 percent average of the 34 OECD (developed) nations and slightly above that of the United States (2.2 percent). However, GDP per capita rose by 0.7 percent, less than the OECD average, since Israel has faster population growth. The fastest growing sectors were: communications and information (8.9 percent) and financial and business services (5.8 percent). GDP growth was led by a 3.8 percent rise in both public and private consumption, offset by a 1.4 percent decline in gross capital formation.

Government defense spending rose by 7.8 percent, in part owing to *Operation Protective Edge*, while government civilian spending rose by 2.5 percent. *Operation Protective Edge* lasted for 50 days, from July 7 through Aug. 26, and effectively shut down all economic growth in the third quarter. But the economy bounced back from the long Gaza War in the fourth quarter, with GDP growing at a robust 7.2 percent during the last three months of 2015; business-sector GDP grew even faster, at 8.8 percent.

The government budget deficit in 2014 was three percent of GDP, about the same as in 2013. Public debt, as a percent of GDP, was 65 percent, a level regarded as financially stable.

Export growth was weak, 0.6 percent, compared with 1.5 percent in 2013, reflecting weak demand in global markets. Imports rose by 0.9 percent. The import surplus (gap between imports and exports) was over \$13 billion.

The shekel-dollar exchange rate began 2014 at NIS 3.47 per dollar, fell to NIS 3.40 in late July, then rose to nearly NIS 4, a depreciation of 14 percent, ending the year at NIS 3.89

¹ This report was prepared by Prof. (emer.) Shlomo Maital, senior research fellow at the S. Neeman Institute, Technion.

per dollar. The shekel-euro exchange rate began 2014 at NIS 4.78 per euro and strengthened by 1.2 percent during the year.

The year 2014 was the first since 2006 when gross fixed capital formation (investment in real assets) declined, by 2.7 percent.

Unemployment in 2014 was 5.9 percent of the labor force, among the lowest unemployment rates in developed countries. However, Dr. Karnit Flug, Governor of the Bank of Israel, warned that much of the job growth was in the public sector.

With regard to inflation, the consumer price index actually declined in 2014, by 0.5 percent, the first such decline since 2006. Normally, such deflation is a cause for concern, as it is currently in Europe. But Israel's deflation is mainly a result of the effect of lower oil and energy prices, not weakness in demand.

Israel's money supply (known as M1) grew by 22.7 percent in 2014. The Bank of Israel maintained its policy of aggressively lowering interest rates to stimulate the weak economy and forestall the rise in the value of the shekel relative to the dollar. The Bank of Israel has slashed interest rates from 5 percent in December 2006 to 0.10 percent (essentially, zero) in February 2015, the lowest in Israel's history.

Critics claim that low interest rates have helped fuel Israel's housing price bubble. House prices increased by 5 percent last year, and have risen by more than 50 percent since 2008. The Bank of Israel estimates that it now takes 148 average monthly salaries to buy a dwelling, or 12 years' work, compared with 66 monthly salaries in the U.S. This, together with the high cost of living, remains a hot issue. The Bank of Israel's Research Department found that a typical basket of basic products is 12 percent more expensive in Israel than the average of the 34 OECD countries, while average wages are \$10,000 lower.

The year 2014 was a record one (for a decade) for aliyah; some 26,500 olim arrived in Israel, 32 percent more than the previous year. The largest number came from France, 7,000, double the number in 2013, and from the Ukraine, 5,840, three times the number in 2013.

The Tel Aviv 100 Stock Index rose by 5.6 percent in 2014, reaching 1,289 points. Long term government bonds also rose sharply in 2014; ten-year government bonds rose 14.5 percent, while corporate bonds rose, then fell, and returned to 2013 levels.

Many startups were acquired in 2014, totaling \$4.3 billion. The pace of such 'exits' accelerated in January 2015, when six startups worth \$862 million were bought in a single month by global firms. The 19th Knesset was disbanded in December, and new elections scheduled for March 17, without passage of the 2015 government budget. This has introduced major uncertainty into the economic climate; the 2015 budget awaits the formation of a new government and is unlikely before June or July.

Budget and Finance

The budget is made up of two categories:

1. The **operating budget** - which covers all of the Technion's operational activities, including staff emoluments and pension payments, student fellowships and scholarships, maintenance and other expenses.
2. The **development budget** - financed almost entirely from donations and gifts is used to develop and upgrade the Technion's infrastructure, research and teaching facilities and establish new research centers and programs.

The financial activities also cover Technion's investments and pensions.

The Operating Budget

About seventy percent of budgeted expenses are for staff emoluments and pension payments. On the other hand, about the same percentage of this budget is covered by the government's allocation. The support of the government is transferred to the Technion, as to all others Israeli universities, via P&BC, the Planning and Budgeting Committee of the Council for Higher Education. This council was established to ensure Israeli universities' academic freedom and protect them from political involvement in higher education. It receives funds from the Israel Government Ministry of Finance and distributes it to the various educational institutions.

This year, 2014/2015, is the last year of the P&BC revised Five-Year Budgeting Plan for academic institutes. This plan includes increased funds allocated to the universities. It also includes several changes in its previous budgeting model. The most significant change is the emphasis on decreasing the student per faculty ratio, and targets to achieve this goal were set. This change is expected to have a direct effect on research and teaching quality.

The Technion managed to recruit 150 new senior academic faculty members over the past five years. In 2014/2015, the Technion continued with a moderate increase in senior academic positions, which reflects new management priorities and an adjustment to the PBC's new budgeting model.

Last year, the Technion's student body numbered around 13,700 (undergraduates and graduates), continuing the trend of increasing the number of doctoral students. The increased senior academic positions and new faculty recruitment will reflect on the students per faculty ratio and will result in enhanced academic quality and strength. During the past ten years, the technical and administrative staff was reduced by about 10 percent. The general approach is to reduce administrative positions and steer some of them to engineering positions.

The 2013/2014 Budget Year

The 2013/2014 budget year ended with a deficit of NIS 34 million, in keeping with the budgeted deficit. The deficit will be covered by withdrawals from Technion's reserves.

The 2014/2015 Budget Year

The 2014/2015 budget framework is NIS 1,407 million. It includes an increase of NIS 29 million for growth and expansion of academic and other related activities and a NIS 34 million deficit (about 2.4 percent of the budget framework). The expenditures are classified into five main categories, as shown below (in NIS million):

Salaries	734	52%
Pensions	256	18%
Student fellowships, scholarships, etc.	106	8%
Maintenance	126	9%
Others	185	13%
Total	1,407	100%

At the same time, the main income components of the budget are (in NIS million):

P&BC	968	70%
Tuition	121	9%
Societies	63	5%
Self-income	221	16%
Total	1,373	100%

The main changes in the 2014/2015 budget as compared to the previous year are an increase in government support, tuition fees and in several self-income components. As for the expenses, the changes are in increased salary expenses because of increased faculty positions as well as national salary agreements, research expenses, graduate students fellowships and pension payments. The deficit will be covered by withdrawals from Technion's reserves.

Development Projects Budget

Development projects are managed by multi-year budgets and schedules. In the year 2013/2014, the Technion invested (cash and obligations) NIS 260 million (\$72 million) in development projects. Income for development projects amounted to NIS 291 million (\$83 million). The Technion policy is to approve new construction of buildings and large renovation projects only according to the income received or guaranteed for each project. Total investment in development projects in the last ten years was NIS 1,757 million. During the same period, the total income sources amounted to NIS 1,917 million.

Category	Invested
Buildings, renovations, infrastructure	196
Multidisciplinary research centers	31
Equipment and Laboratories (not including laboratories establishment for new faculty members)	33
Total (NIS million)	260

The table above lists our investments (in NIS millions) in development projects, divided into three major categories:

Investments

Technion's investment portfolio includes the Technion Pension Reserve Fund, restricted net assets designated for scholarships, research, chairs, projects and others, unrestricted net assets designated for research, development and others. The funds are invested by the investment pool method. The investment policy is set and reviewed on a periodical basis by a public committee. The value of the portfolio on September 30, 2014 was NIS 5,955.7 million (\$1,611.8 million). About 53 percent of the portfolio was in Israeli index-linked investments, eight percent in foreign-exchange linked investments, 27 percent in shares, and 12 percent in liquid assets.

Pension Payments and Actuarial Liability

Pension payments to most Technion employees are provided from the operating budget. In 2013/2014, pension payments were NIS 245 million, representing 18 percent of the operating budget; this year, they are expected to reach a total of NIS 256 million. This percentage is expected to increase over the coming years, after which it will slowly decline and eventually level out. As was pointed out in previous reports, as of January 1, 2004, all new Technion employees, both faculty and administrative staff, have a regular external pension fund. This will have a very positive, future, long-term effect on Technion's financial stability. The total actuarial obligation of the Technion as of September 30, 2014 is NIS 7.5 billion (obligation of 8.2 billion including TRDF).

Physical Development

As in past years, we continue to build and develop the campus for the students, researchers and faculty in order to create an improved and supportive academic environment in which they can promote their teaching and research activity.

The most challenging mission is the preparation for the 30 new faculty members each year. Most of these researchers need "wet" laboratories with special equipment and fittings. Locating these labs mainly in the aging buildings of the campus requires many renovations and adaptations to bring them to updated standards of health, safety and accessibility. Moreover, a chain of relocations and replacements within the faculty's neighboring labs and facilities is usually required.

Great effort is being invested for the implementation of management's goal to increase the number of students living on campus. A new village for undergraduate students is being built and in preliminary stages there is a project for two more towers, housing families, couples and singles. Also, a continuous effort is invested in improving living conditions for those already on campus, by adding air-conditioning systems, replacing old infrastructures and the addition of supportive facilities. An example is the new community center and kindergartens located in the Zielony Graduate Student Village. Creating a supportive community is vital in attracting new researchers and teaching staff.

Complementary to the above issues, there is a continuous renovation and functional reuse process of teaching and research facilities alongside infrastructure upgrades. New learning centers are built both in faculties and in public buildings.

The multidisciplinary, collaborative planning and design team, headed by the Faculty of Architecture and Town Planning together with representatives of the Technion's Division of Construction and Maintenance, is advancing three parallel plans:

- a. A Strategic Master Plan which will give the management tools to develop and maintain the campus as a leading hub of higher education and cutting-edge research, while supporting socially vibrant and environmentally sustainable campus life

b. A new zoning code which is intended to design and secure approval for a revised statutory framework that is responsive to current and future needs and objectives of the campus.

c. Modules of initial improvements aimed at enhancing the campus environment. These improvements enhance the campus physical and social environment, and simultaneously serve as a platform for campus users and stakeholders to effectively participate in the planning process and articulate their needs and desires.



Students on Campus on a Sunny Day

The planning and design process and some of the outcomes will be presented at the coming Board of Governors Physical Development Committee for which a special booklet detailing the plan has been prepared.

Landscape and infrastructure improvements are being implemented also on outdoor areas. On the wooded hill above the built-up area a fire-prevention zone has been created, as part of a three-stage plan to protect the entire campus from fire. Along the ring road new traffic circles are being built.

The most impressive project being planned is the construction of new campus entrance gates with respect to both traffic and pedestrians, designed to better present the face of the Technion as a leading technological institute.

The improvement of the environmental qualities of the campus is also one of the agendas of the new master plan. There is a call in the updated comprehensive plans to be more pedestrian-oriented, to build parking lots, to develop accessible pedestrian axes, more lighting, develop orientation and an improved signage system. Some of these calls are already translated to immediate plans for campus improvement

The main completed, ongoing and planned projects are listed below:

Projects Completed

1. **Schulich Faculty of Chemistry** – Renovation of laboratories, offices
2. **Emerson Family Life Sciences Building** – Labs on floors 7-8
3. **Rappaport Faculty of Medicine** – Renovation and expansion of classrooms, renovation of clinical and experimental research labs
4. **Wolfson Faculty of Chemical Engineering** – Renovation of teaching labs in the "Pilot" – Stage B
5. **Faculty of Mathematics** – Auditorium renovation
6. **Undergraduate Village** – Traffic circle on Ring Road
7. **Senate Building** – Renovation of facilities
8. **Elyachar Library** – Art Gallery
9. **TCE Center Building** – Construction of Second Floor
10. **Canada Dormitory Village** – Renovation and AC systems in buildings 941 and 942
11. **Rivkin Dormitories** – Renovation of communal areas in building 101
12. **Various Research Faculties** – Renovation of labs as part of recruitment of new faculty members
13. **Fire Prevention Zone** – stage "A"
14. **Accessibility for Physically Challenged Individuals** in various projects in campus buildings and outdoor areas
15. **Campus Infrastructure Projects and Safety Upgrades**

Projects under Construction

1. **Undergraduate Student Village** – 4 dormitory buildings - 112 apartments mainly for single students, total of 488 beds
2. **Zielony Graduate Student Village** – Community Center including 4 kindergarten classes, a playroom, a multipurpose hall, courtyard, covered parking
3. **Schulich Faculty of Chemistry**– Renovation of laboratories and public areas
4. **Wolfson Faculty of Chemical Engineering** – Renovation of teaching labs in the "Pilot" – Stage C and auditorium renovation
5. **Grand Technion Energy Program** – research labs on an additional floor
6. **Student Union Building** – Completion of 4th floor for Learning Center
7. **Faculty of Architecture – "Hadarion"** – Renovation and restoration of former library building to house studios, public clinic, lecture hall and exhibition space, including accessibility
8. **MicroElectronics (Wolfson) Building** – EBL lab and AC upgrades
9. **Rappaport Faculty of Medicine** – Renovation and expansion of cafeteria, renovation of experimental research labs
10. **Gutwirth Science Center** - Upgrading the air-conditioning systems to conform to Association for Assessment and Accreditation of Animal Laboratory Care International (AAALAC) standards in the Pre-Clinical Research facility
11. **National Building Research Institute** - Auditorium renovation
12. **DeJur Dormitories** – Renovation of communal areas - bldg. 115
13. **Various Research Faculties** – Renovation of labs as part of recruitment of new faculty members
14. **Accessibility for Physically Challenged Individuals** in various projects in campus buildings and outdoor areas
15. **Teaching Facilities** – Ongoing renovation projects over the campus
16. **Campus Infrastructure Projects and Safety Upgrades.**

Projects in the Planning Stage

1. **Technion Campus Gates** – Design of two new entrance gates
2. **Ullmann Teaching Center** – Building reinforcement, additional elevators, addition of classroom floor
3. **Tower Dormitory Buildings** – Two high-rise buildings for families, couples and singles
4. **Danziger Building** – Mehoudar Center on the ground floor – public laboratories and elevator
5. **Polak Visitors Center** – Additional wing for exhibitions and renovation of existing building
6. **Cancer Research Center** – New building near Rappaport Faculty of Medicine
7. **Counseling Center** – Additional Wing and accessibility for physically challenged individuals
8. **Computer Center** – New building including data center
9. **Churchill Auditorium** – Renovation of auditorium and foyer
10. **Sports Center** – New multifunctional hall
11. **Canada Dormitory Village** – Renovation and air conditioning systems in building 931
12. **DeJur Dormitories** – Renovation of communal areas in buildings 116 and 117
13. **Teaching Facilities** – Ongoing renovation projects throughout the campus
14. **Various Research Facilities** – Renovation of Labs as part of recruitment of new faculty members
15. **Accessibility for Physically Challenged Individuals** in various projects in campus buildings and outdoor areas
16. **Campus Infrastructure Projects and Safety Upgrades.**

Human Resources

Our Vision

Shaping an organizational culture that is committed to the Technion's vision through the excellence and the self-actualization of its employees.

SAP/ Computers

2014: The year of SAP

The beginning of 2014 saw the deployment and use of a new computerized system for human resources management based on SAP software.

The new system replaces the old one developed at the Technion three decades ago.

The system enables employees to view their personal data, and even to update some of the data directly on their own. Many processes that involved filling in forms manually were transferred to the Intranet for implementation there, to streamline work processes.

The new system includes an automated interface to the payroll system for direct transfer of data there.

Because of the system's complexity, 2014 was characterized by a focus on learning, adjustments and dealing with the birth pangs typical of processes of this nature.

Further development and refinement of the system is ongoing.

Academic Staff

In 2014, emphasis was placed on the continued development of ties with the existing staff members at the Technion and implementation of SAP in the division.

In addition, constant efforts are made to improve the hiring process. In 2014, some 48 new staff members were recruited (including clinicians).

Ties with prominent candidates are established early on in the process, while the candidates are still abroad, long before the commencement of their appointment at the Technion. The division focuses on clarifying the needs of every new staff member and

their family and providing as much assistance as possible, including assistance in finding work for the spouses of staff members.

All the while, the division continues to attend to routine issues: tuition fees, sick leave, student dorms increment, full-time dedication to Technion growth, work accidents, unpaid leave, maternity leave, handling of staff cards, position increments, entry of personal details into the computer, etc.

Recruitment Unit

Over the past year, the Recruitment Unit has placed emphasis on internal mobility, resolving personnel problems in various units and hiring workers with special needs.

In 2014, we opened 132 new positions. We recruited 117 new employees, and 25 employees moved to other positions after successfully competing in tenders and as part of planned employee mobility.

Most of the new employees are academics, engineers and microbiologists. Of the new hires, 56 percent are women.

Orientation Day for New Employees

The Human Resources Division held several meetings for new employees over the year in order to speed up their integration at the Technion and help them to identify with the Technion's values and culture.

At these meetings, a new employee meets other newcomers, is told about the organizational structure and functions at the Technion, and receives useful information and general explanations relating to the individual employee and to his/her integration at the Technion, such as: pay slips, training activities, employee welfare, etc.

The meetings are held in a relaxed and informal atmosphere with the participation of staff from the Human Resources Division and representatives from the Payroll Department.

We, in the Recruitment Unit, are convinced that the orientation day contributes a lot to the new employee, both professionally and socially, and eases, if only a little, the initial period of adjustment.

Retirement Unit

Retiring from the workforce is a significant event in a person's life. The Technion, via its Training Unit, offers employees approaching retirement a package of meetings in preparation for retirement.

The package includes various topics:

- Explanations on pensioners' rights: pension, national insurance, taxation, pay slips, etc.
- Family property arrangements: the importance of drawing up a will and inheritance.
- Quality of life in retirement: sports and nutrition.
- Sound family financial management.
- Preserving and improving memory in retirement.
- The culture of leisure and social networks on the Internet and in general.

Technion termination data for 2014:

	Termination of employment	Retirement
Administrative staff	62	61
Academic staff	12	48

Training Unit

In 2014, the Human Resources Division generally, and the Training Unit specifically, ascribed supreme importance to the cooperation of managers and employees in planning and developing training courses.

This principle was reflected in the learning experience of groups of colleagues on campus. The hospitality project included one faculty hosting another and employee gatherings, with the deans and administrative heads acting as hosts.

"College Human Resources" Project: forging of new ties within the faculty and strengthening existing ties. In addition, workshops were held with the contents tailored to the requests of the various faculties and units.

The courses deliver professional content. They also afford added value: gatherings of employees from the same sector from all over the campus, leading to new acquaintances among colleagues, collaborations and transfer of information, workflow shortcuts, and ultimately, to financial savings.

As with every year, we included "Connecting People Meetings" in the training program for new employees, meetings that reflect the culture of the Technion and strengthen their identification with the institution and their commitment to it.

Prevention of Sexual Harassment

In order to strengthen awareness on the subject of preventing sexual harassment, the Technion has taken and continues to take steps:

- A new code and summary were written and translated into English and Arabic. The code can be found on the Technion website.
- A training program was built that includes presentations, workshops, posters and software for self-study of the subject, in order to strengthen awareness among the academic and administrative staff and among the students. All employees were invited to watch a play entitled Inyan Matrid (A Harassing Matter) that deals with the prevention of sexual harassment.
- Lectures were held in the faculty councils for the academic staff.
- Administrative coordinators were appointed throughout the campus - in addition to the two Sexual Harassment Prevention Commissioners - including in Tel Aviv, at the Faculty of Medicine, for contractor workers and at the Students Union.
- Complaints are dealt with by the Chief Commissioner for the Prevention of Sexual Harassment under the close oversight of the legal advisor.

Employee Welfare Unit

"The employee lifecycle": in 2014, the Employee Welfare Unit put the main emphasis on involvement in the lifecycle of employees at the Technion. The unit distributed gifts for various occasions: weddings, births, recruitment into the IDF, birthdays and the Jewish New Year. They also accompanied employees during stressful times in their lives, such as: a lengthy illness, death of a first-degree relative and various forms of emotional distress.

Awards ceremony for employees: in September 2014, the annual awards ceremony for Technion employees was held at the Convention Center.

Additional events: during the year, several events were held for different audiences: a happening for the children of employees going into first grade, a hands-on science morning for the children of employees celebrating their bar/bat mitzvah, an award ceremony to mark 25 years of employment, and a Hanukkah party for Technion pensioners.

Sports teams: in the past year, the Technion had two active competitive sports teams: in basketball and in athletics.

Community outreach: the community outreach project encompasses 80 volunteers from the Technion workforce, who work with two youth drop-in centers in Nesher and Haifa. The volunteering activity includes daily assisting of children at the centers with their homework, birthday celebrations and enrichment activities. The volunteers visit the centers on every festival, and celebrate there with the children. On two of the festivals, the children come to the Technion: on Tu B'shvat, a planting event is held at the Ecological Garden, and on Purim we host them for a hands-on experience, with the participation of the Technion President, the Vice President for Human Resources and volunteers.

Employee Welfare and Development Unit

In 2014, the unit continued to put emphasis on the development of excellence at the Technion, in accordance with the vision of the Human Resources Division.

Incentive Plan

In 2014, an incentive plan was instituted for the first time for the Technion's administrative staff. The plan is designed, first and foremost, to promote values and norms of excellence and to make them central to the organizational culture.

Additional objectives of the plan are to increase the motivation of employees, and to show appreciation for their efforts and contribution to the organization.

Feedback for employees during their probationary period for tenure

The decision to grant tenure to a Technion employee is a highly significant move that impacts the functioning of the unit and the Technion for many years to come. The process comprises four feedback meetings over a two-year period; the final decision is made by a committee composed of the unit's management and the Human Resources Division.

Figures for 2014

- 114 employees were in one of the probationary stages for tenure (feedback/committees).
- 38 committees on the subject of tenure were convened in that year.

Following the decision of the committees:

- 10 employees did not advance to tenure status (constituting 25% of the employees in respect of whom tenure committees were convened).
- 27 were granted tenure at the Technion.

Providing feedback to employees during their probationary period for tenure is gaining traction in the Technion's organizational culture; many managers express their opinion about the functioning of the employee already in the first months of work, and do not wait until the tenure committee is convened. This change leads to a positive labor turnover and enhances the Technion workforce, and at the same time, is fair towards the employee.

Outstanding Employees

As part of the program for excellence that the Technion has initiated amongst its employees, rewards and certificates of merit are granted to outstanding employees every year.

The program for excellence is divided into two parts: outstanding employees in units and outstanding employees of the Technion. Over the past two years, recommendation forms have been revised in order to shorten the process and make it more efficient. In addition, changes have been made in the selection process for outstanding Technion employees in

order to validate the process and select the best employees from all the candidates that the units recommend.

The validation process is conducted by a representative from the Human Resources Division, together with previous outstanding employees, and includes a visit to the employee's workstation, a short interview and presentation of a summary report to the members of the Technion Outstanding Employee Committee. The employees chosen receive certificates and rewards in a prestigious ceremony and a short movie is shown of their daily routine at the Technion.

Computing and Information Systems - CIS

The computing and information systems division that was established in 2011 by merging the Information Systems Department and the Taub Computer Center, is operating as one unit. One major concern is the fact that the merged unit is still operating from two physical and distanced buildings. Significant efforts are being made to find the funding that is needed to move the two units into one building. This will surely improve the functionality and the daily operations of this unit.

The plans for the new building also include a plan to upgrade the very old Data Center that is almost 40 years old and needs a major renovation.

The most significant projects are outlined below:

HR Module Implementation (SAP)

The project of Human Resources module implementation started in 2011. It covers three HR offices: HR Division of the Technion, HR Department of TRDF and the Academic Staff Office. The project went live in January 2014. This is a major project that has a significant impact on a very wide population (actually – all employees).

Because of the magnitude of this project we had some problems after the Go Live date, but the majority of them were solved and the system is getting stabilized. We are working on the open issues that still exist and also adding some more functionality to this module.

Payroll System

The current Payroll System is operating on the old IBM mainframe. Due to the decision to move away from the old mainframe computer there is a need to find a solution for this major and central application. We decided to outsource the payroll process to the same company that provided the original payroll software for the Technion. This service will be interfaced with the new HR module that went live recently. The project has already started, and the target date for going live with this project is January 2016.

Campus Management Module (SAP)

The Campus Management Module will remain the last major function that is still operating on the old IBM mainframe after outsourcing the payroll services.

A project manager has been appointed for the Campus Management Project and now we are looking for the right professional resources to implement this complicated and unique module.

Data Communications Infrastructure

The project of upgrading the data communication backbone infrastructure is progressing. We have acquired the hardware and all the components have been received. We are now in the process of mounting the units step by step. The upgrade process will be completed during the third quarter of 2015, and then we will have a modern high-speed communication at the band-width of 10 GB/Sec.

New WEB Sites Development Infrastructure

During the last two years the CIS division created a new and modern infrastructure for developing new websites, based on the Word Press technology.

We created a development environment in which end users with no computer skills can develop their own website, based on a few templates that were created. By now we have more than 400 websites that were built by our users, with minimum help from the professional developers at the CIS division.

Also, a new template for faculties and academic units was formed, using this new development tool that was put in place. New faculty websites that will be developed with this tool, will, to a certain degree, have the look and feel of the Technion's main website.

The first faculty website developed by this tool belongs to the Faculty of Medicine and its target date to go live is March 2015.

Servers Virtualization

We moved the majority of our servers to a new environment using virtualization tools from VMWare. About 90 percent of the servers at the CIS Division are virtual servers. This move will result in less hardware, significant cost reduction for electricity as well as for hardware, improved environmental impact, a faster response time to servers' set-up needs and requirements.

Improving Data Security Infrastructure

One of the major challenges of the computer world today is data security.

We are making a significant budgetary investment and devoting much effort to arriving at the cutting-edge technology and to finding solutions to this major threat.

We purchased a new state-of-the-art tool: SSL-VPN from Juniper slated to be operational in April 2015.

We are also upgrading the anti-virus tools and the remote access tools that enable remote users to log into the Technion network.

This is an on-going effort and it needs significant attention, efforts and budget.

In addition we took some other steps: we appointed faculty data security managers in all academic units, new data security procedures have been published, the Data Security Officer of the Technion is conducting training sessions for the various populations in campus, and we are publishing an on-line data security magazine in order to increase awareness of this critical topic.

Mobile Applications

Last year we developed a new application for mobile devices. The target users are the students and its function is to provide various types of services that the students require. These include publishing grades in real time, full exam schedules and much more.

The new mobile application was adopted by the students immediately.

We are working currently on some other functions operated by mobile devices and this important area will grow this year.

Cloud Computing Utilization

We have started the process of utilizing cloud services for e-mail. The first stage was moving the e-mail services for all alumni to the cloud, then the students' e-mail service, and the third stage will be moving the e-mail services for staff to the cloud.

We are using Microsoft 365 services for this purpose.

There is no doubt that cloud services is the future, and we are planning to implement more and more cloud service soon. For instance: buying High Performance Computing (HPC) services for researchers in the cloud.

Disaster Recovery Plan (DRP)

We initiated the detailed design of a disaster recovery plan, and we are looking into possible solutions. Management has allocated a budget and the first phase will be implemented during the 2015 fiscal year.

The Organization and Systems Unit

The Organization and Systems Unit is a staff office, with professional authority on matters of organization and operations, providing service to managers at the Technion and its various units and it is involved with core strategic projects of the Technion.

The unit is responsible for evaluating organization and operation systems (assessing work processes and their improvement), characterizing the needs and defining the demands of the information systems, integrating designated off-the-shelf systems, accumulating and processing data, updating and writing regulations, dealing with applicant, student and alumni data and publishing it.

The Unit's Vision - to improve the work processes in the different units with an integrative view of the functioning of the entire organization in order to foster uniformity in the functioning of all the Technion's units.

During 2014 we completed the following activities:

Organizational and Operational Assessments

- **International School** – This assessment, for now, has included:
(note: a draft interim report has been submitted as the project is not finished)
 - A series of meetings with central Technion professional bodies identifying their difficulties in the course of routine functioning vis a vis the International School
 - A series of meetings with the International School administration identifying difficulties in a variety of areas of the school's activities
 - Identifying the current areas of the International School's responsibilities (academic and other curricula, visits, student exchanges, students for advanced degrees)
 - Quantitative data collection
- **Student Accounts Department** – in 2014 this assessment included:
(note: this is a continuation of the 2013 project which is not completed):

- Guidance and support in the formulation in writing of internal work procedures in the unit in accordance with the individual areas of responsibility (as of now approximately 75% of the unit's internal procedures have been notated).
- Categorization of the pooled filing system, determining access criteria and assimilating the procedures for maintenance of files in the pooled files.

Examining Procedures within the Faculty of Chemistry's Administrative Office – the project included:

- Interviews with administrative staff in the office
- Producing a table coordinating duties and functions

Central Technion Projects

- **The Technion's Risk Management System**
 - Selecting three risk factors (in the high-very high range) among the factors which were identified within the framework of the Technion risk- management survey, as factors to be dealt with in 2015
 - Beginning the preparations for integrating the risk management system at the Technion (the integration process will take place in the course of 2015)
- **Setting Up Designated Rooms for Breast-Feeding in the Faculties**
The Students' Rights Law (2007) defined the regulation pertaining to students rights (accommodations for fertility treatments, birth, adoption, guardianship or foster care (2012)).

In order to adapt the academic units in the Technion to suit the requirements of the law, the following actions were taken:

- The requirements for a breast-feeding room were stipulated including the infrastructure and the equipment required.
- Optimal rooms or places were sought in the faculty buildings to be used for breast-feeding.

- The requirements of the faculties were noted for the setting up of breast-feeding rooms – diapering counter, refrigerator and other equipment.
- After approximately two months the implementation in the faculties is to be checked, including the details of the room's location.

Writing, Updating and Publicizing Technion Regulations

In the past year much has been done to publish new regulations and to update old, existing ones.

This included:

- Updating the work plans for 2014 in accordance with the priorities which were set by the Director General and by those responsible for each area/subject
- Numerous meetings with the professionals in charge of the regulations and those connected to the subject, consultations with legal advisors, receiving approval from the unions (in cases where the regulations deal with aspects involving workers) and receiving approval from the administration

In 2014, a total of 37 regulatory codes were written and updated and 12 were finalized and posted on the website of the Organization and Systems Unit.

Routine Management of Data Relating to Candidates for Admission, Students and Alumni

This included:

- Classification of new tracks and curricula for future reporting to the National Bureau of Statistics
- Response to problems/questions posed by the National Bureau of Statistics
- Preparing Reports for the National Bureau of Statistics
- Preparing statistical analyses in accordance with the needs of the Technion administration and other unit heads, to be used as tools in decision-making

- Response to problems/questions posed by Technion staff (Finance Department, Faculties)

Maintenance of the New Internet Website of the Organization and Systems Unit (WordPress)

The website posts all the regulations and forms which were approved and finalized.

Safety and Health

Safety and health has become a high priority as reflected in the resources provided to the Safety and Health Unit. The objectives are to prevent work-related accidents, to minimize safety accidents and occupational illnesses, and to comply with safety laws and regulations. The actions taken are intended to promote the safety and health of staff, students, visitors/guests and contractors on campus. A comprehensive safety and health action plan has been developed and implemented, including the focus on 19 safety projects in several areas of activities, which include safety improvements and upgrading of infrastructure in existing buildings.

Work Related Accidents and Incidents Indicators

The number of reported work-related accidents in the year 2014 was 27 with an accident rate of 1.95 accidents per 200,000 working hours.

These accidents resulted in the loss of 368 working days and a rate of 26.6 lost work days per 200,000 hours. Analysis of this data shows that 30 percent of these accidents were not related directly to Technion activities but to other causes (e.g. accidents on the way from/to work).

Risk Assessments and Implementation of Standards

Continuing from last year, a systematic risk survey was carried out in laboratories and work areas and in zones which have undergone major change or renovation, to identify major risks and to implement risk control measures. A total of 89 risk surveys were carried out including 27 surveys of laboratories and areas after renovation or construction and prior to occupancy. Overall, 3008 corrective actions were recommended to the relevant faculties.

Renovation and Construction Safety Guidelines

The Safety and Health Unit participates in all renovation and construction activities in all areas of the Technion's activities. As part of these activities the Safety Unit issued, in 2014, 62 safety guidelines for planning new or renovated laboratories.

Most of the safety planning guidelines (13) were for the renovation of laboratories in the Faculty of Electrical Engineering. Other guidelines were submitted for the Faculty of Mechanical Engineering (9), and for the Faculties of Chemistry, Material Engineering and Physics (4 each).

Emergency Preparedness

In the arena of emergency preparedness seven faculty evacuation drills were carried out during the year 2014. The drills were performed in the Faculty of Electrical Engineering Building, Civil Engineering, the Main Library, the Danciger Laboratories Building, Chemical Engineering, Biotechnology and Food Engineering and in the Dangerous Material Warehouse Building. The buildings' evacuation staffs were trained by the Safety and Health Unit staff prior to commencing the drills. The drills were analyzed and conclusions and corrective actions were issued to the participants.

An Emergency Response Plan for Hazardous Materials was written by the Safety and Health Unit. The Emergency Response Plan for Hazardous Materials pertains to any hazardous material incidents on campus. The plan has been developed to minimize the severity of damage to human safety and health and the environment in the event of an unexpected hazardous materials discharge. The plan was presented and approved by the Israeli authorities.

Safety Awareness and Training

Safety training courses were carried out during 2014, including 22 courses with 1,842 participants out of 2,258 invited (82% participation rate). In addition, the Safety and Health Unit conducted two safety courses with the participation of 225 contractors and 2,123 of their workers, and eight courses for fire safety practice with 124 participants.

The figures above reflects a continuous growth in participation at the Safety and Health Unit's courses.

Animal Care Accreditation (AAALAC) Safety and Health Activities

As part of the Technion's decision to accredit the Animal Care Facilities by the AAALAC, the Safety and Health Unit established a steering committee for implementing all the safety programs and issues needed for the up-coming accreditation process. The steering committee consists of the Safety and Health Unit director and the head of the Pre-Clinical Research Authority as leaders and sponsors of the committee, and selected members from both units. The Steering Committee commenced activity during the last quarter of 2014 and is scheduled to finish during the second half of 2015.

Safety and Health Comprehensive Plan

For the coming year, 2015, the Safety and Health Unit developed a comprehensive Safety and Health Action Plan that was presented to and approved by the Director General and the Technion's Safety and Health Committee. This action plan consists of timelines and budget for safety and health roles and activities in 2015.

Security

- **Security concept and strategy:** The security concept of the unit was updated to conform to the instructions of the Israel Police and to take into account the potential threats and scenarios for the years 2013-2014. The security directives for 2014 were upgraded and authorized by the Israel Police's Haifa Station.
- **Training:** The campus security guards completed security guards training which authorizes them to search, identify and seize objects dangerous to public safety which are discovered during search, and detain persons in accordance with the 1998 security regulations for public bodies.
- **Last summer's *Operation Protective Edge*:** During the fighting the security unit functioned in emergency mode.
 - The security framework was reinforced, despite the call-up to reserve duty of 15 percent of all the guards and watchmen, in order to respond to the warnings and threats passed on by Israel security authorities.
 - Emergency equipment in the unit's storerooms was refreshed.
 - Guards received personal safety gear including gas masks, protective vests and helmets.
 - The security unit recommended to the president of the Technion and its management to continue with the routine of work, studies and exams. This recommendation was accepted.
 - The security unit recommended opening the shelters and the security rooms in the different buildings in accordance with instructions given by the civil command authorities. This recommendation was fully implemented even in dual-purpose spaces.
 - Faculty and unit activities outside the campus were limited to the necessary minimum.
 - Following the operation, gifts of more than \$2 million were received for projects such as the renovation of the shelter in the Ullmann Building, moving the emergency security headquarters and others.

- **Renovation of the shelter in the Ullmann Building:** The Ullmann Building is the central classroom building for students in their first two years. The building houses approximately 3000 students at peak hours. The shelter was found to be inadequate for its function and the Technion management decided on a general renovation of the shelter. The renovation must deal with building, air conditioning and electricity issues. The work is slated to be finished this year. The project will be funded mainly by donations - estimated cost \$180,000.
- **Security Rooms in the Faculty of Chemical Engineering Building:** Within the framework of the building program for the Grant Energy Center, a reinforcement of the building and the construction of safety rooms for the faculty are included. Funds came from donations.
- **Pepp Day Care Center:** Problems with shelters in the building were identified particularly on the infants' floor. A renovation project and an adjustment of the protection afforded was approved. Funds for the project came from donations.
- **Moving the Security Headquarters to the Taub Computer Center Building:** In accordance with the security model of the head of Technion security, which is approved by the Israel Police, the security headquarters will be moved to the campus core this year in order to facilitate more efficient functioning in times of emergency. The project will be funded by donations.
- **Completing the Southern Fence:** The Technion management has approved a sum of NIS 5.2 million for the creation of fire walls and the construction of a southern fence for the campus. For this project an institutional fence will be built surrounded by an access road for emergency vehicles and including fire extinguisher lines as well as preparation for lighting and security cameras. The project is in the advanced stages of planning with a starting date of April 2015.
- **Technion Entrance Gates Project:** The project for upgrading the entrance gates to the Technion has been approved. The architect of the project was selected by means of a national competition which the Technion initiated. The project plans were approved by the Project Committee and were presented at the Physical Development Committee meeting of the Technion Council. The project is in the

advanced stages of planning and work is slated to begin this summer. The project will be funded by a generous donation.

- Rappaport Faculty of Medicine Security: An updated security program for the faculty has been prepared which is to include building and installing technological equipment (cameras, gates, barriers, entry control system). The funding for the project comes from donations.
- Personnel:
 - The position of director of the Technion security facility was defined and filled.
 - The position of head of shift in the Faculty of Medicine was defined and filled.
- Training: The contract security workers received training in the following areas:
 - First aid
 - Safety
 - Safe driving
 - Fire extinguishing
 - Elevator rescue
 - Hand-to-hand combat
 - One-day refresher courses in accordance with Israel police instructions
 - Security Center Operator course: Workers of the security center received a special 4-day training course in accordance with this year's instructions from the Israel police.
 - Heads of Shifts Course: Heads of shifts received a special 4-day training course in accordance with this year's instructions from the Israel police.
 - Special Activities for Workers: The security unit employs approximately 60 security guards as contract workers through an external security company and approximately 80 students (most of them from the Technion) as Technion employees. In order to strengthen their loyalty to the Technion, to improve their morale and to create team spirit special leisure-time activities were introduced for the first time.
- The law mandating the implementation of regulations for outside contract workers is to be enforced and consequently, for the first time, these workers will receive:
 - A cash prize for excellence and commitment among security guards

- The security company through which they are employed will contribute to the Continuing Education Fund of the security guards in their employ.
- Security Center: The tender for a new Technion security company was finalized successfully for approximately NIS 32 million over six years. The successful company is “Modi’in Ezrahi”, and on May 1, 2015 it will replace the G4S Company after its many years of service at the Technion. The new terms are significantly different from the previous contract and will lead to a serious upgrading of the ability of the security unit to respond to various dangers.

The security unit is currently preparing for the change-over with emphasis on:

- Preserving the standard of security, armed and non-armed, during the process
- Absorbing the outstanding workers from the previous company into the new company while maintaining their full benefits
- The Israel Police has signed off on the security concept of the head of security in the Neve Sha’an an campus and in the Faculty of Medicine campus.
- Routine investigations of all irregular activities on campus have been instituted, some of which have led to the apprehension of suspects.
- The arms safe in the security center was upgraded and approved by the police for storage of up to 20 weapons.
- The security center’s website was upgraded and now contains a rich store of information on the center’s activities and instructions on various emergency situations.
- The process of updating campus entry permits for all the different populations was completed successfully. Stickers for workers and for pensioners will be changed once every three years. More than 13,000 parking permits were issued.

Green Campus

The Green Campus project in the Technion aims to introduce and amplify sustainability values into the Technion campus, addressing the campus on four levels:

- as a place of work,
- as an educational institution,
- as a research center and
- as a residential neighborhood for students.

The goal of the project is to promote a green and sustainable environment in the campus, while raising the sustainability awareness of students and staff – an awareness that will also continue its impact off-campus, in the homes and workplaces of Israel's future engineers and scientists.

Green Campus activities include: education and awareness-raising, resource saving (water, energy, waste recycling etc.), pollution prevention and more. The Green Campus coordinates the different environmental activities on campus, and serves as a meeting place for entrepreneurship as well as a communicating tool of the different activities taking place on campus.

Main projects in past year:

- **Environmental Leaders' Course:** to take place through the first half of 2015, inviting all Technion employees, students and staff members to take part in the green change of the campus. The course will include 20 participants, who will hear lectures and operate green projects on campus.
- **Advising the Campus's Master Plan Planning Team:** on issues concerning green campus operation in the future vision of the Technion campus; addressing all sustainability issues.
- **Establishing a Formal Connection to "MALA":** students for the environment organization leading several engineering, research and operational projects.

- **Resource Conservation:** taking part and supporting energy- and water-savings projects in the Technion, and raising awareness through lectures and other materials such as newsletters and stickers throughout the campus.
- **"Green Campus" website** serves as a center for updates and information on environmental activities on campus, <http://greencampus.technion.ac.il/>.
- **"Green Campus" Facebook** page provides updates, green office tips and links to relevant articles from around the web. URL of the Facebook page "[Technion Green Campus](#)".
- **The Green Campuses Forum** of universities and colleges around the country, of which the Technion green campus is a founding member, is aimed at promoting inter-university cooperation and alliance with organizations such as the Ministry of Environment and more.
- **Technion Greenhouse Gas (GHG) Emissions Reporting:** for the fourth year, the GHG emissions are calculated and reported to the Ministry of Environmental Protection's Voluntary Greenhouse Gas Registration and Reporting Program.
- **Waste Collection and Recycling:** mapping all waste collection into the Technion GIS system. Collection including electronic waste, hazardous waste, paper, cardboard and plastic, and composters located in the dormitories area for organic waste collection. New agreements with electronic equipment and battery collection contractors, were signed, in accordance with new environmental laws.
- **'Moed Bet':** Campus thrift shop – established and operated by civil engineering staff – operated five days a week with volunteer staff and special-needs workers (on payroll).

Main plans for the coming year:

- Continuation of all on-going projects,
- Environmental leaders course (nine meetings starting Jan 21st)

- Cooperation with "MALA" – research on air pollution in campus and indoor pollution on classrooms; biological land treatment following the Arava oil spill; community garden in the old campus in Hadar.
- Cooperation with the students association – waste collection, bicycle facilities, students' activities.

Public Affairs and Resource Development (PARD)

Our resource development efforts are carried out through a network of 18 support societies that are distributed globally with dozens of paid employees and thousands of volunteers and lay leaders – all working diligently year-round towards the shared goal of supporting the Technion. We have been blessed with an extraordinary group of people who are highly motivated and dedicated to the cause, and without their efforts and devotion much of what is reported here would not have happened.

The Israel Technion Society (ITS) is an important member in this network. This year the ITS saw a change of guard: after decades of loyal service, Major General (Res.) Amos Horev stepped down from his position as chairman of the ITS. Amos was replaced by Major General (Res.) Hagai Shalom. In addition, a new executive director was appointed to the ITS, Mr. Ofer Simchony. We welcome Hagai and Ofer, and look forward to seeing



Amos Horev (second from right) at BOG Tribute with Members of Taub Family

the ITS go from strength to strength under their leadership.

The American Technion Society (ATS) continues to be the main pillar of support for Technion in its international network of societies. The ATS also saw a change of guard last year when Mr. Jeffrey Richard took over the position of executive vice president after 27 years in which this position was held by Mr. Melvyn Bloom. Under Jeff's leadership,

the ATS has launched a strategic planning process that will determine the way the organization will function in the next few years. This process is being conducted in close cooperation with the Technion, and we are certain that the ATS, along with our other international societies, will continue to provide the support which we need to maintain our excellence.

Technion continued to advance and expand its global profile in the past year. In New York, the Jacobs Technion-Cornell Institute (JTCI) has recruited its first faculty members and launched its first masters-level program in connective media. It has also launched an innovative postdoctoral program aimed at recent Ph.D.'s interested in technology entrepreneurship rather than an academic career. This initiative, called the "runway" program, has already enjoyed impressive success, as four of the first seven participants have launched startup companies that have attracted significant seed investments. In China, the Technion, together with Shantou University and the Province of Guangdong, continues to develop the Guangdong Technion Institute of Technology (GTIIT). Academic programs have been designed, the process of planning the campus has started, and a number of pilot academic programs have already been tested. These two strategic alliances continued to fuel international interest in the Technion, manifested by a large number of visits by individuals, delegations and missions from all over the world, as well as from within Israel.

PARD helped the Technion maintain the positive momentum created by its globalization efforts by producing high-quality informational and public relations content and distributing it around the world, responding to the needs of the Technion donors and societies in an ongoing effort to raise funds and promote the Technion globally, and by hosting a large and diverse stream of visitors.

PARD Leadership

Prof. Boaz Golany, Vice President for External Relations and Resource Development, was elected to a second three-year term that began in January 2015. Starting last year, Prof. Golany oversees the operations of two more Technion units in addition to PARD -- the Technion Spokesman's Office, under the leadership of Mr. Gil Lainer, who started his term in August 2014, and the Marketing Department, led by Mr. Nir Shilo. Mr. Danny Shapiro

continues to serve as the Director of PARD, and this year assumed the additional responsibility of secretary to the Board of Governors.

Fundraising

The number of fundraising projects produced by the Project Development Unit continued to grow and now averages 1.5 new projects in each work day. Most of these projects were prepared according to Technion needs and in some cases, projects were prepared in response to specific requests from prospective donors or other external parties. The projects were offered to our donors through the Technion societies, leading to a total of nearly \$100 million in donations. Thanks to this generous support, the Technion was able to pursue its ambitious development plan in all areas of science and technology.

Alumni Affairs

PARD continues to work closely with the Technion Alumni Association (TAA). The TAA is increasingly active not only in alumni engagement in general, but also in helping identify alumni who may be willing to support the Technion, and assisting in their involvement in Technion affairs. Prof. Golany serves on the TAA Board and took part in a number of TAA events in Israel, and continues to lead the important effort (in coordination with Technion Societies, especially the ATS) and the TAA, to expand Technion's engagement with alumni living outside of Israel.

Selected Initiatives and Special Projects

PARD has undertaken a number of initiatives in the past year, aimed at diversifying our efforts to promote the Technion and upgrade our abilities to do so. Here are a few examples:

Expanding the Technion's Visitors Center: A substantial gift has been solicited to expand and renovate our visitor's center. The facilities of the existing center, which was built some 30 years ago, are severely inadequate to effectively tell the Technion's story to the thousands of guests who come to our campus each year. PARD is leading the planning process of this new wing.

Exhibition of the Technion Nano Bible at the Israel Museum in Jerusalem: The Nano Bible, created in 2007 by the Russell Berrie Nanotechnology Institute, is the subject of a new exhibition in conjunction with the Israel Museum’s Shrine of the Book, one of Israel’s most famous and well-visited cultural attractions. The exhibition, called “And Then There Was Nano”, opening date April 19th, is part of the Museum’s 50th anniversary celebrations. PARD has led the multi-faceted Technion involvement in this prestigious project.



President Lavie at Nano Exhibit with James Snyder, Museum Director

Introducing Technion Content in Leading Israeli Conferences: PARD, together with the Technion Spokesman’s office, facilitated the inclusion of Technion content and branding in two major Israeli conferences in the past year: the “Globes” business newspaper’s annual business conference; and a major conference on higher education and technology in Haifa. These efforts will be expanded in the coming year.

Animated Science: PARD successfully experimented with a new, interesting and more accessible way of presenting scientific research – through animated video. The first “pilot” video, presenting the work of a young Technion researcher, Dr. Avi Schroeder, was received enthusiastically. Such videos can help Technion and its scientists reach diverse

audiences, and more such movies will be produced with the help of external funding sources, such as European Research Council grants, which allocate funds for public dissemination of scientific knowledge.

A New Technion Book - 25 Innovations for Humanity: The Israeli branch of the international management consulting giant “Accenture” has commissioned a special book about the Technion to be given as a prestigious gift to its top clients. This book, presenting 25 leading “innovations for humanity” by Technion researchers and alumni, is being produced by PARD.

PARD Personnel Changes: Ms. Sari Lavie has joined the division’s staff as administrative assistant to the PARD director, and Ms. Michal Gal has joined the Visitors Center as a visits coordinator.

Public Affairs

The Public Affairs Department continues to cultivate a strong presence for the Technion in the world of social media.

This year, we upgraded the PARD website to function seamlessly with the main Technion website in English. Both these venues are platforms from which the Technion's dynamic social media activity continues to thrive. This is consolidated by the periodic e-newsletter *Technion Live*, which highlights research developments, student activities and significant events taking place at Technion.

The *Technion Live* Facebook page, which is a hub for our global community of friends and supporters, now has 21,500 followers. On Twitter, we have close to 50,000 followers and the account is a hive of news and interaction. As Facebook has become the dominant platform for sharing videos, we began uploading Technion films to our Facebook account in order to maximize global exposure to our message and key projects. The Facebook video section now complements the Technion's powerful YouTube account. The *Technion Live* Facebook page now features a video channel with uploads that can be easily shared on Facebook.

Some 3,250 videos are currently online on the Technion YouTube channel including promotional films showcasing a wide variety of Technion scientists and achievements, donor-related videos, lectures, Board of Governors and campus events, student creativity and academic courses. The channel continues to be highly popular, with over 15,000,000 views, by far the most of any Israeli university.

All of these web-based promotional channels supplement the existing popular newspaper *Focus*, which is a highly popular resource both in print and online.

Technion's dynamic, engaging and responsive online presence continues to serve the dual purposes of promoting inspiration in science and technology, while branding Technion as a globally recognized leader in innovation, for the sake of all humanity.

Projects

The Projects Unit is responsible for translating Technion's funding needs, as determined by Technion management, into project proposals and materials for use by fundraisers and societies. This year again, the unit prepared over 300 new projects. Of this number, about 4 percent were projects over \$10 million, 5 percent in the \$5-10 million range, 13 percent in the \$1-5 million range and 78 percent under \$1 million. Approximately 100 projects were adopted in the past year, including: the recruitment of new faculty, post-doctoral and graduate fellowships and general research support within the Technion Integrative Cancer Center (TICC); naming of the Ed Satell Technion-MIT Leadership Program; naming of the David and Janet Polak Visitors Center; naming of the Susan and David Wilstein Main Gate; support of diverse campus security projects – establishment of the Skodnek Security Command Post, Rechler Fund to Secure the Rappaport Faculty of Medicine and Jack Buncher Foundation support of bomb shelters in the Pepp Daycare Center and in the Wolfson Faculty of Chemical Engineering; support of Ullmann Teaching Center basement bomb shelter; establishment of the Neubauer Study Abroad Program and Neubauer Program for the Recruitment of Minority Faculty Members; Technion-Shantou University Collaboration in Environmental Health; establishment of the Rita and Avner Schneur Type II Diabetes Research Center; continued support of the Bernard Gordon Center for Systems Engineering; continued support of the Nanophotonics Research Fund for Advanced Light

Detection and Sensing by numerous donors; as well as continued support of the top priority project, graduate student fellowships.

Events, Ceremonies and Donor Recognition

PARD'S Donor Recognition Department is responsible for a wide variety of donor-related, academic and general ceremonies and events, including those of the annual Board of Governors meeting. The department also deals with the installation of plaques honoring donors.

Over the past year, 49 ceremonies were held, including those for Technion alumni who generously supported their alma mater, and for former Technion employees whose strong connection with our institution brought them to donate to Technion projects. We also introduced significant changes in the Honorary Doctorate Conferment ceremony, one of our most prestigious academic events, resulting in a format that was highly successful and well received. We are continually assessing how we can improve other ceremonies, as well.

In addition, over the past year we installed 65 new recognition plaques and continued to refurbish existing plaques on campus. In order to enable donors to visualize their recognition before final installation, we are now providing digital imaging of plaques for their consideration and approval. We are also advancing plans to replace those plaques attached to various sculptures around the campus, to do a facelift of the plaques and the environment of the Nobel Laureates Tree Pathway in Lokey Park.

We are working to implement our policy of digital donor recognition wherever possible, and have started with such a system, located in the visitors center, for donors to the Jacobs Technion-Cornell Institute. We have begun planning a state-of-the-art digital recognition system for our major donors inside the Churchill Auditorium, which will eventually replace the Guardian Walls outside the auditorium. In accordance with a resolution of the Board of Governors, we will be publicizing our historic list of major donors online, instead of in

the printed annual President's Report. We are also continuing the project of digitization of old and new photographs of plaques within the PARD database.

Donor Relations

The Donor Relations Unit is responsible for maintenance and cultivation of long-term relationships between the Technion and our donors, provides a wide variety of services for Technion societies and individual donors, including periodic reports, special updates and summaries, pictorial overviews and short digests on donor-supported projects. In addition, the unit personnel take care of donor- and gift-related information requests, from both internal and external sources; prepare a variety of letters and other donor correspondence items; and maintain the division's computerized fundraising and donor information management system (CRM). In the past year, the unit processed approximately 240 reports on chairs, research funds, capital development projects, reports to special donors, lectureships and others. Some 1,500 scholarship and fellowship funds were administered, and reports and thank-you letters from students who benefited from these funds were sent to the societies for delivery to the donors. In addition, some 300 special recognition or appreciation letters were produced. The unit staff continued updating the division's CRM system introduced several years ago. As part of this effort, hundreds of new accounts have been created in the system, to enable efficient distribution of printed and digital publications, e.g. the *TechnionLive* newsletter and *Focus*. With more and more PARD staff using the system for their day-to-day activities, inconsistencies are rectified and incomplete records get amended, as those users share the up-to-date information available to them.

Office of the Board of Governors

The Office of the Board of Governors, managed by the BOG Secretary, ensures the fulfillment of governance obligations of the board, administers all aspects of the board's responsibilities, coordinates the annual BOG meeting and administers the honorary degrees process. The 2014 BOG meeting enjoyed the highest level of participation in many years, with well over 300 attendees. Online registration was successfully introduced for the 2014

BOG meeting, and will be expanded for the 2015 meeting. A members-only BOG website, with relevant information and resources for BOG members, has been launched.

The Visitors Center

The Technion Visitors Center is the portal for thousands of donors, academics, business people, industrialists, public officials, journalists and others from around the world who want to learn about the Technion and its achievements. The Visitors Center staff receives and processes all visit requests – individual and group – and coordinates all aspects of the visits. In the past year, the center hosted approximately 6,000 guests and coordinated 528 visits, with the quantity of visitors significantly affected by *Operation Protective Edge* in the summer. (A list of selected visitors is attached as an appendix to this section.) The trend of requests, particularly from national and regional governments across the globe, who want to learn about Israel's success in entrepreneurship and innovation, and Technion's leading role in the Start-Up Nation phenomenon, continues. As noted elsewhere, the Technion recently received a gift to build a new exhibition wing that will greatly enhance the center's attractiveness and ability to convey Technion's story and key messages.

VIP Visitors to the Technion 2014

Ambassadors

NAME	POSITION	COUNTRY
Brig. Gen. (Res.) Ivo Schwarz	Ambassador to Israel	Czech Republic
Mr. Jacek Chodorowicz	Ambassador to Israel	Poland
Mr. Andor Nagy	Ambassador to Israel	Hungary
Mr. Alfredo Vasquez Rivera	Ambassador to Israel	Guatemala
Mr. Miguel de Almeida e Sousa	Ambassador to Israel	Portugal
Mr. Fernando Carderera	Ambassador to Israel	Spain
Mr. Nikoloz Revazishvili	Ambassador to Israel	Georgia
Mr. Henrique Sardinha Pinto	Ambassador to Israel	Brazil
Mr. Hideo Sato	Ambassador to Israel	Japan
Mr. Guillermo Bassante	Ambassador to Israel	Ecuador

Government Officials

NAME	POSITION	COUNTRY
Mr. Hu Mu	Director of the Dept. of International Cooperation, Science & Technology Commission of Shanghai Municipality	China
Mr. Mauro Dell'Ambrogio	State Secretary for Education, Research and Innovation	Switzerland
Mr. Wyatt Roy	Federal Member of Parliament	Australia
Chinese government officials	Vice Minister and others	China
Mr. Boaz Toporovsky	Israeli Member of Knesset	Israel
Mr. Julien Roitman	Chairman of the National Council for Engineers and Scientists	France
Australia Israel Chamber of Commerce		Australia
Scandinavian Opinion Leaders		Denmark, Finland
Australian Chamber Trade Delegation		Australia
Members of Canadian Parliament		Canada
Mr. Shimon Peres	President of Israel	Israel

University Presidents, Administration and Academics

NAME	POSITION	COUNTRY
Prof. John Hepburn	Vice President for Research, University of British Columbia	Canada
U15 Research Mission	Group from Research Universities	Canada
Prof. Wei Zhao	President, University of Macau	China
Prof. Christopher L. Eisgruber	President, Princeton University	USA
Rector and other Head Departments	University of Torino Delegation	Italy
VP and other Head Departments	University of Arizona	USA
Prof. Xuhong Qian	President ECUST	China
Delegation of Italian Universities	University Presidents and Rectors	Italy
Education Dept. of Guangdong Province		China
Prof. Sir Leszek Borysiewicz	Vice Chancellor, Cambridge University	UK
Prof. Kumble Subbaswamy	Chancellor of University of Massachusetts	USA
Prof. C. Patrick Yue	Associate Provost for Knowledge Transfer & Professor in ECE	China
Dr. Wang Enge	President of PKU	China
Prof. Anant Agarwal	CEO of edX	USA
Prof. Reimund Neugebauer	President of the Fraunhofer-gesellschaft	Germany
Prof. David Zaret	Vice President for International Affairs, Indiana University	USA
Workshop Series in QUBIT	University of Waterloo	Canada
Mr. Yvon Berland	President, Aix-Marseille University	France
Prof. Pancras Hogendoorn	Dean of the Leiden University Medical Center	Netherlands
Prof. Menachem Ben-Sasson	President, Hebrew University	Israel

Other Special Visitors

NAME	POSITION	COUNTRY
Mr. Marcus Weldon	President of Bell Labs	USA
Mr. Miguel Aleman	Son of Mexico's former president	Mexico
ATS Staff Orientation		USA
Mr. Bill Pence	Executive VP and Chief Technology Officer AOL	USA
13 officials of the AFRL	Air Force Research Laboratory	USA
Beracha Foundation	Management Board Members	Israel
Dr. Qanta A. Ahmed	State University of NY at Stony Brook	USA
Stephen Grand	Technion supporter	USA
Mrs. Maria Halphen	Founder & President of the Philippe & Maria Foundation	Sweden

Mr. Norman Seiden	Technion supporter	USA
Joseph and Jeanette Neubauer	Technion supporter	USA
ATS Solidarity Mission	ATS leadership and supporters	USA
Dr. Robert Shilman & family	Technion supporter	USA
Niarchos Foundation	Board of Directors	Greece
Dr. Aynur Aydelidov	Investment and Venture Fund Of The Republic of Tatarstan	Russia
Ms. Ying, Dr. Wee & Dr. See	Members of the National R&D	China
Mr. Allen & Mrs. Jewel Prince	Technion supporter	USA
Shirvan Family (Stanley, Leigh and Randi)	Technion supporters	USA
Mrs. Marilyn Taub	Technion supporter	USA
Mr. Albert Deloro	President, Adelis Foundation	France
Mr. Lowell C. McAdam	Senior Management of Verizon	USA
Women ATS Mission		USA
TF Mission		France
UK High Tech Mission	Philanthropists	UK
Mr. Avraham Kadar	President of the Naomi Praver Kadar Foundation	USA
Mr. Lorry Lokey	Technion supporter	USA
Pioneers in Progress –ATS mission		USA
Mr. Yishai Fraenkel	General Manager of Intel’s Jerusalem R&D Center	Israel
Mr. Larry Jackier	Chairman of the Board of Governors	USA
Mr. Jeffrey Richard	Executive VP, ATS	USA
Ms. Laura Weissman Davis	Iraqi Zionist Underground Club	Israel
Mr. Paul Daugherty	Global Chief Technology Office	International
Mr. Arnaud Parent	President, Havas Media Group Labs	France
Dr. Irwin & Mrs. Joan Jacobs	Technion supporters	USA
Mr. Robert & Mrs. Ruth Magid	Technion supporters	Australia
Dr. Alex Lidow and Mrs. Veronica Gentili	Technion supporters	USA

Technion Societies

American Technion Society (ATS):

As of the end of February 2015, the ATS has raised close to \$37 million for the current fiscal year that began on October 1, 2014. The total raised toward the 6-year goal of \$520 million for the “Innovation for a Better World” campaign, ending in October 2015, stands at just over \$503 million. Remaining true to our history, we continue to perform above target.

These numbers are reflected in the growing roster of our Technion Guardians (gifts of \$1 million plus), with 15 new Guardians added during this time period.

The largest gift(s) of \$1 million plus include gifts for the Technion’s proposed Integrative Cancer Center; International School Education; and the Jacobs Technion-Cornell Institute, among other projects.

Jeffrey Richard officially succeeded Melvyn H. Bloom to become the new Executive Vice President in May 2014. Mr. Bloom became Executive Vice President Emeritus.

We launched a new 21st Century Leadership Development class, with seven participants who enjoyed an inspiring trip to the Technion and Israel in February 2015.

We are in the beginning stages of developing a new strategic plan that will become effective when the current campaign ends. Our long-term goals are to increase our donor base while continuing to focus on the generation that built our organization, and targeting new, non-traditional markets.

National and international events included:

Board of Directors meetings: November 8-11, 2014, Detroit, and March 14-16, 2015, Miami; "Pioneers of Progress" Mission to Israel, April 26-May 7, 2014; Solidarity Delegation to Israel, August 10-13, 2014.

Argentine Technion Society

After a few years without an active presence in Argentina, Technion has gathered a group of individuals who are in the process of formally organizing an Argentine Technion Society, with guidance from PARD of Technion. The society has built an initial board with members whose age ranges between 40 and 47 years old. The board includes one Technion alumnus. In June 2014, we formally started the process of creating the Argentine Technion Society whose local name is “Asociación Civil para el Intercambio Científico y Educativo con Technion – Instituto Tecnológico de Israel”. This formal process of incorporation takes approximately one year. This long process has delayed the fulfillment of some objectives given the fact that the entity does not have a tax ID yet, among other things. Significant efforts will still be focused on this activity during 2015. Once the registration process of the Argentine Technion Society has been completed, a part time employee will be hired.

At this stage, the primary objective of the Argentine Technion Society continues to be the creation of awareness of the Technion brand and its activities within the local community. During 2015 we plan to resume the initiatives to create strategic alliances with top tier Argentine universities. We hope that these alliances will be a strong platform to facilitate exchange of students and researchers. We will also focus efforts on cultivating relationships with potential providers of funding for different activities.

The Technion Society of Australia (TSA) (New South Wales)

The past year has essentially been one of consolidation for Technion Australia (NSW). The highlights of 2014 were the funding for the first year, and commencement of research in the Technion-Sydney University-NSW Government Photonics Research Project; funding for, and holding of, the second Technion-University of Technology Sydney-Stanford University Biomedical Engineering Innovation and Entrepreneurship Program which was held in Sydney; the opening of discussions with the Western Australian Government and universities to establish a major joint project; establishing new collaborations at Macquarie University; and agreement to establish a collaboration at University of NSW into water pollution and energy harvesting.

Our major events were the 2014 Celebration Supper with Assistant Professors Itamar Kahn and Asya Rolls in the presence of the NSW Governor in May 2014 and the 'Meaning of Light' Supper with Israel Prize winner Distinguished Professor Moti Segev in February 2015, in the presence of former NSW Governor, Prof. Marie Bashir, who will be receiving an Honorary Doctorate from the Technion in 2016.

Student exchanges continued with excellent feedback. Most Australian students are not Jewish and we are pleased that a number of Technion students have been from Arab backgrounds, by their very presence repudiating BDS libels. Thanks to our efforts in conjunction with other communal organizations and universities, the past year has been relatively quiet on the BDS front but we are aware that there are continuing efforts to undermine Technion and Israel.

Einstein Suppers featuring Technion professors or Australian professors who have visited the Technion on a Technion Australia Theeman Scholarship continue to attract up to 60 people per evening, including dignitaries such as the NSW Governor and communal leaders. Such events, as well as featured articles, maintain a profile in the media.

Some \$400,000 of pledged funds were collected for projects and a further \$100,000 were committed.

The Technion Society of Australia (TSA) (Victoria)

The Australian Technion Society (Victoria) has progressed this year. Our committee members are all active in organizing events and trying to raise funds. We have provided funding for an important collaboration between Technion and Sydney University, and the supported research has been progressing. Sydney University is a campus where there was considerable BDS activity during the year, thus we believe our collaboration is very important, strengthening the administration's determination to continue to oppose any boycotts, academic or otherwise. We have interest from donors for a water project which we are currently exploring. One of our key jobs is to enhance our board with some new

blood and we are actively pursuing this. We cooperate with other communal organizations to fly the Technion flag at various community events, in order to enhance the Technion brand.

The Austrian Technion Society

The highlight of the activities of the Austrian Technion Society was Prof. Peretz Lavie's visit and lecture in Vienna at the beginning of October 2014. He spoke about aspects and prospects of the scientific policy of the Technion, and his presentation of Technion's global activities impressed the audience quite a bit. In his talk, Prof. Weinberger, the president of the Austrian Technion Society, envisaged the next stage in high-tech, namely an age of ultrafast physical properties and devices.

The Austrian Society acted again as a (charge-free) sponsor and supporter of the Chamber Music Festival at the Schloss Laudonm, which is dedicated to "Forbidden Music". The logo of the society appears in all publications of this internationally renowned festival.

The Brazilian Technion Society

The year 2014 was very challenging for Brazil and for the diplomatic relations between Brazil and Israel. Brazil successfully hosted the World Cup games, and went through a presidential election, won by the incumbent President, Ms. Dilma Rousseff, for another four-year term. However, Brazil's economy is going through a sharp downturn, further aggravated by a severe shortage of water and electricity due to a prolonged drought.

During the "*Protective Edge*" military operation in Gaza, Brazil recalled its ambassador for consultations, after condemning Israel for the "disproportionality" of its reaction to Hamas' hostility, putting the diplomatic relationship under stress.

The Brazilian Technion Society is scaling up its activities in several areas. The most important was that Israel finally joined the Brazilian program called "Science without Borders", which should bring a substantial benefit to the Technion and to its International

School of Engineering. This achievement was preceded by a very successful visit of Brazil's ambassador to the Technion.

The Brazilian Technion Society continued its ongoing efforts, with very good cooperation with Technion's PARD, to expose the Technion to the many opportunities offered by Brazil's special environment.

Technion Canada

The year 2014 was a banner year for Technion Canada, raising \$4,153,000, the most in the last six years.

Technion Canada welcomed visits from Prof. Ishi Talmon in Edmonton, Prof. Peretz Lavie in Calgary and Vancouver; Distinguished Prof. Aaron Ciechanover in Montreal; and Prof. Boaz Golany, who met with the University of Waterloo to sign a \$3.2 million collaborative partnership in the field of quantum information science, nanotechnology and water for basic and applied research, generously funded by the Gerald Schwartz and Heather Reisman Foundation.

Prof. Lior Gepstein, currently on sabbatical in Toronto, was the guest speaker at the 2014 annual general meeting. In April he visited Montreal where he spoke to community members and several prospects. Technion's collaboration with Canada's newest engineering school, the Lassonde School of Engineering at York University, continues to grow rapidly. In August, 2014 and in May 2015 top students and faculty attended the Technion's "eXpert Program". In the next few months a major funding announcement will be forthcoming to expand this lucrative arrangement.

Under the chairmanship of Technion graduate Ronnie Kaplan from Calgary, Technion Canada has created an alumni committee to engage Technion alumni from across the country.

Technion Canada's Generation NEXT has continued to reach out in an effort to recruit more young leadership. In Montreal there was a "Future Leaders" networking event where close to 200 of Montreal's brightest young professionals were treated to an energizing panel discussion on entrepreneurship. Generation NEXT has partnered with Notable.ca for the fourth annual mission to Israel, where eight of Canada's best minds have been invited to the BOG to meet world leaders in innovation and advancement in the fields of technology.

At Technion Canada's Annual General Meeting, Harry Sheres, a great visionary, was recognized for over 50 years support of Technion.

The French Technion Society (ATF)

ATF continues to develop and expand in France and other French-speaking countries, despite the ongoing challenge of radical Islam and terrorism in Europe. ATF has made Technion an attractive and effective partner for both industry (funding for R&D, investment IP, post-docs, grants...) and research and academic communities. ATF has succeeded in demonstrating to the Jewish community how important the Technion is to the development of Israel, leading to an increase in major gifts. ATF continues to bring leading French companies to the Technion and have them fund Technion research.

Activities include: the annual ATF event in December 2014, on the theme of "Making Sense of Big Data", under the patronage of the president of the French Republic, which attracted 800 attendees both at the scientific colloquium at La Maison de la Chimie and the gala dinner at the Prestigious Hotel Salomon de Rothschild; the annual mission to the Technion, with high-level participants from industry, academia and philanthropic communities; the annual dinner at the residence of the Israeli ambassador in Paris, with the participation of Distinguished Prof. Moti Segev; a colloquium and event in different strategic regions in France where ATF has decided to develop a representation. In addition, the many visitors to the Technion from France, Belgium, Luxembourg and Geneva have had an important impact as well. ATF is very active in lobbying activities with the national media (TV, radio and newspapers) and with major political figures. Most significantly,

ATF has become the leading point of reference and contact for French decision makers regarding the Israeli ecosystem.

The German Technion Society (GTS)

GTS continued administering 19 ongoing research projects in the Niedersachsen-Israel cooperation program and funded three ongoing projects (funding period 2014-16).

The Life Science Network continued its yearly funding for up to 50 exchange students from the Technion and five German universities. The program was partly extended to other German universities.

On March 10-11, 2015 the Second Conference of Scientific Cooperation between Lower Saxony and Israel was held in Hanover's Castle Herrenhausen with the participation of the Minister of Science, the Israeli ambassador, heads of Germany's large funding institutes and foundations, six university presidents from Israel and Germany, and 22 mixed teams of German-Israeli scientists. GTS offered conference stipends and co-organized this conference, illustrating the success of the Lower Saxony-Program, which provided the Technion with more than US \$7.58 million during the past 10 years.

The second Green Photonics Symposium took place on March 30-31, 2015 in Berlin. This collaboration between Prof. Gadi Eisenstein (RBNI, Technion) and Prof. Dieter Bimberg (TU Berlin) was funded by GTS and the conference featured world-renowned speakers.

Both symposia are complemented with official opening events as part of the celebrations marking 50 years of German-Israeli diplomatic relations.

GTS chairman Prof. Dr. Thomas Scheper was awarded the prestigious Science Prize of Lower Saxony, and donated his prize money for German-Israeli student promotion and exchange stipends.

In a new program, GTS offered young researchers of both countries seed-money as start-up aid for German-Israeli scientific cooperation.

In 2014/2015, GTS funded 56 students with additional stipends (Second Chance Stipends, GTS-Funds, Marcue-Foundation, Hanover-Haifa-Grants).

The Hellenic Technion Society (Greece)

Unfortunately, the Hellenic Technion Society (HTS) continues to be under the influence of the long-existing crisis in the Greek economy and society. High unemployment, combined with soaring illegal immigration, has helped the neo-Nazi party of “Golden Dawn” become the third largest party in the recent Parliamentary elections! We cannot but observe anti-Semitism growing all over Europe, putting our small Jewish community on high alert. Fortunately, various international organizations are supporting the Jewish communities in Greece, both morally as well as financially.

Consequently, the HTS has found it very difficult to expand its activities, let alone try to raise funds. We have thus decided to concentrate mainly on the promotion of Technion's achievements, by creating a new HTS website which is now near completion. In parallel, our board has put as top priority to produce an HTS quarterly newsletter, to disseminate Technion news to our members and the interested public, with the intention of creating a broader database of friends by subscription, hoping to expand it to important sectors of our academia and society, thus creating an efficient communication vehicle.

Last but not least, another outcome of the Greek crisis is that many young students are leaving Greece mainly for studying and/or working abroad. We continue our efforts to bring young students to the Technion.

Hong Kong Technion Society

The Hong Kong Technion Society was established in 2014 following the visit of Prof. Boaz Golany. The society is co-chaired by Mr. Paul Theil and Dr. Sissi Wachtel-Galor (a

Technion alumnus) and seeks to build an active board of community leaders from diverse fields. A website will soon be active.

As a new society, its primary objective is to create awareness of the Technion brand among the local community, students and academia. It aims to promote partnerships with top-tier local universities, to facilitate exchange of students and researchers, and cultivate relationships with industry and academia by helping to organize conferences, seminars, industrial contacts, and when possible, through fundraising. The society is focusing not only on HK but also on China, which has significant strategic importance for the Technion, especially in light of the establishment of the Guangdong-Technion Institute of Technology (GTIT) at Shantou University, through the generous initiative of the Hong Kong-based Li Ka Shing Foundation.

In this context, the HK Society has sought to assist visiting Technion professors and leaders in the planning phases of the GTIT, including hosting the visit in Hong Kong of President Peretz Lavie and Vice President Paul Feigin.

The society looks forward to hosting Technion professors and officials visiting or passing through Hong Kong, and will try promote the Technion by arranging events with these visitors. In 2014, several such dinners and meetings were organized in the community and universities with Prof. Shlomo Maital and Prof. Moshe Sheintuch. An important collaboration with a top HK university includes a strategic partnership agreement with the Hong Kong University of Science and Technology (HKUST). The Technion was also introduced to high school students in HK and south China through visits to high schools and participation in higher education fairs. Among the events planned for the coming year are the visits of Prof. Peretz Lavie and Prof. Boaz Golany.

Israel Technion Society (ITS)

The past year saw a major change in leadership at the Israel Technion Society.

Major General (retired) Hagai Shalom, a Technion graduate and owner of Ha'argaz Transportation Group and Tiv Ta'am supermarkets chain, was appointed ITS Chairman,

replacing Major General (retired) Amos Horev who served the ITS over the previous 32 years. In addition, Ofer Simchony joined the ITS as its new CEO, bringing his fundraising and marketing experience to the organization.

In addition to strengthening the ITS's relationships with its valued existing donors and contributing foundations, dozens of successful Technion alumni were approached, many of them for the first time, as part of a new, proactive, face-to-face canvassing effort. In early 2015, more than 100 existing and potential supporters participated in a special ITS event, kindly hosted by Raphael Mehoudar, a Technion alumnus and major donor, in his Tel Aviv home, in honor of the American inventor and entrepreneur Dean Kamen.

A proactive approach was introduced to the ITS's industry relations strategy as well, as Israeli companies and leading multinationals with presence in Israel provide a significant portion of the ITS's income through scholarships, equipment, research, seminar sponsorships and more.

Major single contributions received, or pledged, in 2014 included:

- 1.75 million shekels towards recruitment of new faculty
- 1 million shekels towards the Bronica Entrepreneurship Centre's activities
- 1 million shekels pledged towards supporting selected female Ph.D. students
- 500,000 shekels towards The President's List Awards

Total funds raised in Israel in 2014 increased to nearly 38 million shekels (approximately \$10 million), compared with 32 million shekels raised in 2013 (figures include bequests).

The Italian Technion Society

Because Italy's Jewish community is so small (28,000), we are dealing mostly with public and private organizations as the non-Jewish society has practically no contact with the Israeli world. Our society is the only representative of an Israeli university in Italy working in multiple areas such as: fundraising, contacts to develop joint projects with Italian

universities and institutions, recruiting students, spreading the name of the Technion in non-academic contexts and more.

Two more new young academics joined our board, and are active in the society and in inter- university contacts.

Events in 2014:

- March: Israel University Day - Milan (150 people) and Rome (170). Results: more than 20 Italians study at the Technion. Besides the ethical and moral value, it generated a turnover of more than \$400,000.
- July – September: Fundraising for the students coming back to study after the Gaza crisis
- November: Event in Rome in honor of Prof. Alon Wolf and Prof. Dovev Lavie. Prof. Wolf also gave a lecture at Campus Bio Medico in Rome. Prof. Wolf and Prof. Lavie were star guests at the event in Rome, where more than 200 people attended, including the Israeli ambassador, leaders of Italian academic institutions, as well as representatives of the Jewish community.
- November: Mission to the Technion - Università and Politecnico Torino, with two rectors, two deputy rectors for research as well as researchers and a representative of the Italian Chamber of Commerce and Industry. Meetings focused on the preparation of Horizon 2020 projects and contacts for Expo 2015 (Israeli MFA, Technion Water Institute, T3).

The Technion Society of Mexico (Sociedad Mexicana Technion)

During 2014 the Mexico Technion Society organized an encounter between Prof. Dan Zilberstein and the Telmex Organization. This initiative included a direct dialogue with one of the leading executives of the Telmex organization, with the possibility of establishing an academic relationship both with Telmex and with the Tecnológico de Monterrey. On other fronts, towards the end of the year an effort was organized to launch a campaign for the naming of a classroom in the Yitzhak Rabin Civil Engineering Building

(ongoing project) with Mexican donors, hoping that by middle of 2015 the goal will be met.

The Technion Society of the Netherlands (TSN)

TSN has continued its long term strategy to strengthen the relations with Dutch academia and industry, as well as to leverage the visibility of the Technion in the Netherlands and to create fundraising opportunities.

In February 2014, TSN organized a fundraising event with Distinguished Prof. Dan Shechtman as the honorary guest and keynote speaker. The funds raised will be used to support exchange of students and researchers between Technion and its Dutch partner universities. The fund is already making an impact: recently a Technion student received the necessary funding to visit Leiden University Medical Center (LUMC) for a research project.

In addition, TSN is discussing donations to the exchange fund with prominent business people, and a connection with Dutch Mizrahi members has been established.

In July, TSN organized a visit of Prof. Oded Shmueli and Mr. Alex Gordon to the Netherlands to advance and accelerate collaboration with Dutch industry and universities. TSN organized meetings with Philips, SBM Offshore, SKF, Erasmus Medical Center, LUMC and Delft University of Technology. Afterwards, Philips Research visited Technion to explore joint projects.

In November a delegation from LUMC went to the Technion to explore areas for future student mobility and research co-operations. As a result, a coordination of courses between the universities is taking place to ease student exchange.

TSN managed to get Technion invited to join the Innolife consortium, winner of the € 2.1 billion health program of the European Institute of Innovation and Technology (EIT), which is starting in 2015.

Swedish Technion Society (STS):

The Swedish Technion Society is working hard to create goodwill for Technion in Sweden and in Swedish academia and industry. This is achieved mainly through conferences, seminars, industrial contacts, and, when possible, through fundraising. The society has built an active board consisting of seven members. There are around 40 individuals and three companies that are dues-paying members of the society. The society aims to increase the number of members to at least 100 and company members to ten.

In April 2014 we took a group of Swedish society members to visit Technion.

Stefan Sturesson, chairman of STS and Jozef Stern, treasurer, participated in the Technion Board of Governors meeting in June 2014.

A seminar in the field of medical technology was held in February 2015, with the cooperation of the Karolinska Institute and Royal Institute of Technology in Stockholm. In the seminar we had three excellent scientists from Technion, Prof. Yehuda Assaraf, Dean of the Faculty of Biology, Prof. Amir Landesberg, Dean of the Faculty of Biomedical Engineering, and Prof. Yaron Har-Shai, Vice Dean of Strategic Development at the Ruth & Bruce Rappaport Faculty of Medicine.

The audience consisted of people from the Swedish academia, medical companies, the Israeli embassy in Stockholm and society members. This event also resulted in fruitful contacts between the Technion scientists and the researchers from Karolinska Institute and Royal Institute of Technology.

STS cooperates with the Israel-Sweden Friendship Association and other Jewish organizations in Stockholm and Västerås. STS distributes a bulletin “Från den ljusa sidan” (“Positive News from Israel”) among its members.

The Swiss Technion Society (STG)

We participated in the international Student Job Fair with a workshop on start-ups and an information desk. Our media activities for the Haredim program was very well received. We have a proactive cooperation with the Swiss-Israel Chamber of Commerce, such as co-promoting and participation at their Geneva event, with representatives of Weizmann and Rappaport Institute, Swiss Academy of Medical Sciences and Swiss Bioforce Institute.

This year's annual summer event was held at the mansion of Prof. Charles Weissmann with 120 guests, including Distinguished Prof. Aaron Ciechanover, Technion President Peretz Lavie, Ralph Eichler, President of ETH ("Swiss Technion") and Michael Hengartner, President of Zurich University. The event was a big success, followed by various activities in order to support the Student Emergency Fund promoted by President Lavie.

We initiated or supported various group trips to the Technion such as for:

- members of the Swiss Young Liberal party
- a high-ranking delegation of ETH under the leadership of President Eichler
- a high-ranking delegation led by the Swiss Federal Secretary for Education
- the owner of a private Swiss TV channel in July and again in November for a delegation of Swiss media managers around the same important investor.

After the resignation of Prof. Thomas Kappler, who was on our Technion Society board for 15 years, Technion alumnus Prof. Aldo Steinfeld was elected as new board member.

At our general assembly, Dr. Donald Tillman, Managing Director of ETH Foundation, gave the keynote speech.

Prof. Charles Weissmann will be receiving an Honorary Doctorate from the Technion in 2015.

Technion UK

The high spot of our year was the Sir Winston Churchill Award and Dinner in December. Technion UK together with members of the Churchill family presented the award to Prof. Alan Dershowitz at a ceremony at the Connaught Hotel. The award is presented to a person who has made a significant contribution to the State of Israel and the Jewish people, and the inspirational address given by Prof. Dershowitz, the fifth recipient of this award, clearly demonstrated how he passionately defends Israel at every opportunity.

The sell-out audience of our core supporters also heard from the Israel Ambassador to the UK and Prof. Peretz Lavie. Funds were raised during the evening for the Technion's homeland security and counter-terrorism program.

Throughout the year we presented our Technion Roadshow to schools and social groups which for the first time included a Holocaust survivors group of 30 people. A further presentation was given on Israeli Independence Day to B'nai Brith and was a great success.

Further events include a hi-tech breakfast briefing with Prof. Boaz Golany and a visit to the Churchill Archive Center in Cambridge.

It was recently announced that for the first time, two major UK charities, the British Heart Foundation and Parkinson's UK, will be supporting and co-sponsoring research projects between the Technion and leading British universities. This important initiative was endorsed by the UK Prime Minister, Mr. David Cameron.

Boycott, Divestment and Sanctions (BDS) Movement

Prof. Zvi Ziegler of the Technion's Faculty of Mathematics, who is coordinating VERA's (the Committee of Heads of Israel's Universities) efforts in the struggle against the Palestinian-sponsored BDS Movement, reports the following:

The initiatives to boycott Israeli academic institutions, and to stop scientific cooperation with Israeli universities started in the United Kingdom in 2002, and gained momentum in 2005, with resolutions adopted by a British trade union of university professors. This initiative, which was rescinded and reintroduced a year later, was counteracted by the senates of all Israeli universities, with the Technion senate taking the lead. The senates declared that the exchange of ideas and scientific cooperation form the cornerstone of scientific and human progress, and should not be infringed. This position was endorsed by several National Academies of Science and by the heads of the British universities. The Technion Board of Governors joined in the condemnation of academic boycotts in its meetings of 2005 - 2008, and called on societies to oppose such boycotts. The heads of the United Kingdom universities affirmed their opposition to academic boycotts, and these became unacceptable. Salient boycotts, not explicitly presented as such for fear of breaking the rules, still exist. We try to be vigilant, and whenever they resurface we react, using the commitment of the university heads. The discrimination against Israeli scientists thus exists, is harmful, but because it is not explicit, its harm is limited.

The renewed efforts by the generously funded Palestinian Campaign for Cultural and Academic Boycotts of Israel (PACBI) crossed the Atlantic in 2009, and became part of the BDS movement, which has made substantial inroads on American campuses in recent years. Their tactics are different from those used a decade ago – and they are targeting professional associations and student unions, exhorting these to adopt PACBI- type resolutions. In late 2013 the American Studies Association (ASA) became the first major professional association to adopt such a resolution. This caused an uproar in the American and Israeli academic worlds. The Committee of Heads of Israel's Universities (VERA) decided to create a forum to combat such boycotts, and I was appointed head of the forum, which consists of senior faculty members from each university. The forum collaborates with organizations and individuals overseas who share similar goals.

The ASA resolution that served as a wake-up call for the Israeli academic world had a similar effect on various organizations in the USA, and a general mobilization followed. The mobilization and close collaboration between the American organizations and their Israeli counterparts resulted in some successes as well as some failures. Notably, no professional association passed a similar resolution, and not for lack of trying by the pro-boycotters. The Modern Language Association and The American Historical Association both rejected such motions. The American Anthropological Association decided to postpone a discussion on this topic for one year, and appointed a task force, with whom we are in touch. As far as student organizations are concerned, the picture is bleaker, and this is a matter of grave concern, since campuses are where the future leadership is formed. Several student unions, some of them in California, adopted BDS resolutions; these were later rejected by the heads of those universities. Some successes in thwarting such initiatives, such as in City University of New York and McGill, should be noted, but this is a crucial arena that deserves more attention.

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