

## *From the President*

*My first term as president of the Technion has been a very exciting time for the institution. Much has happened and, building on the excellent achievements of the past, we have achieved much. As a result, the future holds within it new aspirations and new possibilities.*

*True, we are facing challenges - internationally, nationally and within our institution - challenges that are difficult and dramatic. The Middle East, never the best neighborhood, has been destabilized and is increasingly volatile. It has become harder to maintain human dignity and uphold our most sacred values within a world that includes outrages such as the situation in neighboring Syria. Nationally, Israel's place in the world is progressively more challenged, and for Jews all over the world anti-Semitism is again becoming a reality that needs to be faced. Meanwhile, the Technion is dealing with an unprecedented economic squeeze and mounting competition. Nevertheless, we must plan, develop, build and dream as if the future of the world depends on our success. It does.*

*There have been some momentous developments in the past four years, which will be detailed in these pages. Currently, the new government in Israel promises many additional changes, both good and bad, which will undoubtedly present us with opportunities and with hardships. It is my hope that my leadership has been effective and that I will continue to be a conduit for the Technion's growth.*

*The outstanding people at the Technion will keep on doing what they do best: study, learn, teach, research, discover, work, innovate, experiment; all in the name of a better future for Israel and the world. In this report, I will review our accomplishments, assess our progress and articulate our expectations and visions as I look forward to my second term in office.*

### ***Recruitment of Academic Staff***

My top priority was, and continues to be, the recruitment of academic staff. This is the cornerstone of an academic institution and successful recruitment of top academics is our lifeblood. In the past four years we recruited 101 new faculty

members; wonderful candidates who will guarantee the continued excellence of the Technion for many years. Fourteen prestigious European Research Council grants were awarded to new faculty – an indication that we made good choices. The success of new faculty in procuring grants from competitive Israeli funds was also outstanding, with 16 distinguished Alon Fellowships awarded to new faculty at the Technion over the past four years. The recruitment of senior staff, however, presented more of a challenge because of the long process necessary for the transition.

Praise from the "Leaders in Science and Technology" evaluation committee report is further proof that we have chosen well. The "Leaders in Science and Technology Program" was an initiative of our outstanding Chairman of the Board of Governors from 1990 to 2003, Henry Taub, of blessed memory, who was also one of our greatest supporters. The program was designed to allow us to be competitive in recruiting and retaining exceptional new faculty members as well as to provide us with the resources and flexibility to attract internationally-renowned scientists to serve as senior faculty. After Henry Taub's death, we received a further gift from the Taub Foundation that will serve as a most welcome supportive endowment for the program, promising us a future capacity to maintain the Technion's excellence.



*Henry Taub*

Indeed, for the future, the main concern of our administration must continue to be the recruitment of academic staff. Because of the number of retirements and other factors, it will be necessary to recruit 30 outstanding new staff members per year until

2017! This most difficult challenge, headed by our Vice President for Academic Affairs, will require the help of all the members of our administration as well as deans and other academics. We will call upon our friends to raise the additional funds necessary for this massive recruitment effort. I will continue to be personally involved in the process, and to invest great effort in providing our new faculty with all the means necessary to support their groundbreaking research activities at Technion.

### ***The Learning Environment and Student Recruitment***

Our second goal was improving the learning environment - by which we hoped to soften the image of the Technion and thereby assist in the recruitment of students. The rigors of a Technion education have produced a no-nonsense aura that is often intimidating for potential students. We have taken many steps to counter this impression. These measures include a program designed to reduce stress among first-year students, an improved processing of examinations in collaboration with the Technion Students Association, the renovation of many teaching facilities, the enrichment and diversification of campus leisure-time activities and the establishment of a committee to recommend changes in the study-load (which is higher than at leading North American universities). A very significant step was the establishment of the Yanai Prize – a personal cash award to academic staff members who are selected by a committee for their excellence in educating students.



*Yanai Prize winners*

These steps have been successful and have led to enhanced interest in studying at the Technion. This past year, unlike at other Israeli universities, there was no drop in the number of admissions to the first year of studies and we were the only university in Israel in which the number of students increased, albeit slightly. The new Technion natural gas and petroleum program, established in the wake of Israel's discovery of natural gas fields in the Mediterranean, as well as the completion of the beautiful new Zielony Graduate Student Village dorms, undoubtedly were additional factors in this increased popularity.

For the future, we plan to intensify our efforts to recruit Israel's outstanding students to the Technion. The generational shift in faculty gives us a wonderful opportunity to transform the Technion's organizational culture in order to change the image of the Technion within the student population, and especially within the population of potential candidates.

For the next four years, I plan to utilize the recommendations of the Committee to Examine the Study Load at Technion as a basis for continuing to change the culture of teaching at the Technion. The committee, comprised of nine Technion professors,

headed by Prof. Yachin Cohen of the Faculty of Chemical Engineering, submitted its report in March of this year. Established in 2012, it was a response to the request of the Board of Governors and the Senate to examine the undergraduate study load and to recommend changes. Among the topics which the committee examined, and for which they suggested relevant improvements were: the academic calendar, the preparedness of entering students, examinations, basic courses, fine-tuning by the faculties on syllabus and attitude, and the method of funding and of implementing the committee's recommendations. In my first term, I began the implementation process for improving the quality of teaching and the attitude towards students. For the future, I will make sure that every faculty member is committed to this change and that the quality of teaching is a larger factor in determining a faculty member's advancement.

We also plan to pursue a dialogue on the place of online courses (MOOCs - Massive Online Open Courses) in the Technion's teaching structure. MOOCs are taking root all over the globe and many say that they will soon change the face of academic education. This phenomenon, of university courses offered freely online, is quickly becoming prevalent in leading American universities and it is attracting tens and hundreds of thousands of participants. At a meeting of presidents of leading universities in Davos, in which I participated recently, there was unanimous agreement that the MOOCs phenomenon is here to stay, and it is liable to alter dramatically the character of university teaching. The Technion will embrace MOOCs at three levels – preparatory courses as remedial instruction for entering students, basic courses required of all first-year students and courses highlighting top Technion scientists. One very popular course in nanotechnology is already prepared for the internet by Technion Prof. Hossam Haick, in English and Arabic.

### ***Advancing Research***

The enhancement of our research activities and of our capacity to derive income from them has been an important priority that I set for my first term as president. Chief among these goals was the promotion of funded research. We encouraged faculty members to present research proposals to foreign sources of funding, As a result, our foreign funding increased from \$60M in 2008/09, to \$90M in 2011/12. We evaluated

the achievements of our four established interdisciplinary research centers (nanotechnology, autonomous systems, life sciences and engineering, and energy), described in detail in the research section of this report. We continued to raise funds for all four and we established our fifth center, in computer engineering. The income from intellectual property has more than tripled in the past four years - from \$7M in 2008 to \$25M in 2012. We established funds for investments in Technion companies and for supporting seed research in order to encourage the commercialization of intellectual property. We are also currently completing new regulations dealing with the utilization of intellectual property and we completed the composition of a code of ethics for research that was approved by the Senate. A required course on the latter is given to all graduate students. All of the above efforts have brought us closer to our goal of elevating the research component of the Technion's profile.

An exciting new direction for academic research in Israel is the creation of I-CORE Centers (Israel Centers of Research Excellence), which were established by the Israel Government Council of Higher Education's Planning and Budgeting Committee. Their aim is to stimulate research in selected areas by top scientists in order to fundamentally strengthen the long-term positioning of Israel's academic research and its stature. The Technion, after fierce competition, was awarded three centers in areas in which it excels – Solar Fuels headed by Prof. Gideon Grader, Light and Matter headed by Dist. Prof. Mordechai Segev and Physical Approaches to Dynamic Processes in Living Systems headed by Prof. Amit Meller. Each group is composed of top researchers from several universities in Israel and the centers were funded at approximately NIS 50M each.

During the past four years, our research activities have been based in the four established interdisciplinary research centers. In my second term, we will concentrate on strengthening our newest center - the international Technion Computer Engineering (TCE) Center, inaugurated in 2011 by the Computer Science and Electrical Engineering faculties. This joint effort is a small step in our attempts to streamline the functioning of the Technion by creating a framework of schools, each of which will serve as a hub for several of our 18 faculties. Further efforts in this direction include the establishment of joint interfaculty study programs and the joint appointment of academic staff members to different faculties.

### ***Physical Development***

There are four main areas of physical development at the Technion that will be the focus of my efforts in the near future. Increasing the number of beds in the dormitories on campus is, in my opinion, an absolute necessity for maintaining progress in the Technion's development. In the next four years, I hope that we will be able to add 600-800 beds on campus, or with special agreements outside the campus, requiring an investment of approximately \$50M. We have already begun to explore the possibility of building the dormitories with the BOT (Build-Operate-Transfer) process. Second, in the coming four years we will continue to invest in the renovation and upgrading of teaching facilities and in creating study areas for students in the faculties. Third, I will undertake a campus face-lift, planned by our own Faculty of Architecture and Town Planning. The plans include total renovation of the campus gates, campus lighting, all signs and all paths on campus, as well as finding a solution for the lack of space in the Senate Building. The fourth area is the Technion libraries. Because of the digital revolution, there has been a dramatic change in the way libraries function and we need to adapt to this new reality. The current system of 16 individual faculty libraries needs revamping and a special committee has dealt with the changes required. This will mean decreasing the number of libraries and librarians and these changes will be implemented during my second term.

### ***The Technion's International Standing – Challenges Ahead***

An additional goal of my presidency has been to consolidate the Technion's international standing and assure its well-deserved position as one of the world's top technological universities. We were catapulted into the international arena by two dramatic events of 2011 – the Nobel Prize to Dist. Prof. Dan Shechtman and winning the New York City Tech Campus competition together with Cornell University to establish a scientific-technological applied research institute in Manhattan. These placed the Technion in a unique position to achieve goals which were remote just months before. The international recognition, the expanded circle of our friends, the enhanced sense of accomplishment and success on campus among our students and staff all contributed to a broadening of our horizons and of our expectations.

We will be facing some unique challenges in the next few years in our quest to maintain and strengthen our international status. The first challenge is from within Israel. The Israel Defense Forces' central technological base of operations is moving to southern Israel. While developing the Negev in the south is an important strategic goal for the country, the move leaves the Technion, with its campus in the north, at a serious geographic disadvantage. The southward move of the IDF bases will result in a related move to the south of research and study centers in scientific and technological subjects, and of companies dealing with telecommunications and computerization. We therefore must fortify our position as the foremost international scientific and engineering institution in Israel, as well as the top research and teaching institution, in order to remain the leading alternative for providing scientific and technological expertise and consulting services to the Israel Defense Forces.

Another challenge that will be at the top of our agenda for a considerable period of time is the development of the New York City campus, which is an intensive and challenging process. One of the main ingredients of our future standing in the world will be our success in the New York initiative: JTCII – Jacobs Technion-Cornell Innovation Institute. The dramatic, munificent \$133M gift that the Technion received from Irwin and Joan Jacobs for the New York campus was a big step in the assurance of our success. Still, we will need to raise additional funds, recruit staff and create strong connections between the campus in New York and the institute in Haifa. We plan that our staff in New York will be based mainly on Israelis who have been in the U.S. for a long time, have attained high academic positions and can imbue JTCII with Israeli flavor and a strong affinity to Israel. Prof. Craig Gotsman heads the endeavor, and many of the Technion's staff and friends are involved in the establishment of the institute. This must be done while simultaneously strengthening our Haifa campus. The prestige and international network that the New York initiative affords makes this an opportunity for the Technion to fulfill its destiny as a truly great international institution.

### Technion Medal Awarded to Irwin Jacobs in Haifa



*Ceremony in NY celebrating Jacobs gift - from left: Irwin and Joan Jacobs, NY Mayor Bloomberg, Cornell President Skorton, Technion President Lavie*

Our horizons have definitely broadened, and in keeping with the growing importance of China as a world power, economically and politically, we are increasing our outreach to that huge and almost unknown territory. We have a considerable number of Chinese students studying at the Technion as well as a number of mutual courses and scientific understandings. We are negotiating with Guangdong Province and Shantu University on opening a Technion campus in the province.



*President Lavie with Zhao Hanqing whose substantial gift will support Chinese students at Technion*

In addition to all the above, we are heartened by the success of the Technion International School of Engineering and other initiatives such as the Technion's research laboratories in Singapore. We plan to further develop international activities on the campus in Haifa, and have created a new framework, "Technion International", which will unify all the bodies on campus dealing with foreign academic guests, postdoctoral researchers, and foreign graduate and undergraduate students. I am confident that the changes that we instituted will make it possible for us to increase significantly the number of foreign citizens on campus. Needless to say, we will accomplish this while taking great care, as we have done in the past, to maintain our academic standards.

I will also explore the possibilities for establishing cooperative initiatives in various fields of research and teaching with countries such as China, India, Chile, Ecuador and Russia, which have expressed interest in collaborations. However, we must beware of spreading ourselves too thin. Therefore, we are considering the establishment, under the umbrella of the Technion Research and Development Foundation, of a Technion-owned company based on our retirees that will deal with international educational-consultancy services and teaching.

This year I participated for the first time, by invitation, in the meeting of GULF - Global Universities Leadership Forum in the framework of the World Economic Forum at Davos. The top universities in the world participate in the GULF meetings, including MIT, Harvard, Yale, Princeton, Carnegie-Mellon, Cambridge, Oxford and

more. I will do whatever is possible to ensure that the Technion continues to participate in the forum's meetings.

### ***Resource Development***

The world Jewish community is undergoing transformation with a dramatic shift in generations. This is reflected in our societies of supporters all over the world, and especially in the United States. This development is characterized by the gradual loss of the generation that saw the rise of the State of Israel, and the emergence of a generation with different attitudes towards Israel and Zionism. The ATS is successfully building up this new generation of supporters, who have new and different priorities. The ATS has been at the forefront of the Technion's development and rise to excellence from the start and we know that it will remain so for the future as well. We are convinced that the Technion's enhanced position as an international institution will be instrumental in attracting a broad, new spectrum of supporters and, concurrently, their support will enable the Technion to develop its international position.

Our ambitious and challenging plans for the next four years require very robust financial resources. We have begun a dialogue with the ATS to ensure that their vital support continues, and indeed increases, despite the changes in the U.S. Jewish population described above. We have already seen a broadening in the pool of supporters following our exciting New York initiative and we are confident that, as always, the exceptional efforts of the ATS will be successful.

The ATS has had at its helm for the past 28 years a passionate professional – Executive Vice President Mel Bloom. Both personally and institutionally, we could not have asked for a better friend and fundraiser. Under his leadership, the ATS has consistently been ranked as one of the top fundraising organizations in the U.S. Mel will be retiring this year and the Technion hopes that his standards in management and human relations will be maintained. He will be missed.

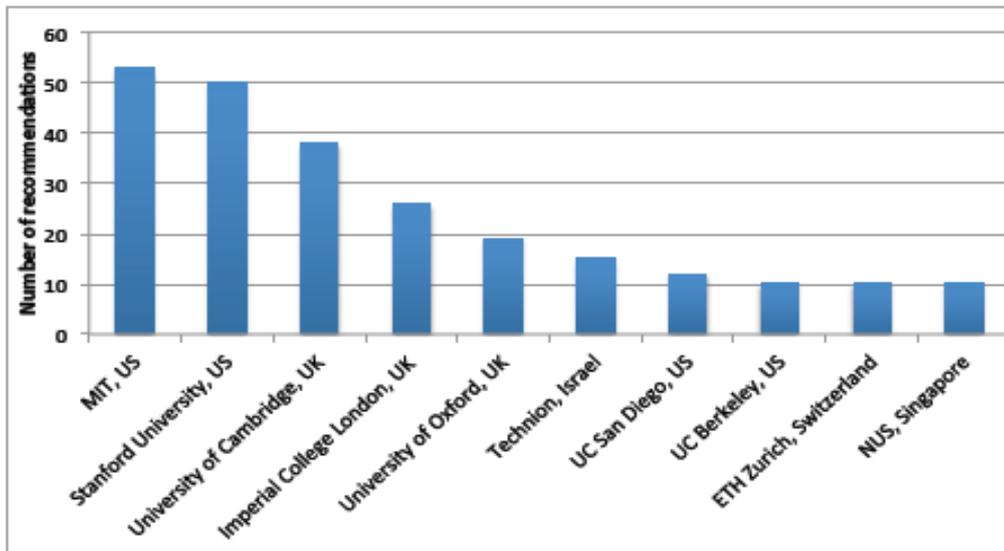


*Mel Bloom*

The Israel Technion Society, second in amount of funds raised for Technion, is undergoing a similar transition. It will redouble its efforts to attract Technion alumni in Israel, many of whom have achieved considerable financial success. Our other international societies, too, are aware of the challenges, and are intensifying their efforts to raise their level of support in what is often a dwindling population. There is a detailed report on Technion societies in the External Relations and Resource Development section of this report. An additional source of funding that I will continue to develop in the next four years is income from research activities, as described above, and specifically the commercialization of knowledge.

### ***Fulfillment of the Vision***

The Technion's vision: "*A scientific - technological university, among the 10 best in the world in developing human capital, leadership and the creation of knowledge, which labors to advance the State of Israel and mankind* ", has been and continues to be the beacon for my path as president. It has led to the Technion's elite position today in Israel, and among the world's technological universities. It is of considerable pride to the Technion community that a recent study, "*Technology Innovation Ecosystem Benchmarking Study*", conducted by MIT's Skoltech Institute of Science and Technology, has ranked Technion among the top 10 universities *in the world* in creating a university environment for entrepreneurship and innovation (see their table below). We have become outstanding both in research and in teaching and have carved out a notable position on the world stage. I pledge to continue to do all within my capacity, with the help of my colleagues in the administration and on the staff, to maintain and strengthen the Technion's leading position among the top universities in the world.



*Top 10 responses to the question ‘which universities would you identify as having created/supported the world’s most successful technology innovation ecosystems’, with the results adjusted for country of residence of the interviewee*

I cannot end this review without expressing my thanks and gratitude to all the wonderful, dedicated people on the Technion campus, in the administration, in the faculties, in the labs, in the workshops and in the offices, and to our friends who support us in Israel and overseas. The outstanding growth and development of our beloved Technion would be inconceivable without the efforts of our committed Technion teams on both sides of the ocean.

## **Technion Governance**

### ***Technion Management***

Prof. Peretz Lavie - President

Prof. Paul Feigin - Senior Executive Vice President

Prof. Gadi Schuster - Executive Vice President for Academic Affairs

Prof. Oded Shmueli - Executive Vice President for Research

Prof. Emeritus Arnon Bentur - Executive Vice President and Director General

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

### ***Technion Deans***

Prof. Daoud Bshouty - Dean of Undergraduate Studies

Prof. Hillel Pratt - Dean of the Irwin and Joan Jacobs Graduate School

Prof. Moris Eisen - Dean of Students

Prof. Yehudit Dori – Dean of the Unit for Continuing Education and External Studies

### ***Deputies of the Executive Vice Presidents***

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

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

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

Prof. Noam Adir – Deputy Executive Vice President for Research

Prof. Daniel Rittel - Deputy Senior Executive Vice President

### ***Heads of the Academic Units***

Prof. Yaakov Oshman - Faculty of Aerospace Engineering

Prof. Yehuda Kalay - Faculty of Architecture and Town Planning

Prof. Yehuda Assaraf - Faculty of Biology

Assoc. Prof. Amir Landesberg - Faculty 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. Noah Galil - Faculty of Civil and Environmental Engineering

Prof. Eli Biham - Faculty of Computer Science

Assoc. Prof. Orit Hazzan - Department of Education in Science and Technology  
Prof. Adam Shwartz - Faculty of Electrical Engineering  
Assoc. Prof. Efraim Lev - Department of Humanities and Arts  
Prof. Aharon Ben-Tal – Davidson Faculty of Industrial Engineering and Management  
Prof. Wayne Kaplan - Faculty of Materials Science and Engineering  
Prof. Ron Holzman - Faculty of Mathematics  
Prof. Pinhas Bar-Yoseph - Faculty of Mechanical Engineering  
Prof. Eliezer Shalev – Rappaport Faculty of Medicine  
Prof. Noam Soker - Faculty of Physics

***Technion International School (TI)***

Prof. Emeritus Arnon Bentur - Head of the Technion International School (TI)  
Prof. Anat Rafaeli - Deputy Head of the Technion International School (TI)

**TECHNION SENIOR MANAGEMENT**



> **Prof Paul Feigin**  
Senior Executive Vice  
President



> **Prof Arnon Bentur**  
Executive Vice President  
for Finance  
and General Director



> **Prof Gadi Schuster**  
Executive Vice President  
For Academic Affairs



> **Prof Boaz Golany**  
Vice President for External  
Relations & Resource  
Development



> **Prof Oded Shmueli**  
Executive Vice President  
for Research

## TECHNION DEPUTY VICE PRESIDENTS

> **Prof Daniel Rittel**  
Deputy Senior Vice President



> **Prof Noam Adir**  
Deputy Vice President for Research



> **Prof Moshe Shpitalni**  
Deputy Vice President  
For Academic Affairs



## TECHNION DEANS



**Prof Daud Bashouti,**  
Dean of Undergraduate Studies



**Prof Moris S. Eisen,**  
Dean of Students



**Prof Yehudit (Judi)  
Dori,**  
Dean of Continuing  
Education and External  
Studies



**Prof Hillel Pratt,**  
Dean of the  
Graduate School

## DEPUTIES OF THE DIRECTOR GENERAL



**Mr Matanyahu Englman,**  
Deputy to the Director General



**Ms Zehava Laniado,**  
Deputy D-G of Operations



**Mr Ariel Hazan,**  
Deputy D-G of Human Resources

## **Academic Affairs**

*Professor Paul Feigin, Senior Executive Vice President, has focused 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 Committee on Program Structure and Study Load, led by Prof. Yachin Cohen, has completed its work and has provided an excellent set of carefully thought-out recommendations, which, for the most part, have been accepted by the Technion Senate. Their implementation according to a tight but feasible schedule will pave the way for a complete overhaul of our engineering and science undergraduate study programs. The recommendations extend from defining learning outcomes at the program and course level, through putting in place mechanisms to ensure quality control of the teaching and evaluation of students, to reorganizing the semester structure so that study and examination periods do not overlap. Another important aspect of the committee's recommendations concerns ensuring that students enter the Technion properly prepared in the basic mathematics and science subjects.

The implementation timetable calls for all faculties to revise programs by March 2014, so that they will be compatible with the new semester structure of 13 weeks of study instead of the current 14 weeks. This new semester structure will be introduced as from the fall of 2014. The Technion management fully endorses these changes, including supplying the resources required to provide incentives to the best teachers of service courses in the sciences and of the basic compulsory courses in the various disciplines. In addition, the management endorsed providing resources for setting up a Center for Evaluation (of student learning) in the Unit for Advancement of Teaching.

The Academic Committee of the Board will hear a report from Prof. Cohen, and will discuss the implementation of the recommendations.

### ***New York City Project with Cornell University***

Much effort was devoted to developing the Foundation Agreement between Cornell and the Technion for establishing the Technion-Cornell Innovation Institute, Inc. Following the agreement, Prof. Craig Gotsman took up his position on January 1, 2013, as the first (Founding) Director of TCII, for five years. The first board meeting was held on April 24, two days after the announcement of an extraordinary endowment gift by Joan and Irwin Jacobs. The institute was immediately renamed the Joan and Irwin Jacobs Technion-Cornell Innovation Institute, Inc. (JTCII).

The main challenge facing the new institute is recruiting faculty. During the past year, in record time, the New York State Department of Education approved the first dual degree program. The first classes in the dual degree programs are set to begin in the fall of 2014. Meanwhile, a novel "post-doctoral innovation fellow" program is being initiated to start in the fall of 2013. JTCII is part of Cornell NYCTech – which is temporarily located on the 3<sup>rd</sup> floor of the Google building in the Chelsea district of New York City. More details will be provided in the presentations during the Board of Governors meeting.



*Roosevelt Island – future site of the JTCII*

### ***Natural Gas and Petroleum Engineering***

The first cohort of 20 students is about to finish a very successful Master of Engineering degree program with a specialization in Natural Gas and Petroleum Engineering. The response of both students and guest lecturers has been very positive

– so much so that three graduates have received scholarships from the Ministry of Energy and Water to study towards their Ph.D. degrees at the University of Houston. This achievement will place the Technion and Israel in a position to develop both technical and research capabilities in this important industry for the future of the State of Israel. We have also started discussions with various groups interested in helping us establish laboratories and research facilities on campus.

### ***Revised Curricula in Medicine and Related Programs***

The Faculties of Medicine, Biology, Biomedical Engineering and Biotechnology and Food Engineering are coordinating the introduction of a uniform entrance track that will allow students to study a common core of science and basic engineering subjects in their first two years. After that, before entering their third year of study, the students will choose, also based on a selection process, to either complete a three-year B.Sc. degree in biology or medical sciences, or to continue with a four-year engineering B.Sc. Some of those completing the undergraduate medical sciences degree will continue to three more years of clinical studies toward the M.D. qualification, or choose a research M.Sc.-Ph.D. track. Similarly, those who successfully complete the B.Sc. in biology will continue to advanced research degrees in biology. The first stage of the process will be completed this year – it is the upgrading of the science and engineering bases of both the medical sciences and the biology degree programs which will be effective as of the 2013-2014 academic year.

### ***Revised Curricula in Architecture***

The Faculty of Architecture and Town Planning, under the stewardship of its dean, Prof. Yehuda Kalay, has approved a new program of study leading to professional accreditation as an architect. It is comprised of a four-year B.Sc. program in architectural sciences, followed by a two-year Masters of Architecture (MArch) program leading to the professional qualification. The revised program incorporates many new courses, and the sequence of studio courses has also been revised. The program has the blessing of the Registrar of Engineers and Architects, as well as finding favor among students and practitioners who were consulted in various stages of the program's development. After many decades without any significant updating

of the curricula, we are convinced that the new program will make a considerable contribution to educating architects in Israel and in general.

### ***MOOCs (Massive Online Open Courses)***

The Technion has decided to present a pilot course on the COURSERA platform and has signed a contract to do so. The course will be "Nanotechnology and Nanosensors," taught by Prof. Hossam Haick, in both English and Arabic. This commitment was made after a number of presentations and a lively debate on the subject of MOOCs in the Academic Assembly on February 3, 2013. This meeting was planned and led by Prof. Daniel Lewin, Assistant to the Senior Vice President for the Advancement of Teaching. The use of MOOC-style computer-interactive platforms, whether for massive audiences or for local use, and incorporating the so-called "flipped classroom" model, has many proponents and there is growing evidence that it can enhance student learning in many types of courses. There are those who say that this approach and technology will revolutionize higher education, and will do so sooner rather than later. The Technion has decided to invest in the pilot program in order to evaluate broader implementation of the approach in the Technion.

### ***Department of Humanities and Arts and Enrichment Studies***

It is a pleasure to report that Prof. 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 initial set of "enrichment courses" amongst which students must choose at least three (six credit points) during their degrees. Based on the first semester 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, 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 20 approved so far. An online, interactive course is also being piloted this year as part of the enrichment program.

## ***International Review Committees***

This year, two types of international review committees provided evaluations of four Technion faculties; three were initiated by the Technion (the Schulich Faculty of Chemistry, the Wolfson Faculty of Chemical Engineering and the Faculty of Biomedical Engineering), and the other one by the Council for Higher Education (the Faculty of Biotechnology and Food Engineering).

### **Schulich Faculty of Chemistry**

The review committee, headed by Prof. Donald H. Levy (University of Chicago), convened in May 2012. The committee praised the excellence of the faculty in both research and teaching, as well as its high international visibility. A series of recommendations were made regarding the establishment of a strategic development plan. The size of the faculty should be increased by careful hiring in selected areas of chemistry along with a consolidation of the interaction between the two divisions of the faculty (organic/inorganic and analytical chemistry). Several detailed recommendations were also made regarding the number of graduate students and fellowships as well as the highly loaded curriculum. Finally, a strong recommendation was made as to the construction of a new wing as part of the future, improved infrastructure.

### **Wolfson Faculty of Chemical Engineering**

The review committee, headed by Prof. Nicholas L. Abbott (University of Wisconsin-Madison) convened in February 2013. Here too, the leadership role of the faculty was acknowledged, as well as its local and international impact in the field. The committee mentioned the presence of “world leaders” in the faculty. Here too, a strategic development plan is recommended with the identification of emerging fields of expertise. Hiring of five additional faculty is mentioned. Several recommendations were made regarding the curriculum and teaching load. The committee noted the poor state of the infrastructure (building, lack of proper workshops), including safety concerns. A recurring remark concerns the desirable increase in the number of graduate students and promotion of international exchange programs. The faculty is encouraged to deepen its collaboration with the Faculty of Biotechnology and Food Engineering.

### **Faculty of Biomedical Engineering**

The review committee, headed by Prof. Morteza Gharib (CALTECH) convened in March 2013. At the time of writing, the final report is not yet available. Based on the preliminary report submitted by the committee, it appears that the committee was deeply impressed by the faculty, its members and the quality of their research. The outstanding level of success in obtaining grants from competitive agencies was noted. Yet, it was remarked that the department is undersized, with a high teaching load. While traditional fields constitute the long-term strength of the faculty, current thrusts such as regenerative medicine should be considered. Here too, the faculty is encouraged to reflect upon a strategic development plan. As of today, the infrastructure (social space, classrooms) is sufficient for the current size of the faculty but clearly insufficient if future expansion is considered. While the committee believes that Biomedical Engineering should remain an independent department, its strength is identified as essentially experimental. Hence, cooperation should be sought with more analytically-oriented departments in the Technion, such as the Faculty of Mechanical Engineering.



*Students in the Biomedical Engineering Laboratory*

### **Faculty of Biotechnology and Food Engineering**

This Council for Higher Education review committee convened in June 2012. The committee also evaluated similar programs in Israel. One should note that the CHE's committees usually focus more of their attention on teaching than research issues.

Overall, the report is quite flattering of the faculty's status and achievements. In parallel, the report contains a series of recommendations, designated as "immediate" and "intermediate". Among these, one can note the need to increase the number of engineering courses in order to readjust the balance between biotechnology and engineering. Specific technical recommendations were made concerning the undergraduate and graduate curricula, while noting their high quality. The committee also noted the excellence of the faculty and students alike. The evaluation of the overall infrastructure was positive, with the exception of the pilot plant that needs to be upgraded.

### ***The Technion International School (TI)***

The Technion International School (TI) was established in October 2012 following a plan reported to the Board of Governors in 2012. TI is a merger of the Technion International School of Engineering (ISE) and the Center for International Academic Relations (CIAR). In 2013, it started to develop its new and existing functions and moved to its new home in the Mauerberger Building on campus. TI handles the development, management and marketing of academic programs for international students at the Technion, as well as managing academic agreements between the Technion and universities as well as multi-university umbrella organizations worldwide.

TI works in collaboration with the Office of Academic Affairs, the Division of Continuing and External Education, the Dean of Students, the Deans of Undergraduate and Graduate Studies and specific faculty deans. TI promotes and facilitates academic visits of individual students and scientists to the Technion, for visits ranging in length from a few weeks through a full degree, and also manages the outgoing student exchange program for Technion students.

A major effort of TI is facilitating the development of English language programs, in order to form a basis for attracting international students. These programs are based on courses identical to the ones taught in Hebrew and they are open to Israeli students who may study (in English) alongside international students and thereby experience aspects of multiculturalism and globalization. TI's key program – the four-year

undergraduate program in Civil and Environmental Engineering – is entering its fourth year, with the first cohort of students about to graduate this summer. In addition, TI works to develop special programs, including offering a freshman year in engineering (in English and in Russian), and summer programs to be offered in English. The first program, "Engineering for Developing Communities", was conducted very successfully during the previous two summers and attracted international and Israeli students. A new set of summer programs scheduled to start in the summer of 2013 will offer academic courses in four faculties (Mechanical Engineering, Aerospace Engineering, Mathematics and Electrical Engineering). Current efforts are also invested in the development of summer programs that will start to operate in the summer of 2014, in entrepreneurship and innovation. Efforts also focus on developing graduate level studies in English. Specific plans include a program for a one-year Masters of Engineering in Systems Engineering, to be offered in cooperation with the Division of Continuing and External Education, and a full (two-year) M.Sc. program in chemistry (to be taught in English so as to attract international students).

Through TI, the Technion currently maintains academic collaboration agreements with 178 universities in 35 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.

This year, there has been special focus on programs of the Israeli government and the European Union. TI received funding from the Planning and Budgeting Committee (PBC) of the Israel Council for Higher Education (CHE) to support hosting of students from China and India, and from the EU for a program focused on the teaching of electronic commerce. In addition, TI facilitated Technion partnerships in the EU Tempus program (for the development of teaching curricula) and Erasmus

Mundus Program (for funding of student and researcher mobility). The submitted proposals involve collaborations with 57 universities from 23 countries.

In 2011/12 (the last academic year for which complete data is available), Technion hosted a total of 826 international students – including 112 full-time undergraduate students, 253 full-time graduate students, 103 full-time medical students, 85 full-time students in the International School of Engineering, 105 visiting students, 102 post-doctoral fellows and 66 academic visitors.

Special efforts continue to be invested in collaboration with MIT. Through the MIT MISTI program, eight MIT students spent eight weeks each on research internships in one of the Technion labs in 2012. Through the TMIP Program, eight Technion students spent 5-12 weeks on research internships in one of the MIT labs.

International relations developed by TI also provide a resource for enriching the experience of Technion students, through the Student Exchange program. This program is open to excellent undergraduate students in their third year of studies. In 2011/12, there were 49 Technion students on a semester or a year abroad program, in universities in Europe, North America, South America, Australia and Asia. In addition, some 60 Technion students participated in the IAESTE summer internship program, which allows students to spend a summer working in a firm or organization in another country. Special efforts are currently being invested to develop additional programs allowing an international experience for Technion students. For example, a special program developed in 2012 to be implemented soon, will allow 18 Technion students to meet fellow students from the USA, Germany, Korea and China for a special seminar to be held in Korea.



*International School class*

### ***Programs for Ultra-Orthodox Students***

As a result of the national effort to increase the work force participation within the ultra-Orthodox communities in Israel, the Council for Higher Education (CHE), through the Planning and Budgeting Committee (PBC), has put out a call for proposals to set up facilities for ultra-Orthodox students to study and obtain degrees in higher education. These facilities are to be close to a current university campus, yet separate enough so that these students will feel comfortable maintaining their own way of life, and not be overwhelmed by the presence of other cultural and behavioral norms. The Technion, based upon its experience with pre-academic training of several such classes of male students, suggested a model. In this model, during the pre-academic phase, students would be divided into two groups – one with students who have the potential to continue to fully-fledged academic studies at the Technion, and the other which will be directed to the two-year diploma program in the National School for Practical Engineers on the Technion campus. The graduates of the latter program are also very much sought after by industry, and so those who graduate will achieve the goal of all such programs – ensuring a respectable livelihood. The plan is that the area occupied by the National School will be divided to provide an ultra-Orthodox section, with a separate entrance and separate classes. When the program is fully developed, female students will probably study in the morning hours, and male students in the afternoon and evening. The idea was received enthusiastically by the PBC, and now a task force is working on recruiting the first class.

In another initiative, the Technion has successfully carried out a pre-academic training program in a Bnei Brak college for ultra-Orthodox students. This program is also supported by the PBC, and a group of some 18 students are now starting a three-year degree program in Geodesics (mapping). The studies will be held both in Bnei Brak and in the Technion, including the use of distance-learning facilities. The program will lead to employment for successful graduates in the Israel Mapping Center.

### ***Off-Budget and Off-Campus Programs***

The Technion, as part of its mission to maintain the skills of graduates through *life-long-learning*, runs several such study programs at the Masters Degree level. These are also called Masters of Engineering courses, are taught part-time, and do not require research but, instead, a 5-credit project (out of a total of 40 credits). These programs were always monitored by the dean of the Technion's Irwin and Joan Jacobs Graduate School, and admissions and student progress strictly follow Graduate School regulations. Some of these programs are taught in the Tel Aviv area where the overwhelming proportion of engineers, architects, and science graduates live and work. This outreach provides an immeasurable service to Israeli industry, as well as to Israel's Ministry of Defense – saving many person-years of work and travel. In order to provide suitable facilities, the Unit for Continuing and External Studies is now completing the Sarona site campus in the center of Tel Aviv.



***President Lavie visits the Sarona site***

After discussions with the PBC, we have decided on a series of steps through which these off-campus programs (with the exception of the Tel Aviv MBA programs) will be fully integrated into the Irwin and Joan Jacobs Graduate School, and then be fully recognized by the CHE. Thus the issues mentioned last year, concerning the funding of these programs, should largely be overcome by the end of this academic year.

### ***Equal Opportunities for Arab Students***

Following on the successful Landa program in the Technion (see <http://www.youtube.com/watch?v=6XBJww603Oc>), the Council of Higher Education has adopted many of its ideas and significantly increased the PBC funding for enhancing the accessibility of higher education to the Arab population. The Technion, together with continuing support from donations and self-funding, is therefore able to maintain and even extend this program and thereby ensure its further success. In this regard, the Technion has appointed Prof. Yosef Jabareen as the Assistant to the Senior Vice President for Advancing Minorities in the Technion. It is his role to oversee a whole range of activities designed to encourage members of minorities to study at the Technion and, for those with the potential, to continue to advanced degrees and academic careers.



***Students Relaxing on Campus***

### ***K-12 School Pupils – Outreach and Influencing Choices***

The Technion has taken the lead in supporting a new pilot program to teach high school physics and mathematics from Grade 7 through Grade 12. Led by two recent physics Ph.D. graduates of the Technion, the pilot program involves learning by doing and understanding experiments rather than by first studying ideas and then doing pre-planned experiments. A class from the local high school is participating, and teachers, pupils and professional supervisors are very positive about the program's progress.

### ***Training High School Teachers***

Last year, in an unprecedented move designed to train a new and talented cohort of science and technology teachers, the Technion's Department of Technology and Science Education offered 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 Technology and Science Education. This training includes the requirements for obtaining a high school teaching certificate. The response continues to be overwhelming in this second year – with about 150 students enrolling over the first three semesters. This influx has completely changed the atmosphere in the department, which has suffered for many years from low enrolment. Moreover, it has caught the attention of the Ministry of Education, who sees this new resource as a major contribution to solving the lack of qualified science and technology high school teachers.



***Department of Education in Technology and Science – Teacher Training***

## *Faculty Recruitment*

The recruitment of excellent young faculty members and their retention remains one of the most important issues the Technion is facing. During last year's Board of Governors meeting, the Executive Vice President for Academic Affairs reported on the efforts geared to facilitate the recruitment process and to make it possible for the Technion to bring the best faculty.

Many recommendations of the recent task force were implemented by the Technion. Faculties are using widespread advertisement and proactive recruitment. The Technion has made several post-doctoral fellowships available to excellent candidates who will be recruited as faculty members in the future. Along these lines, 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 10 years and will then be recruited as faculty members (if they excel in their post-doctoral studies). The Technion participated in very successful career fairs in the last three 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 I-Core that will be supported by the PBC. In several 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 can be increased. The government started to implement the long-term policy that will yield significant additional resources to the Technion, thus allowing an increase in the number of excellent young faculty members we can recruit. In addition, we continue to develop new fundraising programs such as the Career Advancement Chair and have renewed the Leaders in Science and Technology program, which allows us to recruit additional excellent faculty members. This reverses the trend of recent years and will bring back 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 continued our success by recruiting a similar number without compromising the quality of the new recruits. We plan to continue recruiting about 30-35 new faculty each year in the next five years.



*New faculty members and their families in front of Zielony Village*

A very bright spot in the recruitment of the past few years, this year included, is the excellent crop of brilliant young faculty members who joined us, despite attractive offers from other universities or industry abroad and in Israel. It took significant effort by the faculty deans and the 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, the Shillman Career Advancement Chair, Chaya Career Advancement Chair, Andro Deloro Career Advancement Chair, David and Inez Myers Career Development Chair in Life Science and the Advancement Chair in Economy and Finance all played an important role in making this a reality.

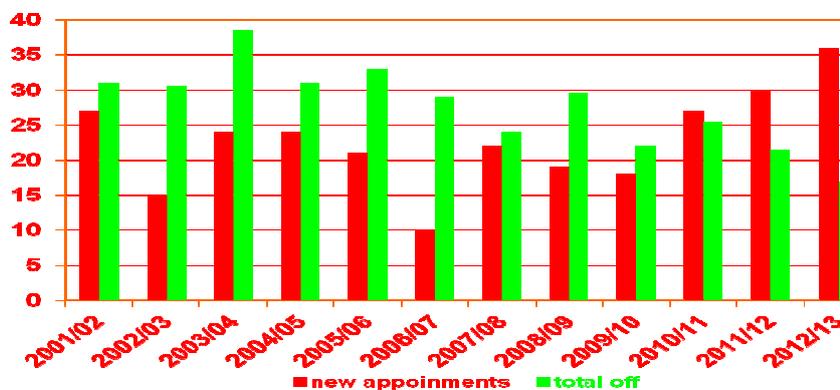
The brilliance of our young faculty members is made apparent by the fact that each year several of them are awarded various prizes and distinctions, including the prestigious Alon Fellowship. This year, four of our new faculty members won this distinguished award:

- **Dr. Meytal Landau** - joined the Faculty of Biology this year. Dr. Landau completed her Ph.D. studies at Tel Aviv University and spent three years as a post-doc at UCLA. Dr. Landau works on producing modern medicines using advanced protein structure as well as computer science tools.

- **Dr. Netanel Lindler** - joined the Faculty of Physics this year. Dr. Lindler completed his Ph.D. studies at the Technion and spent several years as a post-doc at the California Institute of Technology. Dr. Lindler works on quantum physics.
- **Dr. Keren Censor-Hillel** – joined the Faculty of Computer Sciences this year. Dr. Censor-Hillel completed her Ph.D. studies at the Technion and spent her post-doc period at MIT. Dr. Censor-Hillel works in the field of Distributed Computing.
- **Dr. Avi Schroder** - joined the Wolfson Faculty of Chemical Engineering this year. Dr. Schroder completed his Ph.D. studies at Ben-Gurion University and spent three years as a post-doc at MIT. Dr. Schroder works on new medicines and nanotechnology.

Our Leaders in Science and Technology program and the Career Advancement Chairs assisted us in recruiting four to six new faculty members a year since 2002, and continue to serve as a valuable instrument 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, **Dr. Itai Yanai** from the Faculty of Biology and **Dr. Amit Kanigel** from the Faculty of Physics were awarded the prestigious national Krill Prize that is supported by the Wolf Foundation. This prize is for excellence in scientific research of young faculty before they get tenure.



**New Appointment vs. Retirements and Departures**

The retirement of faculty members provides us with the opportunity to truly bring into the Technion ranks the most brilliant and innovative minds out there; however, we have to be in a position to be able 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 cannot refuse. In fact, our approach in this matter is a very hands-on one. If we find a suitable candidate whom we wish to recruit to the Technion, a personal approach to recruitment is warranted and we shall be willing to travel to the candidate and persuade him or her to join the Technion. This illustrates our conviction that this should be an utmost priority of the Technion and we shall pursue it diligently. Other steps we have taken to help in recruitment include: offering higher ranks to start with; offering built-in tenure; offering attractive start-up packages; establishing laboratories prior to the arrival of new faculty members; 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 providing help with the transition of new faculty members and their families (e.g. 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 in terms of the disciplines for which we attempt to recruit. This priority of recruitment has to be in sync with another priority: to develop new and cutting-edge disciplines at the Technion. As president, my obligation is to constantly see the larger picture and steer towards our ultimate target.



*New faculty: Lilac Amirav (left) and Moran Bercovici*

## ***Prizes and Honors - 2012/13***

*The Technion is an outstanding institution, in great part because of its outstanding academic staff. The following impressive list of prizes and honors bears witness to our faculty's excellence. We congratulate the recipients for their wonderful achievements:*

**Prof. Avishai Mandelbaum**, Davidson Faculty of Industrial Engineering and Management, was elected a fellow of the Institute of Operations Research and Management Science (INFORMS).

**Distinguished Prof. Emeritus Daniel Weihs**, Faculty of Aerospace Engineering, became a member of the Israel National Council for Civil Research and Development.

**Prof. Michael Elad**, Faculty of Computer Science, became a fellow of the Institute of Electrical and Electronic Engineers (IEEE) in the U.S.

**Prof. Emeritus Joseph Miltz**, Faculty of Biotechnology and Food Engineering, was awarded a Lifetime Achievement Award in Industry and Academics by the Manufacturers Association of Israel for the year 2012.

**Prof. Emeritus Moussa Youdim**, Faculty of Medicine, was awarded the CINP Pioneers in Psychopharmacology Award by the International College of Neuropsychopharmacology.

**Distinguished Prof. Shlomo Shamai** (Shitz), Faculty of Electrical Engineering, was elected a member of the Israel National Academy of Sciences.

**Distinguished Prof. Yitzhak Apeloig**, Schulich Faculty of Chemistry, was awarded an Honorary Fellowship by the Academic College of Engineering in Jerusalem.

**Prof. Moshe Tennenholz**, Davidson Faculty of Industrial Engineering and Management, was awarded an ACM/SIGART Autonomous Agents Research Award for 2012.

**Dr. Ruth Hershberg**, Rappaport Faculty of Medicine, **Dr. Carmel Rotschild**, Faculty of Mechanical Engineering and **Dr. Uri Shapira**, Faculty of Mathematics, were recipients of Alon Fellowships for 2012.

**Dr. Nir Ailon**, Faculty of Computer Science, received the Society for Industrial and Applied Mathematics - SIAM - Outstanding Paper Prize for 2012.

**Prof. Rachelle Alterman**, Faculty of Architecture and Town Planning, was awarded the Association of European Schools of Planning (AESOP) Award.

**Prof. Emeritus Moshe Feinsod**, Faculty of Medicine, received a Lifetime Achievement Award from the International Society of the History of the Neurosciences (ISHN).

**Mr. Dov Moran**, Technion alumnus, received the Prestigious Technology Award from the Eduard Rhein Foundation in Germany for the Development of the "Disk-On-Key".

**Prof. Yonina Eldar**, Faculty of Electrical Engineering, and **Prof. Lior Gepstein**, Rappaport Faculty of Medicine, were appointed to the Academy for Young Scientists of the Israel National Academy of Sciences.

**Prof. Moshe Shpitalni**, Faculty of Mechanical Engineering, was awarded the Society of Manufacturing Engineers' Albert M. Sargent Progress Award for 2013.

**Prof. Erez Hasman**, Faculty of Mechanical Engineering, became a Fellow of the Optical Society of America (OSA).

**Dr. Sarit Sivan**, Faculty of Biomedical Engineering, was awarded the European Commission's Marie Curie Prize for Outstanding Achievement in Research for the development of a synthetic spinal disc.

**Prof. Ilan Marek**, Schulich Faculty of Chemistry, received the 2012 ICS Janssen Pharmaceutica Prize for Creativity in Organic Synthesis.

**Dr. Itai Yanai**, Faculty of Biology, and **Dr. Amit Kanigel**, Faculty of Physics, were awarded the Wolf Foundation's Krill Prizes for 2013.

**Prof. Steve Lipson**, Faculty of Physics, was awarded the Oasis Prize by the Israel Association of Optical Scientists and Engineers.

**Prof. Adam Mazor**, formerly of the Faculty of Architecture and Town Planning, was an Israel Prize winner in Architecture and Design for 2013.

**Distinguished Prof. Shlomo Shamai** (Shitz), Faculty of Electrical Engineering, became a Foreign Associate of the United States National Academy of Engineers (NAE).

**Prof. Emeritus Chaim Yarnitzky**, Schulich Faculty of Chemistry, was awarded the Israel Analytical Chemistry Society Award.

**Prof. Tamar Ziegler**, Faculty of Mathematics, was named 2013 European Mathematical Society Lecturer of the Year.



*Ilan Marek, Faculty of Chemistry*

## **Research at the Technion**

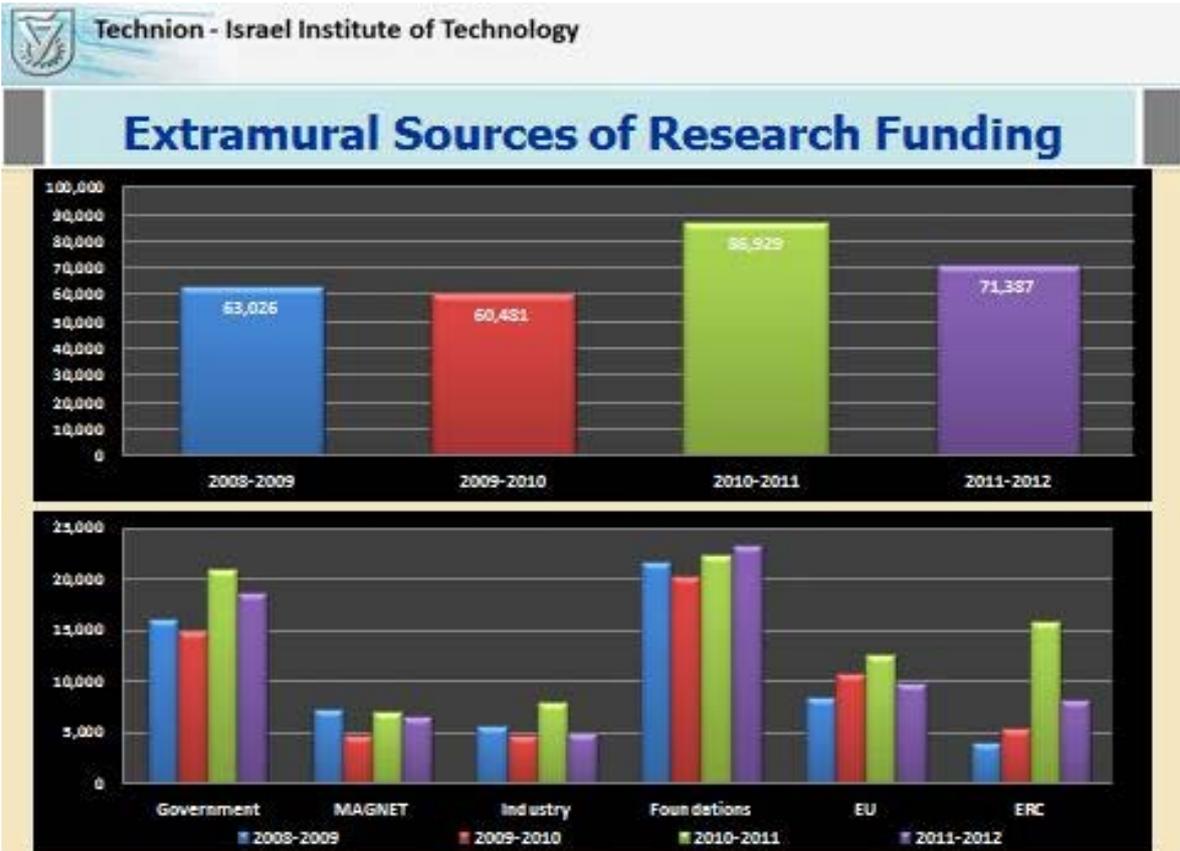
### ***Funded Research***

The Research Authority signed research contracts in 2012 amounting to \$71.4M. In the past two years the scope of Technion's research contracts was: \$60.5M in 2010 and \$86.9M in 2011. The funding amount in 2011 was high as a result of the timing of the grants received from the European Union's ERC.

We continue our vigorous activities to encourage the submittal of research proposals to competitive scientific funds. The last few years have seen an increase in submissions, grants and budgeting from the three main funds (ISF - Israel Science Foundation, BSF - Bi-national Science Foundation and GIF - German Israeli Foundation). From the ISF alone we received \$16.8M in the past year.

The European Union's Seventh Framework Program for Research and Development, launched in January 2007, approved 187 projects as of March 2013, with funding amounting to €78.1M. Of this amount, in 2012 there were awards to 14 researchers of approximately €4M (together) in joint technological-scientific projects with industry. Four researchers were awarded ERC grants for young researchers amounting to €6M. Three received ERC grants for senior researchers amounting to €6.7M and 14 researchers received Marie Curie Mobility Research Grants for a total of €1.8M. Additionally, within the supplemental and academic frameworks of the European Union, the Technion received another €1.63M.

Since 2002, the beginning of the operation of the liaison office in for promoting projects in the Office of the Chief Scientist of the Ministry of Industry, Trade and Labor, the research budgets from this source have increased four-fold. In 2012, we received a total amount of research grants amounting to NIS 39M, as compared to NIS 38M in 2011. These amounts include 18 projects in the "Kamin" program that received NIS 8.4M. In 2012, the total amount of research and development activities funded from industrial, commercial and business sources in the framework of the Research Authority, reached \$7.3M.



### *Supporting Researchers*

In addition to the abovementioned external funding, which consisted 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) in the amount of \$16.7M, and assistance for equipping new faculty members in the amount of \$11.8M, as compared to \$10M the year before. In addition, we received \$4.35M assistance for programs for new immigrant absorption from the Ministry of Immigrant Absorption.

### *Internal Technion Financing*

Over the past year, we have allocated close to \$1.2M to promote faculty research activities (including internal grants, bonuses for researchers submitting proposals to competitive funds and promoting research among new faculty). This amount includes \$269,100 in grants to researchers who submitted outstanding proposals to the ERC and

did not receive grants from them. The sum of \$0.8M was allocated through Academic Chairs and \$25.2M was allocated to finance fellowships for graduate students engaged in research. The total amount invested in research, including all sources - external funding, contributions from donors, external aid, internal funds and graduate fellowships - stands at about \$131.4M.

### ***International and Industrial Collaboration***

- **The Singapore Project** - A research cooperation agreement was signed with the Singapore National Research Foundation (NRF), the Singapore Ministry of Education and two universities in Singapore (Nanyang Technical University and the National University of Singapore) for \$20M Singapore (\$15M US). Research activity in the field of tissue engineering began in October 2009. The project continues to operate to the satisfaction of both parties and a process of technology transfer has been initiated. In the coming months an international committee will carry out an evaluation of the Singapore project.
- **The Umbrella Energy Program** - The annual Umbrella Symposium was held at the Technion in March 2013 on the topic of "Nanoscale Physics and Chemistry as Drivers for Future Technological Developments". Within this framework, a number of research grants will be awarded to research teams from the three participating universities (Technion, Forschungszentrum Jülich, Germany and RWTH Aachen University, Germany).
- **Northeastern University Research Collaboration** - This is a continuing collaboration for research purposes which was initiated at the beginning of 2010; a call went out for proposals in 2011, and two grants were awarded totaling \$80K. The cooperative agreement continued this year as well. In 2012, two research grants were awarded for the total sum of \$80K.
- **The Technion Center of Excellence in Exposure Science and Environmental Health** - The Technion was awarded funding from the Foundation for Environmental Health in the amount of \$1M for five years for the purpose of establishing a Center of Excellence: "From Airborne Stressors through Risk Assessment to Health Outcomes". This is a joint

center for researchers from various Technion faculties run by the Faculty for Civil and Environmental Engineering and the Faculty of Medicine. The center's activities in the past two years included formulating a five-year research plan and managing research in four areas: exposure to air pollution from traffic in the urban environment; the effect of air pollution from agricultural sources on the neighboring population; air pollution within structures; and developing systems for remote sensing of air pollutants and for analyzing data bases from monitoring systems in order to evaluate the level of exposure of the public to pollutants.

### *Significant Agreements*

- A contract has been signed with the Ministry of Construction and Housing for the standardization of research activity and for the examination of new construction methods at the National Building Research Institute.
- The Technion's Asher Space Research Institute signed a research cooperation agreement with NTU – Nanyang Technological University in Singapore, in the area of nanosatellite research.

### *Research Institutes and Centers*

- In the framework of the new Center for Electronic Commerce of the Davidson Faculty of Industrial Engineering and Management with financing from, and in cooperation with, the Microsoft Company, 10 research grants were actuated.
- A wide-ranging research center was established in partnership with Intel, the Technion and the Hebrew University. The center began functioning in the second half of 2012. The center is mainly for the use of faculty members from the Faculties of Electrical Engineering and Computer Science, and its subject is Computational Intelligence.
- The Technion was awarded two Israel Government I-Core Second Wave Centers of Excellence:

**Light and Matter:** non-linear optics and quantum optics – headed by Distinguished Prof. Mordecai Segev from the Faculty of Physics and the Solid State Institute.

**Physical Approaches to Dynamic Processes in Living Systems:** from the level of molecules to the level of individual cells – headed by Prof. Amit Meller from the Faculty of Biomedical Engineering.

- An additional eight I-Core Centers have a significant Technion-researchers component.
- The construction of three nanosatellites (the Samson Project) by the Asher Space Research Institute is continuing at a vigorous pace.
- An inter-university center for research of the Mediterranean Sea was established with government funding at the initiative of Haifa University and the Technion.

The Technion is currently conducting a thorough review of the direction in which the existing and future general Technion programs are developing.

### **The Nancy and Stephen Grand Technion Energy Program (GTEP)**

One of the most existential challenges of the 21<sup>st</sup> century is the recreation of the world energy map in order to ensure a sustainable future.

As such, Technion established The Nancy and Stephen Grand Technion Energy Program (GTEP) in 2007 to facilitate multidisciplinary, national and international collaborative projects in the field of energy science and engineering.

Now, in its sixth year, GTEP's presence on campus is stimulating and facilitating the ultimate environment for integrated interdisciplinary research and education. This is made possible through the establishment of infrastructure research centers, collaborative research opportunities, the Interdisciplinary Energy Study Program, seminars and wide cooperation with academic institutes and industries in Israel and abroad. Over 60 Technion researchers from 12 faculties are involved in research projects and other activities supported and promoted by GTEP.

Pledges of over \$40M have been secured to date, and yet groundbreaking multidisciplinary research at the frontier of new fields of science demands constant expansion and significant support.

### **Central Energy Facilities**

GTEP is investing significant resources in establishing and expanding its central interdisciplinary energy research laboratories. These laboratories are used by researchers and students from many Technion faculties as well as researchers from other academic institutes and industry. Some of the equipment is unique to Israel.

The following GTEP laboratories are equipped and fully active:

- The Ed Satall 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)

GTEP is in the process of setting up The Nancy and Stephen Grand Laboratories and Program Headquarters - a new central facility for fuel cells research and the permanent location of the hydrogen technologies laboratory, which will be on the roof of the Wolfson Chemical Engineering Building. The facility is fully planned and is waiting for city approval. Construction of this facility is expected to start in summer, 2013. A greenhouse for modern plant genetic testing and a central laboratory for cellulose conversion are in the planning stage and expected to come on board in 2014.

### **Energy Research**

#### **Internal Funding for Research – GTEP Seed Money Grants**

In order to promote collaborative energy research, GTEP initiated a research seed funding program last year. This year, the GTEP continued to fund this activity with \$250,000 through two calls for proposals:

1. An internal call for proposals in the field of energy conservation. The funding is for joint proposals that demonstrate collaboration between two or more groups from different Technion faculties. (\$150K were allocated.)
2. A joint Technion-Ben-Gurion University call for proposals in the field of hydrogen technology and fuel cells, for collaborative research between researchers from both institutes. (\$100K were allocated.)

### **National Research Collaborations**

GTEP faculty members are taking part in a national research project on electric fuels for transportation, supported by the Israeli Science Foundation. Two GTEP research groups are taking part in this initiative lead by Prof. Yair Ein-Eli (Materials Engineering) and Prof. Yoed Tsur (Chemical Engineering).

This is a powerful collaboration between scientists at Technion, Bar-Ilan University and Tel Aviv University, to establish the Israel National Research for Electrochemical Propulsion (INREP) within the I-CORE framework. This is the second I-CORE grant in which GTEP members are involved. The first - the Solar Fuels I-CORE in collaboration with the Weizmann Institute of Science and Ben-Gurion University, was launched last year and is fully active.

Nine senior GTEP researchers are participating in the Solar Fuels I-CORE, as well as three new GTEP faculty members.

### **External Funded Research**

During the 2012 academic year, GTEP researchers received over \$3M in external research funds and industrial support for research, and the same or more is projected for the academic year of 2013. This level of external funds would not have been possible without the infrastructure that GTEP is offering on campus.

### **Leaders in Energy Science**

GTEP is continuing its efforts to attract new faculty in energy research, and played a major role in attracting the following new faculty to Technion in the academic year 2012: Assistant Prof. Galia Maayan, Schulich Faculty of Chemistry and Assistant Prof. Moran Bercovici, Faculty of Mechanical Engineering. GTEP's Graduate Program in Energy Studies continues to expand. This year, 29 graduate students

received full support by GTEP and are registered directly to the GTEP graduate program. An additional 50 students whose research is energy-related, received partial support.

The Natural Gas and Petroleum Engineering ME Graduate Study Program was first launched in December, 2011 with 20 students, under the auspices of the Interdisciplinary Energy Graduate Study Program. The first cohort of students has finished its theoretical studies, and will complete final projects within the next three months. The students are now at 11 different Israeli and international oil and gas companies such as Noble Energy Ltd., IEI, INGL and Zion Oil & Gas. They will graduate from the program in the upcoming spring semester. The program's second round will start on March 2013 with 22 new students.

### **Outreach**

GTEP supports projects in outreach and general education as an integral part of its global mission. Individual faculty, students and GTEP itself are involved in projects to promote and enhance energy awareness at Technion, throughout Israel and across the world. This year, GTEP is supporting the following outreach projects:

**Technion Formula Student Team** - GTEP is co-sponsoring a 25-member Technion undergraduate student team and their hand-crafted car to take part in a competition in Italy in September, 2013 with 250 student teams from around the world.



*Formula Car student initiative*

**Support of youth energy activity through the Technion Center for Pre-University Education** - Aware of the need to identify and cultivate the best minds of the next generation, GTEP is supporting energy-related activity through the Technion Center for Pre-University Education – The Youth Unit. This activity is part of a program inspired and initiated by the President of the State of Israel, Shimon Peres, in cooperation with the Ministry of Education, academic institutions and industry. GTEP graduate students, under the supervision of GTEP faculty, are mentoring high school students within this program.

### **Seminars and Visits**

GTEP provides an essential framework for data sharing through seminars, workshops and academic guests. These activities are open to faculty, graduate students and guests from industry and academia. In the academic year 2012, GTEP held and supported six seminars and workshops. Over 25 Technion visitors were hosted by the GTEP faculty and laboratories.

## **The Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering (LS&E)**

The Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering (LS&E) was founded in 2006 following a monumental gift by Lorry I. Lokey. The center was conceived by Technion Nobel Prize laureate Distinguished Prof. Aaron Ciechanover, and its mode of operation was outlined in a detailed agreement between the LS&E Center and Technion's president, Prof. Apeloig. In December 2009, Dist. Prof. Ciechanover stepped down as director of the Center and Prof. Yuval Shoham took up his appointment as managing director of the Lokey Center in April 2010. The main focus of the center is to nurture convergence science that integrates life sciences, engineering, exact sciences and medicine.

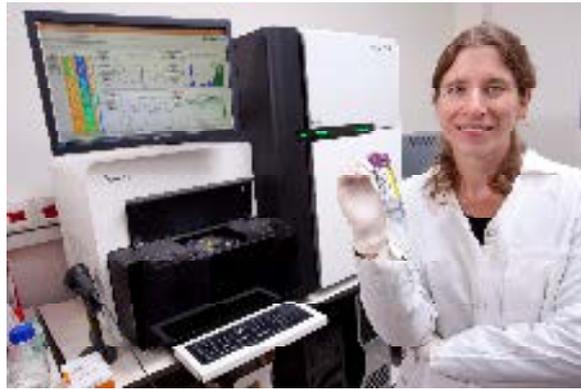
The Lokey Center identified five distinct, yet interconnected areas that are fundamental to the advancement of the Technion's Life Sciences and Engineering Interdisciplinary Research Center (LS&E). These areas include: Structural and Systems Biology, Genomics, Proteomics and Bioinformatics; Tissue Regeneration

and Stem Cell Biology. The LS&E center supports several research clusters: The Network Biology Research Group, Tissue Regeneration Research laboratory, Bioinformatics Knowledge Units, The Pre-Clinical Research Authority, The Infrastructure Unit and the new Center for Structural Biology-TCSB.

During the past year, the center continued to expand and reinforce its interdisciplinary activities in order to encourage and support cross-disciplinary collaboration among Technion researchers. Major efforts were directed at building and upgrading infrastructure facilities at the Infrastructure Unit, which are essential for competing at the forefront of science. The Genomic Unit has developed into the Technion Genome Center, attracting researchers from universities as well as industrial companies from all over the country. The quality and number of scientific papers published during the last years have demonstrated how the new technologies can help us extend our mission, and enrich and strengthen our scientific abilities.

In 2012, we began the building of the new Technion Center for Structural Biology (TCSB) on the ground floor of the Emerson Family Building. The Emerson Family Building provides exceptional laboratories with generous laboratory support space adjacent to the Lorry I. Lokey Center service units. The new center will host a state-of-the-art X-ray machine and robotics for high throughput of crystallization conditions and screening. This higher-end facility will enable Technion scientists interested in molecular structures to conduct research at the front line of scientific discoveries. We expect to complete the establishment of the TCSB by the summer of 2013.

The center invests not only in purchasing highly sophisticated instruments but also in the recruitment of a professionally trained research team. During the past year, our team has grown to 16 people. The staff is highly trained and experienced, dedicated to delivering necessary support and knowledge. During the past year, our team conducted seminars and workshops in various research areas as part of their mission. Many of the Lokey Center activities are coordinated with the Russell Berrie Nanotechnology Institute (RBNI), trying to provide general guidelines for maximizing the impact of large-scale equipment on campus and to provide centers of expertise. It is expected that the activities of both centers will be merged, at least in part, in the form of the NanoMed Initiative.



*Laboratory in the Lorry I. Lokey Interdisciplinary Center*

## **Russell Berrie Nanotechnology Institute (RBNI)**

RBNI is a joint endeavor of the Russell Berrie Foundation, the Government of Israel and the Technion.

Over 150 faculty members and 250 graduate students and postdoctoral fellows from 14 faculties conduct state-of-the-art research in nano-electronics, nano-photonics, nano-materials, nano-mechanics and the interface between those fields and the life sciences.

RBNI is in the fourth year of its second phase (2010-2014). It is continuing most of the activities established in the first phase, while focusing in parallel on the development and management of two additional major research areas: the NanoMed program, jointly established with the Lorry I. Lokey Center for Life Science and Engineering (\$5M over seven years donated by an anonymous foundation), and the "Nano-Photonics for Advanced Light Detection Imaging, Inspection, Smart Sensors, and Energy Conversion" Focal Technological Area (FTA), which was selected earlier this year for funding by the government of Israel. The funding by the government will total \$4.4M over five years, matched by \$6.6M funding by the Technion. This project is led by Prof. Meir Orenstein of the Faculty of Electrical Engineering.

Taking into consideration that no funds will be transferred by the government for years 2012-2014, for RBNI activities other than the FTA, a limited budget dictates a leaner plan for the two remaining years.



*New scanning electron microscope at RBNI*

### **RBNI's main areas of activities in 2012:**

**Vibrant multidisciplinary nano-community:** via joint seminars, Winter Schools (the 3<sup>rd</sup> Winter School was held in February, 2012), Fall Symposia (the 3<sup>rd</sup> one held in December, 2012), five monthly RBNI seminars and various research funding plans offered annually to enhance multidisciplinary nano-activity on campus.

**Recruitment of two outstanding faculty members:** In 2012, RBNI provided start-up funds for two additional new faculty members who joined the Technion this year; Dr. Lilac Amirav of the Schulich Faculty of Chemistry and Prof. Slava Frager of the Wolfson Faculty of Chemical Engineering.

**Research:** Six new Nevet research projects, with emphasis on multidisciplinary collaborations within the Technion campus and with Ben-Gurion University, were selected for funding in 2012; five from Technion and one RBNI Technion-BGU proposal.

**Collaborations with industry:** RBNI continued to develop mechanisms for technology transfer. In 2012, 15 joint projects with industry took place, four patents applied for registration and two nano-related startup companies were established. There were 53 industrial companies that used the nano-related infrastructure centers on campus in 2012.

RBNI launched a Nanotechnology Industry-Technion CTOs forum with the goal to establish a continuous dialogue between Israeli industry and the Technion nano community. Two followup meetings with the CTOs forum took place in January and May 2012, with approximately 15 CTOs from companies such as Camtek, Cellergy, Elop, IBM and Plasan Sasa participating in both meetings.

With the target to bolster RBNI-industry relations, an Industry–Academia Liaison, Dr. Elyakim Kassel, was hired in November 2011. Dr. Kassel acts as the interface between industry and RBNI, helping industry identify contacts within the Technion to solve problems, or suggesting use of particular infrastructure. He also helps identify RBNI-related research projects that could potentially lead to industrial processes or products.

**Extensive upgrade of infrastructure:** In 2012, RBNI invested in upgrading four research labs on campus. In total, since the beginning of the second phase (2010-2012), approximately \$2.85M have been invested in upgrading infrastructure equipment in several nano centers on campus. RBNI continued to support the 11 RBNI-related infrastructure nano centers on campus. In 2012, there were 128 Technion research groups subsidized by RBNI (against equal matching) for user fees at these infrastructure centers. The equipment serves all Israeli researchers.

**The unique Norman Seiden Multidisciplinary Graduate Program in Nanoscience and Nanotechnology:** The program has grown from six students in the first year to 86 students in the past semester (October, 2012). There are 43 students studying towards a M.Sc. degree, and 43 towards a Ph.D. degree. We have reached our goal of 80 students. So far, 21 M.Sc. students and five Ph.D. students have graduated from this program. The program has started to attract international students.

**Collaboration with Life Science and Engineering in the joint NanoMed program:** So far, three faculty members have been fully supported, and three more have received partial support within the framework of this program. In addition, NanoMed has invested in infrastructure equipment, start-up funds for faculty members'

laboratories and laboratory upgrades, and has subsidized user fees in the Infrastructure Centers.

**Future plans:** RBNI together with Technion management, have started a process of contemplating and designing its nano activities beyond the end of phase II. On March 18<sup>th</sup> of this year, a selected group of RBNI members, former and present RBNI directors and Technion management, met and defined RBNI's future development directions. The workshops are intended to determine the focal and development areas of RBNI in phase III.

### **The Technion Autonomous Systems Program (TASP)**

Autonomous systems represent the next great step forward in engineering, by fusion of machines with sensors, computers, and communication capabilities. The objective is to develop intelligent systems that can interact dynamically with the complexities of the real world.

The Technion Autonomous System Program was founded in 2008 in order to form a melding point for studies in different disciplines, thereby gaining from the synergies and bringing Technion to the forefront of this exciting field. The program includes over 60 faculty members from eight faculties, and is divided into five major centers (air and space systems, ground systems, marine systems, medical systems and autonomous agent systems). We relied on initial donations, enabling a buildup of expertise and infrastructure, to attract later funding from government and industry to sustain the center.

Since the center was established, several important donations were obtained – the Goldstein donation of \$5M in 2008, the Javit donation of \$1M in 2010, and an anonymous donation of \$15M in 2012. Three out of five planned centers have been established: the UAV and Satellite Center, the Unmanned Ground Center and the Unmanned Marine Center.

This year we started extensive activity in the ground and marine centers with several major topics – among them an autonomous system for clearing earthquake or terrorist destruction and rescuing casualties. This is partially funded by DARPA (Defense Advanced Research Projects Agency - of the United States Department of Defense), IAI (Israel Aircraft Industries) and the MOD (Israel Ministry of Defense). A second project deals with an autonomous system that will protect gas and oil rigs in the Mediterranean Sea.

We continued sponsoring aerial activities at the UAV and Satellite Center. This is the last year of funding for that center and five ongoing studies are proceeding out of a total of 26 studies since its inception. We have followup agreements with the MOD and IAI. In the ground and marine program, we support nine ongoing projects. The Medical Center is not funded yet and we are working with more than 10 faculty members to define the center's future activities.

Research agreements were signed with DARPA, IAI 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 over 30 students, most of them full-time, including several Ph.D. students.



*Autonomous Systems project presented to US President Obama and Prime Minister Netanyahu*

## **The Technion Computer Engineering Center (TCE)**

The Technion Computer Engineering Center (TCE) was inaugurated during the 1<sup>st</sup> annual TCE conference in June, 2011. It is now open for new members, and more than 50 faculty members of the Technion have joined. A number of industry affiliates from leading companies such as Intel, Mellanox, EZchip and others, spend between a day per week to full time at the center.

In May 2013, TCE will hold its 3<sup>rd</sup> international conference. This year the conference focuses on Machine Learning and Big Data, and will feature speakers in these areas from international and Israeli universities, as well as industry representatives. There is a new venue, and industry highlights will be presented this year. The conference received a grant from the Israel Science Foundation.

During 2013, TCE organized a number of workshops and talks, including a miniseries on image processing by Michael Kazhdan from Johns Hopkins, Ymir Vigfusson from Iceland with a talk on Turing for the latter's 100<sup>th</sup> anniversary, Olivier Temam from INRIA and many more. The visitors met with relevant faculty members and gave talks in seminars.

The Henry Taub Distinguished Visitor Program inauguration talk will be given by Yale Patt of the University of Texas at Austin in June. Prof. Patt will also give a week-long course on computer architecture, which is sure to draw major attention in the Technion and beyond, given Prof. Patt's prominent academic standing.

Among the many workshops and mini-conferences this year are a day on cyber security, a systems research day, a second summer school on computer security and much more.

In January 2013, the CUDA (Computer Unified Device Architecture) Research Center at the Technion (IIT) was established. The 2013 CUDA Research Center, led by Prof. Avi Mendelson, was established to educate, research and support the development of heterogeneous systems using Nvidia's technologies in areas such as computer

architecture, parallel systems, graphics and geometric computing, geometric image processing, image processing and more.

In December 2012, the Technion Computer Engineering Center signed a cooperation agreement with Jaypee University of Information Technology (JUIT) in Noida, India. The main objective of the cooperation is to develop cooperative efforts between Technion and JUIT, which will enhance academic interchange between the two institutions.

TCE is providing administrative support and sponsoring ISCA 2013, the 40<sup>th</sup> International Conference on Computer Architecture, which will be held in Israel for the first time. Following ISCA, prominent speakers will attend a day-long workshop where they can meet with graduate students and share their knowledge.

### **The Samuel Neaman Research Institute for Advanced Studies in Science and Technology**

*The Samuel Neaman Institute was established in 1978 in the Technion, at Mr. Samuel Neaman's initiative.*

The Samuel Neaman Research Institute for Advanced Studies in Science and Technology focuses on promoting informed decisions at the national level in Israel through research and analysis of established information. The SNI is a leading research institute in Israel that identifies, formulates and analyzes policy issues of importance to the national robustness of Israel in order to invoke an informed public discussion, and promote and assist in Israel's decision-making process up to the decision's adoption. The Institute focuses mainly on outlining national policy on the subjects of science and technology, industry, education, and higher education, physical infrastructures, the environment, energy and other areas of national importance.

In 2012, the subjects and studies led by the researchers were varied and covered the different layers of society in Israel, beginning with industrial excellence, through energy and environment-related subjects, and up to the subject of ultra-Orthodox employment in the Israeli labor market.

The star projects of the Institute, *Israel 2028: Vision and Strategy for Israel*, are worth mentioning, since many of the studies conducted are derived from them:

- Deepening the understanding of the ecosystem of the Israeli hi-tech industry and an attempt to preserve its innovativeness, led by Prof. Shlomo Maital
- Promoting national policy on a variety of industrial subjects, as part of the Center of Industrial Excellence established in 2011, under the leadership of Dr. Gilad Fortuna
- Infrastructures, led by Prof. Yehuda Hayuth
- Various environmental subjects and environmental responsibility, led by Prof. Ofira Ayalon
- Energy, led by Prof. Gershon Grossman
- Examining indices for science and technology in Israel
- Evaluating the influence of the space industry on the Israeli economy
- Assessing human, scientific and technological capital in Israel
- Examining the innovation system in Israel
- Evaluation of the Magnet Program, led by Dr. Daphne Getz
- Education and higher education, led by Prof. Zehev Tadmor
- Integrating the ultra-Orthodox sector in the Israeli economy, led by Dr. Reuven Gal.

In 2012, the latter research team focused on the process of integrating the ultra-Orthodox sector in the Israeli labor market while offering applicable solutions in collaboration with the business sector, and more.

Moreover, SNI was already involved in raising the problem of the highly concentrated Israeli economy to the public agenda in 2010, and now the outcomes of this activity are apparent in the relevant legislation that has been passed. In collaboration with the economic newspaper, *The Marker*, a special study day was held three years ago (for the first time in Israel) under the heading: “Examining the Centralization in the Israeli Economy”. About a year later, another study day was held, designed to deepen the public discourse on the subject, so that the Concentration Law recently promoted by

the government serves as an excellent example of the actions taken by the SNI and its influence on decision makers.

Integrating the ultra-Orthodox sector is also an example of the influence of SNI on decision makers. The dozens of documents written on this subject by the Institute were discussed in many of the Knesset sessions, leading to legislation and significant parliamentary activity.

## **Outstanding Research and Scientific Achievements in the Past Year**

**Spin-Optical Metamaterial** - Technion scientists developed a new class of photonic materials, which they named Spin-Optical Metamaterial, and which will enable the development of new optical surface components on the nano scale. Photonics is the science of generating, controlling, and detecting photons. Photonics researchers investigate and manipulate the properties of light. Applications include laser manufacturing, biological and chemical sensing, medical diagnostics and therapy, display technology, and optical computing. This breakthrough research was done by scientists from **Professor Erez Hasman's** research group: **Dr. Vladimir Kliener** and his research students **Nir Shitrit, Igor Yolavitz, Elchanan Magid, Dror Ozri and Dekel Waxler**. Prof. Hasman, from the Faculty of Mechanical Engineering, is the head of the Micro- and Nano-optics Laboratory. The scientists believe that their discovery will facilitate the development of new optical components and nanophotonic devices. Their paper was published in the prestigious journal *Science*.

**Vaterite** - For over 100 years, scientists have failed to reach a clear cut explanation for the atomic arrangement of vaterite, a specific atomic arrangement of calcium carbonate. Doctoral student **Lee Kabalah-Amitai**, with the guidance of **Asst. Prof. Boaz Pokroy**, from the Faculty of Materials Engineering, studied this topic by examining crystals found on and within small marine animals. They found that vaterites actually consisted of two different atomic arrangements that exist in harmony. The second atomic arrangement was found in a microscopic area around 40,000 times smaller than a human hair, and therefore it eluded the eyes of scientists who believed this was a singular rather than a dual structure. Also on the team: Boaz

Mayzel, a sea biologist and scuba diver from Tel Aviv University, Dr. Yaron Kaufman, Dr. Andy Fitch, a scientist at the synchrotron in Grenoble, Leonid Bloch, and Prof. Pupa Gilbert from the University of Wisconsin-Madison. Technion scientists expect that their discovery will facilitate future understanding of the formation mechanisms and stabilization of vaterite.

**Photonic Topological Insulators** – Distinguished Prof. Mordechai Segev's group at the Faculty of Physics have developed and successfully demonstrated a photonic topological insulator, a new device used to protect the transport of light through a unique lattice of 'waveguides.' The advancement may play a key role in the photonics industry, as published in the current issue of *Nature*. The photonics industry is at the heart of modern computing and communication, allowing vast amounts of data to be transmitted extremely quickly over fiber optic lines that cross the oceans. As computers get faster and computer chips get denser, there is a need for ever smaller devices that manipulate light. But when devices get smaller, imperfections in the fabrication processes can make light move irregularly and unpredictably. The photonic topological insulator is designed to protect the light. The research was done in collaboration with the group of Prof. Alex Szameit at the Friedrich-Schiller University in Jena, Germany, and particularly Julia Zeuner, a graduate student at Friedrich-Schiller University. There is a long-standing Israeli-German collaboration between the teams. This discovery is a step in the progress towards optical and quantum computing.

**Thermal Radiation** - Can thermal radiation exceed the limit Planck established more than 100 years ago? We regard the sun as a bright-white source of radiation and only the rainbow is an everyday indication of the colors its light contains. A quantitative description of the colors emitted by a body held at a given temperature was first developed by Max Planck in the early days of the previous century, relating the intensity of each color (wavelength) to the temperature of the body – provided the typical dimension of the body is significantly larger than the radiation's wavelength. Since inherently Planck's formula is independent of the characteristics of the material, it is conceived to describe the upper limit to what a body can emit at a given temperature. In the framework of an article published in *Physical Review A* by Prof. **Levi Schachter** and graduate student **Ariel Reiser** of the Faculty of Electrical

Engineering, they demonstrated that if the characteristic length of the emitting body is of the order of the wavelength, the intensity it emits, in a narrow range of wavelengths, may exceed significantly the prediction of Planck's theory. Such an enhancement may be designed to overlap the spectral region where a photovoltaic cell performs the best, improving dramatically in the process its theoretical efficiency.

**Sight Restoration in Degenerative Retinal Diseases** - Technion scientists have developed a new approach for the artificial stimulation of blind retinas based on optogenetics – a newly developing area in neuroscience. This is a first step towards non-invasive restoration of sight in cases of degenerative retinal diseases. Faculty of Biomedical Engineering **Prof. Shy Shoham** and his team's novel approach is published in the prestigious multidisciplinary journal, *Nature Communications*. Additional study co-authors are **Dr. Inna Reutsky-Gefen, Lior Golan, Dr. Nairouz Farah, Adi Schejter, Limor Tsur, and Dr. Inbar Brosh**. Degenerative diseases of the outer retina are one of the major causes of blindness in the Western world. This new approach attempts to stimulate the surviving retinal cells without the need for direct implants onto the retina, a process which may eventually make surgery and implants redundant. The holographic projection method developed in the study is light-efficient and does not "throw away" much of the light energy. "Applications of this approach are not limited to vision restoration," stresses Prof. Shoham. "Holographic stimulation strategies can permit flexible control of the activity of large cellular networks which artificially express light-sensitive channels, and pave the way towards new medical devices and scientific tools that can help 'break' the brain's neural code."

**Dispersing Carbon Nanotubes in "Super Acid"** - Technion researchers have proven for the first time the possibility of dispersing carbon nanotubes in "super acid". This is a breakthrough that could lead to revolutionary developments in material sciences and nanoelectronics, and could be the first stage in spinning fibers from carbon nanotubes, as published recently in *Nature Nanotechnology*. Explains **Prof. Yeshayahu (Ishi) Talmon** of the Wolfson Faculty of Chemical Engineering: "The challenge facing researchers around the world is how to turn those tubes, whose diameter is 1-2 nanometers (one billionth of a meter), into something useful on a large scale, such as efficient cables for conducting electricity, or strong, lightweight building materials."

When produced, these nanotubes are entangled like “spaghetti”. Thus the challenge has been to disperse and separate them into individual tubes, and spin from them fibers in which the tubes are well ordered. A research group of Rice University in Houston, Texas, led by Prof. Matteo Pasquali, suggested dispersing the nanotubes in chlorosulfonic acid (a “super acid”). The Technion researchers developed new experimental methods to prepare specimens of this acid, for study by electron microscopes, that preserve the tube structure in the acid. Scientists hope that in the future they can use the fibers spun from carbon nanotubes to conduct electricity efficiently over great distances, and to produce very strong building materials that will be lighter than conventional materials.

**Molecular Architecture** – **Prof. Ilan Marek** from the Schulich Faculty of Chemistry found a novel solution to a major problem in organic synthesis that has to date never been resolved, despite intensive worldwide efforts. Marek’s team successfully prepared a new molecular framework possessing a challenging asymmetric center in a single chemical step, from easily available starting materials. Until now, for the lack of available efficient strategies, very few attempts were made and they were all based on long and tedious approaches. This is a significant scientific breakthrough in synthesis, particularly for the production of pharmaceuticals. This groundbreaking discovery is reported by the scientific journal *Nature*. “Synthetic organic synthesis is a science that deals with the building of complex organic molecules from simpler elements,” explains Prof. Ilan Marek. “One of the greatest applications of this new approach is a quick and efficient synthesis of complex natural materials. It must be the goal of the 21st century to accomplish more with less.” This discovery represents an innovative solution to a challenging synthetic problem.

**Decoding Speech Movements in Brain** - Technion and UCLA researchers succeeded in directly decoding vowels from the neural activity which leads to their articulation - a finding which could allow individuals who are completely paralyzed to "speak" to the people around them through a direct brain-computer interface. **Prof. Shy Shoham** and **Dr. Ariel Tankus** of the Technion Faculty of Biomedical Engineering, together with Prof. Itzhak Fried of UCLA, Tel Aviv University and the Tel Aviv Sourasky Medical Center, describe in a new research published in the scientific journal *Nature Communications*, the way in which neurons in different areas of the human brain

encode different speech segments (vowels) during their articulation. The discovery makes it possible, indirectly, to decode the content of the subjects' speech based on brain activity alone. One of the possible applications of speech decoding from brain activity is the creation of a brain-computer interface that can restore speech faculties in paralyzed individuals who have lost them. "There are diseases in which the patient's entire body is paralyzed, he is effectively 'locked in' (locked-in syndrome) and is unable to communicate with the environment, but his mind still functions," explains Prof. Shoham, "Our long term goal is to restore these patients' ability to speak using systems that will include implanting electrodes in their brains, decoding the neural activity that encodes speech, and sounding artificial speech sounds."

## **The Technion Research & 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 Industry; the Unit for Continuing Education and External Studies; the Israel Institute of Metals and the Technion Technology Transfer Office which deals with the commercialization of intellectual property and patents which are developed at the Technion. 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 the Budget and Planning Committee, the balance sheets of the Technion and the TRDF are integrated as of September 30, 2012. The projected deficit for the period October 1, 2011 to September 30, 2012 is approximately NIS 2M, not including the estimation for the actuarial maintenance of pensions. The financial balance of this period is influenced by the nearly NIS 31M in pension payments to 375 retired workers. Without the pension payments, over which the TRDF has no control or sources of funding, the financial result would show an increment of income over expenditures. The continued improvement in the financial situation is a result of increased research activity and of the growth in income from intellectual properties.

### ***The Israel Institute of Metals***

The institute has several activities within the framework of its laboratories such as corrosion, metallurgy, casting and vehicles, and additional functions in the areas of quality and authorization, and steel testing. Most of the activities at the institute are for industry, are connected to industry, and have industry's active participation. About 40%-50% of the institute's income is derived from research funded by industry, the government, the European Union and overseas concerns that make contact directly with the institute. Approximately 50%-60% of the income comes from testing for industry. In 2012, the institute's turnover stood at NIS 17.2M and the operational

profit stood at NIS 2M (including the acquisition of equipment worth approximately NIS 300K).

### ***Continuing Education and External Studies***

The Division of Continuing Education and External Studies, headed by Prof. Yehudit Judy Dori, 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 Architecture (MArch), Master of Real Estate (MRE) or Master of Industrial Design (MID) are carried out in collaboration with various Technion faculties.

The division's goals are to promote, update and enrich the knowledge of engineers, scientists, doctors and other professional populations in accordance with the needs of industry and trends of the marketplace. The division's programs are approved by the academic assembly, which consists of Technion professors representing different faculties. 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 Harry and Lou Stern Family Science and Technology Youth Center at the Technion, the Tel Aviv Center and the Jerusalem Center. This distribution offers accessibility to a large population of professionals in different parts of the country. In view of the division's need of appropriate space for academic studies in Tel Aviv, the Technion has leased three buildings in 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. We start teaching in Sarona in summer 2013.

About 2,000 students are currently studying in the division in more than 30 diploma courses and seven master's degree programs. Over 300 faculty and staff are involved

in the division's activities. During the past eight years, more than 1,300 graduate students received MBA, ME, MArch or MRE degrees through the division, and about 200 students will graduate in summer 2013. This year, about one-third of the master's degree graduates studied in programs managed by the division.

The programs offered in the current academic year include the following.

**Programs leading to academic degrees:**

- MBA – Master in Business Administration – with emphasis on high-tech companies
- ME – Master in Engineering in:
  - systems engineering
  - biomedical engineering
  - civil engineering with focus on development and business management in construction
- MArch – Master in Architecture with emphasis on conservation
- MRE – Master of Real Estate
- MID – Master of Industrial Design

About 560 students are currently studying in the seven master's degree programs in both the Haifa and the Tel Aviv campuses, and are expected to graduate in the next couple of years.

Enrollment has started for a new International MBA Program called “Startup MBA”. Another international program in Systems Engineering is being planned.

**Programs leading to a certificate:**

- Introduction to oil and gas technologies
- International negotiation
- Managers' development in a technological world, management studies in human resources, project management, quality assurance engineering, logistical systems management, and coaching
- Real Estate Studies in land assessing and property management, planning and construction law and construction project management
- Interior Design Studies in landscape design and curation of art exhibits

- Six-sigma methodology for quality assurance, computer studies in software development, software testing, software security, software quality assurance, network administration and management, and data protection
- Tailored programs for various companies such as the Israel Electric Corporation, Intel, RAFAEL, Elbit, Cellcom, Bezeq, IDF and the Ministry of Defense
- Science, engineering, and mathematics teaching
- Photography and treasury

About 1,300 students are currently studying in the certificate programs in both the Haifa and the Tel Aviv campuses.

In addition, about 100 medical doctors started studying specialization courses in several areas, including gynecology, pain medicine, orthopedics and family medicine. These courses are conducted in collaboration with the Rappaport Faculty of Medicine.

A new program in Computer Security Administration for prospective Jewish immigrants from Russia and former Soviet republics was opened in October, 2012. This program, sponsored by the Ministry of Foreign Affairs and NATIV, was opened with a first cohort of about 40 students who have a bachelor's degree in information management, computer science or related fields. About half of them continued for an advanced stage, in which they have served internships in Israeli hi-tech companies, including Radware, U-Btech, Bezeq International and Imperva, as well as Technion laboratories. A second cohort of students started studying this course the following semester. This unique program can potentially attract Jewish academics to make aliya.

### ***The Unit for Business Development and Commercialization of Intellectual Property***

After operating for almost two years without income from funds dedicated to applied research (the Gurwin and Mitchell Funds' sources dwindled in 2011, and the Yeshaya Horowitz Fund was wiped out in the wake of the Madoff affair), in 2012, two funds were established for investment in large-scale applied projects. We are convinced that these funds will enable the business unit to continue advancing and supporting the maturation of projects on their way to commercialization.

Parallel to the increased efforts for the development of projects on the path to implementation, the year 2012 was outstanding for the significant amount of money raised by the Technion's portfolio companies (or companies commercializing Technion technologies). A total of over \$56M was raised this year. It is notable that the total of investments accumulated in the past three years in companies established on the basis of Technion technologies and the nine incubator companies is about \$150M. This trend is a validation and a vote of confidence by industry and its investors in the quality of research and the technologies developed at the Technion. On the basis of the considerable funds raised, the TRDF maintained its relative share in valuable companies.

The activities of the unit during the past year in various areas included:

**Patent Applications:** In the past year, 80 invention-disclosure papers were submitted to the unit by Technion researchers. Out of these, 65 inventions were registered. This year, the proportion of patent applications returned to the researchers (19%) grew; this was within the framework of efforts to close the gaps and to eliminate projects at an earlier stage. Unfortunately, this year as well, there were few applications in the life sciences (specifically medical equipment and new molecules) – a field which traditionally constitutes a reliable source for successful commercialization for academic institutions in Israel and overseas. Undoubtedly, the split between the business unit and the Rappaport Institute and Biorep on the one hand, and the Rambam Medical Center on the other, creates great difficulties for the unit's functioning. This fragmentation leads to serious inroads in the scope of the properties at the disposal of the unit for commercialization.

**Licensing Agreements:** In 2012, we signed 21 agreements for the purpose of commercializing technologies developed by Technion researchers. Among them were eight licensing agreements with companies established on the basis of Technion knowledge. These agreements included fields such as: imaging sensors, non-invasive imaging, a medical robot, water purification, stem cells and efficient utilization of solar energy. Four licensing/option agreements were signed with industrial companies in the fields of concrete additives, medical glue, water and air purification and hydrogen storage. Three memoranda of understanding were

signed in anticipation of establishing companies in the fields of radar antennas, spectroscopy and minimalizing kidney damage. Four "Magnetron" agreements were signed with leading companies in Israel such as GE, CPS, Alubin and Gilat, and two "Nofar" agreements were signed with Golan Plastics and Protologics. Recently, five additional "Magnetron" agreements and three additional "Nofar" agreements were approved. (Details will appear in next year's report.)

**Cooperation with the Alfred Mann Institute at the Technion (AMIT):** In 2012, the commercialization activity in cooperation with AMIT continued. This year a new company – Accelta – was established within this framework for the implementation of stem-cell technologies for drug discovery and drug screening. The institute continues to explore the possibilities for establishing commercial companies based on the existing projects and concurrently is looking into investments in additional initiatives.

**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 \$25M (including the researchers' share). Again this year, the main source of this income was in royalties from the sale of Azilect which amounted to \$16.1M. The annual sales of the drug for 2012 as well amounted to over \$300M. Income from other sources included, among others: the sale of the Invision company (established in 2009 based on technologies developed by Prof. Ron Kimmel and sold to Intel at the end of 2011) and the sale of Prolor stock.

**Investment in New Projects:** As a result of the diminished sources of the funds for applied research (especially the Gurwin, Horowitz and Mitchell Funds), 2012 was a slow year for investments to develop the potential of intellectual property. Nevertheless, during the year, the TRDF was successful in establishing, with donated resources, two dedicated funds of substantial scope for this subject. We hope that the new stream of investments in applied research will contribute in coming years to a faster and greater maturation of projects on the way to commercialization.

In 2012, in the absence of Technion funds for applied research, 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 18 Technion projects were supported by "Kamin". Recently, the fund approved two additional new projects (submitted to the fund at the end of 2012).

**Technion Companies' Fund-Raising:** During the past year Technion companies, or those commercializing Technion technologies, were able to raise a total of approximately \$56.23M. This year, too, the TRDF made efforts to hold on to its relative share in the various companies by investing in these companies in proportion to its relative share. The total of TRDF's investments in Technion companies in this framework was \$900K out of which \$400K was invested from TRDF funds and \$500K by the Technion Investment Opportunities Fund. The fund invested in two companies. One company deals with navigation in heart surgery and remote catheterization, and the second company deals with developing materials for use in building bone and cartilage tissue.

**The Technion Incubator:** The Technion Incubator terminated its activities in November, 2011 as a result of the unforeseen withdrawal of a number of partners. The partners (venture capital funds) left mainly because of an inability to raise future funds. This year we continued our activities and contacts to renew our accreditation with new partners.

## Undergraduate Studies

In the past year, we have dealt with the question, "Why is there a high attrition rate at the Technion?" This question has different levels of answers, some of which are out of our control. Those that we do control range from counseling and admissions to the completion of a degree. This year we focused on the relationships between the teaching staff and the students.

In analyzing the reasons for attrition, the following issues emerge:

1. Credibility
2. Image
3. Study load

All the above relate to the transparency and the fairness of the relationship between service providers and consumers. In the undergraduate studies division, we have focused on confidence-building steps between the different units. Following are a number of activities that characterize the way we have proceeded on the subject:

**The "Big Brother" project** - For the past 11 years, the Technion has run a project for the expansion of higher education among minority youth in order to reduce the percentage of dropouts among Arab students. Because of its success, the project was broadened to include other special groups in projects such as: "Atidim" for industry, "Ofakim" for hi-tech, and "Atidim" for pre-army youth. This year we initiated a similar pilot project in the Faculty of Biotechnology and Food Engineering and it was very successful. Every group of seven to ten newly admitted students was assigned a mentor, an outstanding student from their faculty, responsible for the group's adjustment to studies at the Technion. The new students noted that this support was very helpful and the mentors too enjoyed the experience. Each mentor met with his/her students at regular intervals during the first semester and the students were able to contact their mentor at any time for help. The feeling of identification with the institution and the boost in preparing for exams was expressed by over 93% of the students. The mentors received a stipend and a letter of appreciation. The Committee for the Examination of Undergraduate Program Structure and Study Load approved the project and the Technion administration agreed to support it in all faculties.

**Transparency** - The undergraduate studies unit accepted the students' request and began instituting confidence-building steps between students and teaching staff:

1. The distribution of students' exam results, including averages and graphs: Because the regulations concerning students' rights allow for repeat exams in each course, with the last grade determining the final grade, the distribution of exam grade averages will enable students to determine their relative position in the course and to decide if they wish to take advantage of the second exam to enhance their academic standing.
2. Added attention to the administration of courses according to regulations: This includes distributing full information on the contents of the course and the method of determining grades, assuring identical conditions and levels for both exam sessions and administering exams in accordance with regulations.
3. As much as possible, any ambiguous regulations were clarified with special attention to difficulties during exams. In all the above, we received full cooperation from the lecturers.

**Study Load Committee** – I wish to commend the work of the committee, which collaborated with all the Technion sectors: administration, deans, academic and administrative staff members and students, and presented its conclusions on time. Their proposals were operative and the Technion administration agreed to implement all their recommendations as adopted by the Senate.

**"Umbrella Semester"** – A considerable number of students find that they have chosen the wrong faculty, a situation which reduces both motivation and outcome in their studies. A number of them are offered the option to examine the possibility of moving to other faculties under special conditions including one semester of studies and the necessary courses. A student expressing a wish to transfer to another faculty will be granted an "umbrella semester" in the original faculty, and will take courses according to the student's choice, on condition that studies in the original faculty end after that semester. If the student lives up to the conditions of the new faculty, he/she will continue studies in that faculty, and his studies will not be interrupted. This process is designed to support a student who wishes to study at the Technion and to ensure that he/she does not drop out.

**"Completion Drive"** – Many students begin working in industry in their second or third year of studies. This employment requires at least 20 hours a week and has proven to lead to declining academic accomplishments. A number of students move over to full-time employment before completing their studies and after a few years find that they are missing one or two courses for their degree. We facilitate contact between these students and their faculties in order to allow them to complete their degree requirements under conditions that will allow them to remain employed.

**Instruction Booklet for Undergraduate Studies** - We are preparing a booklet which will include all the regulations and conditions for proper study procedures at Technion pertaining to faculty deans, administrative staff, lecturers, students and everyone involved in teaching. This booklet will be available to all relevant personnel. It was prepared as a result of the comments in the Technion Comptroller's report dealing with undergraduate examinations.

<b>Undergraduate Students by Faculty in 2012/13</b>
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**Engineering Faculties:**

• Aerospace Engineering	405
• Architecture and Town Planning	555
• Biomedical Engineering	177
• Biotechnology and Food Engineering	309
• Chemical Engineering	358
• Civil and Environmental Engineering (incl. Mapping and Geo-Informatics and Agricultural Eng.)	1258
• Computer Sciences – Engineering, 3 and 4-year program	326
• Electrical Engineering	1494
• Industrial Engineering and Management	786
• Materials Engineering (jointly with Physics or Chemistry)	282
• Mechanical Engineering	874

<b>Total Engineering:</b>	<b>6, 824</b>
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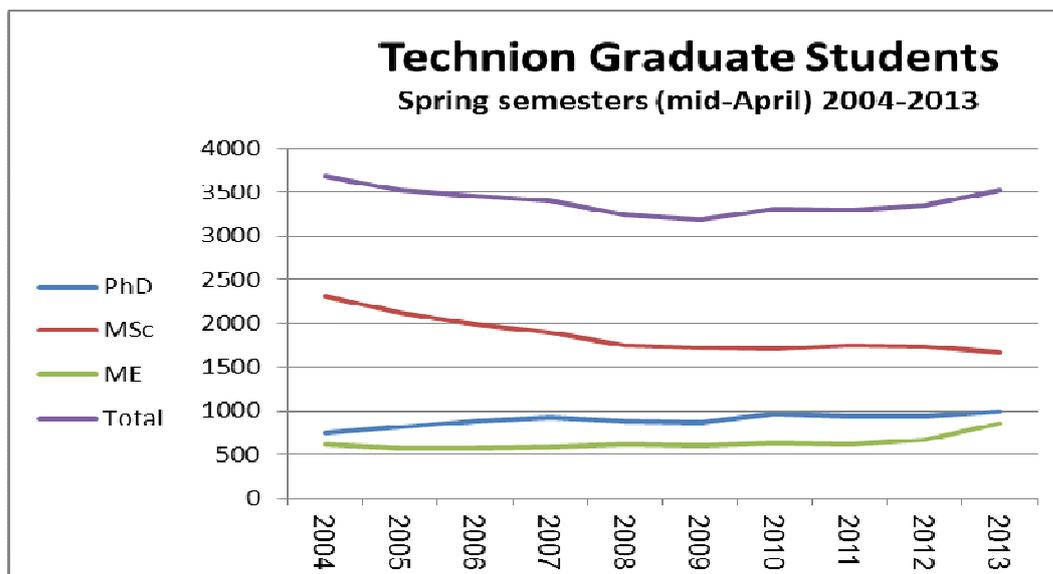
**Non-Engineering Faculties:**

- Biology 287
- Chemistry 99
- Computer Science (3-year program) 961
- Economics and Management 33
- Education in Technology and Science 291
- Mathematics 150
- Medicine 932
- Physics 175

<b>Total Non-Engineering:</b>		<b>2,928</b>
<b>Grand Total:</b>	<b>9752</b>	

## The Irwin and Joan Jacobs Graduate School

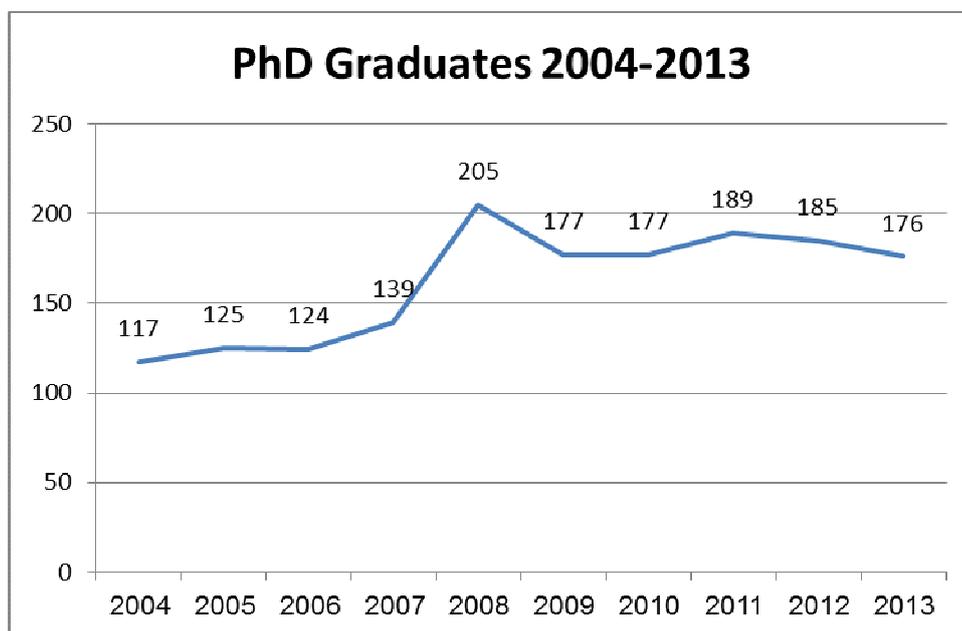
The Dean of the Jacobs Graduate School, Prof. Hillel Pratt, reports that the past year has been very successful for the school in many respects. The student body of the Technion's Graduate School includes, as of April 7, 2013, a total number of 3499 graduate students, of which 992 are doctoral students and 2507 are master's degree students. Of the 2507 master's students, 1674 are studying towards a M.Sc. degree with thesis. These numbers are higher than those in mid-April, 2012, when there was a total of 3,384 graduate students. The increase is due to the new policy, starting this year, of enrolling directly into the Graduate School all students admitted to continuing education graduate programs. The graph below shows the progression in the total number of active master's and doctoral degree students over the past decade.



An encouraging trend that is apparent from the above graph is the reversal in 2010 of a five- to seven-year negative trend in numbers of graduate students in the various programs and a steady increase in their numbers since 2010. Another interesting trend, important for a research university, is the persistent rise in Ph.D. students and the decline in the number of graduate students concluding their studies with a M.Sc. degree. This can be directly attributed to the increasing numbers (three-fold increase in the past decade) of graduate students on the direct track towards Ph.D. (see graph below). In addition, the stagnation in the number of master's students without a thesis was offset and reversed this year, an important development which impacts

Technion's contribution to Israel's industry and business community. The importance of these trends and the need to enlarge the rates of increase is further discussed below, in the context of the Graduate School's ten-year vision.

The graph below shows that the number of Ph.D. graduates at the Technion has risen by 50% since 2004. Based on the numbers in the past few years and the number of current Ph.D. students, we expect the number of Ph.D. graduates to reach a plateau and stabilize at between 180 and 190 in each of the next three years.



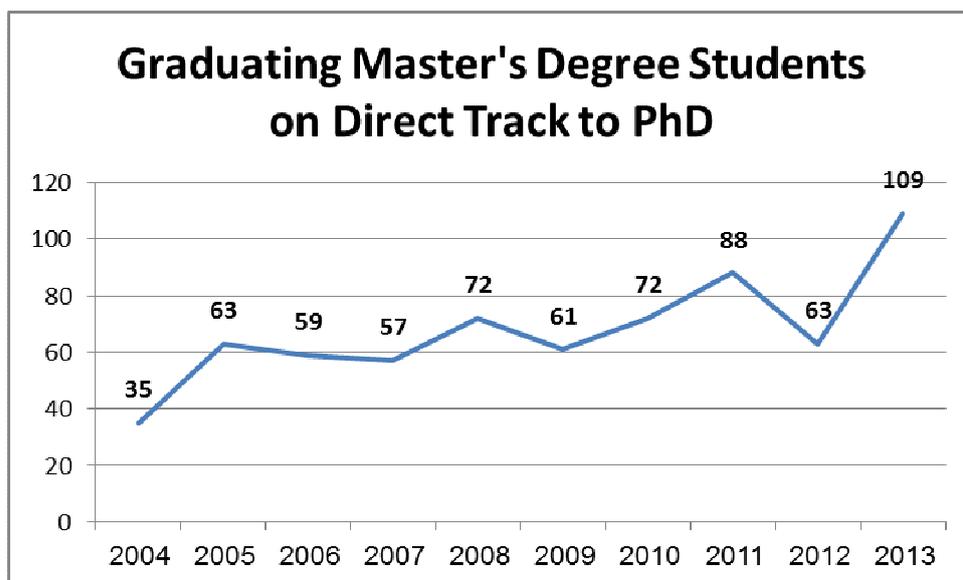
Based on current numbers we expect to reach a steady state of about 1000 Ph.D. students and about 190 Ph.D. graduates each year by 2015, unless steps are taken to promote higher numbers, as detailed in the 10-year vision.

About 70% of our Ph.D. students earned a master's degree from the Technion, reflecting the fact that our main source of Ph.D. students is our own master's program. Therefore, in order to substantially increase the number of Ph.D. students we must increase the number of master's (thesis track) students and make ourselves more competitive in attracting Ph.D. candidates from other universities in Israel and abroad. Unfortunately, due to lack of resources, the rate of increase in the number of graduate students has stalled. The solution is detailed in our 10-year vision for the Graduate

School, which includes a doubling of the number of available stipends and fellowships, increased availability of housing for graduate students and special fellowships for outstanding students to encourage them to join Technion faculty or take on leading roles in industry in the future.

At the upcoming master's graduation ceremony, the Technion will be awarding 756 master's degrees: 449 thesis track degrees and 307 non-thesis track degrees; of these, 81 are MBA graduates and 109 are awarded during the direct doctorate track.

In the past decade, there is a welcome, steady increase in the number of master's degrees awarded to students on the direct track to Ph.D. This reflects the school's policy of encouraging promising master's students to proceed toward a Ph.D. degree.



In addition to the ongoing activity in the various programs, the graduate school has worked on the development of new programs and courses. The following new programs were approved and accredited this year:

- Vehicle Systems Engineering
- JTCII joint Graduate Program for a dual M.Sc. degree in Applied Information Sciences (with Cornell University)
- Updated tracks in Behavioral Sciences and Management

In addition, by mid-April, 51 new graduate courses were approved by the Technion's Standing Committee for Undergraduate and Graduate Studies. Noteworthy among the new courses is the new and compulsory course in Research Ethics which, as of Spring 2013, every graduate student in the research tracks must pass. The course is unique among Israeli universities in its scope and in being compulsory for all research students. The course is taken on-line and includes references to ethical, legal and historical examples of proper and improper conduct. The participants must pass an on-line test that is offered periodically throughout the school year so students can take the course at their preferred pace.

In addition to academic issues, the Graduate School was a key partner to the definition and implementation of new Technion regulations on benefits and adaptations for parenting (pregnancies, adoptions and fertility treatments) by students, including generous stipend support during maternity leave. The Technion regulations served as a model for implementing similar programs in other Israeli universities.

The Hebrew name of the Graduate School was modified this year to better reflect its mission. The ambiguous and archaic Hebrew expression "studies by those that are accredited" (לימודי מוסמכים) was changed to the Hebrew title for "advanced degrees" (תארים מתקדמים). We found it necessary to modify the school's name after receiving complaints from candidates for graduate studies that they could not find information on the school because terms used by other universities in Israel to describe graduate studies were nowhere to be found on the Technion's Hebrew website.

Another development implemented for the first time this year is the Graduate School orientation day aimed at making the transition of newly admitted students smoother. In this event, in the beginning of the academic year, graduate students are greeted by the dean and provided with tips and information on the Technion and its graduate programs and procedures that will help them avoid common pitfalls.

In order to overcome the stalled growth of the graduate student body, and in line with being a research university, a 10-year vision was formulated. This vision will be presented to the Academic Committee of the Board of Governors. In general, the goals are to increase the total number of graduate students in the Technion by about

30%, to about 4,500, with markedly different distributions of students among the different tracks: the number of Ph.D. graduates each year will double to 400; the number of graduate students in the research track who end their studies at the master's level will be halved to 350; and the number of graduate students in the professional, non-research, master's programs will almost double to 1500.

Attaining these goals will require a modest increase in the number of mentors to 600, mostly by replacing retiring academic staff by new faculty who have been exceptionally groomed and prepared for an academic career throughout their graduate and post-doctoral studies. In addition, the attractiveness of the Technion will have to be augmented by stressing quality and innovative new programs in basic science and technology with two excellence tracks: (1) for future academic careers and (2) for future leadership careers in industrial entrepreneurship and innovation. In addition, the number of non-research graduate students will be increased with new programs tailored to the needs of the Israeli economy. Housing opportunities for graduate students will be doubled and 'crash-pads' for students commuting from central and southern Israel will be created. The fellowship budget and the mentors' share in it will be doubled, with most of the increase dedicated to students showing exceptional academic excellence.

## The Center for Pre-University Education

Headed by Prof. Dan Zilberstein, the Center for Pre-University Education sponsors preparatory courses, activities for science-oriented youth, courses fostering excellence and other learning programs for gifted and for challenged youngsters.

**The Unit for Pre-Academic Studies** sponsors many diverse programs adapted to the different populations that seek admission to the Technion and want to study within it. During the year, 600-700 students study within the framework of the unit's programs and an additional 1,000 students participate in other programs which include:

- Preparatory Course for Discharged Soldiers and New Immigrants - a 10-month course focusing on mathematics, physics, English and scientific writing.
- Pre-Entry Courses - courses in mathematics and physics geared at students who have been admitted to the Technion but need preparation in those subjects.
- Pre-Preparatory Course for the Atidim Project - course held from August to October for Ethiopian immigrants, Druze students and those from disadvantaged backgrounds (200 participants).
- Preparatory Course for Arab Students (NAAM Program) - preparation for academic studies for students from northern Arab towns who want to study at Israeli institutions of higher learning (80 participants).
- Special Program for ultra-Orthodox Students - courses providing academic preparation for ultra-Orthodox students who have a weak background in science. With the Faculty of Civil Engineering, we opened a special program in the mostly Orthodox town of Bnei-Brak (20 participants).
- The Ofakim-Hi Tech Program - a preparatory program sponsored by Technion alumni intended for discharged soldiers from combat units who do not have a matriculation degree or a psychometric exam score (80 participants).
- Atidim Industries Program - new program offering preparation and support for discharged soldiers from disadvantaged backgrounds (30 participants).
- A special program for excellent Druze high school students (100 participants).
- The Outstanding Immigrant Students from Ethiopia second-year program encourages and strengthens the mathematical and English background of middle school and high school students. 120 participants study weekly at the Technion.

**The Harry and Lou Stern Youth Activities Unit** 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 sixth year in which the unit is operating in the Arie and Jacqueline Carasso Youth Wing with their nine well-equipped laboratories, modern classrooms and the large Amos and Shoshana Horev Auditorium, all of which enable the unit to expand and enrich its programs.

### *Special Projects*

**The Future Scientists of Israel** - Fifty 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 six-year period.

**Sci-Tech** - This annual international research summer camp for 11<sup>th</sup> and 12<sup>th</sup> graders, held at the Technion, is now in its 19<sup>th</sup> year. This is an opportunity of a lifetime for gifted students to experience serious research opportunities guided by top-notch Technion researchers. The 45 participants in the summer of 2012, from six different countries, also enjoyed the sports facilities at the Technion as well as touring Israel.

**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 13<sup>th</sup> year of the program's operation. Mathematics teachers who participate in the program receive special training on a regular basis. There are 400 pupils participating from six 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 11<sup>th</sup> and 12<sup>th</sup> grades are offered to participate in academic studies at the Technion within the special framework for gifted high school

students.

**The Ort - Technion Classroom** - This is a joint program between the Technion and Ort Schools for outstanding pupils. In 2012, there were 11 classrooms in the framework of the program with a total of 260 pupils. The aim of the program is for the participants to accrue academic credits for future studies at the Technion after they graduate high school. The program takes the pupil from 7<sup>th</sup> to 12<sup>th</sup> grades until they enroll as full-time Technion students, and includes preparation courses for academic studies such as scientific research skills, logical thinking, scientific and mathematical thinking, introduction to the Technion and pre-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.

### ***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. Some of these programs include:

**Summer University at Hand** - Special intensive summer study days sponsored by B'Shaar, the Rashi Foundation and the Technion, for 9<sup>th</sup> and 10<sup>th</sup> graders from outlying communities, aimed at familiarizing participants with academic science studies and with the Technion.

**Mathematics Summer Camp** - A two-week camp for 9<sup>th</sup> - 11<sup>th</sup> graders, in cooperation with the Technion's Faculty of Mathematics and the Youth Activities Unit, aimed at advancing the level of talented pupils.

**The Legacy - Licensed for Science Program** - Sponsored by the Legacy Heritage Fund, the purpose of the program is to encourage a positive attitude towards science and to foster excellence in gifted junior high school pupils from disadvantaged communities and families. The activities take place on campus, in the teaching laboratories of the Carasso Youth Wing and consist of 17 two-hour afternoon sessions held during the school year. The subjects covered are chosen by the participants and include physics, biotechnology, robotics, medicine, architecture and

electronics as well as our Israeli heritage and how it relates to sciences and engineering. In the past academic year, 235 pupils from 16 schools in nine outlying northern towns participated in the program.

**The Ofanim Science Program** - Inaugurated last year, this new program is sponsored jointly with the Ofanim Organization and is designed to encourage scientific and technological studies for 5<sup>th</sup> and 6<sup>th</sup> graders in outlying towns. There were 89 participants this year with activities held in the Technion as well as in a bus that has been re-fitted as a robotics lab and travels to outlying towns.

## Student Affairs

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

The Office of the Dean of Students operates six professional units whose responsibilities are to support and help the advancement of the students. All told, these units serve approximately half of the student population. Among the goals of the units: to help ease the gap for minority groups, to increase the number of students from peripheral areas, to decrease the dropout rate, to raise grade point averages and to assist in integration into the marketplace. We do our best to assist as many students as possible in all ways, including tutorial programs, counseling, housing and financial assistance.

**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 been successful by personally accompanying the new students from the registration stage until the end of the first academic year. Among the aid that the unit offers to all undergraduate students: scholarships for students from disadvantaged socio-economic backgrounds, no-interest loans, and 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 adjustment issues, lack of study skills, heavy study loads, vocational choice, personal or family problems, learning 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 to find efficient ways to cope with the academic requirements. The services include personal counseling, workshops, tutorial programs, special accommodation for the physically challenged and students with learning disabilities, special meetings and lectures.

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

**Professional Employment Unit and IAESTE A.s.b.l.** (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 spotlight days and many other 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 to expand the center. The expansion project of the counseling center has been adopted by the Southern Palm Beach Chapter of the American Technion Society.

**The Unit for Social and Cultural Activities** works in collaboration with the Technion Students Association to provide social and cultural activities for both undergraduate and graduate students. Many programs are run daily including evening activities. Our vision is to continue these important social functions in order to ease the pressure which students feel in their studies.

**The Student Housing Unit** offers housing solutions to about 3,800 students. Although the Technion is Israel's leading university in providing housing to its students, the demands still far exceeds the supply. If it were possible to increase the amount of housing available to students, it would be easy to increase the number of undergraduate and graduate students at the Technion.

### ***Ongoing Special Projects***

**Student Housing** – We continue our long-term project to upgrade the old dormitories and to finish the air-conditioning project of all dormitories. At the same time, we

have started to concentrate on new housing for undergraduate and graduate students including those in the Rappaport Faculty of Medicine.

**Scholarships** – In response to the current financial situation, we have awarded scholarships, all sponsored by donations, to approximately 30% of the undergraduate students. The maximum amount that can be covered by a Technion scholarship is 80% of tuition fees. Many students receive additional financial aid from external, non-profit organizations and foundations. These organizations have actually increased their grants to Technion students in recent years, due to our initiatives and efforts to enhance these sources. Unique scholarships are awarded as a result of the collaboration with outside sources that provide funds for our discharged soldier and reservist students.

Over the past few years, students with excellent prospects from lower socio-economic backgrounds and/or from the geographical and social periphery of Israel have been admitted to the Technion. They were able to start their studies at the Technion because they applied for and received financial aid (scholarship assistance).

**Parenthood Facilitation** - The Technion has launched an adjustment package for students becoming new parents.

**Loans** – The Technion offers students non-interest loans of NIS 12,000. Last year we awarded loans to 300 undergraduate students. In addition, the Magbit and Geller Foundation loans in the amount of \$2,500 to \$3,000 each were awarded, with student-tailored repayment after graduation.

**Reservists** – Throughout the academic years, we assist about 1,200 students who are called for reserve military duty. We provide services from the period before they go on service (V.A.L.T.A.M), during their reserve service (Net Sticks), and immediately after their return to the Technion. We offer a wide variety of special services, such as personal consulting, tutoring, academic credits, non-tuition summer semesters and scholarships. On top of the already wide range of benefits given by the Technion to reservists, we run a project to allow students who are IDF reservists to be connected to the Technion when they are on reserve duty. Students on reserve duty are given Net Sticks - Cell Modems with a secure ID for remote access - that provides the option to

be connected to all internet services to students on campus including online lectures, videos, mail and other important services.

**The ATIDIM Project** – This project assists high school graduates from Israel's periphery with disadvantaged 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 90 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 minority students. 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, 480 students were assisted by this project. Our model for absorption of these students was adopted as a working model for all Israeli universities by Israel's Council for Higher Education

**"Halamish" Project for the Ultra-orthodox** – Thus far, 12 students from ultra-Orthodox Jewish backgrounds who graduated from the Technion Center for Pre-University education are studying at the Technion successfully. The program supports the students with academic enrichment and emotional support.

**The "Ofakim" Project** – This is a project 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 aims to facilitate the absorption of discharged soldiers from the periphery and from underprivileged backgrounds. It operates with the collaboration of various industries and companies in the Israeli private and public sectors. In the current year, 35 students were assisted by this unique program.

**Professional Employment Projects** - This year we organized two technical job fairs with the participation of 95 companies. These employment fairs are among the largest in the country, reflecting the Technion's leading position as a major human resource provider for high-tech industry. In addition, 19 Career Spotlight Days for recruiting and interviewing potential employees were held, as well as four workshops for C.V. writing and job interviewing. Two company tours and three job-preparation lectures were organized as well.

**Technical Training Abroad** - The International Association for the Exchange of Students for Technical Experience (IAESTE) program unit helps to place students who wish to go for technical training abroad over the summer months. There will be 76 students going abroad this summer on professional training. The same program allows student from abroad to gain experience at the Technion.

**Social and Cultural Activities** – This year one of our activities focused on the High Q Lectures Club which hosted outstanding lectures including: the Arab Spring - Ron Ben Yishy, Oriya Shavit , Michal Shraiber and others.

**Computer Labs at the Dormitories** - The Edith and Joseph A. Fischer Computer Lab at the Canada Center was renovated and updated with the latest available technology and network to provide the best environment for the students and the dormitory tenants. It is open and running 24/7.

**A.D.O.T. Community Center**- We successfully renovated and have begun operating the center at the Rivkin Village. The center offers a large variety of cultural and other community activities for the welfare of our dormitory tenants and all students.

**“Lively Campus”** – Within the framework of the program, the Technion is operating an internet radio station and an interactive map website has been created, to allow everyone to know what is happening on campus.

**Community Projects** – More than 400,000 hours of community service were contributed by about 30% of the undergraduate student population. The community-related activities were associated with various frameworks such as PERACH – the big brother program. K.A.A.T is one program in which Technion students reach out to about 400 junior high and high school students from lower socio-economic groups

and peripheral areas. The Technion students supported 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 4<sup>th</sup> and 5<sup>th</sup> grades from various Haifa elementary schools. All our projects aim to reach underprivileged populations and minorities in the Haifa region.

## **Administration and Finance**

*The Executive Vice President and Director General, Prof. Arnon Bentur, provides an overview in the following report of the major activities in the areas of administration and finance. These activities are intended to meet the Technion challenges in a variety of fields: new academic faculty absorption, technical and administrative staff vitalization, quality of life, safety and security on campus, management of the infrastructure to assure efficiency and sustainability, marketing and branding. The management of the budget is a key in making all of these happen within financial constraints.*

### **Israel's Economy in 2012<sup>1</sup>**

Israel's economic growth slowed in 2012 to 3.1%, from 5.0% in 2010 and 4.6% in 2011. The slowdown, according to the Bank of Israel, began in the middle of 2011 and deepened toward the end of 2012. The main causes were the slowdown in global economic growth, which hurt demand for Israel's exports, and an increase in the cost of fuel imports. A fifth of the slowdown was caused by slower growth in the construction industry. Per capita GDP was \$30,500.

A consequence of slower export growth was the disappearance of Israel's Balance of Payments current account surplus for the first time since 2003. Exports rose by 10.4% in the first half of 2012, but fell by 2% in the second half. An even more abrupt change occurred in imports, which rose by nearly 20% in the first six months of the year, then fell by 11% in the last six months. Much of the export slowdown came from weak demand in the European Union, where most economies stagnated. Israeli exporters have aggressively shifted their focus toward higher-growth Asian markets, where exports of technology-intensive services have greatly expanded in the past two years. In 2012, exports of goods and services totaled \$81.6B, one third of Israel's \$241.1B GDP. Imports totaled \$84.8B. The shekel/dollar exchange rate fell from NIS 3.82 at the end of 2011 to NIS 3.73 at the end of 2012, and fell even further to NIS 3.62 in April 2013.

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<sup>1</sup> This report was prepared by Prof. (Emeritus) Shlomo Maital, senior research fellow at the Technion's S. Neaman Institute for National Policy Research.

Despite the growth slowdown, the unemployment rate fell to 6.9%, reaching its lowest level in 30 years. Labor force participation rose, evidence (according to the Bank of Israel) of “increased labor market efficiency and the considerable flexibility of wages and work hours.”

Inflation in 2012 was 1.6%, down from 2.2% in 2011. Housing, energy and food prices were the main drivers of inflation. Offsetting them were declines in the price of kindergarten (owing to the Trajtenberg Committee recommendation to provide it for free) and the price of mobile communication, owing to stiffer competition in the industry.

The Tel Aviv 100 Stock Index rose 7.2%, less than the 13% rise of stocks in developed countries and the 15% rise of stocks in emerging markets. Yields on Israeli government bonds fell to historic lows, but the gap between those yields and those on foreign sovereign bonds rose, reflecting Israel’s increasing geopolitical risks.

In 2012, the government budget deficit expanded to 4.2% of Gross Domestic Product, because of an unanticipated shortfall in tax revenues. Although the ratio of public debt to GDP fell in 2012, from 73.9% to 73%, and remains relatively moderate compared to the U.S. and many European countries, it is expected that this year’s government budget will include major spending cuts, to reduce the deficit to a targeted 3% of GDP. To counteract the slowdown in growth, the Bank of Israel reduced interest rates, from 2.75% at the beginning of 2012 to 1.75% for January, 2013.

The housing market was a source of controversy in 2012, owing to the relatively high cost of housing in Israel and resulting social protest. After a cumulative rise of 40% in home prices during 2008-11, home prices rose by 5% in 2012. Building starts slowed in 2012. The Bank of Israel has expressed concern over a possible housing bubble in Israel and has acted to limit the growth in mortgages.

Some 16,577 people immigrated to Israel in 2012, down slightly from 2011; one-fifth came from Russia and a sixth from Ethiopia. Israel’s population grew 1.8% in 2012 and in February 2013 passed the 8 million mark. Some 170,000 babies were born in 2012.

In April, natural gas from the offshore Tamar field began to flow onshore; it is expected to contribute a full one per cent to GDP growth in 2013, a third of all GDP growth. Israel faces a crucial decision regarding how much of the natural gas to export. Growing instability in the Arab nations bordering Israel also poses a major economic and political challenge for 2013-14.

## **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. It is used to develop and upgrade the Technion's infrastructure and create new research centers and programs.

The financial activities include Technion's investments and pensions as well.

### ***The Operating Budget***

Seventy-two percent of budgeted expenses are for staff emoluments and pension payments. In parallel, about the same percentage of this budget is covered by the government. The support of the government is transferred to the Technion, and to all Israeli universities, via PBC, 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 money from the Israel Government Ministry of Finance and distributes it to the various educational institutions.

This year, 2012/2013, is the third year of the PBC 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/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 116 new senior academic faculty members over the past five years. In 2012/2013, 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.

In recent years, the Technion's student body has numbered around 12,900 (undergraduates and graduates), about the same number as ten years ago. The increased senior academic positions and new faculty recruitment will reflect on the students/faculty ratio to result in enhanced academic quality and strength. During the past 10 years, the technical and administrative staff was reduced by about 11%. In 2012/2013, the number of engineering positions increased while the number of administrative and technical positions decreased.

### ***The 2011/2012 Budget Year***

The 2011/2012 budget year ended with a deficit of NIS 22.6M, as compared to the deficit of NIS 44.8M that was budgeted. The significant decrease in the deficit was made possible due to additional resources received from the PBC as well as the Technion societies. The actual deficit will be covered by withdrawals from Technion's reserves.

### ***The 2012/2013 Budget Year***

The 2012/2013 budget framework is NIS 1,316.1M. It includes an increase of NIS 54M for growth and expansion of academic and other related activities and a NIS 25.2M deficit (about 2% of the budget framework). The expenditures are classified into five main categories, as shown below (in NIS million):

Salaries	711	54%
Pensions	236	18%
Student fellowships, scholarships, etc.	95	7%
Maintenance	112	8%
Others	162	13%
Total	1,316	100%

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

P&BC	918	71%
Tuition	112	9%
Societies	60	5%
Self-income	201	15%
Total	1,291	100%

The main changes in the 2012/2013 budget as compared to the previous year are an increase in government support and in several self-income components. As for the expenses, the changes are: increased allocations for new faculty recruitment and salary agreements, research expenses, graduate students fellowships, essential safety-related activities and pension payments.

### ***Development Projects Budget***

Development projects are managed by multi-year budgets and schedules. In the year 2011/2012, the Technion invested (cash and obligations) NIS 100M (\$26M) in development projects. Income for development projects amounted to NIS 161M (\$41M). 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 1.6B. During the same time period, the total income sources amounted to NIS 1.7B.

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

Category	Invested in Projects 2011/2012
Buildings, renovations, infrastructure	28
Multidisciplinary research centers	32
Equipment and laboratories (not including laboratories established for new faculty members)	40
<b>Total (NIS million)</b>	<b>100</b>

### ***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 by a public committee. The value of the portfolio on September 30, 2012 was NIS 5,198.9M (\$1,329.0M). About 58% of the portfolio was in Israeli index-linked investments, 10% in foreign-exchange linked investments, 16% in shares, and 16% in liquid assets. Our conservative investment policy proved itself during the past few years.

### ***Pension Payments and a New Pension Plan***

Pension payments to most of the Technion employees are provided from the operating budget. In 2011/2012, pension payments were budgeted at NIS 212M, representing 17.7% of the operating budget; this year, they are expected to reach a total of NIS 236M. 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, 2012 is NIS 6.1B (including TRDF, NIS 6.6B).

## **Human Resources**

The activities of the human resources division are driven by the need to develop and enhance the level of the administrative and technical staff as well as promote their wellbeing and motivation. Within this scope, the following are the key activities in the various departments of the division:

### ***Instruction***

Instructional activities were carried out with the intention of enhancing morale and motivation as well as building a sense of commitment to the Technion and the unit. The activities of the current year covered several academic units and administrative departments.

### ***Development of Managerial Staff***

A special program was developed to provide guidance to administrative staff members who have been promoted and appointed to management positions. This is a highly professional process assisted by an external advisor.

### ***Wellbeing and Development of Staff***

The need for enhancing self-esteem and the drive for excellence of the administrative and technical staff is supported by a range of activities which follow the employee from the first stage of hiring until retirement. These include special programs to promote excellence and development of skills and follow-up of the transfer to permanent positions to enable screening and provide assurance that only the best potential employees are hired for permanent positions. These activities are accompanied by new means to enable enhanced interaction between the HR Division and the academic and administrative units. Within the scope of these objectives, we implemented a new process for supporting staff members who are retiring, which includes guidance to provide relevant information, psychological preparedness and enrichment activities.

### ***Academic Staff***

In view of the key role of the academic staff and the challenges posed by the generational shift, a dedicated department dealing with academic staff was established. It cooperates with the academic units to provide special attention to new

academic staff, developing and implementing steps to ease their absorption. In addition, the services provided to veteran academic staff have been broadened to include assistance in a variety of ongoing issues as well as support towards retirement to provide relevant information, psychological preparedness and enrichment activities.

### ***Labor Agreements***

Several labor agreements have been signed covering issues relevant to the administrative and technical staff as well as adjunct academic staff.

### ***Community Volunteering and Assistance***

More than 80 staff members have been involved in voluntary activities. These include responsibilities in community centers serving 6- to 12-year-old youngsters in less affluent neighborhoods of Haifa and Nesher, as well as promoting events on the Technion campus for these youngsters, in order to bridge the gap between the community and the Technion. Within this scope, attention is given to kids with special needs. Volunteer activities were also promoted to support challenged elderly persons by the adoption and the development of special equipment and technologies as well as by personal assistance.

## **Physical Development**

In the past year, we initiated new construction projects as well as the maintenance and upgrading of existing buildings. Many laboratories are being renovated to accommodate new faculty members. Major emphasis has been placed on building safety, savings in energy and water supply, as well as accessibility for individuals with disabilities. A campus-wide survey is on its way to establish a five-year master plan for the renewal of the existing infrastructure, upgrading it to meet modern requirements of performance and safety. Complementary to this step is an effort to renew the initiative to establish a new master plan for the campus that will enable the development of new facilities and open areas. A major effort is planned for "face lifting" of the campus, with emphasis on special projects required for branding it as a high-quality and friendly "city", such as upgraded gates, clear and branded signage, branded lifestyle/experience areas, self-study areas and proper lighting system.

Measures have been taken to enhance the sustainability in all existing as well as new construction projects. All new construction of buildings are planned to be as "green" as possible to ensure maximal energy efficiency and savings in water consumption. All new buildings and renovated areas and labs are designed to enable easy maintenance and follow the policy of "Safety First." In addition, they are fitted with computerized monitoring systems that will save on maintenance costs and provide efficient control of all systems.

Currently there are about 100 projects undergoing construction and additional ones are being planned. The main development projects are outlined below, classified into three categories: recently completed, under construction and in advanced planning stage.

### ***Projects Completed in 2011- 2012***

- Schulich Faculty of Chemistry: renovation of laboratories, offices and public areas
- Emerson Family Life Sciences Building: new laboratories
- Clinical Research Authority – renovation of:
  - Temporary plant for experimental research facilities: 10<sup>th</sup> floor of the Rappaport Faculty of Medicine

- Temporary plant for experimental research facilities on campus
- Rappaport Faculty of Medicine – renovation of:
  - Teaching auditorium (Yellow Hall)
  - MRI Unit and facilities area
- Canada Dormitory Village: renovation of entrances to buildings no. 944- 945
- Ullmann Teaching Center: renovation of Information Center and Marketing Unit
- Senate Building: Senate Hall renovation
- Rifkin Dormitories: renovation of communal areas in building no. 102
- Canada Village: renovation including air-conditioning systems in one building (35 beds) as part of ongoing project (entrance no. 944)
- Various faculties: renovation of four labs as part of recruitment of new faculty members
- Campus safety upgrades: safety measures implemented in various projects in campus buildings
- Accessibility for the physically challenged: upgrading accessibility in various projects in campus buildings and in outdoor areas
- Campus infrastructures: 12 projects on campus

### ***Projects under Construction***

- Schulich Faculty of Chemistry: renovation of laboratories and public areas
- Emerson Family Life Sciences Building: New lab
- Faculty of Mechanical Engineering: new D. Dan and Betty Kahn Building
- Clinical Research Authority: renovation of experimental research facilities
- Rappaport Faculty of Medicine:
  - Renovation and expansion of classrooms to accommodate more students
  - Renovation of experimental research labs on fifth floor
- Wolfson Faculty of Chemical Engineering: renovation of teaching labs in the "Pilot Area" - Stage A
- Department of Education in Technology and Science: renovation of the Abraham and Sonya Slifka Auditorium
- Geographical Information System (GIS): Geographical Information System covering all the campus – mapping infrastructure, safety and security
- Water saving: upgrading computerized irrigation and water saving systems

## D. Dan & Betty Kahn Mechanical Engineering Building



of recruitment of new faculty

in various buildings

adding accessibility in campus

n Ltd.: Renovation of three  
location in Sarona, Tel Aviv

### *Projects in the Planning Stage*

- Guest House: six new apartments
- Zielony Graduate Student Village: community center including a kindergarten + multi-purpose hall
- Wolfson Faculty of Chemical Engineering:
  - Renovation of labs in the "Pilot area" - Stage B (upper floor)
  - Grand Technion Energy Program - research labs on an additional floor
- Undergraduate Student Village: four dormitory buildings - 454 beds in 80 apartments for single students and 27 apartments for couples
- Tower Dormitory Buildings: three high-rise buildings, total of 700 beds for single students in 2-5 bedroom apartments
- Rifkin Dormitories: renovation of communal areas in building no. 101
- Canada Village: renovation, including air-conditioning systems, in one building (35 beds) as part of ongoing project (entrance 943)
- Ullmann Teaching Center: two elevators and earthquake reinforcement
- Schulich Faculty of Chemistry: renovation of laboratories and public areas
- Various faculties: renovation of various labs as part of recruitment of new faculty members
- Teaching facilities: ongoing projects of renovation of teaching facilities
- Main entrance to Technion: upgrading the main entrance to the Technion
- Campus "green projects": water and energy savings
- Campus safety upgrades: measures applied in various projects in campus buildings
- Accessibility for the physically challenged: upgrading projects in various buildings and outdoor areas
- Campus infrastructures: various projects on campus

## **Computing and Information Systems**

The computing and information systems division was formed in 2011 by merging the Information Systems Department and the Taub Computer Center. This process was completed successfully and the positive consequences are already evident. The two merged units are currently physically placed in two separate buildings and plans are in progress to move them into a central facility and to upgrade the Data Center, in order to take full advantage of the potential of the merger. Strategies for Disaster Recovery (DR) in conjunction with this plan are being developed.

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 first phase - the blueprint, is complete and the second stage of Software Customization and Programming is on its way. The implementation of the HR module in the public sector is considered to be more complicated than in other sectors and this is also the experience at the Technion. The project is proceeding according to plan and it is expected to be completed by the end of 2013.

### ***Campus Management Module (SAP)***

The Campus Management Module will remain the last major function that is still operating on the old IBM mainframe after the completion of the Human Resources Module implementation.

The first stage of the project is complete: a high level system-analysis document was developed and will be the basis for the public tender necessary for hiring a consulting firm that will assist us in the implementation of this module. This is the largest and most complicated module of the SAP implementation project.

### ***ECM – Enterprise Content Management System***

The first part of this system went live in January 2013, in the TRDF. The next stage of the implementation will take place in the Technion Public Affairs and Resource Development Division. This part has already started and is in motion. The system

will also be integrated with the HR module to provide a management tool for employees' attached data (electronic filing).

### ***Data Communications Infrastructure***

Two major projects have started in the Data Communications area:

- Upgrade of the wireless network infrastructure, to increase the coverage areas of the WiFi network across the campus, and to provide a solution to the increasing needs for WiFi bandwidth.
- Upgrade the data communication backbone of the Technion, to result in a significant upgrade of the data communications network that will enable faster data communication within the campus and from the campus to outside destinations. The network speed will be increased by this upgrade from 1 GB/Sec to 10 GB/Sec.

## **Organization and Systems**

The Organization and Systems Unit is a staff office with professional authority on matters of organization and operations, which provides service to managers at the Technion. Its objectives are to improve the work processes and to enable integration and uniformity in the working processes of all the institute's units.

The unit is responsible for evaluating organization and operation systems and provide advice for their improvement, characterizing needs and defining requests of the information systems, integrating designated off-the-shelf systems, accumulating and processing data, updating and writing regulations, dealing with applicants', students' and alumni data and publishing it.

The main projects dealt with during the current year include:

- Review of organization and operations: in the course of the year, the organizational functioning of the Undergraduate Studies Office and the Tests Unit in the Rappaport Faculty of Medicine were surveyed. This included a review of work processes, existing problems, and recommendations to improve procedures and provide recommendations for automation of processes to enhance efficiency and

control. In addition, the roles of the administrative assistants in the various teaching departments within the Rappaport Faculty of Medicine, were defined.

- Writing, updating and publishing regulations: in the course of the past year, 15 codes of regulations were written, updated and published.
- Project management of the integration of the supplies and telephone charges system: defining new needs, supervision of implementation and adoption among central users in Technion and in TRDF.

## **Marketing**

The Marketing Unit strategy this year has been to focus on several areas of activities: developing marketing related infrastructure; providing ongoing marketing services to the academic units; supporting the undergraduate and graduate admissions departments; cooperating with relevant organizations. In all of these activities, there is an underlying effort to make the system more efficient by development and use of Information Technology (IT) tools.

### ***Marketing and Related Infrastructure***

- CRM (Customer Relations Management) - Undergraduate Studies: the marketing department in collaboration with the undergraduate admissions department and the IT division is developing a CRM system to track the undergraduate program: campaigns, registration, admission, enrollment, objectives, etc. It is coordinated with the telemarketing center. The system is at an advanced stage, and the intention is to finalize it this year.
- CRM (Graduate Studies): The graduate CRM module is to be developed within the current year.
- Branding: creative concepts were formulated and strategy was developed following research as well as a large-scale survey. Implementation is on its way, including a campaign for revising organizational culture, a new website, a unified look and feel that accurately presents the Technion's essence, as well as physical changes such as an appropriate and stately main gate, clear and branded signage, branded lifestyle/experience areas, proper lighting system, etc.

### ***Marketing Services to Academic Units***

The support to academic units reflects the specific challenges of each and includes: strategic counseling and support, publicity and media, print production, design, internet sites, social networks, presentations, targeted events to convert interested and admitted candidates to actual enrolled students, organization of open campus days, and public relations.

### ***Supporting Undergraduate and Graduate Admissions***

- Coordinating recruitment campaigns and retention programs
- Sharing the CRM and telemarketing center with the undergraduate admissions department
- Formulating a special program with the graduate admissions department to assist new, qualified candidates to go through the registration process. The program has proven to be highly successful and the intention is to turn it into a permanent feature.

### ***Cooperation with Other Organizations***

Several cooperative and joint ventures were initiated with partners such as the municipality of Haifa, IATI (Israel's largest hi-tech and life-science organization), ORT and others.

## **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. An annual action plan has been developed and implemented, including 18 focused safety projects in several areas of activities, which include safety improvements and upgrading of infrastructure in existing buildings.

### ***Safety Awareness and Training***

Safety trainings courses were carried out during 2012, including 21 courses with 1670 participants (out of 1814 invited – a 92.1% participation rate). In addition, the program for certification of "safety trustees" was continued in collaboration with the Israeli OSH (Occupational Health and Safety) Institute and 19 new trustees were qualified.

Safety awareness measures are being implemented and they include: development of a new internet site, offering a professional address for all issues related to safety and health; safety signs and labeling; 2000 Material Safety Data Sheets (MSDS) collected and scanned to become available through the Technion Safety Unit internet site; a new safety manual distributed to all Technion employees; a monthly safety activity report now distributed routinely.

### ***Risk Assessments and Implementation of Standards***

A systematic risk survey was carried out in laboratories and work areas and in zones which have undergone major change or renovation, to identify main risks and implement risk control measures. Seventy risk surveys were carried out and 770 corrective actions were recommended. Fourteen new standards for safety performance were developed and 11 were released and implemented.

### ***Emergency Preparedness***

An Emergency Response Team (ERT) steering committee was organized to promote the ERT implementation program. Evacuation trustees were appointed and trained, evacuation drills were carried out in four departments and a new trailer for chemical safety equipment was installed.

## Security

The activities of the Security Unit were focused on several issues: upgrading of the security concept relating to potential threats and training and implementation of new technological means. Specific projects were carried out which included: development of means to deal with international students and visitors on campus; implementation of strategy and means to provide security in Technion operations outside the Neve Shaanan campus (Rappaport Faculty of Medicine and Saron campus in Tel Aviv); involvement in providing security for events taking place at the Technion; strengthening relations with the Haifa municipality and the Homeland Command. A successful drill of moving from routine to emergency conditions was carried out and the conclusions from this drill were implemented.

- **Security concept and strategy:** The security concept of the unit was updated to conform with the instructions of the Israel Police and taking into account the potential threats and scenarios for the years 2011-2012. The security directives for 2012 were upgraded and authorized by the Israel Police's Haifa Station.
- **Training:** The campus security guards completed a Security Guards training which authorizes them to search, identify, seize objects dangerous to public safety revealed during search, and detain persons in accordance with the 1998 security regulations for public bodies.
- **Technology and security measures:** The emergency situation room was equipped with new instrumentation (computer screens, servers, telephones etc.), IT management modules were installed to enhance the security management system and its interface with SAP, and an emergency generator was set up as a backup in case of electricity failure.
- **International students and visitors during emergency:** English-language emergency instructions were distributed, addressing events such as war, rocket attack and earthquakes, and gas masks were purchased to distribute to the visitors if needed.

## Legal Support and Advice

In January 2012, the process of establishing an in-house legal unit was initiated and a legal adviser to head this unit was appointed.

The legal unit was established in order to provide the Technion with constant and continuous legal counsel, based on a professional, internal and available source, being part of the Technion's administration and thereby a partner to all the processes and events at Technion.

The role of the legal adviser and the law office are:

- Accompany, advise and direct the administration and the various academic and administrative units in the legal aspects of their activities.
- Provide legal representation for the Technion in relation to outside bodies – authorities, institutions, suppliers and service providers.
- Provide advice and guidance to the institution and its management in all aspects pertaining to regulatory requirements, existing and revised, relevant to the institute's functioning.
- Involvement in the institution's internal statutory processes: by-laws, regulations etc.
- Coordinate and guide all the institute's legal activities including trials, with assistance from outside attorneys, as needed.

## Green Campus

The Green Campus project in the Technion, promoted over the past decade by the Samuel Neaman Institute, aims to introduce and amplify environmental values to the Technion community. The goal of the project is to promote a green environment in the campus, while raising the environmental awareness of students and staff – an awareness that will continue its impact off-campus, in the homes and workplaces of Israel's future engineers and scientists.

The project is run by the Green Campus Council, appointed by the President of the Technion, and composed of faculty members, key personnel in Technion administration, the head of the Construction and Maintenance Division, the Technion spokesman and more. Key partners are the Student Council representative.

Green Campus activities include: education and environmental awareness, resource conservation (water, energy, waste recycling etc.), pollution prevention and more. The Green Campus program 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.



*Blooming at the Technion*

Main projects in 2012:

1. **Energy Saving** project operated under the Energy Saving Forum of the Technion Construction and Maintenance Division.
2. **"Green Campus" Website** that serves as a center for updates and information on environmental activities on campus, <http://greencampus.technion.ac.il/>.  
**"Green Campus" Facebook** page providing updates, green office tips and links to relevant articles from around the web. URL of the Facebook page "[Technion Green Campus](#)".
3. **Green Campuses Forum** of universities and colleges around the country, to promote inter-university cooperation and alliances with organizations such as the Ministry of Environment and more.
4. **Sustainable Universities Seminar: Environmental Education in Higher Education** seminar held in February with the participation of dozens of students, faculty and others from all over the country.
5. **Technion Greenhouse Gas (GHG) Emissions** reporting for the second year – the GHG emissions are calculated and reported to the Ministry of Environmental Protection's Voluntary Greenhouse Gas Registration and Reporting Program.
6. **Electronic Waste Collection** established throughout the Technion. The general warehouse and waste treatment company are responsible for dismantling the waste in the right environmental setting, while providing added social value by employing people with disabilities.

Within the framework of the Technion Student Association:

7. **Green Day** on campus aimed at increasing environmental awareness and promoting a variety of projects. The Green Day is organized by the Student Union and the Green Campus Coordinator.
8. **Second-hand Market** - takes place twice a year and organized by the Student Union.
9. **Treatment of Waste** across campus and in the dormitories – bottles and cans collection, and composters in the dorms to separate organic waste, in collaboration with the campus landscaping department.

## Public Affairs and Resource Development

The excitement created by the Technion's second Nobel Prize and the selection of the Cornell-Technion proposal as the winner in the international competition to establishing a new institute of applied science in New York in 2011, spilled over into the past year which was characterized by unprecedented interest in the Technion expressed by a record number of visits by delegations and missions from all over the world, as well as from within Israel.

PARD helped the Technion maintain the positive momentum created in 2011 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 joint effort to raise funds and promote the Technion around the world, and by hosting an ever-increasing stream of visitors.

### *Overview*

**Fundraising:** A record number of fundraising projects was produced by the Project Development Unit of PARD. These projects were offered to our donors through the Technion societies, leading to a total of over \$83M in donations. Not only was this figure higher than the previous year, it was reached at a time when other Israeli institutions have experienced a decline in their fundraising performance following worsening economic conditions in Europe and the USA.

Prof. Golany, Vice President for External Relations and Resource Development, played an active role in obtaining many of the donations last year. In particular, he made four extensive fundraising tours overseas, spending a total of 10 weeks abroad. During these trips, he visited all nine regions of the American Technion Society, the two major regions of the Canadian Technion Society (Toronto and Montreal) and seven of our European societies (Belgium, Germany, France, Italy, Netherlands, Switzerland and UK).

**Work with Technion Societies:** In response to the strategic planning process initiated by PARD in 2012, most of the societies have drafted their multiyear strategic plans, formulating specific mission statements aligned with the overall Technion vision, and

a set of objectives relevant to each country as well as setting strategies to realize those goals.

A key element in this process was a week-long staff seminar attended by representatives of 11 Technion societies that took place in December 2012 on the Technion campus. This intensive program – the first of its kind for the Technion -- was aimed at deepening the knowledge and skills of the professional leadership of our societies around the world, facilitate sharing and exchange of experiences and challenges, and to motivate and inspire.

**Expanding and Strengthening the Network of Technion Societies:** PARD continued the efforts to create new societies and strengthen existing societies that have been inactive in recent years. Technion presence has been reestablished in Argentina and Mexico, and two of the less active societies (Brazil and Sweden) received special attention in an effort to boost their activities.

**Work with the Israeli Ministry of Foreign Affairs:** During the last year, PARD has devoted special attention to cultivate the Technion's relations with the Ministry in a series of meetings and joint activities aimed at supporting our public relations efforts while helping Israeli representatives from around the world present Israel as the Start-Up Nation. These activities included coordinated events with the Israeli ambassadors and counsels general in Brussels, London, Mexico City, Paris, Philadelphia, Stockholm, The Vatican and Zurich as well as meetings in Israel with over 30 Israeli ambassadors and counsel generals in the Asia Pacific region.

**Alumni Affairs:**

*Going Global:* PARD continued its effort of engaging Technion alumni living abroad and recruiting them to support the Technion directly and through the Technion societies where they live or work. Many of these graduates have met with great success abroad, and are well positioned to help the Technion in different ways. These efforts led to the establishment of several new alumni clusters (in New York City, the Silicon Valley and San Diego) and strengthening existing ones (e.g., in Boston). Alumni groups in these areas are now led by local volunteers who receive professional support from the ATS. More than 1,000 alumni have registered in these

clusters and a growing number of them are also contributing funds to the Technion. Other societies with significant concentrations of alumni were also encouraged to adopt similar modes of engagement and activity, and have been provided with systematic tools to enable them to identify alumni living in their countries.

*In Israel:* PARD has continued to help the alumni association advance its goals. These efforts resulted in more and better communication and cooperation between the Alumni Association and the Technion in general, and with PARD in particular. They have also led to efforts to create new frameworks within the Alumni Association, which will strengthen connections between the Technion and its most prominent graduates in the business and technological sectors. In particular, a new President's Circle was established – a group of 24 prominent alumni holding key positions in industry or government offices. Members of the President's Circle provide valuable advice to the Technion and help the President achieve Technion's objectives.

**Renovation:** A project to renovate both the content and the physical structure of the Coler-California Visitors Center has started. This project also includes the construction of a VIP meeting room at the entrance level to the visitors' center.

**Personnel Changes:** Ms. Yael-Adam Shalisman was appointed to fill the newly-created position of Societies Coordinator; Ms. Yael Agmon was appointed Ceremonies and Plaques Coordinator in the Department of Donor Recognition, after previously serving as Funds Coordinator. She was replaced in this position by Ms. Hagit Hermon, who previously served on the staff of the VP for External Relations and Resource Development. Ms. Sima Greenberg joined the Coler-California Visitors Center team; and Mrs. Esther Klein retired from her position as PARD Secretary after many years of dedicated service, replaced by Ms. Maya Mokadi.

**Outstanding Personnel:** Mrs. Marianna Ovadia, head of PARD's Department of Donor Recognition and Events, was among the five administrative employees selected as Technion Outstanding Employees. This was the third consecutive year in which a PARD employee was so honored.

## *Selected Special Projects and Highlights*

### **Showcasing the Technion to President Obama and Prime Minister Netanyahu**

Twice in the past year, the Technion has been asked by Prime Minister Netanyahu to showcase Israel's achievements in science and technology. In both cases, PARD led and coordinated these challenging projects:

1. In June 2012, Mr. Netanyahu took part in the filming of a television travel feature called "The Royal Tour", with renowned American travel journalist Peter Greenberg. To showcase Israeli science and technology, the prime minister chose the Technion as the site for a multifaceted exhibition featuring Technion-born technologies. The filming took place on June 8, 2012, and the Technion segment will have a prominent place in the final production, which will air internationally.
2. The Technion played a leading role in the visit of U.S. President Barack Obama in March 2013:
  - At Mr. Netanyahu's request, the Technion prepared the prime minister's gift to Mr. Obama: scientists of the Technion's Russell Berrie Nanotechnology Institute inscribed replicas of the Declarations of Independence of the United States of America and the State of Israel side-by-side on a gold-coated silicon chip, using a focused beam of high energy gallium ions.
  - Technion-born technologies were chosen for three of the seven exhibits at a special science and technology fair held for President Obama.

**"Technion Nation" Book - Hebrew Version:** Following the publication of the English-language book "Technion Nation" by Prof. Shlomo Maital and Dr. Amnon Frenkel in June 2012, a Hebrew translation has been produced, coordinated by the director of PARD. This book will be distributed widely to Technion alumni, employees, potential students and other targeted populations.

## *Public Affairs*

The Public Affairs Department has established a strong presence in the world of social media. Some 2,617 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, BOG and campus events, and academic courses. The channel has enjoyed an enormous leap in popularity: the number of views is up to 7.2 million, triple the number of a year ago. The e-newsletter, TechnionLive, carries Technion highlights on a bi-monthly basis to our Societies and to a wide local and international audience. The TechnionLive Facebook page, which provides our global network of friends with multiple daily information feeds, now has over 19,000 "likes". The TechnionLive Twitter account currently has over 43,000 followers and is a hive of news and interaction. Both YouTube and Facebook feeds are synched in to the Technion Twitter account - so if anything is happening at Technion, Twitter is the fastest way to discover it. All of these web-based promotional channels supplement the existing popular newspaper– Focus (English) which also appears online.

In addition, a new multimedia website for PARD has been launched, and is a powerful platform for showcasing news, events and videos. The PARD website currently receives 4,000 hits a day, and is increasingly used as a resource by global media, interested groups and followers.

Integrating and synchronizing Technion's online presence across multiple platforms has created a responsive, prolific and carefully crafted media and content machine that grows with every passing month. This formidable network has given the Technion a leading online presence in the context of the "Start-up Nation", Israeli science and technology, branding the Technion as a recognizable emblem of world-class science and service to humanity whose logo is recognized across the planet.

### ***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, the unit prepared approximately 260 new projects. Major projects adopted this year include: Phase II of the Leaders in Science and Technology Program; fellowships for and components of the Technion Computer Engineering Center; support of the Technion-Cornell Innovative Institute; support of the MIT-Technion Post-Doctoral Program for Engineers, Physicists and Chemists;

facilities in the Kahn Medical Engineering Building; a floor in the laboratory complex for a new facility in the Emerson Family Life Sciences Building; research labs in the Molecular Immunology Research Laboratory Complex; projects within the Grand Technion Energy Program and the Technion Autonomous Systems Program; 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 the planning and execution of a wide variety of donor-related, academic and general ceremonies and events, including those of the annual Board of Governors meeting. Over the past year 45 such ceremonies have been held, and the 2012 BOG meeting, celebrating our Cornerstone Centennial, was particularly festive and well-attended. In addition, the department produced 66 new recognition plaques, and 10 old plaques were renovated. The department presented 14 special gifts, including gift-plaques. Also completed was the student wall project, located in the Zielony Student Union Building, including plaques of donors from the original building. Among the special events held this year were: recognizing Technion faculty and alumni selected to light torches for Israel's 64<sup>th</sup> Independence Day; unveiling the signature of Distinguished Prof. Dan Shechtman on the Wall of Fame in the Schulich Faculty of Chemistry; hosting an international women's beach volleyball tournament; the visit of the Prime Minister Netanyahu and an exhibition of Technion achievements.

### ***Donor Relations***

**The Donor Relations Unit** is responsible for reporting to donors – either directly or through the Societies - on the implementation of the projects they support. The Unit faced special challenges in the past year, with several personnel changes and the maternity leave of the head of the unit. Still, the unit managed to produce more than 150 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 120 special letters and items of correspondence were produced. The computerized fundraising and donor information management system (CRM) introduced several

years ago, continues to be updated, upgraded and streamlined. One of the special projects undertaken in the past year was the production of a report of “student-oriented projects”, an overview of Technion’s multifaceted programs that benefit students and target their special needs. This report was sent to all Societies as an additional reporting and marketing tool. This report will be issued in an upgraded format in the coming year.

### ***Office of the Board of Governors***

The Office of the Board of Governors, managed by the BOG Executive 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. This year the Executive Secretary has been involved in the implementation of new procedures for the election of standing members of the BOG committees, and the background administration of the Presidential Appointment Committee. Both issues will be completed by the time of the 2013 BOG meeting. In addition, a process of review of Board membership by Technion Societies has been undertaken. The 2012 BOG meeting was well attended, with more than 200 registrants.

### ***The Coler-California Visitors Center***

The Coler-California Visitors Center is the first stop on campus for many Israeli and foreign guests, delegations and mission, donors, government officials, academic or business people or youth through Birthright or other programs. Yet another manifestation of the growing international interest in the Technion is the continued increase in visitors. In 2012 the Center hosted 11,718 visitors in 705 visits, representing an increase of 33% in total visitors and 36% in the number of visits compared to 2011. A list of selected visitors is attached as an appendix to this section.

The Technion is aware of the continuous need to update the exhibits in the Visitors Center and in this way to give the visitors an insight into the research being carried out at the Technion. The wealth of material for these exhibits comes from our faculty and students who never cease to amaze our visitors. The updates will showcase the

2011 Nobel Prize for Chemistry for Distinguished Prof. Dan Shechtman, other international prizes won by Technion faculty, new material about each of the faculties, models of a myriad of research projects, and achievements by Technion graduates, such as the Iron Dome Project. Infrastructure updates include installation of WiFi, the construction of a conference room and the rearrangement of existing exhibits.

## ***Technion Societies***

### **North America**

**American Technion Society (ATS):** The ATS continues to perform well, meeting all its goals despite the adverse economic environment, including in the always-challenging area of cash collection. During the three years (2010-2012) of the “silent period” of the current ATS six-year campaign, \$238.3M was raised, achieving 99% of the \$241M goal. During the same period, ATS supporters established 145 projects and individual funds of \$100,000 or more.

The ATS announced its six-year, half-billion-dollar “Innovation for A Better World” campaign at the October 2012 national Board of Directors meeting. During fiscal year 2012 (October 1, 2011-September 30, 2012) the ATS raised \$85 of the \$90M goal, a 94% achievement. Cash collections exceeded both the 2012 fiscal year and silent period goals. In the first five months of fiscal year 2013, an additional \$35.2M was raised.

The goal for the next three years of the “Innovation for a Better World” campaign is \$282M, in order to reach a six-year target of \$520M. A dedicated web site to support the campaign has been launched ([www.atscampaign.org](http://www.atscampaign.org)). Meanwhile, the ATS roster of Technion Guardians has reached 341.

On the Technion-Cornell Innovation Institute: the ATS invested great effort and have made strides in working closely with its counterparts at Cornell on PR-related matters. Now the ATS is moving toward developing proposals for joint fundraising efforts.

On the professional front, Joseph Selesny and Diana Stein Judovits are the new directors in the East Central and Western Regions respectively; Amy J. Frankel and Susan Packer are the new assistant directors in the West Central and North Pacific Regions.

Major national and international events included the 26<sup>th</sup> ATS mission *Old World Splendors–New World Solutions: Technion Journey of a Lifetime*, which brought 60 friends to Russia and Israel, and raised \$6.2M. Two projects were dedicated during the mission: the Jaime Cosiol Memorial Children’s Playground in the Technion’s Stanley Shalom Zielony Graduate Student Village, and the Morton and Beverley Rechler Family Foundation Dormitory. During the 2012 Board of Governors meeting, five key ATS supporters were recognized with honorary degrees, while Raphael B. Mishan and his wife Miriam dedicated the Miriam and Raphael Mishan in vivo fMRI Research Facility.

The ATS National Board of Directors Meeting on October 28-29, 2012, in Baltimore proceeded almost as planned despite Hurricane Sandy. At this meeting, the ATS launched the public phase of its new fundraising campaign, and installed Scott Leemaster as its 29th national president.

**Technion Canada:** Formerly known as the Canadian Technion Society, this society is celebrating its 70th anniversary with a new name and renewed energy. Generation NEXT continues to grow, and its second mission to Technion took place in January 3, 2013 and a third mission is planned for the fall of 2013. Several academic, governmental and business groups visited the Technion, including Prof. Allan R. Slomovic, University of Toronto, Research Director, Cornea Service, University Health Network Chairperson; Dr. H el ene David, Associate Vice Rector of Studies, Universit e du Montr eal; Dr. Rose Goldstein, Vice Principal Research and International Relations, McGill University; The Honourable Joe Oliver, Minister of Natural Resources Eglinton–Lawrence Ontario; Mr. G erald Tremblay, Mayor of Montreal; The Honourable Kevin G. Lynch, Vice Chair, BMO Financial Group visited Technion. A film production crew from Evasion TV Canada's French "Travel" Network was at Technion filming and interviewing for a 13 part TV series on Israel "Plus loin que pr evu". The dedication of the Volatile Biomarkers of Lung Cancer Lab

was attended by Ms. Naomi Fromstein and Dr. Efrim Boritz, representing the donation by the Clara and David Nightingale Foundation.

### **Latin America**

**Argentina:** Technion has identified a dedicated group of individuals led by Mr. Marcelo Slonimsky who are in the process of formally establishing an Argentine Technion Society.

**Mexico:** After a long period of inaction, a new group led by Mr. Markos Achar and Ms. Esther Alerhand, took the initiative to revive Technion's presence in Mexico. The group held the first major function in the residence of the Israeli ambassador to Mexico in March 2013.

**Brazil:** The Technion society in Brazil hosted Distinguished Prof. Dan Shechtman, who met senior political and academic representatives and lectured in Sao Paulo and Rio de Janeiro. Mr. Maurice Shashoua, founder of the Brazilian Technion Society, was awarded with a Technion Honorary Fellowship (we note with sadness that Mr. Shashoua passed away shortly afterwards). An important Brazilian News Channel, GloboNews, produced and broadcasted a special program for the Technion's Centennial. An MOU was signed between the Technion and Universidade Positivo, a young and fast-growing private Brazilian University.

### **Australia**

**The Technion Society of Australia (TSA) (New South Wales):** The TSA has achieved most of its action plans for this year. Significant progress was made during Prof. Lavie's visit with major donors and a proposed joint program with the NSW government. The TSA is promoting a collaboration initiative between the Technion, University of Technology Sydney and Stanford University Medical School. Attempted BDS boycotts appear on an annual basis. However, strong relations between TSA and the NSW universities ensure that these are appropriately treated as fringe activities irrelevant to the academic environment.

**The Technion Society of Australia (TSA) (Victoria):** Visits by President Lavie, and Nobel Laureate, Distinguished Prof. Dan Shechtman (twice) gave the Society an

unprecedented profile in the community. Prof. Lavie met many members of the Jewish community and addressed various forums. Prof. Shechtman received an Honorary Doctorate and a prestigious visiting fellowship from Monash University. Much work was done in the general community, through diverse public and media channels, to create goodwill towards Israel and the Technion in particular.

## Europe

**Technion UK:** Previously known as the British Technion Society, the society has formally changed its name and launched its new website. To mark this event and as part of the Technion 100 year celebrations, a reception was held for major donors, with the Israeli Ambassador, Daniel Taub, as guest of honor. New appointments have been made to the Technion UK Board and the joint Vice President, Sir Michael Heller, was awarded a knighthood. Total income for the year increased to \$1.7M, a significant result given a difficult fundraising climate. Projects funded include a Human Allergy Laboratory in the Rappaport Faculty of Medicine, equipment in the Microelectronics laboratory, additional graduate scholarships, and other facilities. Distinguished Prof. Dan Shechtman took part in a two-day program in London which included media interviews; a Master Class at King's College; the 11th Ron Arad Lecture in front of a 300-strong sell-out audience, being the most successful one of the series with the highest-ever attendance and over \$250,000 raised; a breakfast event hosted by the London Business School; a lunch at the House of Lords attended by major donors and invited academics.

**The French Technion Society (ATF):** The ATF has continued to develop relations with both industry and research communities in France and in other French-speaking areas in Europe. Major fundraising was significantly increased, especially within the Jewish community. One of the ATF's most important missions is to foster partnerships between French companies and Technion. Leading French companies are financing research programs and research grants at Technion. Other successes include: the annual ATF event in December 2012 on the Challenges of the Digital World, under the High Patronage of the President of the French Republic (800 attendees both at the scientific Colloquium at La Maison de la Chimie and the gala dinner at the City Hall of Paris); the annual mission to the Technion, with high caliber participants from industry, the research and academic world and donors; events in Paris and Lyon with

Distinguished Prof. Dan Shechtman; and the annual dinner at the residence of the Israeli ambassador in Paris. In addition, the many visitors to the Technion (more than 1,000 this past year) from France, Belgium, Luxembourg and Geneva have an important impact as well. Finally, ATF has been very active in promotional activities with the national media (newspaper, TV and radio) and with major political figures in order to secure the legitimacy of the French government for ATF activities.



*Mission of French Technion Society Mission*

**The German Technion Society (GTS):** In addition to 14 ongoing research projects in the Niedersachsen-Israel cooperation program, the GTS has started to administer four new projects (funding period 2013-15). Prof. Golany's inaugural visit as Vice President aroused the interest of business and industry partners, as well as individuals, for talks and meetings all over Germany. Technion alumnus and industrialist Dov Moran received the prestigious Eduard Rhein Prize in Munich, and he contributed his prize money to promote excellence in teaching at the Technion – in honor of the 100<sup>th</sup> cornerstone anniversary. The GTS initiated a new tool to foster academic cooperation of brilliant graduate students: The “Life Science Network”. Up to 50 graduate exchange students from biotechnology and life sciences from Technion and five excellent German universities will have the chance to experience the academic world in the other countries during their early scientific career. The GTS's members

association elected a new board, including two new members from industry. The board elected a new chairman, Prof. Dr. Thomas Scheper.

**The Swiss Technion Society (STG):** The Nobel Prize to Distinguished Prof. Dan Shechtman and the NYC-Cornell project gave the STG a powerful impetus to start 2012. Through intense media work, a wide range of people in Switzerland learned about the important work done by the Technion. In his second year in the position, the part-time National Development Director continued emphasizing fundraising. Despite the growing difficulty and intense competition, these efforts began showing results, including: a pledge of \$2M by a foundation; a major donor has been reactivated; and a post-doctoral fellowship in mathematics has been donated. Other fundraising initiatives have been undertaken that hopefully will bear fruit. The successful series of “Tech-Talk” was continued in 2012, and the Society’s annual gala dinner, attended by 100 guests, featured Prof. Shechtman, renowned Spanish architect, Dr. Santiago Calatrava, Technion VP Prof. Boaz Golany and the new Israeli ambassador to Switzerland, Mr. Yigal Caspi.

**The Italian Technion Society:** The society continues to carry out its mission in spite of difficult economic conditions: the presentation of Technion International activities in Jewish schools (Milan and Rome); fundraising for an endowed scholarship for the Faculty of Architecture; the “Israeli Hi-Tech in Rome” event in July with Roma3 University and Innovation Lab, in the presence of more than 300 people and of the Israeli ambassador; the same event was held at the Politecnico Milano; meeting in Haifa with Francesco Profumo, Italian Minister of University and Research; hosting Prof. Uzi de Haan at a five-day international conference in Rome, and meeting with entrepreneurs and members of the Society; in October 2012, the second visit of Minister Profumo followed by the signing of an MOU by the Italian Ministry of Foreign Affairs and the Technion; consolidation of ties with Italian universities (Bari, Perugia, Roma Sapienza, Roma3) and new links were developed.

**The Technion Society of the Netherlands (TSN):** The TSN has continued employing its model of creating content and awareness as the basis for its activities. The R&D links with Dutch universities and research institutes have started to materialize into collaborations with both academic and financial benefits for the Technion. The TSN

has created strong links with the current Dutch government. Furthermore, in cooperation with PARD, the TSN has laid the foundation for a five-year strategic plan. The plan focuses on creating scientific collaborations with universities and multinationals, attracting new members for the TSN Executive Club while also continuing its on-going fundraising activities.

**Swedish Technion Society:** The society sponsored a successful workshop in November 2012 on robotics and industrial automation with participation from Technion and high-tech companies in the Swedish Mälardalen region. The seminar, with three Technion professors and three Swedish representatives, was attended by about 40 people. Stefan Sturesson, chairman of STS and Jozef Stern, treasurer, participated in the Technion Board of Governors meeting June 2012. Board member Tommy Klatzkow took part in the Societies professional seminar in December 2012. STS cooperates with the Israel-Sweden Friendship Association and other Jewish organizations in Stockholm and Västerås, and distributes a bulletin “Från den ljusa sidan” (“Positive News from Israel”) among its members.

**The Austrian Technion Society:** Being a small society, the Austrian Technion regularly takes part in all activities of the Austrian-Israeli Chamber of Commerce (<http://www.aicc.at/>) and of the Austrian-Israeli Society (<http://www.oeig.at/>) in order to promote the interests of the Technion.

**The Hellenic Technion Society (Greece):** Greece has undergone economic collapse and a precipitous drop in employment, income and standard of living. Under these circumstances, fundraising is nearly impossible. Therefore, the society has focused on introducing Jewish youth to the idea of studying at the Technion, and on possible cooperation between Greek institutions of higher education and the Technion.

## **Israel**

**The Israel Technion (ITS):** The ITS has raised more than NIS 37M (about \$10 M) in donations in 2012. In the past year, the society initiated visits of potential donors which resulted in contributions to the Technion. A private foundation that ceased to operate donated NIS 6.5M to the Technion to establish a fund to reduce educational gaps by supporting projects at the Technion’s Center for Pre-University Education. A

large contribution by an alumnus of the Faculty of Mechanical Engineering will be utilized to establish a center for mechanical engineering projects as part of the Faculty's general teaching center. The Society endeavors to strengthen links with Technion alumni who wish to contribute to the Technion through new initiatives and by participating in existing activities in the various faculties. The society held a special event marking the Technion Cornerstone Centennial attended by 200 friends of the Technion – donors, alumni and offspring of Technion supporters in the distant past. The keynote lecture was delivered by 2004 Nobel Prize laureate, Distinguished Prof. Aaron Ciechanover.

<b>VIP Visitors to the Technion in 2012</b>		
NAME	POSITION	PLACE
<b>Ambassadors and Diplomatic Visitors</b>		
H.E. Mrs. Elinor Hammaarskjöld	Ambassador to Israel	Sweden
H.E. Caspar Veldkamp	Ambassador to Israel	Kingdom of the Netherlands
H.E.Ms. Andrea Faulkner	Ambassador to Israel	Australia
H.E. Mrs. Gao Yanping	Ambassador to Israel	Peoples Republic of China
H.E.Dr.Guillermo Bassante	Ambassador to Israel	Ecuador
H.E. Mr. Paul Hunt	Ambassador to Israel	Canada
H.E. Miguel Maria Simoes Coelho de Almeida e Sousa	Ambassador to Israel	Portugal
<b>Presidents, Ministers and Government Officials</b>		
Mr. Benjamin Netanyahu	Prime Minister	Israel
Prof. Francesco Profumo	Minister of Education, University & research	Italy
Prof. Zoltán Cséfalvay	Deputy Minister of Economy	Hungary
Honorable James Flaherty	Minister of Finance	Canada
Mr. Carlos Andres de Hart	Vice Minister of Business Development, Min. of Commerce, Industry & Tourism	Colombia
Mrs. Mary Landrier	US Senator for Louisiana	USA
Mr. Carlos Nuno Oliveira	Sec. of State, Entrepreneurship, Competitiveness & Innovation	Portugal
Hon. Pelonomi Venson-Moitoi	Minister of Education & Skills Development	Botswana
Mr. Jan Björklund	Deputy PM and Minister for Education	Sweden
<b>University Presidents, Administration and Academics</b>		
Prof. David Skorton	President	Cornell University
Prof. Dan Huttenlocher	Dean and Vice Provost	Cornell NYC Tech
Dr. Cathy Dove	Vice President	Cornell NYC Tech
Prof. Freddy Boey	Deputy President & Provost	Shantou University
Prof. John Anderson Fry	President	Drexel University

Prof. Peihua Gu	Provost	Shantou University, China and Li Ka Shing Foundation
Prof. Chrysostomos L. Nikias	President	University of Southern California
Prof. Pan Yi	Vice President	Nanjing University
Prof. Lih J. Chen	President	National Tsing Hua University, Taiwan
Dr. Alan Finkel	President Elect	Monash University, Australia
Prof. Dr. Sibrandes Poppema	President	Groningen University, Netherlands
Prof. Stephen K. Smith	VP Research	Nanyang Technological University
Prof. Michael Drake	Chancellor	University of Irvine

<b>Science Foundations</b>		
Prof. Dr. Peter Gruss	President, Max Planck Society	Germany
Prof. Virginia Echinope	Head, Electric Energy Dept	Uruguay
Mr. Taegyun Shin	President Samsung Human Resource Development Center	Korea
Mr. John McDougall	President, National Research Council	Canada
Prof. Dr. Jürgen Mlynek	President, Helmholtz Assoc. of German Research Centers	Germany
Dr. Stephen Lee	Chief Scientist, US Army Research Office	USA
Prof. Suzanne Fortier	President, Natural Science & Engineering Research Council	Canada