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From the President

It is my great pleasure and honor to share with you the fruit of eight incredible years during which I've been privileged to lead the Technion along the advancement of its scientific journey. To provide a concise yet comprehensive overview of the Technion's achievements since I assumed office, I have extracted below my major goals and plans in eight main areas of activity, as I presented them in my election speech to the Senate on March 23, 2009, and summarized what has been accomplished in each of them in the last 8 years.

Technion Accomplishments 2009-2017

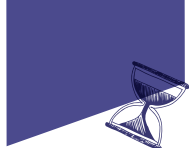
These eight main areas are:

- Faculty Members
- Students
- Interdisciplinary Research
- Globalization
- Graduate School
- Technology Transfer
- Fund Raising

I should emphasize that the credit for the Technion achievements in the last 8 years described below should be attributed to the entire administrative team during this period. I was fortunate to work with an outstanding group of individuals whose wisdom and dedication to the Technion have made an immense contribution. Without them - none of these could be possible.

Faculty Members

"The number of Faculty members reached the black line from which we cannot go down under any circumstances....I will do all in my power to recruit the best faculty members.....Raising the money for recruiting faculty members will be my top priority."



Recruitment of new faculty members has been my top priority over the last 8 years. Since October 1st, 2009, more than 200 new faculty members have been recruited and the total budget allocated for recruitment has reached \$220 Million. However, due to the large number of retirements during this period, the net increase in the number of faculty members has only been 34. To ensure the quality of new faculty members, I have personally participated in the recruitment process in some of the recruitments, by conducting either personal meetings or phone conversations with candidates. In several cases, I met candidates in their laboratories. One of the most significant achievements of the recruitment effort has been our success in attracting several senior researchers, such as: Prof. Roy Kishony (Biology), Prof. Amit Meller (Biomedical Engineering), Prof. Ze'ev Ronai and Prof. Eyal Gottlieb (Medicine), Prof. Steven Frankel and Prof. Tal Carmon (Mechanical Engineering) and Prof. Ezri Tarazi (Architecture). In each and every one of these instances, I took an active role in the recruitment process by meeting candidates personally, to persuade them to join the Technion. Two of the most decisive factors in attracting excellent candidates to the Technion in addition to personal attention by the Deans and the President, were the fact that we could offer some of the candidates housing on Campus at reasonable prices, and the fact that each was provided with a generous recruitment package, enabling them to purchase equipment and upgrade their laboratories. The outstanding quality of the Technion's newly recruited faculty members is evident from the quantity and quality of Technion publications over the past 8 years. The Technion was ranked number 26 in the world in the Nature Index for rising stars for the 2012-2015 period. This Index seeks to identify the ascendant performers in the research world, tracking the research of more than 8,000 global institutions. According to Nature, in the competitive world of academic publishing the rising stars are the players to watch.

Students

"Student quality is an essential element for a university's success....the Technion has no longer a monopoly on engineering education....We must change the way students and candidates view the Technion without compromising academic quality."

We invested major efforts in changing students' learning experience at the Technion. It was perceived by students as excellent but very demanding and overloaded in comparison to other universities. One of the most significant initiatives has been the appointment of a special committee headed by Prof. Yachin Cohen from the Faculty of Chemical Engineering, to examine the "study load" at the Technion, in comparison to other leading universities that are similar to the Technion. This committee meticulously examined the teaching load and the structure of the academic year at the Technion and presented its conclusions and recommendations to the Technion Senate on 19.5.2013 and 2.6.2013. It made 21 recommendations. These were discussed in depth and then adopted by the senate. Many of the committee's recommendations, such as: shortening the academic semester from 14 to 13 weeks, allowing a vacation during the week of Hanukkah, avoiding overlap of the examination and teaching periods, improving pre-academic preparation of Technion candidates, and more stringent control over examinations quality, have already been implemented.

To further improve the learning experience, with the generous support of Technion alumnus Moshe Yanai, we established the annual Yanai Prize in 2010, annually recognizing 10 faculty members selected by a special committee of students, alumni and faculty members, as the best educators of the year. Each of the Yanai fellows receives a substantial monetary reward. A special prize is also given to one of the 18 Technion faculties that has excelled at students' education. The changes in the students' load and the introduction of the Yanai prize have led to improvement of students' satisfaction with the quality of teaching at the Technion. This can be seen from the average teaching scores of all Technion faculty members throughout the last 8 years, revealing a year-to-year improvement in students' satisfaction with the quality of their teachers.

In addition to the steps taken to improve students' learning experience, we have made efforts to improve students' quality of life on campus by supporting cultural and sports events, encouraging student participation in international competitions, as well as providing additional dormitories and further expanding the student union building. Also, a variety of student activities on campus were supported and encouraged. It is noteworthy that in the national students' surveys of each of the last two years, the Technion has been ranked the leading university in the country with respect to quality



of education and services to students.

Interdisciplinary Research

“The nature of scientific research is changing before our very eyes. Scientists who conduct their research alone, like hermits, in their laboratory, are disappearing. There is a new dialogue between scientists from different fields that I will strengthen.”

In the past, a scientist could carry out research and achieve breakthroughs on his own, but now significant research requires interdisciplinary cooperation. Future achievements in science and engineering will require cooperation between laboratories and researchers from different fields. To achieve significant scientific and engineering breakthroughs, enormous knowledge is now required — knowledge that an individual scientist does not possess. For this reason, the trend towards interdisciplinary research, which began in 2004, with the establishment of the Russell Berrie Nanotechnology Institute, has continued during the last 8 years. Four additional interdisciplinary centers have been established: the Technion Autonomous Systems Program, the Grand Energy Center, the Technion Integrated Cancer Center, and Computer Engineering. In addition, the Center for quantum computing is currently in the preparation stage. To increase the number of faculty members conducting interdisciplinary research, a special search committee headed by Prof Roy Kishony, was appointed to look for faculty members who are involved in interdisciplinary research. The first faculty member recruited by this special committee joined the faculty of Biomedical Engineering last year. We are currently addressing the issue of interdisciplinary education with a series of comprehensive reviews and discussions in the academic developmental committee, the Technion Assembly and in each of the Technion faculty councils. These will lead to recommendations on how to facilitate interdisciplinary education on campus.

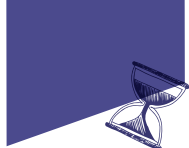
Globalization

“In order to maintain the leading position of the Technion in the world, we must be part of globalization of higher education....I intend to strengthen and expand these activities.”

If the Technion strives to maintain its position as the leading science and technology university in Israel and one of the leading institutes worldwide – and it does – it must become a global university. To accomplish this goal, we have strengthened the Technion International School, providing full degree programs in English to foreign students. We have also increased the number of foreign graduate students and post-doctoral fellows. Currently, undergraduate degree programs are offered by Civil and Environmental Engineering, Chemical Engineering, Biotechnology and Food Engineering, and Mechanical Engineering.

The presence of the Technion in New York and China plays a major role in positioning the Technion as a global university. We opened the Jacobs Technion Cornell Institute (JTICI) together with Cornell University in New York, and soon we will open the Guangdong Technion-Israel Institute of Technology (GTIIT) in China, together with Shantou University. The program in NY is already active and offers two Master's degrees: in Connective Media and in Health Technology, as well as an innovative Postdoctoral program in which Postdoctoral researchers are trained in entrepreneurship. The third Master's degree program, in Urban Life, will be offered next year after moving to the permanent campus on Roosevelt Island. Many praised the successful negotiation with Cornell leading to the establishment of JTICI, and considered it an exemplary outstanding academic collaboration. The establishment of GTIIT is progressing as well. Teaching will commence with three academic programs : Chemical Engineering, Materials Science & Engineering and Biotechnology & Food Engineering - in September 2017. The northern part of campus, designed for 1500 students, will be inaugurated on December 18th, 2017. Currently, we are conducting a worldwide search for faculty members, under the leadership of Prof. Aaron Ciechanover.

It is noteworthy that neither in NY nor in China has the Technion made any financial investment or has taken upon itself any financial commitment.



Technion global efforts have had a major impact on Technion's international visibility and prestige. The list of universities seeking strategic collaboration with the Technion during the past few years alongside the list of high profile guests who visit the Technion are certainly testimony to the fact that we are considered a world class university.

Graduate School

"I intend to continue to expand the Graduate school since the contribution of graduate students to the research at the Technion and after their graduation to the country is invaluable."

The plans to expand the graduate school were only partially successful. Although there was an increase in the number of Doctoral and Master's students from 880 and 2442 in 2009 to 1147 (30%) and 3127 (28%) in 2015/6, the increase was smaller than planned. In 2013, Prof. Hillel Pratt, Dean of the Graduate school at that time, presented to the administration a 10-year program to double the number of Ph.D. students, but unfortunately, due to medical issues, Prof. Pratt had to resign from the Dean's position which delayed the program. Greater success was achieved in attracting Postdoctoral fellows to the Technion. Their number increased from 179 in 2009/10 to 320 in 2015/16 (80%). Particularly impressive is the increase in the number of Postdoctoral fellows from North America and Europe, from 17 in 2008/9 to 64 in 2015/4.

Technology Transfer

"Together with the VP for research, I intend to expand and support Technology transfer of Technion faculty members."

From its establishment Technion encouraged both basic and applied research. In recent years, income from the Technion's Technology Transfer (T3) showed a year to year increase reaching \$35 M last year. The total income from technology transfer during the past years was close to \$200 M, of which more than 50% came from the Azilect Royalties. In 2015, the Technion had 640 active patent families, 70 affiliated companies and 40 commercialization agreements. The companies raised a total of \$200 M. The diverse nature of companies T3 has supported is impressive, including medical devices, energy, regenerative medicine, big data, and virtual reality spin-outs. The lion's share of the Technion's income was the royalties of the anti-Parkinson drug Azilect developed by Professors Moussa Youdim and John Finberg and commercialized by TEVA Pharmaceuticals. To anticipate the expiration of the Azilect patent in 2017, which will result in a decrease in revenues, several steps have been taken to encourage faculty members to be involved in Technology Transfer and to improve its efficiency. First, financial resources were allocated to support "proof of concept" research. Second, a \$10 M fund was established to allow the Technion Research and Development Foundation (TRDF) to protect the value of Technion's equity in its companies from dilution during the second and third round of financing. Third, to widen the pipeline of spinouts from the Technion, and to encourage students and faculty members to engage in technology transfer, we opened DRIVE, the Technion accelerator program. DRIVE offers admitted startups a comprehensive service package including – but not limited to – a mentorship program, beta site support, access to Technion research resources, and seed money. Currently, a subcommittee of the executive committee is examining the proposal to establish a Technion VC fund that will provide further support to Technology Transfer on campus.

Fundraising

"I have no doubts that fundraising will be one of the most important tasks of the President in the next years. Together with the VP for External Relations and Resource Development and relying on my accumulated experience in this area, I will do all I can to raise the funds so critically needed for the Technion's future."

As I often say, fund raising is the lifeline and key to Technion's development. Without the resources raised from Technion supporters, we would not be able to achieve any of the goals I had set at the beginning of my presidency. At the end of 2009, fund raising presented two major challenges: first, in October 2009 we were still under the impact of one of the worst financial crises in modern history,



which had taken place in 2008. Second, the start of my presidency coincided with a change in the leadership of the American Technion Society, which has been our main source of support, responsible for some 75-80% of gifts to the Technion. Together with Prof. Boaz Golany who joined me as VP for External Relations and Resource Development, we managed to reverse the trend and bring fund raising to new heights. During the last 8 years, we have raised over \$616 M, doubling the annual gifts from \$57.6 M in 2009/10 to \$108 M in 2015/6. This major achievement was accomplished by successful fund raising from existing Technion supporters, and most importantly, by expanding the circles of Technion supporters around the world, particularly in the USA and Canada. I should emphasize that the successful change of guards in the American Technion Society leadership in which we took an active role is of no less importance. Furthermore, we leveraged the opportunity of the change of guards to reach a new modus operandi with the ATS that further strengthened the relationship between the Technion and the ATS.

Fundraising allowed us to continue the physical development of the campus. The Emerson building housing the center for Life Sciences and Engineering was completed, the Faculty of Mechanical engineering moved to the modern and impressive Dan Kahn building, the Ullman building, which is the main teaching facility, has been expanded, and the Hadarion, in the Technion campus in Hadar, was rebuilt and became a research hub for the Faculty of Architecture. Students' quality of life on campus has been dramatically improved by adding the communal centers and kindergartens in the Graduate village, and 500 additional beds for undergraduate students. Additional buildings currently in stages of construction or planning include: adding a wing to the visitors' center, new buildings for materials science and engineering and electrical engineering, a new sports hall, a new wing for architecture and more.

Closing Remarks

I concluded my speech in 2009 to the assembly with the following words:

"I see the position of Technion President as the most important mission in my academic life, and I will work with all my might so that the glorious institution of which we are all so proud will develop and thrive." I am grateful to the Technion's Assembly and the Executive Committee for their vote of confidence in me, reelecting me for an additional 2 year term as president. I promise to keep working for the Technion with all my might.

Prof. Peretz Lavie
President





Governance 2017

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Chairman of the Board of Governors

Gideon Frank

Chairman of the Council

Management

Prof. Peretz Lavie

President

Prof. Adam Schwartz

Senior Executive Vice President

Prof. Hagit Attiya

Executive Vice President for Academic Affairs

Prof. Wayne Kaplan

Executive Vice President for Research

Matanyahu Englman

Executive Vice President and Director General

Prof. Boaz Golany

Vice President for External Relations and Resource Development

Deans

Prof. Orit Hazzan

Dean of Undergraduate Studies

Prof. Dan Givoli

Dean of the Jacobs Graduate School

Prof. Benveniste Natan

Dean of Students

Prof. Zeev Gross

Dean of Azrieli Division of Continuing Education and External Studies

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Deputy Vice President for Safety Matters

Prof. Yaacov Mamane

Deputy Director General of Operations

Zehava Laniado

Deputy Director General for Finance

Dganit Shindelman

Deputy Director General for Human Resources

Ariel Hazan



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Prof. Yaakov Cohen

Faculty of Architecture and Town Planning
Prof. Iris Aravot

Faculty of Biology
Prof. Yehuda Assaraf

Faculty of Biomedical Engineering
Prof. Shulamit Levenberg

Faculty of Biotechnology and Food Engineering
Prof. Marcelle Machluf

Wolfson Faculty of Chemical Engineering
Prof. Gideon Grader

Schulich Faculty of Chemistry
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Faculty of Civil and Environmental Engineering
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Prof. Shimon Marom

Faculty of Physics
Prof. Assa Auerbach

Technion Program for Excellence
Prof. Michael Elad

Center for Pre-University Education
Prof. Dan Zilberstein

Guangdong Technion-Israel Institute of Technology

Vice Chancellor
Distinguished Prof. Aaron Ciechanover

Joan and Irwin Jacobs Technion-Cornell Institute
Prof. Ron Brachman

Assistant to the President for Strategic Projects and Head of Technion International
Prof. Paul Feigin



Academic Affairs

Faculty Recruitment

Recruiting and retaining excellent faculty members remain important challenges for the Technion. During the recent Board of Governors meetings, the Executive Vice President for Academic Affairs reported on the efforts to facilitate the recruitment process and to make it possible for the Technion to enlist the best faculty. We have set an ambitious goal of increasing the number of faculty to around 600 by 2020 without compromising on the quality of the new recruits.

The Technion has established several interdisciplinary programs, as well as special programs in nanotechnology, life sciences, autonomous systems and energy programs, which allow an increase in the number of faculty members recruited. This increase is also supported by a long-term policy implemented by the government of Israel, to provide significant additional resources to the Technion, for example, through the *I-Core* framework, supported by P&BC.

During the last academic year, we recruited 29 new faculty; it is likely that we will recruit the same number during the current academic year. We plan to continue recruiting about 25-30 new faculty each year until 2020. Figure 1 summarizes recruitments, retirements and terminations over the ten years leading to 2020.



Figure 1. New appointment vs. retirements and departures (* up to date).



To continue recruitment at this rate, the faculties are using widespread advertising and proactive recruitment. The Technion has participated in six successful career fairs in the Boston area, and has identified several excellent candidates. The Technion has made several post-doctoral fellowships available to excellent candidates, at top institutions such as MIT and University of Toronto, several of whom were already recruited as faculty members.

The massive turnover of faculty members provides an opportunity for the Technion to strengthen its academic standing by recruiting the most brilliant and innovative minds. Excellent academic institutes, both domestic and international, are courting these people, and the Technion is facing tough competition. To attract talented faculty members, the Technion offers substantial start-up packages for equipping a laboratory shortly after the arrival of the new faculty member. New recruits have a reduced teaching and administrative load for the first two years. To ease the transition to a faculty position, the Technion offers generous help with relocation costs for new faculty members and their families, as well as on-campus housing at the *Stanley Shalom Zielony Graduate Student Village* for the first few years. In many cases, the Technion helps to identify employment opportunities for spouses.

Another approach for hiring excellent faculty members is to attract people who already have an academic position elsewhere. This year, we have recruited five senior and mid-career faculty members: **Professor Ezra Tarazi** from Bezalel Academy of Arts and Design Jerusalem and **Associate Professor Aaron Sprecher** from McGill University School of Architecture joined the Faculty of Architecture and Town Planning; **Associate Professor Ari Turner** joined the Faculty of Physics from Johns Hopkins University; **Professor Zeev Ronai** from Sanford Burnham Medical Research Institute and **Professor Eyal Gottlieb** from the University of Glasgow joined the Technion Integrative Cancer Center (TICC) at the Faculty of Medicine.

Fundraising programs like the renowned *Leaders in Science and Technology* program, the *Zuckerman Scholars Program* (for which an agreement was signed last year), and various *Career Advancement Chairs*, support the hiring and integration of excellent faculty members.

These programs offer support, infrastructure and equipment for 8-10 outstanding young faculty members each year. They play an important role in ensuring that this excellent crop of brilliant faculty members choose the Technion over attractive offers from other universities or industry, abroad and in Israel. It took significant efforts on behalf of faculty deans and Technion management, as well as substantial resources, to make this a reality.

The brilliance of our young faculty members is evident from the fact that each year, several of them win various prizes and distinctions. This year, five of our new faculty members won the prestigious Alon Fellowship:

The Leaders in Science and Technology Program and Career Advancement Chairs

The Leaders in Science and Technology Program, initiated and supported by Mr. Henry Taub

Shillman Career Advancement Chair

Chaya Career Advancement Chair

Andro Deloro Career Advancement Chair

Leona Chanin Career Advancement Chair

Shalom Career Advancement Chair

David and Inez Myers Career Development Chair in Life Science

Career Advancement Chair in Economy and Finance

Ravitz Foundation Career Advancement Chair

Jacques Lewiner Career Advancement Chair

Women's Division Career Advancement Chair

Jack Klein Career Advancement Chair in Cancer Research

The Young Investigators Fund for Innovative Collaborative Multidisciplinary Biomedical Research



Assistant Prof. Yuval Filmus from the Faculty of Computer Science, received his PhD at University of Toronto. He came to the Technion after being a member at the Institute for Advanced Study at Princeton. The main research interests of Dr. Filmus include combinatorics, computational complexity, and analysis of Boolean functions. He has also worked in social choice theory and approximation algorithms. Dr. Filmus is also a major contributor to the stack exchange online network.



Assistant Prof. Tzipi Horowitz Kraus from the Faculty of [Education in Science and Technology](#), obtained a PhD in the study of learning disabilities from the Edmond J Safra Brain Center at the University of Haifa (2009). She conducted post-doctoral research at the University of Haifa and then joined the Pediatric Neuroimaging Research Consortium at Cincinnati Children's Research Foundation to continue post-doctoral research. Her research focuses on the characteristics of neural circuits underlying language and reading acquisition in children with language and reading difficulties, due to a neurobiological source and to environmental deficits.

She is also working on tailoring treatments for each of these disorders as well as on prevention of the linguistic and reading difficulty.



Assistant Prof. Meir Reshef from the Faculty of Industrial Engineering and Management obtained a PhD in computer science from the Hebrew University of Jerusalem in 2013. His PhD received several awards, including the Schlomiuk Prize (Hebrew University), an honorable mention for Victor Lesser Distinguished Dissertation Award (IFAAMAS), and the Michael B. Maschler Prize to an outstanding research student (Game Theory Society). During 2013-2015, he was a Rothschild Post-doctoral fellow at the Center for Research on Computation

and Society, Harvard University. His research spans computation game theory, mechanism design, and behavioral game theory. Specifically, he is interested in studying the rationality assumptions at the base of economic and game-theoretic models, analyzing strategic behavior of rational and bounded-rational agents, and designing algorithms and mechanisms that increase cooperation among strategic agents.



Assistant Prof. Tomer Michaeli from the Faculty of Electrical Engineering obtained a PhD in electrical engineering from the Technion in 2012. He conducted post-doctoral research at the Weizmann Institute in Computer Science and Applied Math Faculty (2012-2015). Dr. Michaeli's research interests are signal and image processing, computer vision, and machine learning. In particular, signal recovery problems (such as noise removal, blur removal, super-resolution), statistical signal processing and learning signal representations.



Assistant Prof. Yonatan Savir from the Faculty of Medicine received his PhD in physics, Dept. of Physics of Complex Systems at the Weizmann Institute in 2011. Dr. Savir was a HFSP Post-doctoral fellow at the Dept. of Systems Biology, Harvard Medical School. His research focuses on biological systems. One of the major determinants of the fitness of biological systems is their ability to integrate multiple cues from the environment and coordinate their metabolism and regulatory networks accordingly. His goal is to study, both experimentally and theoretically, the signal processing that links nutrient sensing, uptake, growth rate

and understating its system level failure in disease and in aged cells.

Three additional young faculty earned the prestigious Azrieli Fellowship, awarded to outstanding young scientists, who seek faculty positions at Israeli universities:

Assistant Prof. Michael Khanevsky from the Faculty of Mathematics, received his PhD in Mathematics from Tel-Aviv University in 2012. He was a Dickson Instructor at the University of Chicago with Simons postdoctoral fellowship and a Postdoctoral fellow at the Université Libre de Bruxelles. He works in symplectic geometry and its interactions with geometric group theory, and dynamical systems. In particular, he is interested in the geometry of the group of Hamiltonian deformations.



Assistant Prof. Tamar Segal-Peretz from the Faculty of Chemical Engineering obtained a PhD from the multidisciplinary program for Nanoscience & Nanotechnology at the Technion in 2013. She conducted post-doctoral research at the Institute for Molecular Engineering, Materials Science Division, Argonne National Laboratory and the University of Chicago. Her research is focused on polymer-based functional nanostructures together with advanced imaging techniques for nanostructure characterization. This includes self-assembly process of Block copolymers and their use in nanofabrication and membrane applications, 3-dimensional characterization with transmission electron microscopy tomography, and the growth of inorganic materials inside polymer films.



Assistant Prof. Noam Kaplan from the Faculty of Medicine obtained a PhD in Computational Biology from Weizmann Institute of Science in 2011. He was a Postdoctoral fellow at the University of Massachusetts Medical School (2012-2016). The nucleus of each cell in our bodies contains about 2 meters of DNA, which constitute the operating instructions of the cell. The spatial organization of the genome is not random and, in fact, is closely related to its functional state in both natural processes (e.g., gene activation) and in diseases (such as cancer). Dr. Kaplan focuses on combining high-throughput genomic experiments with advanced computational models, in order to decipher how the genome encodes its spatial organization and how this organization mediates genome functions.

For the first time, this year, three of our young faculty, won the prestigious national Krill Prize from the Wolf Foundation, awarded to ten pre-tenure faculty members each year, for excellence in scientific research:



Assistant Prof. Asya Rolls from the Faculty of Medicine obtained a PhD in Life Sciences from Weizmann Institute of Science in 2007. She joined the Technion in 2013 after postdoctoral training at Stanford University, for which she was awarded the highly competitive Rothschild Fellowship, a Fulbright postdoctoral fellowship, a long-term EMBO fellowship, and the Clore Postdoctoral Award Program for Advancing Women in Science. At the Rappaport Medical School, she has introduced a new research field, studying how the brain can control immunity. Her work identified a neuronal mechanism that can explain the placebo effect.



Assistant Prof. Carmel Rotschild from the Faculty of Mechanical Engineering, obtained a PhD in Physics in 2008, and joined the Technion in 2011 after a post-doc at MIT. His research focuses on new thermodynamic ideas for solar energy, extreme optical frequency up-conversion and for solar powered laser and on chip high-Q lasers.



Assistant Prof. Avi Schroeder from the Faculty of Chemical Engineering, obtained a PhD in chemical engineering from Ben-Gurion University in 2009, and joined the Technion in 2012 after a post-doc at the Koch Institute for Integrative Cancer Research at MIT. His ultimate goal is to help patients recover from metastatic cancer, by tailoring a personalized treatment to each patient. He develops nanotechnologies that target the diseased tissue, where they perform a programmed therapeutic task, including repairing genetic errors and retrieving patient-specific information from the disease site.

On a final note, to advance the cutting-edge research at the Technion, we significantly increased the number and the academic quality of foreign scientists who come to the Technion for postdoctoral training. Indeed, the number of non-Israeli post-docs has almost quadrupled since 2008/9, and there is a marked increase in their academic excellence. We plan to continue on this path in order to reach 500 foreign post docs in 2020.

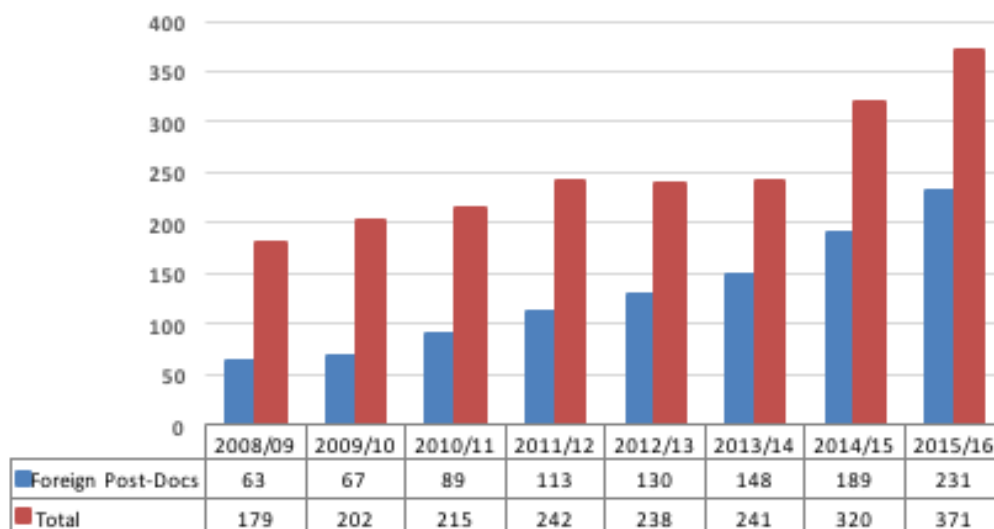


Figure 2. Number of post-doctoral researchers 2008-2016.



New faculty members orientation day held in December 2016

Department of Humanities and Arts

The enrichment courses program run by the Department is proving a great success. Students are required to choose at least three courses (6 credit points) from a rich and varied list of courses during their undergraduate degrees. The program, now in its fifth year, is well received by students and teachers alike, and the cooperation between the Technion and Haifa University is a proven success. The Council of Higher Education, in its third round of calls for proposals on promoting enrichment programs, has endorsed the Technion program as the ideal mode of cooperation.

The Technion and Haifa University are working to develop a further set of courses for the enrichment program. This year alone, 25 courses are being taught by scholars from the University of Haifa and each semester over 50 courses are taught by Technion adjunct lecturers. During the past year more than 5,000 undergraduate students studied in these enrichment courses each semester.



Every semester the Department offers courses in drawing and art, photography, jazz, orchestra, choir and sports, as well as the wide variety of enrichment courses. The high demand results in more than 7,000 students taking courses in the department per semester.

Bringing talented lecturers to teach new courses, and gradually expanding the range of subjects on offer, the department has recently introduced subjects such as the Philosophy of Science and Technology.

The department is proud of its renewed cooperation with the Italian Embassy in Israel and the Italian Institute of Culture in Haifa. Italian language courses are now available to Technion students every semester at beginner and intermediate levels.

An equally successful collaboration began this year with the Haifa Symphony Orchestra. The conductor Dr. Roy Oppenheim teaches a music course to undergraduate students and as part of the course requirements students attend Haifa Symphony Orchestra performances. A generous donation was made to the music section of the Department, benefiting the Technion student Orchestra and Jazz band.

International Review Committees

This year two types of International Review Committees provided evaluations of Technion Faculties and programs; two were initiated by the Technion (Faculties of Mathematics and Mechanical Engineering), and two programs by the Council for Higher Education (CHE).

Faculty of Mathematics

The Committee, headed by Prof. C. Kassel (CNRS and University of Strasbourg), convened in May 2016. The report states that "The Faculty of Mathematics at the Technion represents first and foremost a very strong research unit, with nationally and internationally competitive researchers in both fundamental and applied areas of mathematics." The following points were discussed in the report: recruiting, integrating and retaining faculty; elevating core strength in applied mathematics; strengthening graduate and undergraduate programs; outreach, infrastructure and resource issues; leadership and staff support.

Faculty of Mechanical Engineering

The Committee, headed by Prof. R. McMeeking (UC Santa Barbara) convened in June 2016. The report is positive overall. Suggestions were made to help fine tune the demanding undergraduate program. Research is at a very high level, with potential room for improvement. The report encourages junior faculty to cooperate with senior colleagues and foster collaboration with other departments. The report mentions Biomedical Engineering as a discipline with which tighter collaboration would be beneficial.

Biomedical Engineering Study Program

This CHE Review Committee convened in November 2016 under the leadership of Prof. R. Ethier of Georgia Tech. The report gives a positive review of the Faculty of Biomedical Engineering, its faculty and students, praising the students in the combined BSc/MD program. Faculty expansion is recommended, together with the formulation of a strategic plan, and increased interaction with the Faculty of Medicine.

Medical Laboratory Sciences Study Program

This CHE review Committee convened in June 2016 under the leadership of Prof. A. Roitberg-Tambur of Northwestern University. The committee feels that the Technion leadership is not certain whether there is a need for the medical laboratory sciences program in their institution. The report notes a high dropout rate together with the program's high demands, and limited interest and support from the Faculty of Medicine. The Technion is encouraged to reevaluate the program and clearly define its target audience, namely laboratory technologists or research staff.

Equal Opportunities for Minorities

Minority Students in the Unit for Pre-academic Studies

Minority students in all Pre-Preparatory and Preparatory (Mechina) courses are accepted based on their academic credits (5, 4 or 3 mathematic units). To date, 90 minority students study in all Mechina courses. Some completed army service others only high-school. About half these students enrolled through special programs such as Atidim to Industry and Hessegim to High-tech. Students with weak Hebrew and English skills are offered additional language courses.

Equal Opportunities for Arab Students

The intervention project for promotion of minorities in the academic and social spheres at Technion has been top priority in recent years. The Assistant to the Senior Vice President for Promotion of Minorities at Technion continues to develop and advance intervention programs for these students. The major aim of this program in 2016 was to reduce dropout rates among minority students, to enhance academic excellence, and to promote a pilot project of diversity and coexistence on campus. A major focus of the current program is to increase the number and quality of minority students in graduate studies. With public organizations, the P&BC and Technion invested huge efforts and resources to promote employment among minority undergraduates.

Ultra-orthodox (Haredi) Students

■ Pre-preparatory and Preparatory Programs for Haredim

The students in these programs must be "Haredim" according to the definition of the Ministry of Education. The programs are marketed by the Pre-academic Unit's staff in cooperation with an external representative who is familiar with the various ultra-orthodox frameworks. The male students undergo a four months pre-preparatory program. After these four months, the eligible candidates are accepted into the 10 month Preparatory program run by the Unit for Pre-academic Studies. The weaker candidates are referred to the preparatory program of the School of Practical Engineering on the Technion campus. On the Technion campus there are currently about 46 male students enrolled in these programs. The program for female students is undergoing reassessment. At the Bnei Brak College for religious students there are about 18 male students enrolled in similar programs.

■ Undergraduate Studies

Students who successfully complete the Preparatory course in Bnei Brak are accepted to continue their studies in the geo-information study program in the Civil Engineering Faculty. There are currently 22 such students in their second year of the program, and another 11 students in their first year.

Students who complete the Preparatory course at the Technion's Pre-academic Unit with sufficiently high grades are accepted in various faculties at the Technion. Those students who complete the program with lower grades are accepted to the School of Practical Engineering on the Technion campus.



There are currently 13 male students in their third year of academic studies, 10 male students and two female students in their second year of academic studies, and 12 male students and four female students in their first year of academic studies. These students are spread over seven different faculties, including medicine.



Ultra orthodox Geodesics students in the Faculty of Civil and Environmental Engineering

Course name		Begin	Ends	Beginners	Graduates
Ultra-orthodox on Technion campus	3rd period	03/2015	08/2016	25	17
Ultra-orthodox in Bnei Brak	3 rd period	02/2015	07/2016	22	17
Female ultra-orthodox	2 nd period	11/2015	09/ 2016	13	8
Ultra-orthodox on Technion campus	4 th period	03/2016	072017	14*	12*
Ultra-orthodox in Bnei Brak	Fourth course	03/2016	07/2017	21*	18*
Pre-prepatory, Ultra-orthodox on Technion campus	Fifth course	02/2017	08/2018	33*	

*currents statistics

These programs are supported by Technion and non-profits KEMAH and the Canadian Friends.

Mabatim Programs: High School STEM Leadership

Since 2011, in an unprecedented move to train a new and talented cohort of science, technology, engineering, and mathematics (STEM) teachers, the Faculty of Education in Science and Technology offers the **Views I** (Mabatim I) program. Starting in 2016, Technion graduates have two options. Those who wish to obtain the **Views I** postgraduate STEM teaching certificate enroll for a two-year tuition-free program. Excellent students can elect to enroll in the **Views II** program, in which they get an MSc degree in addition to the STEM teaching certificate.

The demand for the **Views** programs continues to be high in its fifth year with about 300 Technion graduates enrolled this year. About 150 students have already graduated, and many of them are employed as science, mathematics, and technology educators in Israeli junior-high and high-



schools. The Faculty of Education in Science and Technology sees Mabatim as its flagship program and encourages these outstanding teachers to undertake leadership roles in the education system and draw from their experience in the high-tech industry, the Israel Defense Forces, and research institutions.

Medical Studies

The second year science program has started with 108 new students together with 87 new medical students. The third year program of the new curriculum has started.

In the new curriculum, courses have been modified to emphasize areas of exact sciences and syllabi have been updated. The content of the new program provides a unique medical program that intends to educate a new generation of physicians with a broad knowledge and understanding of modern technology and basic sciences. Ultimately, students in this program will acquire high motivation for carrying out research and an ability to face the challenges posed by the modern medical and research disciplines.

Center for the Promotion of Learning and Teaching

The mission of the Center for the Promotion of Learning and Teaching is to support the Technion's commitment to excellence in teaching and learning, to promote a cultural shift to student centered learning, and to encourage and support pedagogical and technological innovation to improve instruction and to advance student learning.

Learning and teaching activities: The Center provides workshops for new staff (~20/year) and new TA's (~250/year), individual consultation following class observation for all new TA's and for staff who score lower than 3.5 on their teaching survey, and workshops for expert TA's (6 /year) to increase the involvement of students in class. Helping faculty members to conduct educational research in their disciplines focused this year on "flipped classroom" and "peer assessment." Teaching surveys conducted each semester gauge the level of student satisfaction re teaching and assessment.

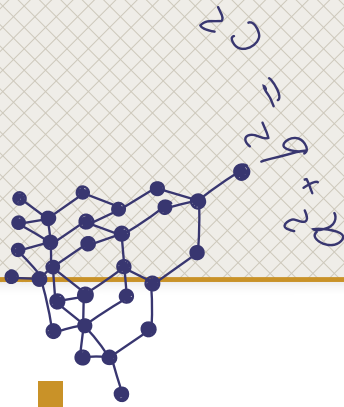
Evaluation and exam center: The Center's main goal is to implement Learning Outcomes Assessment approach (formative assessment) focusing on large core courses and first year service courses. The center promotes the use of alternative assessment by providing help to design and implement rubrics for the evaluation of studio projects lab performance and the use of peer assessment in large courses. The center is using new technology for exam scrambling, exam grading and statistical analysis of exam results.

Educational Technology Support: The Center provides assistance to support the design and the management of Moodle websites for 4,000 courses. New Moodle features were implemented to improve teaching and learning experience. A new Moodle training website was designed to guide teaching staff. Active learning and peer instruction continues with clickers (~20 – 25 courses/year) and mobile devices. The Center is also responsible for the production of video lessons for regular courses (~20/year) and for Coursera and edX. Two instructional videos were made for Lab courses for the Medical Faculty and for the Faculty of Biotechnology and Food Engineering.

Educational Innovations: The center continues to offer pedagogical and technological support for the development and integration of online and hybrid courses for Technion undergraduate courses as well as for the development of MOOCs (~6 courses per year) for Coursera and edX.



Mentor Program: The mentor program has been running successfully in 13 faculties: Aerospace Engineering, Biomedical Engineering, Biotechnology, Biology, Chemistry, Chemical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Industrial Engineering, Mathematics, Physics, and Mechanical Engineering. The effort, which involved more than 200 student mentors, provided assistance in the form of campus information, study tips and a shoulder to lean to more than 1,000 freshmen. This successful program will be expanded next year to every faculty.



Undergraduate Studies

This year we continued efforts to implement the recommendations of the Committee for Review of Undergraduate Program Structure and Study Load, in order to impact positively the undergraduate learning experience at the Technion and increase the quality of learning.

- This is the third year in which the academic semesters have been shortened by a week, to 13 weeks of studies, with suitable adjustment to the syllabi of most courses. This allows both examination cycles of the winter semester to be carried out between the semesters, and to minimize disruption to the studies in the spring semester. Most academic and administrative issues related to streamlining the teaching and examination periods were tackled; future adjustments are considered.
- To increase our understanding of student feeling about study load, we started to examine student employment in the high-tech industry and its influence on their academic achievements and study load.



Class of 2016



- We continue implementing the recommended measures aimed at improving the preparedness of incoming students in mathematics and the science subjects. Preparatory internet-based courses were made available, as well as in-class sessions. Preliminary evaluation of this process is underway.
- At the faculty level, a comprehensive survey is being conducted to track the implementation of the complete set of recommendations of the report.

Exams:

- All new faculty members teaching for the first time, were invited by the Evaluation Center of the Center for Promotion of Learning and Teaching to prepare the exams with personal guidance. All responded positively.
- All grades are reported online to minimize errors and to increase data assurance. To keep a steady grade scheme, the online report tool – Upgrade – provides the instructors data about student achievements in previous semesters for each course they teach.



Irwin and Joan Jacobs Graduate School

New Study Programs and Specializations

A new specialization in behavioral economics, as part of the MSc program in economics (in cooperation with Haifa University) was approved by the Standing Committee for Academic Studies, as well as some significant revisions in the MSc program of Operation Research and Systems Analysis, with a change in its title to Operations Research and Optimization.

New specializations in the non-thesis master's program of Industrial Engineering and Management are in the process of being approved by the Standing Committee for Academic Studies, and so is the new PhD program in Landscape Architecture.

Cooperation with Universities and Institutes Abroad

We currently have eight dual PhD agreements with first class universities abroad. During the last year, some new elite European and Far East universities have requested to constitute a dual PhD program. All requests are examined in depth, both legally and academically.

An agreement between the Max Delbrück Center for Molecular Medicine in the Helmholtz Association, Germany, and the Technion Graduate School was signed with the main purpose of recruiting and funding Israeli and German students in the field of Cell Signaling and Gene Regulation (SignGene).



Irwin and Joan Jacobs Graduate School, PhD Ceremony 2016



Teaching Graduate Courses in English

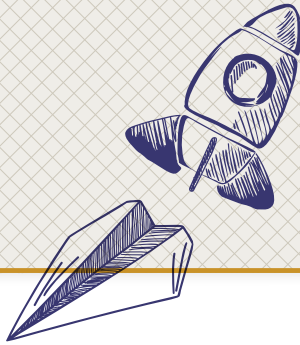
Last year, the Faculties of Medicine and Biomedical Engineering agreed to teach graduate courses in English, joining the nine other faculties which already teach all their classes in English for the benefit of the international students.

Efficiency and Improvement of Student Services

The Graduate School continues its efforts to streamline and improve its procedures. As of last year all procedures related to thesis presentation and graduation confirmation are conducted online.. Starting this year, all scholarship documents are sent out in English on request.

Admissions

Semester	Master with thesis	Master without thesis	Doctor (PhD)	Non-degree	Total
Fall 2015	294	479	135	6	914
Spring 2016	162	124	136	7	429
Fall 2016	318	472	129	3	922
Spring 2017	134	110	11	2	257



Tech nion International and Strategic Projects

Guangdong Technion-Israel Institute of Technology

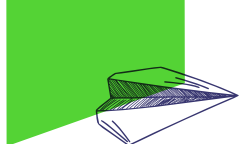
In December 2016 the Ministry of Education (MOE) of the PRC granted GTIIT permission to commence operations and recruit students for the 2017-2018 academic year. Since that important announcement, the Technion team as well as the local GTIIT team have been working intensively to prepare for the beginning of studies.



GTIIT

Recruiting Faculty

Nobel Laureate Aaron Ciechanover, serving as Vice Chancellor of GTIIT, leads the group of Technion professors and professors emeriti who are responsible for recruiting academic faculty to GTIIT – ensuring that it is positioned as world-class research university. Senate approval has been obtained for the addendum to Technion's academic regulations, which defines how faculty for GTIIT will be appointed, promoted and granted tenure. Several candidates are in advanced stages of



appointment, of whom several will hold senior professorial appointments. Note that the model we employ distinguishes between the academic appointment (according to Technion criteria) and the employment contract (which will be issued by GTIIT).

The first year of classes will be taught mainly by Technion faculty, emeriti and adjuncts. Some of them have taught Chinese student classes recruited to the Technion in the last two years. All have attended a workshop in preparation for their teaching in China on understanding cultural differences, overcoming the language gap, effective teaching of non-native English speakers in English, and using technology in the modern classroom for enhanced learning.

We continue to offer postdoctoral fellowships to recent PhD graduates from top schools in the West, who show high potential as future candidates for tenure track positions in the new institute. Several have delivered seminars and one has already been offered a position in GTIIT starting Fall 2017.

As well as academic aspects of recruiting international faculty, attention has been paid to welfare issues such as housing, health insurance and campus emergency health care, education for international families, taxation regulations, as well as employment options for spouses. An information website has been launched for potential faculty.

Proposed Programs and Preparations

The Guangdong Technion campus will initially offer three Technion engineering degree programs to be taught in English – Chemical Engineering, Materials Engineering, and Biotechnology and Food Engineering.

As well as the Chemical Engineering cohort of Chinese students which started at Technion in the Fall of 2015, in 2016 we also recruited another cohort of Chinese students to two programs – one in Chemical Engineering and one in Biotechnology and Food Engineering. This cohort will also study in Haifa for 4 years. As a result, we will have the relevant materials translated and tested for two out of the three programs to be launched in GTIIT in August 2017.

A major effort is planning the teaching laboratories and training the support staff and lab supervisors. We have hired research staff and visiting scientists who will help equip these laboratories based on Technion specifications, and train the permanent staff.

Construction of the Guangdong Campus

Under the diligent stewardship of Dr. Moshe Marom – the Pro Vice Chancellor (PVC) and Director General of GTIIT – the campus construction is being carried out in line with Technion requirements and local regulations. The dormitories and faculty housing will be completed by June 2017, including interior design, and ready for occupation by August 1, 2017. The teaching and administration areas will be ready by the end of July. The research laboratories will be fitted and equipped towards the year's end. Teaching laboratories must be operational by September 2018.

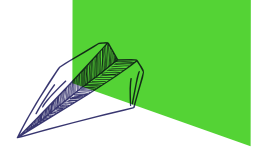
The official inauguration of the GTIIT campus is planned for December 2017.

A conceptual plan of the South Campus, also designed by Architect He and five times the size of the North Campus, has been approved. It is located some 700 meters south of the current campus under construction. The overall design of the GTIIT campuses is based on the goal of reaching 5,000 students and 300 academic faculty within 20 years, as well as providing co-location facilities for start-up companies and R&D centers of larger companies.

Administration

The Board of GTIIT consists of 4 directors from the Technion (President Lavie, Vice President Englman, Assistant to the President Feigin, Prof. Shmueli) and 4 from China (Chancellor Li Jiange, Provost Gu Peihua and Vice President Lin from STU, Ms Wang Yun, formerly a Shantou City councilor). The Board met in June and December 2016 and will meet next in July 2017.

Prof. Ciechanover established the Guangdong Technion Project Management Committee, led



by himself as Chair, Pro Vice Chancellors Prof. Eliezer Shalev and Dr Moshe Marom, Dean of Engineering Prof. Moshe Sheintuch, Dean of Science Prof. Noam Soker, Program Coordinators Profs. Moshe Eizenberg and Sima Yaron, and Technion management representative Prof. Paul Feigin. This committee meets regularly, focusing on planning and implementing procedures for the recruitment of faculty and staff for GTIIT, but also dealing with matters related to establishing a new university.

Project Manager of the Guangdong Technion Project, Ronit Lis Hacohen, has been managing the operations of the project in Haifa and organizing support staff for various aspects of the project.

More recently, after a meeting in early March in Shantou of the Chancellor, the Vice Chancellor and the three Pro Vice Chancellors, it was decided to hold regular biweekly GTIIT PVC's meetings.

Marketing Guangdong Technion and Student Recruitment

Over the past seven years, Technion International staff have been actively marketing Technion's international programs in China, and have promoted the Technion brand name in China. Technion International's marketing department and PARD, together with GTIIT's Student Recruiting and PR Departments, are developing GTIIT's branding to reflect both the Technion's reputation and the novelty of the Guangdong campus. Style guidelines and content for all media, focusing mainly on student recruitment, were implemented in April. The focus this year is on recruiting the first cohort of students which will climax towards the end of June when Chinese students receive their scores in the GaoKao college entrance examinations and apply to universities.

Student recruitment and admissions in China are based on allocating seats to selected provinces as well as to international students. Half of the 300 seats will be allocated to Guangdong Province candidates, 30% will be allocated to other selected provinces, and the remaining will be allocated to international students. The policy for offering merit and needs-based scholarships has been determined. These are designed to help worthy students attend GTIIT despite the relatively high tuition (set at 95,000 RMB per year).

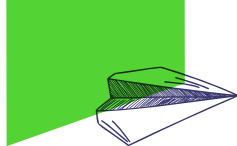
The value proposition for studying in Guangdong Technion includes: studying in English; obtaining a prestigious Technion degree in China; an opportunity to spend a semester at Technion; learning from top researchers from Israel and all over the world; opportunities for graduate studies in elite programs, including Technion; obtaining an internationally acclaimed degree attractive to the global market; studying programs with emphasis on topics of great relevance to China including environmental engineering, energy and materials, and biotechnology and food engineering; education on innovation and entrepreneurship as they are taught at Technion.

Jacobs Technion-Cornell Institute

In 2010 Michael Bloomberg, Mayor of the City New York, launched a competition for a new applied science and engineering campus in the city. Cornell University and Technion won the competition together, and in late 2011 announced the establishment of Cornell Tech – a new graduate school intent on developing pioneering leaders and technologies for the digital age. The Joan and Irwin Jacobs Technion-Cornell Institute (Jacobs Institute), created in 2013, is a cornerstone of Cornell Tech. Cornell Tech will move to its new campus on Roosevelt Island in July 2017.

As a partnership of two world-class academic institutions, the Jacobs Institute places excellence in research and education at the top of its priorities. It participates in Cornell Tech's overall mission of creating pioneering high-tech leaders, with significant attention to external engagement of faculty and equipping its graduates for top jobs in industry. The Jacobs Institute constitutes a third of Cornell Tech in various metrics, including number of faculty members, students and budget.

The Jacobs Institute is charged with pushing back the emerging frontiers of the digital age via out-of-the-box programs and bringing a global perspective to the campus as a whole. Jacobs approach is empowered by the Technion-Cornell partnership and by its special legal status as a separate non-profit. These enable the Institute to push beyond the traditional comfort zone of academia. The global



Future home of Jacobs Institute

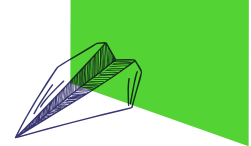
perspective includes building comprehensive collaborative relations between Technion and Cornell. The Jacobs Institute leads the way for Cornell Tech in its emphasis on transdisciplinary research, research and educational engagement with critical application domains, and efforts that create value for the common good.

The Jacobs Institute currently has four regular faculty members, one fellow on a three-year rotational visit from Cornell, and a director, who is also a faculty member. Currently in the middle of a recruitment season for additional faculty members, the Jacobs Institute will recruit about two new faculty members each year as per the founding agreement.

This year the Jacobs Institute offered two concentrations within its Master of Science in Information Systems degree program: Connective Media and Health Tech. The Jacobs MS program is a two-year, dual degree program: students are both Technion and Cornell students and receive degrees from both institutions. The first cohort of Connective Media students consisted of a dozen students and graduated in May 2016. The second cohort of 21 Connective Media students and the first cohort of half a dozen Health Tech students are now completing their second year of studies and will graduate in May 2017. The third cohort is about the same size as the second. Recruiting students for both programs is underway for the academic year 2017-2018; and applications are up.

As part of their education, most Jacobs masters degree students spend two weeks in Israel during their second year, combining education, hands-on projects, and a general introduction to Israel. This past January the students spent six days at the Technion working on a variety of projects, including a three-day “makeathon” to build solutions for the disabled. They participated in activities with Technion students and heard lectures from faculty. They participated in a sightseeing and educational tour of Jerusalem, Masada, and the Dead Sea area together with 45 MBA students from Cornell Tech.

The Runway Startup Postdoc Program is a unique program allowing for aspiring entrepreneurs with a PhD. This “translational tech” program is a unique combination of an academic postdoctoral experience and a startup company incubator. Now recruiting for the fifth Runway cohort, the first cohort, which started in January 2014, produced two companies that have raised considerable funding (one founder is a Technion PhD), and both have launched deep-technology, high-impact products. Additional companies of later cohorts are also showing signs of potential success. This program continues to evolve, innovate, and push out of the comfort zone of academia, in line with the Jacobs Institute vision. Runway companies now have over 60 employees and have raised total funding in eight digits (US\$).



The tenure of former director, Prof. Adam Schwartz, from Technion, ended in October, 2016. In accordance with the founding agreement, the next director was nominated by Cornell, and approved by both Cornell and Technion. The new director, Ronald Brachman, held leadership positions in Bell Labs, AT&T Labs, DARPA and Yahoo Labs. As part of this rotation, Schwartz is now the Chair of the Jacobs Institute Board of Directors



2017 graduates of the Jacobs Institute in NYC

Governance and management

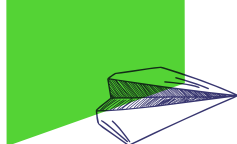
The Jacobs Board of Directors, consisting of four senior members from Cornell and four from Technion, meets regularly. The new Finance and Audit Subcommittee provides professional support. The Steering Committee follows the institute's progress and provides advice on strategy. The academic and administrative processes are constantly being streamlined to support the mission of the Jacobs Institute, a unique entity in the academic world.

Development

The next stage is dependent on the ability to recruit faculty members who will create, launch and run new academic programs. Working to develop resources to support the necessary growth includes the following:

- Tuition, mostly from Masters program, which is becoming a large fraction of the resources;
- Philanthropy (Cornell and the American Technion Society)
- Grants, which typically provide a substantial part of the resources in the US
- Commercialization through the Runway Companies, in its infancy with small growth in value although no direct revenue yet

An academic startup, the Jacobs Institute is establishing itself as a unique academic entity, developing rapidly, and growing in size, and is scaling up and stabilizing some of its activities, keeping in mind its role as the drivers of change for Cornell Tech, Technion, and Cornell.



Technion International (TI)

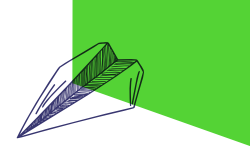
Technion International is responsible for the development, management and marketing of programs involving studies and visits of international students in the Technion. TI was led by Prof. Anat Rafaeli until March 31, 2017, after which Prof. Paul Feigin took on these responsibilities. TI promotes the multicultural and global nature of Technion, and also manages the Technion student exchange program, allowing Technion students to spend a semester or a year abroad, and inviting international students to spend a semester or a year at Technion. In addition, TI oversees academic agreements between Technion and international universities, as well as Technion membership in multi-university and multi-country umbrella organizations. In 2016/17 Technion maintained academic collaboration agreements with 152 universities in 41 countries and 13 medical school agreements. Technion maintained membership in umbrella organizations including CLUSTER (Consortium of Leading Universities of Science and Technology), GE3 (Global Engineering Educational Exchange), CMU (Community of Mediterranean Universities) and IAU (International Association of Universities). In the past two years, TI has been instrumental in the development of the Guangdong Technion program, and will continue to play a key role in its future.

The English language program in Civil Engineering is in its eighth year, with a current enrollment of 98 students. This program served as the foundation for two parallel programs for Chinese students opened in August 2015 and 2016 as part of the Guangdong Technion project – a program in Chemical Engineering, with current enrollment of 34 students and a program in Biotechnology and Food Engineering with current enrollment of 12 students. TI opened another full undergraduate program in English in Mechanical Engineering with current enrollment of 34 students. In October 2016, 10 students with adequate Hebrew language skills transferred from TI undergraduate programs to one

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of the regular Hebrew language programs.

In 2015/16 (the last academic year for which complete data is available), Technion hosted a total of 676 international students. This includes 178 students in full-time TI undergraduate programs; 152 students in one of the full-time graduate programs; 62 study-abroad students; and 93 visiting research students. In addition, 191 students participated in one of the TI's summer programs - 170 international students (mainly from China and India) participated in the Summer School of Engineering and Science, and 21 international students visited Technion for a Summer in Entrepreneurship and Innovation.



Two spring semester programs are managed by TI, one allows French students to spend a semester studying at Technion (PREPA, sponsored by UJA); a second allows MIT students to spend a semester conducting research in one of the Technion labs (MISTI, sponsored by Technion donors). During 2015/16 we hosted 28 PREPA students and 5 MISTI students.

TI also provides (non-academic) support to postdoctoral fellows, their families, and their hosting Technion faculty members, and to international graduate students. This support is coordinated with the Vice President for Academic Affairs and the Irwin and Joan Jacobs Graduate School who are responsible for the academic appointments and graduate student admissions, respectively.

In recent years, TI has participated in several multi-university programs sponsored by the Israeli Government. TI has hosted over 450 students from China and India, with funding provided by the Planning and Budgeting Committee (PBC) of the Israel Council for Higher Education (CHE). In addition, TI has supported various academic programs sponsored by the European Union such as the EMAIL III Erasmus Mundus Program, which provided funding for student and researcher mobility. In the 2016/17 academic year, Technion applied to 17 Erasmus Plus mobility agreements and 3 Capacity Building projects.

The Technion outgoing student-exchange program allows excellent undergraduate Technion students to spend a semester studying abroad. In 2016/17, 60 Technion students spent a semester in one of our partner universities in Europe, North America, South America, Australia, and Asia. In addition 80 Technion students participated in the IAESTE summer internship program, which allows students to spend a summer working in another country in their field of study.

In 2016, TI developed a new service to international affiliates comprising study tours for groups of students from a specific university who visit the Technion for a short period (five to 21 days). Over 50 students have already visited Technion in such tours in 2016/17, from 4 institutions, and TI looks forward to approximately 80 students who will visit Technion in the next few months.

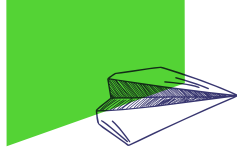
An initiative sponsored by the generous support of the Neubauer family allows TI to promote Technion as a location for study abroad for US students. Through the Neubauer American Study Abroad Semester program, TI increased the number of courses available at Technion in English. In the 2016/17 spring semester and summer 2017 Technion will offer courses in English in Engineering, Sciences, Medicine, and Entrepreneurship, together with an internship opportunity at one of the Technion labs, or in a local start-up company. A total of 50 students from US universities are expected to visit Technion in the spring semester and summer of 2017. As a result of the Neubauer program, TI has become known in leading universities in the USA, including Yale, Johns Hopkins, Brandeis, Tufts, Cornell, Columbia, and the University of Florida.

MOOCs (Massive Online Open Courses)

The development of MOOCs and MOOC-style courses has become a strategic initiative of the Technion and falls into line with the recent coalition between “Digital Israel”, the EdX platform and the Council of Higher Education and its Planning and Budgeting Committee.

During the last year, we have focused on the following MOOCs that are at different stages of development:

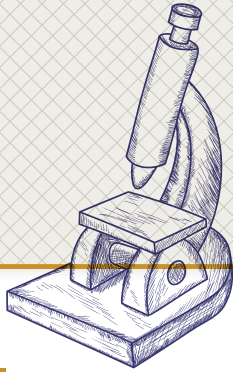
- **Medical Marijuana for Pain Control - Prof. Elon Eisenberg**, Faculty of Medicine in cooperation with **Prof. David Meiri**, Faculty of Biology. A 3D “nerve model” will be incorporated in this MOOC.
- **Sparse and Redundant Representations and their Applications in Signal and Image Processing - Prof. Michael Elad**, Faculty of Computer Science. This MOOC is being developed as part of the “Digital Israel” initiative.
- **New Product Development - Develop Your Own New Product, Prof. Avy Shtub**, Faculty of Industrial Engineering and Management. This MOOC will allow the learner to experience “hands on” the process of developing a new product by using a simulator that will be integrated into the MOOC.



- **Traditional Herbal Medicine for Cancer Care: A Practical Approach to Tailor Patient Treatment**, *Prof. Eran Ben Arie*, Faculty of Medicine. This MOOC will include filming professional workshops and interviews with international experts from around the world.
- **New Horizons in Reproduction** – *Prof. Eliezer Shalev and Dr Rawan Damouni*, Faculty of Medicine. This MOOC will be offered in English and in Arabic.

Up and running MOOCs.

- **Nanotechnology and Nanosensors - Part 1 + Part 2**, *Prof. Hossam Haick*, Faculty of Chemical Engineering.
- **Startup Entrepreneurship Specialization** (4 modules), *Prof. Shlomo Maital*:
 - Cracking the Creativity Code: Discovering Ideas
 - From Idea to Startup
 - Innovation: Career Lessons from a Master (with *Dedi Perlmutter*)
 - Action Driven Business Plan: From the Classroom to the World



Pre-University Education Center

The Center for Pre-University Education consists of two branches: the Unit for Pre-Academic Studies and the Youth Division. Students participating in the various programs are focused on the goal of pursuing the study of engineering. The unit offers various programs related to science and technology for high school pupils.

The main function of the Mechina unit is to provide a second opportunity for students interested in academic studies. Most of the students (75%) are on programs supported by the state and philanthropic bodies.

Special Programs

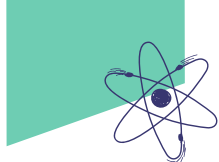
Achievement (Hesegim) for High-Tech – This program offers full engineering tuition at Technion. This is the first year that the program has been managed by P&BC and is open to all Israeli citizens who meet the socioeconomic criteria. 110 students started to study on October 2016.

Ultra-orthodox (Haredim) – Technion has two ultra-orthodox classes (33 students), one on the main campus and the second in a Haredi College in Bnei Brak. The program consists of a five month pre-preparatory course followed by a nine month preparatory course. The program is supported by the government and Technion.

A Future in Industry (Atidim La'ta'asyia) – This program consists of students from the periphery that completed their mandatory military service and hold a matriculation diploma. This is a 12 month program. 33 students participated in 2016, all of which were supported by the Technion "Atidim" program that is supported by the Rosman Foundation.

Atidim – Students in this program are high school graduates from peripheral regions that hold matriculation and psychometric certificates, but their grades are not sufficient. In order to be accepted they are required to take an additional year of preparatory courses. 63 students participate in this program. They are supported by "Atidim" under the auspices of the Ministry of Defense. Because of their age (18), the students are mentored by military and Technion supervisors. Each year, an average of 65% of students successfully complete the Mechina enabling them to continue in Technion undergraduate studies. The other students either repeat the course or apply to other universities.

Other Courses – In addition to the above, PUC provides the following courses; 1) basic physics, mathematics and chemistry to students with weak background, 2) refresher courses in physics and mathematics to freshmen, 3) "step ahead" for non-Hebrew speakers and 4) Hebrew "Ulpan" for new immigrants.



Harry and Lou Stern Family Science and Technology Youth Center

The Harry and Lou Stern Family Science and Technology Youth Center focuses on making science and technology attractive to junior and high school pupils. This year more than 35,000 pupils have taken part in many scientific activities, including 330 science days and 80 groups.

Future Scientists and Inventors Program - This Program was inspired and endorsed by late President Shimon Peres, as a path to promoting scientific, engineering and technological excellence in Israel. The program identifies exceptionally brilliant and creative 8th grade pupils. They study at the Technion one-and-a-half days a week for a four-year period. This year, 63 students participated in this special program (27 students from the 9th grade; 20 students from the 10th grade and 16 students from the 11th and 12th grades).

Scitech - This annual international research summer camp for 11th and 12th graders, held at the Technion, is now entering its 23rd year. This is a lifetime opportunity for gifted pupils to experience serious research opportunities guided by Technion researchers. In 2016, 60 participants from eight 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 of PUC and the Faculty for Education in Science and Technology. Its objective is to strengthen the potential of children from sixth grade and up to study the highest level of mathematics, to enhance their understanding of the subject and finally to encourage them to apply to the Technion. This is the 17th year of the program's operation. Six hundred pupils have participated in this program from eight schools in Northern Israel. Graduates of this program in the 11th and 12th grades are offered a chance to participate in studies at Technion within the special framework for gifted high school students.

Program for Integrating Exceptional High School Students into Technion Studies This program concentrates on the development of exceptional high school students in order to prepare them for academic studies at the Technion in conjunction with their high school curriculum, and allows them to receive credits toward an academic degree. This year 168 students participated in this program, including the "from high school to Technion" program in cooperation with the Faculty of Mathematics. This program includes a joint effort with Chemistry in the framework of the "Archimedes Program."

Ort - Technion Classroom - This program is a joint effort between the Technion and Ort Schools for outstanding pupils. 15 classrooms operated in 2015 in the framework of the program with a total of 300 pupils. The program maintains a follow-up of the pupils from 7th to 10th grades until they enroll as full time Technion students and includes preparatory courses for academic studies. Some of the high school participants will be admitted to the Technion as regular students in a special early-registration process for gifted students.

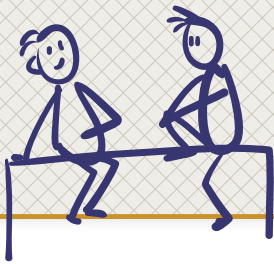
Other Youth Advancement Programs

The Center for Pre-Academic Studies sponsors outstanding programs aimed at enhancing academic potential among a variety of groups. Sponsored jointly with other organizations and institutions they make a difference for many talented and disadvantaged groups of junior and high school students in their aptitudes as well as their attitudes towards the study of science, math and technology.

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

Ofanim Science Program - This program is jointly sponsored with the Ofanim Organization and is designed to encourage scientific and technological studies for 5th and 6th graders in outlying towns. There were 101 participants this year from Tiberias and Migdal Ha'emek that took part in activities held in the Technion youth laboratories as well as in a bus that has been equipped as a robotics lab.

Summer Science Activities - 12th graders from all over the country, aimed at familiarizing participants with academic science studies and with the Technion. This year 950 students participated in the summer activities in 51 different groups.



Student Affairs

The Dean of Students has the responsibility for dealing with issues relating to the welfare of Technion students.

The Office of the Dean of Students manages six professional units whose responsibilities are to support and promote the advancement of students. These include the Unit for Personal Assistance, the Beatrice Weston Unit for the Advancement of Students, Professional Career Unit and IAESTE, the Phillip and Francis Fried Counseling Center, the Unit for Social and Cultural Activities and the Student Housing Unit.

Special Projects

Support Center for Students with Disabilities equipped with up to date accessible equipment to match the special needs of students with disabilities.

Haredim (ultra-orthodox) students - At the Technion there are 30 male and female undergraduate students from an ultra-Orthodox background.



Students at the "Experiencing Accessibility" event on campus



Hesegim to High-tech – This is a new special project intended for students who live in Israel's peripheral and economically disadvantaged cities and towns. The first class of 23 began studying at the Technion this year.

Student Housing –Two of the new undergraduate village dormitories have been populated this semester. At the beginning of the winter semester, all four buildings are expected to be occupied.

Phillip and Francis Fried Counseling Center –Since April 2016, the center temporarily has been located at the Gross dormitories. Construction of the new wing is taking shape.

Scholarships – About 40% of the undergraduate students are eligible for scholarships. The maximum amount that can be covered by Technion scholarships is 85% of the tuition fee.

Loans – The Technion offers zero percent student loans of 18,000 NIS. Last year we gave loans to 380 undergraduate students.

Reservists – Last year we had the great honor of receiving the National Reserve Defender award for the year 2015. In the past year we assisted more than 1,000 reservist-students throughout the academic year.

ATIDIM Project – This project in collaboration with the IDF, assists high school graduates from Israel's peripheral areas with low socio-economic backgrounds. This year, 94 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. In the current academic year 600 freshmen have been assisted by this project.

Rosman Atidim for Industry - The project is aimed at facilitating the absorption of discharged soldiers from peripheral areas and underprivileged backgrounds. This unique program assisted 70 freshmen in the current year.

Freshmen Mentoring Project - According to the resolutions adopted by the study load committee, a special new mentoring project aimed at facilitating the adjustment of freshmen is up and running.

Professional Career Projects - This year we organized three technical job fairs with the participation of more than 150 companies.

Technical Training Aboard - More than 80 students took part in internships last summer.

Social and Cultural Activities – This year there were significant activities across the campus.



Leading companies vie for Technion students at the biannual job fair on campus



“Lively Campus” – A large variety of activities took place on and off the campus.

Community Projects – About 350,000 hours of community service were contributed by approximately 30% of the undergraduate student population, in association with various frameworks such as PERACH – Big Brother Program.

Technion Students Association - TSA

Academics Support

- **Reserve Soldiers:** Following hard work in protecting the rights of reserve soldiers, the Technion received the “Reserve Service Protector Award,” given by the IDF to civilian entities who support the reserve forces. The work vis-à-vis the IDF’s award committee was led by the office of the Dean of Students with the Association’s help.
- **Exam Viewing Stations:** In order to provide students greater access to the marked versions of their exams, the platform that enables viewing of exam folders has been expanded to eight more faculties. In the future, Technion students will be able to view their folders free of charge from anywhere, with no need to reach designated computer stations.
- **Problems during Exam Period:** For the past four semesters the Association has published a report collating the most significant malfunctions and problems during the past exams period and has shared it with departments and administration in order to learn from errors and find solutions.
- **Disciplinary Rules Portal:** In an attempt to simplify and streamline processes that impact students, the Association has created a comprehensive database.
- **Study Court at Ullmann:** Due to ongoing renovations and the severe lack of classrooms, the Student Association received permission to keep the study space in the Ullmann Building open until 02:00 in the morning during the exam periods.
- **Expansion of Elective Courses:** The TSA is currently working with the Senior Executive Vice President to expand the array of electives for the 2017-2018 academic year.
- **Study Labs:** A survey of all labs will be conducted in order to recommend guidelines for assessment and unified preparation for the labs.
- **Scanning Exam Folders:** Last year, mapping was initiated in all departments to ensure that all exam folders are scanned, as required by law.
- **Relaunching of the Net-Stick Array:** During the 5776 (2015-2016) academic year, 10 new and improved net-sticks (cellular modems for internet access) were purchased as a pilot, with the aid of the Dean of Students, for the use of reserve soldiers, to enable them to study during their service. The pilot has been a success, and there is high demand among the student body to receive them on loan.
- **Teaching Questionnaire:** Complaints have been made by both students and faculty regarding the teaching questionnaire. The TSA recommended the formation of a committee to examine the questionnaire and its structure.

Academic Support Services

- **Remedial Courses:** The Student Association provides remedial courses at nominal costs that are geared to help students understand the material taught in various courses.
- **Mentorships:** In addition to the mentorship project, in which high-achieving students assist those who need help in physics, chemistry, and computer science, this year the Student Association opened mentoring marathons ahead of the exam period. Many students make use of the mentorships and attest to the great benefit they have derived from them.
- **Improving the Learning Environment:** Erasable boards have been installed in the study



space of the Students Union and tables and chairs have been added to meet the high demand for study spaces.

- **Workbooks and Exam Folders:** The booklet store located in the Student Union building contains a collection of approximately 600 workbooks and exam folders from the various departments, as well as books written by lecturers and teaching assistants.

Cultural Life

- **Family Club:** The Association continues to hold designated events for the older student populations with families, especially graduate students.
- **Student Festival:** The Joint Student Festival, produced entirely by the Technion Students Association, is the largest festival in Israel and includes concerts by Israel's top artists. Last year some 18,000 students attended the festival for a nominal fee of less than \$10.
- **Enrichment Workshops:** With help from the Dean of Students' office, the Student Association has held a large number of enrichment workshops, including a wine and cheese workshop, a sushi workshop, and a chocolate workshop.
- **Wednesday Afternoons:** Every Wednesday at 12:30 PM, all students take a two-hour break during which no classes are held. TSA organizes activities, such as a large concert on the first Wednesday of the semester, sporting competitions, shows, fairs, organized activities, and market stalls.
- **Enrichment Lectures:** TSA holds lectures once a month thanks to support from the Dean of Students office. These lectures expose students to issues not on the academic agenda, and provide a break from intensive studies.
- **Concerts and Plays:** Every semester the Students Association makes sure to host quality plays from among the best the country has to offer.
- **Parties:** Once a month during the academic year, the Students Association turns the campus center into an impressive nightclub.



Gala Event to honor Technion student reserve soldiers



Social Life

- **Environment:** An array of paper and tin can recycling locations exist throughout the campus. The recycling scheme includes a full student team operating throughout the campus to collect and empty the recycling bins.
- **Donations:** The Association continues to operate the clothing donation project in the laundry rooms and acts on an ongoing basis with Magen David Adom to carry out blood drives on campus. In order to increase the scope of giving back to the community, the Association leads and promotes the “Volunteering = Credit” plan, which allows students to volunteer with selected organizations in return for one academic credit.
- **Extracurricular Activities:** The Students Association, in cooperation with the Dean of Students’ office, operates a full array of extracurricular activities such as yoga, Pilates, and kickboxing, for the benefit of students on campus. This year an additional culture and sports center was opened with activities designed for graduate students and their families.
- **Shabbat Meals:** Meals are subsidized and enable students to maintain a traditional lifestyle in a warm atmosphere at Technion. Last year we held the first “Grand Shabbat Meal” in which 300 students and faculty members took part.
- **Accessibility:** The Association held a special event for students with disabilities, in which other students experienced first-hand the challenges of dealing with special needs.
- **Delegation to Poland:** In cooperation with the President of the Technion, an independent Technion student delegation went to the death camps in Poland. Students underwent preparation in which they discussed dilemmas regarding Holocaust remembrance. After their return, additional meetings included volunteering at a Holocaust survivors’ center and listening to testimonies, followed by a discussion on Holocaust Memorial Day. Students in the delegation came from different backgrounds.
- **Social Initiatives:** Notable events included a hair donation drive for cancer patients, distributing candy on Purim at Rambam Hospital, and food packages for Passover.
- **Birthright:** Technion students join Birthright delegations throughout the year. Students help Israeli public outreach and empower the experience of diaspora Jews.

Campus Life

- **Authorities Fair:** For the first time, TSA held a fair on campus at the beginning of each semester for officials from various authorities, in order to help students. Representatives came from the Haifa Municipal Tax office, the Nesher spokesperson office, the National Insurance Institute, RavKav, Hot Mobile, the Technion security unit, legal counsel and more.
- **Dormitories:** The Wi-Fi bandwidth was increased from 12 to 30 MB in small apartments and from 30 to 100 MB in large apartments; improved customer service for reporting cable service malfunctions; permission to bring guide-dogs-in-training into the dorms; and distributing a flier with a list of all the services for dorm residents.
- **Laundry:** New equipment has been purchased for all laundry rooms (including the medical campus at Bat Galim) in order to expand the services offered. This equipment includes laundry hampers, irons, ironing boards, and boxes in which to collect donated clothing.
- **Virtual Wallet:** Last year the Student Association created a “virtual wallet” which enables students to charge their student card through the internet and use it for photocopying documents and payment at the laundry and beverage vending machines. The cards are embedded with RFID chips.
- **Food:** TSA continues to lead Israeli academia in food and beverage pricing. The range of eateries at the Shalom Zielony Student Union was improved, with emphasis on lower prices, longer operating hours, larger selection, and improved service. The convenience stores will soon offer delivery service by app. This year we bargained global chain Pizza Hut down to less than half the price it charges off campus.



- **Transportation:** Technion operates internal transportation services from early morning to evening. The Association is also promoting the launch of new municipal lines, with an emphasis on an express line between the Rappaport School of Medicine and the main campus. Covered bicycle parking was installed near the various dorms, a self-service bicycle repair station will be built, the bicycle parking in the center of campus was moved to a covered area, and free bicycle repair is offered to students every Wednesday afternoon.
- **Printing:** TSA operates one of the largest printing services in the country with photocopy, print, and copy facilities in each of the faculties with highly competitive prices. The Association continues to expand these services through scan-to-mail and cloud-printing services.

Sports

- **The Academic Sports Association** currently operates 115 sports courses worth one academic credit, and 42 sports teams, for which participants receive 1.5 academic credits, in 34 different sports. Six thousand students take part in the teams and the various sports courses. 2016 saw the addition of Kengo, TRX, and Feldenkreis classes.
- **Israeli Championships for Academia:** The sports teams compete annually in the national championship in which some 32 universities and colleges take part. For the 2015-16 academic year, ASA Technion teams were ranked first in the general and men's categories, and second in the women's category.
- **European Championship:** ASA Technion took part in the European Championship.
- **Technion Challenge:** Last year the sixth annual interdepartmental sports tournament saw thousands of participants from all Technion departments compete in 10 different sports. The winners received the "President's Technion Challenge Cup" and an award of 15,000 ILS to the winning faculties. Scholarships totaling 45,000 ILS were handed out to winners in the various fields.
- **Technion Race:** In 2016, ASA Technion held the second annual Technion Race. Students, faculty, staff, and workers ran a 5-kilometer course within the campus. Although originally intended as a student event, it has turned into a full-blown sporting-fest with the participation of the academic and administrative staff members. Winners of the race received outstanding prizes, estimated at 15,000 ILS.
- **Scholarships:** Under the auspices of the Dean of Students, scholarships are awarded each year in three categories: exemplary, excellence, and champions. Last year approximately 100 sporting scholarships were awarded, worth 100,000 ILS.



Research

Research contracts signed in 2015/6 by the Research Authority amounted to \$96.85M. In the last two years 2014/15, the Technion's research contracts totaled \$86.3M; in 2013/14 they totaled \$83.25M. This is an increase of 12.21% within 3 years (see Figure 1).

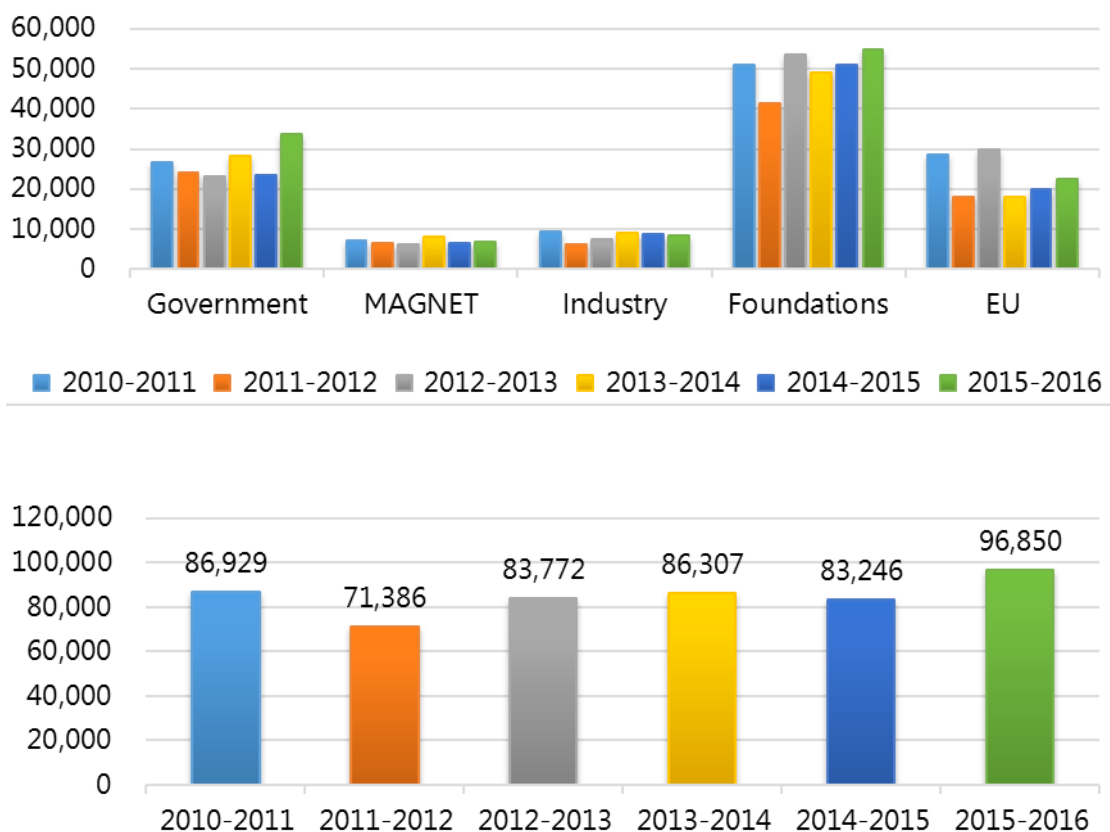


Figure 1: Extramural Sources of Research Funding (Thousands USD)



Activities to encourage the submission of research proposals to competitive scientific funds continue. In the past few years there has been an increase in submissions to the three main competitive funds (ISF-Israel Science Foundation, BSF-Bi-National Science Foundation, and GIF- German Israeli Foundation) from 181 proposals submitted to ISF in 2012 to 323 proposals submitted during 2016. The Technion received new awards from the ISF during 2015/6 totaling \$22.5M in comparison to \$20.2M during 2014/5.

On 01/01/2014 the new funding framework (Horizon 2020) from the European Commission was launched. Horizon 2020 is the largest EU Research and Innovation program ever initiated, with nearly €80B available over 7 years (2014 to 2020). In the period of October, 2015 through September, 2016, the Technion was awarded \$22.6M in funding in the Horizon 2020 framework in comparison to \$19.9M during 2014/15 and \$18.1M during 2013/14.

Funding in the past year for projects from the Office of the Chief Scientist of the Ministry of Economics and Planning, was \$6.8M, in comparison to \$6.3M during 2014/15.

From October, 2015 to September, 2016, the total amount of contracts for research and development activities funded by USA funding agencies reached \$10.6M; a major increase in comparison to \$7.6M during 2014/5 and 6.4M during 2013/4.



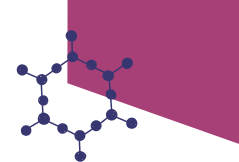
Technion ERC Research Award winners 2016

External Aid for Research

In addition to the external funding mentioned above, consisting of research contracts signed within the framework of the Research Authority, the Technion received contributions from donors (for specific individual researchers or for the creation of research infrastructures) for a total amount of \$15.19M, and assistance for purchasing equipment for new faculty members in the amount of \$9.55M. In addition, the Technion received assistance from the government for programs for new immigrant absorption (Shapiro and KAMEA) totaling \$3.13M.

Internal Technion Financing

Over the past year the Technion allocated close to \$653K to encourage competitive research activities (including internal grants, bonuses for researchers submitting proposals to competitive funds and



the promotion of research among new faculty). The sum of \$3M was granted via academic chairs and approximately \$28.64M was allocated to finance fellowships for graduate students engaged in research. The total investment in research, including all sources (external funding, contributions from donors, external aid, internal funds, and graduate fellowships) amounts to \$157.04M.

International and Industrial Collaboration

The Umbrella Program (Aachen University, the Jülich Research Institute and the Technion): Last year's Symposium was held in Jülich in April 2016 on the topic of: *"From Quantum Matters to New Materials"*. This year's symposium will be held in Aachen in July **on the same topic**. In addition to the Scientific Conference, it was decided that it is important to bring the Research Authority (RA) and Technology Transfer Office (TTO) of each institute into play in order to facilitate the special connection of the Umbrella. The RA is important for submissions to the EU (and DFG, GIF, DIP, and so on), and the TTO for possible accelerator collaborations and translation of the IP generated by these projects. Mutual visits of RA and TTO staff will be coordinated.

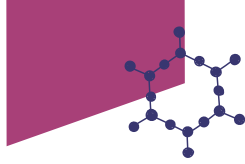
Technion Center of Excellence in Exposure Science and Environmental Health was established at the end of 2010. The Technion was awarded \$1M for five years in funding from the Environment and Health Foundation for establishing a Center of Excellence: *"From Airborne Stressors through Risk Assessment to Health Outcomes"*. This is a joint center for scientists from various Technion departments run by the Faculty of Civil and Environmental Engineering and the Faculty of Medicine. The Center's activities in the past six years included research in four general areas: exposure to air pollution in the heterogeneous urban environment; the effect of air pollution from agricultural sources on the population of neighboring communities; air pollution within the built environment; and developing tools and methods for remote detection of air pollutants and for analyzing air quality databases from monitoring stations in order to evaluate the level of exposure of the public to airborne pollutants.

The Center directs research in a wide variety of subjects, among them: wireless distributed sensor networks for air pollution monitoring, the use of satellite remote sensing of aerosols for environmental management and public health applications, development of advanced models for assessing the effect of traffic on air quality in urban areas using IT data, developing methods for evaluating the influence of exposure to residues of agricultural pesticide spraying and brominated flame retardants in vehicle upholstery, establishing a national database of air pollutant concentrations, developing novel methods for Fourier transform open-path remote sensing of gaseous and particulate pollutants, using both active and passive modes of operation, and development of a national scale innovative model for estimating the impact of commute on personal exposure to air pollutants.

The Center consists of five Israeli postdoctoral researchers, approximately ten graduate students and a number of faculty members. In the six years since its establishment the center members have published more than 70 papers in leading scientific journals and were active participants in approximately 125 national and international conferences. At the same time, the center enabled its members to raise research money from different sources, both competitive (e.g. EU, ISF), national (MoEP, MoI, MoST) and other funds. In the last year, 7 students who performed their research within the center graduated, including 4 PhD students and 3 MSc students.

Waterloo - Technion Cooperation: The research teams continued their work during 2015/16. A new call for proposals will be issued during 2017. The priority areas will remain the same: Quantum Computing and Technology; Water; Nanotechnology.

Technion Marseille Mission: In November 2015 14 faculty members from 3 interdisciplinary programs (RBNI, GTEP, LS&E) took part in a workshop in Marseille on the topics of Quantum, Green Energy and Bio-Imaging. During the visit an MOU was signed between the Technion and Aix Marseille University, with the goal of common participation of research teams in national, European and international programs



Collaboration with China:

In May 2016 the EVP Research and head of the TTO traveled to Shantou to define research collaborations and strengthen existing ones within the GTIIT and Shantou University. This led to discussions on active collaborations between the TTOs of the universities, and the technology accelerator at the Technion with future counterparts in Shantou. With regards to research, it was decided to host some 15 Shantou faculty members at the Technion for a workshop on environmental science.

AWARDS

Minerva Foundation ARCHES Award

ARCHES is awarded to German-Israeli research teams of outstanding young investigators. Each research team is composed of a Principal Investigator from Germany and a Principal Investigator from Israel. Asst. Prof. Matthew Suss of the Department of Mechanical Engineering was awarded the prize.

Hershel and Hilda Rich Visiting Professorship in Applied Research

Ms. Renie Carniol, daughter of the late Hershel and Hilda Rich, donated funds for the

"Hershel and Hilda Rich Visiting Professorship in Applied Research." This is in addition to the original program her father founded in 1992. In 2016 Prof. Mark Horowitz of the School of Engineering at Stanford University was selected. He was a nominee of the Faculty of Electrical Engineering. He gave a lecture on Innovation in a Post-Moore's Law World, and spent one week on campus interacting with Technion faculty and students.

Significant Agreements

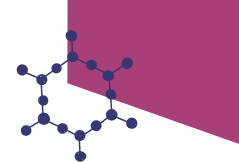
- Eleven research grants were continued this year in the framework of the Center for Research in Electronic Commerce, with the funding and cooperation of Microsoft and the Faculty of Industrial Engineering and Management...
- The wide-ranging research center in cooperation with Intel, the Hebrew University and the Technion continues its activity. The activities in the center are mainly conducted by faculty members from the Faculties of Electrical Engineering and Computer Science in the field of computational intelligence. Within this framework and in 2015 a fourth portion of research grants (9 research grants) was received.
- The Focal Technology Area (FTA) program, with a total investment of \$10M (of which 40 percent are Government funds and 60 percent are Technion funds), finalized this year its 5 years activity within the framework of RBNI on the subject of: "Nano photonics for Advanced Light Detection". Technion's FTA enabled acquisition of a major infrastructure tool; a state of the art electron beam writing system with characteristics that are second to none in the world.

Pre-Clinical Research Authority

The pre-clinical research authority is a complex operation providing animal research facilities to two different types of researchers, faculty members of the Technion and affiliated hospitals and commercial companies.

There are several important goals that need to be accomplished in order to push forward the activities in this important operation:

- Accreditation of Laboratory Animal Care International (AAALAC) for the Pre-Clinical Research Authority at the Technion. Obtaining AAALAC accreditation is crucial for sustainable animal research at the Technion. The process started in 2015, and included appointment of a Deputy Executive Vice President for Research and hiring a special international consultant to accompany the process. In addition \$5.5M funds were allocated by the Technion and TRDF for this goal. However, despite all the efforts the qualification requirements for AAALAC accreditation have not yet been met. Completion of the process is vital since it is expected to become mandatory by funding agencies such as the European



Commission and NIH.

- Establish a realistic budget for the pre-clinical research authority. Establishing a realistic budget is of crucial importance. It will allow better planning and prioritization of the financial investments for the pre-clinical authority.
- Reform in the management structure of the pre-clinical research authority. The pre-clinical research authority is a large operational facility, which needs a restructuring in its management.
- Development of new facilities. Presently the authority is developing three main facilities that will provide state of the art services to the faculty members. This includes an IVF facility for preserving different animal models, Patient Derived Xenograft (PDX) tumor models and a Germ Free facility, which will enable research in the growing field of microbiome. These three facilities should be budgeted and service pricing should be established.

Research Institutes

Nancy and Stephen Grand Technion Energy Program

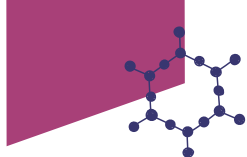
Founded in 2007, the Nancy and Stephen Grand Technion Energy Program (GTEP) is a global pioneer in energy research and education. GTEP brings together an exceptional cross-disciplinary community of energy scholars, conducting basic research and developing applications to enable the effective generation, use and storage of energy for the future. In its ninth year, GTEP is consolidating its achievements and building on its strengths. Presently, GTEP is identifying additional multidisciplinary research areas that could be supported to maximize energy research at Technion. To this end, GTEP is exploring funding sources for new initiatives.

The following GTEP central laboratories are equipped and fully active:

- Ed Satell Family Nitrogen/Hydrogen Alternative Fuels Research Laboratory (NHAF).
- Photovoltaics Central Laboratories (a joint project of GTEP and RBNI).
- Leona M. and Harry B. Helmsley Charitable Trust Energy Storage Complex.
- Hydrogen Technologies Research Laboratory (temporary location).
- Bioenergy Laboratory.
- Temperature Controlled Greenhouse for Growing Transgenic Plants.



Prof. Avner Rothschild (L), Dr. Hen Dotan (R)



The Nancy and Stephen Grand Energy Laboratories and headquarters, are currently in final stages of construction on the upper floor of the Faculty of Chemical Engineering building. The new floor will house two central laboratories: the Fuel Cells Research Laboratory and the Hydrogen Research Laboratory, in addition to GTEP's administrative offices and workspaces for graduate students, postdocs and visiting scientists.

During the past nine years, around 60 Technion faculty members have been supported through GTEP's funding channels, which include seed money grants; graduate student and postdoctoral fellowships; facilitation of events; and the use of the GTEP central laboratories and equipment. GTEP researchers participated in national collaborations funded by competitive and philanthropic sources. This year we have continued to focus on expanding multidisciplinary research projects and promoting collaborations on campus as well as with other Israeli and international scientists.

- The UConn-Technion Energy Collaboration Initiative
- The McDonnell Academy-Technion Energy Cooperation
- Cooperation with the University of Calgary (UoC), Canada

In the 2016 academic year, GTEP funded activities have yielded significant developments in the field, with 139 publications published in high impact scientific journals and 11 patent applications were submitted. It should be noted that new faculty recruited in the last three years with GTEP support are among the leaders in patent applications.

GTEP researchers received over \$7.5M in external research funds and industrial support for research. This level of external funding and scientific papers would not have been possible without the infrastructure that GTEP has created on campus. In 2016, GTEP researchers have crossed the ratio of 1:1 of external funding from competitive sources as compared to total (cumulative) donations.

GTEP strives to attract excellent scholars in energy research to the Technion. As part of this endeavor, it has assisted with the recruitment of 14 new faculty members to the Technion between the years 2010-2016.

GTEP's unique Graduate Program in Energy Studies is a popular program, both for Technion students and for candidates from other leading academic institutions in Israel. The program's competitive advantage is in its attraction of top minds for energy research. Only outstanding students get accepted to the program. In the academic year of 2016 GTEP's Graduate Program in Energy Studies supported 41 excellent students of whom 22 were MSc students and 19 were PhD students. One measure of the students' quality is the competitive external prizes and scholarships won by 12 of them in 2016. In the past academic year 12 students graduated the program. This year we expect additional 26 graduates. The program is supervised by a 12-member faculty committee, headed by Prof. Viatcheslav Freger.

In 2012 GTEP and the Wolfson Department of Chemical Engineering launched an ME graduate study program in Natural Gas and Petroleum Engineering. Thus far, 50 students graduated the program. The fourth class will be launched in October 2017.

GTEP has launched the GTEP Fellowship Program for Outstanding Postdoctoral Fellows. As part of the program, GTEP proposes to support successful applicants with a matching stipend. In 2016 five postdoctoral fellows won fellowships through this program.

GTEP supports projects in outreach and general education as an integral part of its global mission. This year, GTEP supports the Technion Formula Student activity, and the 1/4 Scale Tractor International Student Design Competition.

GTEP provides an essential framework for seminars, workshops and academic guests. In the past academic year, GTEP supported 19 seminars and workshops.



Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering

Since its foundation in 2006 the Lorry I. Lokey center has sought to develop the creation of a collaborative ecosystem, encompassing all aspects of the convergence among Technion Life Sciences and Engineering faculties, as a key element of its strategy. This is done by encouraging the development of a dense, highly connected community of researchers, students and affiliated members.

Stewarded by Nobel Laureate Prof. Aaron Ciechanover, Mr. Lokey's monumental gift to the Technion, and the vision behind it, has made possible the establishment of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering that was launched in 2006. In September 2016 Prof. Roy Kishony was appointed director.

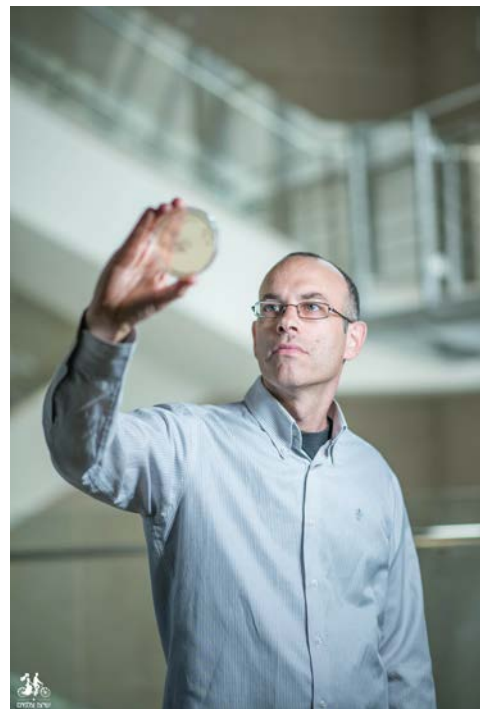
The center fosters collaborative research, provides state-of-the-art research facilities, and contributes to educational opportunities in biotechnology. The diversity of faculty research is reflected in the wide range of disciplines including biology, biomedical engineering, chemical engineering, chemistry, computer science, materials science, mathematics, mechanical engineering, and physics. This convergence has led to the emergence of new disciplines in the center such as biomedical optics and imaging, systems biology, synthetic biology, bioinformatics and computational biology, metabolomics among others, which are a reflection of how convergence is a serious and increasingly important development in science.

This year we launched the Presidential Search Committee for recruiting interdisciplinary researchers in an attempt to develop the center core strengths at the interface of engineering, quantitative sciences, biology and medicine. The president has initiated a special program for recruitment of exceptional interdisciplinary candidates who span disciplines, combining new approaches from physics, chemistry, materials engineering, computer sciences or mathematics to bear upon key questions in biology and medicine. The new program aims to recruit original and creative scientists and engineers who are experts in one or more of the disciplines above and interested in developing and applying new technologies, experimental approaches or quantitative methodologies from their home fields to enable novel perspectives on important biological systems. We have recruited a young researcher in the field of nano-optics who brings with him fresh viewpoints and new expertise in the field of developing novel methods for nanoscale precision optical microscopy that can be applied to answer biological questions in the micro/nano realm.

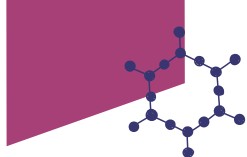
During the past year we conducted workshops, seminars, courses and tutorials in order to reach out and expose the activities and services offered by the center to the Technion.

The Lorry I. Lokey Distinguished Lecture Series continues bringing world-class scientists who deliver their talks and meet with researchers and students.

We continued to focus this year on the development of the various units within the clusters: Technion Genome Center, The Infrastructure Center (including the Microscopy and Imaging Unit, Flow Cytometry Unit), Bioinformatics Unit and the Technion Center for Structural Biology. We have invested in augmenting these research facilities by means of upgrading and purchasing advanced scientific equipment. The center units that have been growing rapidly over the years are one of the main reasons why life sciences have flourished at the Technion.



Prof. Roy Kishony



The center allocated funds this year to support researchers who wish to upgrade their research equipment and for subsidizing usage at the center units (joint project with RBNI).

The Lokey Center team members are highly trained and experienced, fully committed and dedicated to delivering all necessary support and knowledge to the Technion research community, most importantly students, postdoctoral fellows, and all other users including from those other institutions and industry.

Russell Berrie Nanotechnology Institute

Established in 2005, RBNI is a joint endeavor of the Russell Berrie Foundation, the Government of Israel, and the Technion. Over 200 faculty members and 250 graduate students and postdoctoral fellows from 14 faculties conduct state-of-the-art research.

Vigorous recruitment of bright new faculty members from research laboratories around the world, extensive investment in infrastructure, new educational programs for training the next generation of scientists and engineers, and nurturing of multidisciplinary collaborations within campus, as well as with industry and other academic institutions, provide the vehicle for achieving the desired impact on the Technion, the State of Israel, and the wellbeing of humankind.

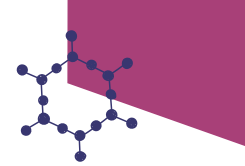
Research activities within RBNI cover a wide range of scientific and technological areas typifying the multidisciplinary nature of the center. The activities are divided into several fields that include: nanophotonics, quantum science and engineering, nano electronics, advanced electron microscopy, nanomed, advanced imaging, nanotechnology for energy harvesting, self-assembled materials, two-dimensional and topological materials and new nanomaterials.

RBNI is in the midst of its third phase (2015-2019). It is continuing most of the activities established in the first phase, while focusing on the development and management of two new major research directions;

- **NanoMed:** jointly established with the Lorry I. Lokey Center for Life Sciences and Engineering (\$5M over 7 years were donated by an anonymous foundation). Technion is seeking new funding sources for the program.
- **Center for Quantum Science, Matter and Engineering:** The center will address the quantum nature of fields such as computation, communication, signal processing and sensing. The latter will be of particular significance due to its vast range of applications in all aspects of life. The center will connect Technion's nanotechnology experts with the information scientists at Technion. This center was launched last June at the Mark and Diane Seiden International Symposium on Quantum Science, Matter and Engineering held at Technion. The event honored Norman Seiden, the the Seiden family, and featured 12 Israeli and internationally renowned speakers.



Quantum Photonics conference



This year the “Nano Photonics for Advanced Light Detection Imaging, Inspection, Smart Sensors, and Energy conversion” Focal Technological Area (FTA) that was selected for funding by the Government of Israel (a total of \$10M funding by the Government and the Technion over 5 years), was completed and the research continues.

RBNI's main activities in 2016:

Promotion of a vibrant multidisciplinary nano-community via monthly RBNI seminars and research funding channels offered annually to enhance multidisciplinary nano-activity on campus.

Research - Nevet research projects with emphasis on multidisciplinary collaborations within campus. Since RBNI's inauguration a total of 121 “Nevat” research grants were awarded for multidisciplinary collaboration within Technion and for collaborations with Israeli and foreign universities and institutes

Collaborations with industry Strengthening contacts with Israeli industry is one of RBNI's highest priorities. Such contacts include IP commercialization, joint industry-academy R&D, consulting, and the use of RBNI infrastructure.

- This year 33 joint projects with Industry took place.
- 14 patent applications - 9 patents were approved.
- About 60 companies used the RBNI infrastructure centers in 2016, yielding an income of \$~600K.

Forming ties with other academic and research institutions - RBNI is continuously formulating and initiating collaborations with universities and research institutions in Israel and abroad. The international aspect of RBNI has developed significantly in the past few years. This year we continued to focus on enhancing the international scope of RBNI by means of international programs with major nanoscience centers in Europe, North America and Asia.

Extensive upgrade of infrastructure - RBNI invested \$45.85M for the upgrade of nano-related equipment between 2005 and 2016. A major infrastructure upgrade took place this year. It made use of the maintenance fund (established during Phase I). This purchase included equipment for several infrastructure centers and totaled \$5.6M, with an additional \$2M from Technion sources.

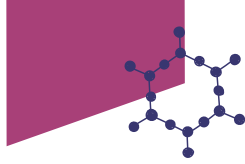
RBNI continues to support 15 infrastructure centers on campus, serving Israeli researchers in academia and industry. This year 119 Technion research groups received subsidy from RBNI (against equal matching funds) for usage fees at these centers. These funds serve to cover the maintenance costs of the infrastructure centers on campus.

The Norman Seiden Multidisciplinary Graduate Program in Nanoscience and Nanotechnology - The Russell Berrie Foundation approved a seven-year donation to support the unique Norman Seiden Multidisciplinary Graduate Program in Nanoscience and Nanotechnology and its related activities. This pledged gift of \$3,710,000 is matched by the Technion at a ratio of 2:1. The Graduate Program has grown from 6 students in the first year to 65 students at the end of the 2016 academic year. Since the launch of the program 70 students have graduated the MSc track and an additional 31 students have graduated the PhD track.

Technion Autonomous Systems Program

Autonomous Systems represent the next grand challenge in engineering, involving the fusion of mechanics, electronics, computer science and materials with sensors, actuators and communication capabilities. The objective is to develop intelligent systems that can interact dynamically with the complexities of the real world.

The Autonomous Systems Program was founded in 2008 in order to form a melding point for studies in different disciplines, thereby gaining from the synergies and bringing the Technion to the forefront of this exciting field. The program includes over 80 faculty members from nine faculties, and is



divided into three major centers (air and space systems, ground systems and marine systems). We rely on initial donations, enabling a buildup of expertise and infrastructure, to attract later funding from government and industry to sustain the center. The principle we work by is to support research activity and equipment and not “bricks and mortar” construction.

This year we continued extensive activity in the marine and ground centers with several major projects:

- **Autonomous Underwater Vehicle.** The goal is to develop and produce a 3m long, modular, autonomous, marine, underwater vehicle, which will serve as a technology demonstrator and platform for various research programs. This project is partially supported by RAFAEL and MOD. The unique feature of this project is the capability of depositing a module on the ocean bottom for research purposes. This year construction of the full-scale submarine has reached the final stages, with first water entry expected later this summer.
- **Autonomous landing of a Quad-Copter drone on a moving marine platform.** The goal of this project is a hybrid system that can identify threats by the aerial component, and deal with them with the surface vehicle component.
- **Autonomous Ground Vehicle for a smart stretcher.** The main goal of this research is to provide a system for rapid and continued medical treatment and remote monitoring of an injured soldier using the “Smart Stretcher”. This can also serve as emergency equipment after earthquakes etc. The vehicle has autonomous stabilizers so as not to exacerbate the injured person’s situation and approach the frontline location without risking more lives and extract the wounded soldier to a safe location, all while initial medical care is administered.

At any given time we support about 20 different studies, in the areas of Aerial, ground and marine vehicles, and autonomous subsystems. In addition to donations, we are supported by grants from industry and government ministries to the tune of several million shekel. This is a good sign for the future sustainability of the program.

We have an outstanding graduate studies program, with about 50 students, most of them full-time, including nine PhD students. To date 23 Master’s students and 1 PhD have graduated.

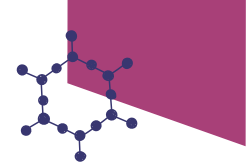
Technion Computer Engineering Center

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

We continued our effort to reach out to leading companies in Israel and to date, over 20 companies are industrial members of TCE, among them Intel, Amdocs, Qualcomm, Rafael and more. R&D staff from these companies bring up new research agenda and enjoy the wealth of knowledge available at the Technion. TCE has titled these researchers ‘agents of knowledge’ who can benefit both industry and academia, on whose collaboration the center relies.

In June 2017 TCE will hold its 7th international conference. As of 2014, these conferences are named after Henry Taub, a great friend and benefactor of the Technion. This year the conference focuses on Coding for Storage and Information Systems and will feature speakers in these areas from international and Israeli universities, as well as industry representatives. The conference won a grant from the Israel Science Foundation as well as support from several companies, and promises to draw the attention of a broad audience of researchers. Last year’s conference on 3D Graphics and Geometry was a major success and was attended by several hundred participants, an impressive number for an academic conference at the Technion. This year the TCE also takes part in the 2017 Stephen and Sharon Seiden Frontiers in Engineering and Science Workshop focusing on Beyond CMOS: From Devices to Systems.

During this year the TCE continued its mission of knowledge dissemination with numerous talks, workshops, seminars and conferences. The TCE organized the 2016 international conference on Parallel Architectures and Compilation Techniques (PACT), which took place in Haifa and was attended



by over 200 researchers from around the world. As a by product of PACT the TCE organized a panel addressing the Future Research in Computer Architecture that included top-notch panelists from MIT, Stanford, UT Austin, Texas A&M university and the University of Illinois. The TCE also organized and hosted a talk series by top Intel speakers to expose and better understand Intel technologies and marketing strategies. The talks drew the attention of Technion students and researchers as well as that of competing Israeli industry and demonstrated the importance of the TCE in maintaining tight academia-industry relations. There were many other similar activities such as the 5th Summer School on Computer Security that took place in September 2015, the Seminar of Computational Linguistics, the Intel Executive Seminar and more. These are all delineated in TCE's website (www.TCE.technion.ac.il).

The Henry Taub distinguished visitor program this year included distinguished speakers such as Daniel Kroening from Oxford University, Ron Faigin from IBM Research, and Kunle Olukotun from Stanford. All these visitors met with faculty and students and delivered one or more lectures.

The Viterbi Chair continued to bring in prominent researchers for a semester long visit. This year these visitors include Prof. Uzi Vishkin of the University of Maryland, and Prof. Ken Birman of Cornell, and Prof. Jacob Benesty of the University of Quebec.

TCE took part in the establishment of the new Technion Cyber Security Research Center, a multiyear research program initiated by the Cyber Center in the Prime Minister's office and headed by Prof. Eli Biham from the faculty of Computer Science. The Center aims to enhance cyber security to a much wider perspective.

Cyber Security Research Center

Supported by the Israel National Cyber Bureau in the Prime Minister's Office and Technion, the Technion Cyber Security Research Center was inaugurated in April 2016 and aims to become a top leading cyber security research facility that will contribute greatly to the field.

Today, Israel and Technion in particular are leaders in maintaining the country's ability to withstand cyber threats. Yet to continue to do this we must promote interdisciplinary research that relies on the capabilities of the Technion.

At the center, faculty members from various faculties explore the weaknesses that endanger computerized systems and propose methods of protection. The center fosters awareness of these issues and holds seminars for engineers working in cyber security in order to broaden their knowledge and keep them abreast of the latest developments in the field. The center collaborates with many Israeli and international industries and is working to expand these collaborations. We invite industry collaboration and will be happy to host researchers and post-doctorate fellows from Israel and abroad.

The center focuses on cyber security research such as software and hardware protection, operating systems security, cloud security, protection of IoT (Internet of Things) systems, verification of software and hardware, computer vision, security of autonomous systems, cryptology and cryptanalysis, security and privacy of medical and aeronautical systems, and others. The center manages research grants for researchers and graduate students (MSc and PhD), serves as a focal point for scholars, focuses on disseminating innovative knowledge through conferences and international workshops, and deepen awareness of the field via courses, lectures and other outreach activities.

List of Events in the Academic year 2015/2016 (organized with the TCE Center):

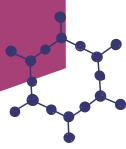
2015 CyberDay, July 29, 2015

2015 CryptoDay, December 28, 2015

Lightweight Crypto Day, March 28, 2016

Inauguration Ceremony, April 5th, 2016

2016 Summer School on Cyber and Computer Security, September 4th-8th, 2016



Technion Integrated Cancer Center

Inauguration

The inauguration of the TICC took place on November 20, 2016, in the presence of the Mayor of Haifa, senior officials from HMO Clalit, Technion leadership, faculty and about 200 guests of honor, including international renowned invited speakers.

The first TICC cancer symposium was held in November 2016, with over 400 participants from all Israeli academic institutions, and special sessions devoted to clinical initiatives and future development in cancer management.

Fundraising

During 2017 the TICC and the president of the Technion expect to raise another \$43M of which \$30M will be dedicated to the construction of the TICC building adjacent to the Rappaport Faculty of Medicine. A donation of \$13M is expected to be finalized for the Azrieli epigenetic computation core. Fundraising to achieve the goal of \$100M will be part of the Technion leadership campaign in 2017/8.

Recruitment

We have completed the recruitment of Dr. Na'ama Geva-Zatorsky from Harvard Medical School. Na'ama, an expert in computation and microbiota research, will join the Faculty of Medicine to establish the first microbiome based research group and mouse gnotobiotic facility. Her landmark paper in *Cell* (Feb 2015) exemplifies the new platform and its significance for the Technion.

Na'ama joins the recruitment of Drs. Ronai and Gottlieb at the TICC. Efforts to recruit lead system biologists are expected to be complete in 2017.

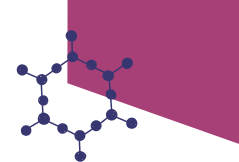
We began the recruitment of Elhanan Burenstein, a lead expert in system biology / computer sciences in the field of microbiome, with implications to neurodegenerative, diabetes and cancer. We expect to complete this process during 2017.

New and Upgraded CORE Facilities

- The TICC has developed the PDX (Patient Derived Xenografts) room in the vivarium of the Faculty of Medicine. This allows the implementation of patients tumor in avatar mice which lack the immune system, thereby allowing to propagate the tumors for further assessments and drug screens. This room offers the first in kind PDX services at the Technion.
- The TICC will establish the gnotobiotic room at the Faculty of Medicine, which will allow studies on mice who lack gut microbiota. This room will serve the newly recruited faculty



Launch of TICC, (L to R) Prof. Eyal Gottlieb, Prof. Peretz Lavie, Haifa Mayor Yona Yahav, Prof. Aaron Ciechanover, Prof. Rafi Beyar



member and establish the first core providing such services at the Technion.

- The histopathology core at the Faculty of Medicine has been upgraded, enabling the purchase of new equipment for high throughput assessment and high level imaging.
- The TICC has invested in the purchase of state of the art equipment for single cell analysis, which will be located at the Faculty of Medicine at the Technion.

Collaborations

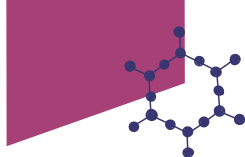
- A number of collaborative initiatives were launched during 2016 and will be part of TICC activities in 2017:
- The first TICC integrative two day workshop that was held in June 2016. Participants included engineers (10), clinical oncologists (2) and biologists (10). Key unmet needs identified by the clinical oncologists were discussed, focusing on three main problems – early diagnosis, therapy resistance, and tumor heterogeneity. Working groups were established, where defined paths for developing research programs addressing these critical questions, were mapped.
- A collaborative group of engineers and biologists (Amit Meller, Shulamit Levenberg, Yoni Savir, Moran Bercovici) teamed for a Wolfson application focused on single cell analysis. Single cell technology is the premier approach for addressing problems in tumor heterogeneity. The application was recently funded by the Wolfson Foundation, with matching funds of over \$450,000 from TICC money.
- TICC launched collaborative discussions across faculty and medical oncologists. These TICC FORUM meetings will be held every two months at the Faculty of Medicine or upper campus. The first TICC FORUM meeting was held in December 2016, where over 30 participants (engineers, biologists and medical oncologists) participated. The minutes of this meeting are attached.
- The TICC-Cancer Center at NYU Langone, funded by the Laura and Isaac Perlmutter initiative. So far two calls and four research groups which consist of collaborators from Technion and NYU have been funded. The third call was announced in February 2017, and focuses on expertise concerning with computational biology/ bioinformatics/ big data, nanotechnology, materials sciences, sensors/ lab on a chip and imaging.
- The Rubinstein postdoctoral fellowship, to encourage multi-disciplinary collaborations within the TICC faculty. Of four calls, six post-doctoral fellows with backgrounds in different disciplines and who are from different faculties, were funded. The fifth call for applicants was released at the beginning of January.
- A new funding initiative for core based services was launched by the TICC, to promote and enable research in facilities that do not benefit from any other Technion support. Applications will be combined for philanthropy-based funding. The first RFA was released at the beginning of January.

Training / Teaching

The TICC is establishing an integrated PhD program which will be launched in late 2017. This program will be based on co-mentorship of TICC members, from complimentary disciplines in biology engineering and oncology. TICC will provide unique enhancements to assure the success of this program, which is expected to be the first cross-disciplinary based training, thriving for outstanding trainees and their future development as lead scientists.

Clinical Initiatives

The TICC has developed an MOU with Clalit, the biggest HMO in Israel which has the largest patient population in northern Israel, for collaborative studies and personalized medicine that will be part of enhanced oncological services to northern Israel, in collaboration with affiliated hospitals (Carmel, Ha'emek) and related day service centers. As part of this MOU TICC members will have access to the largest database of oncological patients in Israel.



The TICC has initiated a personalized medicine initiative with Rambam, the biggest oncology center in northern Israel, and one of the Technion affiliated hospitals. As part of this initiative, TICC will enable the use of software allowing to project possible treatment modalities for cancer patients based on simple and relatively inexpensive biopsy-based analysis.

Collaborative forums, where oncologists, engineers and scientist meet to discuss innovative solutions to existing problem were established as bimonthly meetings and annual workshops.

Samuel Neaman Institute for National Policy Research

The Samuel Neaman Institute for National Policy Research is a unique think tank in Israel, dedicated to promoting informed national decisions in Israel through research and the analysis. The mission of the Institute is to maintain its role as a leading research institute that identifies, formulates, and analyzes matters of policy of national importance in the areas of scientific–technological development, economics, and social issues in Israel. The Institute's activity is designed to encourage educated public debate, promote, influence the decision making process of the State of Israel, and implement their recommendations.

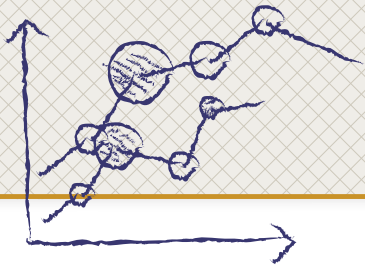
The Institute focuses on formulating national policies in the fields of science and technology, industry, schooling and higher education, social integration, infrastructure, environment and energy, and other issues of national importance, where the Institute can provide valuable input.

SNI pursues integrative policy documents and researchers independently choose their research topics, while the Institute is able to leverage their skills, their multi-dimensional expertise and the database accumulated over the years as a result of hundreds of infrastructure research studies.

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

The Institute supports national projects, such as the Ministry of Industry, Trade and Labor MAGNET program in nanotechnologies, media, optics and communication, chemistry, energy, environmental and social projects of national importance. The Institute organizes seminars on its leading fields of research.

The subjects addressed by SNI in 2016 include: Science, Technology, Industry, Economy and Human Capital led by Dr. Daphne Getz; Environment, Climate Change, Private/Public partnership in waste management led by Prof. Ofira Ayalon; Industry: Upgrading Israeli Industry, led by Dr. Gilad Fortuna; Israel's Land Policy and Housing Prices, led by Prof. Rachelle Alterman; Migration, Society and Societal Resilience led by Dr. Reuven Gal; the Wheels of Life report on Israel, led by Prof. Shlomo Maital; and National infrastructure, Shipping, Ports and Import of Vehicles in Israeli Ports led by Prof. Yehuda Hayuth. In addition national projects were addressed, such as the Grand Strategy for the State of Israel, led by Prof. Tadmor; Empowerment of Classical Industries led by Giora Shalgi; Information Technologies led by Yosef Linnheart; Mathematical Education in Schools led by Prof. Nitsa Movshovitz-Hadar; and Future of Chemistry Education led by Prof. Judith Dori.



Technion Research and Development Foundation

TRDF comprises different divisions: the Research Authority (which handles Technion-sponsored research, research ties with the European Union, research with industry, and universities abroad); the Unit for Continuing Education and External Studies; the Israel Institute of Metals, and the Technion Technology Transfer (T3) office which handles the commercialization of intellectual property and patents, technological accelerators, and Economics Ministry programs. These four TRDF units are supported by the TRDF Human Resources office, a TRDF Financial Management office, and a dedicated in-house legal team.

Financial Management

In accordance with the instructions of the Ministry of Finance and the Budget and Planning Committee, the balance sheets of Technion and TRDF are integrated. The projected profit for the period October 1, 2015 to September 30, 2016 is approximately NIS76M, not including the estimate for the actuarial maintenance of pensions. The financial balance of this period is influenced by the almost NIS33M in pension payments to 377 retired workers. The continued improvement in the financial situation is a result of growth in income from IP and increased research activity.

Part of the TRDF management (personnel and wages) was relocated to the MALAT building to a temporary location, while waiting for the renovation of the entrance floor. They joined T3, which moved to MALAT the previous year. The Research Authority will also get additional renovated space due to personnel increase.

Israel Institute of Metals

The Institute of Metals promotes the development of modern material systems in local industry. While in the past this focused on metals and alloys, modern materials engineering now includes, corrosion and coatings, high performance ceramic systems, high thermal conductive materials, materials for growing the local biomedical market and functional metal based composites. Most of the institute activities are collaborations with industry. About 45 percent of the institute's income is derived from research funded by government offices, industry, the European Union and international industrial projects. Approximately 55 percent of the income comes from testing for industry. In 2016, the institute's turnover was approximately 21M NIS and the operational profit stood at 1M NIS.



In order to play a pivotal role in materials development in Israel the Metals Institute established a cutting-edge center for metal 3-D printing technologies. The center includes modern equipment in the field, including two powder bed metal printers (Electron Beam and Selective Laser Melting), high vacuum thermal treatment furnace and advanced powder characterization equipment.

During 2016, the Metals Institute led several activities in the field of metal 3D printing (additive manufacturing), including a key role in the Israeli consortium for development and production of titanium aero-structures ("AATiD"), multilateral collaboration projects for improvement of metal 3D printing processes and national activities for implementation of advanced manufacturing processes in Israeli industry.

Azrieli Division of Continuing Education and External Studies

The Azrieli Division of Continuing Education and External Studies specializes in developing advanced study programs for university graduates in engineering and science domains. It also grants diplomas to senior professionals in engineering, architecture, medicine, administration and teaching through specially designed courses. All advanced courses and programs for Master in Engineering (ME), Master of Business (MBA), Master of Real Estate (MRE), Master of Urban Engineering (MUE) or Master of Industrial Design (MID) are carried out in collaboration with the relevant Technion faculties and interdisciplinary committees. Since January 2015, Prof. Zeev Gross serves as the dean of the division.

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

The division operates out of three centers: the Haifa Technion campus, the Technion-Azrieli Sarona Campus in Tel Aviv, and the Azrieli College of Engineering in Jerusalem. This geographical distribution offers accessibility to a large population of Technion graduates and other professionals in different parts of the country. The Technion-Azrieli Sarona Campus in Tel Aviv was opened in July 2013 and teaching began soon after. The campus consists of three buildings in historic Sarona. After close to sixty years of operating in Tel Aviv in various ad-hoc locations, the division finally has a home and a real campus.

The response of students is very positive and preliminary data indicates a substantial increase in prospective students for the summer and fall of 2016, and up through January 2016 more than 1,350 students have used the facilities on campus.

The programs offered in the current academic year are:

- Programs leading to academic degrees:
- MBA – Master in Business Administration, with emphasis on high-tech
- ME – Master in Engineering in:
 - Systems Engineering
 - Biomedical Engineering
 - Civil Engineering, with emphasis on development and business management in construction



- MID – Master of Industrial Design
- MRE – Master of Real Estate
- MUE - Master of Urban Engineering

All the programs, except MUE, are offered in Tel Aviv and the programs in MRE, MUE, ME in System Engineering and Biomedical Engineering are offered at the Haifa campus as well. More than 600 students are currently studying in the seven masters degree programs offered by the Azrieli Division of Continuing Education and External Studies. At the last graduation ceremony in June 2016 about 35% of all master's degree graduates (excluding direct PhD) were students from the Division of Continuing Education and External Studies. In 2017 we expect a similar number.

Programs for certification:

The Azrieli Division of Continuing Education and External Studies offers a large variety of professional programs and courses that are non-degree. These courses are intended typically for graduates of Technion or other universities, who are working in industry. The courses are divided into six main categories: Computers; Design; Management; Coaching; Photography; and Real Estate.

These include unique courses, carefully designed to match the industry needs, such as Introduction to Oil and Gas Technologies, International Negotiation, Construction Project Management and Software Security.

In addition to programs open to the general public, the division teaches tailored programs for companies and organizations such as the Ministry of Defense, Israel Railways, Rafael, HP and Israel Aircraft Industries.

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

The Continuing Education School for medical doctors, in collaboration with the Faculty of Medicine, offers nine programs in fields such as gynecology, pain medicine, cardiology, and orthopedics. About 400 medical doctors study in these programs that range from one semester to three years. The Haifa center also offers a separate program in family medicine which has 120 MD students.

The division conducts three diploma programs that are sponsored by MASA and NATIV agencies, for students from Russia and FSU, holding a bachelor's degree in information management, computer science or related fields. During 2017 more than 200 students will graduate from these programs.

International Collaboration:

The Division develops programs in collaboration with leading academic institutions worldwide, to provide professional services for students in Israel who want to obtain leading tools in their field. During 2015, the Division conducted a unique oil and gas related study program in cooperation with the University of Austin, Texas (UT). Beginning in 2016, the Division conducted a unique biannual negotiation workshop in collaboration with Harvard Law School.



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

In the year 2015-16, T3, the unit for business development actively promoted several initiatives that will hopefully contribute to turning the Technion into a hub of innovation, not only for Technion faculty and researchers but also for alumni.

AMIT – Alfred Mann Institute at the Technion

2015-16 is marked as a year of transition for AMIT, transforming it from a Technion BioMedical R&D program into an innovation hub that supports biomedical companies created by Technion students, faculty and alumni. During 2015-16 AMIT's Board of Directors approved investment in three new companies formed by Technion alumni: nanofiber and sealant technology, anastomosis protection device for colorectal surgery and real time kidney monitoring.

In total, in 2015-16 AMIT invested over 1.8 M dollar in five of AMIT's portfolio companies.

Sanoculis (surgical procedure for the treatment of glaucoma), an AMIT graduate company, completed a \$1M investment round.



T3 Event

Number of Patent Applications: During 2015-16, 104 Technion invention disclosures were submitted. Of these, 89 were approved for registration. This year there was a significant shortage of applications in the fields of life sciences (particularly medical equipment and new molecules), fields that traditionally provide a central source of commercial success for academic institutions. The division between T3 and the Rappaport Institute and BioRap on the one hand, and the Rambam Medical Center on the other, creates difficulties to protect and commercialize Technion life sciences IP. This fragmentation limits the Technion's ability to effectively capitalize on its ingenuity in these fields.

At the end of 2015-16 the Technion's patent portfolio included 624 active patent families, of which 445 patent families are available for commercialization.

Licensing Agreements: In 2015-16, T3 signed over 50 commercialization agreements. Of these 15 MOUs were signed in various fields including, tuberculosis, barcode diagnostics, metal air, delivery technologies, medical screening through breath analysis, authentication system, heavy metals detection in aquatic animals, real time bacteria detection, computational biology software platform,



isolation and analysis of individual cells, antimicrobial food packaging and others.

Five license agreements were signed with new companies including: medical screening through breath analysis, heavy metals detection in aquatic animals, real time bacteria detection, delivery technologies and computational biology software platform. In addition two license agreements were signed with companies licensing technologies, in fields of tuberculosis and medical diagnostics. In addition, three “Magnetron” agreements were signed with leading companies in Israel, including: RAFAEL and Applied Materials; four “Nofar” agreements were signed with companies including: Tortechn Nano Fibers, Israel Aerospace Industries and InterLab.

Income from Commercialization: In the past year, TRDF income from commercialization and/or the monetization of Technion IP rights by other means amounted to over \$20M (including the researchers’ share). This does not include income following the enforcement of Technion IP rights via legal or semi legal procedures, income from research agreements resulting from commercialization agreements, and income from patent expenses reimbursement. In 2015-16 income from these sources totaled over 1.5 M USD.

Proof-of-Concept Grants: A total of \$40,000 were invested from the Uzi and Michal Halevy Fund (2 projects). Four proof-of-concept grants were also awarded from the Spira Fund. The “Kamin” Fund, which functions according to R&D regulations and is administered by the Israel Innovation Authority, continues to be significant. Kamin supports extended proof-of-concept research with the specific end-goal of technology transfer. The 2015/16 budget approved for Technion projects supported by the “Kamin” Fund exceeded \$2.3M, bearing testimony to the commercialization potential of technologies developed by Technion researchers.

Fundraising by Technion Companies: During the past year, 26 Technion related companies raised approx. \$100M. Among the companies which raised considerable amounts are: Nutrinia (developing pharmaceuticals to treat rare conditions of the gastrointestinal tract), Regentis Biomaterials (developing and commercializing an innovative hydrogel platform for the repair of damaged tissue), Metabomed (a drug discovery company in the field of cancer metabolism with a proprietary target identification platform based on computational biology and metabolomics) and Eloxx (discovery, development and commercialization of compounds for the treatment of genetic diseases caused by nonsense mutations).

TRDF invests considerable efforts to protect its share in the various companies by participating in follow-on investment rounds and maintain its pro-rata share. TRDF invested more than \$540,000 in affiliated companies within this framework. The Technion Investment Opportunities Fund (TIOF),



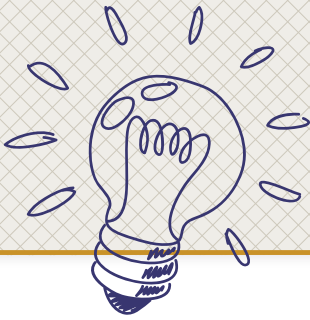
Technion DRIVE Accelerator, a 9 month acceleration program for pre-seed and seed projects



whose function is to invest in Technion-related companies in order to preserve the scope of Technion's holdings, invested over \$2M (in nine companies). The largest investment this year by the fund were in: Metabomed, Nutrinia, Sealantis, and Eloxx.

Technion Accelerator

In 2015-16 a Technion Accelerator Pilot Program named T-Factor was set up to explore additional avenues for the TRDF to help Technion students, faculty and alumni 'invent their jobs' and pursue their vision by providing proof of concept funds, mentoring, fundraising support, educational programs, office space, administrative support etc. In 2015-16 five projects joined this pilot program, including projects focusing on mobile dialysis machines, smart bottles for dietary & nutritional supplements, an authentication system, heavy metal detection in aquatic animals, multi-spectral camera tagging. This pilot was concluded towards the end of 2016 and was followed by the establishment of the DRIVE Accelerator implementing the lessons learned from T-Factor and based on a TRDF investment of \$2.5M.



Faculty Achievements

Ocean Detectives

In their article published in *Current Biology*, researchers present new findings about viruses that attack microorganisms from one of the archaeal marine groups (Euryarchaeota). Little is known about this group, and the team's findings shed light on the interaction between key groups in the marine ecosystem.

In the study conducted by Dr. Alon Pilosof, under the supervision of Prof. Oded Béjà of the Faculty of Biology, samples of dozens of liters were collected from the surface water layer in the Gulf of Eilat, from which DNA segments were sequenced. The researchers used the DNA segments to identify the microorganisms living in these waters and assembled the DNA segments computationally – a method similar to putting together a jigsaw puzzle from millions of pieces without a picture to serve as a guide. In doing so, they were able to reconstruct the genomes of viruses that attack the marine archaea. In all, 26 viruses that were previously unknown to science were detected in the study.

Environmental microbiology, especially in the oceans, is one of the last frontiers of ecology. The results of this study shed new light on the evolution of an important archaeal group and its viruses.



Prof. Oded Beja (L), Dr. Alon Pilosof (R)

Remote Functionalization

Researchers at the Schulich Faculty of Chemistry have reported a paradigm shift by functionalizing organic molecules at a very distant position of the most reactive site. The article, published in Nature Communications, is co-authored by Prof. Ilan Marek, head of the Mallat Family Laboratory of Organic Chemistry, Dr. Sukhdev Singh, Jeffrey Bruffaerts, and Dr. Alexandre Vasseur.

The group has managed to transfer chemical information from the original location of the functional group to a remote point in the molecule, in a single process (one-pot operation) and independently of the molecular distance between the two points. By using a strained structure in the molecular backbone, the migration of the information releases the strain and allows the creation of several chiral carbon centers, that might have far-reaching applications in the academic world, but also for chemical industries and in particular for pharmaceutical companies.

Technion Researchers Develop Innovative Boat

An innovative research vessel has been developed at Technion to test a novel design approach. Technion scientists built the speedboat to test their new design procedure that makes it possible to significantly reduce the vessel's scantlings – the dimensions of the frame – thus reducing its weight, increasing its speed, and reducing its fuel consumption.

Dganit was designed and built over the past three years by Profs. Nitai Drimer and Daniel Rittel from the Faculty of Mechanical Engineering; Sela Ltd. and Sherman Carmel, two firms owned by Benny Danino; and by postgraduates Yahav Moshkovich, Or Neuberger, and Oren Rijensky.

Speed boat design, explains Drimer, involves trade-offs between the lightweight needed for speed, and the strength needed to resist the force of the waves while cruising at high speed in the open sea. "The most common concept for speed boats," explains Drimer, "is planing, where most of the boat's weight is supported by hydrodynamic lift. Having so much of its mass outside the water reduces water resistance and speeds up the boat. The problem is that in rough seas, planing exposes the hull to great slamming pressure by the water impact." Conventional practical design treats the slamming pressure as quasi static. "We take a more complex, exact approach to wave-boat interactions, based on a design philosophy, an algorithm, and analytical tools we have developed."



Dganit boat at sea



Deep Learning

Prof. Michael Elad and his PhD students Vardan Papyan, Jeremias Sulam, and Yaniv Romano have presented a broad theory that explains many of the important aspects of multi-layered neural networks, which are the essence of deep learning. "One could say that up to now, we have been working with a black box called a neural network," Elad explains. "In our study, we managed to open it up, analyze it, and provide a theoretical explanation for the origins of its success. Now, armed with this new perspective, we can answer fundamental questions such as failure modes in this system and ways to overcome them. We believe that the proposed analysis will lead to major breakthroughs in the coming few years."

"We propose a hierarchical mathematical model for the representation of the treated information. The neural network's job is to break up the complete information into its components in order to understand the data and its origin."

Prof. Elad emphasizes, "Our expertise in this context is related to handling signals and images, but the theoretical paradigm that we present in the article could be relevant to any field, from cyberspace to autonomous navigation, from deciphering emotion in a text to speech recognition."

New Types of Antibiotics

The highly pathogenic *Staphylococcus aureus* bacteria is one of the five most common causes of hospital-acquired infections. In the US alone, approximately 500,000 patients in hospitals contract a staph infection. It is the bacteria responsible for MRSA, for which there is no vaccine.

All that could change thanks to groundbreaking findings published in *Science* by a team led by Asst. Prof. Meytal Landau of the Faculty of Biology. The researchers discovered a novel form of an amyloid fibril whose three-dimensional structure was determined at atomic resolution, revealing the first-of-its-kind structure of this toxic fibril.

Prof. Landau estimates that the new discovery will lead to the development of antibiotics with a new action mechanism. Such drugs will inhibit the amyloid formation thereby neutralizing one of the important weapons in the arsenal of this pathogenic bacterium. In her opinion, since this antibiotic is not aimed at killing the bacterium but only reducing its toxicity to humans, it will not lead to a rapid development of bacterial resistance towards it.



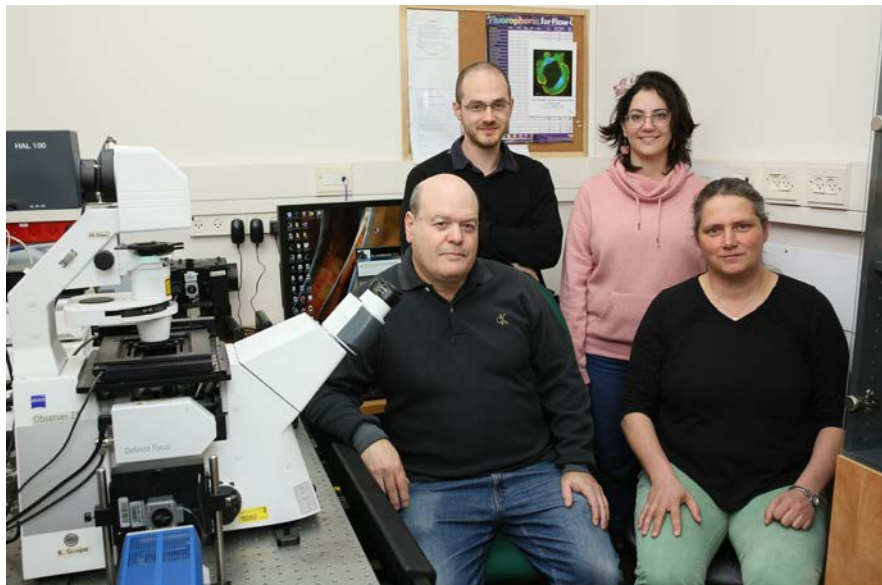
Prof. Meytal Landau, PhD student Einav Tayeb-Fligelman, Dr. Orly Tabachnikov (L to R)

Moons Collided To Form Our Moon

A newly proposed theory published in Nature Geoscience by researchers Asst. Prof. Hagai Perets, of Technion, and Raluca Rufu and Prof. Oded Aharonson of the Weizmann Institute, runs counter to the commonly held “giant impact” paradigm that the moon is a single object formed following a single giant collision between a small Mars-like planet and the ancient Earth. The researchers suggest that the Moon we see every night is not Earth’s first moon, but rather the last in a series of moons that orbited the Earth in the past.

“Our model suggests that the ancient Earth once hosted a series of moons, each one formed from a different collision with the proto-Earth,” said Perets. “It’s likely that such moonlets were later ejected, or collided with the Earth or with each other to form bigger moons.”

The new model is consistent with science’s current understanding of the formation of the Earth. The tidal forces from the Earth could cause moons to slowly migrate outwards, as the current Moon is doing at a pace of about 1 cm a year. A pre-existing moon would slowly move out by the time another moon forms. However, their mutual gravitational attraction would eventually cause the moons to affect each other, and change their orbits.



????? – Photo with Erez Braun

How Hydras Regrow Body Parts

A study published in Cell Reports by Assoc. Prof. Kinneret Keren, Prof. Erez Braun, Lital Shani-Zerbib, and Anton Livshits of the Faculty of Physics suggests that pieces of hydras have structural memory that helps them shape their new body plan according to the pattern inherited by the animal’s “skeleton.” Previously, scientists thought that only chemical signals told a hydra where its heads and/or feet should form.

The main cytoskeletal structure in adult hydra is an array of aligned fibers that span the entire organism. Tampering with the cytoskeleton is enough to disrupt the formation of new hydras, the researchers found. In one experiment, the researchers cut the original hydra into rings, which folded into balls that contained multiple domains of aligned fibers. Those ring-shaped pieces grew into two-headed hydras. However, anchoring the hydra rings to stiff wires resulted in healthy one-headed



hydras, suggesting that mechanical feedbacks promote order in the developing animal.

Hydras are much simpler than most of their cousins in the animal kingdom, but the basic pattern of aligned cytoskeletal fibers is common in many organs, including human muscles, heart, and intestines. Studying hydra regeneration may lead to a better understanding of how mechanics integrate with biochemical signals to shape tissues and organs in other species. “The actomyosin cytoskeleton as the main force generator across the animal kingdom,” says Keren. “This is very universal.”

Crucial Enzyme for Tumor Development

An international team led by researchers from the Rappaport Faculty of Medicine and the Technion Integrated Cancer Center (TICC) has discovered a biological pathway that plays an important role in tumor development. Published in *Cell Reports*, the findings could lead to cancer-fighting drugs that work by shortening the shelf life of select cancer-promoting proteins known as oncoproteins. Led by Assoc. Prof. Amir Orian, the researchers found that RNF4 -- a ubiquitin enzyme first detected in fruit flies, and later in human cancer cells -- binds to these oncogenic proteins and provides them with a stabilizing structure. RNF4 itself is not an oncogenic protein, but oncogenic proteins and cancer cells are highly dependent on it.

“We have demonstrated that removing RNF4 leads to the death of the cancer cell, and hence the potential application of the discovery: the development of drugs that will inhibit the activity of RNF4 and significantly shorten the half-life of oncogenic proteins even in scenarios that they are abnormally stabilized, thus indirectly eliminating the cancer cell,” said Orian.

One surprising twist to the team’s findings is the role played by the ubiquitin system, which is best known as being responsible for the degradation of regulatory and damaged proteins. In this case, said Orian, it does the exact opposite – it stabilizes the cancer proteins and prevents their degradation.

Personalized Cancer Therapy

Using synthetic DNA sequences as the tiniest of barcodes, researchers have developed a new diagnostic technology for determining the suitability of specific anticancer drugs to a specific patient – before treatment even begins. The study, published in *Nature Communications*, was led by Asst. Prof. Avi Schroeder of the Faculty of Chemical Engineering and the Technion Integrated Cancer Center (TICC).


Together with other researchers, Prof. Schroeder created a safe, miniature lab in each patient’s body, which examines the effectiveness of a specific drug in that patient. They packed miniscule quantities of anticancer drugs inside of dedicated nanoparticles they developed. The unique design of the anticancer drug-loaded nanoscale packages gives them the ability to flow in the bloodstream to the tumor, where they are swallowed by the cancer cells. Synthetic DNA sequences attached to the anticancer drugs serve as barcode readers of each drug’s activity in the cancer cells; the barcode analysis provides accurate information about cells that were or were not destroyed by each drug.

The study focused on the effect of various drugs on Triple Negative type breast cancer – a particularly challenging cancer that does not respond well to standard treatment.

Photovoltaic Cells – 70% Efficiency

Technion researchers have developed a technology that could improve the efficiency of photovoltaic cells by nearly 70%. The study was conducted at the Excitonics Lab, headed by Asst. Prof. Carmel Rotschild of the Faculty of Mechanical Engineering, with the assistance of the Grand Technion Energy Program (GTEP) and the Russell Berrie Nanotechnology Institute (RBNI).

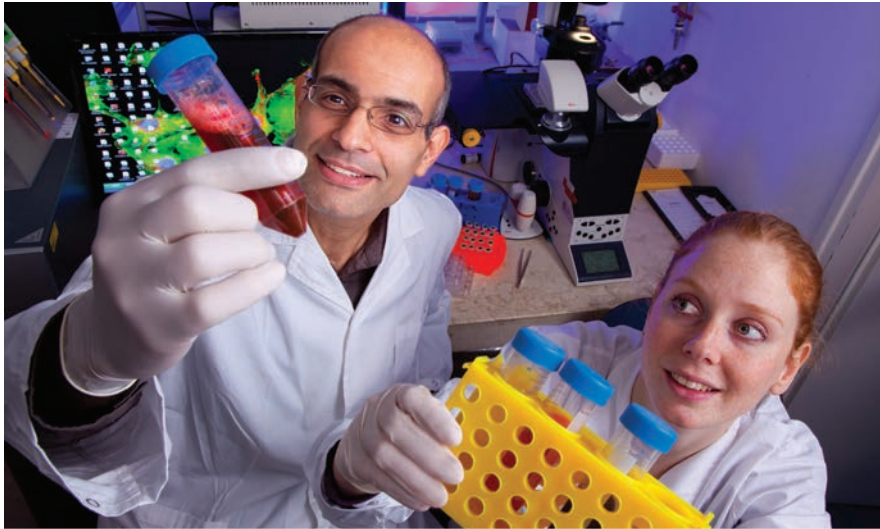
Photovoltaic cells optimally utilize a very narrow range of the solar spectrum – the broad light



supplied by the sun; radiation not within this narrow range merely warms these cells and is not utilized. This energy loss limits the maximum efficiency of current solar cells to around 30%.

The novel method is based on an intermediate process that occurs between sunlight and the photovoltaic cell. The photoluminescence material they created absorbs the radiation from the sun, and converts the heat and light from the sun into an “ideal” radiation, which illuminates the photovoltaic cell, enabling higher conversion efficiency. As a result, the device’s efficiency is increased from 30% (the conventional value for photovoltaic devices), to 50%.

The group hopes to demonstrate a full operating device with record efficiency within five years.



Prof. Yuval Shaked (l)

Cancer Treatment a Double-Edged Sword

Even with today’s safer and increasingly targeted anti-cancer drugs, scientists have been unable to explain why treated cancers often reoccur. The common theory is that the cancer cell develops internal resistance to treatment, and overrides the toxic effects of the drug.

Findings by a team led by Prof. Yuval Shaked of the Faculty of Medicine and the Technion Integrated Cancer Center (TICC) could provide the key for reducing recurrence, and allowing anti-cancer drugs to work as intended. In their study published in *The Journal of Pathology*, the team shows that tumor relapse occurs when the body mobilizes itself in favor of the tumor, causing recurrence of the disease, increasing its aggressiveness, and creating metastases or tumor spread.

Shaked explains, “The body responds to chemotherapy the way it responds to trauma. This creates a double-edged sword: although chemotherapy kills cancer cells, it also causes the secretion of substances that confer resistance to the tumor. Even more selective treatments, with fewer side effects, cause physiological reactions that increase the aggressiveness of the disease. Ultimately, we are talking about a trade-off between the intensity of the treatment and the intensity of the physical response. The moment the ratio is in favor of the treatment and to the detriment of the response, we will achieve effective treatment without a ‘fine’ in the form of enhanced metastasis. In addition, we can inhibit the body’s response using existing drugs, thereby enabling the anticancer drugs to get the job done.”



1st Observation of Hawking Radiation

Known as Hawking radiation, elusive radiation emanating from black holes is too weak to observe with current techniques and remained a “holy grail” until Prof. Jeff Steinhauer’s observations in an analogue black hole created in his Atomic Physics Lab at the Faculty of Physics. Steinhauer’s latest findings, published in Nature Physics, describe the first observation of thermal, quantum Hawking radiation in any system. Pairs of phonons (particles of sound) appear spontaneously in the void at the event horizon of the model black hole, and it is the correlations between these pairs that allow for the detection of the Hawking radiation.

Steinhauer explains, “Using a technique we developed, we saw that high energy pairs were entangled, while low energy pairs were not. This entanglement verifies an important element in the discussion of the information paradox as well as the firewall controversy.” This observation verifies Hawking’s semiclassical calculation, which is viewed as a milestone in the quest for quantum gravity. The observation of its entanglement verifies important elements in the discussion of information loss in a real black hole.

Steinhauer has been working since 2009 to simulate a black hole. Steinhauer says that evidence for the existence of quantum Hawking radiation brings us one step further in our endless journey of discovering the laws of the universe.

Brain Power

Technion researchers are exploring a possible effect of placebo on the immune system. According to findings, the brain’s “reward system” transmits messages via the sympathetic nervous system, which affect the immune system. The article, published in Nature Medicine, presents the work of Asst. Profs. Asya Rolls and Shai Shen-Orr from the Rappaport Faculty of Medicine. The study was led by Tamar Ben-Shaanan, a doctoral student in Rolls’ lab.

“Placebo is a complex phenomenon in which the patient’s expectation of recovery affects his state of health,” explains Rolls. “Expectation of improvement and the arousal of positive emotions are reflected in the brain.” Using innovative technology, the researchers triggered the reward system in the brains of mice and examined the behavior of the immune system following this intervention. Their findings show that triggering the reward system causes the immune system to operate more effectively. Due to the intervention, the immune system created a more robust immune memory against the bacteria it was exposed to and will therefore operate more effectively the next time it is exposed to the same bacteria. The researchers also mapped the route through which the message passes from the brain to the immune system -- the sympathetic nervous system, which is responsible for immediate response in emergencies.

1st Water-Wave Laser

Technion researchers have demonstrated that laser emissions can be created through the interaction of light and water waves. This “water-wave laser” could some day be used in tiny sensors that combine light waves, sound, and water waves, or as a feature on microfluidic “lab-on-a-chip” devices used to study cell biology and test new drugs. For now, the water-wave laser offers a context for scientists studying the interaction of light and fluid at a scale smaller than the width of a human hair.

The study, published in Nature Photonics, was conducted under the supervision of Prof. Tal Carmon, head of the Optomechanics Center in the Faculty of Mechanical Engineering. The study is first to bridge two areas of research that were previously considered unrelated to one another: nonlinear optics and water waves.

A typical laser can be created when the electrons in atoms become “excited” by energy absorbed from an outside source, causing them to emit radiation in the form of laser light. Carmon and his colleagues now show that water wave oscillations within a liquid device can also generate laser radiation.

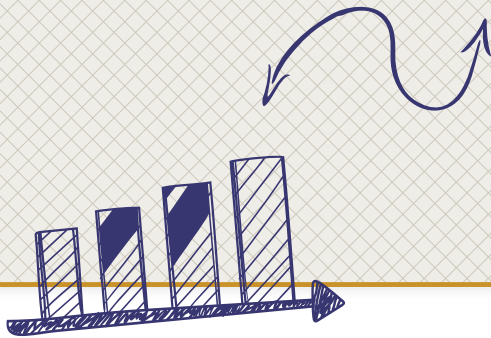


Hydrogen on Demand

Technion researchers have developed a new method for the production of hydrogen from water using solar energy, which will make it possible to produce hydrogen in a centralized manner, cost-effectively, safely, and efficiently. In findings published in *Nature Materials*, the researchers explain that this approach will make it possible to produce hydrogen at the point of sale. The new technology is expected to significantly reduce the cost of producing the hydrogen and shipping it to the customer. The study was led by Avigail Landman, a doctoral student in the Nancy and Stephen Grand Technion Energy Program (GTEP), and Dr. Hen Dotan from the Electrochemical Materials and Devices Lab, along with Dr. Gennady Shter from the Wolfson Faculty of Chemical Engineering.

The new process allows geographic separation between the solar farm consisting of millions of photoelectrochemical (PEC) cells that produce oxygen, and the site where the hydrogen is produced. This is accomplished with a pair of auxiliary electrodes made of nickel hydroxide, an inexpensive material used in rechargeable batteries, and a metal wire.

"Our method could successfully compete with existing water splitting methods and serve as a cheap and safe platform for the production of hydrogen," says Ms. Landman.



Administration and Finance

Israel's Economy in 2016 ¹

On a sunny winter day in February, Prime Minister Benjamin Netanyahu and Finance Minister Moshe Kahlon doffed their neckties and ventured out into the streets of Jerusalem to celebrate in Netanyahu's words "an excellent year for the economy". They stopped at a hummus stand and ate hummus, pita, bean soup, ful (fava beans) and Turkish coffee, with the scene streamed on Facebook Live.

But was it truly an excellent year? Actually, it was, relative to the U.S. and OECD (the club of 35 developed nations).

Gross Domestic Product (GDP) grew by 4 % in 2016, spurred by torrid 6.2 % growth (annual rate) in the fourth quarter. Business-sector GDP grew by 4.7%. The engines of growth were consumer spending, which rose by about 6 %, and a spurt in investment (gross fixed capital formation), both in residential building and in industry. Israel's economic growth compares favorably with that of the United States (1.5%), OECD (1.7%) and the world (2.9%).

In May 2016, the rate of unemployment fell to its lowest level in 33 years, 4.8 per cent, and then fell even further, to 4.3 % in December, regarded by many as full employment.

The Tel Aviv Stock Exchange TASE 25 stock index fell by 3.8 % in 2016, after rising 4.4% in 2015 and 10.2% in 2014. This figure is somewhat misleading, because three major pharma stocks – Teva, Mylan and Perrigo – with disproportionate weight in the TASE25, dragged the index down at year's end, while other stock indexes rose sharply. TASE 75 index rose 17.3 %, and the TASE MidCap 50 Index (medium size companies) rose by 24.4 %. The TASE 25 index has now been revised; the new TASE 35 will reduce the pharma stocks' impact.

Israeli high-tech startups continued to rack up major exits and initial public offerings in 2016, totaling \$10.02 billion, up 12% from 2015. However, 44% of that sum came from one deal, the takeover of Playtika by a Chinese online gaming company, one of Israel's largest all-time exits. All in all, there were 93 mergers and acquisitions. Experts noted that the pace of exits and IPO's slowed noticeably in 2016.

At the end of 2016, Israel had 73 companies listed on NASDAQ. More than 300 global companies had R&D centers in Israel, and according to the Bank of Israel, there were more than 5,000 startups, of which 430 were in cyber security. In 2016, Israel ranked 21st in the IMD's World Competitiveness rankings, 21st in the Global Innovation Index, but only 52nd (out of 190 countries) in the World Bank's Ease of Doing Business rankings.

Immigration to Israel slowed markedly. Falling immigration from France and Ukraine led to some

1. This report was prepared by Prof. (emer.) Shlomo Maital, senior research fellow at the S. Neaman Institute for National Policy Research, Technion.



27,400 immigrants during 2016, down 12 % from 2015. About 5,700 immigrants came from Ukraine, and just over 5,000 from France, or around 38 % of the immigration total. Immigration from the U.S. remained stable at about 3,000.

Israel's trade deficit – the gap between imports and exports -- doubled in 2016, from \$7.8 b. in 2015 to \$13.6. This was the result of a 3% fall in exports and 6% rise in total imports. One cause was the appreciation (rise in value) of the shekel, which made exports more expensive and imports, cheaper.

Even though the dollar rose strongly relative to most other currencies in 2016, the shekel strengthened by 2.5% relative to the dollar and is by some measures at its highest level since 1984. Bank of Israel continued to buy dollars to keep the strong shekel from rising excessively and thus hurting exports, and bought \$8 billion in 2016, bringing Israel's foreign exchange reserves to over \$100 b., an all-time high. The shekel-euro exchange rate too is now at a 14-year high.

The Bank of Israel continued to expand money and credit in 2016. The amount of cash and demand deposits, known as M1, rose by 17.3 %, while the broader monetary aggregate, M2, rose by 8 %. Despite the expanding money supply, inflation remained very low in 2016, with the consumer price index actually declining by 0.2 %, the second straight year of negative inflation. The reason the credit bulge has not generated price rises is that the velocity of money (the rate at which money changes hands) has slowed. The Bank of Israel plans to reach its inflation target of 2% by year end, to spur the economy. Housing prices continued to rise in 2016, by 8 %, though some measures showed prices fell slightly in December, the first decline in years.

Israeli government debt continued its 7-year decline in 2016 and has now fallen from 75.3 % of GDP in 2009 to about 62% in 2016. This is in part because government budget deficits have been modest, 2.2 % of GDP in 2016, the same as in 2015, due to higher-than-expected tax revenues.

Summing up 2016 to the Jerusalem Press Club, Bank of Israel Governor Karnit Flug said, "our macroeconomic situation is very good and I think the economy has great potential, but we only utilize a portion of our strengths and our resources". On many occasions, Dr. Flug has noted Israel's lagging productivity (output per hour). Labor productivity is only 76 % of the OECD average and the gap is not closing.

Income inequality in Israel remains high, among the highest of all OECD nations. Measured by those below the poverty line and by spendable income, Israel ranks below all 35 OECD nations except Mexico in equality. However, a Finance Ministry report states that consecutive years of economic growth since 2007 have benefited lower-income groups more than higher earners, partly because of lower income tax rates. Real wages rose by about 2.5 per cent in 2016, even though more Israelis joined the labor force and hence labor supply rose. In 2016 labor force participation rose to 80.7 % of the working-age population, higher than the OECD average.

The outlook for 2017 is quite bright. According to OECD economists, "despite the appreciation of the currency and ongoing weakness of foreign demand, growth is projected to be robust in 2017 and 2018. The accommodative monetary stance and higher wages for the low-paid will bolster consumption, while investment will benefit from the launch of projects by major hi-tech firms and government measures to promote housing and transport. The current account surplus should shrink, unemployment remain low, and inflation increase steadily within the targeted range of 1-3%, driven by pay rises."



Budget and Finance

Operating Budget

The operating budget covers all of the Technion's operational activities, including salaries and pension payments, student fellowships and scholarships, faculty recruitment, maintenance and other expenses. About seventy percent of budgeted expenses are designated for staff emoluments and pension payments. On the other hand, about the same percentage of this budget is covered by the government's allocation. The support of the government is transferred to the Technion, as to all others Israeli universities, via the P&BC, the Planning and Budgeting Committee of the Council for Higher Education.

The main challenges and emphasis for the upcoming years are recruitment and absorption of new faculty members, upgrading the quality of teaching and upgrading of physical facilities.

The Technion has managed to recruit about 150 new faculty members over the last five years, around 30 faculty each year. Last year, the Technion's student body numbered around 14,300 (undergraduates and graduates), with continuing tendency of increasing the number of doctoral students. The increased senior academic positions and new faculty recruitment will reflect on the students per faculty ratio to result in enhanced academic quality and strength. During the last ten years, the technical and administrative staff was reduced by about 5%. The general approach is to reduce administrative positions and reallocate some of them to engineering positions.

2015/2016 Budget Year

The 2015/2016 budget year ended with a deficit of NIS 28.6 million, slightly lower than budgeted. The deficit was covered by withdrawals from Technion's reserves.

2016/2017 Budget Year

The 2016/2017 budget framework is NIS 1,455 million. It includes an increase of NIS 13 million (in 2016/2017 prices) for expansion of academic and other activities and a NIS 30 million deficit (about 2.1% of the budget framework). The table below shows the budget summary (in NIS million):

Salaries	749	51%
Pensions	276	19%
Student fellowships, scholarships, etc.	111	8%
Maintenance	120	8%
Others	199	14%
Total Expenses	1,455	100%

P&BC	1,007	70%
Tuition	124	9%
Societies	70	5%
Self-income	224	16%
Total Income	1,425	100%

The deficit will be covered by withdrawals from Technion's reserves.



Development Projects

Development projects are managed by multi-year budgets and schedules. In the year 2015/2016, the Technion invested (cash and obligations) NIS 169 million (\$44 million) in development projects. Income for development projects amounted to NIS 215 million (\$61 million). The Technion policy is to approve new construction of buildings and large renovation projects only according to the income received or guaranteed for each project. Total investment in development projects in the last 10 years was NIS 1,753 million.

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

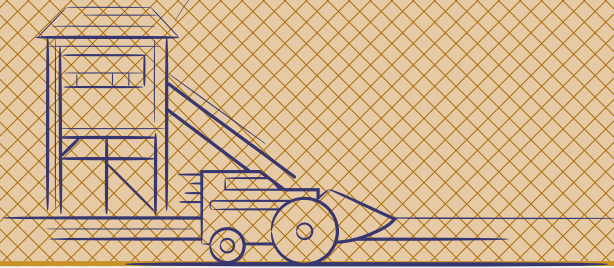
Category	Invested in Projects 2015/2016
Buildings, renovations, infrastructure	95
Multidisciplinary research centers	56
Equipment and Laboratories (not including laboratories establishment for new faculty members)	18
Total (NIS million)	169

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 an investment pool method. The investment policy is set and reviewed on a periodically basis by a public committee. The value of the portfolio on September 30, 2016 was NIS 6,262.8 million (\$1,666.5 million). About 55% of the portfolio was in Israeli index-linked investments, 8% in foreign-exchange linked investments, 27% in shares, and 10% in liquid assets.

Pension Payments and Actuarial Liability

Pension payments to most of the Technion retirees are provided from the operating budget. In 2015/2016, pension payments were NIS 267 million, representing 19% of the operating budget; this year, they are expected to reach a total of NIS 276 million. This percentage is expected to remain unchanged 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, 2016 is NIS 7.3 billion (Including the TRDF - 7.9 billion).



Physical Development

The continuous construction and development of the campus towards an improved and supportive academic environment enables Technion students, researchers and faculty to promote their teaching and research activity.

All faculties have expansion plans in order to enable the recruitment of new faculty members. As some of the faculties have no space left to be renovated or adapted to the latest research needs, plans to create new space have been initiated: the new wing of Viterbi Electrical Engineering Faculty, the new wing of Materials Science and Engineering Faculty, the expansion of a studio wing for the Faculty of Architecture and Town Planning, and a new research building, which will be a joint venture between life sciences faculties.

One of the management's goals for increasing the number of students and new faculty living on campus has been achieved with the completion of the new undergraduate village, housing 488 students. In addition, zoning approval has been received for building two tower dorms on campus (one to house couples and families, the other for single students) with a total of 341 beds.

The Technion initiated the competition for rebuilding the existing dormitory tower for medical students on Allenby Street in downtown Haifa. The winning design is an innovative building, which will raise the quality of life and serve as a catalyst for urban renewal.



Winners of the design competition of the Technion's new medical student dormitories



In addition there is a continuous renovation and repurpose process of teaching and research facilities along with infrastructure upgrades. New learning centers are being inaugurated both in faculties and in public buildings. Ullmann Teaching Center, the teaching hub of the campus, which serves over 3,000 students a day, is being modified to meet updated requirements for health, safety, and accessibility with earthquake reinforcement, additional elevators and secure spaces. Also, an additional floor (8th floor) is being built for the construction of large lecture halls.

The most impressive project under construction is the development of new campus entrance gates, designed to reflect the technological institute.

The beautification of campus has been given special attention. The sidewalks and pedestrian street crossings all around the ring road were enhanced, with more lighting and street furniture added. New signage is proposed and will be implemented gradually.

The main projects underway are as follows:

Completed

- **Shulich Faculty of Chemistry** – renovation of laboratories, offices and library.
- **Rappaport Faculty of Medicine** - renovation of research laboratories.
- **Undergraduate Student Village** – four dormitory buildings with 112 apartments for mainly single students, total number of 488 beds.
- **Grand Technion Energy Program** – research labs on an additional floor including “reinforced shelter-tower.”
- **Zielony Student Union Building.** – completion of learning center on the 4th floor.
- **Henry and Marilyn Taub and Family Science and Technology Center** - rooftop terrace.
- **Rosen Solid State Institute** – renovation of corridors and public areas , new entrance and site development, addition of a new lecture hall.
- **Wolfson Faculty of Chemical Engineering** – renovation of research labs and auditorium.
- **Canada Dormitory Village** – renovation and AC systems in buildings 932,950,951.
- **Rivkin Dormitories** – renovation of communal areas in building 104,105.
- **DeJur Dormitories** – renovation of communal areas in building 116.
- **Fire Prevention Zone: stage C** – road pavement and security improvements.



New Undergraduate Village



- **Various Faculties** – renovation of labs as part of recruitment of 30-35 new faculty members.
- **Campus Safety Upgrades.**
- **Accessibility for Physically Challenged Individuals** in various projects in campus buildings and outdoor areas.



Dedication of the new Academic Accessibility Support Center in the Beatrice Weston Unit for the Advancement of Students

Under Construction

- **Technion Campus Gates** – construction of two new entrance gates: Susan and David Wilstein Main Gate (Nave Shanan) and Nesher Gate.
- **Ullmann Teaching Center** – building reinforcement, additional elevators, addition of classroom floor (8th floor).
- **David and Janet Polak Visitors Center** – enlargement wing to the existing building for exhibitions.
- **Southern Palm Beach Chapter Expansion of Students' Counseling Center** – additional wing and accessibility arrangements for physically challenged individuals.
- **Faculty of Architecture – "Hadarion" Stage B** – renovation and restoration of former library building on Hadar Campus to house exhibitions on entrance floor, building an exterior elevator and site development.
- **Rappaport Faculty of Medicine** – renovation of library, Upgrading fresh-air supply and expansion of research labs.
- **Gutwirth Science Center** – upgrading the AC systems to conform to AAALAC standards in the pre-clinical research facility.
- **Danciger Building: Rafi Mehoudar Creative Design Center on the ground floor** – shared laboratories and new elevator for improving accessibility.
- **Canada Dormitory Village** – renovation and AC systems in building 933.
- **Forchheimer and Botnar Tower Dorms (160,161)** – new AC systems.
- **Sports Center** – roofing the outdoor multipurpose sports court, replacement of hot tub



relaxation center.

- **Various Faculties** – renovation of labs as part of the recruitment of 30 new faculty members.
- **Teaching Facilities** – ongoing renovation projects over the campus.
- **Campus Safety Upgrades**
- **Accessibility for physically challenged individuals** in various projects in campus buildings and outdoor areas.

In the Planning Stage

- **Tower Dormitory Buildings** – two high-rise buildings for families, couples and singles.
- **Zielony Student Union Building** – expansion of 4th floor to house International Technion Societies Study Center.
- **Henry and Marilyn Taub and Family Science and Technology Center** – learning center.
- **Student Dorms in Hadar Neighborhood** – design competition for the planning of new dorms complex in Technion's Hadar Campus.
- **Medical School Dormitory on Allenby Street** – demolition of existing building and design of a new modern dorm with 220 beds.
- **Cancer Research Center** – new building near Rappaport Faculty of Medicine.
- **Electrical Engineering Research Building** – new wing as part of the Andrew and Erna Viterbi Faculty of Electrical Engineering.
- **Computer Center** – new building including data center.
- **Center for Intelligent Composite Materials** – new laboratories wing as part of the Faculty of Materials Science and Engineering.
- **Andrew and Aviva Goldenberg Architecture Studio Pavillion** – new wing as part of Amado Building to house studios.
- **New Research Building** – for life-science laboratories.
- **Sports Center** – new multifunctional hall.
- **Teaching Facilities** – ongoing renovation projects over the campus.
- **Various Faculties** – Renovation of labs as part of recruitment of 30-35 new faculty members.
- **Campus safety upgrades.**
- **Accessibility for Physically Challenged Individuals** in various projects in campus buildings and outdoor areas.



Sustainability Hub

In order to meet the goals set by Technion's strategic master plan, which was approved by the Board of Governors in the summer of 2015, the Technion sustainability hub is now a part of the Construction and Maintenance Department.

The main goal is to establish the Technion as a leading university in environmental policy and campus management, in Israel and worldwide, and as a sustainable campus, by:

- Preserving and nurturing the unique natural environment in which the campus is situated.
- Striving to become a zero-carbon emissions campus through energy conservation and increased use of renewable energy.
- Drastically reducing the use of non-renewable resources.
- Increasing its role in environmental research and innovation and becoming a global leader in the field.
- Educating students, staff, and faculty members toward environmental leadership and responsibility.

Activities in 2016 include education and awareness raising, resource saving (water, energy, waste recycling etc.), pollution prevention and definition.

The focus of the passing year was to increase cooperation with the students' association, and the hub's involvement in every day management and future planned projects.

Main projects in 2016:

- **Presenting the Technion Sustainability Hub** in national conferences and hosting other campuses teams in the Technion campus. Regular reports and articles delivered to all Technion employees as part of the quarterly newsletter.
- **GreenTech Competition** for sustainable ideas and entrepreneurship – finals took place on April 2016.
- **Resource Saving:** taking part and supporting energy and water saving projects at the Technion, and raising awareness through lectures and other material such as newsletters and stickers throughout the campus. Promoting the use of 100% recycled paper on campus in cooperation with procurement department.



- Establishing the **Technion Sustainability Forum** with EWB (Engineers Without Borders, engaging in social technological activities round the world), the Technion Social Hub (in the Faculty of Architecture, promoting social activities in the Haifa area), PERACH project (students teaching science and environment in schools around Haifa) and ASAT (the Technion Students Association).
- The new and accessible “sustainability hub” website serves as a center for updates and information on environmental activities on campus <https://sustainability.technion.ac.il>
- **“Green Campus”** facebook page provides updates, green office tips and links to relevant articles from around the web. URL of the facebook page “Technion Green Campus”. Soon to be renamed as “Technion Sustainability Hub”
- The Technion green campus is a founder member of the **Green Campuses Forum** of universities and colleges around the country, to promote inter-university cooperation and alliance with organizations such as the Ministry of Environment and more.
- **Technion Greenhouse Gas (GHG) Emissions** reporting for the sixth year – the GHG emissions are calculated and reported to the Ministry of Environmental Protection's Voluntary Greenhouse Gas Registration and Reporting Program.
- **Waste collection and recycling** – around the campus and dormitories area.

Main plans for the coming year:

- Cooperation with the sustainability forum members
- Cooperation with the student society – waste collection, bicycle facilities, student activities
- Promoting sustainable project in campus – renewable energy, energy efficiency, water saving, etc.
- Promoting a healthier campus – encouraging stairs climbing, restricting smoking areas, etc.



Human Resources

Negotiations with Junior Faculty Association – In 2016, negotiations were held to complete a new collective agreement. The agreement principles were the delineation of the position of continuing teachers, advancement of the position of teaching faculty members at the Technion, in general, and additional salary payments. This agreement is in the final draft stage.

National agreements – Implementation of the 2016 administrative staff framework agreement has begun. Implementation of the new senior academic faculty collective agreement has begun.

Feedback workshop and regular interviewing of employees –The objective of the workshop is to create a process of organizational change that fosters effective communication between supervisors and employees, improves employee performance and attention regarding his or her job, team, professional and personal development or any other subject raised by the employee.

Employment of persons with disabilities A Technion-wide procedure for hiring persons with disabilities was circulated this year.

In addition, we are examining the possibility of running workshops for relevant Technion staff on the subject of access to service for people with disabilities.

Writing/updating HR procedures – Over the past year, a number of Technion procedures were issued; for example, on tuition fee exemption, supporting an employee on extended sick leave, awarding tenure to an employee, appointing a temporary replacement for an administrative staff, employee transportation, employment of people with disabilities, and request by a retiring employee to continue employment after retirement.

Unions – During the past year, two new chairpersons took their places – in the M4 Organization and the Practical Engineers Organization. The administration continues its policy of productive cooperation and ongoing dialog with the unions.

Continued integration of the HR SAP software:

- We are branding the electronic email signature with a uniform design for all.
- Personnel Development has completed programming the SAP letter issuing system.
- A control system was set up that has audit reports and can locate data in employee attendance records.



Recruitment

Recruitment has put the emphasis on HR problem solving and analysis of needs. We have advanced the onboarding process of new employees. This year we expanded recruitment sources using social networks.

Our recruitment and absorption processes were audited by the Technion Comptroller. Aspects that should be maintained and others that should be improved to achieve more efficiency were mapped. Among the many subjects that were examined were: planning recruitment activities, recruitment of family members, sharing information between the Technion and the Technion Research and Development Foundation Ltd., recruitment sources, placement tests, the process of internal and external tender committees, a salary determination mechanism, the process of updating candidates about their rights and the salary on offer, the onboarding process in the HR Division and the respective unit, managing computer system permissions.

Among the decisions that have been implemented: Collecting and entering data about family members into the employee's personal file in the SAP system.

The beginning of the process of writing an employee recruitment procedure. Expanding preliminary checks of candidates (familial relationship, information from social networks, etc.) prior to the tender committee. Directives regarding salary proposals for candidates.

Personnel Development In 2016, the Unit continued to put the emphasis on developing processes at the Technion, in line with that specified by the HR Division, and on the feedback given to employees during the trial period before receiving tenure.

Tenure Process

In the past year, 180 employees in various stages of the trial period before receiving tenure were given feedback. 49 employees received tenure this year.

92% of the employees whose tenure was discussed in the Tenure Committee received tenure.

It must be noted that the percentage of employees that receive tenure in the Tenure Committee has been increasing over the last few years, which we can attribute to improvement of the processes starting from the onboarding of the employee by the unit/faculty (resignation/dismissal of employees for whom getting tenure at the Technion in the stages prior to the Tenure Committee is inappropriate).

Outstanding Employees

There are two categories: Unit Outstanding Employees and Technion-wide Outstanding Employees.

In the past few years, changes have been made in how Technion-wide Outstanding Employees are chosen, with the aim being to validate the process and select the best employees.

This year, for the first time, the Outstanding Employees Ceremony was held separately from the Outstanding Lecturer Ceremony. Outstanding employees received a Certificate of Excellence and remuneration.

This year, too, we held a breakfast for Outstanding Employees, joined by the director-general and the deputy director-general. The purpose of the get-together is to encourage fruitful discussion with Outstanding Employees about excellence together with their direct superiors and the administration.

Educational software for prevention of sexual harassment

As part of sexual harassment prevention at Technion, we have begun a process of assimilating educational software for prevention of sexual harassment. Every new employee at the Technion is asked to respond to the software within the first month of employment. The percentage of response to the software among new employees is 100%.

In 2017, the Unit will begin introducing the software to all Technion employees.



Training

Objectives and aims:

Broadening the professional courses and providing professional and technological knowledge.
Encouraging creative thinking and innovative processes.

Peer instruction and the creation of knowledge teams and cross-fertilization in different courses.

Development of a new management team, enrichment of the existing management team.

Strengthening of the organizational culture.

Welfare

Welfare guidance

This year, too, Technion employees facing illness/distress/additional difficulties received help from social workers and psychologists with expertise in specific fields. In general, employees' satisfaction from this service was high.

Support during extended illness

The Welfare Unit helps provide emotional support to Technion employees facing a prolonged illness and functions as an interface between the employee and the various administrative elements in the Technion (HR, Salary, etc.).

Social events

These events are designed to raise motivation and pride in the workplace (for employees and their families) as well as to enable managers to socialize with academic faculty and Technion employees to socialize with TDRF employees.

March 2016, **Employees at the Technion for 25 Years Ceremony**, in which recognition certificates were given to about 100 employees and faculty members.

April 2016, **bar/bat mitzvah event** in the Science Oriented Youth Programs Department

July 2016 festive family happening day to celebrate **entering Grade 1**.

August 2016 Technion employees participated in the **Children's event**, on campus, led by the Technion Students Association in cooperation with the HR Division.

September 2016 **Employee Recognition Gala Event** at the Congress Center, to which partners were also invited.

December 2016 **traditional Chanuka Party for Technion pensioners**



Technion NewTon Singing Troupe

The Technion NewTon Troupe, comprising 15 employees, began performing in January 2016 and appeared at a number of large Technion events, and represented the Technion at two external singing group meetings. Membership in the troupe has significantly raised the singers' feelings of connecting to and pride in the Technion.

Retirement Preparation

During November 2016, a Retirement Preparation program was held in which about 50 employees and faculty members about to retire from the Technion participated.

The program included varied lectures in relevant areas such as taxes before retiring, social insurance, health and nursing insurance, options of volunteering after retirement, and more.

Health and sports As part of the growing worldwide trend, HR has begun holding activities to encourage employees to maintain a healthy lifestyle.

Competitive sports teams In 2016 four competitive sports teams from the Technion participated in the local league: basketball, five-a-side football, catchball and running.

HR newsletter Once every three months, HR distributes a newsletter to administrative employees.

Giving Back to the Community About 60 Technion employees volunteer in two afterschool clubs in Nesher and Haifa. Activities include helping children with their homework, celebrating the children's birthdays and holiday and general enrichment activities.

Retirement

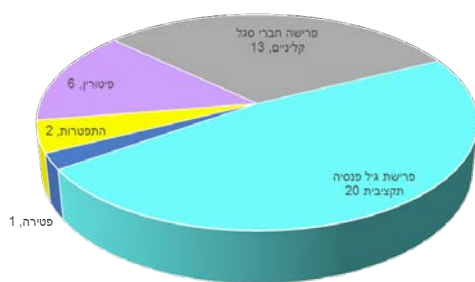
Increased Technion involvement in the field of accumulative pension.

A booklet for administrative retirees containing information about budgetary pensions has been published. We continue to work on a second booklet for the other retirees.

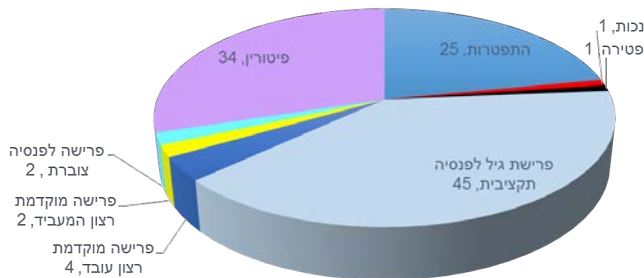
Employees that left Technion in 2016: a total of 194 employees are no longer associated with Technion (42 are retirees that passed away).

In 2016, 25 new faculty members were recruited. In 2017, 29 new faculty members were recruited.

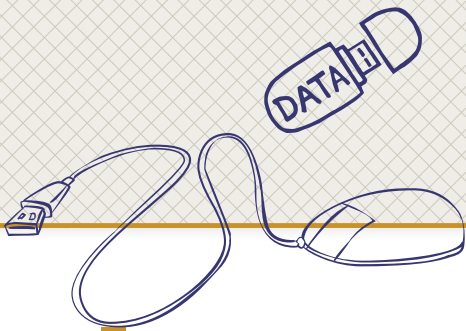
The contact with new faculty begins before they arrive at the Technion. We provide as broad as possible information about employment conditions and help when there are special family needs.



Academic Faculty



Administrative Staff



Computing and Information Systems - CIS

The Computing and Information Systems Division was formed in 2011 by merging the Information Systems Department and Taub Computer Center. A major concern was and still is the operation from separate buildings. Significant efforts are being made to raise funds to move the two units into one building, which will improve the operations of the Division.



Taub Computer Center

HR Module Implementation

The Human Resources module went live in January 2014. This application covers three offices: the HR Division of the Technion, HR Department of the Technion Research & Development Foundation, and the Academic Staff Office. This project has had a significant impact on all employees. On-going operations are working well and additional functionality is being added to this application.

Campus Management Module

The Campus Management Module, or the Student Life Cycle Management (SLCM), is the final major



function still operating on the old IBM mainframe after outsourcing payroll services. The first stage of the project will be the blueprint.

New Accessibility Regulations

Since 2013, the Division has created a new infrastructure for developing websites based on Word Press technology, in which end users with no computer skills can develop their own website based on templates. In the last two years new regulations to assist disabled people were enacted in Israel, and in order to comply the Division is working to alter existing websites. The main Technion website now complies with the regulations and has achieved Access Israel certification. The 600-plus websites that were developed based on Word Press also comply with the new regulations.

Virtualization of Servers

The majority of servers were moved to a new environment using virtualization tools. About 90% of the servers in the Division are virtual, which allows improved and more reliable services while using less hardware and electricity.

Data Security

One of the major threats of the computer world today is data security; a significant portion of the annual budget along with major efforts are dedicated to the integration of cutting-edge technology to detect and prevent security infringements.

Cloud Computing

Providing IT services via cloud is a valuable and inevitable process. The first stage of implementing Microsoft Office 365 cloud services for email and other areas of IT services was moving alumni email services. The next stage was moving student email services, then admin staff; the final stage is moving academic staff.

Disaster Recovery Plan

Moving essential services to the cloud provided a portion of the disaster recovery solution, although other IT applications are still running on premises. The previous DRP is being updated to reflect cloud services.

Backup

The existing backup system on premises is becoming outdated and plans exist for replacing it. The new backup plan will take both cloud and on-premises backup into consideration.

SAP Portal

In 2016, new electronic forms were adopted to replace exhaustive manual processes, which allow the automation of a process from beginning to end and target the most popular and complicated processes; they significantly expedite manual processes, shorten the cycle time required, and have received excellent feedback from academic staff. Recently a new web-based application was added to the portal: researchers will publish their areas of expertise as well as special projects, so that donors can be presented with this information quickly and easily.

High Performance Computing

HPC is growing at Technion. The cluster began with 1,000 cores in 2012 and is currently composed of 3,500 cores. The needs of research are constantly growing, and the Division is looking into HPC cloud-based services as well as on-premises solutions.



Organization and Systems Unit

The Organization and Systems Unit is responsible for evaluating organizational-operational functions (assessing work processes, recommendations for improvement, business analysis, and job definition); characterizing needs and defining information system requirements; integrating and customizing off-the-shelf software; data collection and processing; updating and writing procedures; and handling and publishing data regarding candidates, students, and alumni.

Vision: Fostering work consistency in all Technion units by deepening the unit's insight into the organization's horizontal processes, and recommending work process improvements for different units.

In 2016, the following activities were conducted:

Guiding Units Following Operational Review: International School

- Delineating jobs
- Defining the process for handling an international research student, computerizing this process as a form in the portal, and guiding the computerization of the form in the portal

Writing, Updating, and Publishing Technion Procedures

- Updating procedures for new regulations: 125 topics have been identified as requiring new procedures
- 74 procedures were drafted and updated, of which 32 were signed and published on the Unit's website
- A work program was created for 2017 (including a list of procedures to be translated into English), based on prioritization of regulations which support work processes, also carried out by an international population. This requires:
 - Meetings with professionals in the field of the procedure and consultations with legal advisors
 - Authorization from employee associations (in cases where procedures concern employees)
 - Authorization from administration



Main Projects

Risk Management

- Chemical warehouse: poor management of purchasing and stock
- Public Affairs: drop in resource development, development of resources for goals that are not top-priority; improper management of donations; decrease in or non-distribution of projects

Actions taken include:

- Meetings with unit heads as well as additional employees
- Validation of risks delineated in Technion's 2013 risk survey
- Recommendations for each risk and delineation of tasks
- Identifying persons responsible and tracking points for execution of tasks
- Reporting to the risk management committee

Parent-Friendly Modifications in Academic Units

According to the Student Rights Law, Technion must modify classrooms and buildings to include rooms for nursing and diapering. In every academic unit, there must be a diapering area in washrooms and in the designated nursing room. In 2014, Technion began implementing the law, and the requirements were budgeted for by the Administration.

In 2016, progress on this item included:

- Sending a survey to all academic units to assess the status and scope of the implementation, and examination of additional requirements
- Data collection and publication (in Hebrew and English) on the website and Facebook page of the Office of the Dean of Students

Management of Candidate, Student, and Alumni Data

- Classification of academic tracks and programs with the purpose of reporting to the Central Bureau of Statistics
- Responding to issues and questions raised by the Central Bureau of Statistics
- Preparing summary reports for the Central Bureau of Statistics
- Statistical analyses, as required, which support decision-making



Safety and Health

Preventing work-related accidents and incidents has become part of the Technion culture. The main goals of the Safety & Health Unit are to take the necessary actions to minimize accidents and occupational illnesses, and to comply with safety laws and regulations. The actions taken are intended to promote the safety and health of staff, students, visitors/guests and contractors on campus. A comprehensive Safety & Health action plan has been developed and implemented. All numbers (in parentheses) in this report represent the previous year's data.

Work-Related Accidents and Incident Indicators

The number of reported work-related accidents in the year 2016 was 24 (27 in 2015) with an accident rate of 0.47 (1.52) accidents per 200,000 working hours.

These accidents resulted in the loss of 348 (368) working days and a severity rate of 6.78 (21.12) lost work day cases per 200,000 hours.

Figures 1 and 2 reflect the annual accidents and severity rates in the years 2012-2016.

Analyzing the annual accident rate from the years 2012-2016 shows that this rate has declined in five years by 87%.

The severity rate has declined during the same period by 83%.

30% of these accidents were not related directly to the Technion activities but to other causes (e.g., accidents on the way to/from work).

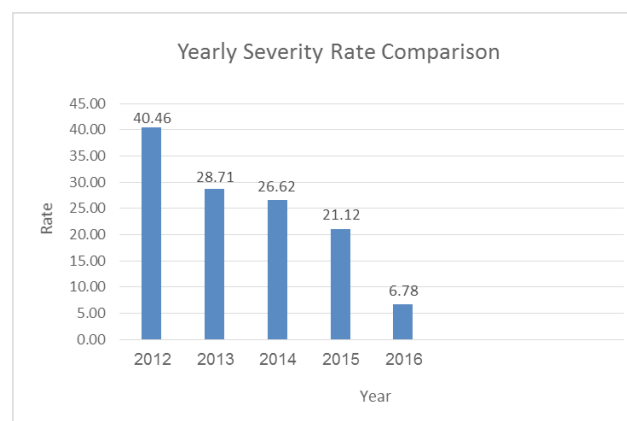


Figure 1: Yearly Accidents Rate Comparison

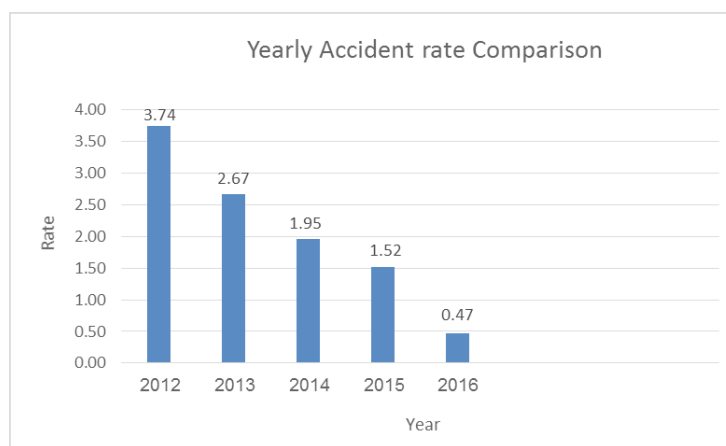
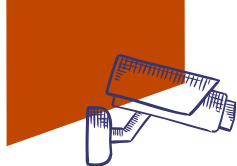


Figure 2: Yearly Severity Rate comparison

Risk Assessment and Implementation of Standards

Over the past few years, a systematic risk survey was carried out in laboratories and work areas, as well as in areas that have undergone major changes or renovations, to identify main risks and implement risk control measures. An overall of 97 (44) risk surveys were carried out including surveys of laboratories and areas after renovation or construction prior to occupancy. 1,276 corrective actions were recommended to the faculties involved.

SIP: Safety Improvement Projects

The Unit manages an annual budget for safety improvements projects in the sum of 2.7 M NIS.

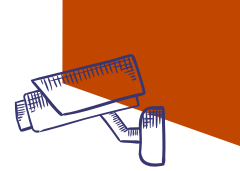
Below are examples of the safety projects completed during 2016:

- Installation of fire alarm systems in the student dormitories and the Viterbi Faculty of Electrical Engineering
- Upgrading of safer Bunsen burners in research and student laboratories on the Technion Campus and in the Rappaport Faculty of Medicine
- Replacement of unsafe windows in the Wolfson Faculty of Chemical Engineering
- Replacement of unsafe electrical panels in the Faculty of Aerospace Engineering
- Installation of water sprinklers in the Faculty of Biomedical Engineering
- Replacement and renewal of asbestos chemical hoods
- Upgrading of chemical hood exhausts in accordance with Israeli Standard 1839 in the Wolfson Faculty of Chemical Engineering and the Faculty of Materials Science and Engineering
- Removal of old and unsafe gas cylinders from the Technion Campus

Renovation and Construction Safety Guidelines

The Unit participates in all renovation and construction activities in every area of Technion activities. The Safety Unit issued 51 (47) safety guidelines for planning new or renovated laboratories.

Most of the safety planning guidelines were for the renovation of 7 laboratories in the Rappaport Faculty of Medicine. Additional guidelines were submitted to the Faculties of Biology and Aerospace Engineering, 6 each; and 4 to the Wolfson Faculty of Chemical Engineering, and 3 each to the Viterbi Faculty of Electrical Engineering and the Faculty of Civil and Environmental Engineering.



SMCP: Safety Management Computation Projects

During 2016, the Unit and the Technion Computing Division developed several computing applications projects intended to assist the Safety Unit in managing safety and health issues and comply with Israeli safety regulations at all Technion sites.

Periodical Safety Equipment Checkout Application – The highlight of this joint activity was the development and establishment of an ERP (Enterprise Resource Planning) system for managing and conducting periodical equipment safety checks. The application summons the relevant auditor and alerts all relevant individuals regarding the status of the safety inspection.

LSS App for Weekly Automatic Defibrillator Inspections – A new SAP-based application was developed to assist in the performance of weekly and periodical inspection of LSS (Life Saving Systems) stationed in Technion buildings and facilities. This application uses the mobile phone as the inspection reporting media using barcode technology.

Safety Training Management Systems – During 2016, the Unit issued master guidelines for the management of all safety training on campus in the ERP system. This project is scheduled for implementation during 2017-2018 with the assistance of the Technion Computing Division.

Emergency Preparedness

In the area of emergency preparedness, five main evacuation drills were carried out during 2016. The drills were performed in buildings housing the Rappaport Faculty of Medicine, Biotechnology and Food Engineering, Computer Center, Canada Building, and the Wolfson Microelectronics Centre. The evacuation staff were trained by the Safety and Health Unit staff. The drills were evaluated, and corrective actions were issued to the participants.

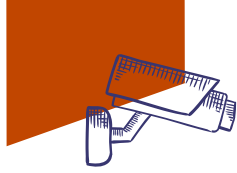
A real fire emergency occurred in the Technion vicinity in the City of Haifa, which required activation of the Technion's Emergency Operation Center and the evacuation of some buildings and populations from the campus in real time. The Emergency Response System acted in a satisfactory manner after a similar drill was carried out in 2015.

Safety Awareness and Training

One of the main activities of the Unit in 2015 was the development of a new Computer Based Training (CBT) system for chemistry and biology laboratories staff and students. This E-learning interactive program is targeted at providing information regarding risks in the laboratories, and thus complying with Israeli Safety Laws to prevent accidents and injuries to staff and students. The tutorial is in both Hebrew and English.

During 2016, we started a trial run of the new CBT system. An overall 1,057 students and lab employees used the system. A total of 940 (89%) users passed the test successfully and were qualified to work safely in the lab.

Safety training courses 24 (26 in 2015) were carried out during 2016 with 1,799 (2,221) participants out of 2,248 invited, representing a 80% (88%) participation rate. The Unit offered two safety courses with the participation of 230 contractors and 1,934 of their workers, and 11 (10) courses for fire safety practice for 332 (302) participants.



Comprehensive Safety and Health Action Plan

For the upcoming year (2017), the Unit developed a comprehensive safety and health action plan that was presented and approved by the Director General and the Technion's Safety and Health Committee.



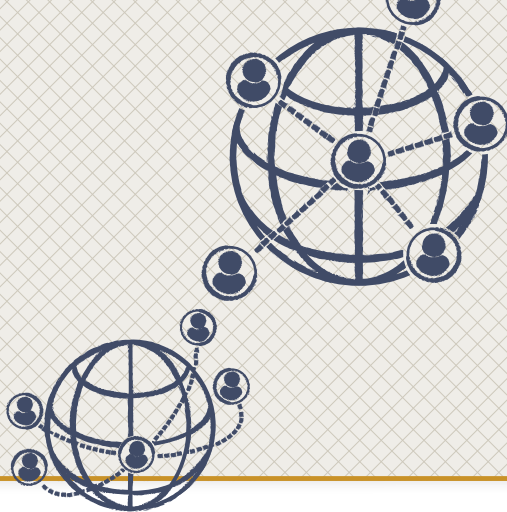
Security Department

The security strategy was updated to conform with the instructions of the Israel Police. The security directives for 2016 were authorized by the Haifa division of the Israel Police.

- The Israel Police has approved the Technion's policy for the Neve Sha'anani and Bat Galim campuses. The approval is valid for the next five years.
- Cameras and panic buttons were installed at the Pepp Daycare Center. Fences were installed where needed and in other areas, made higher.
- Relocation of the operations center to the Taub Computer Center continues, with the aim of facilitating efficiency in the event of a crisis; construction has been completed and installation of systems continues. The project is funded by Richard and Kenneth Skodnek.
- Technion gates renovation project has been approved. A chief contractor has been selected, and the work is expected to begin next summer. The Wilstein Family donated \$5,000,000 to the main gate, while a donation for the Nesher gate is still being sought.
- An audit of the Department examined four main areas of organizational operations: external and internal security circle activity, implementation of work processes, and operations of the subcontracted security company. The comptroller's comments related mostly to the lack of a perimeter fence, campus entrance gates, the location of the security operations center, and control systems. Technion has allocated several budgets to address these gaps, all of which are now in advanced development stages.
- An online system for issuing campus gate passes has been developed.
- Thirteen obsolete security cameras around campus have been replaced with ones that meet Israel Police standards.
- A smart barrier has been installed at the entrance to the Senate parking lot, and is designed to ease the process of locating an available parking space.
- Security employees have undergone training in the following areas: first aid; safety; safe driving; firefighting; elevator evacuation; self-defense (krav maga); hotline operation; shift supervision
- The Department employs approximately 60 security guards as contract workers via an external security company, and approximately 80 students. In order to instill team spirit, group activities such as team-building workshops and bonuses for outstanding security guards were organized.



- Routine investigation of all irregular events on campus has been instituted, some of which have led to the apprehension of suspects.
- The Department has handled approximately 400 requests from Ben Gurion Airport, making it easier for foreign guests to enter and leave the country.
- A promotional video has been prepared as part of the Department's outreach efforts to students and guests.



Public Affairs & Resource Development

Technion continues to raise the bar, both in terms of its international visibility and its fund-raising achievements. With an overarching goal to promote relationships with and seek financial support from our global network of societies, to build the Technion's brand and enhance its reputation and visibility, PARD has been restructured to ensure these goals are met and exceeded. Funds raised last year reached an all-time record of ~ \$118M; the Technion presence in New York and Guangdong continues to attract world-wide attention; the inauguration of the Technion Integrated Cancer Center (TICC); collaboration agreements with leading universities add strength and recognition to the Technion's brand name; an ever-increasing number of visitors to the Technion campus experienced first-hand the special Technion "touch" – the unique ecosystem of innovation and entrepreneurship that has become a role model for numerous organizations trying to follow in our footsteps. This could not have been achieved without the hard work and devotion of an extraordinary group of people who are highly motivated and dedicated to the cause.

Technion continued to advance and expand its global profile in the past year. In New York, Cornell Tech – the home of the new Jacobs Technion-Cornell Institute campus is now in full gear and the Jacobs Institute is scheduled to move to its new home on Roosevelt Island in late 2017.

In China, the new campus of Guangdong Technion – Israel Institute of Technology (GTIIT) is set for its opening on December 18, 2017. This is another major step forward in our quest to become one of the leading science and technology universities in the world. Together with our endeavors in New York City, and other strategic international collaborations, the Technion is well on its way to become a world-renowned powerhouse in science, technology and innovation — and this is manifesting itself east and west.



The path to the Élysée Palace passes via Technion: Emmanuel Macron Visit at Technion in September 2015, (L to R) Prof. Peretz Lavie, Emmanuel Macron, Muriel Touaty, ??



PARD Leadership

Prof. Boaz Golany continues to serve as the Vice President for External Relations and Resource Development, a position he has held since January 2012. At the end of 2015, PARD entered a process of organizational change. Today, there are three new units: "Resource Development," "Events & Hospitality," and "Communication & External Relations." Richard Tabachnik heads the Resource Development unit, coming from an extensive background in fundraising and non-profit management. Events & Hospitality is led by Zohar Nathanson who joined Technion after serving in the Israel Air Force for 25 years, in various administration and leadership positions. In her last position, she served as Head of Foreign Affairs and Protocol. Leading the External Relations unit is Gil Lainer, former Technion spokesperson. The responsibility of Secretary to the Board of Governors continues to be handled by Advocate Asaf Binder, Secretary of the Technion Senate.

Resource Development Unit

The number of fundraising projects produced by the Project Development Unit continued to grow and the portfolio of available projects became more diverse than ever before. To provide Technion more flexibility in allocating philanthropic support and ease the reporting requirements, PARD has launched a new line of "Focus Area" projects. These include academic excellence, accessibility, biomedical and brain research, international collaboration, defense, engineering, student fund, sustainability and Tikkun Olam. Donors who wish to give funds under a certain threshold are encouraged to designate their gift to one of these funds. PARD is making information more accessible to the societies by offering a research portal with search capabilities to look into research funding opportunities. In addition, a comprehensive project database is being launched where professionals can search and download the latest proposals on all subjects. As we are constantly striving to be responsive to our donors, our stewardship is constantly evolving as we better our internal systems and our methods of keeping the best contact with them.

Projects

The Projects Unit is responsible for translating Technion's funding needs, as determined by Technion management, into project proposals and materials for use by fundraisers and societies. This year again, the unit prepared over 300 new projects.

This past year, about 100 projects of varying levels were adopted, including: dormitory buildings named within the Undergraduate Student Village; an Architecture Studio Pavilion; establishment of the Mehoudar Innovation Center; the Rothschild Scholars Program for gifted students in the Technion Excellence Program; support to the Quantum Technology Research Project; as well as continued solid support of the top priority project, graduate student fellowships.

Projects in the works in terms of fundraising include the following: naming of the Faculty of Aerospace Engineering; naming of the Technion Integrated Cancer Center (TICC) and TICC Building, as well as establishment of the TICC Genomics/Epigenetics/Bioinformatics Core and the Annual Workshop on "Frontiers in Cancer Research and Therapy"; establishment of a Research Building in the Viterbi Faculty of Electrical Engineering; establishment of a Center of Intelligent Composite Materials in the Faculty of Materials Science and Engineering; support of the Cyber Security Research Center; establishment of a Prize for Transformative Technologies for Africa; and establishment of the Heritage Research Center for the Built Environment.

Our goals for the upcoming year include the following:

- Increasing the number of projects supported
- Enhancing relations with our Technion Societies around the world
- Continuing to focus on the needs of our donors
- Tailoring Technion's high priority project needs to potential funding sources



Donor Relations

The Donor Relations Unit is responsible for the maintenance and cultivation of long-term relationships between the Technion and its donors. As such, it provides a wide variety of services to Technion societies and individual donors, including periodic reports, special updates and summaries, pictorial overviews and short digests on donor-supported projects. In addition, the unit personnel take care of donor- and gift-related information requests, from both internal and external sources; prepare a variety of letters and other donor correspondence items; and maintain the division's computerized fundraising and donor information management system (CRM). In the past year, the unit processed approximately 200 reports on chairs, research funds, capital development projects, reports to special donors, lectureships, and others. Some 1,500 scholarship and fellowship funds were administered, and reports and thank-you letters from students who benefited from these funds were sent to the societies for delivery to the donors. In addition, some 300 special recognition or appreciation letters were handled. The staff continued updating the division's CRM system introduced several years ago. As part of this effort, hundreds of new accounts have been created in the system, to enable efficient distribution of printed and digital publications, e.g. the TechnionLive newsletter and Focus. With more and more PARD staff using the system for their day-to-day activities, inconsistencies are rectified and incomplete records get amended, as those new users share the up-to-date information available to them.

To ensure accurate and timely response to the requests of each and every Technion society, the unit's staff work closely with the fundraising professionals on the ground. The quality of these working relationships directly impacts the collaborative effort to keep the Technion donors involved, informed and interested in our University and its activities. During this past year, significant progress has been made toward streamlining and improving working routines and procedures between the unit's staff and, chiefly, their counterparts at the ATS. The newly adopted processes include direct phone and Skype calls, regular conference meetings, centralized communication channels and joint editing sessions, all of which have already contributed to the constructive dialogue between PARD and the ATS.

Communication and External Relations Unit

The Communication and External Relations Unit connects Technion with strategic stakeholders such as alumni, government agencies, media, and the general public, in Israel and the world. It includes the office of the spokesperson, the marketing department and the strategic communication department. The unit produces content for local and international media, including press releases, campaigns, videos, digital and print media, in order to advance the Technion global brand.

Messaging

The Communication and External Relations Unit has continued its work towards developing global unified marketing and communication messages aimed at existing as well as new audiences.

Under the guidance of Technion management and following discussions and consultations with various shareholders, three key messages the unit should focus on promoting were identified: Excellence in research; Technion's unique ecosystem of innovation and entrepreneurship; Globalization.

The three key messages above are regarded as principle guidelines. Subsequently, all content and messaging coming out of Technion via the Communication and External Relations Unit, across all major platforms is aligned with at least one of these key messages.

Media Exposure

Increasing Technion's exposure in the media, both in Israel and worldwide, continues to be at the focus of both the The Communication and External Relations Unit as well as Technion societies worldwide. The Technion spokesperson's office focuses its efforts on proactively creating press releases, visual materials and media placement of Technion faculty, students and staff in media outlets worldwide. The stories promoted include new research, events and visits on campus, symposiums and conferences featuring participants from Technion, student projects, notable alumni etc.

Special emphasis is given to promoting and organizing visits on campus of Israeli and international



journalists. These visits are found to be highly effective as they generate not only stories as a direct outcome of the visit, but also a better knowledge and understanding of Technion. This later manifests itself in additional positive coverage as well as placement opportunities etc. In its effort to increase the number of visits of this nature, the Communication and External Relations Unit partners with Technion societies, Israeli government agencies and ministries as well as the media outlets themselves.

In the year 2016, some 16,278 articles and news items featuring Technion were published in major newspapers and websites worldwide. 94.9% of these stories were classified as either “Neutral” or “Positive,” while the remaining 5.1% reflect a “Negative” sentiment.

Some notable examples of major media outlets that carried positive articles about the Technion include:

- An article in the [New York Times](#) about Prof. Kinneret Keren and Prof. Erez Braun’s study of the hydra’s ability to regrow body parts,
- An article in the French daily [Le Monde](#) following the reporter’s visit on campus and meetings with faculty, students and staff.
- An article in China’s [People’s Daily](#) following the reporter’s visit on campus and an interview with President Lavie.
- A [CNN story](#) about Prof. Roy Kishony’s MEGA plate video.
- A [REUTERS story](#) about Prof. Hossam Haick’s “NaNose”.
- A [BBC story](#) about Prof. Jeff Steinhauer’s simulated black hole.

Social Media and Strategic Communications

The Communication and External Relations Unit continues to cultivate a strong presence for Technion in the world of social and digital media. In a time when the reach and influence of traditional media is ever changing, the importance of these channels, which enable us to reach our target audiences directly, is ever growing.

As of this year, as a direct result of the structural changes in PARD, Technion’s online presence and messaging in both English and Hebrew is managed by the same entity. This contributes greatly to our ability to create and distribute a unified message, while assuring the needed adaptations, based on the platform and target audience, are being made.

Technion continues to follow a social media philosophy of reciprocity, sharing and engagement across the social media. The Technion Facebook page in English, which is a hub for our global community of friends and supporters, has 24,390 active followers. Our Hebrew Facebook page, with its 68,441 followers, is quickly becoming a social media focal point for those seeking scientific and innovation related stories. These include a considerable number of influencers such as science reporters, bloggers etc.

The Technion website in English and Hebrew continues to be a major source of information. This is true not only to those seeking specific information about Technion, but also to people interested in science, technology and innovation in general. We believe that our efforts to continue and maintain a constant newsfeed on the website is a key contributor to some 2.05 million monthly visits, Technion website is ranked 196th in Israel and 29,114th in the world. We continue to update the website in an effort to include as much relevant information as possible, while reducing duplications with other websites. This year, while merging the PARD English website into Technion website, we continued to increase the amount and quality of resources available online. These include all press releases issued by the Technion spokesperson, visual materials, a designated portal for the societies, official logos for download and more.

On Twitter, Technion has close to 50,000 followers with close to 11,000 tweets. The account is a hive of news and interaction. Technion Twitter also plays a hospitality role in welcoming international guests to Technion and retweeting them, as well as an informational role in answering questions and sending Twitter users to relevant links.

Our recently established Instagram account will complement Technion’s social media presence, as it



will help us cater to the increasing demand in importance of visual materials.

As the importance of video materials, on social media and in general, continues to grow exponentially, Technion is well positioned to answer this trend. With Some 4,200 videos, currently online on the Technion YouTube channel' it continues to be highly popular, with over 23,600,000 views and 26,000 subscribers, by far the most of any Israeli university. Many of these videos are also used on Facebook and the websites.

Events And Hospitality Unit

The unit supports the PARD's goals by producing events and visits according to Technion's spirit of innovation and excellence. The Visitors Center hosts a wide variety of visits including Academic, Business and Official delegations as well as tourist from all over the world.

The department of Ceremonies and Events plans and carries out academic ceremonies and special events. The department also produces donor related ceremonies and inaugurations as well as well as plaques, to recognize the generosity of individuals who have been associated with the Technion over the years.

Events, Ceremonies and Donor Recognition

PARD's Donor Recognition Department is responsible for a wide variety of donor-related, academic and general ceremonies and events, including those of the annual Board of Governors Meeting. Furthermore, the department deals with the installation of plaques honouring donors.

Over the past year, 51 ceremonies have been held including those for Technion alumni who generously gave to their alma mater.

We prepared 17 gifts with dedication plaques; we installed 61 new recognition plaques and renovated 12; the refurbishment of the existing plaques on campus is an ongoing process.

We continue to provide donors for major projects visualization of their donor recognition plaques before final installation, and we are preparing digital imaging of plaques for information. In addition, the project of digitization of old and new photographs of plaques within the PARD database progresses.

Visitors Center

The Technion Visitors Center is the portal for thousands of donors, academics, industrialists, public officials, journalists and others from around the world who want to learn about the Technion and its achievements. The Visitors Center staff receives and processes all visit requests – individual and group – and coordinates all aspects of the visits. In the past year, the center hosted over 8000 guests and coordinated 629 visits, an increase of %16 in the number of guests and 12% in the number of visits since last year. (A list of selected visitors is attached as an appendix to this section.) The requests, from national and regional governments across the globe, who want to learn about Israel's success in entrepreneurship and innovation, and Technion's leading role in the Start-Up Nation phenomenon, continues to grow. In addition, due to the Technion Campus's established on Roosevelt Island, NY, USA and in Shantou, Guangdong, China we see an increase of visits both from the USA and China. As a result of the growing interest in the Technion and in the hope of exposing the Technion to an even greater population of people, a donation was received for building a new Visitors Center. The hope is that this will greatly enhance the centers' attractiveness and ability to convey the Technion's story and key messages.



Appendix

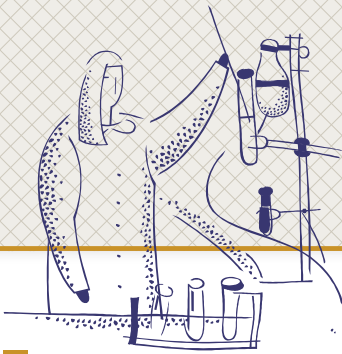
Category	Name	Affiliation	Country
Government Officials	Delegation from Lower Saxony Parliament		Germany
	Dr. Yuval Steinitz	Minister of National Infrastructure, Energy and Water Resources	Israel
	Dr. Gabriele Heinen-Kljajic	Niedersachsen State Minister for Science and Culture	Germany
	French National Assembly Members		France
	H.E. Mrs. Camara Kandia	Minister of Education	Côte d'Ivoire
	H.E. the Right Honorable David Johnston	Governor General of Canada	Canada
	Hon. Ms. Kathleen Wynne	Premier of Ontario	Canada
	Hon. Scott M. Stringer	Comptroller, City of New York	USA
	Legislators from Missouri		USA
	Mary O'Kane	NSW Chief Scientist & Engineer	Australia
	Mr. Averof Neofytou	Chairman of the House Standing Committee on Foreign and European Affairs	Cyprus
	Mr. Bart de Wever	Mayor of Antwerp	Belgium
	Mr. Ikuro Sugawara	Vice Minister, Ministry of Economy, Trade and Industry (METI)	Japan
	Mr. John Tory	Mayor of Toronto	Canada
	Mr. Liu Xiaotao	Mayor of Shantou Municipal Government	China
	Mr. Matt Nosanchuk	Office of the Secretary of State	USA
	Mr. Michael De Jong	Minister of Finance	Canada
	Mr. Ofir Akunis	Minister of Science, Technology and Space	Israel
	Mr. Tord Lien	Minister of Petroleum and Energy	Norway
	Mrs. Axelle Lemaire	Minister of State for the Digital Affairs and Innovation	France
	The Right Honorable Matt Hancock MP	Minister of State for Digital and Culture Policy at the Department for Culture, Media and Sport	UK
Ambassadors	H.E. Mr. Alexander De La Rosa Garabito	Embassy of the Dominican Republic	Dominican Republic
	H.E. Mr. Alfredo Vasques Rivera	Embassy of the Republic of Guatemala	Guatemala
	H.E. Mr. Clemens Von Goetze	Ambassador of Germany to Israel	Germany
	H.E. Mr. Doulat Kaunyshev	Ambassador of Kazakhstan to Israel	Kazakhstan
	H.E. Mr. Esteban Tenrod Tadilla	Embassy of the Republic of Costa Rica	Costa Rica
	H.E. Mr. Fernando Alzate Donoso	Embassy of the Republic of Colombia	Colombia
	H.E. Mr. Guillermo Bassante Ramirez	Embassy of the Republic of Ecuador	Ecuador
	H.E. Mr. Gustavo Otero Zapata	Embassy of the Republic of Peru	Peru
	H.E. Mr. Henrique Sardinha Pinto	Embassy of the Federal Republic of Brazil	Brazil
	H.E. Mr. Jon Bauer-Hanssen	Ambassador of Norway to Israel	Norway
	H.E. Mr. Jose Isaías Barahona Herrera	Embassy of the Republic of Honduras	Honduras



Category	Name	Affiliation	Country
Ambassadors	H.E. Mr. Martin Weiss	Ambassador of the Republic of Austria	Austria
	H.E. Mr. Max Haber Neumann	Embassy of the Republic of Paraguay	Paraguay
	H.E. Mr. Nestor Alejandro Rosa Navarro	Embassy of Uruguay	Uruguay
	H.E. Mr. Peter Huleyni	Ambassador of Slovakia to Israel	Slovakia
	H.E. Mr. Werner Matias Romero	Embassy of the Republic of El Salvador	El Salvador
	H.E. Mr. Hennadii Nadolenko	Embassy of Ukraine in Israel	Ukraine
	H.E. Mrs. Monica Jimenez de la Jara	Ambassador of Chile to Israel	Chile
University Presidents, Administration and Academics	Dr. Yuko Yasunaga	Vice President, Research Institute, AIST	Japan
	Mr. Graham Goldsmith	Chancellor, University of Swinburne	Australia
	Presidents of French Universities	Israel's Ministry of Science, Technology and Space	France
	Presidents of North American Universities	AJC	USA
	Prof. Dr. Hans Jürgen Prömel	President, TU Darmstadt	Germany
	Prof. Dr. Lino Guzzella	President, ETH Zurich	Switzerland
	Prof. Dr. Otmar Wiestler	President, Helmholtz Association	Germany
	Prof. Dr. Reinhard Hüttl	President, National Academy of Science and Engineering (acatech)	Germany
	Prof. Jean Chambaz	President, University Pierre & Marie Curie	France
	Prof. Lin Jianhua	President, PKU	China
	Prof. Seung Hyeon Moon	President, GIST	Korea
	Prof. Shoop Barry	President and CEO, IEEE	USA
	Rectors of Italian Universities		Italy
Technion Supporters	Anja Schumann, Reinhard Frank Foundation		Germany
	Azrieli Foundation		Canada
	Cynthia & Bill Marcus		USA
	Gilbert Foundation		USA
	Irwin and Joan Jacob		USA
	Judith Taub Gold		USA
	Julia Epel & Robert Sherry		USA
	Landes Family		USA
	Meyerhoff Foundation		USA
	Mimi & George Elbaum		USA
	Norman, Sharon & Steve Seiden		USA
	Paul & Rodica Burg		USA
	Prof. Andrew & Aviva Goldenberg		Canada
	Prof. Jacques Lewiner & Dr. Colette Lewiner		France
	Rafi Mehudar & son		Israel
	Richard Skodnek		USA
	Robert & Denise Hanisee		USA
	Robert & Ruth Magid		Australia
	Robert Cooperman		USA
	Sandy & Jim Danto		USA



Category	Name	Affiliation	Country
Technion Supporters	Sara Star, Crown Family Philanthropies		USA
	Seymour and Tanna Schulich		Canada
	Silvia Silver & Family		Italy
	Sir Michael Heller & Lady Morven Heller		UK
	Steve & Rita Emerson		USA
	Stuart Feldman, Vice President for Engineering, Google East Cost		USA
	Yehuda Bronicki		Israel
Industry Visits	Alstom Transport		France
	Apple		USA
	Bank Hapoalim		Israel
	Bharat Forge		India
	Boeing Global Technology		USA
	Bosch Venture Capital GMBH		Germany
	Cisco & Polytechnique		France
	Keter Plastics LTD.		Israel
	Lockheed Martin		USA
	L'oreal		France
	NASA		USA
	Nichia		Japan
	Nissan		Japan
	Rafael Advanced Defense Systems		Israel
	Temasek		Singapore
	Unilever		Mixed
	Yahoo		USA



Women at Technion

Current Situation

Students: The overall percentage of female students at the Technion in 2015-2016 was 36%. The percentage of female undergraduate students increased in the last 13 years from 33% in 2003 to 37% in 2016. Female students comprise 31.5% of all master's students and 44.7% of all doctoral students. Female students comprise 34.3% of all graduate students on the Honors List and 36% of all graduate students on the Distinguished Honors List.

Faculty: There are 89 women faculty members, comprising 16.5% of all tenure track faculty. Women Full Professors comprise 10.5% of all Full Professors, Associate Professors are 24.8% of all Associate Professors, and Assistant Professors are 31.3%.

Representation of Women Faculty in Decision-Making Positions: Prof. Hagit Attiya is currently serving as the Vice President for Academic Affairs. In 2016 only one woman faculty served as a Dean (Education in Technology and Science) and a woman faculty member served as the chair of the international school. During 2017, a significant change has occurred, as the Technion now has five female deans.

President's Advisor on the Promotion of Women in Engineering and Science: In March 2016 Professor Ayellet Tal of the Faculty of Electrical Engineering was appointed by the president to lead the effort to promote women at the Technion. To support her work, the Technion allocated a biennial budget.



New Deans – (L to R) Prof. Shulamit Levenberg, Prof. Yehudit Dori ,
Prof. Iris Aravot, Prof. Marcelle Machluff, Prof. Orit Hazzan



Actions taken

In 2016 a comprehensive work plan was drawn up to address problems at various stages of a woman's career, starting at high school, continuing with undergraduate and graduate studies, post-doc and faculty positions. At all levels, women benefit from role models and networking with women with similar experiences. A pilot project has already started with the intention to extend it next year.

High-school students: The goal is to encourage talented high school female students to make choices that will qualify them for higher education in engineering. The Technion organized the "Tech Women" event during which 600 female students, who excel in Math, were hosted by five faculties (Electrical Engineering, Mechanical Engineering, Computer Science, Aerospace Engineering, and Civil and Environmental Engineering). In addition, 300 middle school and high school students were hosted at the Technion by "Movilot la'Technion" initiative, promoting STEM education.

Undergraduates: In two departments - Electrical Engineering and Mathematics - social frameworks for undergraduate female students were formed. They are managed by graduate students and aim to create a supportive interaction both in the virtual and in real world, organizing social and professional events. This initiative will be expanded to other faculties.

Young faculty: We have established a mentoring project for young faculty members (up to three years at Technion) by full professors. Matching is between professors from similar (but not the same) faculty.

Faculty: Meetings were held with female faculty members from all faculties to discuss challenges and opportunities.



gg nnfn ngf

Barriers were discussed and ideas were raised. In addition a social event took place to encourage and strengthen networking.

Collaboration: Collaborations were started with organizations with similar goals. These include hosting "SHE Codes" events and meetings with the Technion Alumni Organization and industry (e.g., Elbit, Israel Electrical Corporation, female directors etc.)

Plans for upcoming year

Additional plans for next year are underway. These include a symposium for PhD students to encourage them to apply for Postdoc positions; creating a database of candidates for faculty positions (Postdocs abroad); launching a new website; and publicizing inspiring research performed by women researchers at the Technion.



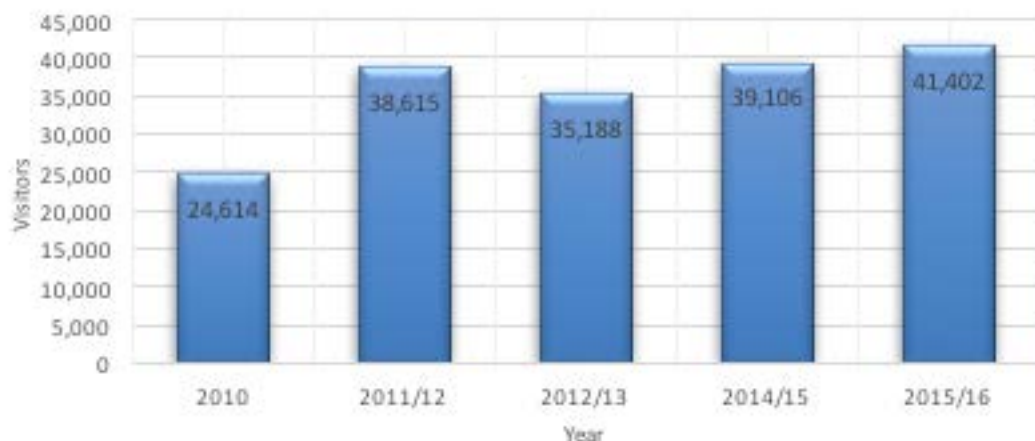
Technion Alumni Association

Officeholders

Sigal First, Chair, Technion Alumni Association
 Dr. Eli Laufer, Chair, Technion Alumni Association 100 Club
 Reuven Agassi, Technion for Life – Entrepreneurship
 Pnina Ziv, Director, Technion Alumni Association

Technion Alumni Association Website

Database comprises over 76,000 alumni
 In the past year over 41,000 people visited the site, with almost 54,000 visits from 112 countries
 12,000 alumni created a profile on the website
 Job openings are posted monthly: almost 1,000 positions yearly from 140 companies



Visitors to the Technion Alumni Website



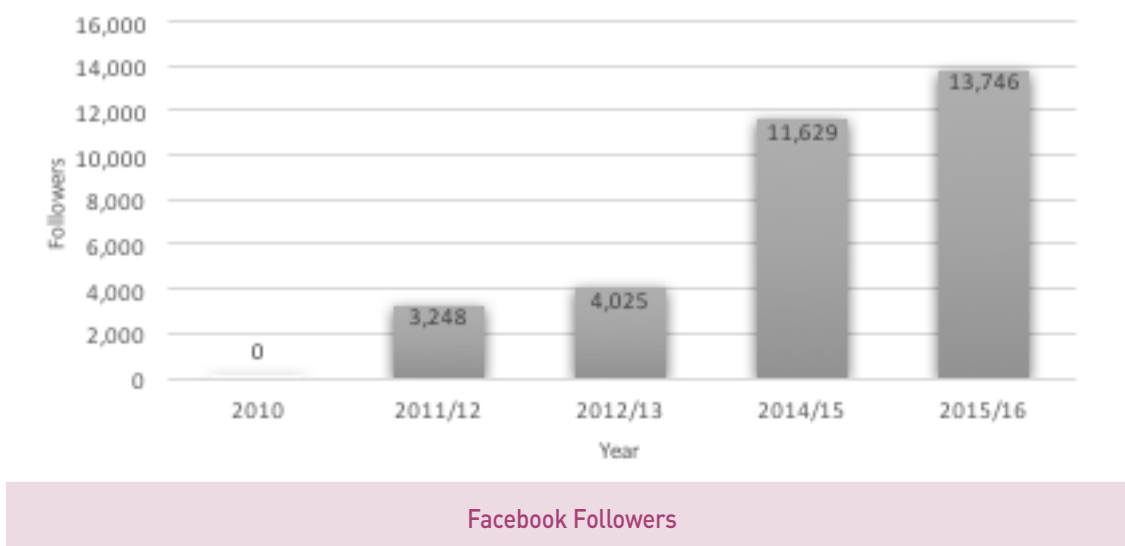
Social media

Facebook

13,746 followers, with 1,041 added in 2016

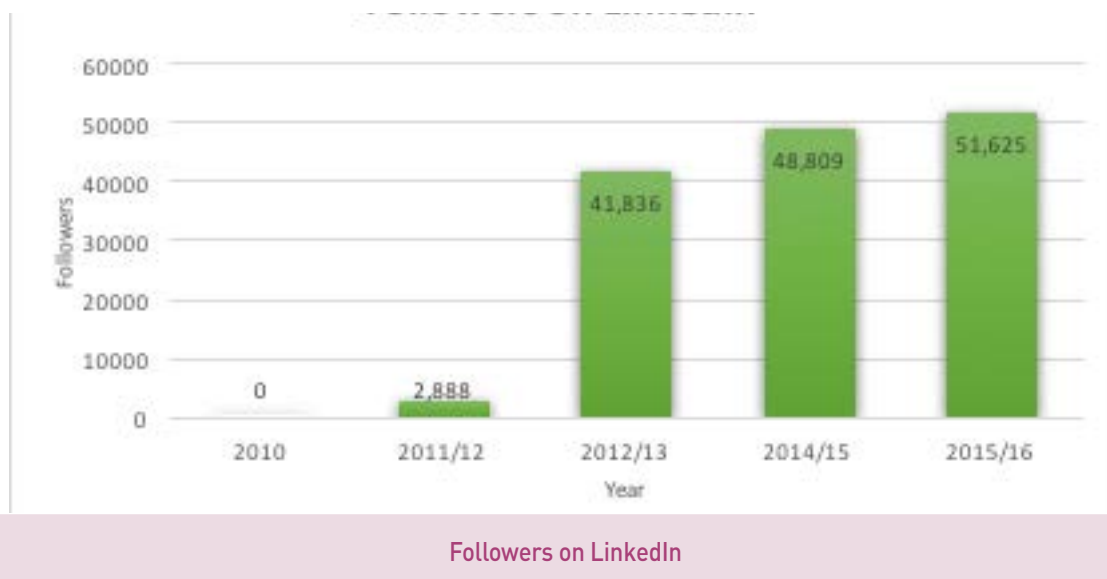
7,580 unique visitors per post (triple the number from 2015)

95,609 visitors clicked on content sourced from the web page: 1,912 visitors, on average, per post



LinkedIn

51,625 followers: 42,439 from Israel and over 5,000 from the US



Alumni Fund for Student Scholarships

410 scholarships of 10,000 NIS distributed since the establishment of the fund seven years ago

In the past year 4,000 alumni contributed to the fund

More than 6,000 Technion alumni among the greater circle of donors

Technion Alumni 100 Club

253 members from leading companies in Israel

Annual Conferences

"Autonomous Systems, Robots, and Medicine: Where to?" - 250 participants

"Lady Tech" - 230 alumnae

"Spotlight on Secret Services" - recruitment of Technion alumni

Technion for Life

More than 300 projects to date

40 entrepreneurs applied to the program last year

12 entrepreneurs presented their projects to the Committee

50+ entrepreneurs were matched with mentors this year

About 70 Technion alumni participate in the project as mentors

Hi-Technion Lecture Series

Nine lectures were held in the last year

Four lectures were held on campus with 600 alumni and students in attendance

Five lectures were held at the Eretz Israel Museum, Tel Aviv, with 1,200 alumni in attendance



Ten-Giving – Technion Alumni Mentoring Students

Each alumnus is asked to invest 10 hours per year

245 students and 323 alumni are registered for the program

Alumni on Campus

Meetings between students, alumni, and faculty members regarding the profession studied in the faculty and its development

Creating a structured space for meeting, roundtable discussions on the subject of the profession, career development, and the job market

Faculties in which the program is conducted: Chemical Engineering (2), Biomedical Engineering (2), Aerospace Engineering (2), Chemistry (2), Biology, Biotechnology and Food Engineering, Materials Engineering, MBA, and Mechanical Engineering

Class Reunions (25 Years)

Chemical Engineering 19.5.2016

Civil Engineering 13.6.2016

Electrical Engineering 2.11.2106

Mechanical Engineering 2.3.2017

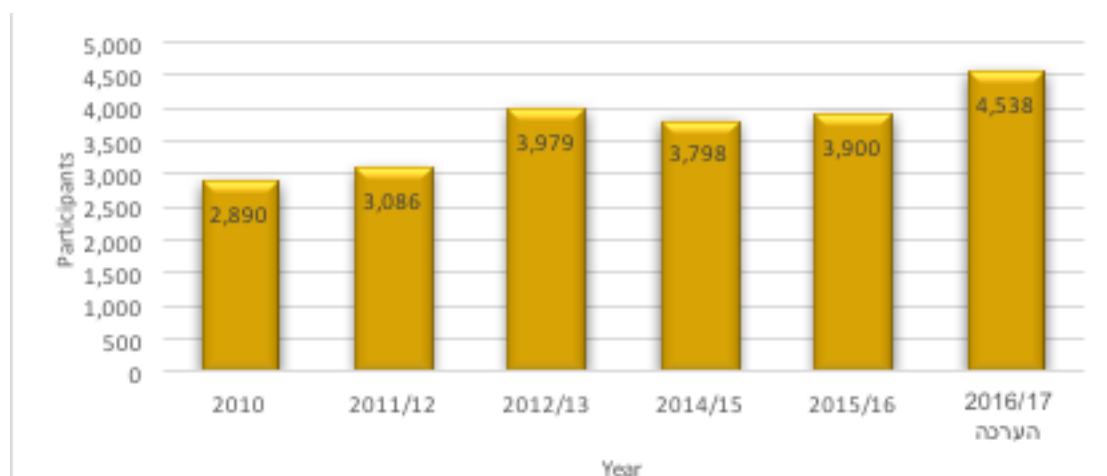
Aerospace Engineering 26.4.2017

Mechanical Engineering 16.5.2017

Alumni Reunions

Alumni of all generations: in the last four years, the following faculties have held reunions: Aerospace, Medicine, Biomedical Engineering, Systems Engineering, and MBA

Annual reunion: the 2016 annual reunion was held at the Shuni Amphitheatre - about 1,000 alumni and students attended



Conference Participants



Awards & Honors*

International Awards and Honors

ACM

Edsger W. Dijkstra Prize in Distributed Computing

Prof. Alon Itai

Faculty of Computer Science

"A Fast and Simple Randomized Parallel Algorithm for the Maximal Independent Set Problem"

AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS AND SCIENTISTS

International Honorary Member Award

Assoc. Prof. Eran Friedler

Faculty of Civil and Environmental Engineering

AMERICAN INSTITUTE OF ARCHITECTS LOS ANGELES CHAPTER

2016 AIALA Design Award

Assoc. Prof. Aharon Shprecher

Faculty of Architecture and Town Planning

AMERICAN SOCIETY OF CIVIL ENGINEERS

Environmental Water Resources Institute Service to the Profession Award

Prof. Avi Ostfeld

Faculty of Civil and Environmental Engineering

ASME

Mayo D. Hersey Award

Prof. Emeritus Izhak Etsion

Faculty of Mechanical Engineering

"in recognition of distinguished and continued contributions over a substantial period of time to the advancement of the science and

engineering of tribology"

COLLOQUIUM ON STRUCTURAL INFORMATION AND COMMUNICATION COMPLEXITY

2017 SIROCCO Prize for Innovation in Distributed Computing

Prof. Shmuel Zaks

Faculty of Computer Science

EUROPEAN SOCIETY FOR SIGNAL PROCESSING

EURASIP Fellow

Prof. Yonina Eldar

Viterbi Faculty of Electrical Engineering

IEEE

AI's 10 to Watch

Asst. Prof. Reshef Meir

Davidson Faculty of Industrial Engineering and Management

Fellows

Prof. Dov Dori

Davidson Faculty of Industrial Engineering and Management

"for contributions to model-based systems engineering and document analysis recognition"

Prof. Israel Cidon

Viterbi Faculty of Electrical Engineering

"for contributions to high-speed packet network, network-on-chip and wide area files systems"

Richard W. Hamming Medal

Distinguished Prof. Shlomo Shamai



Viterbi Faculty of Electrical Engineering

INFORMS

Khachiyan Prize

Prof. Emeritus Aharon Ben-Tal

Davidson Faculty of Industrial Engineering and Management

INSTITUTION OF CHEMICAL ENGINEERS

Dhirubhai Ambani Resource-Poor People Award

Prof. Hossam Haick

Wolfson Faculty of Chemical Engineering and Russell Berrie Nanotechnology Institute

MARINE BIOLOGICAL LABORATORY, WOODS HOLE

University of Chicago

Distinguished Scientist

Distinguished Prof. Avram Hershko

Rappaport Faculty of Medicine

"for his studies at the Laboratory defining the role of ubiquitin-mediated protein degradation in the cell division cycle"

REPUBLIC OF FRANCE

Legion d'honneur

Distinguished Prof. Dan Shechtman

Faculty of Materials Science and Engineering

SIAM: SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

Outstanding Paper Prize

Joseph (Seffi) Naor and Roy Schwartz

Faculty of Computer Science

"A Tight Linear Time (1/2)-Approximation for Unconstrained Submodular Maximization"

The SIAM Activity Group on Optimization (SIAG/OPT) Prize

Asst. Prof. Shoham Sabach

Davidson Faculty of Industrial Engineering and Management

SOCIETY OF AUTOMOTIVE ENGINEERS

Fellow

Dr Leonid Tartakovsky

Faculty of Mechanical Engineering

SOCIETY FOR MELANOMA RESEARCH

Lifetime Achievement Award

Prof. Ze'ev Ronai

Rappaport Faculty of Medicine

"for his significant contributions to melanoma research that are advancing understanding of this deadly form of skin cancer and could lead to new treatments"

SPINOFF.COM

SPIN-OFF Award

Prof. Hossam Haick

Wolfson Faculty of Chemical Engineering and Russell Berrie Nanotechnology Institute

"for his tremendous contribution to the diagnosis of diseases through innovative markers that he discovered in his research at Technion"

THOMSON-REUTERS

Highly Cited Researcher 2016

Prof. Michael Elad

Faculty of Computer Science

Distinguished Prof. Shlomo Shamaï

Viterbi Faculty of Electrical Engineering

HORIZON 2020

THE EU FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

EXCELLENT SCIENCE

EUROPEAN RESEARCH COUNCIL GRANTS

ERC Advanced Grants

Prof. Yuval Ishai

Faculty of Computer Science

Prof. Moshe Tennenholtz

Davidson Faculty of Industrial Engineering and Management

ERC Consolidator Grants

Prof. Yonina Eldar

Viterbi Faculty of Electrical Engineering

Assoc. Prof. Debbie Lindell

Faculty of Biology

Prof. Shy Shoham

Faculty of Biomedical Engineering

ERC Proof of Concept (POC) Grants

Prof. Yehuda Kalay

Faculty of Architecture and Town Planning

Assoc. Prof. Avner Rothschild

Faculty of Materials Science and Engineering

Assoc. Prof. Yuval Shaked

Rappaport Faculty of Medicine

Assoc. Prof. Eran Yahav

Faculty of Computer Science



Prof. Eli Ben Sasson
Faculty of Computer Science

ERC Starting Grants

Asst. Prof. Mirela Ben-Chen
Faculty of Computer Science
Assoc. Prof. Tomer Shlomi
Faculty of Computer Science

Israeli Awards and Honors

AZRIELI FOUNDATION

Azrieli Fellows

Dr Noam Kaplan
Rappaport Faculty of Mathematics
Dr Michael Khanevsky
Faculty of Mathematics
Dr Tamar Segal-Peretz
Wolfson Faculty of Chemical Engineering

COUNCIL FOR HIGHER EDUCATION

Allon Fellows

Asst. Prof. Yuval Filmus
Faculty of Computer Science
Asst. Prof. Tzipi Horowitz-Kraus
Faculty of Education in Science and Technology
Asst. Prof. Reshef Meir
Davidson Faculty of Industrial Engineering and Management
Asst. Prof. Tomer Michaeli
Viterbi Faculty of Electrical Engineering
Asst. Prof. Yonatan Savir
Rappaport Faculty of Medicine

SHOSH BERLINSKY-SHEINFELD EXCELLENCE AWARD FOR ACADEMIC-COMMUNITY

INVOLVEMENT

Prof. Rachel Kallus
Faculty of Architecture and Town Planning

ISRAEL CHEMICAL SOCIETY

Technological Innovation Award

Prof. Timor Baasov
Schulich Faculty of Chemistry

ISRAEL SOCIETY FOR NEUROSCIENCE

Sir Bernard Katz Award

Asst. Prof. Omri Barak
Rappaport Faculty of Medicine

ISRAEL VACUUM SOCIETY

IVS Excellence Award for Research

Prof. Efrat Lifshitz
Schulich Faculty of Chemistry

THE ISRAEL YOUNG ACADEMY OF SCIENCE

Elected Members

Assoc. Prof. Ayelet Baram-Tsabari
Faculty of Education in Science and Technology
Prof. Roy Kishony
Faculty of Biology

MINISTRY OF HEALTH

Lifetime Achievement Award

Prof. Eliezer Shalev
Rappaport Faculty of Medicine

MUNICIPALITY OF HAIFA

Citizen of Merit Award
Prof. Emeritus Moshe Eizenberg
Faculty of Materials Science and Engineering

NATIONAL UNION OF STUDENTS

Inspiring Lecturer Award

Dr Muhammed Akashe
Faculty of Physics
Dr Aviv Censor
Faculty of Mathematics

THE MARKER

40 Most Promising under 40 in Israel

Asst. Prof. Yonatan Savir
Rappaport Faculty of Medicine

WOLF FOUNDATION

2017 Krill Prize for Excellence in Scientific Research

Asst. Prof. Carmel Rotschild
Faculty of Mechanical Engineering
Asst. Prof. Asya Rolls
Rappaport Faculty of Medicine

Asst. Prof. Avi Schroeder

Wolfson Faculty of Chemical Engineering

YAD HANADIV (ROTHSCHILD FOUNDATION)

Michael Bruno Memorial Award

Prof. Roy Kishony
Faculty of Biology



Technion Awards and Chairs

COOPER AWARDS FOR EXCELLENCE IN RESEARCH

Assoc. Prof. Amir Yehudayoff

Faculty of Mathematics

"for application of ideas from mathematics to study theoretical aspects of computation"

Assoc. Prof. Eran Yahav

Faculty of Computer Science

"for developing techniques that change the way software is constructed"

ALEXANDER GOLDBERG RESEARCH PRIZE

Asst. Prof. Guy Bartal

Viterbi Faculty of Electrical Engineering

HENRI GUTWIRTH FOUNDATION RESEARCH GRANTS

Asst. Prof. Yuval Cassuto

Viterbi Faculty of Electrical Engineering

"Re-Write Codes for Multi-Level Memories"

Asst. Prof. Oded Amir

Faculty of Civil and Environmental Engineering

"Computational approaches for optimal design of aviation structures fabricated by additive manufacturing in Titanium"

Dr Beni Cukurel

Faculty of Aerospace Engineering

"Acoustic Resonance Excited Heat Exchanger"

UZI AND MICHAL HALEVY INNOVATIVE APPLIED ENGINEERING AWARD (2016)

Asst. Prof. Matthew Suss

Faculty of Mechanical Engineering

"Fluidized bed electrodes for dendrite-less flow batteries"

JULUDAN RESEARCH PRIZE (2016)

Assoc. Prof. Ayelet Fishman

Faculty of Biotechnology and Food Engineering

RAYMOND AND MIRIAM KLEIN RESEARCH PRIZE

Assoc. Prof. Dan Tsafir

Faculty of Computer Science

HILDA AND HERSHEL RICH TECHNION INNOVATION AWARDS (2016)

Assoc. Prof. Haim Azhari

Faculty of Biomedical Engineering

"Miniature high intensity focused (HIFU) ultrasound for noninvasive Lipoma treatment"

Assoc. Prof. David Broday, Assoc. Prof. Eran Friedler and Ben Gido

Faculty of Civil and Environmental Engineering.

"Development and analysis of liquid-desiccant vapor separation for atmospheric moisture harvesting"

Prof. Yachin Cohen and Dr Dmitri Rein

Wolfson Faculty of Chemical Engineering

"Cellulose dissolution and application in porous materials, emulsions and enzymatic hydrolysis"

Prof. Hossam Haick, Dr Gady Konvalina and Meital Segev-Bar

Wolfson Faculty of Chemical Engineering and RBNI

"FeellT – high resolution touch smart patches"

Prof. Ester Segal and Dr Nadav Ben-Dov

Faculty of Biotechnology and Food Engineering

"Bacterial antibiotics susceptibility: Growth dependent analysis using hybrid photonic microporous silicon arrays"

Assoc. Prof. Alon Wolf and Oded Salomon

Faculty of Mechanical Engineering

"Hyper-redundant robotic snake-like manipulators"

NORMAN SEIDEN PRIZE FOR ACADEMIC EXCELLENCE

Assoc. Prof. Boaz Pokroy

Faculty of Materials Science and Engineering

"for groundbreaking achievements in understanding the atomistic and microstructure of biogenic materials"

DIANE SHERMAN PRIZE FOR MEDICAL INNOVATIONS FOR A BETTER WORLD

Prof. Mordechai Choder

Rappaport Faculty of Medicine

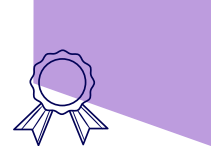
"for work on specific stages of the gene expression system, for example, transcription and translation"

Prof. David Yarnitsky

Rappaport Faculty of Medicine

"for investigating the endogenous pain inhibitory system"

DANIEL SHIRAN MEMORIAL PRIZE



Asst. Prof. Shelly Tzlil
Faculty of Mechanical Engineering

HENRY TAUB PRIZES FOR ACADEMIC EXCELLENCE (2016)

Prof. Idit Keidar
Viterbi Faculty of Electrical Engineering
Prof. Assaf Schuster
Faculty of Computer Science
Assoc. Prof. Doron Shilo
Faculty of Mechanical Engineering
Assoc. Prof. Eldad Yechiam
Davidson Faculty of Industrial Engineering and Management

MOSHE YANAI AWARDS FOR EXCELLENCE IN EDUCATION (2016)

Faculty Prize:

Faculty of Biotechnology and Food Engineering
Assoc. Prof. Oded Amir
Faculty of Civil and Environmental Engineering
Asst. Prof. Guy Bartal
Viterbi Faculty of Electrical Engineering
Prof. Eli Biham
Faculty of Computer Science
Dr Ari Gero
Faculty of Education in Science and Technology
Prof. Ron Holtzman
Faculty of Mathematics
Prof. Sima Yaron
Faculty of Biotechnology and Food Engineering

KURT MAHLER PRIZE FUND IN MATHEMATICS

Asst. Prof. Uri Shapira
Faculty of Mathematics
"Integer points on spheres and their orthogonal lattices"

Leaders in Science and Technology and Career Advancement Chairs

CAREER ADVANCEMENT CHAIR AT THE TECHNION

Asst. Prof. Yoav Schechtman
Faculty of Biomedical Engineering

CHAYA CAREER ADVANCEMENT CHAIR

Asst. Prof. Nadav Amdursky
Schulich Faculty of Chemistry

DELORO CAREER ADVANCEMENT CHAIR

Asst. Prof. Adi (Ish Am) Radian
Faculty of Civil and Environmental Engineering

HOREV FELLOWS

Asst. Prof. Michael Khanevsky
Faculty of Mathematics
Asst. Prof. Tamar Segal-Peretz
Wolfson Faculty of Chemical Engineering

JACK KLEIN CAREER ADVANCEMENT CHAIR

Prof. Ze'ev Ronai
Rappaport Faculty of Medicine

TAUB FELLOWS

Asst. Prof. Noam Kaplan
Rappaport Faculty of Medicine
Assoc. Prof. Anat Levin
Vitrebi Faculty of Electrical Engineering

WOMEN'S DIVISION CAREER ADVANCEMENT CHAIR

Asst. Prof. Raz Palty
Rappaport Faculty of Medicine

NEW CHAIR INCUMBENTS

American Technion Society Academic Chair

Prof. Avi Ostfeld
Faculty of Civil and Environmental Engineering

ALFRED AND MARION BAR CHAIR IN ENGINEERING

Prof. Ayellet Tal
Viterbi Faculty of Electrical Engineering

BERNARD ELKIN CHAIR IN COMPUTER SCIENCES

Prof. Tuvi Etzion
Faculty of Computer Science



FELDMAN FAMILY CHAIR IN COMPUTER SCIENCES

Prof. Dan Geiger
Faculty of Computer Science

BENNO GITTER AND ILANA BEN AMI CHAIR IN BIOTECHNOLOGY

Prof. Marcelle Machluf
Faculty of Biotechnology and Food Engineering

DAVID HACHOEN AND HILLEL DAN ACADEMIC CHAIR

Prof. Aviad Shapira
Faculty of Civil and Environmental Engineering

DR JOEL HAMBURGER CHAIR IN CLINICAL THYROIDOLOGY

Prof. Yedidia Bentur
Rappaport Faculty of Medicine

ALBERT AND ANNE MANSFIELD CHAIR IN WATER SCIENCE AND TECHNOLOGY

Prof. Ori Lahav
Faculty of Civil and Environmental Engineering

LILY AND SILVIAN MARCUS CHAIR IN LIFE SCIENCE

Prof. Jackie Schiller
Rappaport Faculty of Medicine

PEARL S. MILCH CHAIR IN BIOMEDICAL ENGINEERING SCIENCES

Prof. Noam Ziv
Rappaport Faculty of Medicine

LAURA AND ISAAC PERLMUTTER CHAIR OF CANCER

Prof. Eyal Gotlieb
Rappaport Faculty of Medicine

RUBEN AND TALLU ROSEN CHAIR IN SOLID STATE PHYSICS

Prof. Dan Ritter
Viterbi Faculty of Electrical Engineering

PEARL SEIDEN CHAIR IN SCIENCES

Prof. Shimon Marom
Rappaport Faculty of Medicine

BEATRICE SENSIBAR CHAIR IN ENVIRONMENTAL ENGINEERING

Prof. Per-Olof Gutman
Faculty of Civil and Environmental Engineering

STANLEY AND SYLVIA SHIRVAN CHAIR IN CANCER AND LIFE SCIENCES

Prof. Shulamit Levenberg
Faculty of Biomedical Engineering

PHILIP TOBIAS CHAIR IN MATERIAL SCIENCES

Prof. Yair Ein-Eli
Faculty of Materials Science and Engineering

CHIL AND BERTA WEISSMAN CHAIR IN PERSONALIZED MEDICINE

Prof. Ze'ev Ronai
Rappaport Faculty of Medicine
Davidson Faculty of Industrial Engineering and Management to the Community Institute