



# **Report of the President**

**Professor Peretz Lavie**

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Technion – Israel Institute of  
Technology

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## *In Memoriam*

Before beginning this report I must write a few lines about the loss of our friend, Henry Taub, the Technion's outstanding leader, supporter, visionary and benefactor who passed away on March 31<sup>th</sup>, in New Jersey. Henry was Chairman of the Board of Governors for 13 years, 1990 to 2003, and although he held many positions at the Technion and in the American Technion Society, before and after, that was the apex during which he had a major impact on the development of the Technion. The many key campus sites and developments which bear his name and that of Marilyn – Mickey, his adored wife, are a testimony to his love of the Technion. When he recognized a genuine need he contributed unprecedented sums, and persuaded others to do so as well, led by his intimate comprehension of the institution's core concerns. He cared deeply about the Technion and spared himself no effort to assure that his beloved institution would thrive. With exceptional patience and love, he led the institute through a number of crises and displayed true leadership in his quiet, reticent yet forceful way. He was a wise and caring leader whose support for the Technion flowed from his love of Israel and his conviction that Israel's future lay in technological development. An innately modest person, he displayed all the attributes of character which mark a truly exceptional leader; honesty, wisdom, humility, directness, compassion, consideration and a truly broad vision and understanding. His motto in life was to leave the world a better a place than it was when he entered it. He succeeded beyond all expectations!

May his memory be an inspiration for us all.

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As we were preparing this report for publication, and barely more than a month after Henry Taub's death, we got word of the passing of another Technion giant: Justice Moshe Landau died on May 2<sup>nd</sup>, in Jerusalem, having spent 99 full and productive years on this earth. Justice Landau was a remarkable man; his loss is momentous and it was widely marked in Israel in general and at the Technion in particular. A former president of Israel's Supreme Court with many learned, illustrious, groundbreaking decisions to his credit, Justice Landau left a very significant imprint on Israel's legal system and is regarded as one of the giants of the Israel Court's founding generation. Israel's president, Shimon Peres, considered Moshe Landau's rulings to be the foundation of Israel's democracy. He was also a member of the International Court of

Justice. Justice Landau's reputation was such that he was chosen to lead the panel of judges at the trial of the infamous Nazi criminal, Adolf Eichmann in Jerusalem. His connection to the Technion was broad and deep; he was one of the shapers of the original Technion Constitution and subsequently was pivotal in all deliberations involving issues of law and structure. Many Technion presidents relied on him to solve knotty legal situations. He was Chairman of the Board of Governors for a number of terms, attended board meetings regularly for as long as he was physically able and remained involved for years after. He had a unique and deep friendship with Henry Taub both personally and through their common interests. Their strong bond was based on mutual respect and their shared concern for humanity, Israel, justice and of course, the Technion.

He will be missed.

## From the President

### *Ingredients of Success*

One of the more enjoyable aspects of the president's job is to host fellow university presidents, rectors and provosts, ministers from abroad, ambassadors and other dignitaries who visit the Technion. Looking back on the list of visitors during the past year it is notable that in the span of one year we hosted presidents of world class universities such as UCLA, Cornell, Miami and the National University of Singapore, along with the Minister of Science of Westphalia, Germany and others. (A comprehensive list of important visitors to the Technion is on page 75 of this report).

There is a single question which often reverberates during these visits: "How did you do it? How did you manage to build a world class university that excels in science and technology and simultaneously has had an unprecedented impact on the development and economy of the country?" This question can be taken as just another compliment, part of the small talk between colleagues; yet, more than once, when the visit was over, I found myself reflecting on this issue and trying to analyze the ingredients that have led to the success of the Technion. After all, it is rare that a university can be privileged to play such an essential role in the practical, day-to-day building of the nation to which it belongs and yet manage to maintain the top-most standards of academic excellence.

There is no simple answer to the question of how we did it. The success of any university is dependent on the complicated interaction between elements such as the quality of the faculty, the quality of the students, the available resources and how they are managed, as well as the quality of the administrative and technical staff. But even these are not enough; there are more subtle elements, not easily defined or quantified, and they include the sense of mission of a university, its tradition of excellence, its capacity to predict future scientific trends and its overall academic atmosphere.

In their best-selling book "Start-up Nation", Dan Senor and Saul Singer discuss the elements which went into making Israel one of the most successful entrepreneurial nations on earth. We have more start-up companies, more listings on the New York stock exchange, more investments and better economic markers than other countries vastly bigger and better endowed than Israel. How do they explain it? They point to the pivotal role of the military in producing mature individuals, to the efforts invested in integrating new immigrants, to the centrality of R&D, to the survivalist ethic. They use words such as resilience, integration, leadership, innovation. The Technion has been a full partner in creating this miracle and the ingredients of success are the same for both.

## *Enhancing our Excellence*

Indeed, in the past year we invested in and enhanced all these elements, and I am devoting much of this report to identifying and specifying the ingredients of our success. First and foremost, we continued our campaign to bring to the Technion the finest faculty available. We recruited a record number this year; twenty-six new faculty members came to us from the best schools in the world.

We devote much thought and effort to attracting to the Technion the most talented students in Israel and we strive to provide them with an excellent education. We make every effort to make their studies here effective and to foster their personal adjustment. In this regard I would like to focus on several features. We continue to administer a unique program (the Good Start Program) which aims to ease the jolts and difficulties of the first year of studies. Another tack has been our efforts to change our students' attitude toward the study of mathematics in the Technion, which has indeed improved. The Faculty of Mathematics has experimented with smaller classes and additional remedial workshop hours and found that these efforts have considerably enhanced the students' satisfaction with the undergraduate study of mathematics at the Technion. In our steadfast efforts to elevate the level of teaching at the Technion, this year, for the first time, thanks to a generous alumnus' contribution, we have instituted the Yanai Prize for "Educators of the Year" – the Moshe Yanai Award for Excellence in Academic Education. The process of selecting winners among our faculty members, which has started in all faculties, has stimulated a very welcome discussion on what is superior education and how to define a good teacher within a university setting.

In the past year we invested heavily in making the campus friendlier to the students. The renovated Shalom Stanley Zielony Student Union Building was opened and resumed its place at the heart of the campus. The Dean of Students initiated special events within the "Lively Campus" program and we opened the newly-built Shalom Stanley Zielony Graduate Student Village on the western slope of the campus with more than 200 apartments, many of them for married couples with children. The availability of dormitory facilities for an increasing number of students, both undergraduate and graduate, is a priority and an endless challenge for the Technion's administration.

I have chosen to shine our spotlight on the Faculty of Biotechnology and Food Engineering this year. It is the only faculty in Israel where the exciting new field of biotechnology in combination with the innovations of food technology can be studied and can produce novel and exciting research. The human genome, food packaging, alternative fuels and production of new drugs, all fit into the framework of this growing faculty which offers a wide range of programs. With the retirement of many of their veteran teachers, a new corps of talented young faculty was brought in, almost half of them women, and they have attracted an ever-growing number of

students both in the undergraduate and graduate programs. The number of students in the faculty has more than doubled in the past decade and we have high expectations of this shining new star on campus.

### ***Our Top Asset – our Alumni***

To come back to the question of the ingredients of our success – we decided that it merited scientific study and we turned for help to the Samuel Neaman Institute. Prof. Shlomo Maital and Amnon Frenkel undertook a large scale study of the Technion's contributions to the Israeli economy, with an attempt to understand the wide-ranging roles our graduates play in Israel's economy and society; and in the world in general. Some 4,000 Technion graduates responded to a web-based survey.

The institute's initial results show how crucial is Technion's contribution to the economy of Israel, and how true it is that the Technion is the gateway to the start-up nation:

- Of the top 125 Israeli business leaders, according to Dun & Bradstreet's list, fully 41 (one-third) are graduates of Technion degree programs.
- Technion graduates led 11 of Israel's top exporting companies, which accounted for some \$19,492 billion in exports (out of an annual total of some \$45 billion), and employed nearly 80,000 workers.
- Fully half of Israel's 121 NASDAQ-listed companies (59 companies) are led by Technion alumni/ae and/or were founded by Technion alumni/ae. These Technion-originating companies have a market value, as of Nov. 2010, of \$28,240.57 billion. In other words, Technion alumni/ae have created wealth exceeding \$28 billion.

### ***The Challenges Ahead***

We may be facing a new era in the history of higher education in Israel. A five-year budgeting program, instituted by Israel's Council for Higher Education's Planning and Budgeting Committee (VATAT), has been launched. We hope that it will enable us to advance and close the gap that resulted from the severe cuts in the budgets of the last decade. We must plan for this change in order to make sure that if and when the new resources are made available we will be in a position to harness them and thereby elevate the Technion to new heights.

In the next five years I plan to recruit at least thirty new faculty members to the Technion yearly. We are combing universities worldwide to find the faculty we need. At an employment fair held in Boston recently Prof. Moshe Sidi, our Executive Vice President for Academic Affairs, interviewed more than thirty potential applicants. We were persuaded by this successful response to conduct additional such initiatives in the future.

## *Global Perspective*

Our sense of mission and concern for the future require that we increasingly reach out to the international community and acquire an ever wider global perspective. We are aware that in today's world, and especially in view of Israel's geopolitical situation, it is imperative that we open our campus to progressively wider-ranging international relationships and also encourage our students to study in other countries. Some of these initiatives are enumerated below:

**The Technion's International School of Engineering**, which opened in 2009 with 19 students, was a major response to this need. In this framework, at present, we offer a program in the Faculty of Civil and Environmental Engineering. In 2010, its second year of operation, the program took in 36 new students from 20 different countries, and we are encouraged enough by its progress to consider adding additional faculties to the program. This will be done without sacrificing the high level of students which we have accepted up to now. Another international program, the Technion American Medical School Program, continues to thrive and provide a full, rich medical education to international students for an MD and PhD program. Moreover, our global vision has filtered down to our students. Notably, Israel's first chapter of Engineers without Borders, an organization devoted to applying modern engineering methods in developing countries which have no access to these innovations, was founded recently at the Technion. It has successfully completed a project of installing bio-gas systems in rural Nepal. In the same vein, an accredited program on "Engineering for Developing Countries" was held last summer at the Technion for international and Israeli students.

The Technion recently received a formal invitation from the City of New York and its Mayor, Michael Bloomberg, to be one of the participants in a new initiative to develop a scientific and engineering center for applied research in New York City, as detailed further on in this report in the Academic Affairs section. We were one of a very small number of universities outside the U.S. who were invited to submit a proposal. The challenge is tremendous. This will give us additional exposure to the very heart of the scientific world in one of the world's greatest cities in an effective manner which is within our reach. There is no doubt that being part of such a grandiose program will enhance our possibilities and potentialities. As already mentioned above, more details about Technion's participation in this initiative can be found in the Academic Affairs section.

## *Interdisciplinary Inroads*

Interdisciplinary programs have provided our researchers with unique opportunities which the Technion is exceptionally positioned to grant. We are currently focusing particularly on the development of programs in autonomous systems and in computer engineering. The Technion Autonomous System Program (TASP) headed by

Distinguished Prof. Daniel Weihs, who was recently replaced by Prof. Omri Rand, is the first such program in Israel.

Autonomous systems fuse machines with sensors, computers and communications capabilities in order to create systems that can react intelligently in the real world. They are designed for use in medicine, transportation, environment, security and myriad other fields where intelligent machines can increase man's capacity to improve the world. Five major centers are already at work within the framework of TASP and their facilities are used by researchers from ten different faculties. TASP's application-oriented research is extensively dependent on new developments in micro and nanotechnology which, thanks to its Technion location, are readily obtainable. The potential and success of TASP is substantiated by a five-year agreement signed in January 2011 between the Technion and Israel Aerospace Industries (IAI) to cooperate on research in autonomous systems. IAI will invest \$1million in TASP over the next five years.

An interdisciplinary center in computer engineering, under the leadership of the Faculty of Computer Science and the Faculty of Electrical Engineering, has recently received the blessing of the Technion administration. Because of the outstanding eminence of each of these faculties, their strength and their centrality in Technion's research generally, this center will be integral to the Technion's future growth and achievements. We envision that Israeli industry too will be closely involved with the development and functioning of the center.

A wonderful, generous gift by Nancy and Stephen Grand of \$20 million, announced at the 2010 Board of Governors session, enabled the creation of the dynamic, interdisciplinary Grand Technion Energy Program (GTEP). GTEP is devoted to harnessing Technion researchers' unique talents and providing them with the resources to develop ecological solutions which will diminish our massive dependence on non-renewable energy sources. The Technion is the natural place where research in this field, vital to the entire world, can be sparked and provide an impetus for others in Israel and globally. Currently, within the framework of GTEP, we are establishing centers for the development of carbon-free fuel and solar cells. Many more will follow as researchers from more than ten different Technion faculties join the search for clean, green energy. Recently Israel's Council for Higher Education approved an interdepartmental graduate program in energy, the first in Israel.

### ***Further Challenges***

Another issue that presents a special challenge for the future is the role of the Technion in improving science education in Israeli schools. The unfortunate diminishment of the level of science education, which becomes apparent when our students enter the Technion, has increasingly been a matter of concern over the past

decade. We have several programs, centers and projects in place to deal with bridging the educational gap for our qualified applicants and our efforts are meeting with success. Our Center for Pre-University Education has been in the forefront of these accomplishments will be covered further on. Their remedial study programs in math, physics and English at various levels and for various lengths of time have proven to be ideally suited to prepare the qualified applicant with an academic deficiency for future studies at the Technion. We have also taken the additional step of reaching out to high schools and to their students and have initiated enrichment programs on a group and an individual level which we hope will contribute to a general improvement of the level of math and science education in our high school graduates. Especially notable is a project organized by the Technion administrative staff who voluntarily coach children in a nearby underprivileged neighborhood. This is in addition to the many students who tutor disadvantaged youth on a regular basis as a stipulation of their academic stipends.

The Technion's Department of Education in Technology and Science, headed by Assoc. Prof. Orit Hazzan, responded to the lack of qualified high school math and science teachers with a unique program. The first 85 participants in a retraining course for university graduates, organized by the department, graduated in October 2010. The graduates, chosen for the nine-month course from 536 applicants, most from hi-tech companies, attended classes at the Technion and fulfilled their practice teaching requirements in high schools. Nearly all have found employment as qualified high school math and science teachers. The Minister of Education, Gideon Sa'ar, attended the graduation ceremony and thanked the Technion for its contribution to enhancing the education of Israel's high school students.

Always at the back of our minds, like a ticking clock, is the condition of our many thirty-something-year-old buildings and teaching laboratories that are in desperate need of renovation. This presents a most difficult challenge because there is no source of funding for refurbishing old buildings. Yet they are essential to our functioning and we cannot, and dare not, give up on maintaining and renewing them so that they become suitable to our purposes. The striking contrast between our advanced research (and achievements) and the sometimes decrepit facilities in which it is conducted is dramatic and daunting.

### ***Government Involvement***

It became apparent to me that if we are to pursue our agenda effectively we must become more involved with key figures and processes in Israeli government. We need to bring them to the campus to witness and to partner the contributions which the Technion is making and can make in the future to the development of this country. In October we hosted a delegation from the Council of Higher Education's Planning and Budgeting Committee (VATAT) at the Technion to discuss the Technion's budget and to present them with our scientific achievements in the face of

the lack of equipment and infrastructure. The fact that members of the committee revisited the Technion shows that they were extremely impressed by what they saw on campus and thoroughly understand the importance of this institution. And indeed, one of the aims of these visits was to stress the pivotal role that the Technion plays in the national and economic arena, and its contribution to the advancement of Israel's industry, economy and security.

We were proud to host several key members of the Israeli Government this past year and to show them the accomplishments, vision and potential of the Technion. Among others, the Prime Minister, Benjamin Netanyahu; the Minister of Education, Gideon Sa'ar; the Minister of Agriculture (currently Minister of Industry, Trade and Labor), Shalom Simhon; the Minister of Welfare, Yitzhak Hertzog; the Minister of Home Front Defense, Matan Vilnai; the Vice Prime Minister and Minister of Strategic Affairs, Moshe Ya'alon and the Minister of Science and Technology, Daniel Hershkowitz, a tenured Technion professor and a former Dean of our Faculty of Mathematics. We were honored as well to host Member of the Knesset and former Minister of Finance, Ronnie Bar-On, the State Comptroller, Micha Lindenstrauss; the Head of the National Economic Council, Eugene Kandel and former Minister of Industry, Trade and Labor, Benjamin Ben-Eliezer during their visits to the Technion as our distinguished guests. In line with our policy of encouraging the active engagement of members of the government and of the Knesset in the Technion, these visits are fundamental to our development and we view them as essential elements of the Technion's future growth. We are making and will continue to make huge efforts to bring the attention of government officials and decision makers to the importance of our institution and to the need for funding and infrastructure. These visits go a long way in impressing these leaders with the contribution our researchers have made and continue to make to Israel's economic strength and stability and the potential role of our students in tomorrow's world.

We are further encouraged by the fact that Distinguished Prof. Daniel Weihs has been named Chief Scientist of the Ministry of Science and Technology, currently headed by Prof. Daniel Hershkowitz. The understanding and support for Technion's role and contribution which we are assured will be forthcoming from that ministry will mean that, at least for the near future, we can expect a fair hearing.

The Prime Minister's Prize for Entrepreneurship and Innovation, a prestigious, new, annual award given in conjunction with International Entrepreneurship Week, was granted at the Technion. This award focuses upon young people and those living in peripheral areas, who have demonstrated outstanding entrepreneurial spirit; and it is aimed at motivating people in these categories to undertake new and exciting projects. We are proud that the Technion was chosen as the venue for the award ceremony.

Next year, 2012, the Technion will celebrate the cornerstone centennial of the day in 1912 when the cornerstone was laid for a building to house a bold, visionary and innovative experiment; a school to train Jewish engineers and builders for the Jewish state-in-the-making. Certainly those brave pioneers could not have imagined what we have achieved since then, despite all the difficulties. But it is never enough, and to meet the challenges of the future we must continue nurturing and reaping those ingredients for success which have served us so well until now.

## Israel's Economy in 2010

The Technion functions within Israel's economic climate and, as such, is sensitive to the ups and downs of the current situation. In order to brief you, the following report on Israel's economy in 2010 was prepared by Prof. (Emeritus) Shlomo Maital, senior research fellow at the Technion's Samuel Neaman Institute for National Policy Research:

Overall, after near-zero growth in 2009 owing to the global recession, Israel's economy returned to impressive growth in 2010. Gross Domestic Product (GDP) grew (according to preliminary figures) by 4.5%, among the highest growth rates for the 31 OECD member nations. And similar to 2009, Israel's economy in 2010 performed like a football squad making a comeback in a four-quarter game – in the last quarter of 2010, GDP grew at a surprising 7.8% rate, driven by a 10% rise in personal consumption, in turn driven by a 42% rise in durable goods consumption. Apparently, at year's end, Israeli consumers decided the recession was over and that it was reasonable and desirable to resume spending. Business GDP rose even faster than GDP in 2010, growing by 5.1%.

The two drivers of Israel's 2010 economic growth were personal consumption spending, which drove 70% of GDP growth, and capital formation, which accounted for the remaining 30%. Both residential construction and industrial investment grew rapidly, at 11-12%, reflecting Israel's continuing 'hot' property market, with a record 39,000 housing starts in 2010.

After sharp declines in both imports and exports in 2009, reflecting weak global markets, exports grew by 12% in 2010, and imports grew even faster, by 13%, driven by stronger imports of consumer goods. For the first time in over a decade, in 2010 exports, at \$20.2 billion, were slightly less than non-exports, such as chemicals, fertilizers, etc., at \$20.5 billion, an increase of 20.2% over 2009. Among the outstanding exporters were pharmaceuticals, with a 42% rise. Higher energy prices drove energy imports up by 29%, a trend likely to continue in 2011. Israel's merchandise trade deficit in 2010 rose sharply, by 59%. However, strong services, exports and other transfers created a \$6.7 billion balance of payments current account surplus. After a sharp decline in 2009, foreign direct investment in Israel recovered strongly and totaled \$7.8 billion, up from only \$1.7 billion in 2009.

The influx of foreign investment strengthened the shekel vis à vis the U.S. dollar. From a near-term peak of 4.20 NIS per dollar reached in March 2009, the shekel rose in value, to about 3.60 NIS in March 2011, despite very large dollar purchases by the Bank of Israel, aimed at helping exporters by moderating the shekel's appreciation. As a result of these purchases, Israel's foreign exchange reserves rose sharply, from \$60.6 billion in Dec. 2009 to \$73.8 billion in Feb. 2011, a rise of 22%.

Inflation remained moderate in 2010, with the consumer price index rising by 3.5%, although inflation accelerated toward the end of the year, driven by higher food and energy prices. The Bank of Israel continued to expand the money supply, with a 5.6% year-to-year rise in money up to March 2011. In that month, the Bank of Israel raised interest rates by 0.25%, to 2.5%, pursuing a gradual policy of raising interest rates in the face of rising housing prices and higher inflation. The Bank of Israel continues to show concern over a potential housing bubble, noting that housing prices have risen by 17.5% during the past 12 months.

After declining since mid-2009, unemployment rose to 6.6 % in the last quarter of 2010, with the number of participants in the labor force rising by 1.7%, and the number actually employed rising by only 1.5%. In sharp contrast to the U.S. and a number of European nations, Israel's government budget showed improvement, with the deficit falling in 2010 to 2.5% of GDP from 3.7% in 2009. The budget deficit was greatly aided by a sharp recovery in tax revenues, which rose by 5.5% in 2010 after falling by 9% in 2009. During 2010, Israel's Tel Aviv Stock Exchange continued to rise, with the TA-100 index rising by 16% after very strong gains in 2009.

An area of deep concern was the venture capital industry. According to a study by IVC online, a venture capital research firm, in 2010 a miniscule three percent of VC investments went to 'seed' money (i.e. investments in very young companies, or young startups), or a total of just \$38 million. Only 45 startups got such funding, out of a thousand or more existing ones. Total venture capital investments rose a bit in 2010, compared to 2009, but were 40% less than the pre-global crisis level in 2008. Moreover, only 30% of venture investments were made by indigenous Israeli VC firms, the lowest proportion in over a decade. Foreign VC's are far less likely to invest in 'seed' companies, simply because they understand the local landscape less well and hence are less likely to take risks.

Israel's economy operates in an environment of perpetual uncertainty. With uprisings in Tunisia, Egypt, Libya, Bahrain, Oman, Syria and other Mideast nations at the onset of 2011, policymakers and business leaders alike face regional and global risks. Successfully navigating Israel's economy through 2011 will take considerable strategic agility and wisdom.

Among the major causes for optimism was the discovery of large proven natural gas reserves in Israel's territorial waters, in the Tamar and Leviathan fields, enough to supply 50 years of consumption. Initial supplies from these fields are planned to come on-line in 2013.

## **The Technion Management Team**

- Prof. Paul Feigin – Executive Senior Vice President
- Prof. Moshe Sidi – Executive Vice President for Academic Affairs
- Prof. Oded Shmueli - Executive Vice President for Research and Managing Director of the TRDF
- Dr. Avital Stein – Executive Vice President and Director General
- Prof. Raphael Rom – Vice President for Resource Development and External Relations
- Prof. Yaacov Mamane – Dean of the Undergraduate Studies
- Prof. Moshe Shpitalni – Dean of the Graduate School
- Prof. Michal Green – Dean of Students
- Prof. Yehudit Dori – Dean of Division of Continuing Education and External Studies

### ***New Faculty Deans (appointed January 1<sup>st</sup>, 2011)***

- Assoc. Prof. Orit Hazzan – Department of Education in Technology and Science
- Prof. Eliezer Shalev – Faculty of Medicine
- Prof. Yehuda Kalay – Faculty of Architecture and Town Planning (October 2010)

### ***Continuing Technion Deans***

- Prof. Yoram Tambour – Faculty of Aerospace Engineering
- Prof. Gadi Schuster – Faculty of Biology
- Prof. Dan Adam – Faculty of Biomedical Engineering
- Prof. Ben-Zion Levi – Faculty of Biotechnology and Food Engineering
- Prof. Yachin Cohen – Faculty of Chemical Engineering
- Prof. Moris Eisen – Faculty of Chemistry
- Prof. Arnon Bentur – Faculty of Civil and Environmental Engineering
- Prof. Eli Biham – Faculty of Computer Science
- Prof. Adam Shwartz – Faculty of Electrical Engineering
- Prof. Charlotte Schapira – Department of Humanities and Arts
- Prof. Boaz Golany – Faculty of Industrial Engineering and Management
- Prof. Wayne D. Kaplan – Faculty of Materials Engineering
- Prof. Jacob Rubinstein – Faculty of Mathematics
- Prof. Pinhas Bar-Yoseph – Faculty of Mechanical Engineering
- Prof. Noam Soker – Faculty of Physics

### ***Other Appointments***

- Prof. Daniel Rittel replaced Prof. Moshe Sheintuch as Deputy Senior Vice President as of March 1, 2011
- Prof. Zeev Gross was appointed Deputy Vice President for Academic Affairs on March 1, 2011

## **Academic Affairs**

Prof. Paul Feigin, Senior Executive Vice President, has focused on a number of vital projects which are currently on the Technion's agenda and have been mentioned in passing in other sections of this report.

### ***New York City Project***

In December 2010, Mayor Michael Bloomberg of New York City (NYC) asked the Technion to respond to a request for expressions of interest (RFEI) in establishing an applied sciences research facility in NYC. The Senior Executive Vice President, Prof. Paul Feigin, attended an information session in NYC in February 8-9, together with Mr. Mel Bloom of the American Society for Technion. There, Deputy Mayor Steel and members of the NYC Economic Development Corporation (NYCEDC), in a private meeting with Prof. Feigin, strongly encouraged the Technion to respond to the RFEI. Visits to various city-controlled sites were also conducted.

The Technion management decided to submit a response with two primary caveats: the Technion would participate in such a project only in partnership with a reputable US academic institution; and the Technion would not finance the establishment of the research facility from its own resources. An intensive effort to produce the response was carried out by a team consisting of the Senior Vice President, the Vice President for Research and six Technion Deans; and it was delivered to the NYCEDC by the due date of March 16, 2011. The Technion is now starting to investigate various partnership opportunities with other universities that also responded to the RFEI. The NYCEDC is expected to issue a formal RFP during the summer, at which time the Technion will need to decide whether the conditions are right for it to join a partnership and submit a proposal.

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

With the discovery of off-shore natural gas, and the heightened potential for discovering off-shore oil reserves, Israel is entering a new era of energy production and consumption. In order to fully utilize these new resources in an efficient and safe way, the country needs to develop a research and education infrastructure in natural gas and petroleum studies. An immediate concern is to train experts, and in particular engineers, in the various fields of natural gas and petroleum engineering. The Technion has decided to meet this national challenge by immediately opening a track in Natural Gas and Petroleum (NG&P) Engineering within the framework of its Masters of Engineering in Energy Engineering program. The latter program is managed by an Inter-departmental Committee for Graduate Studies that was established as part of the Grand Technion Energy Program (GTEP). The study track was developed and will be taught in cooperation with Haifa University's Department of Marine Geosciences. Initially, many of the courses will be given by guest lecturers,

including some from international universities and schools with leading programs in the field. The Technion is coordinating this development with the Ministry of National Infrastructure, and has also submitted a plan to establish a NG&P Research Center within the GTEP framework.

### ***Schools and Academic Departments***

One of the goals of the current administration is to establish a more streamlined academic management system that will decentralize some of the functions of Technion management, allow for more efficient planning and implementation of teaching and research programs and provide better service to students and researchers. Steps have been taken to initiate the process of establishing "Schools" as combinations of faculties/departments. The Deans of the Faculties of Chemical Engineering, Biotechnology and Food Engineering, and Materials Engineering have started a discussion to promote the establishment of a School of Process Engineering which would incorporate all three faculties. The Faculties of Mechanical Engineering and Aerospace Engineering have started a dialogue to consider how to integrate some of their undergraduate and graduate teaching programs. The Faculties of Medicine, Biology and Bio-medical Engineering are coordinating the establishment of "pre-med" programs that will lead to a new four-year graduate medical training program being proposed by the Faculty of Medicine. The Faculties of Electrical Engineering and Computer Sciences have agreed to establish a joint Center for Computer Engineering. All parties to these collaborations are aware that they are laying the seeds for the formation of schools. On a more formal level, a draft set of academic regulations for the establishment and running of schools has been compiled and will be discussed in various Technion committees.

### ***Distance Learning***

The Technion has started to pilot the development of a distance learning capability under the auspices of Prof. Judy Dori, the Dean of Continuing Education and External Studies. The program is called "Technion International Distance Education & Studies" (TIDES) and is currently seeking financial sponsorship. The focus has been on developing asynchronous course units which students can view and interact with when it is convenient for them during the week. Several such courses have been produced, and are being produced, with the aid of teachers and the pedagogical advice of the TIDES team. At a meeting of the Technion's Academic Assembly, a discussion was held on the topic of distance learning, with the participation of experts from overseas as well as local ones. The consensus was that the Technion cannot afford to ignore this aspect of higher education, even if it is not a solution for all study programs. One of the current initiatives is to cooperate with an overseas university, each providing a set of courses that together can make up a full degree program.

The Technion is also pursuing a synchronous distance learning solution. Here the plan is to provide a live classroom experience to students located at remote locations who simultaneously participate in lectures or seminars. Several faculties have started such efforts for their specific program needs, and the Technion is about to decide on a common hardware/software solution for the campus.

Within the framework of TIDES, thirty students enrolled in 2010 in two distance learning courses: From Cell to Tissue and Innovation Management. For the Spring 2011 semester three new courses were developed: Tissue Engineering, Therapeutic Ultrasound and Methodologies in System Development. The ultimate aim is to develop distance education which will enable professionals, individually or through their employers, to adopt life-long learning and continue specializing in their workplaces at their own time and pace.

### ***Mathematics Courses***

As a consequence of a review of the mathematics curriculum in several faculties, a revision of the distribution of topics between courses has been carried out by the Faculty of Mathematics in consultation with the relevant faculties. Part of the motivation was to remove some advanced topics from the first year courses so as to allow a less pressured experience for new students as they re-familiarize themselves with mathematical concepts and methods. The Technion, through its pre-academic center, also runs refresher courses in mathematics and physics during the summer prior to the start of the academic year and is considering ways to encourage the participation of more students who need it in these classes.

### ***Humanities and Social Science Courses***

The Dean of Undergraduate Studies, together with the Dean of the Department of Humanities and Arts, are developing new requirements for the study of humanities and social sciences in the Technion. Instead of leaving complete freedom to take – or not to take – such courses, the idea is to require students to complete one or two clusters of such courses in order to qualify for their degree in engineering or science. Such a requirement is very much on the agenda of the Council for Higher Education, and has already been implemented at the Hebrew University in Jerusalem. Defining such clusters was actually a decision of the Kogan committee which defined the current requirements for all Technion undergraduate degree programs. Making such studies compulsory was also part of the Gutfinger committee report which set out to define the basic courses for all undergraduate degree programs. The plan is to bring the revised requirements to the approval of the Technion Senate by the end of this academic year or the beginning of the next academic year.

### ***New First -Year Workshops in Physics and Chemistry***

As part of the "Good Start" program and following the successful collaboration with the Technion Students Association (TSA) in conducting workshops for first-year compulsory computer science (C-language) courses, the Technion management has extended this cooperation to two new workshops for first-year chemistry and physics courses. These workshops provide first-year students with access to more senior student mentors who can answer questions concerning concepts and methods that arise in the assignments and laboratories in these courses. The senior mentors are carefully chosen and are instructed on how to help the first-year student approach problems without actually solving the problem for the student.

## **International Review Committees**

This year International Review Committees of two types provided evaluations of four Technion faculties; two were initiated by the Technion (the Faculty of Medicine and the Faculty of Civil and Environmental Engineering) and two by the Council for Higher Education, (the Faculty of Mathematics and the Faculty of Industrial Engineering and Management).

### **Faculty of Medicine**

The committee, headed by Prof. Allen M. Spiegel of the Albert Einstein College of Medicine, was impressed by the strong academic standing the faculty has achieved at the national level with certain focal points of nation-wide strength. In their vision for the organization of the faculty's research program they suggested increasing the cooperation between members of the currently outmoded and undersized preclinical departments by creating thematic centers of excellence. The committee also encouraged the faculty to consider integrating and joining forces of the preclinical faculty with other faculties of the Technion, starting with biology and the life sciences and engineering programs, and potentially with others.

### **Faculty of Mathematics**

The chapter of the report dealing with research states that the research activity of the faculty is strong and it covers a broad range of major areas in pure and applied mathematics. The committee noted with praise that recently the faculty has hired several outstanding young mathematicians, resulting in a dynamic research environment.

### **Faculty of Industrial Engineering and Management**

The Faculty of Industrial Engineering and Management's review was very favorable – the high levels of teaching and research, as well as of the students and the staff, received much praise from the committee. The committee did comment on the urgent need to appoint new academic faculty in order to maintain the current high standards.

## **Faculty of Civil and Environmental Engineering**

The review committee of the Faculty of Civil and Environmental Engineering was chaired by Professor Michael P. Collins of the University of Toronto and was on campus during January 2011. They assessed "that the academic standing of the Technion's Faculty of CEE places it in an elite set of technological universities of which ETH, Georgia Institute of Technology, TU Delft, Norwegian University of Science and Technology, Korea Advanced Institute of Science and Technology, National University of Singapore and Imperial College are also members..." In their report the committee members state that "In the area of research the faculty and students are of high quality; however, in some areas the laboratory equipment is antiquated and in urgent need of renewal ..." As to the future, the report poses a challenge with the following: "The large number of current and pending available positions is a golden opportunity for the faculty to renew itself".

## **Faculty Recruitment**

The recruitment of excellent young faculty members and their retention remain one of the most important issues facing the Technion. During the 2010 Board of Governors meeting, the Executive Vice President for Academic Affairs reported the recommendations of a Technion task force that are geared to facilitate the recruitment process and to make it possible for the Technion to acquire the best faculty.

Several recommendations were implemented immediately by many Technion departments, e.g., wide-spread advertisement and proactive recruitment. The short-range recommendations were also implemented. The Technion has made a few post-doctoral fellowships available to excellent candidates. The Technion participated in a very successful fair in the Boston area where several excellent candidates were identified. The Technion is in the process of establishing several interdisciplinary programs, some of them in the framework of ICore; that will be supported by VATAT. So far, the long-range recommendations were implemented only in a few cases where the Technion provided significant help in identifying employment alternatives for spouses.

With the help of special programs such as nanotechnology, life sciences, autonomous systems and energy programs, the number of faculty members that are recruited can be increased. We are still hoping that the government will implement the long-term plans that will yield significant additional resources to the Technion, thus allowing an increase in the number of excellent young faculty members we can recruit. In addition, we continue to develop new fund-raising programs such as the Career Advancement Chair which allow us to recruit more faculty members and reverse the trend of recent years, increasing the number of faculty back to around 600 over the next five years. In fact, during the current academic year, we were quite successful in

recruiting 26 new faculty members. We would like to increase this number to around 30 each year in the next five years.

A very bright spot in the recruitment of the past few years, this year included, is the excellent crop of brilliant young faculty members who joined us despite attractive offers from other universities or industry abroad and in Israel. It took significant effort on behalf of the faculty deans and the Technion management, as well as substantial resources, to attract them to the Technion. The Leaders in Science and Technology Program initiated and supported by Mr. Henry Taub, of blessed memory, and the recently funded Shillman Career Advancement Chair, Chaya Career Advancement Chair, Andro Deloro Career Advancement Chair and Advancement Chair in Economy and Finance played an important role in making this a reality.

The brilliance of our young faculty members is apparent by the fact that each year several of them are awarded various prizes and distinctions, including the prestigious Allon Fellowship. For three years in a row, four of our new faculty members won the Allon Fellowship.

Last year we had a Technion record of six recipients of *Allon Fellowship*. They were:

- **Dr. Ophir Auslander** from the Faculty of Physics
- **Dr. Ayelet Baram-Tsabari** from the Department of Education in Technology and Science
- **Dr. Ruth Heller** from the Faculty of Industrial Engineering & Management
- **Dr. Emanuel Milman** from the Faculty of Mathematics
- **Dr. Boaz Pokroy** from the Faculty of Materials Engineering
- **Dr. Eran Yahav** from the Faculty of Computer Science

All six have a chair in the Leaders in Science and Technology program or a Career Advancement Chair.

This year three of our new faculty won the *Allon Fellowship*. They are:

**Dr. Guy Bartal** – joined the Electrical Engineering Department this year. Dr. Bartal completed his Ph.D. studies at the Technion in 2006 and spent his post-doctoral period at Berkeley. Dr. Bartal works in the fields of plasmonics and metamaterials exploring light and waves phenomena in nano-scale sub-wavelength systems, typically incorporating metal and dielectric composites. His work combines fundamental science of electro-magnetic waves as well as the emerging field of nanotechnology. His research interests involve both fundamental study of the underlying physics of such systems and practical applications and devices that include super-resolution imaging and focusing and miniaturized photonic integrated circuits and nano-lasers.

**Dr. Amos Yarom** – will join the Physics Department in the coming year. Dr. Yarom completed his Ph.D. studies at Ben-Gurion University and spent his post-doctoral period at Ludwig-Maximilians University, Munich and at Princeton University. His research interests lie in string theory and its application to various physical systems. A powerful mathematical tool, called the AdS/CFT correspondence, which has emerged from string theory, allows one to model various strongly coupled systems via black holes in higher dimensional curved space. His work ties together fields as diverse as superconductivity, fluid mechanics, nuclear physics and black hole mechanics in one unified framework.

**Dr. Amir Yehudayoff** – joined the Mathematics department this year. Dr. Yehudayoff completed his Ph.D. studies at the Weizmann Institute and spent his post-doctoral studies at the Institute of Advanced studies at Princeton University. His main area of research is computational complexity with a focus on algebraic computation. He is studying connections between computational complexity and other more classical areas of mathematics, like geometry and algebra. He is also interested in probability theory and the behavior of random processes.

Our *Leaders in Science and Technology Program* and the Career Advancement Chairs assist us in recruiting four to six new faculty members a year since 2002 and continue to serve as valuable instruments enabling the recruitment of young outstanding faculty members and provide them with the required infrastructure and equipment.

The new faculty members recruited under these programs are:

**Dr. Ophir Auslaender – Faculty of Physics** - completed his PhD studies at the Weizmann Institute in 2004 and spent his post-doctoral period at Stanford University. He is a low-temperature, condensed-matter experimentalist.

**Dr. Ayelet Baram-Tsabari – Department of Education in Science and Technology** - completed her PhD studies at the Weizmann Institute in 2008 and spent her post-doctoral period at Cornell University. Her interests are in science education and science communication research.

**Dr. Ruth Heller – Faculty of Industrial Engineering and Management** - completed her PhD studies at Tel-Aviv University in 2007 and spent her post-doctoral period at the University of Pennsylvania. Her research interests are in statistics.

**Dr. Emanuel Milman – Faculty of Mathematics** - completed his PhD studies at the Weizmann Institute in 2007 and spent his post-doctoral period at the Institute for Advanced Study in Princeton, at the University of Toronto and at the Fields Institute.

**Dr. Josue Sznitman – Faculty of Biomedical Engineering** - completed his PhD studies at the Swiss Federal Institute of Technology (ETH) in 2007 and spent his post-doctoral period at Princeton University and at the University of Pennsylvania.

His research interests are in the areas of biofluid mechanics and transport phenomena, at the interface between physiology and engineering.

**Dr. Alex Szpilman – Faculty of Chemistry** - completed his PhD studies at the Weizmann Institute in 2003 and spent his post-doctoral period at the Swiss Federal Institute of Technology (ETH). His research focuses on the new ways to forge chemical bonds and prepare biologically active compounds with potential as medicine.

**Dr. Eran Yahav – Faculty of Computer Science** - completed his PhD studies at Tel Aviv University in 2005 and then was a research staff member at IBM's T. J. Watson Research Center. His research interests are in program verification, program analysis, synthesis, programming languages, formal methods, compilation techniques and software engineering.

This year, two of our young faculty, **Dr. Oren Cohen** from the Faculty of Physics and

**Dr. Yuval Shaked** from the Faculty of Medicine, won the prestigious, national Wolf Foundation's Krill Prize. This prize is very competitive; it is for excellence in scientific research by young faculty before they get tenure:

**Dr. Cohen** completed his PhD studies at the Technion in 2005 and spent his post-doctoral period at the University of Colorado at Boulder. His research focuses on high-field physics and extreme nonlinear optics.

**Dr. Shaked** completed his PhD studies at the Hebrew University in 2004. He spent his post-doctoral period at the University of Toronto. His research program aims to study tumor cell biology and growth in the context of angiogenesis, invasion and metastasis, microenvironment, and cancer stem cells (CSCs) and to enhance efficacy of currently-used and future developed targeted anti-cancer drugs.

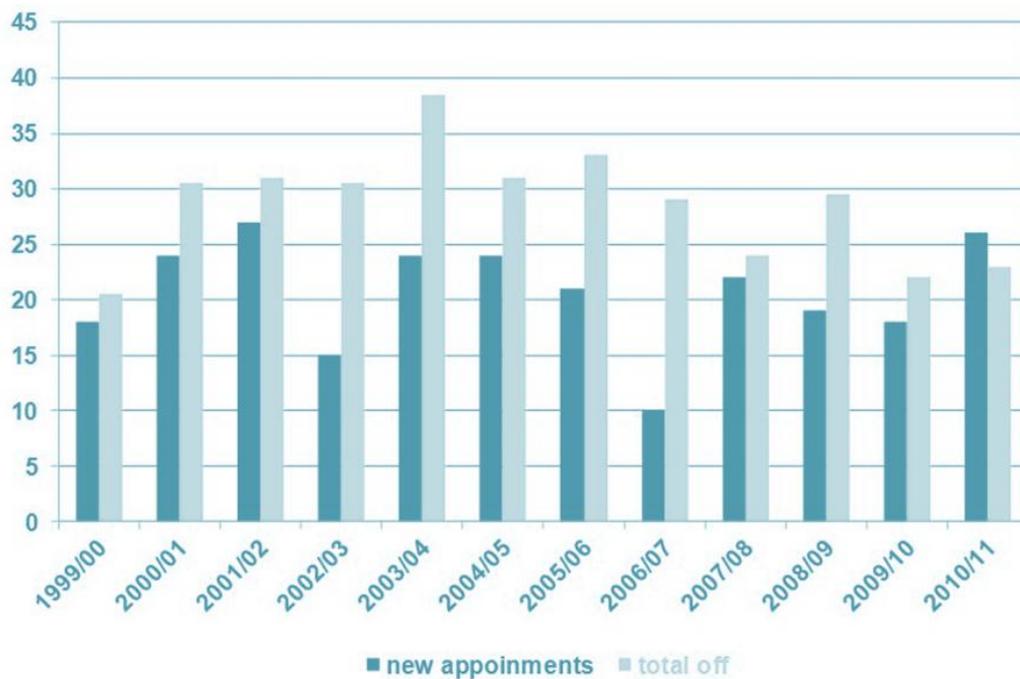
The retirement of faculty members provides us with the opportunity to bring into the Technion's ranks the most brilliant and innovative minds, provided we are in a position to offer them an attractive package. The Technion is facing some tough competition both domestically and internationally in terms of faculty recruitment. In order for the most brilliant and innovative minds to join the Technion we literally have to make an offer they cannot refuse. In fact, my approach in this matter is a very hands-on approach. If I find a suitable candidate whom I wish to recruit to the Technion I believe that a personal approach to recruitment is warranted and I shall be willing to travel to the candidate and persuade him or her to join the Technion. It is my conviction that this should be an utmost priority of the Technion and I shall pursue it diligently.

Other steps we have taken to help in recruitment include offering higher starting ranks, built-in tenure and attractive start-up packages; establishing laboratories prior to the arrival of new faculty members; encouraging our faculty members to be more proactive and involved in the recruiting process; allowing new recruits a reduced

teaching and administrative load for the first two years; providing each new recruited faculty member with a Technion mentor and providing help with the transition, such as offering on-campus housing (at the Stanley Shalom Zielony Graduate Student Village) for a certain period to facilitate and ease the transfer.

Our recruitment efforts are extremely focused and planned in terms of the disciplines for which we attempt to recruit. This priority of recruitment has to be in sync with another priority: to develop new and cutting-edge disciplines at the Technion. As president, my obligation is constantly to see the larger picture and steer towards our ultimate target.

### **New Appointments vs. Retirements & Departures**



## **The Technion Center for International Academic Relations (CIAR)**

Among other factors, universities are judged by their international academic relations and their cooperation and collaborations with leading universities worldwide. Science knows no political borders and is very much a universal language. The Center for International Academic Relations at the Technion, headed by Deputy Senior Vice President for International Academic Relations, Prof. Anat Rafaeli, serves as a gateway between Technion and people, universities and governments abroad. The center has existed for many years, but its activities have received an increasingly major emphasis in recent years, due to the increased importance of global collaborations for both the education and research of engineers and scientists.

The center currently maintains academic collaboration agreements with 118 universities in 28 countries. Of these, 36 agreements were signed in 2010, including 14 university-wide agreements (that enable student exchange and other forms of collaboration with any of the Technion's faculties and departments), and 22 faculty-specific agreements (enabling collaboration with one or more specific faculties). Collaborative agreements include universities in North and South America, Europe, Australia, Asia, and Africa. Focused efforts are dedicated to developing relationships with universities in the Far East. The CIAR works with the VP for Academic Affairs to promote the Technion Program for Cooperation with Far Eastern Universities which offers funding for hosting post-docs and visiting scientists from China, Singapore and South Korea. Special collaboration agreements have been established with universities in China, India, South Korea, Singapore, Taiwan and Thailand.

A dual doctorate program, administered by the Dean of the Graduate School with the assistance of the CIAR, offers dual and joint doctorate programs: Technion students have a formal advisor and complete all the academic requirements for a doctoral degree in two institutions, and are granted a doctorate from each of the institutions. The Technion has such agreements with TU Berlin, KTH in Sweden, Politecnico di Milano, and Nanyang Technological University in Singapore.

The CIAR receives queries on a daily basis from people, institutions and government agencies interested in developing a relationship with the Technion. CIAR activities entail identifying the best form and format for effective and productive collaborations. Together with the Coler Visitors Center the CIAR promotes and hosts visits of academic delegations to the Technion, which are typically used for exploring options for academic collaboration.

In addition the CIAR promotes and facilitates academic visits of individual students and scientists to the Technion, working in collaboration with the Office of Academic Affairs, the Deans of Undergraduate and Graduate Studies and various faculty deans. Academic visits range in length from a few weeks through to a full-term degree. In 2010, the Technion hosted 403 international students from 39 countries, 73 post-doctoral fellows from 21 countries and 74 academic visitors from 13 countries. The

CIAR provides all visitors essential assistance prior to their arrival, such as entry visas, insurance, residence assistance and any other specific needs.

Special efforts of the CIAR are invested in hosting Massachusetts Institute of Technology (MIT) students through the MISTI (MIT International Science and Technology Initiatives) program which allows MIT students to visit the Technion for eight-week research internships. In 2010, five MISTI students spent eight weeks each at the Technion. A new initiative of the center is TechniMisti, and is intended to sponsor reciprocal research internships of Technion students to MIT. This program will extend the former HIBUR program which involved a social integration of MIT and Technion students and mutual delegations.

To promote the social integration of international visitors, the CIAR social coordinator works with the Office of the Dean of Students and the Student Associations to allow visitors to enjoy the rich Technion campus life. The social coordinator also initiates special activities and holiday functions for the international campus community. Welcome meetings inviting all international visitors are held every semester at the Coler-California Visitors Center, with each meeting drawing close to 100 international scientists and students. And, in collaboration with the Department of Humanities and Arts, the CIAR offers special non-credit classes in conversational Hebrew.

Through special Jewish Agency programs, the CIAR attracts young Jewish students to study at the Technion. Such funding supported several students this year, including ten Technion International School of Engineering (TISE) students and eight new immigrants from France who studied in general Technion classes.

The international relations developed by the CIAR also provide an important resource for enriching the experience of Technion undergraduate students, through the Student-Exchange program. The CIAR promotes and manages this program, which is open to students who have an excellent undergraduate track record and are in their third year of studies. In 2010, the CIAR allowed 44 Technion students to spend a semester or a year abroad; students visited 24 universities in 12 countries in Europe, North America, South America, Australia and Asia.

The CIAR works closely with several key international Technion programs, including the Technion International School of Engineering (TISE), the Technion American Medical School (TeAMS), the Master of Business Administration (MBA) Program, the Technion Liaison Office (which works under the Executive Vice President for Research to promote international research funding), and the IAESTE exchange program, which is run by the Dean of Students and offers summer internships in Israeli industry to international students, and internships in other countries to Technion students. Internationally, the CIAR manages Technion membership in organizations connecting top-league science and technology universities, including CESAER and CLUSTER.

## Budget and Finance

The Executive Vice President and Director General, Dr. Avital Stein, has prepared the following report on the Technion's financial aspects and other projects which she directs:

The Technion budget is presented below in two categories:

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

This section of my report also includes information about the Technion's investments and pensions.

### *The Operating Budget*

Seventy-three percent of budgeted expenses are for staff emoluments and pension payments. In parallel, about the same percentage of this budget is covered by the government. The support of the government is transferred to the Technion, and to all Israeli universities, via VATAT, the Planning and Budgeting Committee of the Council for Higher Education. This Council was established to ensure Israeli universities' academic freedom and protect them from political involvement in higher education. It receives money from the Israeli government's Ministry of Finance and distributes it to the various educational institutions.

VATAT approved a Five-Year Plan (for the budgetary years 2010/11 until 2014/15) with the Ministry of Finance, for the academic institutes' budget. This plan includes an increase in the funds allocated to the universities. It also includes several changes in its previous budgeting model. The most significant change is the emphasis on decreasing the students/faculty ratio by setting a target for the universities to decrease this ratio. This change is expected to have a direct effect on research and teaching quality.

Over the past decade there has been a steady decline in senior academic positions of about 13%. The reduction was implemented by cutting vacant academic positions. Despite these fundamental cuts in academic positions, the Technion managed to recruit 91 new senior academic faculty members over the past five years. In 2010/2011 the Technion instituted a moderate increase in senior academic positions. This change reflects a new management policy and an adjustment to the VATAT's new budgeting model.

In recent years, the Technion's student body has numbered around 12,500 (undergraduates and graduates), about the same number as 10 years ago. The decrease in senior academic positions over the last years caused an increase in student/faculty ratio, which adversely affects the Technion's academic quality and strength. During the same period of time, we cut technical and administrative staff by about 17%. In 2010/2011 we increased engineering positions and at the same time decreased administrative and technicians positions.

### ***The 2009/2010 Budget Year***

The 2009/2010 budget year ended with a deficit of 42 NIS million, as compared to the 37.5 NIS million deficit that was budgeted. The actual deficit exceeds the budgeted amount as a result of increased pension payments and decreased income from societies to the current budget. On the other hand, there was an increased allocation from the government which helped us to absorb most of the deficit growth. The deficit will be covered by withdrawing from Technion's reserves.

### ***The 2010/2011 Budget Year***

The 2010/2011 budget framework is 1,136.1 NIS million, an increase of 58 NIS million for growth and expansion of academic and other related activities, with a 44.6 NIS million deficit (about 4% of the budget framework). The expenditures are divided into five main categories, as shown below (in NIS million):

Salaries	621	54%
Pensions	201	18%
Student fellowships, scholarships, etc.	84	7%
Maintenance	98	9%
Others	132	12%

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

VATAT	802	74%
Tuition	100	9%
Societies	47	4%
Self-income	142	13%

The main changes in the 2010/2011 budget compared to the previous year are an increase in government support and in self-income. As for the expenses, the changes are increased allocations for new faculty recruitment, research expenses, graduate

students fellowships, and also pension payments and essential safety-related activities.

### ***Development Projects***

Development projects are managed as multi-year budgets. In the year 2009/2010, the Technion invested (cash and obligations) 241 NIS million (\$66 million) in development projects. Income for development projects amounted to 107 NIS million (\$29 million). Part of the sources for these projects was received in the previous year. Development projects are administered on a multi-year schedule. The Technion policy is to commence new construction buildings and large renovation projects only according to the income received or guaranteed for each project.

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

Category	Invested in Projects 2009/2010
Buildings, renovations, infrastructure	203
Multidisciplinary research centers	27
Equipment	11
<b>Total (NIS million)</b>	<b>241</b>

### ***Investments***

Technion's investment portfolio includes the Technion pension reserve fund invested within the framework of the investment pool. The investment policy is set by a public committee. The value of the portfolio on September 30, 2010 was 4,749 NIS million (\$1,296 million). About 62% of the portfolio was in Israeli index-linked investments, 8% in foreign exchange linked investments, 22% in shares, and 8% in liquid assets. Our conservative investment policy proved itself during the past years.

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

Pension payments to all Technion employees are made from the operating budget. In 2009/2010, pension payments were budgeted at 195 NIS million, representing 17.4% of the operating budget; this year, they are expected to reach a total of 201 NIS million – 18% of the operating budget. This percentage is expected to increase over the next six 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.

## **Human Resources Division**

As this central unit, which oversees all personnel matters at the Technion, continues with its myriad, crucial, routine tasks serving the Technion's employees we have taken some vital steps to improve the effectiveness of the services offered to the Technion's staff. The Technion recognizes that the employees are critical to all of its accomplishments and that the welfare of its human resource is essential to its success.

**Our Vision** – "Creating an organizational culture that combines the achievement of the Technion's aims with the personal fulfillment of its employees".

**Welfare Unit** – As the Technion's management wishes to stress the importance of its main resource – the human resource – a special unit was established. The Welfare Unit was established to deal with issues of workers' and academic staff's bereavement, illness, family events and others, and initiates activities to enhance ties between different Technion units, including a new community volunteer program.

**The Training Unit** – focuses on professional development including senior personnel.

**Organizational Changes** – have occurred in the Safety Unit, the Marketing Unit, and the merging of the Computer Unit with the Data Processing Unit (see below).

**Improvements and Innovations** – in an effort to enhance the employees' motivation and pride the Human Resources Division sponsors courses, professional mentoring, social and cultural events and others.

**Computerization** – The HR Division is participating in the Blueprint process for SAP-HR in building a campus wide system for the management of personnel and academic staff.

**Work Routines** – A survey of work routines has been initiated in various settings throughout the campus including the Coler-California Visitors Center, dormitories, the Physical Development Unit and the Graduate School.

**Other Current Human Resources Issues** include absorption of new faculty members, building a new website, distribution of Technion salary slips online, negotiations with teaching staff for a new agreement and an internal HR training program.

**Heads of Academic Units and Management Retreat in Jerusalem** – the first in a series of workshops and lectures which dealt with and included: negotiation techniques, finances and budget administration, transmitting messages, a deans' panel and guest lectures.

## **Marketing Unit**

In the past year we established a marketing unit. The goals of the unit are to prepare a marketing strategy for the Technion, to concentrate all marketing activity in one body, to institute international branding, to assist in recruiting sources of income for research centers and other needs.

We recruited a marketing director with responsibility for the entire Technion, and a staff, including the spokesperson and a public relations coordinator, subsequent to constructing an effective organizational framework and a budget for the unit and its activities.

The aims of the unit in the near future include:

- Building a professional and effective staff to deal with the marketing needs and marketing communications for the Technion and its divisions.
- Producing presentations and briefs for the heads of the administration and the faculty.
- Entering into the process of promoting and branding the Technion :
  - Research
  - Comprehensive Strategy
  - Design
  - Incorporating the Technion generally and the faculties and divisions in the framework
  - Managing the brands' properties
- Consulting, training and professional guidance for all faculties and units on their current marketing concerns.
- Introducing proven working and marketing systems which are simple and effective.

## **Safety Unit**

Approximately one year ago, the Technion's management decided that it needed to enhance awareness of administrative responsibility for work safety in the Technion and to examine the existing organizational framework and regulations in this vital area.

For this, a survey comparing legal safety requirements and the status quo at the Technion was needed followed by recommendations for bridging the gaps, in the event that there were such. A legal firm which specializes in organizational counseling in the field of safety was engaged and meetings were held with all relevant administrators such as deans, heads of labs, radiation safety workers and others.

The areas identified and requiring attention were:

*Regulations* – The safety regulations dealing with the safety infrastructure and responsibility were re-written and distributed on campus.

*Head of the Safety Unit* – A new director with full academic qualifications was appointed; the need for additional workers is being examined,

*Training* – Every new student, worker and faculty member is requested to undergo training in basic safety regulations through computer programs, lectures and/or

practical workshops; all are requested to be tested on the material and receive periodic updates.

*Safety Surveys* are conducted on a regular basis in labs, classrooms, workshops and other relevant places; the danger spots are identified and eliminated.

*Laser Labs*, of which there are 45 at the Technion, require special annual inspections by an external, authorized lab.

*Biological Labs* – a new Technion Director of Biological Safety was named this past year. Surveys of the labs resulted in classifications by NIH standards and the labs' activities are authorized accordingly.

*Budget* – The Safety Unit's budget was increased this year to 2.5 NIS million and included items such as firefighting equipment, roof banisters, diffusion chimneys, asbestos clearing and others.

It is important to stress that during the large fires in the Mount Carmel area the Technion's Safety Unit performed its appointed functions outstandingly. This emphasizes the importance of our readiness in emergency situations.

## **Computing and Information Systems**

Major projects in process:

### **HR Module Implementation (SAP)**

This application, which we began implementing in 2003, administers the areas of Finance, Budget and Budget Control, Procurement, Inventory, Grants Management, Sales, Plant Management, Portal, and CRM. As of today, only two major ERP modules have not been implemented, Human Resources and Campus Management, and they will be operating within two years.

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

The new documents management system which was selected, DOCUMENTUM, aims to provide a good solution for both SAP users and non-SAP users, at Technion and at TRDF. Its benefits include greener paperless history, sharing of documents, electronic search, and a wide range of capabilities including documents encryption. The project kick-off was scheduled for April, 2011.

**Electronic Forms** – Portal based automated processes for researchers and academic staff.

The Technion and TRDF have a large number of printed forms that are in heavy use. We are in the process of developing a framework with an outside vendor of supporting electronic forms via our SAP Portal. As part of this framework, several forms are already in implementation, including travel-requests and sickness-reports. The benefits, beyond a greener environment and paperless, improved service, include documented history, auto-fill of known data, manageable workflow and follow-up of workflow, statistics and e-Search. The forms of the first phase will be deployed within a few months.

### **Campus-Wide Assimilation of Exchange 2010**

Under the leadership of the Taub Computer Center and the information systems units, and with the help of an outside vendor, we have completed the assimilation of a new mail and calendar system for the entire Technion and TRDF. This new mailer also offers support for hand-held and cellular devices as well as voice and video communications, abilities that will be tested and implemented at the Technion, as a second stage and in the near future. The project took close to a year to complete and is now in production.

### **Unified Video Conferencing and Remote-Learning Support**

Initial examinations are currently being made into formulating a unified video conferencing and remote-learning support for the entire campus. A survey that examined the different needs of the various units at the Technion is in its final stages, with the understanding that more and more units will find this service crucial.

### **Computers Center and Information Systems Reorganization**

During the first semester this year, we examined the possibilities of reorganizing the structure of the computer center and information systems units, including the possibility of a complete merger. We now have successfully implemented this reorganization.

## **Green Campus Project**

The Green Campus Project has been operating at the Technion for the past ten years and is designed to enhance awareness and promote activities for the preservation of the environment on campus. By supporting these activities we hope to have an influence on the behavior of the students, workers and academic staff outside the campus as well and on the engineers of the future. The Technion's president appointed a Green Campus Council which coordinates the project and consists of representatives of all segments of the campus, including top administration. The Technion Students Association is significantly involved. The key points of focus of the program are education and consciousness-raising, energy conservation and preventing pollution.

The Physical Development Department's Forum for Conservation of Energy has taken steps for saving electricity in numerous faculties. In the dorms, meters have been installed in the individual rooms and students are billed accordingly. These measures have resulted in savings of approximately 2 NIS million per year!

A Green Day on campus, a recycling, second-hand market, substituting electric vehicles for current campus transport, electronic trash handling, a new internet site for the green campus project, seminars and prize-bearing competitions - all are ways that have been employed this year to further the aims of the program.

Recently the president of the Technion appointed Prof. Tali Tal, of the Department of Education in Technology and Science as the head of the Green Campus Project. The coordinator of the program for the S. Neaman Institute is Tal Goldrath.

The Technion, as a leading university, is the first in the country to sign **The Protocol for the Reporting of Statistics on Greenhouse Gas Emissions**.

## **Other Issues**

### **Agreement with the ATS**

Following previous correspondence and as a result of the ATS's losses in Bernard L. Madoff's investment securities, the Technion and ATS reached an agreement regarding the amount of \$63,000,000 to become payable within a period of 30 years, bearing an annual settled interest.

### **Agreements with the Haifa Municipality and the Israeli Tax Authorities**

The Technion signed agreements with the Haifa municipality and the Israeli tax authorities regarding local and national tax liabilities accrued from year 2004 to the present. Both agreements were achieved after a series of long negotiations accompanied by our attorneys and C.P.A.s.

### **Implementation of New Regulations for Institutions of Higher Education**

During the past year the Technion implemented new regulations regarding accounting policies for the financial statements of institutions of higher education and the regulation concerning the requirements to publicize a bid before making any commitment or alliance exceeding 100,000 NIS. The latter obligates us to summon committees and to set procedures to conform to the regulations for tendering bids.

### **Emergency Simulation Exercise**

In March 2011, a simulation exercise was conducted by the Technion's emergency team in case of earthquake and of dangerous substance leak in order to test procedures for evacuation, communications, medical care, freeing trapped victims and others. The president and the Technion management; the entire senior administration participated in the exercise and in formulating conclusions. Among other recommendations, a survey of the Technion buildings' strength will be conducted and all new building will have to conform to new earthquake-resistant standards.

## Physical Development

In the past year, we have continued to pursue new construction projects as well as maintain and upgrade existing buildings. A great deal of emphasis has been placed on building safety. A campus-wide effort has been made to promote energy savings. The program encompasses the Faculties of Electrical Engineering, Physics, Computer Science, Civil and Environmental Engineering, Biology and Medicine, and the Department of Education in Technology and Science. Electric meters have been installed in all Technion units, including 550 dormitory apartments.

Measures have been taken in all new construction projects to ensure that buildings be as “green” as possible to ensure maximal energy efficiency and savings in water consumption. All new buildings are planned for easy maintenance and follow the motto “Safety First.” In addition, they are fitted with computerized monitoring systems that will save on maintenance costs and efficiently control all systems. We are continuing to make the campus as accessible as possible for individuals with disabilities.

Below is an overview of the main development projects recently completed, those under construction and those in advanced planning stage.

### Projects Completed in 2010

1. Shalom Stanley Zielony Graduate Student Village: major construction project with 216 apartments involving an estimated investment of \$35 million. Three buildings are populated.
2. Schulich Faculty of Chemistry:
  - Renovation of laboratories, offices and public areas – Stage A
  - New infrastructures of the entire complex
  - Renovation of the teaching wing
  - Renovation of the student lounge
  - Façade renovation
3. Emerson Family Life Sciences Building: covering a total area of 10,500 m<sup>2</sup> including parking floors: Floors 0, 2, 3, 4, 5 are completed.
4. Wolfson Faculty of Chemical Engineering: renovation of nanotechnology laboratories
5. Faculty of Mechanical Engineering: renovation of two research labs
6. Faculty of Biotechnology & Food Engineering
  - Renovation of infrastructures
  - Renovation of fermentation lab
7. Sports Center: two outdoor swimming pools for toddlers & children

8. Canada Dormitory Village: renovation of entrances to buildings 944- 945
9. Ullmann Teaching Center renovation:
  - Classrooms 211-213, offices and service facilities in the Center for Promotion of Teaching and the Recording Studio
  - Classrooms 301 - 307, 309-311
  - Transfer of the Medical Clinic from the Elyachar Library Building to the ground floor
  - Infrastructure renovation
10. Security Unit: operations room shelter at the Main Gate
11. Churchill Auditorium: Electro-mechanical infrastructure renovation
12. Renovation of Jacobs Graduate School offices
13. Demolition of old buildings: Finkelstein and Kennedy Leigh dorms, Salenger Guest House and Konoff Building
14. Faculty of Aerospace Engineering: Satellite Center
15. Real estate upgrading from special management budget: various projects related to safety and adapting facilities for the disabled
16. ATS Village II-Solar water heating, air-conditioning systems.

## **Projects under Construction**

1. Schulich Faculty of Chemistry: renovation of laboratories, offices and public areas – Stage B
2. Emerson Family Life Sciences Building covering a total of 10,500 m<sup>2</sup> including parking floors: the sixth floor will be completed soon and additional floors will be completed prior to the recruitment of new researchers
3. Sohnis Garden: at the entrance to the Emerson Family Life Sciences Building.
4. Faculty of Mechanical Engineering: new D. and Betty Dan Kahn Building
5. Clinical Research Authority:
  - Renovation of experimental research facilities, Rappaport Faculty of Medicine.
  - Temporary plant for experimental research facilities Floor 10, Rappaport Faculty of Medicine
  - Temporary plant for experimental research facilities on campus
  - M.R.I. facility
6. Rappaport Faculty of Medicine: renovation and expansion of classrooms to accommodate more students
7. Real estate upgrading from special management budget: various projects related to safety and adapting facilities for the disabled
8. Ullmann Teaching Center: Self-study Center
9. Various lab renovations all over campus for students and new researchers

## **Projects in the Planning Stage**

1. Undergraduate Student Village – Guest Apartments (5 + 1 Presidential Suite)
2. Senate Hall renovation
3. Ullmann Teaching Center
4. Rappaport Faculty of Medicine
5. Various lab renovations all over campus for students and new researchers
6. Real estate upgrading from special management budget: various projects related to safety and adapting facilities for the disabled
7. Community Center (containing Kindergartens) at the Shalom Stanley Zielony Graduate Student Village
8. Clinical Research Authority – MRI Unit
9. Rifkin Dormitories – Renovation, communal areas Building 102
10. Guest House – six new apartments
11. Green Campus Project – water-and energy-saving and waste separation.

## Undergraduate Studies

### *Student Numbers*

Over the last several years the number of students has, more or less, remained the same, although due to constraints imposed by VATAT, the number is about 700 students lower than it was in 2003, when the number of students was the highest in Technion's history. The total number of undergraduate students in 2010/11 is 9564 out of which 2242 are new students. Students' distribution among the various faculties is given in the following tables. The four largest faculties are Electrical Engineering, Computer Science, Civil and Environmental Engineering, and Industrial Engineering and Management.

Early figures for this year indicate stability in the number of candidates applying for the 2011 academic year. The Technion is continuing its marketing efforts to attract the best candidates to the campus – including personal tours by high school students to the campus, discussions of potential candidates with faculty members, media exposure, and active encouragement of candidates. These efforts are needed to keep the same enrollment level.

Last year, the Technion made a special effort to identify Technion students close to graduation and encourage them to take those final steps to graduate as early as possible. It was estimated that these moves helped another 50 to 70 students to graduate.

### Total Undergraduate Students and New Admissions

<i>Total Number of Students</i>				
<b>Year</b>	<b>2007/8</b>	<b>2008/9</b>	<b>2009/10</b>	<b>2010/2011</b>
<b>Engineering</b>	6,167	7,171	7,292	7,455
<b>Non-engineering</b>	2,324	2,107	2,119	2,109
				<i>(Including 555 MD 4<sup>th</sup>- 6<sup>th</sup> year students)</i>
<b>Total</b>	<b>8, 521</b>	<b>9,278</b>	<b>9,401</b>	<b>9,564</b>

<i>Admissions</i>				
<b>Year</b>	<b>2007/8</b>	<b>2008/9</b>	<b>2009/10</b>	<b>2010/2011</b>
<b>Engineering</b>	1,495	1,746	1,701	1,836
<b>Non-engineering</b>	610	439	499	406
<b>Total</b>	<b>2,105</b>	<b>2,185</b>	<b>2,200</b>	<b>2,242</b>

<b>Undergraduate Students by Faculty in 2010/11</b>
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**Engineering Faculties:**

• Aerospace Engineering	371
• Architecture and Town Planning	520
• Biomedical Engineering	196
• Biotechnology and Food Engineering	261
• Chemical Engineering	338
• Civil and Environmental Engineering (incl. Mapping and Geo-Informatics and Agricultural Eng.)	1098
• Computer Sciences – Engineering, 3 and 4-year program	1154
• Electrical Engineering	1510
• Industrial Engineering and Management	925
• Materials Engineering (jointly with Physics or Chemistry)	259
• Mechanical Engineering	823

<b>Total Engineering:</b>	<b>7,455</b>
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**Non-Engineering Faculties:**

• Biology	339
• Chemistry	131
• Computer Science (3-year program)	108
• Economics and Management	76
• Education in Technology and Science	176
• Mathematics	155
• Medicine	862*
• Physics	219
• General Undergrad. Option	43

\* Including 555 MD 4<sup>th</sup>- 6<sup>th</sup> year students

<b>Total Non-Engineering:</b>	<b>2,109</b>
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<b>Grand Total:</b>	<b>9,564</b>
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***Recruiting New Students***

The location of the Technion in the northern part of Israel may affect candidates who live in the Center and the south of Israel not to choose the Technion as their first choice. The Technion has confronted this challenge in different ways. The reasons are non-academic. Even those who prefer to study in Tel-Aviv or Beer Sheba are aware of the Technion's academic advantages. The reasons for not choosing the Technion are mainly financial. To be more attractive in this respect the Technion addressed the main expenses: housing and scholarships. The Technion has made great efforts to increase the dormitory space available for students, thus making the Technion more attractive for students from the center and south of Israel. A total refurbishment

process of existing dormitories, and planning and building of additional dormitory buildings continues at all times.

With regard to scholarships, we received an important boost lately from the American public charity, Israel Endowment Funds (PEF). PEF decided to allocate very significant scholarships to Technion undergraduate students realizing their importance to Israel's future. Forty scholarships each year, each for the amount of \$7,000, were granted in the last few years to disadvantaged students and to excellent students. The total number of fellowships is now 120. These scholarships are known as The Alfred and Anna Grey Scholarships and they are extremely important as they help us recruit to Technion the best students in Israel. Other scholarships are available to many students of the Technion. In addition, we have been holding open days in the Technion, as well as participating in numerous recruiting fairs for soldiers and other potential candidates. High school students from central and southern Israel are invited to visit the Technion with their classes to see for themselves the various departments, laboratories, housing and the campus in general.

### ***Improving the Quality of Teaching and Learning***

#### ***Good Start – First-Year Students' Experience***

The Technion has always been committed to improving the academic experience and the quality of teaching and we have invested much effort in our commitment to this issue. As part of our efforts we initiated a revolutionary program for first-year students known as the "Good Start" Program. This program was designed to help overcome the initial stress that many students experience during their first year of studies at the Technion, and their feeling that many of the courses they are studying are "not relevant" to their future profession. A very important component of the program is the first-year design course – a vehicle by which engineering students can learn early on the challenges of their chosen profession, experience the excitement of design, develop the capabilities in engineering design, teamwork and problem-solving and understand how studying basic science subjects will help meet those challenges. In the last few years, the design course was piloted in several departments including Chemical Engineering and Industrial Engineering and Management, among others.

A survey carried out among all first-year students showed conclusively that the majority of the students who took the course felt better prepared and more grounded in their chosen major compared to 20-50% of those who did not. Teaching workshops to improve the didactic skills of faculty members are offered. The impact of these steps has already been felt, and positive responses from students have been received.

Another aspect of the program is significantly reducing the size of regular classes and mainly the review classes in mathematics courses (to a maximum of 35 students each), together with providing the students with more feedback during the course of

the semester. The latter is achieved both by training the tutors and teaching assistants to encourage active learning in their sessions and by providing individual grading of homework assignments. "Drop-in" workshops were instituted and are available every afternoon for students with specific questions. These extra efforts are needed as we have come to realize that the mathematics preparation in high schools has deteriorated significantly over the last decade. This program obviously requires significant resources and despite the difficult budgetary situation, we decided to support it, realizing how important it is for the core of what we do at the Technion.

### **The Center for the Promotion of Teaching**

The Center for the Promotion of Teaching works together with faculties and students to promote Technion commitment to excellence in teaching and learning throughout the institute. The center provides workshops and individual consultation for new teaching assistants (350 TAs each year), new faculty members and departments. The center provides the technological and pedagogical support for designing website courses (1800 *moodle* – on-line courses) and the use of a variety of instructional technology tools.

In addition, at the Streaming Media Service, students can watch videos of their courses. This is particularly helpful for students who have been called for reserve military service or have been absent for other reasons. The center conducts an annual survey of the quality of teaching which helps in the learning process of faculty members.

### **The Unit for Personal Assistance**

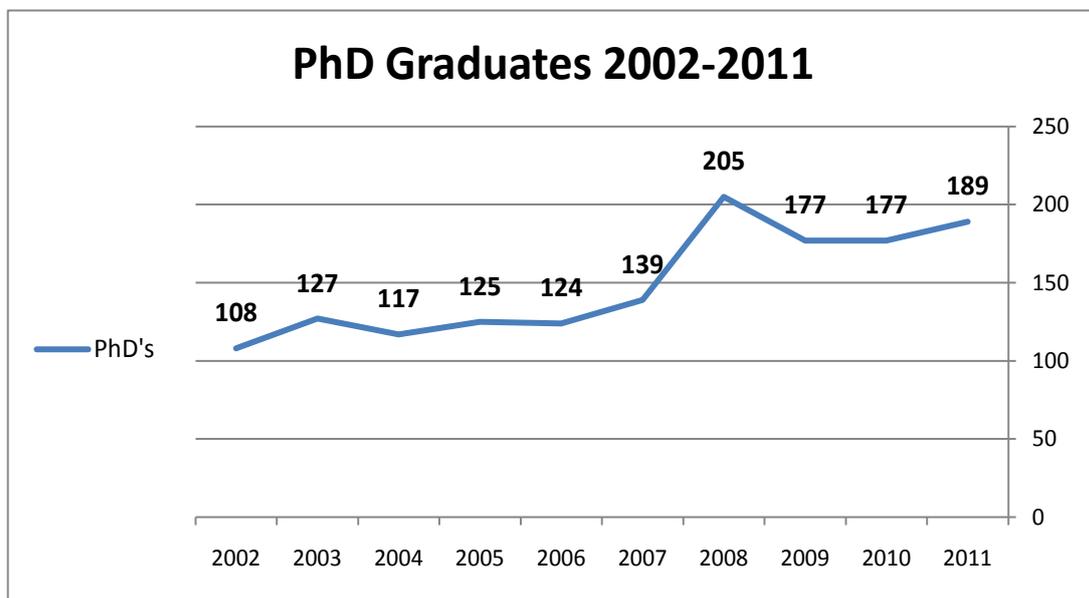
The Unit for Personal Assistance has always been an essential part of student life at the Technion. In an attempt to make life easier for our students we have placed great emphasis on the services which the unit offers. Over the years Israel has had its share of military operations and we are proud that many of our students are active reservists who are called up for frontline duties on a regular basis, especially in times of a general call-up. At times, students can miss many days of studies and the unit has to become creative in order to help them catch up. For example, the unit will provide tutoring for these students, photocopying services, counseling, summer courses at a reduce rates and at times even provide them with loans or special scholarships. The unit also assists students with financial difficulties by extending loans and offering special scholarships. The unit is a valuable tool in helping our students and it is believed that it has assisted hundreds of them navigate through their degree effectively.

The Senate of the Technion recognized that each period of military service during the semester or examination periods impacts the student reservist's academic achievements. Last year the Technion's Senate modified the regulations to allow more adjustments and benefits for students serving as reservists in the army during

the course of their studies. Also, the Senate has recently approved a program to encourage students to volunteer and serve in the community through various volunteering organizations. Students get credit for their public involvement as well as army reserve duties.

## The Irwin and Joan Jacobs Graduate School

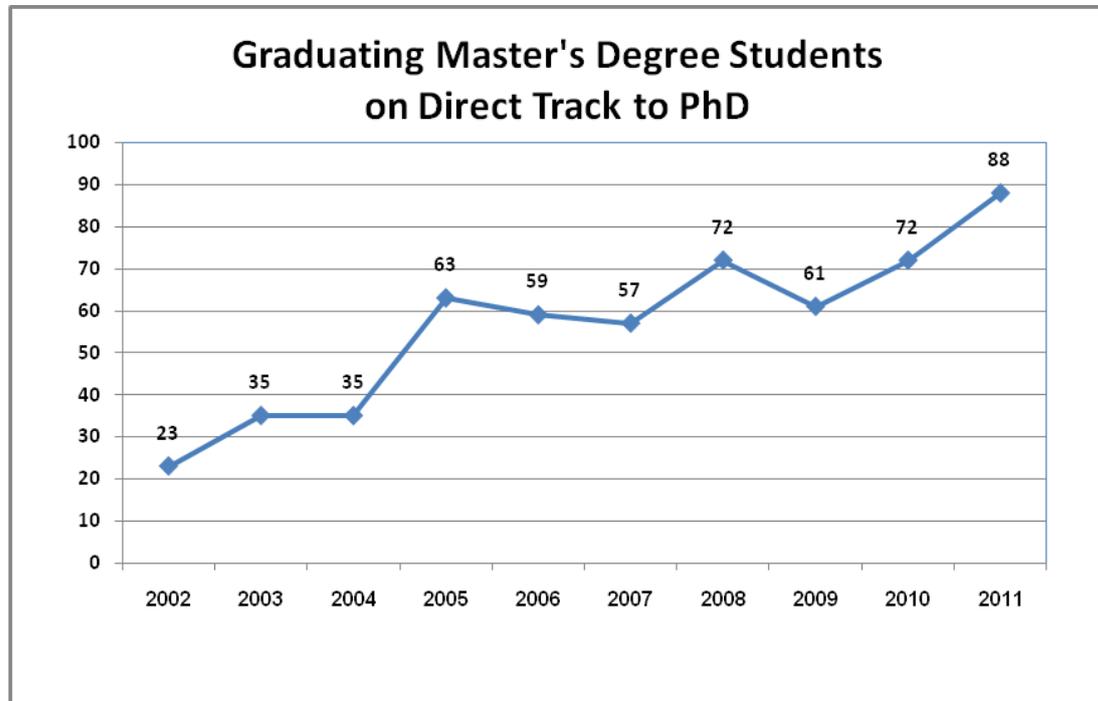
The dean of the Jacobs Graduate School, Prof. Moshe Shpitalni, reports that the last five years have been very successful for the school in many respects. The graph below shows the progression in the number of students who have completed their PhD's at the Technion since 2002. The clear and encouraging picture shows a steady increase since 2006, with the average number of PhD's graduating from Technion in the last four years 70% greater than the number 10 years ago. Based on the total number of current PhD students, we expect that over the next three years around 160-180 PhD's will graduate each year. This is a significant and important achievement that brings us closer to our goal of reaching a steady rate of 1100 PhD students and 200 – 220 graduates each year by 2015.



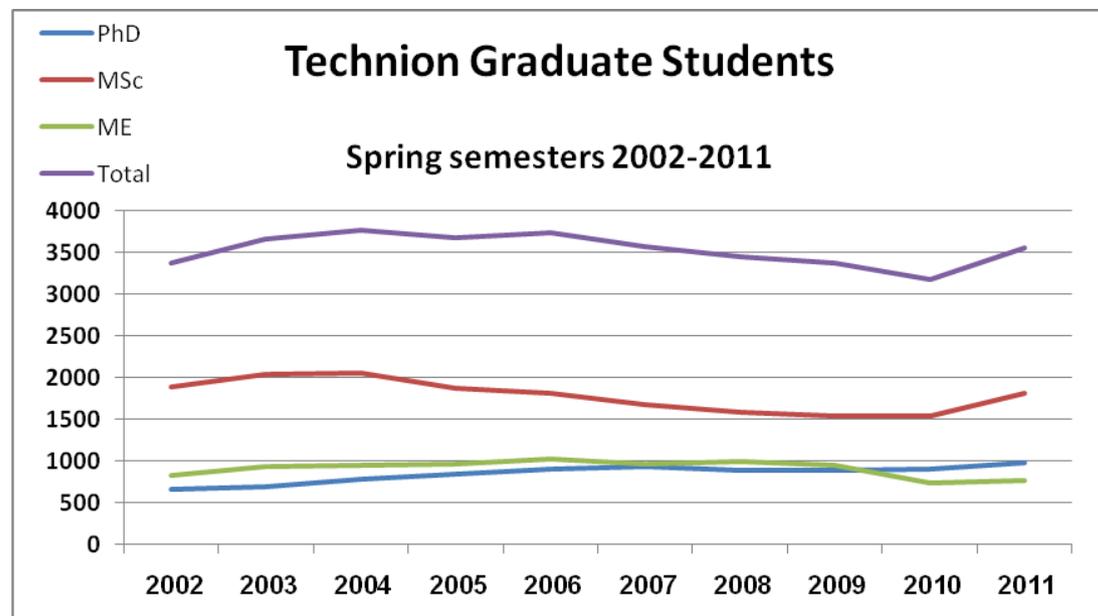
From 65% to 70% of our PhD students earned a master's degree from the Technion, so that our master's degree students are our main source of PhD students. Therefore, in order to increase the number of PhD students and reach our annual goal of over 200 new graduating PhD's a year, we have to increase the number of master's (thesis track) students and make ourselves more competitive in attracting more PhD students from other universities in Israel and from abroad. Unfortunately, due to a lack of resources, the numbers of these students are decreasing, which may jeopardize our efforts. The solution to this is one we have been stressing for some years now: to increase the number of available fellowships, which in turn will enable us to attract more master's students and to better support more PhD students. We hope to establish a large enough fellowship fund to allow as many doctoral students as possible to study at the Technion without the constant worry of budgetary constraints.

At the upcoming master's graduation ceremony, the Technion will be awarding 741 master's degrees: 374 thesis track degrees and 367 non-thesis track degrees. Of these,

115 are MBA graduates and 89 are on the direct doctorate track. I am very pleased to report a steady increase in the number of graduate students taking the direct path to their PhDs, in accordance with the policy of the Technion and the graduate school.



The graph below shows the progression in the total number of active master's and doctoral degree students over the past 10 years. The graph indicates a slight increase in the total number of master's students compared to 2001, a continuous decrease in the number of thesis track master's students and an increase in the number of non-thesis master students. Some of this decrease is due to the positive trend of more master students transferring to the direct PhD track. These students are counted both as master and as PhD students for shorter periods of time. In addition, since more master's students in the non-thesis track complete most of their studies in the Continuing Education Department, they too are counted as students of the graduate school for shorter periods of time.



In mid-March 2011, the number of graduate students stood at 3,556, of which 985 are doctoral students and 2,571 master's degree students. Of the 2,571 master's students, 1,805 are studying towards an MSc degree with thesis. This number marks a slight increase compared to the spring semester of 2010, when the numbers totaled 3,180 graduate students.

The following new programs were approved this year.

- Master of Mapping and Geo-information (non-thesis)
- Master of Science in Landscape Architecture (with thesis)

To attract international students to Graduate School programs taught in English, such as MBA and Civil Engineering, the requirement to take the Hebrew examination has been dropped.

Other significant issues I wish to report to you are:

- Construction of the new Stanley Shalom Zielony Graduate Student Village is almost completed. In fact, occupancy began in March, and 82 lucky families have already moved in. This new village will certainly serve as a factor in attracting top graduate students from Israel and abroad, especially those with families.
- The Graduate School offices have at last undergone a complete makeover. The clean, new and pleasing design has made the Graduate School a better and more pleasant place for students, employees and visitors alike.
- In spite of difficulties, we have continued to increase our budget for student travel, thus enabling our students (mainly PhD's) to present their research work at international conferences abroad. I am a strong advocate of this policy, as it is through these conferences that doctoral students can meet their peers, forge scientific ties and brainstorm. I believe this is a sound investment for the Technion.
- The joint MSc program in Economics with the University of Haifa was renewed.

# **Faculty in Focus: The Faculty of Biotechnology and Food Engineering**

## ***The Faculty***

The Technion's Faculty in Focus for 2011 is the Faculty of Biotechnology and Food Engineering. It is the only one of its kind in Israel, providing the highly skilled engineers needed for the country's expanding biotechnology and food industries. It offers a unique interdisciplinary blend of courses in engineering, life and natural sciences.

The dean, Prof. Ben-Zion Levi, reiterates that the faculty's mission is two-fold: to train generations of first-class engineers and scientists who can lead the biotechnology and food industries and to maintain a position as a leader in Israel and around the world. The fulfillment of both missions will impact on Israel's national level in both basic and applied research. These missions are in line with the Technion's vision of becoming one of the world's ten top universities.

Founded in 1953 as part of the Faculty of Chemical Engineering, the faculty became a separate unit in 1967. In the past decade the faculty has undergone a major and dramatic transformation following a strategic decision committing faculty resources towards biotechnology. Accordingly, many new and outstanding faculty members specializing in biotechnology were recruited and the teaching programs were revised to include a program for specializing in biotechnology, in addition to the already existing food engineering program. Both fields deal with biological materials and this unique and exciting combination of disciplines reflects the progressive change in the traditional food industry which is increasingly turning in the direction of biotechnology. The faculty's graduates are employed in all areas of the food and biotechnology industries in Israel and around the world. They are at the helm of the Israeli industries in these fields and are also key in the research and development fields.

The faculty in 2011 consists of 14 full time faculty members, 76 teaching assistants and seven part-time adjunct teachers (mainly expert scientists from the industry). Recognizing our need for expansion, the Technion administration raised funds for a new wing which was completed in the fall of 2009 – The Louis and Bessie Stein Biotechnology and Food Engineering Complex. The faculty members are also affiliated with the research and development center, which is the administrative arm responsible for the coordination of research programs with government, national and international agencies and industry.

## ***Research***

The research topics which engage the faculty members currently are wide-ranging and diverse including theoretical and practical areas. Although the faculty is

relatively small it covers all modern aspects of research in their fields, centered in the outstanding research laboratories listed, which include:

The Laboratory for Cancer Drug Delivery and Tissue Engineering  
The Laboratory of Molecular and Applied Biocatalysis  
The Laboratory of Biopolymers and Nano-Biotechnology  
The Laboratory of Functional Foods, Nutraceuticals and Food Nanoscience  
The Laboratory of Molecular Nutrition  
The Laboratory of Mammalian Cell Technology  
The Protein and Enzyme Engineering Laboratory  
The Laboratory of Applied Genomics and Food Microbiology  
The Laboratory of Molecular Biology of Pathogens  
The Laboratory of Nanostructured Molecular Assemblies  
The Laboratory of Functional Nanomaterials, Biosensors and Sensors  
The Laboratory of Antimicrobial Peptides Investigations (LAPI)

There are a number of very exciting and promising research projects currently underway at the faculty; a few examples of these are listed below:

**Prof. Eyal Shimoni** is researching BioCurcumin as a platform for enhanced bioavailability and smart delivery of biologically active ingredients.

**Dr. Yoav D. Livney** is studying nature-inspired biopolymeric systems for delivery of nutraceuticals for enrichment of staple foods and beverages and for oral delivery of anti-cancer drugs.

**Dr. Ester Segal's** work is focused on the development of optical biosensors for pathogen detection against bioterrorism and their integration in food packaging platforms.

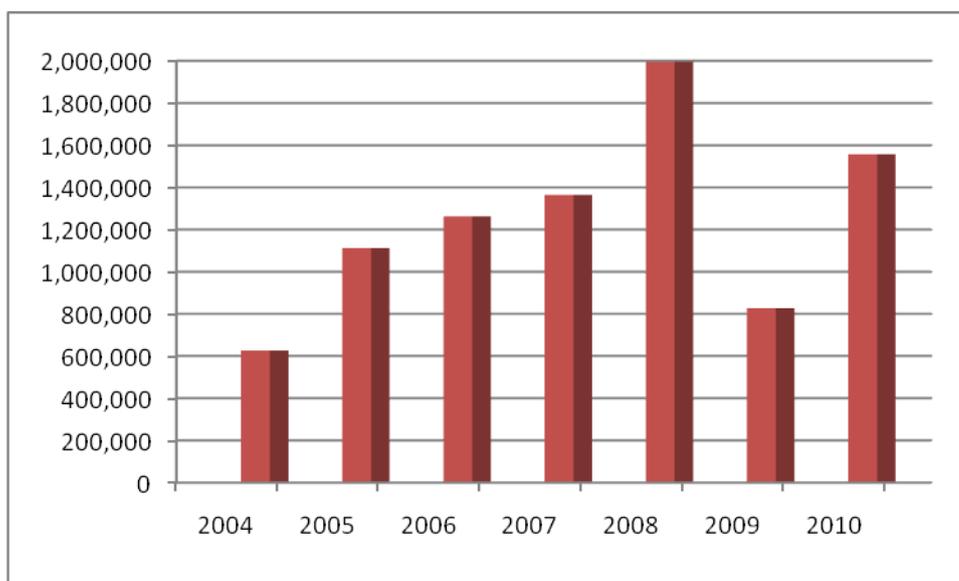
**Prof. Amram Mor** is investigating OAQ-based chemical mimics of host defense peptides as a novel approach to overcome antibiotics resistance in bacteria.

**Prof. Marcelle Machluf** is exploring the development of extra cellular matrix (ECM) isolated from porcine organs as a platform for engineering organs ex-vivo. She is also studying the design of drug delivery systems which can deliver cancer therapeutics, particularly for brain tumors.

### ***Research Funding***

The Faculty's revived research activities and achievements are apparent in a sharp increase in research funds (table below). The majority of the grants (63%) are from what is considered at the Technion to be competitive resources like: Israel Science Foundation, The U.S.-Israel Binational Science Foundation (BSF), German-Israeli Foundation (GIF), The Israel Cancer Research Fund, EU funding, etc. About 14% of the research grants are from Israeli industry, 13% from government funds (translational research), and 10% from Technion internal funds.

## Research Funding – Faculty of Biotechnology and Food Engineering – 2004-2010



### *Future Plans*

#### **Food Engineering**

Modern ways of life and modern medicine are the driving force behind the rapid increase in world population and the steady increase in life expectancy. Further, as personal genomic information becomes available at affordable cost, due to new breakthroughs in parallel DNA sequencing, this vast genomic information will have a huge impact on life style and hence on diet as part of wellness and quality of life.

Together, this new era is imposing new research and development challenges on modern food engineering and technology. One of the challenges for research in food engineering is the development of new products and processes through the use of modern tools and knowledge. Food safety and security will be an even more critical issue as consumers demand fresher foods and manufacturers transport the foods over longer distances. Furthermore, new packaging materials and techniques will be developed to give more protection to foods. In addition, there is significant interest in identifying preservation technologies that can improve food security and defense to meet the growing demand for fresh and healthy convenient foods. “Dining on our genome”, i.e. personalized food, will be a key issue in food processing development.

Converting existing manufacturing and supply chain processes that were designed for high-volume outputs to short runs for highly customized products is particularly challenging. The changeover technologies will become increasingly important with more custom products being developed to satisfy that demand. Optimization and process analysis of such new technologies will be among the top priorities in food engineering. Development of advanced monitoring and control systems will become key points in facilitating flexible manufacturing. Energy saving and minimization of

environmental problems (green industry) will continue to be an important food engineering focus.

Some of these crucial issues are already being addressed as part of the long-term research focus of our faculty members. However, we particularly wish to strengthen and expand our research and teaching activities in the areas of food and wellness, technology and engineering and the development of green food industrial processes.

### **Biotechnology**

The current revolution in life sciences is having a huge impact on biotechnology. Among the major breakthroughs are massive genome sequencing, stem cell technology, tissue engineering, proteomics, and metagenomics, system biology and metabolic engineering, synthetic biology/biotechnology, structural and computational biology, and directed evolution of proteins. Some of these topics are already part of the research program of the faculty members and there are plans to recruit new faculty that will strengthen these new research fields. The planning takes into account the current activities in other Technion faculties such as Biology, Bio-Medical Engineering, Chemical Engineering and the need to enrich the faculty's teaching programs.

The plans to enhance biotechnology capacity are focused particularly in the fields of system biology, synthetic biology, process engineering, metabolic engineering, biological engineering, biomechanical engineering of mammalian cells and bioreactors.

### **School of Process Engineering – Prospect for the Future**

The most crucial development for the future is that the faculty, along with the faculties of Chemical and Materials Engineering, is involved in discussions towards the establishment of the School of Process Engineering. The three deans: Profs. Ben-Zion Levi, Yachin Cohen and Wayne D. Kaplan, are in the midst of pioneering deliberations concerning the administrative structure of the school and its relationship with Technion management, various study programs, research activities and infrastructure as well as issues of faculty autonomy.

## The Center for Pre-University Education

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

**The Unit for Pre-Academic Studies** sponsors many diverse programs adapted to the different populations which seek admission to the Technion and study there. During the year, 600-700 students study within the framework of the unit's programs and an additional 1000 students participate in other programs which include:

- Preparatory Course for Discharged Soldiers and New Immigrants – a 10-month course focusing on mathematics, physics, English and scientific writing.
- Pre-Entry Courses – courses in mathematics and physics geared at students who have been admitted to the Technion but need preparation in those subjects.
- Pre-Preparatory Course for the Atidim Project – course held from August to October for Ethiopian immigrants, Druze students and those from disadvantaged backgrounds.
- Preparatory Course for Arab Students (NAAM Program) – preparation for academic studies for students from northern Arab towns who want to study at Israel's institutions of higher learning.
- Special Program for Ultra-Orthodox Students – courses providing academic preparation for ultra-Orthodox students who have a weak background in science.
- The Ofakim-Hi Tech Program – a preparatory program sponsored by Technion alumni intended for discharged soldiers from combat units who do not have a matriculation degree or a psychometric exam score.
- Atidim Industries Program – new program offering preparation and support for discharged soldiers from disadvantaged backgrounds.

**The Harry and Lou Stern Unit Youth Activities Unit** aims to make science and technology attractive to youth and to enhance learning for middle school and high school age youngsters. The activities take place in the morning in the framework of special science days and in after-school clubs and courses. This is the fourth year in which the unit is operating in the Arie and Jacqueline Carasso Youth Wing with their nine well-equipped laboratories, modern classrooms and the large Amos and Shoshana Horev Auditorium, all of which enable the unit to expand and enrich its programs.

### *Special Projects*

**Sci-Tech** – This annual international research summer camp for 11<sup>th</sup> and 12<sup>th</sup> graders held at the Technion is now in its 17<sup>th</sup> year. This is an opportunity of a lifetime for gifted students to experience serious research opportunities guided by top-notch

Technion researchers. The 38 participants in summer 2010 from six different countries also enjoyed the sports facilities at the Technion as well as touring Israel.

**TeLeM – Technion Promotes Mathematics** – The TeLeM program is a joint program between the Pre-Academic Center and the Department for Education in Technology and Sciences. It aims to persuade children in grades six and up to study mathematics at the highest level, to enhance their understanding of the subject and to encourage them to study at the Technion later on. This is the 11<sup>th</sup> year of the program's operation. Mathematics teachers who participate in the program receive special training on a regular basis. There are 600 pupils participating from six schools in the north; the program is sponsored jointly with the Ministry of Education. The program also sponsors special competitions and a Math Olympics for all its students. Graduates of this program in the 11<sup>th</sup> and 12<sup>th</sup> grades are offered to participate in academic studies at the Technion within the special framework for gifted high school students.

**The Ort – Technion Classroom** – This is a joint program between the Technion and Ort Schools for outstanding pupils. In 2010 there were 11 classrooms in the framework of the program with a total of 260 pupils. The aim of the program is for the participants to accrue academic credits for future studies at the Technion when they graduate high school. The program takes the pupil from 6<sup>th</sup> to 12<sup>th</sup> grades until they enroll as full time Technion students and includes preparation courses for academic studies such as scientific research skills, logical thinking, scientific and mathematical thinking, introduction to the Technion and pre-academic courses in biology. Some of the high school participants will be admitted to the Technion as regular students in a special early-registration process for gifted students.

### ***Other Youth Advancement Programs***

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

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

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

**The Legacy- Licensed for Science Program** – Sponsored by the Legacy Heritage Fund, the purpose of the program is to encourage a positive attitude towards science

and to foster excellence in gifted junior high school pupils from disadvantaged communities and families. The activities take place on campus, in the teaching laboratories of the Carasso Youth Wing and consist of 17 two-hour afternoon sessions held during the school year. The subjects covered are chosen by the participants and include physics, biotechnology, robotics, medicine, architecture and electronics as well as our Israeli heritage and how it relates to sciences and engineering. In the past academic year 235 pupils from 16 schools in nine outlying northern towns participated in the program.

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

## Continuing Education and External Studies

The Division of Continuing Education and External Studies, headed by Prof. Yehudit Dori, specializes in organizing and developing advanced study programs for university graduates in various engineering and science domains. It also grants diplomas to high-ranking professionals in different fields of engineering, architecture, medicine, administration, and teaching through specially designed courses. All advanced courses and programs for Master in Engineering (ME), Master of Business (MBA), Master of Architecture (MARC) or Master of Real Estate (MRE) are carried out in collaboration with various Technion faculties.

The division's goals are to promote, update, and enrich the knowledge of engineers, scientists, doctors, and other professional populations in accordance with the needs of industry and trends of the marketplace. The division's programs are approved by the academic assembly which consists of Technion professors representing different faculties. Over the years the division has grown considerably, providing professionals with the opportunity to further their education and careers.

The division operates out of three centers: the Technion campus in Haifa, the Tel Aviv Center, and the Jerusalem Center. This distribution offers accessibility to a large population of professionals in different parts of the country. In view of the division's need of appropriate space for academic studies in Tel Aviv, the Technion is in the process of leasing and developing three buildings in Sarona, a unique German Templar colony established in 1871. The Municipality of Tel Aviv is investing in restoring and developing the site in order to create a cultural and academic environment.

About 2,600 students are currently studying in the division in more than 30 diploma courses and eight master programs. More than 300 faculty and staff are involved in the division's activities. In the last seven years, about 1000 graduate students received an MBA, ME, MARC, or MRE through the division and about 200 students will graduate in the summer of this academic year 2010-2011.

Below are some of the programs which were offered in the current academic year:

Programs leading to academic degrees:

- MBA with emphasis on high-tech companies.
- M.E. in systems engineering, biomedical engineering, environmental engineering, civil engineering - with focus on development and business management in construction, civil engineering - with focus on managing construction projects, and industrial design.
- MARCHII in architecture with emphasis on conservation.
- M.R.E – Master of Real Estate.
- B.A. in geo-information.

Programs leading to a certificate:

- Management Studies in human resources, project management, quality assurance engineering, logistical systems management and coaching.
- Real Estate Studies in land assessing and property management, planning and construction law and construction project management.
- Interior Design Studies in landscape design and curation of art exhibits.
- Computer Studies in software development, software testing, software security, network administration and management and data protection.
- Tailored programs for various companies such as the Israel Electric Corporation, Intel, RAFAEL, Elbit, Cellcom, Bezeq, IDF and Ministry of Defense.
- Family medicine.
- Photography
- Software Quality Assurance
- Treasury.

## Student Affairs

The Dean of Students has the responsibility of dealing with issues relating to the welfare of Technion students. The current dean is Prof. Michal Green from the Faculty of Civil and Environmental Engineering. The Office of the Dean of Students activates six professional units whose responsibility it is to support and advance the students. These units serve approximately half of the total student body:

- **The Unit for Personal Assistance** offers help and guidance to students in financial distress. The aid offered includes scholarships, loans, and special help and personal consultation for students who are called to IDF (Israel Defense Forces) reserve duty.
- **The Beatrice Weston Unit for Student Advancement** offers advice and counseling to students who have difficulty studying due to adjustment issues, personal problems and learning disabilities. The unit also helps with career guidance and assists students with physical disabilities or family-related difficulties.
- **The Professional Employment and IAESTE** (International Association for the Exchange of Students for Technical Experience) **Unit** provides professional and career guidance to students and graduates. The unit organizes job fairs, career focus days, workshops for resume writing and job interviewing. This year, two job fairs were held with the participation of 70 companies. These job fairs are among the largest in the country, reflecting the Technion's leading position as a major human resource provider for the high-tech industry. In addition, 18 career focus days for recruiting and interviewing potential employees were held by leading companies. We also gave job-preparation lectures to approximately 500 students. The unit also helps to place students who wish to go for technical training abroad over the summer months. Fifty-five students will be going abroad this summer on professional training as part of the IAESTE exchange students program.
- **The Phillip and Francis Fried Counseling Center** offers a professional team of skilled clinical counselors, therapists, social workers and a psychiatrist for the benefit of the student population. Over the last few years there has been a 25% increase in counseling requests from students and we therefore created a program for expanding the center that is now waiting for donor adoption. The counseling center is an important feature on campus and one which can truly make a difference in the lives of students who feel overwhelmed.
- **The Unit for Social and Cultural Activities** works in collaboration with the Technion Students Association to provide social and cultural activities for both undergraduate and graduate students.
- **The Student Housing Unit** offers housing solutions to about 3,800 students. We continue our long-term project to upgrade old dormitories.

## *Ongoing Special Projects*

**“Lively Campus”** –The first stage of the "Lively Campus" project has ended and the winners have been chosen. The competition was designed to stimulate and contribute to a vibrant student life on campus. The project, at this stage, is focused on building a supportive platform for disseminating campus activities to all Technion students via internet, radio and cell phones.

**Student Housing** – The New Shalom Zielony Graduate Village has opened and houses graduate students and their families. The residence hall includes units and facilities for 215 couples and families.

**Scholarships** – As a result of a demonstrated need and the current financial situation, we have awarded scholarships, all sponsored by donations, to approximately 30% of the undergraduate students. The maximum amount that can be covered by Technion's scholarships is 80% of the tuition fee. Many students receive additional financial aid from external non-profit private organizations and foundations. These organizations have actually increased their grants for Technion students for this academic year. Over the past few years, more students from a lower socio-economic background and from the periphery of Israel have applied and are admitted to the Technion. We do our best to assist as many as possible.

**Loans** – Technion student loans of 12,000 NIS, offered at preferred interest rates, were awarded to about 350 undergraduate students. In addition, 40 Magbit and Geller Foundation loans in the amount of \$2,500 each were awarded, with student-tailored repayment after graduation.

**Reservists** – We have recently made the decision to allow students who are IDF reservists to convert reserve duty into academic points up to twice during their degree studies as well as to allow them 25% more time for the first round of exams. This will be implemented on top of the already wide range of benefits given by the Technion to reservists.

**New Students' Welfare Project** – A new project for high-potential new students was successfully initiated last year. As part of this project we provide personal support for these students from registration until the end of the first year.

**The ATIDIM Project** – This project assists high school graduates from Israel's periphery and from economically distressed neighborhoods who have received permission to postpone their military service in order to attain an academic education in engineering or science. This program is in collaboration with the IDF. At the Technion, we offer these students one-on-one tutorships, academic workshops and counseling. We try to ease their entrance into academic life as much as possible.

This year approximately 100 students were absorbed into the program at the Technion.

**New Immigrant Students** – The majority of these students came to Israel without their families and encountered difficulties in meeting academic requirements and tasks, in addition to the expected adjustment difficulties. These students receive financial assistance and personal counseling related to their difficulties.

**Students from Ethnic Minorities** – A special project is underway to help ease the absorption and adjustment process of first-year students from ethnic minorities. The goal of the project is to reduce first-year dropout rates among these populations and help them to excel. In the current academic year, 420 students were assisted by this project. Our model for absorption of these students was adopted as a working model for all Israeli universities by Israel's Council for Higher Education.

**Haredim "Halamish" Project** – Thus far, 17 students from an ultra-orthodox Jewish background who graduated from the Technion Center for Pre-University education started studying at the Technion successfully. The program supports the students with academic enrichment and emotional support.

**The "Ofakim" Project** – This is a project targeted at discharged soldiers from the periphery who have completed the Technion preparatory program. The first class of 77 students commenced in the beginning of the 2009/10 academic year, and they are being helped by workshops on learning strategies, support and follow-up.

**Students with Learning Disabilities** – A new counselor, specializing in treating learning disabilities, has been employed. The new program includes diagnosis, academic and emotional support.

**Social, Cultural and Sports Activities** – This year we enlarged and consolidated the activity of the High Q Club which hosted the former Minister of Welfare and Social Services – Mr. Isaac Herzog, Member of the Knesset for the Labor party – Ms. Shelly Yechimovich, the Deputy Foreign Minister – Mr. Danny Ayalon and other distinguished guests. In addition, we increased the activities of The Tirosh Music Center.

**Community Projects** – More than 350,000 hours of community service were contributed by approximately 2,500 undergraduate students, i.e., about 30% of the student population. The community-related activities were associated with various frameworks such as PERACH (student mentoring program). In another program, Technion students reach out to about 400 junior high and high-school students from lower socio-economic groups and peripheral areas. The students assist them with their science and technology-related studies. The M.A.T.A initiative, a collaborative

effort shared by the Haifa Municipality, the Ministry of Education and the Technion, sends 40 students to provide assistance in mathematics to students in grades 4 and 5 from various Haifa schools.

## Research at the Technion

Research is the heart of a university; it is the most basic criterion on which universities are ranked. As president I have made every effort to maintain and enhance the research activities of our faculty members. Both on an individual level and as an institution, we provide much of the research on which Israel's outstanding scientific and technological accomplishments rest. We are justifiably proud. Below is a brief outline, prepared by our Vice President for Research, Prof. Oded Shmueli, enumerating our research activities for the past year:

### *Funded Research*

The Research Authority signed research contracts in 2010 amounting to \$65.2 million. In the past four years the scope of Technion's research contracts was: \$44.5 million in 2006, \$50.6 million in 2007, \$64.4 million in 2008 and \$61.7 million in 2009. This increase of 46.5% over the last five years is very impressive.

We continue our vigorous activities to encourage the submitting of research proposals to competitive scientific funds. In the last few years there is an increase in submissions, grants and budgeting from the three main funds (ISF – Israel Science Foundation, BSF- Bi-national Science Foundation and GIF – German Israeli Foundation). From the ISF alone we received \$14.9 million in the past year. A new BSF program, Transformative Science, received 53 applications from all Israeli universities; of the two successful applicants one was from the Technion and received \$179,000.

The European Union's Seventh Framework Program for Research and Development, launched in January 2007, approved 85 Technion projects; by the end of 2010 their total funding amounted to €48.6 million. This figure includes, among others, the award of €7 million to five researchers by the European Research Council's grants to young researchers at the Technion and two Advanced Grant awards in the sum of €4.5 million.

The Office of the Chief Scientist at the Ministry of Industry, Trade and Labor distributed a total amount of research grants in 2010 amounting to 37 NIS million as compared to 35 NIS million in 2009 – an increase of approximately 6%. Since the Liaison Office began promoting these programs in 2002, the total sum of the research grants received by Technion researchers has increased three and a half times despite cutbacks from the Office of the Chief Scientist. In 2010, the total amount of research and development activities funded from industrial, commercial and business sources in the framework of the Research Authority reached \$5.86 million.

### *Other Sources of Funding for Researchers*

In addition to the above-mentioned external funding, which consisted of research contracts signed within the framework of the Research Authority as described above, the Technion received contributions from donors (for specific individual researchers or for the creation of research infrastructures) in the amount of \$12.3 million and assistance for equipping new faculty members in the amount of \$4.2 million, as compared to \$6.2 million the year before. In addition, we received \$4 million assistance for programs for new immigrant absorption from the Ministry of Immigrant Absorption.

### **Internal Technion Financing**

Over the past year we have allocated close to \$1 million to promote faculty research activities (including internal grants, bonuses for researchers submitting proposals to competitive funds and promoting research among new faculty). The sum of \$551,000 was allocated through Chairs and \$20 million was allocated to finance fellowships for graduate students engaged in research. The total amount invested in research, including all sources (external funding, contributions from donors, external aid, internal funds and graduate fellowships) is about \$108 million.

### *Interdisciplinary Research Programs*

In 2010 we continued to promote and initiate interdisciplinary research on campus with collaboration of faculty members from different faculties with specializations in different disciplines. Following are a number of examples:

- **The Technion Autonomous Systems Program (TASP)** has continued to actively fund collaborating faculty members from various faculties. In 2010 the amount of \$195,000 was awarded as compared to \$229,000 in 2009. A research agreement for \$1 million was signed with the Israel Aerospace Industries in the field of robotic land systems.
- **The Grand Technion Energy Program – GTEP** broadened the scope of its international cooperation. The Technion participated in a conference on energy at the University of Washington in St. Louis, MI. We received funding commitments to GTEP which have made it possible for us to broaden the scope of the program: a commitment for \$20 million over 11 years from Mr. Stephen Grand; an additional \$5 million over three years has been promised for the energy storage project and for the recruitment of new faculty members from the Helmsley Foundation and a \$1 million donation comes from the Ada Stiftung Fund of Switzerland for the Photovoltaics (PV) project. In addition, the Los Angeles chapter of the American Technion Society is continuing to raise money for the PV and for the solar air conditioning projects. The PV project is proceeding to fund equipment with a donation of £330,000 from the Wolfson Foundation approved last year.

Planning has begun for the renovations of the complex in the Faculty of Materials Engineering which will be used as a central laboratory for the energy storage project. The PV laboratories are located in the Zisapel Building and include a production lab and a lab for solar cell characterization. This is a joint program between the GTEP and the Russell Berrie Nanotechnology Institute. Over the past year we have continued procuring equipment for the lab and as of today it is operational and providing services to the campus. The Ed Satell Family Nitrogen-Hydrogen Alternative Fuels (NAHF) Reaction Research Laboratory is located in the Gutwirth Industrial Park and has been actively supplying research services for the past eighteen months. The recruitment of new faculty members for the GTEP continues apace.

Within the framework of the Russell Berrie Nanotechnology Institute \$6.5 million was invested in augmenting the Technion's research facilities by means of upgrading laboratories and purchasing advanced scientific equipment (this is in addition to the total \$108 million invested in research mentioned above).

### *International and Industrial Collaboration*

- **The Singapore Project** – A research cooperation agreement was signed with the Singapore National Research Foundation (NRF), the Singapore Ministry of Education and two universities in Singapore (Nanyang Technical University and National University of Singapore) for \$20 million Singapore (\$15 million US). Research activity in the field of tissue engineering began in October 2009. The project continues to operate to the satisfaction of both parties and a process of technology transfer has been initiated.
- **Johnson & Johnson** – The Technion is proceeding with its research collaboration agreement with Johnson & Johnson on medical issues. In the framework of this agreement, promising medical Technion projects are supported. A call for proposals resulted in the awarding of \$200,000 for funding four projects at about \$50,000 per project with a \$50,000 matching from Technion sources. So far, three such project grants have been approved and a new group of proposals is currently under review.
- **The Umbrella Symposium** – The annual Umbrella Symposium will be held in June, 2011, in the city of Aachen. This year's symposium will celebrate the 25<sup>th</sup> anniversary of the cooperation between Israel and Germany in the various fields of science and will be held jointly with a German-Israeli Research Forum (DIFF).
- **The International Institute of Biomedical Sciences and Technology (IIBMST)** – This is an international collaborative program between three institutions: the Technion, Upstate Medical University in Syracuse NY and National Cheng Kung Univ. in Taiwan. The purpose of the program is to break down borders between nations in order to promote basic and applied

medical research. The project was launched at an event held in Syracuse in the summer of 2010 and has begun operating.

- **Northeastern University Research Collaboration** – This is a collaboration for research purposes, which was initiated this past year; a call went out for proposals and two grants were awarded. This is a five-year program, made possible by Dr. Robert Shillman's generous \$0.5 million gift for each institution.
- The research collaboration agreement with **Johns Hopkins University** was recently renewed and a new set of projects are currently funded.

### *New Research Center*

**Environment and Health Foundation** – The Technion was awarded funding from the Foundation for Environmental Health in the amount of \$1 million for 5 years for the purpose of establishing a Center of Excellence: "From Environmental Stressors through Risk Assessment to Health Outcomes". This is a joint center for researchers from various Technion faculties run by the Faculty for Civil and Environmental Engineering and the Faculty of Medicine. The center began operating in October, 2010.

### *New Framework Agreement*

A first framework agreement was signed with RAFAEL – Advanced Defense Systems Ltd. for research cooperation and an additional agreement is in the preliminary stage. A framework agreement was signed with Microsoft to formalize all aspects of joint research.

## **Research Highlights**

**Prof. Benjamin Podbilewicz** and doctoral student **Meital Oren-Suissa**, both of the Faculty of Biology, together with a Technion-led international research team have discovered, by studying the small (1 mm) roundworm *C. elegans*, how tree-like nerve structures are formed and maintained. Their breakthrough work exposing a surprising, new facet in the functioning of the nervous system, was published online in the May issue of Science Express, and may have applications in the treatment of neurodegenerative diseases and in the repair of nerve damage.

**Prof. Arie Admon**, who heads the Smoler Proteomics Center, led a team of scientists from Technion's Faculties of Biology and Medicine and from IBM's Haifa Research Laboratory, in developing a new technique that allows for the detection of valid biomarkers in just one test-tube of blood providing enough data to determine what kind of disease a patient might have. Their report on this new source of blood-

derived biomarkers was published in October 2010, in the Proceedings of the National Academy of Sciences (PNAS).

At Technion's Faculty of Physics, **Dr. Erez Ribak** and master's student Amichai Labin have solved a mystery in the function of the eye that had puzzled optical scientists for 120 years. Their findings, published in the prestigious scientific journal *Physical Review Letters*, reveal that the retina is optimally designed to improve the sharpness of images resulting in enhanced human visual acuity.

**Prof. Lior Gepstein** of the Rappaport Faculty of Medicine, together with a research team, in a study published in *Nature* in January, 2011, shows the ability of human-induced pluripotent stem cells (iPSCs) to recreate - in a Petri dish - a cardiac disorder known as long QT syndrome. This enables researchers to model the abnormal cardiac function and to identify potential new therapeutic agents. Prof. Lior Gepstein obtained skin cells from a patient known to have long QT syndrome – a disease which affects the heart's ability to recharge itself after each heartbeat, causing fainting, seizures and even leading to sudden death. The Technion scientists turned the skin cells into iPSCs and then coaxed these all-purpose stem cells to become cardiac cells.

**Assoc. Prof. Tamar Ziegler** of the Technion's Department of Mathematics, together with two colleagues, Prof. Tao from UCLA and Prof. Green of Cambridge University, have aroused much interest among mathematicians with a theory solving basic problems in the field of prime numbers – a mathematical field that has lately become a center of attention. Their results delineate methods for finding asymptotics for arithmetic patterns of prime numbers. The solution combines methods from two seemingly unrelated fields – dynamics and number theory.

**Dr. Ester Segal** and her research group at the Faculty of Biotechnology and Food Engineering have developed a new method for rapid detection of bacterial contaminations. She recently published a significant paper in the area of biological sensors or biosensors, the result of a research project which paves the way for major expansion of the use of biosensors for detecting harmful bacteria contaminations.

**Prof. Ori Lahav** from the Faculty of Civil and Environmental Engineering has developed an elegant method for adding magnesium to desalinated seawater - making it fit for drinking and agricultural use.

## Prizes and Honors – 2010/11

### *Academic Staff Achievements*

**Distinguished Prof. Daniel Weihs**, the Louis and Lyra Richmond Memorial Chair in Life Sciences and head of the Technion Autonomous Systems Program, has been appointed Chief Scientist of the Ministry of Science and Technology. In this capacity, Prof. Weihs will also head the forum of chief scientists of the various government ministries and the science administration at the ministry.

**Prof. Moussa Youdim** was made a Fellow of the American College of Neuropsychopharmacology. Prof. Youdim, of the Rappaport Faculty of Medicine, is director of the Eve Topf and U.S. National Parkinson Foundation Centers of Excellence for Neurodegenerative Diseases Research and Teaching.

**Prof. Moussa Youdim** also won the 2010 EMET Prize for Brain Sciences. The EMET is an annual prize given for excellence in academic and professional achievements that have far reaching influence and significant contribution to society. The prize was awarded to Prof. Youdim for his achievements in the field of neurological studies, which led to numerous scientific discoveries and to the development of AZILECT, an innovative Parkinson's disease treatment.

**Prof. Moussa Youdim** was elected to Leopoldina, the German Academy of Sciences (founded in 1652, it is the world's oldest academy) and was awarded The European College of Neuropsychopharmacology (ECNP) LifeTime Achievement Award for contributions to the field and drug development.

**Distinguished Prof. Yitzhak Apeloig** of the Schulich Faculty of Chemistry was elected to the American Academy of Arts and Sciences. Prof. Apeloig served as president of the Technion from 2001 to 2009 and now joins one of the world's most prestigious honorary societies. Other Technion faculty members who are Foreign Honorary Members of the academy include Distinguished Profs. Aaron Ciechanover and Avram Hershko and Distinguished Prof. Emeritus Jacob Ziv.

**Assoc. Prof. Tamar Ziegler** from the Faculty of Mathematics was elected by the Israeli Mathematical Union to receive the 2011 Erdos Award. She is the first Technion faculty member to win this award. This is the highest award for Israeli mathematicians and is awarded to a person not more than 40 years old who made outstanding contributions in pure or applied mathematics.

**Assoc. Prof. Herman Wolosker** from the Rappaport Faculty of Medicine received the 2010 IMHRO (International Mental Health Research Organization) Rising Star Award for his proposed research on "Novel Strategies to Ameliorate NMDA Receptor Hypofunction in Schizophrenia: Focus on D-Serine Homeostasis."

Wolosker is one of three Rising Star awardees this year. He joined the Technion in 2001.

**Dr. Oren Cohen**, a senior lecturer at the Faculty of Physics, and **Dr. Yuval Shaked**, a senior lecturer at the Rappaport Faculty of Medicine, have received the Krill Prize for Excellence in Scientific Research for 2011. The Krill Prize is awarded annually by the Wolf Foundation to excelling faculty members at Israel's universities who have not yet been granted tenure. This year, two of the eight winners of the Krill prize are from Technion.

**Prof. Emeritus Reuven Rubinstein** from the Davidson Faculty of Industrial Engineering and Management received the Lifetime Professional Achievement Award, the highest honor given by INFORMS Simulation Society. The award recognizes major contributions to the field of simulation that are sustained over most of a professional career, with the critical consideration being the total impact of those contributions on the field. Prof. Rubinstein has been a pivotal figure in the theory and practice of simulation as we know it today.

**Prof. Ori Lahav** received The France-Israel Foundation annual bilateral prize of the scientific commission, in Paris, at a ceremony presided over by Edith Cresson, former Prime Minister of France. He received the award along with Moshe Herzberg from Ben-Gurion University and a French researcher from CNRS. Lahav is an associate professor at the Faculty of Civil and Environmental Engineering and a member of the Grand Water Research Institute. Prof. Ilan Marek, president of the scientific commission on the part of Israel and master of ceremonies for the event, presented Prof. Ori Lahav with the prize.

**Prof. Emeritus Jacob Bear** from the Faculty of Civil and Environmental Engineering is the recipient of the 2010 Robert E. Horton Medal of the American Geophysical Union (AGU), for outstanding contributions to hydrology. Established in 1974, the award is named in honor of Robert Elmer Horton who is deemed the father of modern hydrology.

**Prof. Yonina Eldar** from the Faculty of Electrical Engineering was awarded the 2010 Michael Bruno Memorial Award. This is granted by the Rothschild Foundation (Yad Hanadiv) each year to Israeli scholars under the age of 50, of truly exceptional promise, whose achievements to date provide hope for future breakthroughs in their respective fields.

**Prof. Miriam Erez**, the Mendes France Chair in Management and Economics at the Davidson Faculty of Industrial Engineering and Management, was appointed by the Minister of Science and Technology to chair the National Committee for the Promotion of Women in Science and Technology.

**Prof. Emeritus Gad Hetsroni** from the Faculty of Mechanical Engineering was awarded the 2010 International Conference on Multiphase Flow (ICMF) Senior Award. This is awarded once every three years to a senior scientist for outstanding achievements in multiphase flow research; Hetsroni is its fifth recipient.

**Prof. Nimrod Moiseyev**, the Bertha Hertz Axel Chair in the Schulich Faculty of Chemistry, received the 2010 CMOA Medal in recognition of his contributions to the development of non-Hermitian quantum mechanics. The CMOA medal, awarded by Quantum Systems in Chemistry and Physics, is named in honor of Centre de Mécanique Ondulatoire Appliquée, a French academic society founded in 1962.

**Prof. Shlomo Shamai (Shitz)**, the William Fondiller Chair in Telecommunications at the Faculty of Electrical Engineering, has been named the recipient of the 2011 Claude E. Shannon Award of the IEEE Information Theory Society. Granted since 1974, the Shannon Award was instituted to honor consistent and profound contributions to the field of information theory.

**Prof. Pinhas Bar-Yoseph** of the Faculty of Mechanical Engineering was named an American Society of Mechanical Engineers (ASME) Fellow.

**Assoc. Prof. Ze'ev Hochberg** of the Rappaport Faculty of Medicine was awarded the European Society for Pediatric Endocrinology 2010 Andrea Prader Prize.

**Prof. Ehud Keinan** of the Schulich Faculty of Chemistry was named an American Association for the Advancement of Science (AAAS) Fellow.

**Prof. Anat Rafaeli** of the Davidson Faculty of Industrial Engineering and Management was named a Fellow of the American Psychological Association.

**Prof. Moshe Tennenholz** of the Davidson Faculty of Industrial Engineering and Management was named an Association for the Advancement of Artificial Intelligence (AAAI) Fellow.

**Prof. Hagit Attiya** of the Faculty of Computer Science was named a Fellow of the Association of Computing Machinery (ACM).

### ***Alumni Achievements***

Two Israeli physicists—both Technion graduates—are among the top ten scientists awarded the U.S. National Medal of Science by President Barack Obama in mid-November. **Prof. Yakir Aharonov**, a professor at the Chapman University in California, was honored for his work in quantum physics. **Prof. Amnon Yariv**, of the

California Institute of Technology (CalTech), was noted for his work in photonics and quantum electronics that has helped developments in optics and light wave communications. The National Medal of Science and the National Medal of Technology and Innovation represent the highest honor for achievement in science and technology bestowed by the president of the United States. The medals honor individuals for pioneering research in a range of fields that enhance an understanding of the world and lead to innovations and technologies that give the U.S. a global economic edge.

**Shai Agassi**, one-time Technion wunderkind and now the driving force behind the current electric vehicle initiative, has introduced the concept of switching from pump to plug, thus weaning the economy off its oil dependence. Initially, Agassi's company, Better Place, is focusing on the passenger vehicle market, but will later target public transport. A pilot project is currently being established in Israel.

Technion alumnus **Dr. Amit Goffer** and a team, which includes other Technion graduates, are developing and manufacturing the first commercially viable upright walking assistance tool. ReWalk is a combination of innovations on a multidisciplinary level, incorporating cutting-edge technology from mechanical and control engineering, electronics and computer science and enabling people who are paralyzed to walk again.

**Moshe Yanai**, Technion alumnus and global leader in information storage systems was awarded the prestigious Reynold B. Johnson Information Storage Systems Award by the Institute of Electrical and Electronics Engineers – IEEE, for his innovative storage designs, which revolutionized the systems of information storage, protection and retrieval in commercial use.

### ***Achievements Celebrated***

Prime Minister Benjamin Netanyahu presented the first **Prime Minister's Awards for Entrepreneurship and Innovation** at Technion on November 18, 2010. The awards were given in three categories: Entrepreneurship among Women in Israel, Entrepreneurship among Young Israelis, and Entrepreneurship Activity in the Periphery of Israel. The ceremony took place during Global Entrepreneurship Week (November 15-21, 2010) in the Butler Auditorium of the Samuel Neaman Institute for Advanced Studies in Science and Technology on campus.

Nobel Laureates, Prof. Linda Buck (Nobel Prize in Physiology or Medicine, 2004) and Ada Yonath (Nobel Prize in Chemistry, 2009) came to the Technion to deliver the **Stanley Shalom Zielony Distinguished Women in Science Annual Lectures**. Following their lectures, delivered to a packed Churchill Auditorium, they planted Judas Trees (*Cercis siliquastrum*) on the Nobel Avenue in Technion's Lokey Park.

## **The Technion Research & Development Foundation (TRDF)**

There are five bodies administering different types of activities that come under the umbrella of the TRDF: the Research Authority which handles the Technion-sponsored research; the Liaison Office which handles research ties with the European Union, industry, universities abroad and the Ministry of Industry; the Unit for Continuing Education and External Studies; the Israel Institute of Metals and the Technion Technology Transfer Office which deals with the commercialization of intellectual property and patents which are developed at the Technion. More detailed information about research activities and the research authority can be found in the report on research at the Technion. The Unit for External Studies and Continuing Education is reviewed fully in its own section in previous pages.

### ***Finances***

In accordance with the instructions of the Ministry of Finance and of the Budget and Planning Committee the balance sheets of the Technion and the TRDF were to be integrated as of September 30, 2010. The TRDF is preparing for the change, which poses many administrative challenges. The projected deficit for the period October 1, 2009 to September 30, 2010 is 25 NIS million, not including the estimation for the actuarial maintenance of pensions. The financial balance of this period is influenced by the nearly 30 NIS million in pension payments to 375 retired workers. Without the pension payments, over which the TRDF has no control or sources of funding, the financial result would be balanced and would even show a small increment of income over expenditures. The continued improvement in the financial situation is a result of increased research activity and of the growth in income from intellectual properties.

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

The institute has several activities such as the corrosion laboratories, metallurgy, foundry technology, vehicle testing laboratory, and steel testing. About 40%-50% of the institute's income is derived from research funded by industry, the government and the European Union. The remaining 50%-60% of the income comes from testing for industry. In 2010, the institute's turnover stood at 17.8 NIS million and the operational profit stood at 2.7 NIS million.

### ***The Land Systems Division***

As a result of a reduction in the Ministry of Defense's participation, the division suffered large losses which led to the decision by the TRDF board to close the division as of May, 2010. Some of the activity with the Ministry of Defense was transferred to a research center in the Faculty of Civil and Environmental Engineering.

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

In 2010 the unit underwent a considerable upgrading in procedures and modes of operation. The department of patent applications intensified its operations and took steps to clean up the TRDF's backlog of patents by eliminating old files and those which had weak potential for commercialization. In addition, the agreements with the offices for contract writing were reviewed and the commercialization activities were accelerated; these efforts of the past few years began to show results towards the end of the year.

The unit was active in a number of different directions in the past year:

**Patent Applications:** In the past year 88 invention disclosure papers were submitted to the unit by Technion researchers. Out of these 78 inventions were registered from which 59 patent applications were submitted; 19 inventions are currently at different stages of registration.

**Establishment of New Companies:** In 2010 the TRDF was directly involved in initiating and establishing five new companies in various fields including medical instrumentation, three-dimensional processing, software, medical diagnostics and drug development. Unfortunately, despite considerable efforts, we were unable again this year to commercialize any new project in the framework of the Technion incubator.

**Licensing Agreements:** In 2010 there were eight agreements signed for the purpose of commercializing technologies developed by Technion researchers. The technologies commercialized were from diverse fields and include stem cells, software, medical equipment, laboratory equipment and green bio-technology. In addition, 10 "Magnetron" agreements were signed with leading firms such as Plasan, Orbotech, Netafim, SAP and GE.

### ***The Alfred Mann Institute at the Technion (AMIT)***

In 2010, the commercialization activity in cooperation with AMIT continued. In this joint effort, several projects judged to have potential were reviewed. One of the projects commercialized resulted in the establishment of the firm Nanose Ltd. The institute continues to explore the possibilities for establishing companies based on the existing projects and concurrently is looking into investments in additional initiatives.

### ***Income from Commercialization***

In the past year the TRDF's income from commercialization amounted to approximately \$12.8 million (including the researchers' share). Again this year the main source of this income was in royalties from the sale of Rasagelin (commercial name: Azilect) which amounted to \$12.5 million. Sales of the drug for 2010 amounted to \$312 million. During the year, shares in Prolor Biotech Inc. and in Mazor were sold for hundreds of thousands of dollars. Towards the end of

the year we were the recipients of good news – Arresto Biosciences (to which, three years ago, we commercialized a technology developed by Technion Prof. Gera Neufeld) was sold to Gilead Sciences for \$225 million and the TRDF's share amounts to almost \$2 million. The total income, should the drug be developed successfully, may amount to tens of millions of dollars.

### ***Investment in New Projects***

The TRDF continued to promote the intellectual property developed at the Technion through direct financial investment in promising projects. The investment was made through the Mitchell Fund and in 2010 it amounted to \$160,000. The Mitchell Fund's resources dwindled this year and the outlook is that in 2011 no additional projects will be financed by the fund. In 2010 the absence of the Gurwin Fund and of the Yeshaya Horowitz Association (which was wiped out by the Madoff affair) was keenly felt as they had invested over \$1 million annually in promising projects. The loss of this source of funds has significantly damaged the unit's ability to support and promote projects for commercialization and we are working hard to find alternative funding sources.

### ***Technion Companies***

During the past year Technion companies, or those commercializing Technion technologies, were able to raise a total of \$33.5 million. This year, too, the TRDF made efforts to hold on to its relative share in the various companies by investing in these companies in proportion to its relative share. The total of TRDF's investments in Technion companies in this framework was \$163,000.

### ***Computerization***

In the process of upgrading the system for the management of the information that accumulates in the unit for business development in all its aspects, an agreement was signed with the Teldor Company to purchase the TTM software program. This program is specifically designed for the management of intellectual property and technology transfer and was developed by Teldor jointly with the Yissum Co. – the commercialization arm of the Hebrew University. This system will allow us, among other things, to advance and to streamline the activities of the unit by improving access to information, storage of information and supervision of the activities of the unit for commercialization.

## Public Affairs and Resource Development

The Division of Public Affairs and Resource Development (PARD) continues to play a central role in generating material and public support for the Technion. It does this by providing a wide range of support services and products to our societies around the world, cultivating relationships with our donors and friends and promoting the Technion in Israel and abroad. PARD's work also includes project development; organizing ceremonies and events, including the annual Board of Governors meeting (and related governance); media relations through the Office of the Spokesperson; and other areas, initiatives and special projects.

The Technion has always excelled at getting its message out to the world, but the dramatic growth in technology-driven platforms for mass communication has presented us with significant challenges. PARD has eagerly embraced new web-based tools and social media in promoting the Technion, and has kept us at the forefront in this important arena. A detailed description of this effort appears later in this report.

After more than a half-year without a PARD director, Mr. Danny Shapiro was appointed director of the division. Danny, who took up his position on November 1, 2010, has broad experience in resource development, public affairs and management, and has held senior positions at several Israeli institutions, including Tel Aviv University, the U.S.-Israel Binational Science Foundation and the Peres Center for Peace.

The year saw two other staff changes:

- Ms. Yona Giladi who for many years was the coordinator of the Spokesperson's Office, retired;
- Mrs. Eva Alouf resigned her position in the Donor's Recognition Department and has been replaced by Mrs. Shira Abir.

The PARD staff performed admirably during this period of change, and for this I thank them.

Significant resources are required to maintain and continually enhance the Technion's world-class position. Fundraising is one of the main avenues to meet these needs. Our fundraising efforts are conducted in a highly challenging context. Economic recovery in the U.S. and other Western nations has been slow and uneven, and levels of giving have not returned to their pre-recession levels, with no guarantee that they ever will. Given this reality, together with demographic and generational shifts in the Jewish world, the fundraising results achieved by the Technion and its societies are gratifying. Yet we are constantly seeking ways to improve our work. PARD plays a key role in this broad, team effort.

## *Technion Societies*

**The American Technion Society (ATS)** completed its \$1 billion “Shaping Israel’s Future” campaign in 2010 with a major gift from Stephen and Nancy Grand for the Technion Energy Program. In the years ahead the ATS expects to continue building on this success to help the Technion maintain and improve its position as a world-class university. Since the beginning of the ATS fiscal year on October 1, more than \$30 million has been raised towards the \$88 million goal for 2010-2011. During the same period, \$14.3 million has been transmitted to the Technion. This activity compares favorably with some of our best years of performance.

An important factor in ATS achievements is the growing number of transformational gifts. In the past seven years, 141 gifts accounted for more than two-thirds of the campaign. The average size of these gifts rose to nearly twice that of the early to mid ‘90s. Family foundations are also becoming increasingly important. Gifts from the Russell Berrie Foundation and the Leona M. and Harry B. Helmsley Charitable contributed significantly to our fundraising goals.

To ensure continued success, the October 2010 Board of Directors meeting launched the development of a comprehensive strategic plan that will guide the ATS through 2015. At the subsequent March 2011 meeting, a preliminary draft of the strategic plan was approved with a new mission statement that reads:

*To enable the Technion to be among the world’s leading institutions improving the well-being of Israel and all humanity through leadership in science and technology.*

**The Technion Society of Australia (TSA) (New South Wales)** has consolidated the foundations established in the previous 12 months and re-appointed Ken Lander as executive director. A new Australian alumni group has been formed. Memorandums of understanding and student exchange agreements have been signed with the University of Technology, Sydney and the University of NSW. The society’s new website is publicizing TSA/Technion news and events. LinkedIn is being used successfully to connect to alumni.

In **Victoria**, the **TSA** has secured a donation to create a high-definition video link to connect Monash University and the Technion. This will allow them to bring to the Jewish community in Melbourne any speaker from the Technion in a fully interactive way. It will also allow for joint seminar series and collaborative research to take place without the expense or the time commitment of travel.

**The Austrian Technion Society's** highlight of the year is the co-sponsorship of a chamber music festival devoted to composers who were victims of the Holocaust. The Technion is highlighted through the society's presence. This activity also reminds the public that technical sciences and technology do not exclude cultural engagement, in particular when related to Jewish history. The Austrian Technion Society has its own website and every opportunity is taken to promote the Technion.

**The Brazilian Technion Society** nominated two new members to the Board of Governors to help the society in promoting the Technion in Brazil. The political and commercial relationships between Israel and Brazil are going through a good period, with reciprocal visits of ministers, legal authorities and businessmen from both countries. The society continued its efforts to expose the Technion to the many opportunities offered by Brazil's special environment.

**The British Technion Society (BTS)** held its ninth Ron Arad Lecture and Dinner in October which was attended by over 300 people. This event marked a seminal change in the society's direction in that many more young professional people attended and gave their support. The BTS also held a successful Business Breakfast in July which enabled them to illustrate to current and new supporters the ground breaking work of the Technion. The BTS has been successful in increasing its media coverage achieving regular coverage in the Jewish, national and regional press, and has increased its use of Facebook and Twitter in promoting the Technion.

**The Canadian Technion Society (CTS)** recently organized a highly successful visit for President Lavie, which included promising meetings with major Technion supporters; interviews in leading Canadian business and Jewish print and electronic media; a presentation at the prestigious Economic Club of Canada; and a major event for young professionals, sponsored by Mr. Seymour Schulich. Earlier in the year, the CTS hosted Prof. Daniel Weihs, Distinguished Technion Professor and Director of Autonomous Systems Program at gatherings in Winnipeg and in Toronto for a group of young professionals as well as a luncheon for the Toronto-Technion Technology (TTT) Fund. Technion Faculty of Aerospace graduate, Dr. Victor Chernov, now a Lyon Sachs Fellow at the University of Toronto, travelled with the CTS National Development Director, Hershel Recht to speak to several groups about his research and about Technion. A student exchange program has been established between the faculties of medicine at University of Toronto and Technion to support research electives. The CTS sends a weekly e-newsletter to 600 subscribers, and has launched a Facebook page.

**The French Technion Society's** activities over the past year include new cooperative arrangements with many institutions and industrial firms; a mission to Israel; a dinner at the Israel Embassy; and a conference and annual fundraising event at UNESCO. In addition, fundraising efforts have been launched in Lyon, Marseille and Strasbourg. Media coverage has included monthly interviews on Jewish National Radio. A Facebook page has been created, with updated Technion news promotion of events. They have posted approximately 15 videos so far on YouTube.

**The German Technion Society** continues to award its science prize on an annual basis. In 2010 two brilliant young professors, Prof. Ilan Marek (Technion) and Prof. Ulrich Martin (Medical University, Hanover) received the prize at a gala dinner held in the historic Leibniz House. To promote its work and that of the Technion this society supports the new media tools (Facebook, Twitter, LinkedIn etc.) by linking them to their website.

**The Hellenic Technion Society** (Greece), with the assistance of Prof. Benny Nathan, is investigating two new initiatives: A presentation in Greece to be given by a small group of Technion professors in faculties relevant to academic and industrial interests in Greece; and liaising with Technion's patent office to investigate possible patents to be offered in Greece for commercial exploitation. Another program was a trip to Israel in December, 2010 of a group of high school students to visit Israeli academic establishments, including the Technion. The Society wishes to highlight the unprecedented improvement in Greek – Israeli political relations, which has resulted in various bilateral visits and exchanges of industrialists and politicians, in search of specific joint programs in the fields of energy, agriculture, information technologies, defense, commerce, tourism and others. The society considers this favorable climate to be ripe for new initiatives in academic fields and in the specific areas of the Technion's expertise. It is determined to be part of this opportunity.

**The Israel Technion Society (ITS)** once again succeeded in raising significant resources to support Technion programs that promote academic and scientific excellence and improve educational opportunities for disadvantaged populations in Israeli society. The latter is accomplished mainly in the framework of the activities of the Technion Alumni Association and the Technion's Center for Pre-University Education. The ITS initiates and takes part in visits of Israeli political, public and business leaders, resulting in significant donations and exposure of policy and opinion makers to the Technion and its achievements. The ITS has recently launched its own website, improving its ability to promote the Technion and the society among its members and the public.

**The Italian Technion Society** successfully promoted the Technion at the Israeli University Day held in February 2010 in Rome. As a result, Italian students now represent the second largest group at the new Technion International Engineering School, after the Chinese. In May, 2010 Prof. Arnon Bentur visited the “La Sapienza” University and the “Campus Opus Dei” in Rome. He delivered a lecture at Perugia University and met academics, students and industrialists. A special evening was organized in Rome in his honor (in the presence of the president of CNR – Italian National Research Centre – and of journalists) to talk about the Technion and the International Campus. The Society also sponsored an important visit to the Technion to consolidate the university bilateral agreement with the University of Perugia as well as to foster research, study and business relations between the University of Perugia and the industrial association of the region. Major progress has also been accomplished on the fundraising front despite the very difficult Italian fiscal environment.

**The Technion Society of the Netherlands** has strengthened existing cooperation between the Technion and the Erasmus Medical Center, Rotterdam School of Management and Erasmus School of Economics and is working on a proposal to start cooperation with universities and private public organizations in the Brabant region. The substantial investment in creating industrial, academic and political links for the Technion is reaching a phase in which these ties can now be capitalized. The society has its own website on which it publishes news and information about the Technion and the society, and is utilizing other social media tools as well.

**The Swedish Technion Society** sponsors, in collaboration with the fast-growing science park in Västerås, a workshop in robotics and industrial automation with participation from Technion and high-tech companies in the region of Mälardalen, which will be held in 2011. The Society is in the initial phase of a fundraising campaign among some Swedish companies. There has been collaboration with the Israel-Sweden Friendship Association and other Jewish organizations in Stockholm and Västerås.

**The Swiss Technion Society - Geneva** has approximately 140 members who are enthusiastic about being a part of the Technion’s international family. There are discussions under way for the merger of this society with either the French Technion Society or the Swiss Technion Society – Zurich.

In consultation with the Technion, the **Swiss Technion Society – Zurich** took the important step of appointing Mr. Eduard M. Rosenstein as its development director, effective 1<sup>st</sup> January, 2011. The society is happy to report exceedingly positive results for 2010 resulting in much support of various projects at the Technion. In August 2010 over 100 guests, representing a much larger number

compared to the previous year, attended the society's annual promotional event. The society maintains its own Facebook group.

The Vice President for Resource Development and External Relations, Professor Raphael Rom, continued his visits to societies, focusing over the past year on the U.S., Holland and France. These visits cultivate ties between the Technion and its donors, and between PARD and the societies.

### ***Public Affairs***

PARD's Public Affairs Department, responsible for the Technion's public relations and communications efforts outside of Israel, has integrated an array of new web-based and social media tools for getting the Technion's message out. We have pursued an aggressive campaign on YouTube, the most important and effective of these new platforms. In the past year, 206 videos have been produced including promotional films showcasing a wide variety of Technion scientists and achievements as well as videos of donor, BOG and campus events. Many of these have been uploaded to the Technion's **YouTube Channel**, which has enjoyed an enormous leap in popularity: "The Marker" newspaper recently reported that the Technion YouTube channel led all Israeli universities with **774,000** views over the past year. PARD recently began publishing a new **e-mail newsletter**, "TechnionLive", which will carry Technion news on a monthly basis to our societies and to a wide international audience. A new **Facebook** page, also called *TechnionLive*, has recently been launched, providing our societies and friends with multiple daily information feeds, in a dynamic platform highly amenable to information sharing and networking. This has been supplemented by a newly-established **Tweeter** account. All of these web-based promotional channels supplement our existing periodicals – **Focus** (English) and **HaTechnion** (Hebrew). Both of these publications are also available online.

The **Projects Unit** is responsible for translating the Technion's funding needs into project proposals and materials for use by fundraisers and societies. Ninety new such proposals have been issued in the past year. The unit is also responsible for information flow on the adoption of projects by donors – of which there were 93 in the past year. Additional responsibilities include special projects such as the Technion's application to host the 2013 International Space University.

### ***Donor Recognition and Donor Relations***

The **Donor Recognition Department** is responsible for the planning and execution of a wide variety of donor-related, academic and general ceremonies and events, including those of the annual Board of Governors meeting. Over the past year, 52 such ceremonies have been held. In addition, the department produced 115 new recognition plaques, and seven old plaques were renovated.

**The Donor Relations Unit** is responsible for reporting to donors – either directly or through the societies - on the implementation of the projects they support. In the past year, over 200 reports have been issued on chairs, research funds, capital development projects, reports to special donors, lectureships, and others. In addition, some 1,400 scholarship and fellowship funds were administered, and reports and thank-you letters from student who benefited from these funds were sent to the societies for the donors. Another important project undertaken this past year was the integration of a new computerized fundraising and donor information management system which will significantly streamline PARD's work in many areas.

### ***Technion Spokesperson***

The Office of the Technion Spokesperson issued 120 press releases which, according to media information sources, resulted in close to 7,500 stories in Israeli print and electronic media and on the internet. Of these stories, 92.3% were in Hebrew, 39.8% were in the general press, and 24.9% were on websites. Positive portrayals accounted for 91% of the stories, and 33 of them received top headlines. The Technion took first place among Israeli universities in terms of the quantity of media coverage, and more importantly, in the number of positive and prominent Israeli media stories. The Technion spokesperson also invites senior editors and reporters to the Technion. This year the Technion hosted a panel of senior Israeli journalists, which led to a favorable article in the Haaretz newspaper. The Technion spokesperson also publishes HaTechnion magazine in Hebrew three times a year. The magazine is sent to tens of thousands of Technion alumni and constitutes an important tool for strengthening our ties with alumni and other Israeli supporters. Other responsibilities include regular updating of the Technion's website homepage in Hebrew.

### ***Board of Governors Executive Secretary***

Last year saw the re-introduction of the role of executive secretary to the board as a separate role from that of the Director of PARD. This had a positive impact on the programming of the board meeting and its operation. Another of the executive secretary's responsibilities is the administration of the honorary awards process. An increase in the number of nominations was seen this year and a more timely and efficient process in their handling.

### ***Technion Cornerstone Centennial***

PARD has begun planning the celebrations for the Technion Cornerstone Centennial commemorating the laying of the Technion cornerstone in 2012. Initial plans envision several major events in Israel and by Technion societies worldwide, with the aim to promote the Technion and enhance fundraising efforts. PARD will also produce special promotional products and will continue to raise the Technion's online profile. The celebrations will be officially launched at the

closing event of the 2011 BOG meeting, to be held at the Haifa Museum, which has produced a special exhibition called “The War of Languages – the Founding of the Technion”. This exhibition was developed in close cooperation between the museum and PARD.

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

The center is the showcase of the Technion, and its professional staff and students are responsible for facilitating, organizing, accompanying and hosting the thousands of visitors who come to the Technion each year. Visitors include donors and potential donors; business, academic, governmental and diplomatic delegations from Israel and abroad; Birthright groups; potential Israeli Technion students on student open days; students on international programs; and more. Coler’s volume of activity has grown significantly in the past few years: In 2010, there were 627 visits, with a total of 10,698 visitors, an increase of 29.4% in comparison to 2009, and 61% more than in 2008. The center also facilitated the ATS’ Shaping Israel’s Future Mission and Discovery Mission, the French Technion Society Mission, and hosted a 160-person delegation from the American Israel Public Affairs Committee (AIPAC). The center is also used as a venue for Technion conferences and lectures.

Coler runs special projects, such as the two-week long fundraising “**Phonathon**”, initiated by and conducted jointly with the American Technion Society, in which Technion students made some 2,600 calls in the middle of the night (to account for the time difference) to encourage lower-level and lapsed donors to return to the ATS donor base and move to higher levels of support. The project was a success: in addition to the funds raised, both the students and donors expressed positive feelings and enthusiasm for this program and close to 80 percent of the 2,600 donors called were reached successfully. The benefit of reconnecting with donors will be invaluable in future fundraising on behalf of the Technion.

<b><i>Important Visitors to the Technion</i></b>		
<b>NAME</b>	<b>POSITION</b>	<b>PLACE</b>
<b>Ambassadors and Diplomatic Visitors</b>		
Jonathan Hadar	Israeli Embassy	Seoul, Korea
H.E. Yu Myung-Hwan	Ambassador to Israel	South Korea
Kwak Sung-Kyu	First Secretary, Korean Embassy	South Korea
H.E. Boris Sovic	Ambassador to Israel	Slovenia
H.E.Mr. Michael Zantovsky	Ambassador to Israel	Czech Republic
H.E. Zoltán Szentgyörgyi	Ambassador to Israel	Hungary
H.E. Bénédicte Frankinet	Ambassador to Israel	Belgium
H.E. Isaac Gilinski	Ambassador to Israel	Colombia
H.E.Ms Andrea Faulkner	Ambassador to Israel	Australia
H.E. Henry Hanson-Hall	Ambassador to Israel	Ghana
H.E.Mr. Christophe Bigot	Ambassador to Israel	France
H.E.Mr. Navtej Singh Sarna	Ambassador to Israel	India
H.E. Mr. Roberto Arango	Ambassador to Israel	Panama
H.E. Mr. Paul Hunt	Ambassador to Israel	Canada
<b>Presidents, Ministers And Government Officials</b>		
Mr. Stjepan Mesić	President	Croatia
Jim Doyle	Governor	Wisconsin
Dr. Olivier Liersch	Ministry of Economy, Labor and Traffic in Lower Saxony	Germany
H.E. Nikola Todorov	Minister of Education and Science	Republic Macedonia
Mr. Robert Fonberg,	Deputy Minister of National Defence	Canada
Ms. Rona Ambrose	Minister of Public Works and Government Services	Canada
Mr. Peter Kent	Minister of Foreign Affairs	Canada
the Hon. David Chomiak	Minister of Innovation, Energy and Mines	Canada
Mr. Ted Kulongoski	Governor of Oregon	USA
Hon. Moira Stilwell	Minister for Advanced Education and Labour Market Development	Canada, BC
Mr. Michel Vauzelle	Former Minister of Justice, President of the Regional Council Provence-Alpes-Côte d'Azur	France
Dr. Michael Stückrad	Deputy Minister, State Secretary, Ministry of Innovation, Science, Research and Technology, North Rhine Westphalia	Germany
Mr. Shri Prithviraj Chavan	Minister of Science & Technology and Earth Sciences	India
Dr. Ruben Nerrocal	Minister of Science and Technology	Panama
Prince Lionel De Merode	Prince	Belgium

AIPAC delegation	Washington DC Israel Lobby	USA
Dr. Virachai Virameteekul	Minister of Science and Technology	Thailand
Mr. Rob Norris	Minister of Advanced Education, Employment & Immigration and Minister Responsible for innovation	Saskatchewan, Canada
HE Devall Patrick	Governor and Delegation Commonwealth of Massachusetts	USA
Mr. Jean Claude Gaudin and delegation	Mayor of Marseilles,	France
<b>University Presidents, Administration and Academics</b>		
Prof. Robert M. Ackerman	Dean of the Law School	Wayne State University Detroit, MI
Ms. Valerie M. Parisi	Interim Dean, WSU University School of Medicine	Wayne State University Detroit, MI
Prof. Robert L. Thomas	Dean, College of Liberal Arts & Sciences	Wayne State University Detroit, MI
Prof. Mark Wardell	Dean of the Graduate School	Wayne State University Detroit, MI
Prof. Su Guaning	President, Nanyang Technological University	Singapore
Dr. Mark Greenberg	Provost and senior VP	Drexel University
Dr. C.R. "Chuck" Pennoni	Interim President	Drexel University
Mr. Bob Dayton	President, Delaware BioScience Association	Delaware, USA
Mr. Jeffry Bullock	Secretary of State	Delaware, USA
Dr. Havidan Rodriguez	Vice Provost for Academic Affairs and International Programs, University of Delaware	Delaware, USA
David Mathe	Deputy Director-International Trade, Department of State	Delaware, USA
Dr. Robert Folberg	MD, Founding Dean, OU William Beaumont School of Medicine, Professor of Biomedical Sciences, Pathology, and Ophthalmology, and Chief Academic Officer, Beaumont Hospitals	Oakland
Dr. Gary Russi	PhD, President of Oakland University	Oakland
Albert Marouani	President, University of Nice Sofia Antipolis	France
Jozef Ritzen	President of Maastricht University	Maastricht

Dr. Gaby Odekerken-Schröder	School of Business and Economics	Maastricht
J.F.M. Smits	Centre for Research Innovation	Maastricht
Mr. Wesly, Benoit	General Manager	Maastricht
Dr. Eric Isaacs	Director Argonne National Laboratory	Argonne National Laboratory
Prof. Ing. Vladimír Mareček, DrSc	Rector, Czech Technical University	Prague, Czechoslovakia
Prof. Sergio Bertolucci	CERN, Director for Research and Scientific Computing	Switzerland
Professor Paul B. Van Cauwenberge	Rector Ghent University	Belgium
Professor Luc de Schepper	Rector, Hasselt University	Belgium
Professor Alain Verschoren	Rector, University of Antwerp	Belgium
Dr. Ted Hewitt	VP Research & International Relations, The University of Western Ontario	Canada
Prof. Mamdouh Shoukri,	President and Vice Chancellor of York University	Canada
Prof. Ed Byrne AO	Vice-Chancellor & President of Monash University	Australia
Dr. Jay Noren	President, Wayne State University	Michigan, USA
Prof. Sir John Bell	President of the Academy of Medical Sciences, Regius Professor of Medicine, Oxford University	Oxford University UK
Prof. Su Guaning	President of Nanyang Technological University	Singapore
Prof. Jung Ho Sonu	President of GIST	South Korea
Mr. Tom Boland	Chief Executive of Higher Education Authority	Ireland
Mr. Paul Killeen	Senior Programs Manager of University College Dublin	Ireland
Dr Mary McNamara	Head of Graduate Research & Head of Research, Faculty of Science of Dublin Institute of Technology	Ireland
Prof. Lokesh Joshi	Stokes Professor of Glycoscience of NUI Galway	Ireland
Prof. Abhay Pandit	Director, Network of Excellence for Functional Biomaterials of NUI Galway	Ireland
Mr. Paul Dillon	Director, Technology Transfer Office of University of Limerick	Ireland
Prof. Philip Hans Franses	Dean Erasmus School of Economics Erasmus University, Rotterdam	Netherlands
Prof. Molly Corbett Broad	President of American Council on Education (ACE)	USA
Prof. Ericksson Rocha	Dean of the polytechnic School, Federal	Brazil

e Almendra	University of Rio de Janeiro	
Prof. M.W. Makgoba	University Kwa-Zulu Natal	Africa
Prof. Errol M. Tyobeka	Tshwane University of Technology ) (TUT	Africa
Prof. Hans Michael Piper	Rector, Heinrich Heine University of Dusseldorf	Germany
Prof. Kurt Mehnert	Rector, Folkwang University for Design and Arts	Germany
Prof. Elizabeth Garrett	Provost and Senior Vice President for Academic Affairs	University of Southern Californ
Prof. LEE KITAE	Head of Directors & President, new campus of Yonsei University	South Korea
Distinguished Professor Gene D. Block	Chancellor, UCLA	USA
Prof. Angie Bukley	Associate Dean & SSP Director, International Space University (ISU)	France
Prof. Joseph Saliba	Provost University of Dayton	USA

## *A Final Word*

On concluding this report I wish to leave you with a few thoughts. We have just completed the 2010-2011 academic year which was an important one in many respects. We are proud of what we have accomplished, as reflected by the contents of this report, and face the coming year with optimism similar to that which enabled us to flourish this year. Regardless of adverse economic, political and security trends globally and most intensively in the region, the Technion, like the rest of Israel, was able to go about its business and despite everything, thrive. That is an achievement that cannot be taken for granted and that requires a great deal of fortitude and support. We include you, the members of the Board of Governors and friends, in these accomplishments of which you were a vital component.

Our anticipation of continued productive achievements is well grounded in our history.

As we mark, in the coming academic year – 2012 and the centennial of the cornerstone laying of the historical Technion building in 1912, we are confident in our ability to continue to excel and to attract the best teachers and the best students to our institution and to maintain our technological and scientific edge. We will celebrate our achievements during these hundred years as we commemorate the historic, visionary and most unlikely historical event which made possible the birth and subsequent flowering of an institution which enabled modern Israel's success.

I hope that you have benefitted from this report in which we attempted to share with you our plans, our vision, our dreams and our challenges. Because you are part of the Technion Family we consider your opinions and your support vital to our continued success. You will be taking part in a rich program of activities during these days on campus: ceremonies, dedications, festive dinners, tours, visits, meetings, plenaries and business sessions. All are designed to provide you with the tools to become part of our family and to help us to achieve our goals. I wish the Board of Governors a productive 2011 session; one in which you will be inspired and strengthened, challenged and enriched and also amused and entertained.

I extend to you a warm welcome to the Technion and thank you for attending.



Professor Peretz Lavie  
President