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New Israeli Civil Space Policy to Boost R&D and Commercial Space Industrial Base

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ABSTRACT

Israel's space industry emerged from defense necessity, having its first launch in 1988. State budget was always low and mostly defense related, lately $76 million, of which only $3 million for the civil program administered by the Israeli Space Agency. The $3 million was highly leveraged, as 80% of the investment in space-related R&D in Israel so far came from foreign governments interested in cooperation and joint projects resulting in agreements with over 10 space agencies. Despite low budgets, achievements so far are remarkable: Israel was ranked number 1 in terms of publication per capita on aerospace engineering and has demonstrated capabilities and products in space infrastructure, products, and services, with leading optical equipment and small satellites. The space industrial base includes around 20 corporations employing 2,000–2,500 workers driving annual sales of $800 million, the eighth largest in the global space sector. Following a series of studies regarding the impact of the space industry on the Israeli economy, Israel adopted a new civil space policy, increasing civil budgets eightfold to a yearly $24 million. The goal is ambitious—with the new cash injection and capitalization on its lucrative defense, communications, and IT industries as a solid base, Israel plans on boosting its civil space industry, placing it among the top five leading nations in space, with yearly sales of $6–10 billion, representing 3–5% of the global space market. Success will make the space industry a driving force for economic growth. The lion's share of the budget will be allocated to international cooperation and projects. The two other major allocations are to industrial R&D and basic research. A key element launched by a directive promulgated in December 2012 is a targeted program by which state financial support will be provided to innovative commercial space R&D, considering mainly the novelty and uniqueness of the product/technology; their expected achievements and capacity to enhance and upgrade satellites' utility and performance; and their market. Support will amount to 50–85% of the project's budget, not exceeding $5.3 million, unless for ground-breaking projects. Considering past achievements with small budgets, this is a significant stimulus. Successful projects will pay the state royalties as a percentage from future income (3–6%), if (and only if) such is generated, until full repayment of the grant, thus having state bearing most of the project's risk.

BACKGROUND: THE SPACE SECTOR IN ISRAEL

Academic and scientific research on space started in Israel in the early 1960s. A bibliometric analysis published in 2009 ranked Israel number one in the world in publications per capita in the field of aerospace engineering with twice as many publications per capita as the second country on the list. The United States leads in absolute numbers of publications.[1]

The Israeli space program was initiated in 1983 as a result of defense needs. This was a daring decision by such a small country, which is still by far the smallest space-faring nation today. Yet the challenge was met, and after only 5 years, when on September 19, 1988, Israel launched its first satellite, *Ofeq* (Hebrew for "horizon"), on board the Israeli rocket-launcher *Shavit* (Hebrew for "comet"), from an airbase on the Mediterranean Coast south of Tel-Aviv,[2] becoming the eighth state to join the exclusive club of space-faring nations.

The Israeli space industry has demonstrated capabilities and products in both space infrastructure (construction and operation of launch sites, ground stations, launchers, and satellites) and space products and services (satellite TV and radio, mobile and stationary communication services, remote sensing, etc.). The Israeli space industry is relatively small, but is considered to be highly advanced technologically and to be a leader in certain specific sectors. According to "Futron's 2010 Space Competitiveness Index," Israel "continues to play important niche roles in the optical equipment and small satellite markets."[3]

There are about 20 Israeli corporations in the space industry. Products range from launching facilities, ground stations, and rocket launchers to communication and observation satellites all the way to high-end optical equipment and sophisticated (RadHard) computer chips and satellite-borne communication products. The main commercial service that Israeli companies provide is satellite-based communication, with coverage in Europe, the Middle East, Africa, and North America. Other services provided by Israeli corporations include high-resolution satellite imagery; software, technical, and engineering consulting; and project management. As a whole, the Israeli space sector directly employs 2,000–2,500 workers.[4] "Futron's 2010 Space Competitiveness Index" ranked Israel eighth in global volume of sales of space-related products and services.[5]

THE NEW ISRAELI CIVIL SPACE POLICY

Up to and including 2012, government investment in the space industry was almost exclusively defense related, estimated at $73 million, and the budget of the Israeli Space Agency (ISA), administering the civil program, was only $3 million per year (2007–2012

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average).[6] These figures are ridiculously low in comparison to the budgets in the major space-faring nations.

ISA estimates that about 80% of the investment in civil space-related R&D in Israel so far has come from foreign governments interested in cooperation,[7] with agreements and common projects with over 10 countries,[8] which to some extent makes up for the low domestic budget. However, the foreign investment is not enough, and as Futron's report remarked, before the new civil space policy, the Israeli space sector "is inhibited by a lack of clear government commitment to its national space program."[9] The recent new civil space policy is expected to change the picture.

A series of studies conducted in Israel starting in 2005 suggested that, with a moderate government investment in the civil space sector, the Israeli space industry would be able to play an important role in the global space sector and the Israeli economy.[10] According to one of these reports, the Report of the President's Team, on which the new civil space policy is based, an investment of $80 million per year for the next 5 years will increase the market share of the Israeli space industry to 3–5% of the global space market, estimated at $250 billion per year, leading to yearly sales of $6–10 billion.[11]

The Israeli government adopted the main recommendations of the reports and approved a yearly budget of approximately $24 million for the new civil space program for the 2013–2014 work plan. This is lower than the recommended budget, but still marks a change in policy and an eightfold increase in the budget of the ISA. It is possible that the budget for 2015–2016 will be still higher, depending on performance in 2013–2014. On the other hand, general budgetary constraints might lower the actual budget. "With … [the new] cash injection … [and] its lucrative defense and communications industries as a solid base … Israel is looking to space as its newest high-tech business frontier. Capitalizing on its defense, communications and IT industry, Israel plans on kick starting … [its] civilian space industry. The country already boasts a $5 billion defense industry."[12] The target is indeed ambitious—to place Israel among the top five leading nations in space and boosting the revenue of its civil space industry to $6–10 billion annually, making it an important growth engine.

According to ISA's work plan, the lion's share of the budget will be allocated to international cooperation and projects. The two other major allocations are to industrial R&D and basic research.[13]

Another area covered only briefly by the new civil space policy is the regulatory environment. Despite having been a space-faring nation since 1988, Israel has no prior legislation on these issues. Israel ratified the 1967 Outer Space Treaty, the 1968 Rescue Agreement, and the 1972 Liability Convention. Like most countries, including most of the space-faring nations, Israel did not accede to the 1979 Moon Agreement. However, unlike many other countries and almost all space-faring nations, Israel did not accede to the 1975 Registration Convention.[14] Despite its being bound by several space-related treaties, Israel has no domestic legislation implementing the treaties acceded to, or regulating space-related activities in general. There seems, however, to be a new recognition that a sound, stable, and transparent regulatory environment is necessary also for up-scaling the space industries and international, commercial-led cooperation. Indeed, one of the recommendations in the report of the President's Team is to introduce legislation regulating space law issues, space-related activities in Israel, and the powers and responsibilities of ISA. The report recommends considering such legislation 2 years after commencement of the new space policy and in view of the experience gained.

THE NEW DIRECTIVE: STIMULUS FOR R&D IN SPACE TECHNOLOGIES

Background: The R&D Act

Since 1984, Israel has successfully implemented an ongoing framework program for the encouragement of R&D and innovation in selected fields, managed by the Office of the Chief Scientist (OCS) in the Ministry of Economy (which, until January 2013, was known as the Ministry of Industry, Trade and Labor [MOITAL], and older references bear the old name).

Most of the state support for R&D projects is granted under the Encouragement of Industrial Research and Development Act, 1984 (The R&D Act).[15] The R&D Act has since been revised several times to reflect accumulated experience. The purpose of the R&D Act is "[t]he development of science-intensive industry whilst utilizing and expanding the technological and scientific infrastructure, and the existing human resources in the State," which is to result in the reaping of economic benefits, that is, creating "surplus yield," improving the balance of payments in international trade, and increasing the employment rate, productivity, and GDP.[16]

Developing science-based industry is highly important to economic growth in Israel, since as a small-scale economy with limited natural resources, its competitive edge is applied innovation. Creating and maintaining a technologically advanced industry is also necessary to meet Israel's immense defense needs, because meeting these needs relies on technological edge.[17]

The OCS administers the implementation of the R&D Act. According to its stated policy:

> In addition to direct R&D grants for the industry, emphasis is placed upon: the encouragement of international cooperation in industrial R&D; the encouragement of technological entrepreneurship; the development of future technologies by means of increasing the academic-industry interaction and cooperation; the development of new technologies by means of increasing the academic-industrial interaction and cooperation.[18]

In practice, the OCS supports hundreds of projects at different stages, from incipient concepts with a pre-seed framework through start-up companies, to industrial R&D by well-established enterprises and corporations.[19]

In 2007, the Israeli Ministry of Finance and the OCS have commissioned a study of the effectiveness of the support provided under this framework program and the benefit to the economy as a whole. The report showed that the total return on state support for the economy as a whole ranged from 475% to 751%. This figure

represents private investment that followed state investment and R&D spillover (the spread of knowledge in the industry, a positive effect for the economy). There was a clear excess return to the economy as a whole, far beyond the return for the researching firm.[20] The highly positive results supported continuation of the framework program.

The New Directive

On December 6, 2012, the Director General of the Ministry of Economy[21] signed a directive establishing a specific framework program for stimulus of R&D and innovation in space technologies—*Directive 8.24: Encouragement of R&D in Space Technologies*.[22]

The directive briefly notes, in its general part, its goals and background. As noted there, as a result of the technological complexity required for operations in the harsh environment of space, development of systems and components for use in space involves both high technological risk and high development and manufacturing costs. In order to cope with these difficulties, ISA and the OCS have initiated this targeted framework program aiming to stimulate and support R&D in the space sector. The goal is to develop technological solutions in various areas of the space industry and market, to further enhance the technological level and capabilities of Israel, to close any knowledge gap between Israel and the leading space-faring nations, and to improve the competitive capacity of the Israeli space industry. [23]

Scope of the Directive

The directive provides that state support will be given to commercial R&D in the field of space. The definition of "commercial R&D in the field of space" determines the scope of the directive and which projects are eligible to apply for support. "Commercial R&D in the field of space" is defined in the directive as follows:

> [R]esearch and development of products in the field of space intended for installation in satellites or in ground stations for control and manoeuvre of satellites; development products in the field of space intended for transmitting or receiving data to and from satellites; development of equipment for calibration and testing of space sector products intended for installation in satellites or related to satellite activity, including adaptation of various models of satellites which are eligible for export.[24]

The phrase "products in the field of space" used in the above definition is itself defined as follows:

> [P]roducts for the space industry or components of the product—mean all the following: a new product, a material improvement of an existing product, a material improvement in an existing process, the addition of existing technologies to existing products or demonstrating technological feasibility, based on commercial R&D in the field of space.[25]

The above definitions exclude from the scope of the directive the "heavy industry" of the space sector, mainly rockets and other spacecrafts (other than satellites) and ground stations, though equipment for ground stations is included. Heavy industry is excluded because Israel has no competitive advantage in heavy industries.

Prerequisites for Financial Support

The prerequisites for financial support are as follows:

1. The applicant is a company registered in Israel, operating according to the laws of the State of Israel and is not a charity corporation.
2. The applicant did not receive state support for the submitted project or part thereof.
3. The applicant is not under bankruptcy proceedings and has no unsettled debt to the Ministry of Economy.
4. The applicant is in conformity with all labor laws.[26]

It should be noted that while the applicant must be a company registered in Israel, there is no requirement as to the nationality of the investors and shareholders. Non-Israeli entities may invest and hold equity in relevant companies and projects. However, the directive applies rules regarding intellectual property (IP) and transfer of technology, as elaborated below. In addition, general export control rules will apply.

The Scope of the Financial Support

Approved projects will get financial support for a period of up to 3 years. The actual grant of financial support for the second and third year is subject to the applicant's meeting the milestones set in the approved work plan. The amount of financial support granted is a percentage of the approved budget of the project, according to the following rates: [27]

1. For an approved project of an applicant with a yearly turnover of more than $100 million—50% of the approved budget
2. For an approved project of an applicant with a yearly turnover of less than $100 million—60% or 85% of the approved budget, determined as follows:
   a. For R&D of a product not intended to operate in space—60% of the approved budget
   b. For R&D of a product intended to operate in space—85% of the approved budget

An "approved budget" means the total budget of the approved project, including expenditures, as approved by the Space R&D Committee. These expenditures include the cost of salaries, contractors, equipment, components, raw materials, and so on, provided that they do not exceed their respective maximum cost, as set in the guidelines of the OCS.[28] The approved budget includes the state financial support and the additional funding provided by the applicant or a third party.

The maximum total financial support for a project, for its entire length, is limited to $5.3 million. This may not seem a large sum,

especially for a project in space-related technology. However, one should bear in mind that, for various reasons, R&D in Israel is significantly faster and cheaper than in other developed countries, and that so far the Israeli space program has had remarkable achievements on a very small budget, as noted above.

The Space R&D Committee may approve a higher amount of financial support in exceptional cases, such as ground-breaking projects. In such a case, the exceptional conditions or reason must be stated.

The applicant must demonstrate the availability of supplemental funding for the project, either from its own sources or from a third party. The supplemental funding should cover the difference between the total approved budget and the state funding.

An applicant can receive financial support for only one project. The Space R&D Committee may approve more than one project from the same applicant in exceptional cases, such as ground-breaking projects. In such a case, the exceptional conditions or reason must be stated.

Payment of Royalties to the State

A company that has been granted financial support for a project is required to pay the OCS royalties on any income from any technology and/or product developed under the approved project or from derivative products, including services accompanying the product or associated with it.[29] Royalties will be paid on the above income up to the full amount of the financial support granted, plus annual interest.[30] The rate of the royalties starts at 3–4% during the first 3 years of their payment and goes up in later years to a maximum that may be as high as 6%, depending on the characteristics.[31]

The royalty mechanism means that the state is assuming most of the risk of the project, since the payment of royalties depends on the success of the project. If no income is generated, no royalties will be paid, and if an insufficient income is generated, there will be only a partial return of the government's investment. However, royalty debt has preference in bankruptcy proceedings, and if the failed company is purchased, the buyer will have to pay the royalties.[32]

The Committee Entrusted with Deciding Applications

The principal decision-making body entrusted with executing the directive is the Committee for R&D in Space Technologies (Space R&D Committee) established under Articles 3.1–3.2 of the directive. The committee is headed by the Chief Scientist of the Ministry of Economy, and its members include the head of the ISA as well as representatives of the Ministry of Economy, the Ministry of Finance, and the industry.

The proceedings of the Space R&D Committee (except for its decisions) and any materials delivered to it are confidential,[33] since they include trade secrets. To ensure objectiveness of the decisions, no member of the committee is permitted to be present in any hearing or discussion or to be involved in any issue if there is a conflict of interests between his/her duty as member of the committee and any of his/her other professional or personal affairs.[34]

The powers of the committee include the following:[35]

1. to discuss applications for support of R&D projects;
2. to approve, partially approve, or deny such applications;
3. to approve, partially approve, or deny the budgets of said R&D projects;
4. to monitor performance of approved R&D projects;
5. to decide, in appropriate cases, to withdraw support from a previously approved R&D project; and
6. to prolong the performance period for a previously approved R&D project, without increasing the amount of support, until all of the allocated support has been utilized.

In addition, the Space R&D Committee may also issue further rules and guidelines for the execution of the directive.[36]

Proper reasoning should be provided for the decisions of the Space R&D Committee. Judicial review on the decision of the Space R&D Committee is available, but the court will normally limit its review to assuring that the norms of the administrative law have been preserved.[37]

The accumulated experience of the OCS will be applied to the execution of this directive. At the same time, when deciding feasibility of suggested projects and other matters pertaining to space technology and markets, it is the representatives of ISA that will have more to contribute to the discussions and decisions.

Considerations in Deciding Whether to Grant Support

Applications for support will be considered only if they meet the prerequisites provided in Article 4, discussed above, and will be considered according to the following criteria:[38]

1. Product and technology: the level of technological novelty; technological depth; uniqueness; technological barriers for competitors; expected achievements of the project; and the capacity of the product to upgrade various kinds of satellites, enhance their performance, or reduce impediments limiting the performance of satellites in space.
2. Work plan: is there a fully developed work plan for achieving the targets of the project?
3. Business plan: is there a solid business model to utilize the potential of the product?
4. Personnel: the skills of the applicant's personnel.
5. Market (domestic and international): the scope and rate of growth of the market for the product, the expected market share of the product, and the advantages of the product and its price compared to competitive alternatives.

Every application is examined and evaluated by an expert nominated by the OCS.[39] The expert may ask the applicant to provide any additional information required for evaluation of the application. The evaluation will be submitted to the Space R&D Committee before the committee's discussion on the application. When discussing

applications, the committee will compare the various applications on the agenda.

Review of Progress

The execution of an approved project will be monitored.[40] The OCS may review and supervise the progress of an approved project and its adherence to the milestones and other conditions and parameters set in the approved work plan. The OCS may conduct the review itself or use external experts. An applicant undertakes to allow such review and supervision and to act according to the instructions of the OCS, as given from time to time.

Intellectual Property and Limitation on Transfer of Technology

The directive is aimed at supporting R&D that will result in innovative technology. It is therefore a basic concern and need that such a technology be protected to prevent its being copied or transferred abroad. Article 12 of the directive provides for rules regarding this critical issue.

Applicants are required to comply with the Israeli Intellectual property (IP) laws.[41] If an applicant is convicted of a criminal offense for violation of Israeli IP laws, the Ministry of Economy will be able to annul, retroactively, any benefit, grant, loan, tax benefit, or other financial relief granted, in whole or in part, and demand reimbursement with interest.

Further, it is naturally in the interest of Israel that technology developed in Israel, especially a technology developed utilizing financial support from the government, will stay in Israel, and will not be transferred abroad, nor the production of products developed in this way. The R&D Act sets rules and restrictions on transfer of technology and production abroad. According to the R&D Act, such a transfer is prohibited unless by prior approval of the OCS. The act specifies exceptions under which approval of a transfer may be given. Approval may be given for transfer abroad of technology, transfer of production, or transfer of rights to produce. These rules were eased in an amendment that came into force in 2012.[42] The rationale of the amendment is the increasing globalization, the rising importance of cooperation with multinational corporations to commercially utilize technologies, and the need for further fundraising in later stages of R&D.

According to the new rules, requests for transfer of production or technology may be approved in several cases, mainly: (1) transfer of production outside Israel in return for transfer of production to Israel of products of at least the same technological level or against payment of extended royalties to the OCS amounting to 120–300% of the royalties originally due, and (2) transfer of technology outside Israel in return for transfer of technology to Israel that is as valuable at least as the technology transferred abroad, or against payment of extended royalties to the OCS, up to 600% of the royalties originally due, if the R&D activity will not remain in Israel.[43]

These rules also apply to R&D projects under the current directive. The directive refers to these rules and also provides that technology resulting from R&D under an approved project and any rights derived therefrom will remain fully owned by the approved applicant, unless it receives approval for their transfer, according to the R&D Act.[44] Transfer of production or rights for production outside Israel also requires prior approval.[45] Applications for transfer of technology, production, or rights derived therefrom will be considered by the general Research Committee of the OCS, not by the Space R&D Committee.[46]

Application of Laws and Regulations

The R&D Act and resulting regulations, rules, and guidelines, including those issued by the OCS, apply to this directive, applications submitted according to it, and all acts under and according to it.[47] It is also specifically provided that the R&D Act and the regulations and guidelines issued under it regarding transfer of technology and production outside Israel without the approval of the general Research Committee of the OCS shall apply, *mutatis mutandis*, to projects approved under this directive.[48]

CONCLUSION

The future of space exploration and utilization lies in the hands of the industry, as much as in the hands of governments. Israel, already an advanced space-faring nation, is determined to be an important player in the space arena, as appears from its new civil space policy.

This is the first space-related legal instrument in Israel. The effect of the new civil space policy and the new directive is yet to be seen. Will the new approved budget sustain cuts? Will the new directive result in more new space-related technologies? Will Israel manage, despite its small scale, to be among the five leading nations in space?

The tool provided by the directive was successfully implemented in other advanced technology sectors in Israel, and it will now be applied to boost the private-sector space industrial base. Based on its overall academic, industrial, and technological achievements and capabilities in other sectors, and especially in the neighboring Communication and Information Technology (CIT) and defense sectors, and considering the sharp increase in government spending in the space sector, Israel presupposes and anticipates a significant upscaling of its already respected position as the eighth leading space-faring nation.

DISCLAIMER

The views expressed herein are solely those of the author and do not necessarily represent those of the government of the state of Israel or any organ thereof.

AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.

ENDNOTES

[1]Based on the ISI database (the Science Citation Index of Thomson Scientific) for 2001–2005 as analyzed and processed in Samuel Neaman Institute for National Policy Research, *Assessment of the Impact of the Space Industry on the Israeli Economy*, Volume I (Technion-Israel Institute of Technology, 2008), p. 12. The first five states are Israel, the Netherlands, Singapore, the United States, and the

United Kingdom. The United States is leading with the total number of publications and produces half of the world's publications in aerospace, and the rest contributing each less than 10%, where the United Kingdom is second with around 7.5% (id. at 11). Data refer to aerospace engineering; there is no separate data for space engineering, which is estimated to provide around 20% of the aerospace research (id. at 19).

[2]Brian Harvey, Henk J.F. Smid, and Theso Pirrard, *Emergins Space Powers, the New Space Programs of Asia, the Middle East, and South America* (Springer, 2010), p. 427.

[3]Futron Corporation, *2010 Space Competitiveness Index*, p. 3.

[4]Neaman Institute, *Assessment of the Impact of the Space Industry on the Israeli Economy* (cited in reference 1), pp. 22, 50–51.

[5]Futron Corporation, *2010 Space Competitiveness Index*, p. 3.

[6]The actual figures for defense-related investment in the space sector are classified. The estimation is made by the Organization for Economic Cooperation and Development (OECD) in *The Space Economy at a Glance* (OECD Publishing, 2011). The figures of the civil budget were revealed in a report submitted to the Israeli parliament—*Activity of the Israeli Space Agency, Report of the Center for Research and Information of the Israeli Parliament*, submitted to the Parliamentarian Committee of Science and Technology (May 10, 2012).

[7]Ora Koren, Star Wars: the Ministry of Finance Examines a Proposal to Invest 300 Million NIS a Year in the National Space Program, The Marker July 30, 2010 www.themarker.com/misc/article-print-page/1.588422 (Last accessed December 30, 2012).

[8]Israel already has cooperation agreements with NASA, ESA, RKA (Russia's ROSCOSMOS), CSA (Canadian Space Agency), CNES (French Space Agency), ISRO (Indian Space Agency), ASI (Italian Space Agency), NLR (the Netherlands Space Agency), and KazCosmos (Kazakhstan's Space Agency). Further, Israel is currently in the process of reaching new cooperation agreements with the Brazilian Space Agency (AEB), the Korea Aerospace Research Institute (KARI), the Netherlands Space Office (NSO), the State Space Agency of Ukraine (SSAU), and the European Union. Israel has or has had common projects with NASA, ASI, NLR, DLR (German Space Agency), and NSAU (Ukraine Space Agency). See website of the Israeli Ministry of Science, Technology and Space (www.most.gov.il).

[9]Futron Corporation, *2010 Space Competitiveness Index*, p. 3.

[10]Samuel Neaman Institute for National Policy Research, *Assessment of the Impact of the Space Industry on the Israeli Economy* (Technion-Israel Institute of Technology, Volume I 2008, Volume II 2009); Rotem Strategy Ltd., *Strategic Plan for the Israeli Space Agency* (2006); The National Economic Council at the Office of the Prime Minister, *Examining the Possibility of Developing a Civil Space Industry* (2010); *Report of the President's Team: Space as a National Project: The Israeli Space Program and a Sustainable Domestic Industry within a Few Years* (June 2010). Only the first report was published.

[11]*Report of the President's Team* (cited above) at 21. In November 2009, the president of Israel, in coordination with the prime minister, appointed a team to prepare a new space program for Israel. The team was headed by the chairman of ISA, Prof. (General, Res.) Yitzhak Ben-Israel, and the director general of the Ministry of Science and Technology, Mr. Menachem Grinblum.

[12]Rivka Van Der Meer, *Kick-Starting Israel's Place in Space* (Israeli Ministry of Foreign Affairs, September 6, 2010), www.mfa.gov.il/MFA/InnovativeIsrael/Kick-starting_Israel_in_space_Sept_2010.htm (accessed November 19, 2012).

[13]Daniel Barok, international cooperation advisor for ISA, presentation at the 50th session of COPUOS Scientific and Technological Subcommittee (Vienna, February 2013).

[14]UNOOSA, *Status of International Agreements Relating to Activities in Outer Space*, as on January 1, 2013 (A/AC.105/C.2/2013/CRP.5).

[15]An updated version of the law, in Hebrew, is available online at: www.moital.gov.il/NR/rdonlyres/54503B31-F089-4604-9F78-1867654AD43D/0/hokmop2011.pdf (accessed July 13, 2013). An unofficial English translation, made by the Ministry of Economy, updated in 2005 is available online at: www.moital.gov.il/NR/exeres/9F263279-B1F7-4E42-828A-4B84160F7684.htm (accessed July 13, 2013); however, this translation lacks amendments made since then, especially the important amendment (Amendment 5) that entered into force in 2011 regarding transfer of technology or manufacturing outside Israel.

[16]The objectives of the act are stipulated in Article 1 thereof, and the quotes are from the said article.

[17]The National Security Doctrine of Israel, introduced by its first prime minister David Ben-Gurion, maintains that in view of the overwhelming inferiority in numbers, Israel must rely on technological superiority. This doctrine preceded the establishment of the State of Israel and is still in force today. On the early development of this doctrine, see Ari Bar'el, *The Leader, The Scientists and the War: David Ben-Gurion and the Establishment of the Science Corp*, 15 Israel (2009), pp. 67–92; on the modern Israeli National Security doctrine, see Yitzhak Ben-Yisrael, *The Security Doctrine of Israel* (Ministry of Defense Publishing, 2013).

[18]Chief Scientist, Israeli Ministry of Industry, Trade and Labor, *Note to Entrepreneurs* (January 2001).

[19]OCS, *R&D Incentive Programs* (no date), available online at: www.moital.gov.il/NR/rdonlyres/5E7A4322-4D0F-4320-953C-83F94024E7AA/0/RDspreads.pdf (accessed January 2, 2013).

[20]Shaul Lach, Shlomi Prizat, and Daniel Wertak, *The Effect of Government Support for Industrial R&D on the Israeli Economy*, report submitted by Applied Economics Ltd. (June 2008).

[21]Then still named the Ministry of Industry, Trade and Labor.

[22]Directive 8.24 of Director General of the Israeli Ministry of Industry, Trade and Labor: *Encouragement of R&D in Space Technologie*s (December 6, 2012). Original Hebrew text of the directive is available online at: www.moital.gov.il/NR/exeres/DA2C1E5D-BDF6-4565-8FC1-CB191D9507F0.htm (accessed December 16, 2012).

[23]The general part of the directive.

[24]Directive 8.24, Article 2. This and all other quotations from the directive are the author's translation.

[25]Ibid.

[26]This is ensured by reference to another directive: Directive 0.4 of Director General of the Israeli Ministry of Industry, Trade and Labor: *Applying Social Responsibility as Condition for Support* (June 14, 2010), Hebrew version available online at: www.moital.gov.il/NR/exeres/0F3A4C84-93D5-43E4-85DA-F16D5AF9A875.htm (accessed January 2, 2013). Applicant must not be in breach of the said directive.

[27]Directive 8.24, Article 6, specifies the financial support to be awarded to an approved project.

[28]Directive 8.24, Article 2.

[29]Directive 8.24, Article 10.

[30]Directive 8.24, Article 10, and according to the R&D Act and regulations promulgated under Article 21(c) of the act.

[31]*Encouragement of Industrial Research & Development Regulations* (Rate of Royalties and Rules of Payment), 1996.

[32]Article 47(b) of the R&D Act. See Bank. (TA) 1277/02 *Advocate Israel Bernstein v Maberly Investment* (unpublished). The other two respondents in this case were Wecco Briot International Ltd., which sought to buy Pro-Laser Ltd. and the OCS. Because this court decision concerned a decision by an OCS research committee, it is relevant to decisions of research committees under Directive 8.24 as well. An appeal of the special administrator to the Supreme Court was withdrawn—(S.Ct.) C.A. 4303/04 *Advocate Israel Bernstein v. Maberly Investment* (decision of September 15, 2005, unpublished).

[33]See Article 14 of the R&D Act and Directive 8.24, Articles 3.4–3.6.

[34]According to Article 15 of the R&D Act, and as specifically applied by Article 3.7 of Directive 8.24.

[35]Directive 8.24, Article 3.10.

[36]Directive 8.24, Article 8.2.

[37]See HC 7205/03 *Vipeg Ltd v The Minister of Industry, Trade and Labor* (unpublished). Although this decision did not directly concern Directive 8.24, it should apply to decisions of research committees under that directive because it concerned a decision by an OCS research committee.

[38]Directive 8.24, Article 5.

[39]Directive 8.24, Article 9.

[40]Directive 8.24, Article 13.3.

[41]Directive 8.24, Article 12.2.

[42]*Economic Policy for 2011 and 2012 (Legislative Amendments) Act*, 2011, Chapter 6. The amendment was introduced as part of the above bundle of legislative amendments, colloquially known as the *Arrangements Act*. It should be noted

that although the title of the act refers to the years 2011–2012, the amendments do not expire after this period.

[43]R&D Act, Articles 19A and 19B; *Regulations for Encouragement of Industrial Research and Development (Maximum Amount of Payment for Transfer of Know-How Under Section 19B(B)(1) and (2) of the Law)*, 2012.

[44]Articles 19A and 19B of the R&D Act, endorsed by Directive 8.24, Articles 12.1, 12.3.

[45]Ibid.

[46]Directive 8.24, Article 12.3.

[47]Directive 8.24, Article 8.

[48]Directive 8.24, Article 13.4.

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