EXECUTIVE SUMMARY

“If you go to the Middle East looking for oil, you don’t need to stop in Israel. But if you go looking for brains, energy and integrity, it is the only stop”, so said Warren Buffett, founder of Berkshire Hathaway. No one can sum up Israel’s innovation ecosystem better, as he speaks from personal experience, having purchased 80% of Israeli tungsten carbide tool maker ISCAR for $4 billion in 2006.

Israel is internationally recognized as being at the forefront of high-tech innovation. Rankings of various independent organizations which include publications such as Newsweek, the Wall Street Journal, and Business Week highlight Israel as one of the world’s most innovative countries. Specific rankings by the World Economic Forum and the International Institute for Business Management (IMD) in Geneva also demonstrate Israel’s top position in innovation worldwide.

Israel, a small country with only 8 million people and just 65 years old, possesses few natural resources. Yet, its dynamic population thrives upon its cultural, religious and ethnic diversity resulting from the absorption of immigrants from 130 countries. Through its human capital, Israel generates more start-up companies than large, industrial nations like Japan, China, India, Korea, Canada, France, Germany and the UK. In addition, Israel has, per capita, attracted over twice as much venture capital investment as the US and 30 times more than all the members of the European Union combined.

As Google Chairman Eric Schmidt remarked after his visit to Israel in June 2012 “For a small country, Israel will have an oversized impact on the evolution of the next stage of the technology we all use.”
“THERE’S AN ISRAELI WORKING ON EVERY INSOLUBLE PROBLEM”

Several aspects of Israeli society contribute to fostering an environment in which entrepreneurship and creativity naturally emerge:

• Culture of perseverance and willingness to take risks.
• Commitment to education with 57 colleges, 7 highly-ranked universities, 12 technology transfer organizations (TTOs) and a highly educated workforce.
• Close-knit social network characterized by open, direct, task-oriented approach.
• Network of support from government and private industry, a large community of venture capital funds and 26 technological incubators.

While there is no way to know which of these is more important than any other, serial entrepreneur Yossi Vardi give high marks to the culture of perseverance which he likens to the “Jewish mother” syndrome. He says: “It’s a cultural and spiritual phenomenon, but not a technological one, as you have technology all over the world. All Israeli kids know that their mother will tell them: ‘After all that we’ve done for you, is asking for one Nobel Prize really too much?’

Examples of Israel’s innovation find expression in technological breakthroughs across a wide variety of fields including high tech, life sciences, biotech and agro-tech. Coupled with these are the many multinationals who have located R&D facilities in Israel, in many cases their only foreign-based R&D operations. Israel’s R&D expenditures account for approximately 5% of the country’s GDP, higher than any other western country and twice the OECD average.

Israel’s innovative spirit and culture has encouraged some of the world’s largest multinational corporations to use local talent to develop their key breakthroughs. The continuing influx of foreign companies and conception of new local firms both reflects and reinforces the vibrancy of Israel’s industrial research and development.

Gary Neill, the head of Johnson & Johnson’s Innovation Research Unit, noted during a recent trip to Israel: “There’s an Israeli working on every insoluble problem.”

Israel is a place where ideas matter, where the creative process is nurtured, where many have come to realize that tomorrow’s solutions can come from the unlikeliest of sources.

Paul Smith, Senior Vice President of Philips Medical, recounted: “In two days in Israel, I saw more opportunities than in a year in the rest of the world.”
INTRODUCTION

“If you go to the Middle East looking for oil, you don’t need to stop in Israel. But if you go looking for brains, energy and integrity, it is the only stop,” so said Warren Buffett, founder of Berkshire Hathaway. No one could sum up Israel’s innovation ecosystem better, as he speaks from personal experience, having purchased 80% of Israeli tungsten carbide tool maker ISCAR for $4 billion in 2006.

Israeli culture naturally breeds innovation. It is a place where optimism, resilience and creative improvisation are the norm. From a young age, Israelis are educated to ask questions, challenge authority and take risks. The classic Hebrew phrase “Yihiyeh b’seder,” translated loosely as “it will work out fine,” is a motto by which many Israelis have learned to live. The Israeli drive to challenge given assumptions and to think “out of the box” facilitates the emergence of the country’s entrepreneurial character.

Along with its inherent creative spirit, Israel’s commitment to education helps to ensure that Israelis acquire the academic and professional tools they need to succeed. In addition, exposure to local R&D activity and technical experience gained in the military augment skills learned in the classroom.

As a country of immigrants, Israel’s people represent a diverse range of backgrounds, talents and skill sets, further enriching the local economy. Israel has thus accumulated experience in making sure that each person and idea counts.

Additionally, a network of support from government and private organizations provides new ideas and technologies with funding and other types of assistance. Technological incubators and venture capital funds play a large role in offering basic infrastructure for start-ups and in cultivating young talent.

The environment resulting from this coalescence of societal elements naturally invites inventors, entrepreneurs, investors and government bodies to leverage their respective resources so as to encourage the rapid development of breakthroughs. An active interchange among the various parties results in the rapid concept-to-product pipeline that is unique to Israel. This has been critical to the development of Israel’s high-tech innovation community.

Testimony to the existence of what Broadcom CEO Scott McGregor called Israel’s “hotbed of innovation” can be found in various international rankings. In 2011 Newsweek’s Daily Beast ranked Israel as the 4th most innovative country in the world. Similarly, the Wall Street Journal and Bloomberg Business Week rank Israel high worldwide when it comes to innovation. Bloomberg adds that “Israel has one of the most dynamic high-tech industries in the world and is a hub for venture capital as well.” The greatest testimony to its success however, is the results: more patents filed per capita than any country in the world and the second highest number of start-ups anywhere.

As Google Chairman Eric Schmidt remarked after his visit to Israel in June 2012 “For a small country, Israel will have an oversized impact on the evolution of the next stage of the technology we all use.”

THIS IS ISRAEL: INNOVATIVE SOLUTIONS FOR TODAY AND TOMORROW.
EMERGENCE AS A CENTER FOR INNOVATION

Israel, a small country with only 8 million people and just 65 years old, possesses few natural resources. One could fit Israel 25 times into France or 17 times into Germany. Furthermore, over half of its already tiny territory is desert.

Yet, Israel has learned to transform its limitations into assets. It has developed some of the world’s most advanced technologies in fields such as water, agriculture and energy. *It generates more start-up companies than large, industrial nations like Japan, China, India, Korea, Canada, France, Germany and the UK.* In addition, Israel has, per capita, attracted over twice as much venture capital investment as the US and 30 times more than all the members of the European Union combined.

Laurent Bochereau, head of the Unit for International Cooperation for Policy Coordination at the European Commission, remarked after his visit to the country in May 2012: “I think Israel has understood the whole of research and development as an engine for growth and development.”

Israel has more companies on the tech-oriented NASDAQ stock exchange than any country outside the US except for China – more than all of Europe and India combined. And Israeli innovation is not limited to computers, security, and communications; Israel leads the world in medical device patents, and is a strong global player in clean-tech and biotech as well.

*Israel’s R&D expenditures account for approximately 5% of the country’s GDP, higher than any other western country and twice the OECD average.* Additionally, IMD’s World Competitiveness Yearbook ranks Israel ahead of the UK, France, Japan and Spain.

In a recent interview, General Electric VP and Chief Marketing Officer Beth Comstock reflected on Israel’s creative energy: “Israel is the best country for business innovation, according to GE internal research, and its business executives are among the most optimistic in the world.”
CULTURE OF PERSEVERANCE

Every aspect of Israel’s culture contributes to and reflects this creative atmosphere. The small town, close-knit social network connecting Israelis to each other existed long before Facebook and LinkedIn. Fewer degrees of separation between Israelis facilitate a quicker transition between research labs and commercial endeavors, between resources and resource processing and between minds and matter.

In Israel, barriers are dropped, lines are blurred and hierarchy is not pronounced. In the Israeli military, young soldiers are given major responsibility for decision-making, while taxi drivers and top level scientists serve side by side in the reserves. Israelis are known for their candor, sharing their thoughts and ideas openly even with strangers.

General Manager of Intel Israel Mooly Eden explains that Israelis, at a young age, “are educated to challenge the obvious, ask questions, debate everything, innovate.” They have a deep respect for those who question given assumptions and who are willing to take risks, Israelis rarely take “no” for an answer.

Of course, there are others like serial entrepreneur Yossi Vardi, who attribute the culture of perseverance to the “Jewish mother” syndrome. He says: “It’s a cultural and spiritual phenomenon, but not a technological one, as you have technology all over the world. All Israeli kids know that their mother will tell them: ‘After all that we’ve done for you, is asking for one Nobel prize really too much?’”

EDUCATION MATTERS

Israelis are committed, by culture and tradition, to education as the prime guarantor of success in life. This aspect of the population’s value system encourages individual academic achievement and the pursuit of higher degrees to the level of each person’s capability. Thus, it is not surprising that Israel has 135 engineers, scientists and PhDs per 10,000 people in the work force, the highest such ratio in the world.

Israel’s emphasis on education is manifested in its 57 colleges and 8 highly-ranked universities which, over the last 10 years, have produced six Nobel Prize winners. Recent winners include Dan Shechtman of the Technion–Israel Institute of Technology, who was awarded the 2011 Nobel Prize in Chemistry for “the discovery of quasicrystals”, Ada Yonath of the Weizmann Institute, who received the Nobel Memorial Prize in Chemistry in 2009 for showing how ribosomes function, and Robert Aumann, who received the Nobel Memorial Prize in Economics in 2005 for his work on conflict and cooperation through game-theory analysis.

Each university also has a technology transfer organization (TTO) designed to commercialize research done under its auspices (e.g. YEDA, the TTO of the Weizmann Institute, among the 5 most successful TTOs worldwide.). These groups have proven critical to the successful conversion of university-based research to commercial products and concomitantly generate significant income from royalties for each of these academic institutions. The universities bridge the gap between academia and business, making sure that the best and brightest get a chance to make a difference on a global scale.

As a result of these programs, the World Economic Forum in its 2011-2012 ranking lists Israel first in the world in the quality of scientific research institutions and 4th globally in utility patents per million population. Similarly, the International Institute for Business Management (IMD) in Geneva ranks Israel first globally in scientific research, in resilience to economic cycles as well as in total expenditure...
on R&D. They go on to rank Israel 2nd globally in innovative capacity of firms, in public expenditure on education, in skilled engineers available in the labor market and in funding for technological development.

ISRAEL HAS 135 ENGINEERS, SCIENTISTS AND PHDs PER 10,000 PEOPLE IN THE WORK FORCE, THE HIGHEST SUCH RATIO IN THE WORLD

CHESS MASTERS AND FARMERS

Take a walk through Tel Aviv, Haifa or Jerusalem and it is obvious that Israel has been gifted with extraordinary cultural, religious and ethnic diversity. Israel benefits from its own melting pot of immigrant cultural styles, underscoring the importance of incorporating diverse skill sets and points of view to create an innovative society.

Relative to its population, Israel is the largest immigrant-absorbing nation on earth. During its history, it has welcomed people from every continent. For example, Israel absorbed over 1 million people from the former Soviet Union during the 1990s, most of them holding advanced degrees. Their contributions stretch from the world of the arts, athletics and chess to the high-tech, medical and academic sectors.

Russian-speaking immigrants are credited with raising the level of science, research and teaching in the country. Nearly 70 percent of the math faculty at Ben-Gurion University of the Negev, for example, is comprised of immigrants from the former Soviet Union.
NETWORK OF SUPPORT

A comprehensive framework of government and private support for new ideas and technologies, as well as the refinement and further development of more traditional industries, continues to bolster Israel’s cutting edge position in the world’s “innovation space.”

The Office of the Chief Scientist of the Ministry of Industry, Trade & Labor provides R&D funding of up to 50% of the costs for projects approved under its guidelines. This “bottom up” approach to funding innovative projects supporting researchers at the nascent stage of their development is unique in the world of early-stage R&D funding.

VENTURE CAPITAL

Additionally, the government understands that R&D cannot be commercialized without an active venture capital community as well, dedicated to providing funding for the innovative technologies coming out of the R&D sector. In 1993 the Government of Israel, in its desire to jump-start the creation of a venture capital industry, seeded a fund, Yozma, through which the State of Israel initiated four “drop down” venture capital funds with the intention of withdrawing from this activity once the funds became self-sufficient. Today, there are approximately 70 active venture capital funds in Israel, of which 14 are international VCs with offices in Israel. In 2010, the sciences sector led the market with $350m or 28% of total capital raised, followed by the communications sector with $238m or 19% and the Internet sector with $222m or 18% of total capital raised.

The late American venture capitalist David Anthony, founder and managing partner of 21Ventures, identified Israel as “the single best place in the world to invest in technology ventures” and a place of “tremendous opportunity in multiple fields.”

The government’s MAGNET program is designed to provide a competitive position for Israeli industry related to state-of-the-art technologies of worldwide interest. These new technologies are developed as a cooperative venture between industry and leading academic scientific research institutions with the intent that such cooperation will provide the basis for new high-tech products and processes. For approved joint projects the program provides up to 66% of the R&D costs of the project for the industrial partner, and up to 80% of the costs for the academic partner, further encouraging the emergence of state-of-the-art technologies.
Given the need of early-stage researchers for seed money, the Government of Israel has also committed itself to supporting such activities through its TNUFA program. The aim of the program is to bridge the gap between Israeli inventors and the business world by providing up to $50,000 of seed funding to qualified individuals. Such funding can be used for components, materials, employment of sub-contractors and consultants as well as tools, equipment and, for small manufacturers, salaries as well. The TNUFA management also provides assistance in locating investors and strategic partners along with scheduling seminars, workshops and personal consultations. The result is that approximately 120 qualified projects are identified each year, on average 20% of them reach the next stage of financing and $20m of added-value inures to the benefit of the Israeli economy on an annual basis.

Venture capitalist Frank Meehan of Horizon Ventures recently remarked that he has always been “amazed at the scope of Israeli companies. They think global; they think big; they work hard and drive fast - all very attractive to investors.”

**TECHNOLOGICAL INCUBATORS**

Another similar concept has today become the primary source of innovative technology start-ups in Israel. Originally funded by the government and now privatized, 24 technological incubators operate country-wide. They offer funding of up to 85% of early-stage project costs for two years. More than 80 new companies are started each year in these incubators and since the inception of the program, over 1,400 companies have been initiated, representing a total government investment of over $500 million. This was matched, as well, by private investment in excess of $3 billion. The program has also positioned itself as an important source of deal flow for the venture capital industry with a significant impact on the high tech and life science sectors in the country.

**TAXES & INCENTIVES**

Tax law reforms have reduced corporate tax rates to as low as 10% (dropping to 6% in 2015), while investment grants of up to 20% of a project’s value are available to foreign investors investing funds in approved projects. In addition, significant grants to offset the cost of salaries are available for new projects located in designated areas of the country.

In an effort to encourage companies to employ people outside the main population centers, there is increased support for R&D centers located in the north quadrant of the country (i.e. the Galilee region) as well as the less populated southern desert area (the Negev) which makes up 50% of the country’s land. In addition, there is increased support for activities in specialty areas of interest such as life sciences, clean-tech, nanotechnology and ICT.

Finally, the government has signed numerous bi-national R&D agreements worldwide which have made funds available to encourage cooperation between...
Israeli and overseas firms. These funds are unique in that, for the most part, the monies allocated do not show as liabilities on the accounts of the cooperating companies. Rather, should the cooperation result in the development of a commercially successful product, the companies pay back the funding on the basis of royalties on sales. In those cases where the R&D does not yield a commercial product, the support funding simply carries no further repayment obligation. The most successful of these is the US-Israel Bi-national R&D Fund which, through 2011, has allocated $295 million in grants to such projects. Sixteen other countries plus the EU (via its Framework program) also operate such funds.

Of course, at the end of the day, being flexible and willing to stay “on message” is also key to the success of Israeli entrepreneurs. Jonathan Medved, founder of the venture capital fund Israel Seed Partners and an entrepreneur as well, is a case in point. Israel Seed Partners sold start-up Shopping.com to eBay for a stunning $640 million in 2005. But while the final product was a rousing success, the original was anything but. “Two guys walked into our office in 1998 with a bad idea. We hated it,” he says. “But we said, “Right you guys, throw that one out the window and give this one a go”. And these guys didn’t sit and calculate. They said if you are going to give us the money, we are up for it. Again we went through several iterations until we eventually got it right.”

A CLOSER LOOK AT ISRAELI INDUSTRY

What has resulted from the convergence of these varying factors in Israeli society? What has the world gained from Israel’s openness and creativity? Examples from three sectors will serve to illustrate Israel’s achievement as a center of innovation.

HIGH TECH AND COMMUNICATION TECHNOLOGIES

Much of the technology that the world depends on daily has its source in innovations developed in Israel. These include *USB-Flash Drives* developed by M-Systems (later acquired by SanDisk) used for portable storage worldwide. *The world’s first internet security systems* were developed and are continuously updated by Israel’s CheckPoint Technologies. Computer chips developed by Intel Israel were revolutionary in introducing energy consumption and cost efficiency to personal computers and laptops. And the world’s first commercially successful digital offset color printing press was launched by Israel’s HP Indigo.

In addition, Orbotech’s unique inspection and imaging solutions technology for the printed circuit board and flat panel display industries are used globally in most electronic devices; voice, fax and call processing functions were integrated into a single system by Israel’s Comverse. The original H.323 Protocol, enabling voice, picture and data to be transmitted via the internet was developed by Radvision. Technology enabling multiple phone calls on the same line was developed by ECI Telecom; and NICE Systems was the first to introduce VoIP recording technology. All of these companies continue to improve and initiate innovations on a regular basis.

LIFE SCIENCES & BIOTECH

In the medical space, multiple sclerosis patients worldwide are getting long-term relief using Rebif and Copaxone, both developed in Israel at the Weizmann Institute of Science and marketed worldwide by TEVA. Alzheimer’s patients are
able to delay worsening symptoms by 6-12 months using Exelon developed at the Hebrew University. Medinol is a pioneer and expert in the field of cardiac stenting, the inventor of the flexible closed stent design, and a world leader in innovative stent designs and manufacturing technologies for heart catheterization. The ingestible pill camera developed by Given Imaging assists doctors in the diagnosis of cancer and other digestive disorders and in many cases preempts the need for colonoscopies; and Elscint was the first to introduce multi-slice CT scanners for the medical sector and later developed advanced MRI technology in use today worldwide.

AGRITECH

Israel, which at one time had an agriculture-based economy, used that experience to become a leader in agricultural technology. For example, Israel leads the world in recycling 70% of its wastewater for agricultural use, three times the figure for the second-place recycler, Spain, with the potential for the rest of the world to do the same. Desalination plants worldwide use Israel’s seawater reverse osmosis (SWRO) technology. Israel supplies the drip irrigation technology it invented to more than 50% of the world market. Now replicated worldwide, Israeli cows have the highest milk yields with over 12,000 kg of milk annually per cow. Some 40% of European tomato greenhouses use long-shelf-life hybrid seeds produced and developed in Israel. Emefcy produces low cost electricity ($0.10/kWhr) and hydrogen in a bio-electro-chemical process from wastewater using microbial fuel cell technology; and an Israeli inventor has developed operating systems to create water from the humidity in the air with equipment that can operate in the most remote corners of the world.

Anil Jain, managing director of India’s Jain Irrigation, which recently purchased Israel’s NaanDan Irrigation remarked: “Israel has been a birthplace for water irrigation technologies. Not only a birthplace – it has been ahead of the curve.”

MULTINATIONAL COMPANIES FIND A HOME IN ISRAEL

The vibrant and innovative business climate in Israel has encouraged multinational companies to open local R&D facilities in order to take advantage of the resident high-tech capacity for creativity. For example:

- **Microsoft** built its first overseas R&D facility in Israel in 1989. It has since added a new communications R&D center as well.
- **Cisco Systems** established its first R&D facility outside the US in Israel, and it is now its second largest such center outside the US, employing more than 700 engineers.
- **Motorola** opened its first Israeli facility in 1964 it is now the company’s largest development center in the world employing more than 3,000 people.
- **IBM** began operating in Israel in 1950 and in 1972 established its first R&D center outside the US in Israel.
- **Intel**, the largest foreign employer in the country with close to 7,000 personnel, set up its first overseas design and development center in Haifa in 1974. It now has four Israeli R&D centers and two manufacturing facilities. The Centrino, Core2 Duo and most of its mobile WiMAX chipsets were designed in Israel.
- **Google** established its first Israeli operation in 2007 and now has two R&D centers in Israel as well as a newly dedicated incubator for Israeli startups.
- **Apple** is one of the most recent firms to open facilities in Israel with the 2012 inauguration of their first development center outside the US, at Haifa’s Scientific Industries Center.

- While Israel’s innovation ecosystem continues to produce for the benefit of the world, it is also elemental to the growth of the local economy and to the world’s technological expansion. As Bill Gates, Microsoft’s founder, said recently:

  “...innovation going on in Israel is critical to the future of the technology business.”
SUMMARY

Israel is internationally recognized as being at the forefront of high-tech innovation, backed by a highly educated and creative workforce, aided by a sound infrastructure and robust government support. Its innovative spirit and culture has encouraged some of the world’s largest multinational corporations to use local talent to develop their key breakthroughs. The continuing influx of new companies both reflects and reinforces the vibrancy of Israel’s industrial research and development.

Gary Neill, the head of Johnson & Johnson’s Innovation Research Unit, noted during a recent trip to Israel: “There’s an Israeli working on every insoluble problem.”

Paul Smith, Senior Vice President of Philips Medical, recounted: “In two days in Israel, I saw more opportunities than in a year in the rest of the world.”

Israel is a place where ideas matter, where the creative process is nurtured, where many have come to realize that tomorrow’s big ideas can come from the unlikeliest of sources. Though small in size and lacking in natural resources, Israel has cultivated a wellspring of ideas that has enabled it to be one of the world’s largest sources of innovative technologies and startup companies.