

SCITEX: THE SEVENTIES

A Promising Option

“Scitex is more than a pioneer in developing innovative products,” Efi Arazi wrote in the employee handbook. “Company founders initiated a new tradition of labor relations. Management is committed to personal employment contracts with each employee. Evaluations and promotions are based on personal contribution and career track development enabling every person to reach maximum potential and aspirations....We believe in direct and personal relations, with each employee having direct access to superiors at all levels.”

Although today such a handbook seems quite standard, something that every employee in every high tech company receives as part of the orientation process, in the early 1970’s it was seen as a radically different approach from the then Histadrut¹⁷ dominated work culture. All the founders of Scientific Technology had previously worked in the United States. They were exposed to innovative management methods and a progressive approach to the world of business and labor relations such as were then unknown in Israel. From the very outset the company was characterized by an American management

¹⁷ General Federation of Labor in Israel

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style, and stood out on the Israeli business scene. Arazi believed in democratic and fair work relations between employer and employees, and did not need the Histadrut labor unions, which he considered to be outdated and corrupt. Arazi sought to base overall company management on modern principles, adapting them to the local reality. “Efi wanted to import work procedures and methods from the United States, which then, as today, was the pacesetter,” explained Arie Levin, a founder of Scientific Technology. He described the methods Arazi used to entice employees to leave secure work places and join the young company: “This certainly was of pioneering character. I recall how when I returned to Israel I dragged files full of forms and procedures used by companies for which I had worked in order to set up a new infrastructure. At a certain stage we even tried to encourage the practice of coming to work in a jacket and tie, but I must admit that this didn’t last long.” In addition to procedures and neckties, Scitex introduced work practices which not only succeeded in Scitex, but are still followed today in the high tech industry: a five-day work week, flexible hours, an employee relations department, frequent trips abroad, and a dining room which was essentially a restaurant serving high quality and varied dishes. Arazi’s most dramatic innovation was allocating stock options to employees, thereby in fact sharing company ownership. In the first programs drafted during 1967 and 1968, ownership of Scientific Technology was divided between investors and the Efraim Arazi group (the founders). When asked whether the concept of distributing stock options as a way of motivating employees was an economically viable management method, Uzi Ish-Hurwitz, Scitex deputy CEO for production and operations from the mid-’70s, replied: “A good employee who contributed to the company might receive a raise, a bonus or even a promotion, but, if the company viewed an employee as an important part of its future, not

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necessarily based on performance, and wanted to hold on to that person for the long run, they were allocated shares, which made them real partners, partners in ownership.” Arazi had well internalized one of the instructive lessons he learned when many of those who had founded Scientific Technology left the company because they felt they had been overlooked in the options distribution. Later he fought uncompromisingly with the board of directors for a more equitable employee solution. Ultimately he viewed the employees as the most important resource in the company’s future and success.

Within a short time, some twenty skilled engineers and technicians joined the seven original founders who gladly accepted the informal relations in the company. Even when Scitex grew and expanded its activities and the number of its employees, the same practices remained, mostly due to Arazi’s aversion to a formal management style. His need for direct contact with his employees was evident in Gerald Dogon’s job interview for the position of VP for finance. Dogon reconstructed the meeting: “Arazi told me, ‘If I work with you, I have to know that I can rely on you and you can rely on me. We have to be able to look each other in the eye and feel comfortable.’ Loyalty was extremely important to him. He dealt more with getting this message across than going into the professional aspects. ‘If you have something to say to me, just come and say it to me directly, and not behind my back,’ he said.”

Following this, Dogon was interviewed by Scitex Chairman of the Board, Dan Tolkowsky, who did examine in depth the candidate’s professional qualifications. When he was satisfied, the conversation took an unexpected turn: “Dan suddenly asked me a sort of surprising question: ‘Can you withstand temptations?’, and then he looked me in the eye and continued: ‘As VP finance we expect you to know how to set limits, to know what is and is not permitted. I know

what I'm asking you to do is not easy.' I was very confused. I really didn't understand what he was talking about. 'Do you know how to fly a kite?' he asked me. Why did I need to know how to fly a kite, I wondered. 'Look,' he said. 'Flying a kite is not simple. You have to know how to hold it lightly so that it can soar, but if you don't hold onto it firmly enough it will take to the sky and you'll lose it. If you pull on the string too hard, the kite will fall. If you relax the string all at once – it will settle gently to the ground. The trick is to find the golden mean. Efi Arazi is a man with a great deal of charisma. Efi Arazi loves the good life. Efi Arazi loves to tell stories and can convince anyone with any story. Efi Arazi is going to be your kite.' Ultimately, I believe that I succeeded in my job, and it really wasn't easy."

Do you like to fly kites?, I asked Arazi.

"I like to do many things," he answered with a smile.

Just the same, I insisted, does it have any other significance for you?

"I'm a pragmatic person," he said, and rebuffed my attempt to look for veiled meanings behind his self-perceptions. And then, with sort of an apologetic shrug he admitted, "I like kites because they are so beautiful when they are aloft, and I like the feel of controlling their flight against the wind. Not for any hidden reasons." So he humorously signaled me (not for the first time) that he would resist my strong need (and the readers' as well) to peer into his inner world. In an interview Arazi gave in March 1999 at his home in San Francisco to Avner Brenheimer of Yediot Aharonot, he waxed poetic on the subject: "Did you ever want to dance like Isadora Duncan but were too embarrassed to? I do that with a kite. When I fly kites I feel like I'm dancing."

Perhaps Tolkowsky thought that Arazi was a kite, but Arazi himself proved that he had both feet firmly planted on the ground when he defined the company's path and business concept. He himself

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recruited most of the Scitex employees and managed them marvelously, imbuing them with his own enthusiasm and instilling absolute company loyalty. In the course of working on the book I met quite a number of Arazi's employers and colleagues, and to this day they see him as a partner, even though from their point of view he had very little social contact with them. "When I managed Scitex," Arazi related, "I would go into the building through the rear door. I enjoyed passing through the production hall and the labs, and speaking with people on the floor, to be involved in all the details, to encourage people to talk about problems that arose or mistakes that they made – subjects that they hesitated to bring up in staff meetings. Listening to employees was for me the very core of the matter." Arazi again spoke of the relaxed conversations he would have when by chance he would meet an employee in the men's room. He knew that in a way his management style threatened mid-level managers, but he was convinced that his involvement in every detail at every level of the company was a powerful and essential dynamic for its operations.

This is how Arazi himself defined his credo in answer to his detractors who both privately and publicly questioned his management style: "From the beginning I made it clear that I expected direct accessibility to every level, everywhere, and not necessarily through the chain of command...I used this information to develop and improve my evaluations, in addition to the information that routinely flowed upward through the usual pipelines. I made a verbal agreement with my managers that I would never take advantage of this information or informal relations in order to bypass the chain of command. I also took care not to embarrass those under me by looking for screw-ups or by forming conspiracies with 'spies' – not every tale from someone on the floor or a junior in the system is

necessarily correct...and I also tried to bring about a situation where the management level would be the one to dig up what was or wasn't going on in their own back yard.”¹⁸

Arazi's undisputed control of Scitex – the upside and the downside – stemmed not just from “founder's rights”, but largely from his charismatic personality. He passed on his management concepts to the managers and junior managers who worked with him. According to Arazi, the authority and function of managers should be expressed not only in the salary level or in their place in the organization chart: “Rank makes you a rank holder, it does not give you any command responsibility. In addition to this we have a command and control structure, which is also informal, whereby people are subordinated to other people, independent of rank. It also depends on particular functions. You have a two-star general reporting to a major in some things. We do not engage in block diagrams showing who reports to whom, because, as you see, it depends on the task to be performed at any time.”¹⁹

Anyone who couldn't live with Arazi's worldview could not have lasted long at Scitex. Some of the “desert generation” who returned with him to Israel from the United States, or had joined him in the initial formative stages, considered him to be the first among equals. It is perhaps because of this, both the good and the bad, that they found it difficult to accept his leadership, and eventually left the company. “Today it is clear to me that it was simply impossible for the company to have more than one manager,” said Arie Levin reflecting on the separation. “Over the years I understood that it was a natural process, but at the time I felt very hurt. After so many years of heading the very difficult Response-80 system, Scitex's most important project, I was pushed out.”

¹⁸ Efi Arazi, “From Early Ittek Days to Leaving Scitex”, 2002

¹⁹ Case Study: Scitex, Pg.9

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It turned out that this airplane had room for only one chief pilot, and the pilot didn't like direct confrontations, not then and not now, especially confrontations involving separation. The criticisms leveled by his former colleagues that he avoided blunt and unpleasant conversations were raised again twenty years later during the Scitex crisis in the '80s.

In the mid-'70s, after almost a total break with the founding generation, a new group of managers combined to lead Scitex in its first decade: Efi Arazi, the CEO and leading strategist, Arthur Low, deputy CEO and business manager, Uzi Ish-Hurwitz, production, manpower and special projects manager, and Gerald Dogon, VP for finance.

The Size of the Dot

Efi sat across from me with the archive boxes that had arrived from the U.S., picking out brochures and impressive publications that represent in graphic language, which even now appear up-to-date and innovative, the wealth of Scitex products over the years. What on earth, I demanded to know, is the connection between a knitting machine and coloring processes, or between the textile industry and the printing industry? Where is the legendary Scitex core technology among this apparently eclectic multitude of products? "It's very simple." Arazi solved the entire mystery in a single sentence. "All this is a matter of the size of the dot, whether it's a few large dots forming the knitting pattern or millions of tiny dots forming the graphics on the screen for offset printing, the principle is the same, but the sophistication increases, and

with it the degree of precision and detail.” Just like other great technological inventions, the initial knitting development by Scitex became one of the foundations of all computerized graphics, integrating talent, timing and originality.

The 21st century computer children would probably find it difficult to imagine those “distant days” when there were no high definition LCD monitors, color printers that compete with reality itself, or graphic files that are easy to use and reproduce on home printers. In the early 90’s, Efi Arazi, with the new company that he founded, EFI (Electronics For Imaging), led a move that actually made it possible for the first time in the history of printing to produce quality color pictures without requiring a print shop equipped with an expensive and complex printing production line. But in the 1970’s only a few understood the nature of pixels (pixel: pix [picture] + element), the tiny dots composing the picture on the TV screen or computer monitor. The raster model that represents the mathematical picture of reality as a matrix of cells or dots was familiar mostly to mathematicians and optical engineers. Only the very few were capable of conceiving the possibility of improving the raster technique into a breakthrough technology for creating computerized graphics.

Over the years, the raster concept was applied to every picture composed of a network of dots defined as an array of bits (bitmap), where each dot in the picture is assigned a numerical value containing information on the pixel’s color. The great advantage of the raster technique in graphics, as it turned out a few decades later, is its very complexity which in fact enables the display of every graphic element down to the point (pixel) level.

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The first one to come up with the idea of adapting the raster model for broadcasting pictures was Philo T. Farnsworth, a forgotten inventor from Utah. The radio broadcasts on the one hand and the invention of the moving pictures of the cinema on the other caught the imagination of every scientist of the early twentieth century. It was only natural for someone to take that one extra step and try to develop electronic broadcasting of pictures, similar to radio broadcasts. This development was destined to be one of the turning points in human history. In 1927, none other than this young inventor from Utah thought of broadcasting pictures through electronic means, by scanning rows of points (the future pixels), by a beam from an electronic tube (Cathode Ray Tube, CRT) and magnetic deflection of the beam. The first television picture in history. Thirty-five years later, Efi Arazi, alongside Prof. Wiffel, and later at the Itek Corporation, used a tube of the same type, thus its inherent potential and the raster model were not unfamiliar to him.

The road from the world of textiles to the world of printing is described by Ilan Fono, one of the engineers who joined the founding team of Scientific Technology Ltd. in 1969, and who became one of the senior project managers at Scitex: “Anyone who knits by hand or machine knows that a knitting pattern is composed of stitches. Each knitted stitch is characterized throughout the design pattern by color and its location on the grid. The Jacquard designers worked on checkered draft paper, with each square representing one knitted stitch. Since the raster method is also based on a grid of points, it was natural to continue in this direction. We didn’t think of “color surfaces” or “lines”, we thought of “stitches”. From this thinking we developed the computerized work station CDC (Color Display Console), first for knitting, then for printing on fabrics, printing of maps, and finally for the printing and publishing industry.”

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In retrospect, there is no doubt that this technological concept brought forth the beginning of a great technological revolution - a digital printing revolution initiated and led by Efi Arazi, a revolution which firmly positioned him in a place of honor in the pantheon of high-tech entrepreneurs of the final years of the last century.

By 1976, Scitex had established its dominance in the electronic double knit systems market. Two years later it already controlled some 80% of the revenues of the textile printing systems sector. Nearly one hundred complete systems, with a price tag ranging between a hundred thousand and half a million dollars were sold in that decade, in addition to hundreds of accessory products for the same markets: controllers, small systems, electronic laser recorders, etc. Although Scitex controlled the very top, leaving its competitors far behind, the attractiveness of the Jacquard knits began to wane and they became passé in the fashion world. While the size of the market for other applications like textile printing and printing of maps that Scitex had begun to penetrate was broader, that market too began to show signs of saturation and the company was forced to urgently prepare to introduce new technological applications.

Expanding

The Scientific Technology founders considered technological research and development to be the jewel in the crown of their professional activity. The fact that they were forced to manufacture instruments and systems for economic survival was viewed by them as a necessary evil, just boilerplate rather than content. Arazi, when interviewed for the case study, related how in the early 1970's the board of

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directors tried to force the company to contract for the manufacture of technological products developed by the military industry in order to generate a positive cash flow. Arazi maintained that if they had to manufacture, they should manufacture only original products developed by the company, and even those in limited production runs. Although by 1973 Scitex had a full-fledged production line, it grew as an integral part of in-house R&D developments, and Scitex became an industry in every sense of the word. This is how “high-tech industry”, a baffling and peculiar fusion in those years, became a buzzword in Israel.

With its expanding business activity and industrial production line, the young company was compelled to leave its comfortable home at the Weizmann Institute. The Wolfson Building was just too small for the cumbersome computer system and sizeable knitting machines.

The building site chosen for the new Scitex building was west Herzliya, even before it became the bastion of advanced industry known as “Herzliya Pituach”. The high-tech park that proliferated began with the move by Scitex, followed by other pioneering high-tech companies, and today it is almost synonymous with the high-tech industry. Here too the credit belongs to Scitex and Efi Arazi.

Arazi enthusiastically devoted himself to preparing the site along the lines of the modern technology enterprises he had visited in the U.S. In 1972 Scitex was still seeking its way to the top, but while company employees struggled for its survival, Arazi invested most of his energy and talents in planning and designing the building down to the minutest details.

In a letter written early that year, one of many sent to the Gav-Yam Company which managed and built the Herzliya Pituach site, Arazi focused on “plaster color samples...in dark grey with a touch of

blue,” demanded proper fit for “metal doors at the western and eastern ends,” and insisted that the same finish be used “on the gratings,” and added “if in your opinion it is important to paint the carpentry work in the building, we request that it all be painted a light grey.” Arazi believed that the exterior appearance reflected and affected the interior.

The fact that even in difficult and economically hard pressed times Arazi insisted on a highly polished image, noted Aharon Dovrat, then CEO of Clal, later appointed chairman of Scitex during the difficult crisis in the mid-’80s: “As part of my duties at Clal I visited plants throughout the world and saw quite a few innovations, but for the high-tech industry and Scitex, of which endless legends have been woven, I had only awe and reverence. On my very first visit to the company my host Efi Arazi took me straight to the dining room. The revered Arazi, who founded a fabled company which was then possibly on the brink of collapse, chose to show me the employees’ dining room, as if this was the most important thing in Scitex, directing my attention to the tables he had meticulously designed with “Lazy Susan” centers so that diners could easily (and quickly, Arazi explained) take their selections. I remember this as if it happened yesterday. It made a tremendous impression on me. At that moment I wasn’t certain whether the man was a genius capable of rising above it all even in times of distress, or whether he was just detached from reality.”

Dovrat was not the only one who mentioned the tremendous importance that Arazi ascribed to external packaging, to the image of the company that he managed, whether it was the work environment, product design or the company’s annual publications. Nor was he the only one who wondered about Arazi’s ability to immerse himself totally in a sea of seemingly marginal details, while

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letting others deal with the routine management he viewed as tedious. Shlomo Lahat, Dan Tolkowsky's deputy chairman of the board of Scitex over a long period, cautioned the board members, including Arazi, against engaging too much in "cosmetics", in side issues rather than in the important ones. Missing the forest for the trees as it were. But Arazi saw it differently then as today: "My focus on colors, shapes, acoustics, what Lahat and others viewed as an obsession, was essential to employee performance and the impression made on customers and potential investors. They have a striking effect on the activities of the entire company. Everyone today is aware that the benefits from the business standpoint are indisputable."

Arazi's versatile thinking, his creative talents and his powerful attraction to esthetics and design - his basic existential perception that everything is possible and everything is permissible – all these produced a working environment of a kind that was then unique in Israel. Only a few could grasp it. To this very day, almost twenty years later, no one misses the chance to mention with awe the employee dining room with its "Lazy Susan" tables, serving carts and varied menus, parquet floor and acoustic ceiling. They recall the clear signs in the hallways and the open areas and management offices with transparent walls enabling continuous eye contact between managers and employees.

Following the move to the new building, production line efficiency improved. Many items were purchased from other companies and embedded in Scitex systems (Scitex was one of the largest purchasers of HP computers outside the US in the late '70s). Since the practice of subcontracting sophisticated components was as yet undeveloped in Israel, Scitex was forced, explains Uzi Ish-Hurwitz, to cope with an unforeseen situation: "We simply had no choice

but to do the manufacturing ourselves. Quality wasn't quality, reliability of spare parts was quite poor and ultimately, because of these constraints, we built a plant for mechanical components as well as one for electronic components. In fact, Scitex developed its manufacturing capability because no other alternative was possible."

During the 1970's, Scitex expanded not only its business operations and physical plant, but also, and most importantly, increased the number of its employees, which Arazi considered to be a primary factor. The company's early days at the Weizmann Institute afforded Arazi and his partners productive interactions with the outstanding research staff. In fact, locating Scientific Technology Ltd. at the Institute was initiated by Prof. Amos De Shalit, President of the Weizmann Institute in the '60s and '70s, to encourage industrial development alongside research activities, and to create what are known today as "technology incubators". Some of the most important figures in the history of Scitex were recruited in the hallways of the Weizmann Institute. "I first met Amir Pnueli (recipient of the Israel Prize in Computer Science in 2003 and the Turing Award²⁰ in 1996) when he was a young mathematics researcher at the Weizmann Institute and whom I had met when he was still an instructor at the Technion, and I was a young student," related Ilan Fono about the first meeting between Arazi and a group of scientists who founded the software development group of Scitex. "Later I met him again when I myself worked at the Weizmann Institute. The Lachover brothers, Hagai and Ido, were working with him on a prestigious computer project. When Efi assigned me as an engineer on the knitting project (a conversation that took place in the men's room, by the way), he offhandedly asked if I also had some understanding of software development. I told him that software was not my field, but that there were excellent

²⁰ The Turing Award "Nobel Prize of Computing" is awarded annually by the Association for Computing Machinery to one person in recognition of his/her technological contribution to the computing community.

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people in the building across the way.” Even at the very first meeting between Arazi and the Institute’s top mathematicians it was clear that the chemistry between them would be problematic, as Fono continued to relate: “Who is this wild man, an astonished Pnueli cried out when he saw Arazi sitting in the office with his long legs stretched out on the table in front of him.” Yet despite the most basic personality differences, they all decided to try to work together. Pnueli and the Lachover brothers founded an independent company called Mini Systems Ltd., and worked as Scitex subcontractors for many years. Although there was no great harmony there, Arazi appreciated the tremendous contribution made by Mini Systems to Scitex. The subcontractor continued to grow and expand as did Scitex. Indeed it was thanks only to these special Mini Systems software developments that Scitex succeeded in implementing the man-computer-machine interface that launched its breakthrough into the world market. Some of the engineers who participated in the Weizmann Institute computer project chose to cross the barrier between pure research and practical applications and joined Scitex as engineers, like Gideon Rosenfeld, who later became VP for R&D.

By the late 1970’s the company employed nearly 300 people in Israel and its subsidiaries in the U.S., Europe and Japan. At that time it became abundantly clear that the era of the small, intimate company had ended and that a new era had started, during the course of which it would be necessary to forgo some of its informal management concepts. Managing thirty employees at the Weizmann Institute was not at all similar to managing several hundred employees around the globe. These rapid changes led the company and Arazi to adopt alternate procedures. Prof. Richard Rosenbloom of Harvard University, who authored the second case study on Scitex in 1980, recorded Arazi’s words:

“We need more formal procedures but we also need to keep up the good management because, as I have learned, all the policies and procedures in the world won’t substitute for good management. We have to manage our people so that each employee will have the same affinity to the company now, the same quality of leadership and clarity of purpose, as when we were 30 employees and I was managing the whole show and knew each of them.” ²¹

Across the Ocean

“What really distinguished Scitex in the 1970’s,” explained Zvi Zur (Chera), the then CEO of Clal Industries and a member of the Scitex board about the secret of the company’s magic, “was that it was a super-technology company with a very advanced marketing organization. Today every company likes to define itself as global, but Scitex was global from its very first day with branches in New York and Boston, Belgium and Japan, and with professional teams, systems, display rooms and service people in each one. In this too Scitex was a real pioneer and operated ‘far and wide’ in the fullest meaning.” Efi Arazi indeed thought far and wide: he enthusiastically planned new developments even before completing development of previous products. In effect, he viewed the world map as a blueprint for targets to be conquered. As the head of a company whose products were intended for export, Arazi saw potential markets all over the globe, even though most of the company’s employees and managers lived and worked in Israel.

Arthur Low, Arazi’s colleague, guided and navigated this vision from concept to reality. After Scientific Technology failed in marketing its

²¹ Richard S. Rosenbloom, Case Study: Scitex B, Harvard University Business School: 1980, p. 14. (On the cover: “This case was prepared by Professor Richard S. Rosenbloom as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation).

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first products – Chroma-Scan and Response-80 for the Jacquard knitting industry, through local agents and distributors in the U.S., it became clear to Low that there was no choice but to take full responsibility not only for sparking technological innovation, but also for distributing those innovations throughout the world. To this end, Scitex North America (STA) was founded in 1972. On countless occasions Arazi told the story of the split between Scitex and Joe Hamilton, its partner in developing the Response-80 system who was to have marketed the system throughout North America, a parting that led to the founding of STA. Hamilton, for reasons of his own, held back on the marketing, and Arazi – guided by Low – carried out a bold end run around the exclusive agreement through an independent North American market survey. Arthur Low took advantage of the crisis in order to complete the separation, paying compensation of a healthy sum of money, a considerable percentage of the receipts, initial investment and a respectable share package. This partnership with Hamilton taught Arazi and Low how essential it was for the company to develop close and well-nurtured customer relations. Such relations were indeed formed between the company's own marketing organization and its customers.

Establishing an American subsidiary was an innovative idea, but because of Scitex's difficult financial state, an unenthusiastic board of directors was against "betting its last dollar". But, not for the last time, Low and Arazi exhibited their powers of persuasion in convincing the directors to adopt decisions, even if they contradicted their professional judgment. The gamble paid off and in the years 1973-1979 the financial activity of Scitex climbed from \$3.5m to more than \$14m. Although Scitex experienced ups and downs throughout the wobbly 1970's and continued to be plagued with financial instability, the relationships that Arazi and Low had

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formed with their customers and their intimate familiarity with the market enabled them to quickly succeed in penetrating and conquering new markets before their competitors were even aware of what they were doing – competitors who were for the most part stronger and richer than the young and cheeky Israeli company: “We’re sitting on a gold mine. Because of our youth, size and marketing clout we’ve had to make use of our singular strength by going after specialized market niches. But...the niches are getting bigger, though they still have a finite size, and we are the dominant force in each.”²²

The natural arena for Arazi and Low’s activities was in North America, but at the same time they made contacts with other markets in Europe and the Far East. The ITMA-71 exhibition in Paris created huge interest among textile manufacturers, especially among the Japanese. Recalled Arie Levin who nurtured the Response project from its beginnings: “From our standpoint, this was one of the greatest successes of the exhibition, and we were invited to come to Japan and examine the possibility of designing a system that would work with theirs.” Within just two years, Japan’s share of all Scitex sales grew to ten percent. Entering the Japanese market was one of the most daring moves ever made by Scitex, Efi Arazi himself, and eventually the EFI Company that he later founded in Silicon Valley.

Supervised by Low, STE (Scitex-Europe) was established by Arie Rosenfeld, who became the CEO of Scitex and who was one of the first Israeli engineers enlisted by Scientific Technology when it was established at the Weizmann Institute. “I returned to Scitex after a year’s study in France, shortly before the Yom Kippur War broke out,” said Rosenfeld in describing the birth pangs of the European branch of Scitex. “I did military reserve duty for half a year, and when I returned Arthur said, come on, let’s check out what’s happening

²² Efi Arazi in Case Study: Scitex B, p.16

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in Europe. He didn't send me there officially. Although Scitex, just like the entire Israeli economy in that period simply didn't have enough money to do that, he said: 'Go, try to see if there's a market to sell to and then come back.'" Although Scitex already had European customers, the Jacquard fashion had begun to wane and the textile printing systems had not as yet been launched. Rosenfeld, highly motivated and supported by Low, made contact with the Stork Company in Holland, one of the largest manufacturers in the world of textile printing machines. Herbert Cohen, a Dutch Zionist Jew, a generous donor to Tel-Aviv University, and Low's personal friend, decided as a gesture to an Israel traumatized by the war to purchase, at his own expense, the experimental Scitex Response 300 system for printing on fabrics and to install it in a Dutch plant where Rosenfeld could test its operation under actual conditions. Even more, the Israeli representative demonstrated the machine's operation to potential buyers who visited the plant.

Rosenfeld related: "It was a fantastic opportunity. Drove of customers came to Stork every day, and under their sponsorship we set up a sort of display center that integrated a technological laboratory that allowed them to examine through countless experiments whether the system worked, or if it could be improved, a sort of beta-site. Mainly though we used the center to show the system to the principal buyers in the market. Suddenly an electronic system appeared in a world of iron and steel, and there is little doubt that this made a powerful impression on their customers." At first Rosenfeld traveled a great deal on the Tel-Aviv-Paris route, but it became obvious that it was the European textile designers who preferred the rare opportunity given them by Scitex to continue the leap of imagination of spectacular collections throughout the entire year by using the Response-200 system, instead of depending

on the slow translation of design samples by the knitting machines. In early 1975 Arthur Low decided, this time with the support of the board of directors, to officially launch STE in Brussels. By the end of that decade, some sixty employees were working in a company that in fact controlled three subsidiaries: Scitex GmbH (Germany), Scitex-SA (France) and Scitex Europe Ltd. (UK). Despite the fact that the new company was flourishing, Arazi was still tied by umbilical cord to the American market, and left the European arena to his colleague Low. He nonetheless valued the work being carried out on the “old continent”, and when seeking a replacement for himself in the late ‘80s he turned to Rosenfeld, and even agreed to his request to manage Scitex-Israel from his place of residence in Belgium.

The close of Scitex’s first decade under Arazi and Low’s management proved to all those who doubted that the company had a future, notwithstanding their unusual personalities, notwithstanding their controversial business decisions, notwithstanding Arazi’s daring approach to new markets and new technological applications, and notwithstanding Low’s aggressive development and marketing policy. In a sort of self-fulfilling prophecy, Low summed up the first decade of Scitex and the one about to begin in these words: “The company is not the same animal as before. We need to plan far more carefully over even longer time horizons. That means we’ve got to redefine our business philosophy and relations within the company. We’ve entered a war and that leads to uncertainty at our stage of growth. Our immediate preoccupations may prevent us from seeing the deeper and more dangerous uncertainties in developing our business strategy.”²³

²³ Arthur Low in Case Study: Scitex B, p. 16.

FOUNTAINHEAD

How Great Inventions are Born

“How are great inventions born?” I asked Arazi.

What is the secret of that singular moment when filaments of ideas, scraps of information and thought processes coalesce into lucid and coherent insight? Starting with the Bible when Joseph was granted a glimpse of his destiny through a series of dreams, and on to Archimedes who jumped out of a steaming bathtub the moment he solved the secret of the link between density and volume, and finally to Isaac Newton who discovered gravity, one of the fundamental forces of nature, after being hit on the head by an apple, we are witness to the significance Western culture gives to that fleeting illumination, human intuition, ceaselessly trying to track down the quintessence of great creations, great ideas and the great insights of human endeavor.

When asked to describe his *modus operandi* – his creative process, Arazi referred again and again to the concept of intuition: “One thing follows another, and you only have to rely on a healthy intuition and then fit the pieces in the right places. You should know that I never

try to compete in areas I know nothing about just for the sake of competing. Familiarity with the things I deal with is the essential precondition for success.” Arazi claims that the solutions are out there somewhere and inventions are merely “waiting” for someone to discover them. “I look at the world around me and I see that there are voids. I know that something lies within them. I know that something must be there and it’s clear to me that if a need exists, then someone will push for a solution.”

“Push?!” I am baffled by the word. “It’s an important word,” Arazi insists stubbornly. “In fact, it could be said that I am often the one who pushes the first lit twig under a pile of straw to get the fire started. That twig carries the initial data, the direction. After the fire gets going, then solid logs can be laid on it.” Nonetheless, Efi Arazi doesn’t presume to define himself as an inventor. Just the opposite. He spots inventions of others, nurtures them to production, and then makes the relevant connections. He believes that brilliant ideas, even if not from his own workshop or other companies he is involved in, are no less important than his own.

“Efi always said: ‘I like to learn and I hate to be taught,’ commented Yoav Chelouche, Scitex CEO in the early ‘90s. “He knew how to ask the right questions. He always searched for the very best teacher for anything that interested him, and he certainly felt no shame in copying something if there was a better solution than his own. In the same spirit he led the Scitex team to make use of the developments of others rather than ignoring them. Within this context, he never envied successes of others.” Budding new projects or new directions of thinking and work would start churning in Arazi’s mind from talking with a customer, reading a newspaper article or after a brainstorming session with the R&D team. He acknowledged that in most cases he had no idea of how he arrived at one insight or

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another. A very graphic example of Arazi's way of thinking was provided by Ilan Fono: "I remember the precise moment when Efi raised this idea with me of how to convert our Response system from printing to geophysics and petroleum exploration." Arazi had returned that day from a working trip abroad. He was excited and brimming with ideas. Early in the morning he called Fono to his office, grabbed a large glass ashtray from his desk and declared: "Listen, I want to develop a system that could look at seismic data (data collected from controlled explosions in the ground aimed at discovering traces of oil and natural gas)." Arazi rotated the ashtray slowly in his hand and added, "but this system must be able to view it from this and this and this angle, in fact from every possible angle."

"He was exceptionally creative," added Micha Michaeli, one of the principal Scitex engineers in the '80s. "While most solutions didn't come from Efi, he was the one who raised most of the questions and put the items on the agenda. When he gradually formed a picture in his mind of the next generation of Scitex products, he would sit down and write out thirty or forty pages. Based on this, the group would define the new product. This is perhaps one of the most compelling reasons why people wanted to work for him and with him. He would guide them and at the same time give them real creative freedom and encouragement to come up with ideas of their own. This was definitely the most important part of my experience as a Scitex developer."

Arazi's tremendous interest in new opportunities for adopting developing technologies, and his admitted admiration for brilliant ideas of other developers, thrust Scitex constantly forward. Although this unrelenting expansion led Scitex to huge successes in the late '70s and early '80s, there are those who believe that it also led to its subsequent collapse. "I think that to a large extent Scitex turned

itself into a casino,” remarked Aharon Dovrat after he closely scrutinized Scitex during its ‘80s crisis. “Efi Arazi is clearly a genius. I, compared to him, am a person with both feet planted solidly on the ground. No one else could have accomplished what he accomplished in Scitex, but there is no doubt that in order to save the company from the crisis in which it found itself the company’s core area of activity had to be strengthened, and it had to stop hopping sporadically from market to market and from one field to another. I did not ignore the fact that they always walked a tightrope, taking enormous risks in new markets which produced exceptional profits. On the other hand, Scitex employees and resources were then scattered in all directions, and were in fact involved in four principal areas of activity. We were forced to shut down three of them as part of the recovery process.”

Whether or not Arazi accepted this analysis, his admirers and critics were united in the opinion that he was simply not able to focus on the one single activity of preserving and ensuring the survival of the product line. Dr. Micha Engel, Arazi’s friend and currently CEO of Discount Capital Markets, tried to decipher Arazi’s approach for me: “Everything constantly centered around defining our business: Who are we? What are we engaged in?”

There are countless examples in modern history of industries that shut down because of faulty or too pragmatic concepts regarding the substance of their business. One example relates to the crisis of the U.S. railroad companies which had defined themselves as being in the business of transporting passengers and cargo on railway lines. They excelled at everything they did. Without a doubt they had an immense impact on the growth of the United States from every standpoint, but then, as World War II came to an end in the 1940s, the airplane - a new form of transportation – came on the

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scene. The railroad companies did not include this new technology in the framework of their business definition, and didn't even bother to consider the new opportunities that had come their way. Let's assume that if they had included all means of transport whatsoever in their overall strategy, they would have had tremendous advantages, and could easily have become the largest airline companies in the world. After all, who established the first airline companies? Upstart entrepreneurs whose sole advantage was knowing how to fly a plane. It was in this way that the railroad companies lost their exclusivity in the transportation field. In contrast, Efi Arazi had tremendous breadth of vision - technological, esthetic, intellectual. When asked what Scitex was, or what Scitex included, he saw the big picture and did not restrict himself to saying just optical developments for the military industries, imaging for the textile industry, or even pre-press."

One way or another, the result was a multiplicity of experimental and sideline projects that had Arazi's full blessings. Some of these became important and integral parts of the company's production lines, while others eventually spun-off from Scitex and became independent businesses, or were sold to other companies. Others were ephemeral experiments of which nothing remains.

Cartography: Scitex on the Map

In 1977, when company engineers headed by Gideon Rosenfeld were laboring to adapt the technology of textile dyeing to the field of printing, Arazi decided to investigate another market segment that offered an opportunity for the Response system: cartography –

printing maps. The traditional Scitex markets in knitting and textile printing reached saturation with the Response 80 and Response 200 systems. The Response 300 pre-press system had not yet been presented, and no one could predict its future chances of success. Arazi began to seek out additional technology applications for small and undeveloped markets which Scitex could enter with relative ease. As was the situation in textile printing before Scitex penetrated the field, the process of preparing maps for printing was slow, cumbersome and primarily manual. The similarity between printing large fabric surfaces and coloring topographic surfaces excited Arazi's imagination. Scitex, however, was not the only company that identified the potential in computerizing cartography. Integraph, a U.S. technology company based in Atlanta, Georgia, which engaged in computerized graphics, was in advanced experimental stages of introducing its own computerized mapping system to the market. At that point though, Scitex was poised in a superior position since it had already achieved a practical advantage with its applications of raster technology, a technology that a decade later would conquer the computerized graphics market.

Implementation of the technological vision was entrusted in 1977 to the senior Scitex engineer Ilan Fono, who had just returned from two years of study in Canada. Fono related: "Efi assigned me to learning cartography and to start product development. In order to closely observe other players, competitors and customers, we traveled as exhibitors to a professional seminar on computerized cartography held in San Francisco (Carto Seminar). This was Efi's typical mode of operation: when examining a new field for development he would "feel out" the market, mainly by visiting exhibitions, professional seminars and conferences. That was how it was in the knitting, textile and printing fields, and that was how it

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was in cartography.” Among the participants were the leading developers in cartography and a few customers. The seminar was intended to serve as an arena for discourse and exchange of views among the professionals. It was there that Arazi and Fono went, just a few months after Fono returned to Israel, with a cohesive presentation of a product still in its infancy that was intended to position Scitex at the center of the cartography market.

Just as he had in the past and would continue to do in the future, Arazi, in his flowing and persuasive manner, presented a system which was ostensibly just completed and operating smoothly in the Scitex laboratories in Herzliya. Fono: “Efi conducted the presentation as only he knew how – brilliantly. Earlier he had meticulously prepared it and learned it down to the tiniest details. All that was left for me to do was to change the slides and leave the stage to him.”

For the next two years Fono headed a group of developers, and the system was presented in 1979 at the GEC exhibition in Milan, an international commercial exhibition of graphic arts for printing. The manufacturing cost of the system was huge – more than half a million dollars. To Scitex’s good fortune, the first Response 250 system was actually manufactured to order. Kartoplan, a German map publisher, decided to purchase the new system after the reputation of Scitex systems for textiles had been secured and their commercial potential well known. On the way to being installed at the customer’s premises, the new system made a pit stop at the Milan exhibition, thereby receiving international exposure under the strict supervision of the German customer. In the three years between 1979 and 1982 the list of customers for the Response 250 system continued to grow, and in 1982 more than fifty representatives and companies participated in a seminar for customers organized by Scitex-Europe in Brussels.

The product development team managed by Fono was faced with additional challenges when Scitex competed in the tender for a computerized mapping system for the United States Geological Survey (USGS). This was a golden opportunity for utilizing the talents of Dr. Pnueli and other software developers of Mini Systems to develop new software for encoding scanned maps which could be read by the computer, a process known today as digitization. This process, so common today in inputting complex visual information into a computer, was still in its infancy in the early '80s.

The achievement attained by Pnueli and the Mini Systems people was indeed an historic landmark on a world scale. "At present there are hundreds and thousands of documents awaiting digitization," stated an internal memo to "Real Time" a Scitex employees' magazine, in December, 1982. "...In view of the fact that this stage is performed manually, somewhat like driving a toy car along every street and alley on a city map...the Response 280 system has automated this process...notwithstanding the fact that there are other systems with automatic digitization capability, the raster process and the raster editing system applied in Response 280 is unique to Scitex. The new generation of the Response system for cartography, the Response 280, will be joining the Scitex product mix in 1982. The company has won prestigious tenders, such as those of the U.S. Defense Mapping Agency (DMA), the IDF Mapping Department and the Institute Géographique National (IGN) of France."

During the first years of the 1980s, Scitex completed its conquest of the government cartography market, leaving it with no visible opportunities to expand activities and enter additional markets. But with success came an appetite for more. Even though in 1982 it was abundantly clear to Arazi and his colleagues in Scitex management

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that the printing industry would be the company's principal area of operations and that the greatest profits were to be made there, Arazi stubbornly persisted in encouraging R&D in additional areas. Some projects were the result of computerized cartography applications, while others represented totally new lines.

By 1985 Scitex had developed the Response 800 system for the geophysics field (oil and gas exploration) based on the Response 300 system and the Insight system for manufacturing printed circuits, under Shmulik Len and Mark Buler. In these secondary markets Scitex wisely utilized another two exclusive developments of its creative engineers: an Electronic Laser Plotter (ELP) camera developed by Asa Bar-Lev for the Response 200 textile system, second to none in the world in its accuracy, size, resolution and speed, a plotter that enabled scanning complex patterns for printing textile fabrics into computers through laser photography, and an interactive computer graphics workstation, the Imager, developed by Ami Caspi for the Response 300 pre-press system, which was marketed in the early '80s.

A year and a half after launching Response 800 and Insight, the crisis at Scitex erupted. Arazi was forced to agree to the abandonment of the development initiatives he had fostered in the previous decade.

Notwithstanding the management crisis and the many doubts that arose regarding the economic feasibility of the product lines, the history of high-tech developments in the computerized printing and graphics fields proved that here too, Arazi impressively predicted future markets and trailblazing technologies. All these, even if not suited for Scitex, led other companies to considerable successes. Among those who had no regrets was a group of former Scitex-Israel and Scitex-Europe people who a few years later stubbornly persisted with the petroleum exploration market, estimated at millions of

dollars, and founded a new spin-off company, Paradigm Geophysical, currently managed by Eldad Weiss, a young engineer in the then Scitex development teams.

Based on the astute market analysis and business assumptions made by Efi Arazi years earlier, the printed circuit enterprise which was purchased jointly by a group of ex-Scitex people and the Japanese Toyo Ink Company became a promising firm, and the Mabul Company, founded by Mark Buler, continued to develop computerized mapping based on PC computers.

Towers Rising in the Air

In a personal column published in August 1982 in “Real Time”, the Scitex in-house newspaper, Efi Arazi wrote: “In recent years in Israel the inventors, the technologists with sharp minds and acerbic know-how, with secret formulas, have become the new stars...not a day passes without some mystery-shrouded scientist showing up by me...at night, on my way home, I wonder and think: the founders of the huge industries that were established in the 20th century and earned fabulous profits were not like the scientists running around in our country. IBM was ‘invented’ by a genius of marketing and customer service, not a scientist; ITT was invented by a marketing genius. What is the actual percentage of companies founded by scientists? Who founded Boeing? Sony? Was Ford based on any sort of patent, on technology, on a secret formula? The technologists among us are by definition wise in ‘how to do’, but the people who founded the large industries and businesses were people of ‘what to do’, who worked in tandem with the wise

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people of 'how to do'. The success of all these thriving enterprises was in correctly identifying the field, in characterizing the market.”

Even though Arazi is today considered one of the founding fathers of the Israeli high-tech industry, he expressed his reservations regarding what would become the apex of the aspirations of the high-tech generation fifteen years later: just one brilliant idea will pave the way to the Silicon Valley paradise. “Building a profitable and competitive industry is a web of sophisticated and organized activity. There are no secret formulas that get us out of doing the hard work,” Arazi summarized at the end of that article.

Of course this did not contradict the fact that whenever he encountered an idea or invention that had a spark of promise, he would devote all his energy to it.

Scitex began to allocate R&D resources not only for developments carried out within the company and with its encouragement, but also to visiting stars seeking its favor. One of those was Eli Gamzon, developer of the Israeli UAV,²⁴ who was later awarded the Israel Defense Prize. Gamzon first met Arazi back in the Scientific Technology days when he was about to be discharged from the Israel Air Force with the rank of captain and Arazi was looking for “engineers with potential” for the young company. He used his spare time to contribute to the development of what was referred to then as the “tracking mount” project – the first military development at Scientific Technology. Gamzon ultimately decided to continue with his military career and was discharged twenty years later after serving as the commanding officer of the Israel Air Force software development unit. Scitex was a natural choice when he decided to enter the civilian market. It was one of the first companies he applied to and where he was gladly accepted. Arazi,

²⁴ Unmanned Aerial Vehicle

as always enthusiastic about everything related to military R&D, was happy to close the circle and engage once more in an industry whose importance he never doubted.

“I am a sort of an inventor type,” Gamzon described himself. “I had a few inventions under my belt: three were connected in some way to the fields that Scitex was engaged in, and one to the military. I tried to interest various bodies, but I didn’t have the faintest idea of how to raise capital or how to launch a start-up, a term that didn’t even exist then. Fortunately when I came to Arazi in early 1985, I was welcomed with open arms.” According to Gamzon, Arazi went over every single one of his inventions and diagnosed its chances with great accuracy. Gamzon: “One invention which Efi rejected, with great justification, was a flat display similar to the currently popular plasma monitors, although employing a different technology. The other idea integrated with the cartographic activities at Scitex based on a vehicle navigation system. Efi did not reject this proposal outright, and in fact ideas of this sort are currently undergoing accelerated development (see GPS), which not only indicates astonishing analytical ability but also a most impressive intuition and ability to predict everything related to market needs – in this case the vehicle market. The third invention was in fact what we today call a “laptop”, a portable computer. I thought then of a small computer that would be a work tool for an engineer. Efi believed that it could be developed at Scitex, but he understood that the company as it was then didn’t have the tools for competing in mass marketing to the private market. Here too, he was of course one hundred percent right.”

It was actually the fourth invention that aroused Efi’s interest, a development which focused on a clandestine military sphere and was defined by his inventor as a new aircraft type – the UAV.

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Eli Gamzon also submitted his proposal for developing the next stage of the UAV to the Tadiran and Elbit companies. “At Tadiran I was told to ‘come spend a few months working for us, and then we’ll decide’. Benny Peled, who knew me from the IAF and was then CEO of Elbit, gave me a similar answer. Only Efi said: ‘Come in tomorrow morning, here’s the office, here’s the lab, here’s a \$700,000 budget, recruit people and start working.’”

On April 1, 1985, just a few months before the serious Scitex crisis, Gamzon launched the Silver Arrow project. In his opinion it was the passion that burned in the engineer-inventor Arazi that urged him to take the gamble, and not just the absolute confidence he had in the product and its developer.

“Efi used to say that one can tell what sort of a person you are by the thoughts that run through your head at night. If you think about stocks and finance, you’re a finance man; if you think about inventions, you’re an engineer; if you think about order and organization, then you’re a manager. At night I only think about technical things. I also invent in my every spare moment. To me, management and marketing are merely a platform for realizing ideas. It is not that I don’t want money and don’t need money, but money as an objective in itself doesn’t interest me and doesn’t occupy my spare time. In my view, money has always been only a means. It seems to me that to a large extent Efi was also like that.”

The first generation RPVs²⁵ (as they were then known), small high-flying aircraft flown by ground-based pilots for photographic surveillance - were purchased by Israel from the United States before the Yom Kippur War. However, these aircraft were capable of taking aerial photographs which could only be developed after landing. One of the painful conclusions Israel reached after the

25 Remotely Piloted Vehicle

war was the necessity for developing a new generation of RPVs – the UAVs – capable of transmitting pictures in real time. This decision brought about a substantial improvement in the aircraft’s flying and control abilities. In 1985, nearly a decade after Israeli industry began to take an interest in the UAV, Gamzon’s efforts facilitated another step forward in developing an advanced generation of UAVs which operated without a ground-based pilot. Gamzon’s improvements increased the UAVs operating range tenfold, and correspondingly its imaging range. Only a few people in Scitex knew what was happening behind the locked doors of Gamzon’s new “Special Technologies Department”. When the first flight trial failed, Scitex was already heading for disaster. Even so, Arazi fought to continue the Silver Arrow project, enlisting the support of the Federman family, then the controlling stockholders of El-Op. In 2000, El-Op merged with Elbit Systems, and the rest is history. Ultimately, the UAV was a success story that earned many millions for Elbit, while Gamzon was awarded the Israel Defense Prize for his invention.

A Matador Seeking an Arena

“If you ask me why my father behaved in this way, I can only repeat what he himself told me,” summed up Michele Arazi. “I conduct all my wars three years in the future,’ my father would lecture me. It was a basic principle of his concept of life.” Why three years? I asked. “Why?! First of all, Israel was always a year behind technologically, so he added a year to what he saw and mapped out. Besides, he knew from experience that whatever reached the shelves had already exhausted itself two years earlier

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from the standpoint of development and market potential, so that the technology and products needed today were developed two 'product generations' ago. This worldview forced him to always be alert – to check which way the wind was blowing, where market trends were heading. I remember that a constant stream of engineers, scientists and inventors came to him, saying: Look Arazi, this mobile phone can be made half the size, and this scanner can be made twice as fast, and his answer would be: 'Of course it is possible to make it twice as fast, and not only that, six months from now we'll see it on the shelves.' It was clear to him that while struggling to bring a product to the next generation, it could reasonably be assumed that in another moment it would be on someone else's production line. I think he was constantly looking for what to do and where to do it." In short - Arazi was a matador looking for an arena.

No one disputes that Efi Arazi was blessed with unlimited inquisitiveness. He never stopped searching for new directions. Neither does anyone dispute that all of his activities, whether Scitex, EFI or Imedia, stem directly from these very traits. As to the importance of these traits in managing the companies he founded and to what extent they advanced or hindered their success – here opinions are divided. Arazi assumed huge obligations and tremendous risks for himself and his investors, yet there is no doubt that for world industry and for Israeli industry in particular he was one of the most important and prolific entrepreneurs in his field.

EFI ARAZI: HIS WAY - A BIOGRAPHY