IVC MAGAZINE

FEBRUARY 2019

ISRAELI HIGH-TECH SUMMARY - 2018

Capital raising, exits, investors, most active funds, leadings trends and insights

WHEN ART AND TECHNOLOGY MEET

Featuring a unique look at the symbiosis between art, innovation and technology.
Articles and commentary of how technology influences fine arts and how art and creativity enrich the technology sector

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From the Desk of the CEO

This edition of IVC Magazine takes an up-close look at the big changes in the Israeli technology ecosystem in 2018, particularly, the trend of larger capital investments in a smaller number of companies. The money invested in the big rounds last year was meant to optimize investor gains after they realized they might have a winner on their hands.

Despite large exits and higher amounts in rounds, this trend has exposed the issue of investors' growing aversion to risk, which has the potential to disrupt the risk-reward equilibrium that has dominated the industry for decades. Investors are preferring a "less risky" approach, knowing that these opportunities come up in later rounds.

As these changes emerge, it's clear that two factors are crucial in the decision-making of tech investments: deep understanding of industry patterns and the rarity of great entrepreneurs.
This magazine summarizes 2018 from two edges: profound analysis of what happened in the Israeli high-tech ecosystem during 2018, and a unique view of innovation, technology and art. In tech investing—like in art—understanding patterns is integral to being able to appreciate the whole. IVC, with almost 20 years of data collecting experience in Israel's high-tech ecosystem, knows better than anyone else how to read and most accurately interpret the trends and influences in this fast-moving industry. These insights, we believe, are crucial for optimizing decisions in the high-tech world.

. Enjoy your reading

Benzi Segev, CEO

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8,306

Active High-Tech Companies

335

Active Incubators and Accelerators

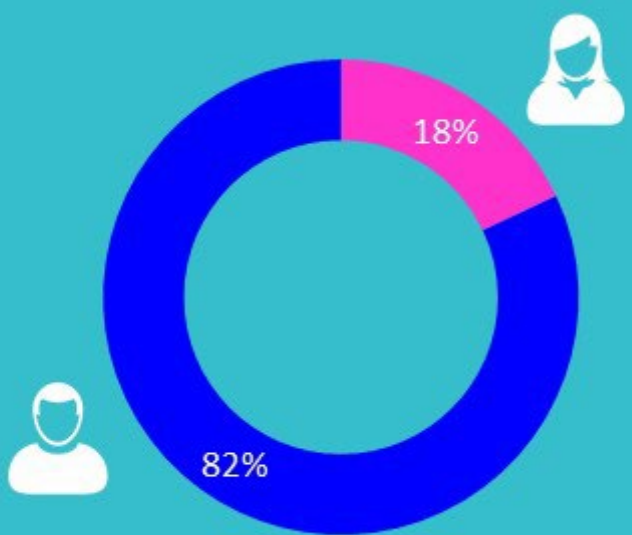
354

Active Multinational Centers

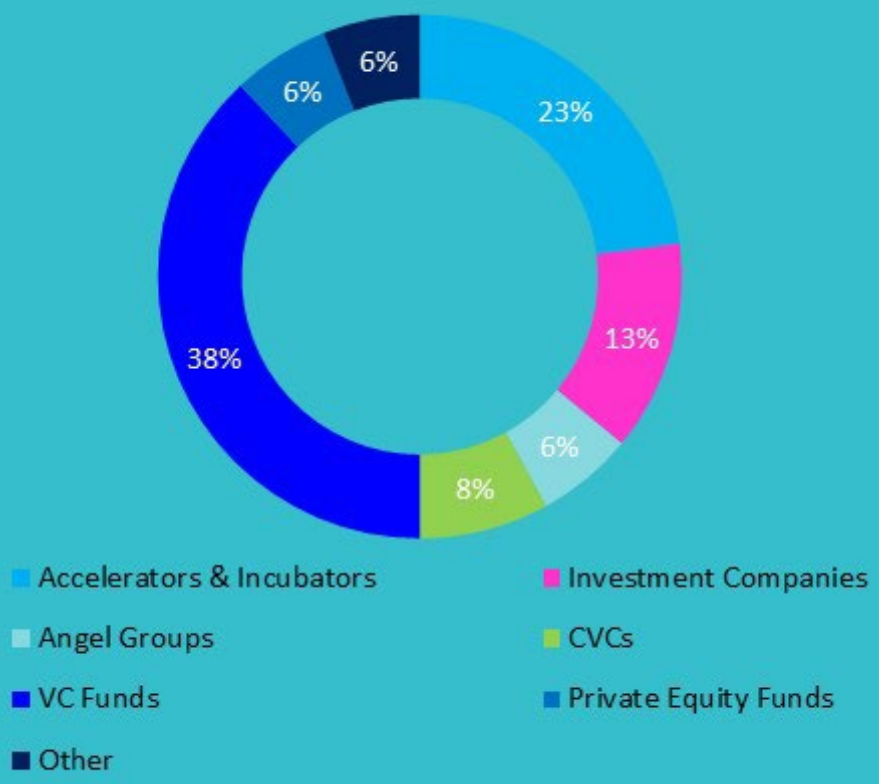
of Companies Established by Year

*Projected # of Companies, the figures for 2018 will be finalized in mid-2019

Israeli Entrepreneurs by Gender



Active Investors by Type (%)



Capital Raising 2013– 2018

Largest Financing Round in 2018

Landa LABS

raised $300 million

Exits 2013– 2018

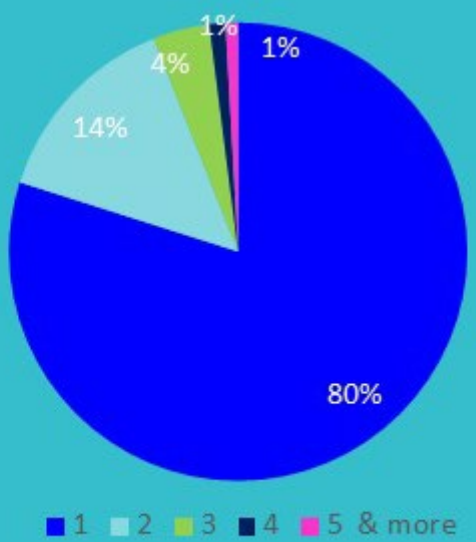
Largest Exit in 2018

orbotech

Acquired by KLA Tencor for

$4.3 billion

Number of Entrepreneurs by Number of Companies



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Source: IVC Research Center

Israeli High-Tech in 2018 - Overview

Israeli tech funding saw another year of strong activity. The dominant trend in the industry in 2018 was the focus by investors on a smaller number of companies while investing larger amounts of capital in them. The impact of mega-rounds—also called "Softbank effect", "Preemptive Rounds effect" or "Supergiant rounds effect"–is well-known in the Israeli tech ecosystem. There were 24 mega-rounds of over $50 million in 2018, reaching 31% of the $6.47 billion in total funding, more than double the amount in 2013.

Israel's share is just a fraction of the worldwide mega-round phenomenon, with the US leading the trend. A smaller number of winners took the bounty, which means things are looking less rosy for most companies. Deals below $5m accounted for less than 10% of overall capital investments during 2018 with amounts similar to 2013 figures. Put simply, nearly 60% of the transactions over the last year attracted less than 10% of the overall funding.

The economics of this situation—a kind of "Pareto Principle" for start-ups—will work as long as money keeps flowing.

This trend also raises questions about what will happen when the music stops? What about the appetite of traditional tech investors to support risky ventures when more compelling companies appear in later growth stages.

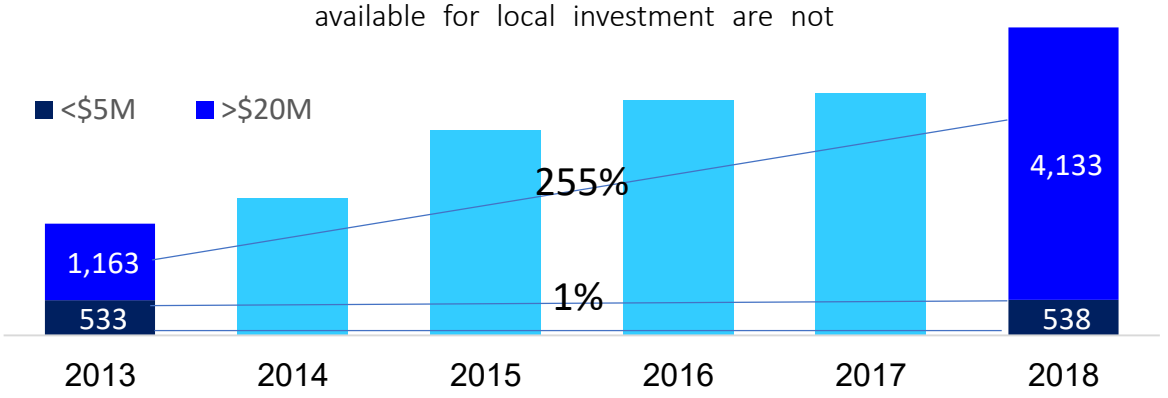
A look at the current global economy leaves room for concern regarding local funding resources over the next 12 months. The US interest rate hike, which has already led to dramatic effects on Wall Street, US–China relations and other global trade conflicts contribute to the growing concern.

All these could negatively impact the level of allocated funding to alternative asset classes in general and allocations to Israeli tech in particular. It is easy to imagine a scenario in which 2019 will not reach the levels we have seen in 2018. However, barring a repeat of the 2008 financial crisis, local funds available for local investment are not expected to decline too much either.

On the exits side of the tech business, the amount of deals dropped in 2018 singularly during 2018, to 103 deals, around 30% less than 2017. The main declines occurred in the non-VC backed deals of less than $20M, and in the mid and high range of above $250M.

The first could be related to the availability of funds–or at least, hope for money–which led entrepreneurs and angel investors to hold and not rush to sell. The deals in mid and high numbers are another story. The major deals cited at the outset could prove to be the trend of the coming years. But only time will tell.

The next two years are not likely to produce high numbers of newly established companies, due to the change in the investors' appetite toward risk. However, the Israeli tech ecosystem should expect that a larger number of well-established companies will lead the way toward the creation of a healthier local industry.



Source: IVC Research Center

2018 – Key Facts

$6.47b was raised in 623 deals—a 17% increase from 2017 and the highest ever annual figure. A record five $100m+ deals attracted 13% of the total

In 2018, the total value of exits reached **$12.63** billion, mainly due to a record four exits exceeding $1 billion each, which accounted for approximately 65% of the total

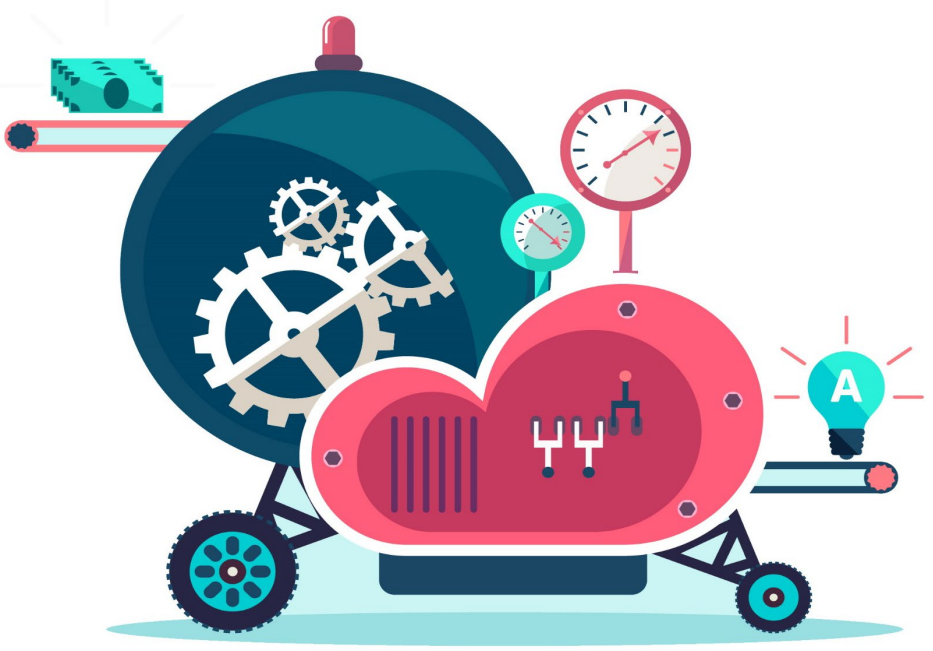
The number of M&A deals during 2014–2017 was relatively stable, but decreased by 20% in 2018 compared to 2017. The decline was largely attributed to deals with a value of less than $20 million

The number of exits of **$100–$250** million remained stable. The number of exits in the $250 million–$1 billion rage declined from previous years

VC-backed capital raising in 2018 amounted to **$4.7b**, about **17%** higher than 2017, but the number of VC-backed deals declined by **14%** from the previous year, a first since 2013

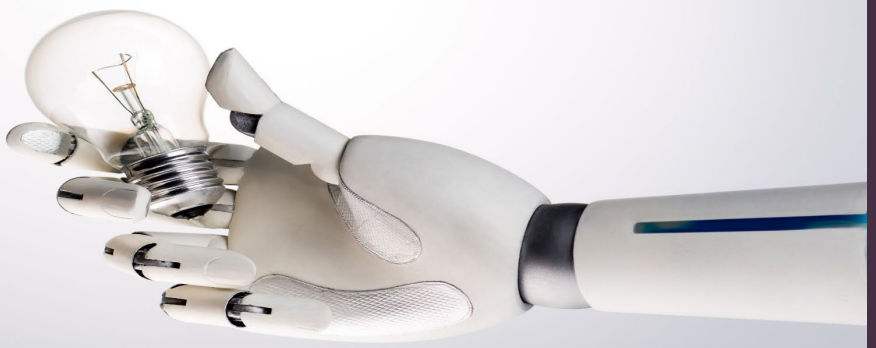
The share of Israeli VC funds in capital raising declined in 2018 to 12% of the total invested, down from 14%–17% in 2013–2017. First investment activity was the lowest since 2013

The number of companies that raised **$20 million** or more increased from 41 in 2017 to 62 in 2018



PART 1

Israeli High-Tech in General



Read More

PART 2

DEAL SIZE

Read More

PART 3

TYPES OF DEALS

Read More

PART 4

STAGES & SECTORS

Read More

PART 5

LEADING CLUSTERS

Read More

PART 6

INVESTORS

Read More

PART 1

ISRAELI HIGH-TECH – GENERAL

PART 1

Israeli High-Tech in General

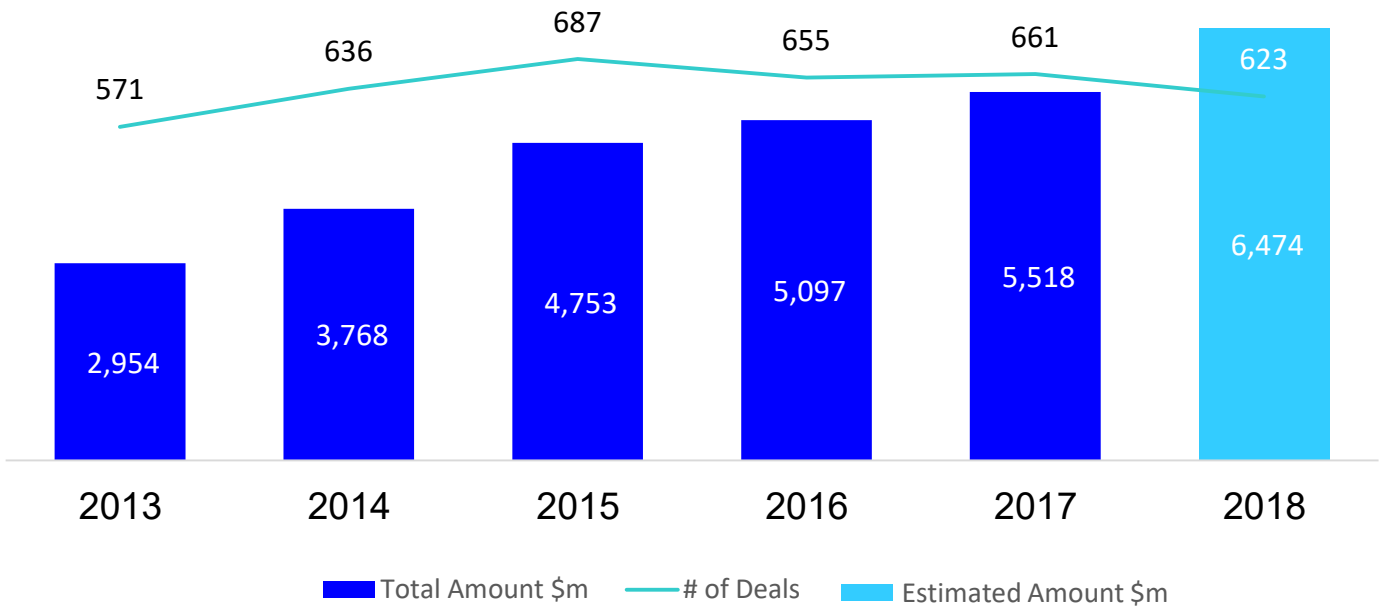
More Capital in Fewer Deals

In the past, the gap between exits and financing rounds was very clear. Israeli high-tech companies raised small amounts while exits brought in the "big money." During the past years this gap has diminished as large financing rounds are more common and have become the dominant force fuelling the Israeli high-tech ecosystem.

Overall funding increased in 2018 to a record $6.47 billion, up 17% compared to 2017 and soared 120% compared to 2013. The number of deals (623) decreased compared to 2014–2017. However, from 2013 through 2018 the number of high valuation deals grew significantly and was the main reason for the high amount raised in 2018.

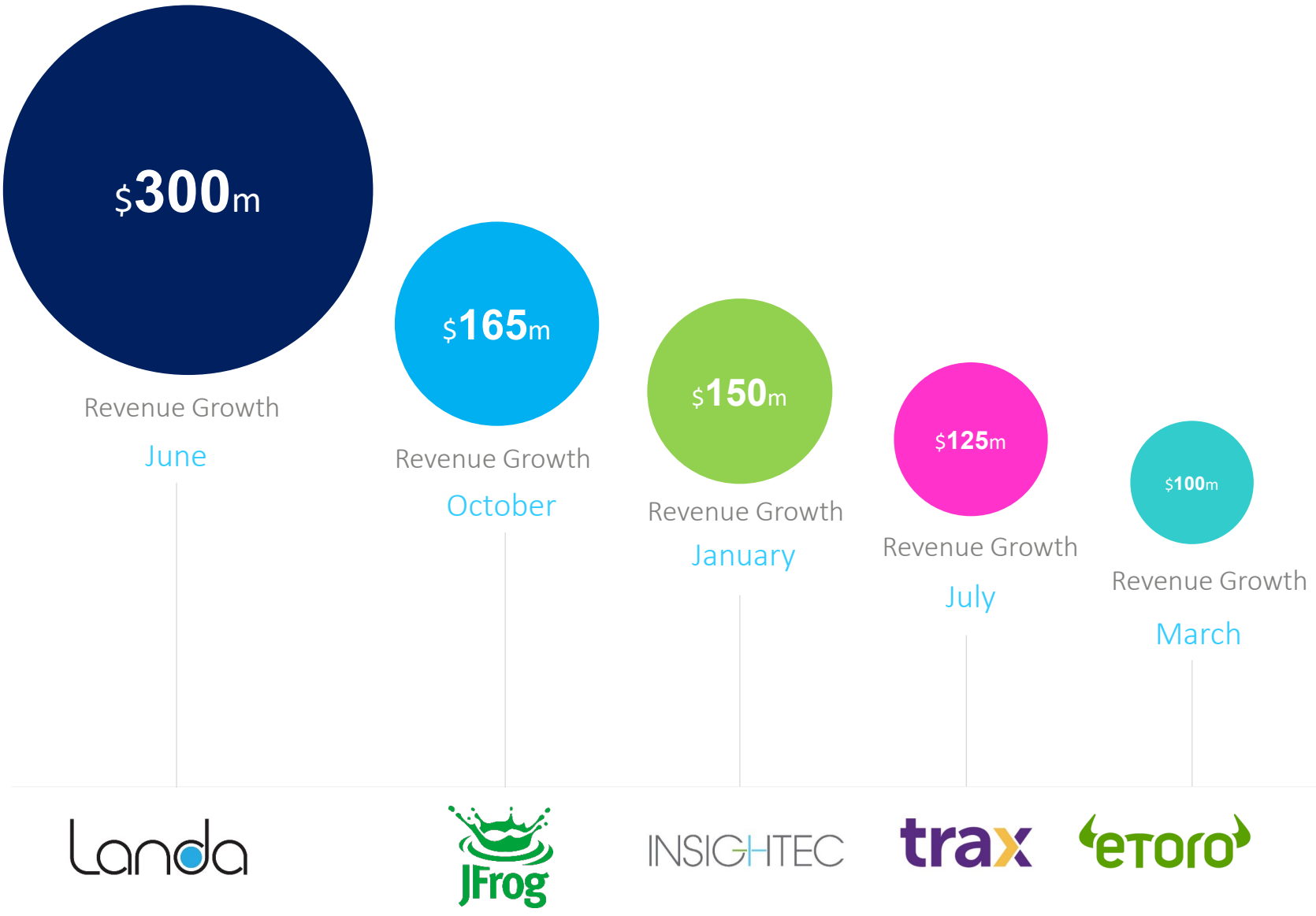
Q4/2018 capital intake reached $1.82 billion*, a growth of 8% compared to Q3 and another record quarter for the year.

Israeli High-Tech Capital Raising 2013 – 2018



Source: IVC Research Center

5 Largest Financing Deals of 2018



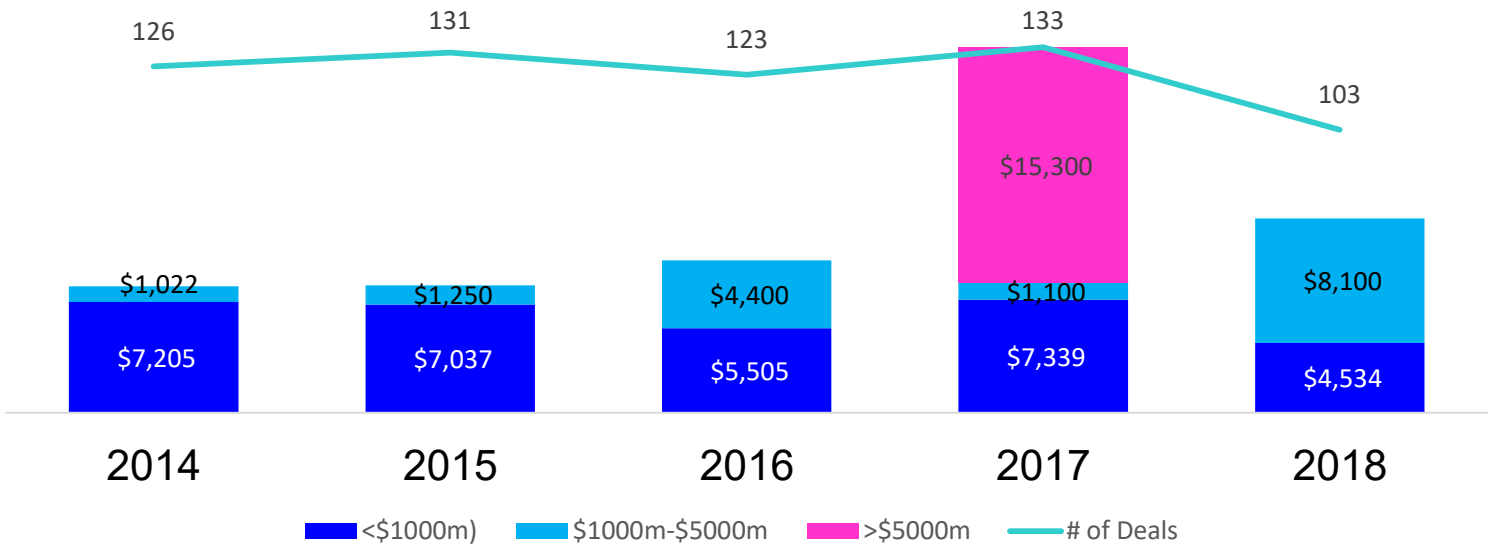
Source: IVC Research Center

Total value of exits in 2018 reached $12.63 billion, including four deals of over $1 billion each. Three were publicly traded companies and one was a divestiture by a strategic entity. Therefore, these deals did not contribute to VC or private investor returns, which were relatively low in 2018 compared to previous years.

Excluding those deals, the total value of exits was $4.5 billion, the lowest since 2014.

The number of exits decreased from 133 in 2017 to 103 in 2018. The decrease was mostly attributed to deals with a value of less than $20 million.

Exits 2014 – 2018 ($m)



Source: IVC Research Center

orbotech	IMPERVA	Mazor Robotics	Synamedia
acquired by KLA-Tencor for $3.4 billion	acquired by Thoma Bravo for $2.1 billion	acquired by Medtronic for $1.6 billion	acquired by Permira for $1 billion

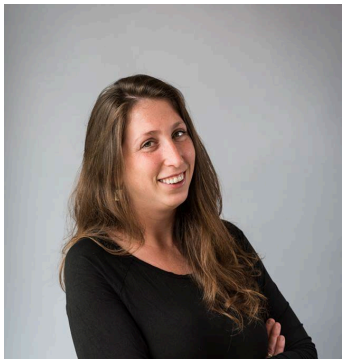
**Previous reports presented data that excluded "mega-exits", defined as transactions valued at $1 billion or more. In the last few years there was at least one per year. In 2018 there were four such transactions. This fact led us to redefine the term. As $1 billion deals or more have become more common, our new methodology is to exclude only transactions of $5 billion or more (resulting in the exclusion of the Mobileye transaction in 2017).*

Tech Trends 2019 – Revolution vs Evolution

Stav Erez, Labs/02 Partner and Jonathan Medved, OurCrowd CEO

In 1962, the philosopher of science Thomas Samuel Kuhn changed the way we (humanity) viewed science with his book *The Structure of Scientific Revolutions.* In it, Kuhn claimed that science enjoys periods of stable growth punctuated by revisionary revolutions, which he called "paradigm shifts" that present new ways to comprehend what scientists would never have considered valid before. This new way of thinking replaced the old theory of scientific evolution, which held that science develops by adding "additional" truth to what was considered to be the old truth and in the odd case, correction of past errors.

It is our belief that 2019 will bring more revolutions in the tech industry than previous years. We will continue to see evolutions in most tech sectors, such as AI (artificial intelligence) and ML (machine learning) diverse use cases.



However, for the first time in years, we will witness the next phase of evolution, technological paradigm shifts that will revolutionize multiple segments of life.

Physics Takes Over Mathematics

Quantum theory, which is based on the laws of physics, is hard to grasp and explain. The behavior of the atomic world frequently conflicts with common-sense-based observation of the everyday world but with advancements in science, the growth of knowledge is leading us to the next paradigm shift, from simple and intuitive to counterintuitive. The physical expression of this shift would be quantum computers, quantum encryption, quantum communication, etc.

Voice to Replace Touch

While the technology behind the touch

screen was developed in the 1960s, the revolution began in 2007 with the first iPhone and we quickly switched from pressing buttons to sliding our hands to use our cellphone, operate a washing machine, and even read books. The next revolution will be voice. Voice is set to replace remote controls and keyboards, which are slow under the best of circumstances and already obsolete in some places in the world.

BeyondFood vs McWorld

Impossible Foods and Beyond Meat are just two examples of new food products that replicate the taste and texture of meat. Successes like these have created a demand and we will soon be seeing a paradigm shift in the standard, quality and production of the foods that we will be eating. This portends not only the beginning of the end of meat produced from animals but also the beginning of the end of industrialized sugar, flour, and more.

Shifting Transportation

Just as the automobile replaced the horse and buggy, the next shift will see our cars replaced by floating/flying vehicles. In addition to completely changing perceptions of distance, this newest shift in transportation will impact traffic, safety regulations and even urban architecture.

We can't predict the revolutions in all tech related fields, but we can witness the evolution. For example, I am hopeful that the IPO window will reopen with high profile offerings from companies like Uber, Beyond Meat, Pinterest, and others, which will herald important liquidity events for venture capitalists, which is like oxygen for our ecosystem.

If this fails to happen because of government shutdowns or market conditions, this will not only delay much needed liquidity for funds, it will also have a negative impact on later stage valuations. But the good news is that when public markets come down in value, this is the time when smart venture money redoubles its focus on early stage and seed investing.

There is a very strong inverse relationship between venture vintage performance and public market evaluations, so much so that one should expect that in 2019, vintage investment for early stage companies will outperform, given the public market retraction.

This will be a good thing for Israel because we have a huge number of newly formed companies and really interesting seed deals. At OurCrowd, you will see a renewed focus on these early stage opportunities. The Israeli ecosystem has matured with inflow of new venture sources all the time.

I expect that in 2019, we will see more of this trend with new venture investments coming from regions such as Latin America, the Gulf Region, and Southeast Asia, in addition to the traditional investors from the US, Europe and North Asia.

PART 2

ISRAELI HIGH-TECH – DEAL SIZE

PART 2

Israeli High-Tech – Deal Size

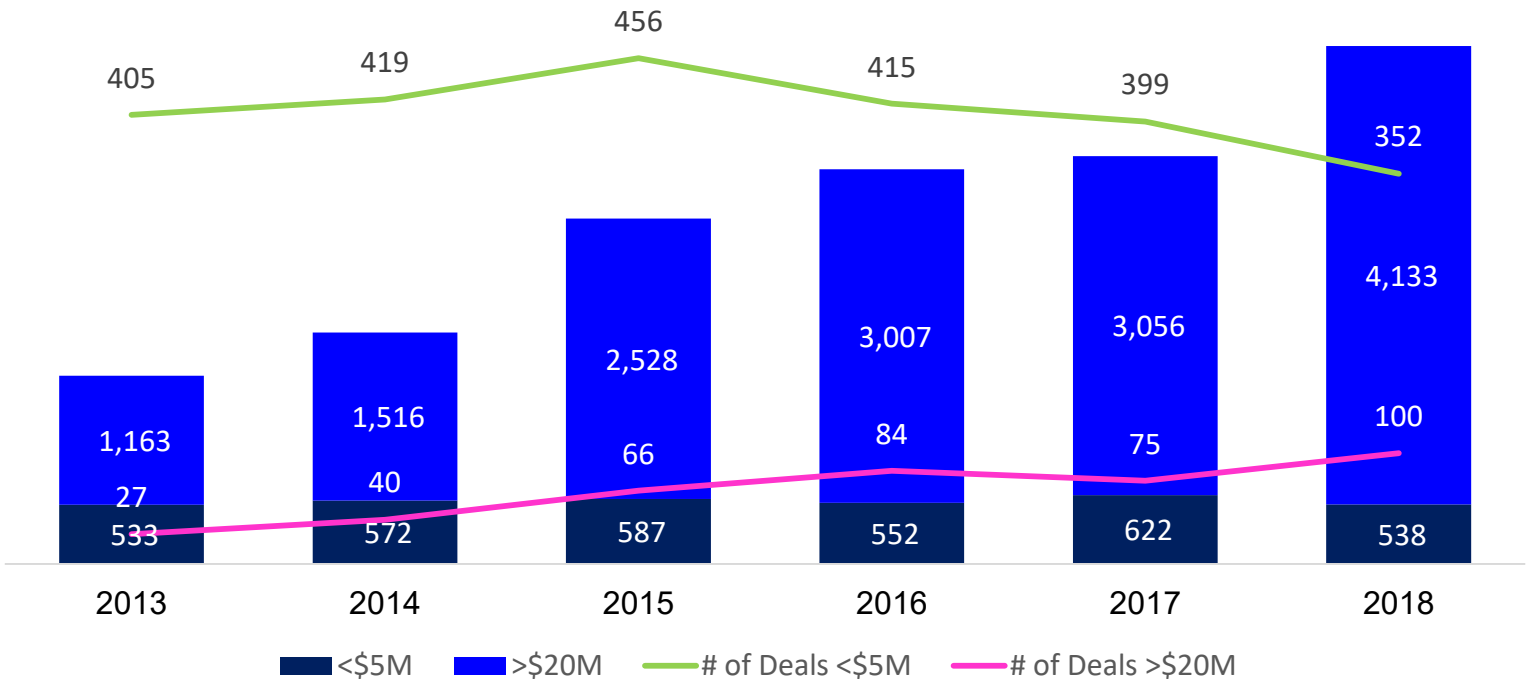
The same trend appears with regard to deal size in exits and capital raising. Small financing rounds and exit deals declined. This affected mostly private investors (rather than VCs) as they are historically the largest investors in early stages. The number of financing rounds larger than $20 million grew significantly and explains part of the drop in exits in the $250m–$1b range in 2018.

From 2015 and through 2017, capital raising by seed companies dropped 27% though there was a slight recovery in 2018 with $250 million raised.

The number of seed deals (175) was 18% higher than 2017. The number of companies that raised $20 million or more has increased significantly in recent years, from 75 in 2017 to 100 in 2018.

Investor incentive to focus on winners is highlighted via a growing uptrend in the number and value of big deals (over $20m). While amounts and deal numbers in this range almost quadrupled from 2013 into 2018, attracting 64% of the total in 2018. The number of small deals, up to $5m, has dropped dramatically since 2015.

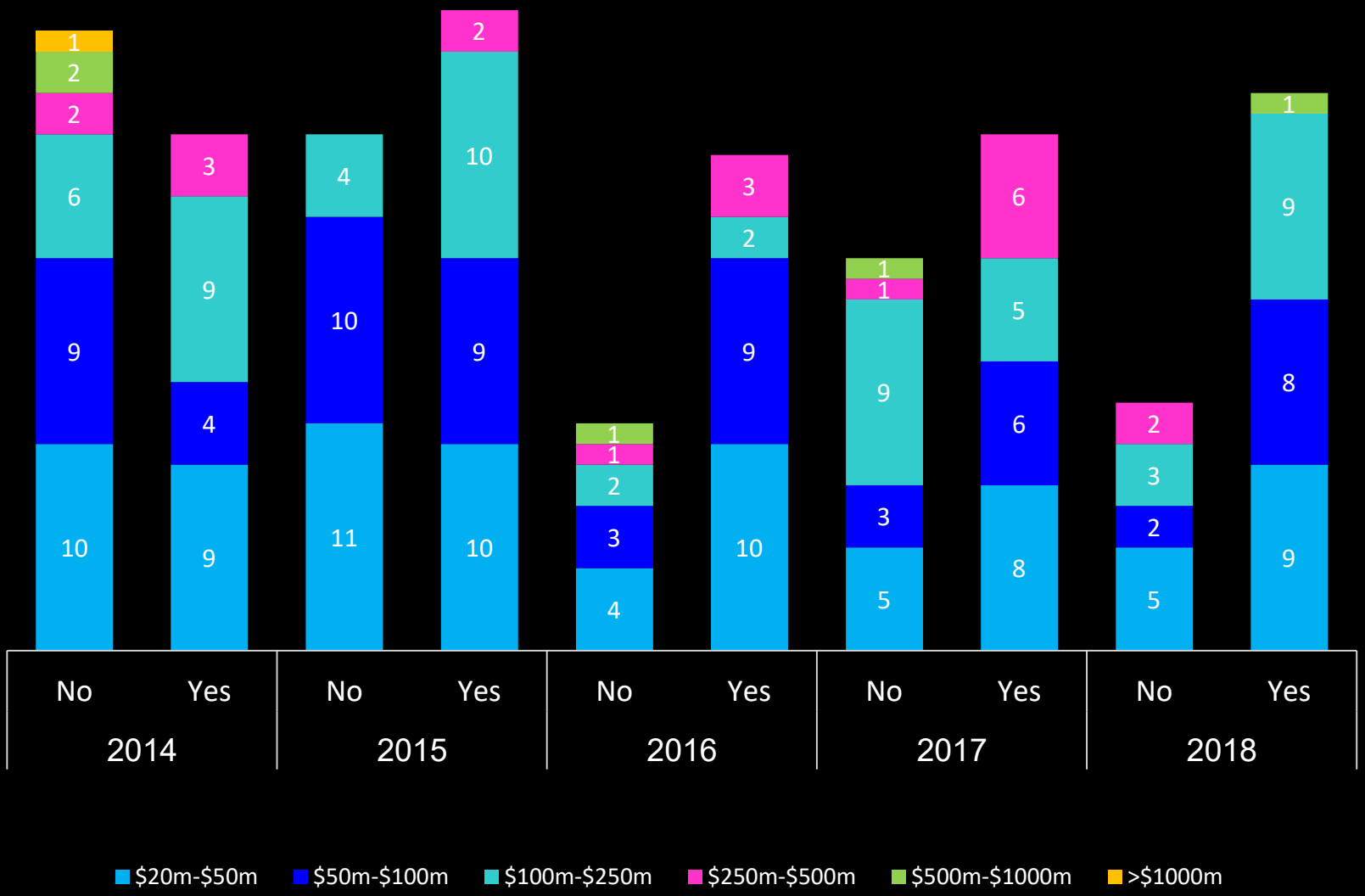
Israeli High-Tech Capital Raising by Deal Size 2013 – 2018



Source: IVC Research Center

Only three exits in the $250m–$1b range were noted in 2018, lower than eight in 2017 and five in 2016. The number of M&As in the $20 million or less range decreased dramatically. In dollar amounts, the decline in smaller exits was offset by the four $1 billion plus exits.

Number of Exits by Deal Size (private companies) above $20M: VC Backed vs. Non-VC Backed*, 2014 – 2018



Source: IVC Research Center

PART 3

ISRAELI HIGH-TECH - TYPES OF DEALS

PART 3

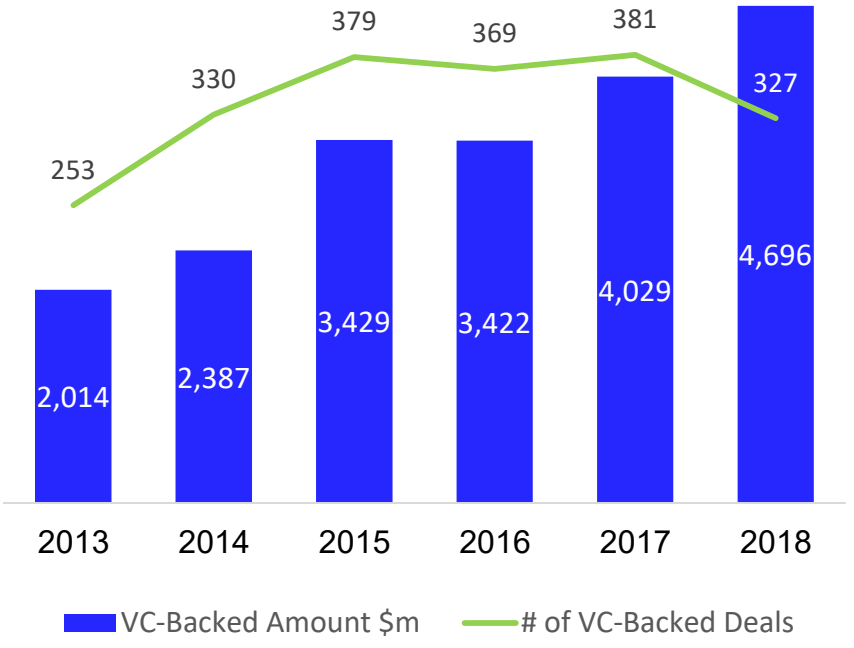
Israeli High-Tech – Types of Deals

VC-Backed and Non-VC-Backed

Investor activity in 2018 was the weakest in terms of number of VC investments, but amounts raised soared to $4.7 billion, a new high record. According to IVC, in 2018 the number of VC-backed deals dropped in all rounds except Seed and B rounds. The largest decline was noted in A rounds, 101 deals, back to the level in 2013 level of 105 deals.

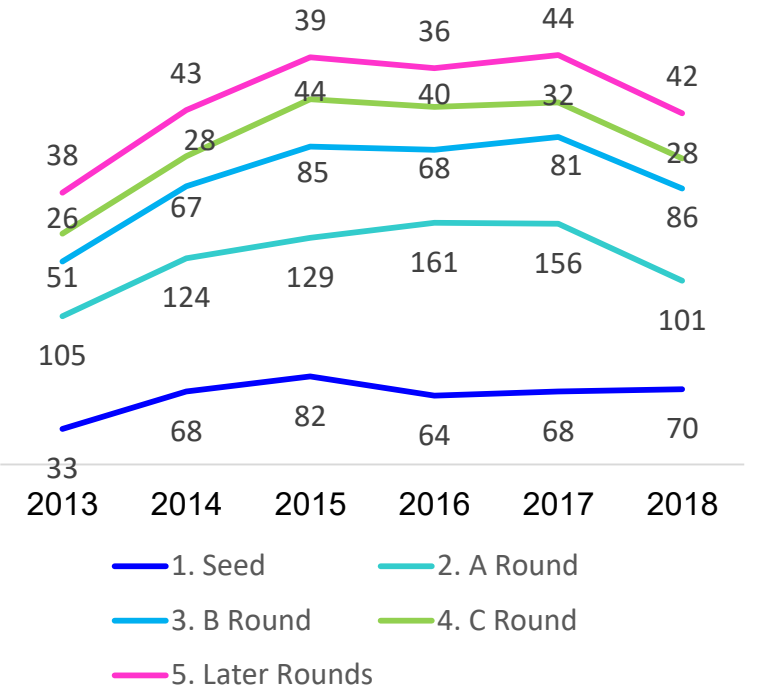
2018 was the weakest year for the number of VC's deals since 2014, though the amount invested reached a new record—$4.7b. Deal amounts for Israeli VC-backed deals have never been higher: $1.47b was invested in Q4 in VC-backed transactions.

Israeli High-Tech Capital Raising in VC-Backed Deals 2013 – 2018



Source: IVC Research Center

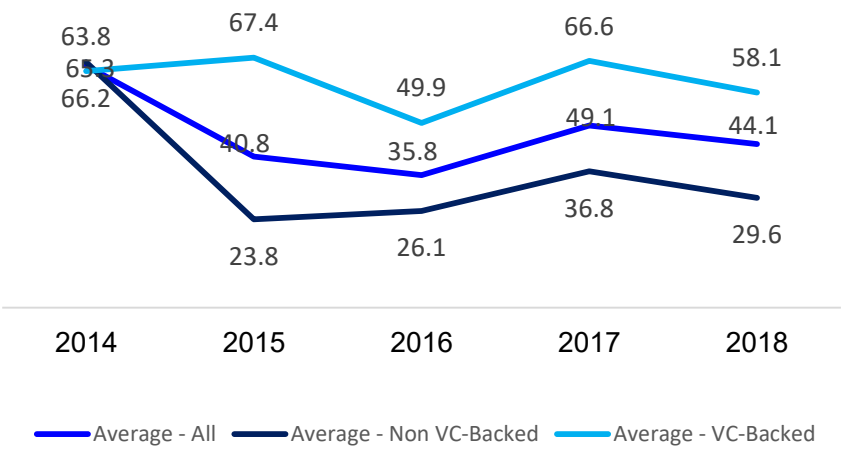
of VC-Backed Deals by Round 2013 – 2018



Source: IVC Research Center

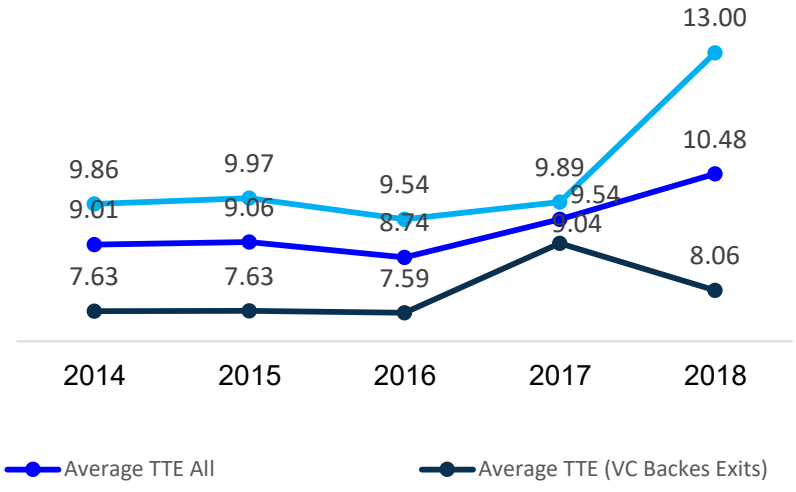
The number of exits of VC-backed companies with a Time to Exit of up to ten years has remained constant since 2015 (34 in 2018), while the number of exits of non-VC backed companies with the same Time to Exit has decreased significantly from 50 in 2017 to 26 in 2018. The exit ratio (Multiples) continues to decline—mostly for non-VC-backed companies—while remaining stable for VC-backed companies.

Average Exit Deals: VC-Backed Vs. Non-VC-Backed



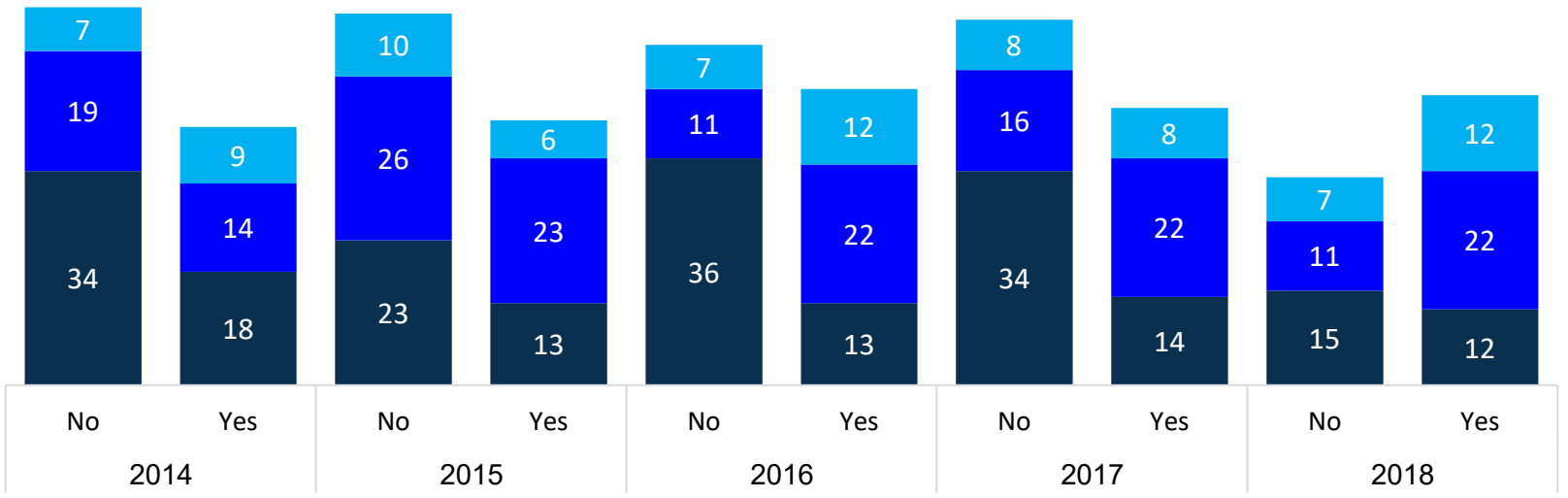
Source: IVC Research Center

Average Time To Exit: VC Backed Vs. Non-VC-Backed Exits



Source: IVC Research Center

No. of Deals per Time To Exit: VC-Backed Vs. Non-VC-Backed Exits



Source: IVC Research Center

PART 4

ISRAELI HIGH-TECH – STAGES & SECTORS

PART 4

Israeli High-Tech – Stages and Sectors

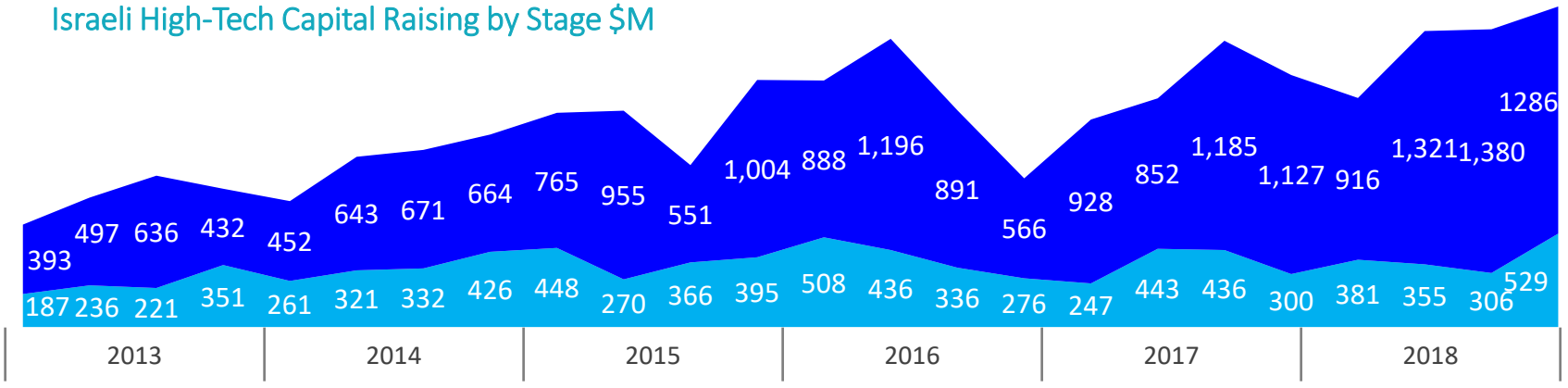
The appeal of early stage companies gradually dimmed since the beginning of 2017. Until 2016, investors clearly had more appetite for early stage companies (Seed + R&D stages).

In 2018, overall amounts raised by mature and early stage companies were larger than ever.

A similar trend appeared in the exits analysis: in 2018, the number of exits declined in both the $20 million and below range and in the $100–$250 million range.

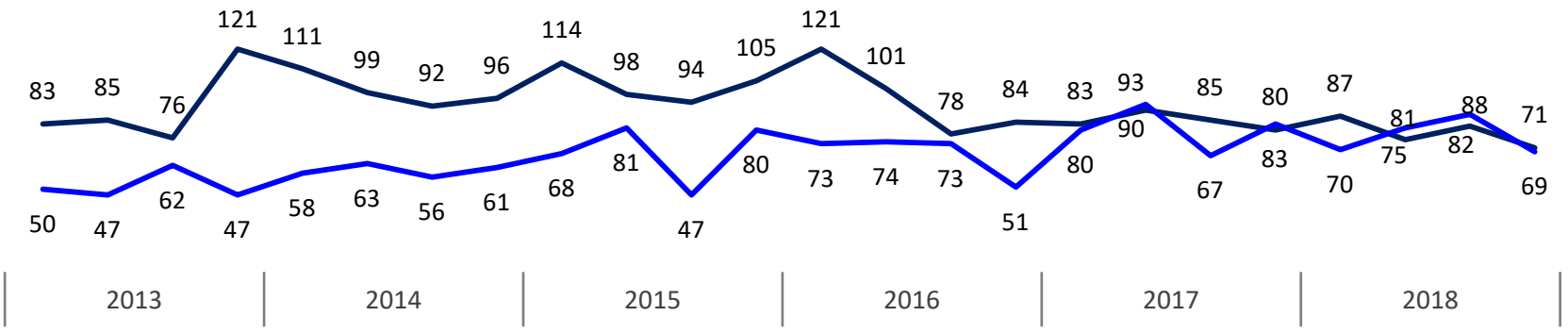
In 2017 and 2018, the gap between amounts raised by early and mature companies (initial + growth revenues stages) in number of deals reversed. Mature stage companies now lead capital raising.

Israeli High-Tech Capital Raising by Stage $M



Source: IVC Research Center

Israeli High-Tech Capital Raising by Stage: # of Deals



Source: IVC Research Center

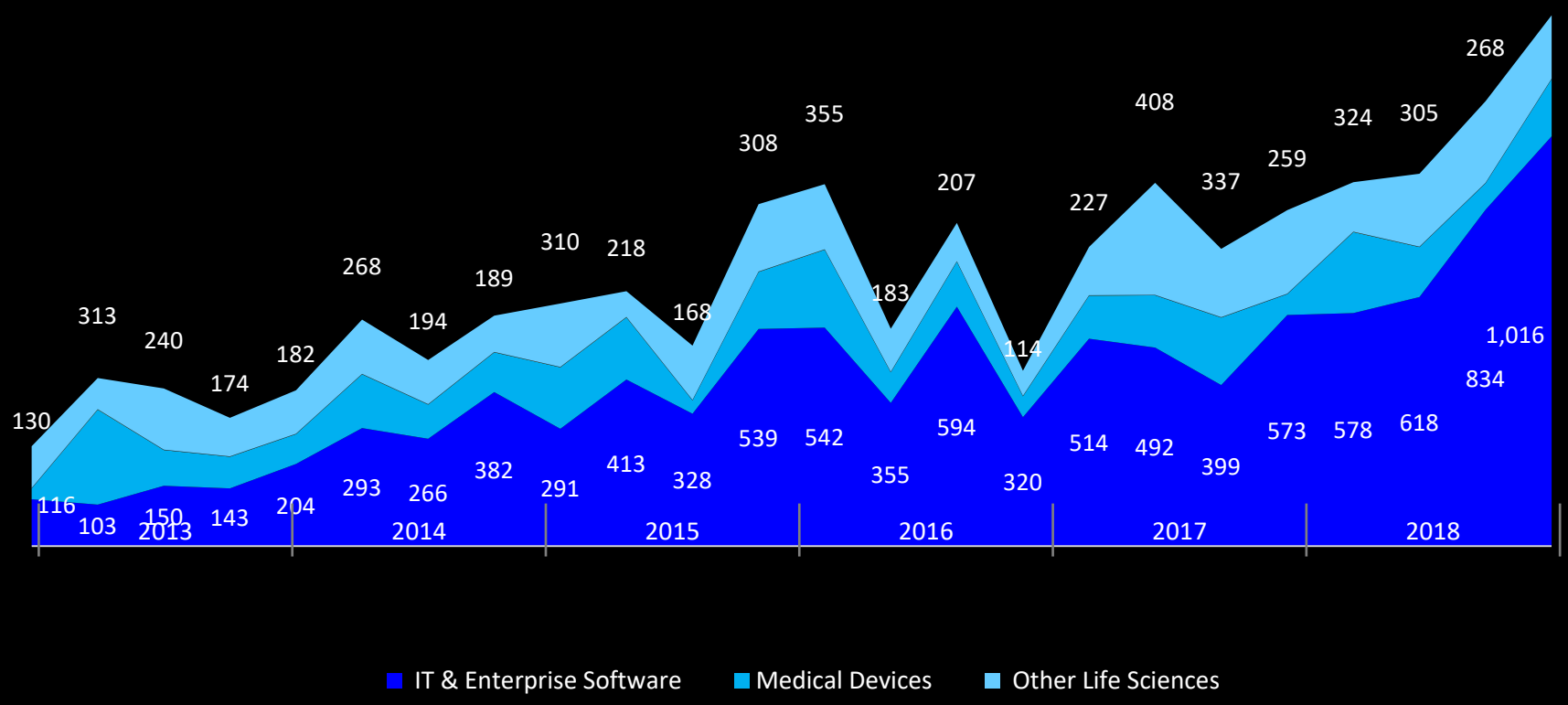
Capital raising amounts in the IT & software sector have had a huge upsurge since 2013. Total amounts in this sector grew six-fold in 2013–2018, rising more than 50% in 2018 alone. Twelve large software rounds (over $50m each) totaled more than $1b in 2018. The latter is the result of the importance of the sector's software-based artificial intelligence (AI) and cyber security technologies.

Software amounts raised have grown considerably since 2013, reaching a high of $1.01b in Q4/2018, with 19 deals of over $20m each, totaling $900m.

Life sciences amounts have remained stable over the years with allocation for medical device companies averaging in the range of 40% to 50% of the total. The number of life science deals has continued to trend downward.

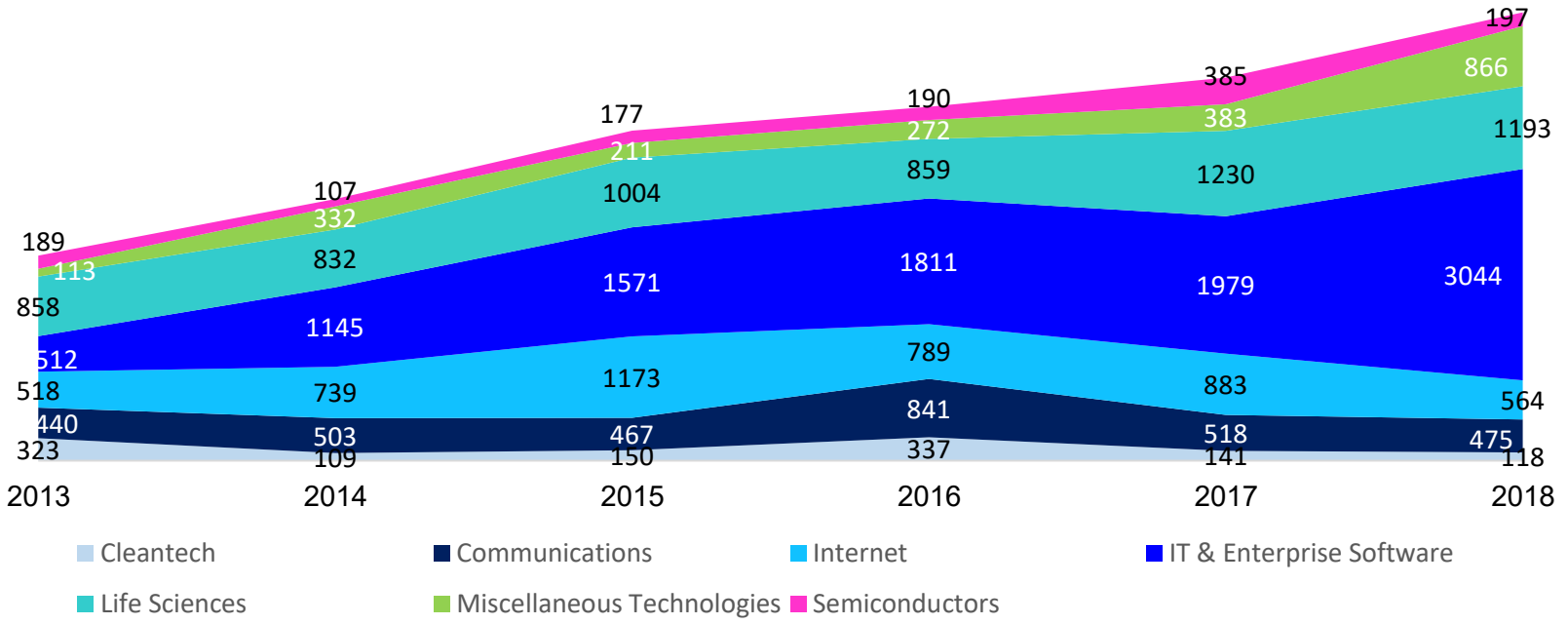
With the exception of software, the number of deals in other major sectors did not grow.

Capital Raised in Leading Sectors: Software & Life Sciences ($M) 2013 – 2018



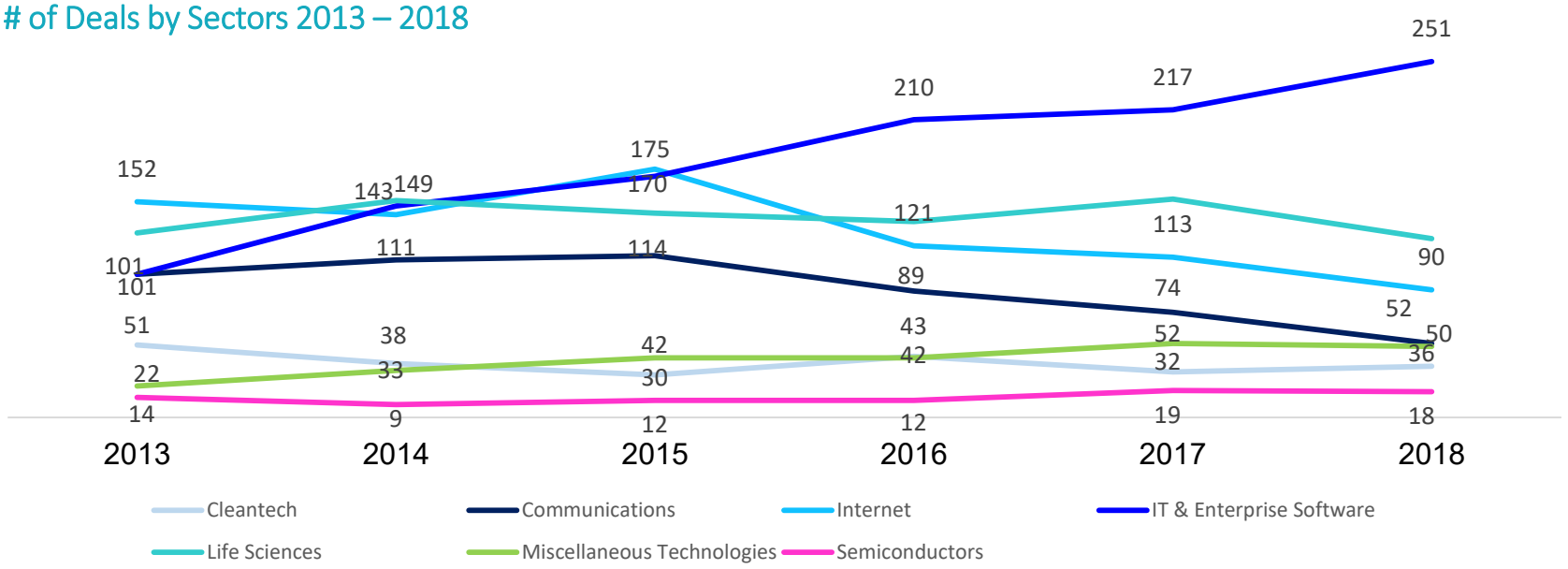
Source: IVC Research Center

Capital Raised by Sectors 2013 – 2018



Source: IVC Research Center

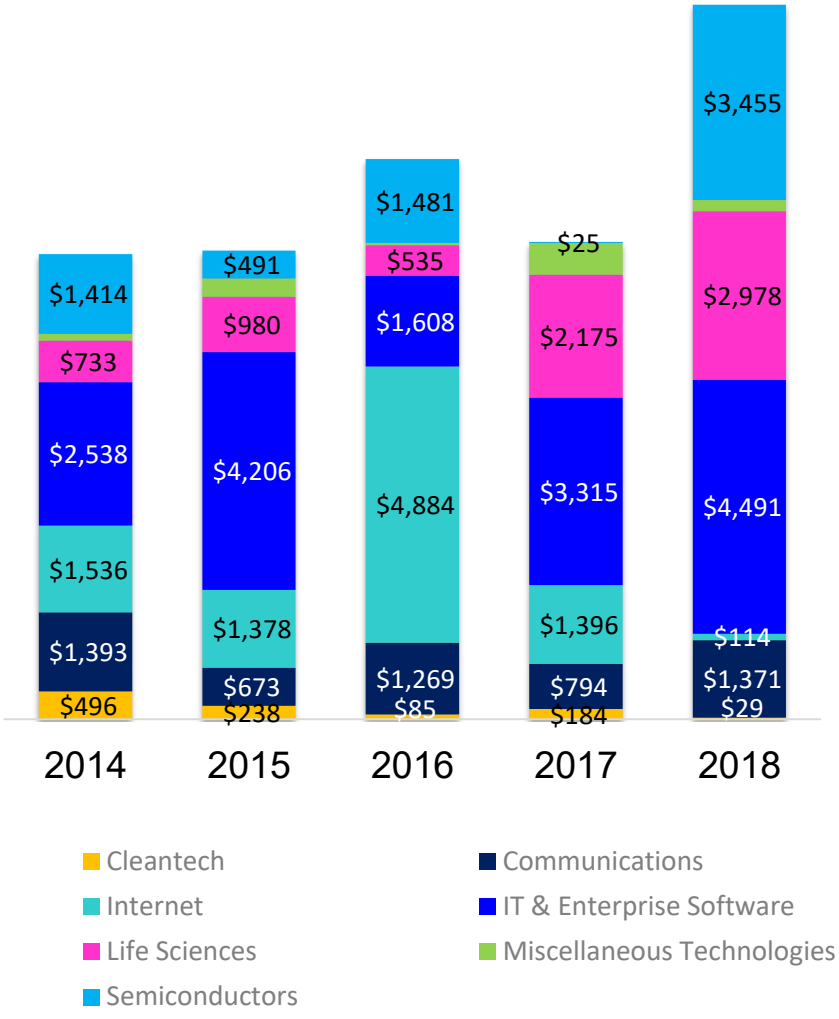
of Deals by Sectors 2013 – 2018



Source: IVC Research Center

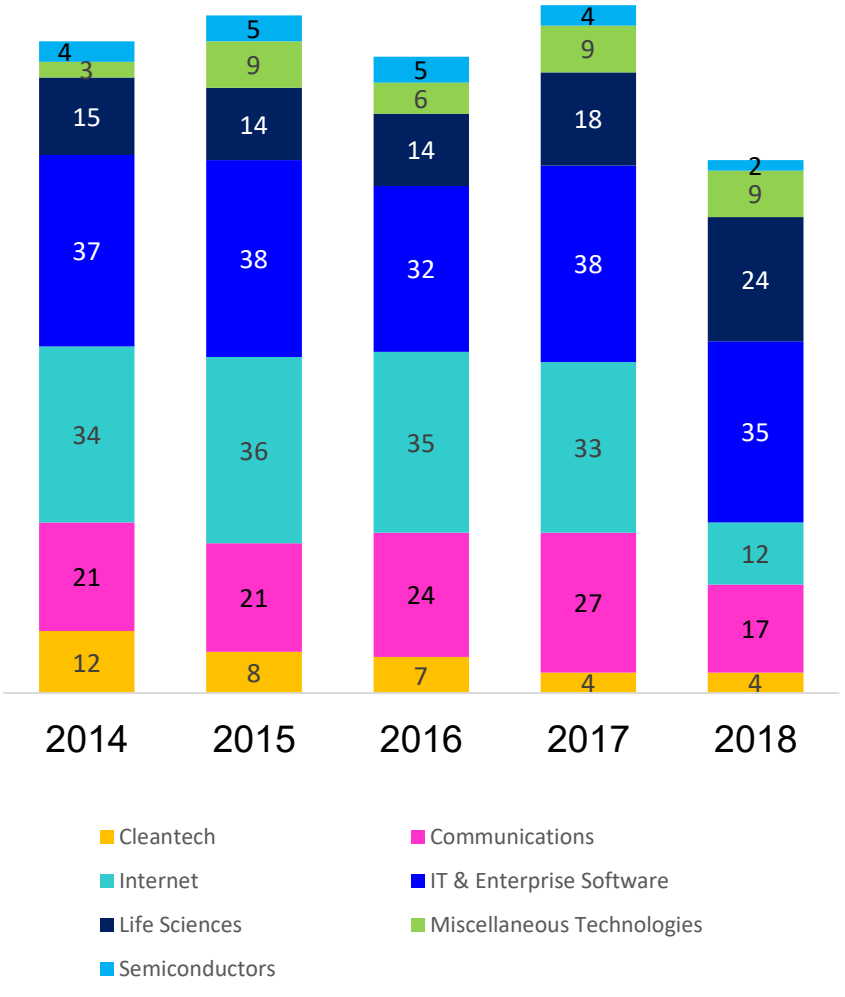
2018 saw an increase to 24 exits in life sciences, of which 7 were IPOs. The number of deals in the IT and enterprise software sector remains stable.

Exits by Sector 2014 – 2018 ($M)



Source: IVC Research Center

of Exits by Sector 2014 – 2018



Source: IVC Research Center

PART 5

ISRAELI HIGH-TECH – LEADING CLUSTERS

PART 5

Israeli High-Tech – Leading Clusters

Cyber security, fintech and AI attracted more capital in 2018. However, median amounts in AI, cyber and fintech clusters decreased during 2018, indicating that some of the hype surrounding these industry verticals has begun to diminish. In terms of amounts in 2018, AI and cyber exits reached new records.

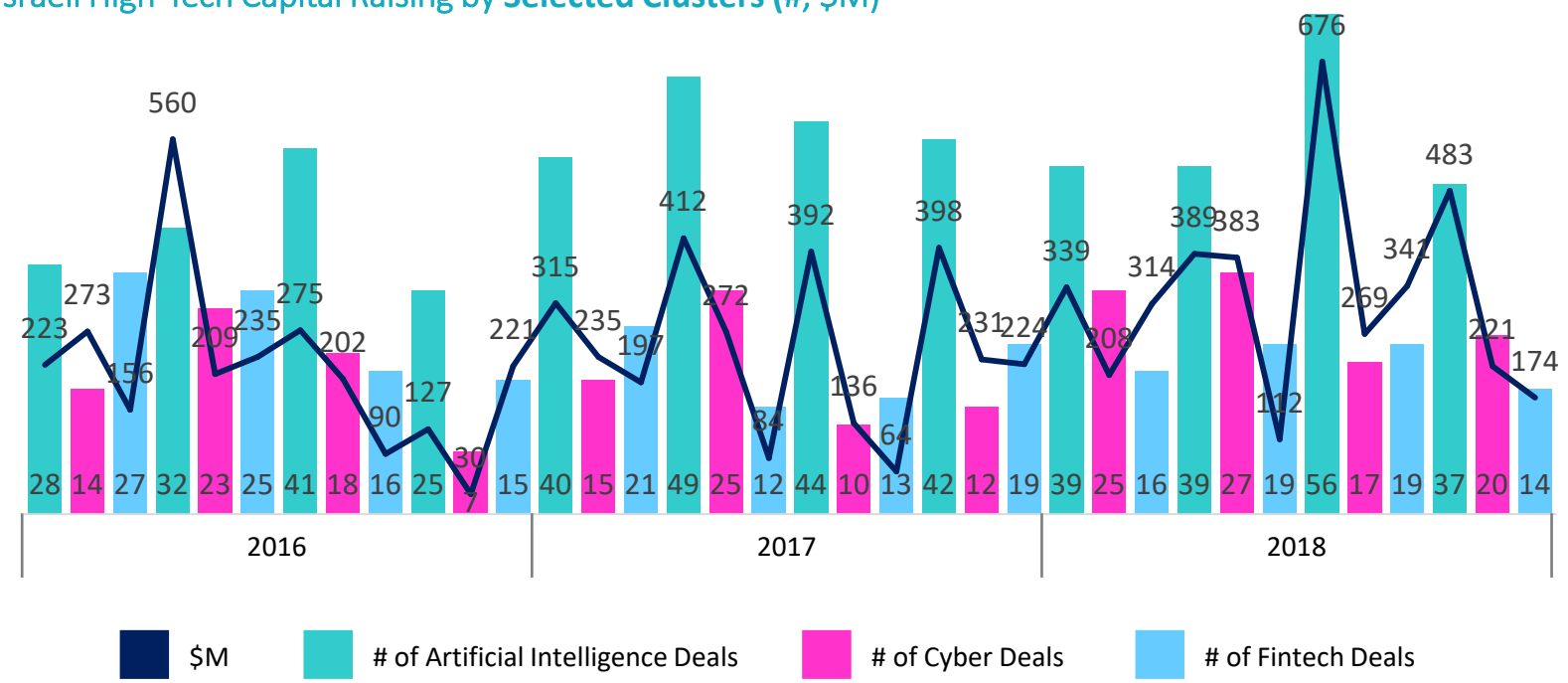
The number of capital raising deals continued the trend in the leading industry verticals: artificial intelligence (AI), cyber security and fintech. Cyber companies continued to show historically high numbers. Demisto was the largest round in the cyber vertical with $43m (acquired in February 2019 by Paulo Alto NETWORKS FOR $560m), Hippo Insurance Services ($70m) in fintech and Habana Labs ($75m) in AI.

2018 was the strongest year yet for cyber security companies in both number of deals and amounts, with 89 deals and $1.08b in investments, much higher than 2017. About half the amount was invested in 15 companies, which raised more than $20m each during 2018.

AI companies underscored the upward trend in valuations. Fintech companies also attracted higher funding in 2018 with several large deals such as eToro ($100m), Next Insurance ($83m) and Hippo Insurance ($95m—in two rounds).

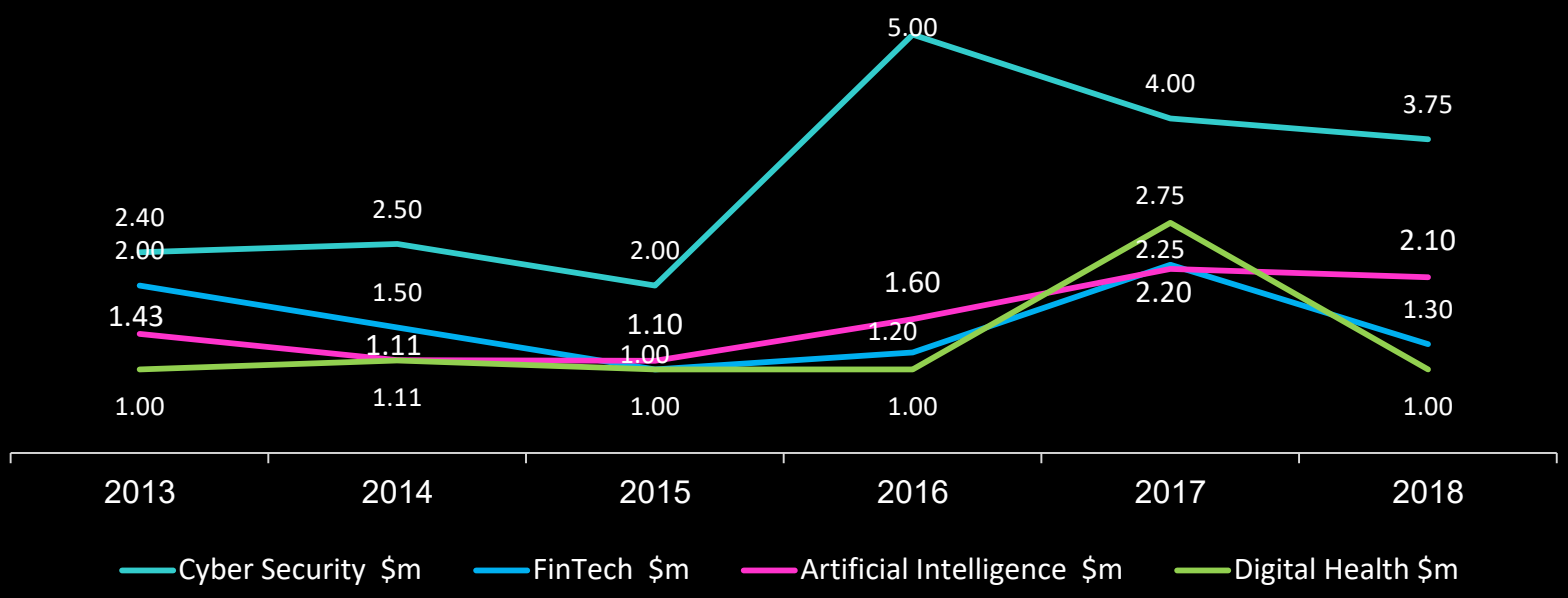
Hippo habana DEMISTO

Israeli High-Tech Capital Raising by **Selected Clusters** (#, $M)



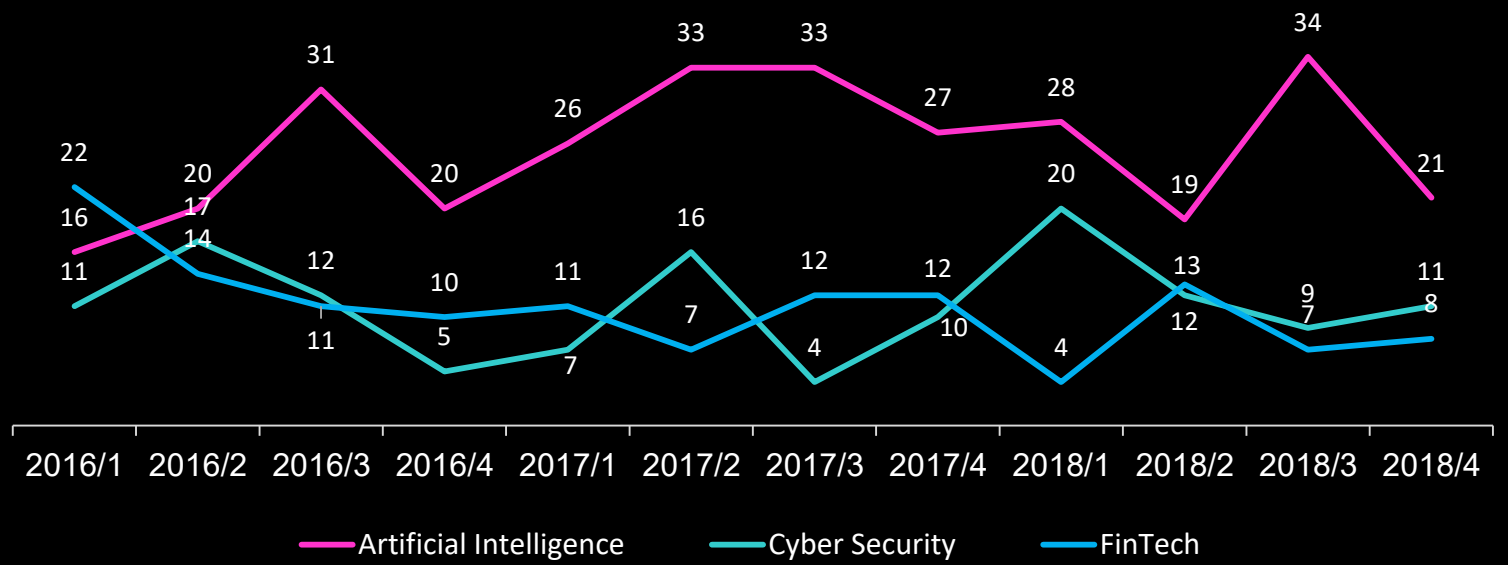
Source: IVC Research Center

Median Israeli High-tech Deals in selected Clusters $M



Source: IVC Research Center

of Israeli High-Tech Deals in Seed and A Rounds in Selected Clusters



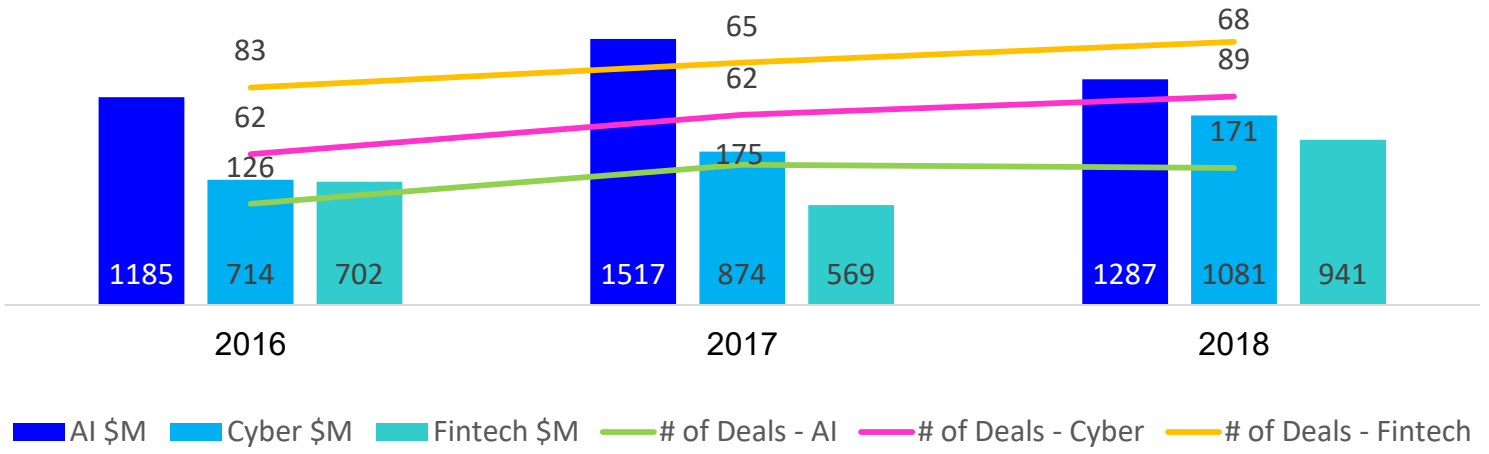
Source: IVC Research Center

AI exits in 2018 totalled $1,150 billion, significantly more compared to 2015–2017. The increase is due to the $850 million Datorama deal. The number of AI exits was slightly down compared to 2017.

Cyber security exits set an all time record at $2,806 billion. The number of cyber exits decreased compared to 2017.

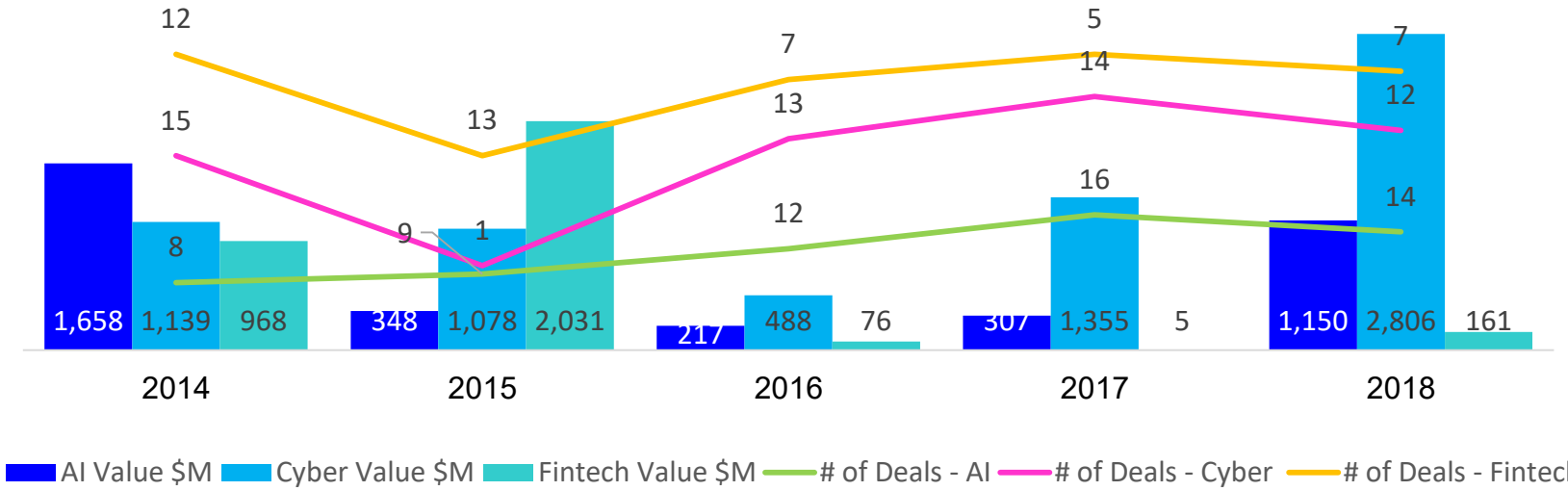
Fintech exits lagged in 2018, seven companies were acquired for $161 million.

Artificial Intelligence, Cyber Security and Fintech Capital Raising



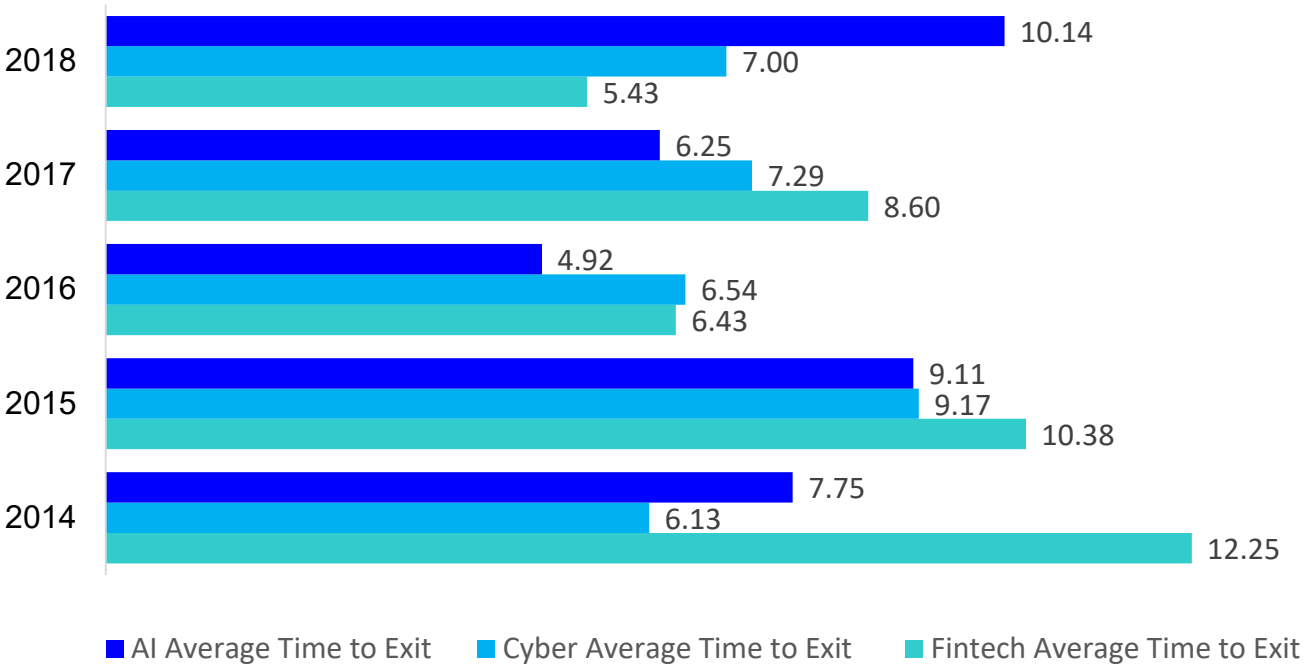
Source: IVC Research Center

Artificial Intelligence, Cyber Security and Fintech Exits



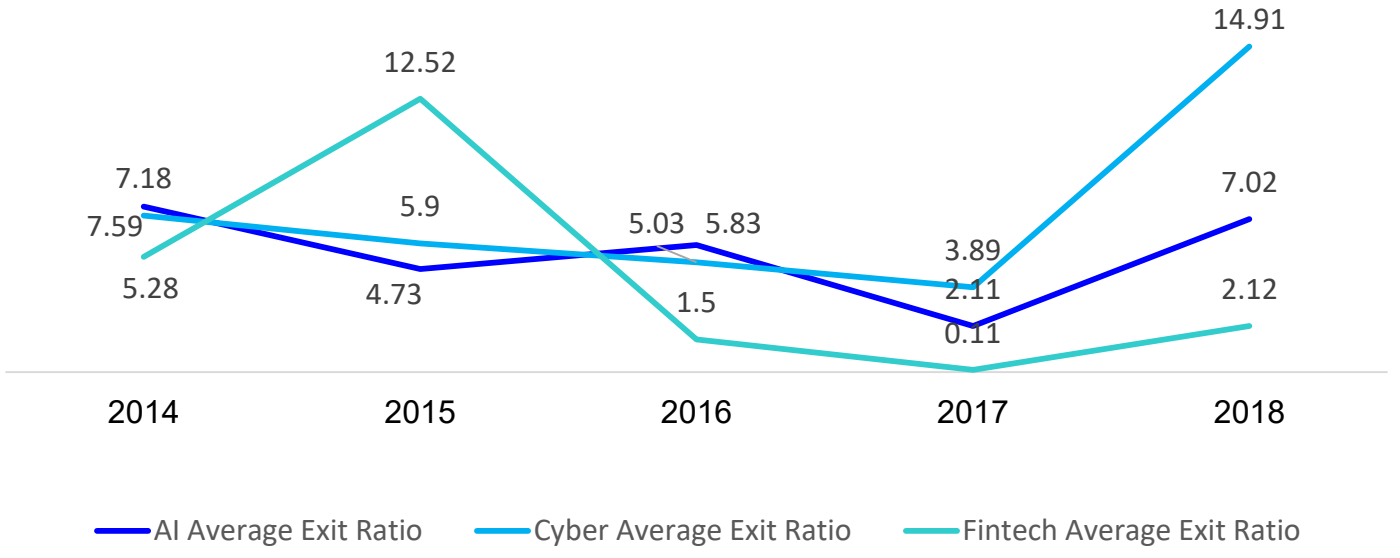
Source: IVC Research Center

Average Time-to-Exit in Selected Clusters



Source: IVC Research Center

Exit Multiple in Selected Clusters



Source: IVC Research Center

PART 6

ISRAELI HIGH-TECH – INVESTORS

PART 6

Key Facts:

In 2018, VC funds first investment activity in Israel was **robust** following the trend of previous years but was **down from the 2017 record**

Israeli and foreign VCs maintained traditional share of first investments—Israeli funds with 39% while foreign VCs took 61%

Lowest number of first investments in Seed rounds since 2014, mostly due to a decrease in foreign VC investments

Corporate VC capital investments have **gradually grown** over the years, reaching 9% of total capital raised in 2018

In 2018, **for the first time**, the number of VCs operating in Israel **surpassed** the number of private investors

The average number of investors per deal showed the **same trend**, while the number of VC investors **continued rising** and the number of private investors remained unchanged in 2018

The follow-on investment average **continued to climb**, while the first investment average **decreased dramatically**. This ran counter to the upward trend of valuations in the industry during 2018

Six types of investors had the largest impact in terms of deal-making in 2018. VC funds held the largest investment share—34% of total capital invested this year.

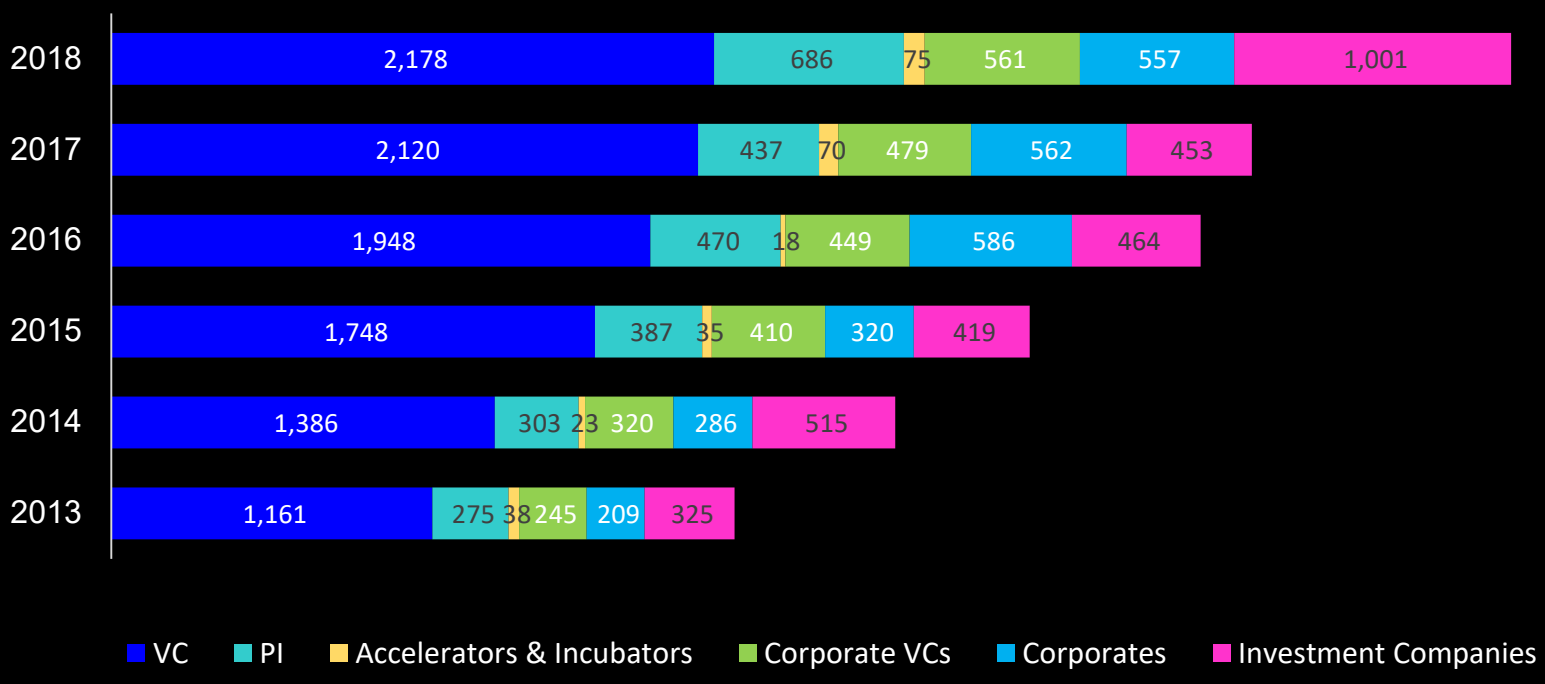
Investment companies and private investors provided another stable source of capital inflow. Corporate VC capital investments have gradually grown over the years, reaching 9% of total capital invested in 2018, similar to the 2017 share. Amounts invested by accelerators and incubators grew to $75m in 2018, following the up-trend in 2017, but are still low.

The number of investments that were made by private investors continued to run counter to VC numbers. While the number of VC investments remained at the 2017 level, the number of private investors fell by 10%.

Israeli VC funds slowed their activity during 2018, both in new and follow-on investments. The annual number of follow-on investments exceeded the number of first investments by Israeli VCs in 2018, marking several quarters of this trend.

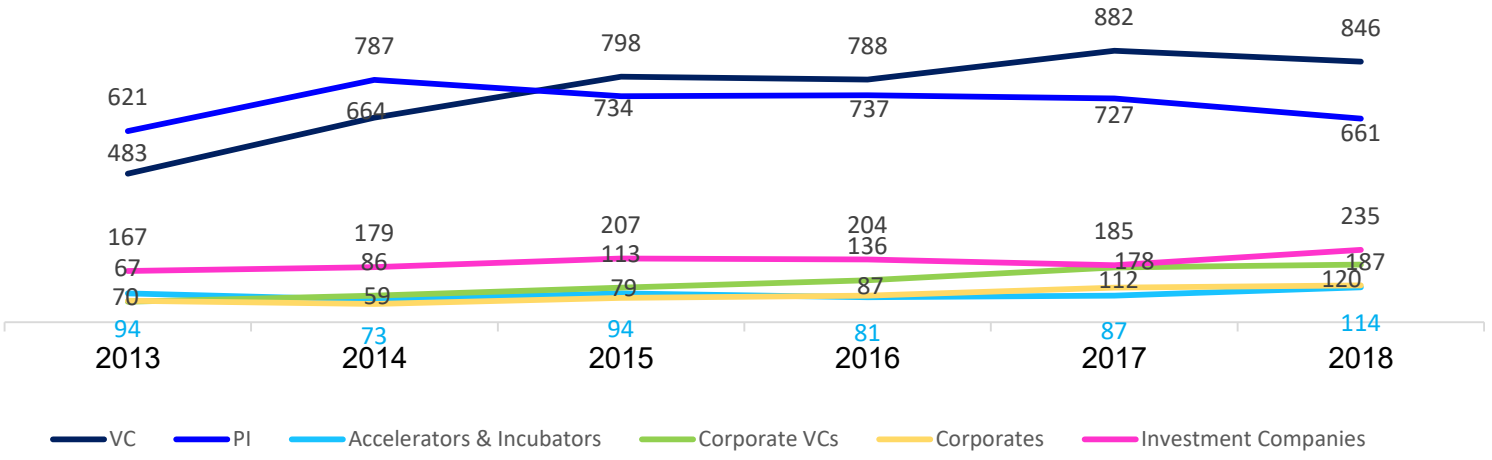
A slowdown in first investments was also noted in the low share of Israeli VCs compared to the total—just 12%—the lowest in six years. The growing need to allocate more money for follow-on investments and the end of 2015–2016 vintage fund lifecycle could provide an explanation for this decrease.

Israeli High-Tech Investments by Investor Type $M



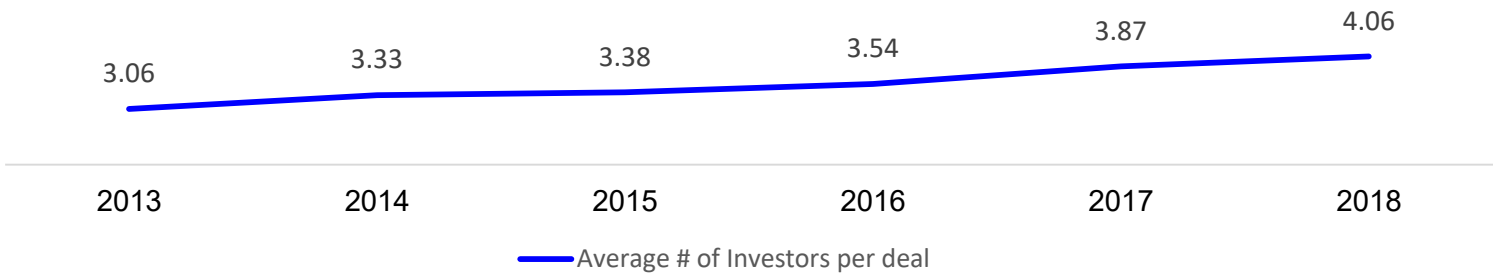
Source: IVC Research Center

of Investments by Selected Investor Types



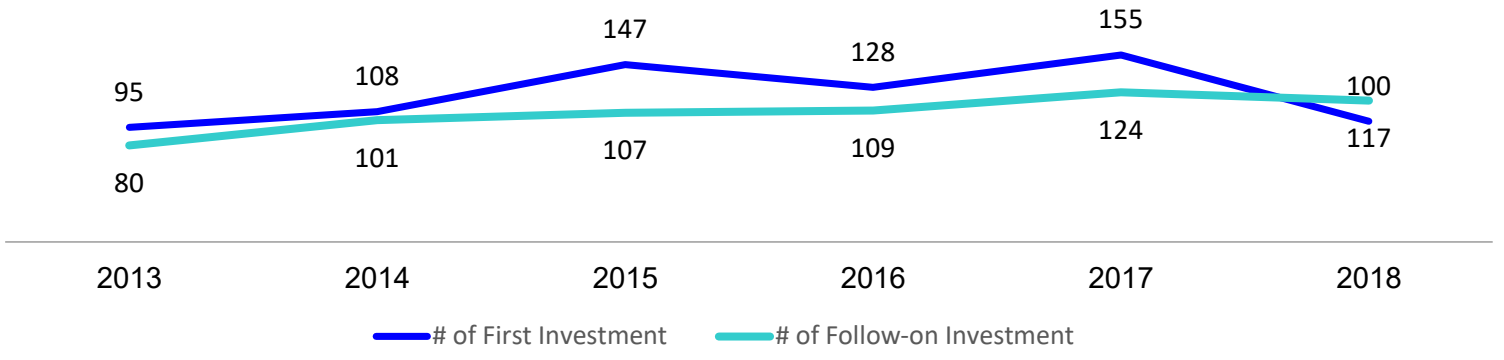
Source: IVC Research Center

Average # of Israeli High-Tech Investors per Deal $M



Source: IVC Research Center

of Investments by Israeli VC Funds: First Vs. Follow-On 2013 – 2018

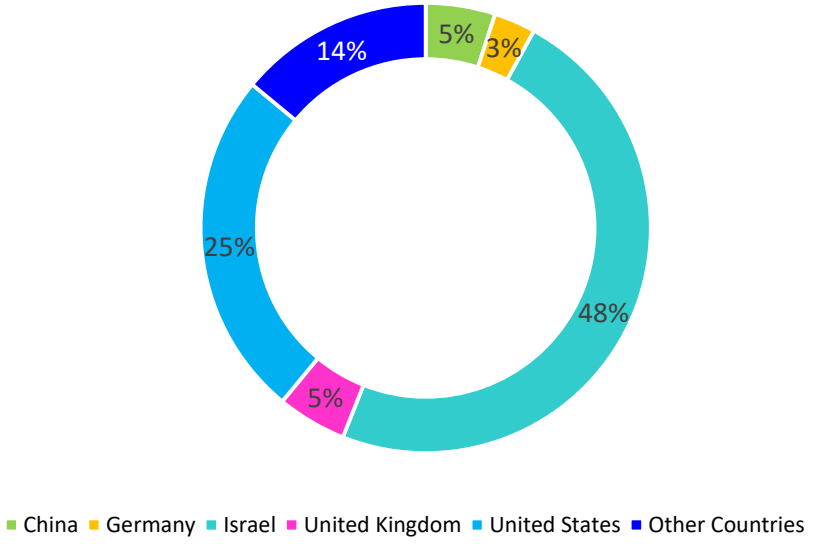


Source: IVC Research Center

Analysis of Investors by Region

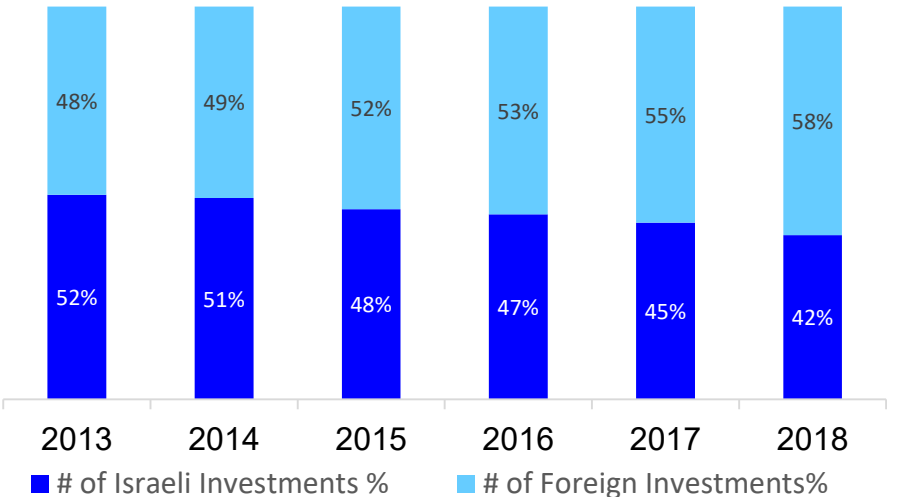
2018 continued the turnover trend from 2013—Israeli investor shares continued to shrink, 42% of total investments, while foreign investors made up 58% of investments. In terms of annual capital investments, 30% of capital invested came from Israeli investors and 70% from foreign investors, in line with historical levels. In 2018, most funds came from investors located in Israel, the United States, China, Germany and the United Kingdom.

of Investments by Investor Region 2018



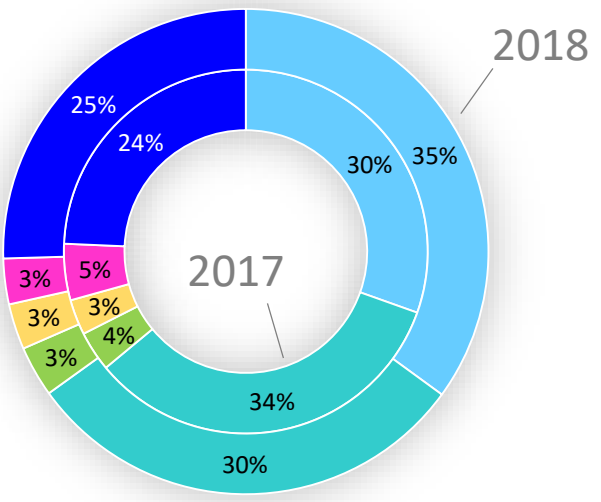
Source: IVC Research Center

of Investments by Investor Region



Source: IVC Research Center

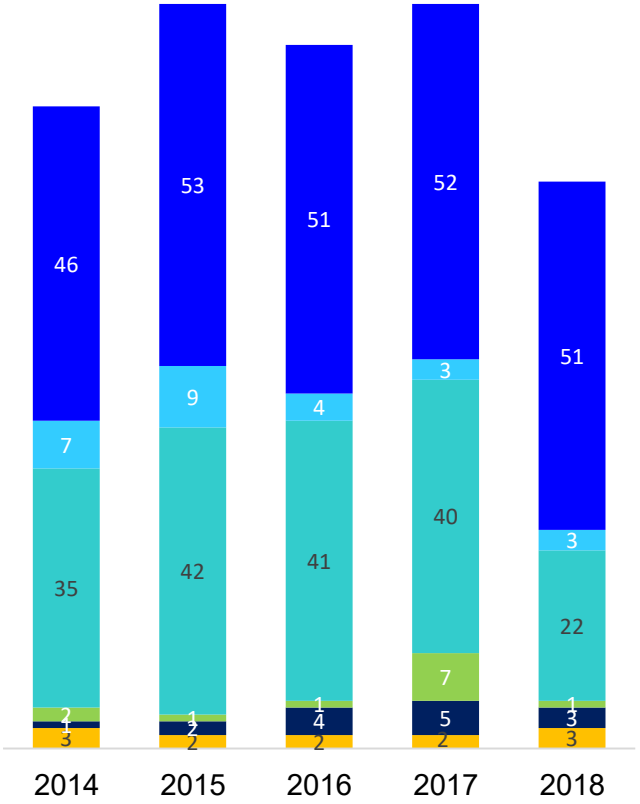
Investment by Investor Region, $M



Source: IVC Research Center

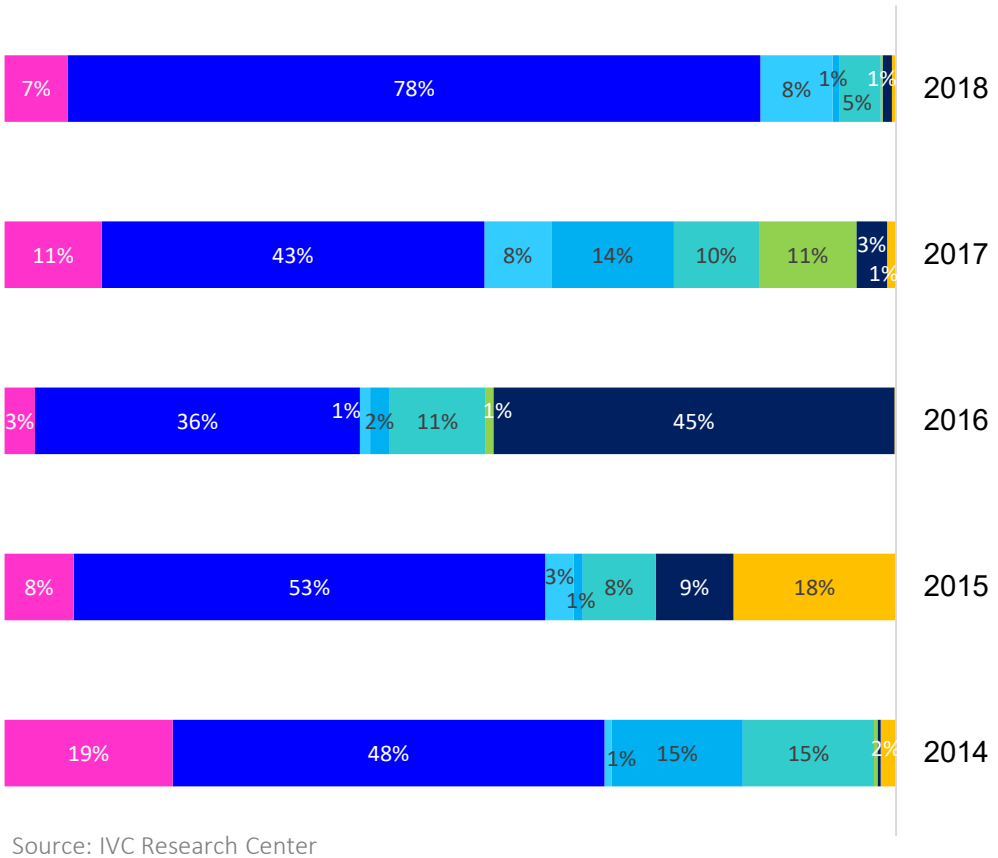
US and Israeli acquirers led 2018 in terms of number of exits. In terms of amounts, the US acquirers captured 78% of the total amount. Chinese acquirers do not yet play a significant role.

of Deals per Acquirer Country of Origin*



Source: IVC Research Center

Deal Value per Acquirer Country of Origin



Source: IVC Research Center

Canada China Germany Israel Japan United Kingdom United States Other

*Excluding exits above $5b and countries with less than ten exits over the last five years

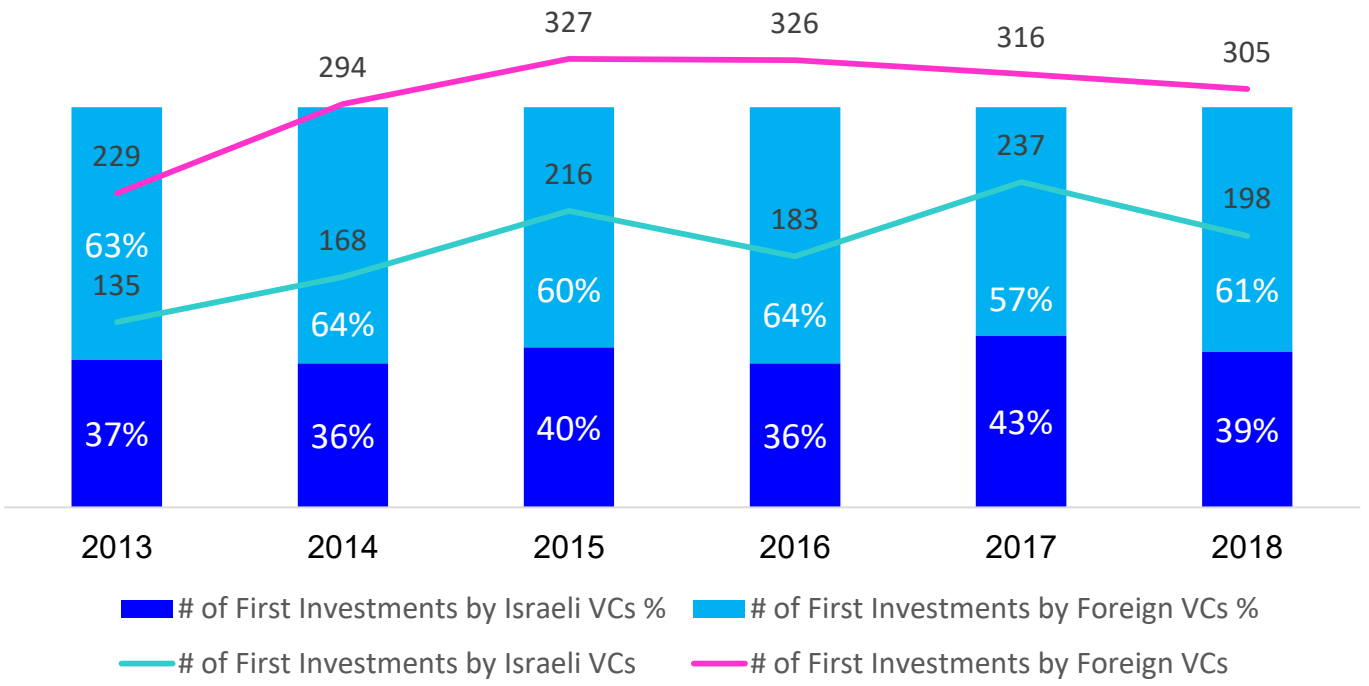
Most Active Fund

In 2018, venture capital funds made 503 first investments in Israeli high-tech companies, a 9% decrease from 2017's record of 553 first investments. Foreign VC funds retained high levels of involvement, their number of first investments was much higher than the 2013–2014 figures. Israeli VC funds demonstrated a return to average first investment activity, both in number of active funds and investments.

Following a very busy 2017 for Israeli VC funds, their share of total number of first investments in 2018 returned to the five-year average of 39%. Foreign VCs regained their regular shares of over 60% of total first investments in 2018. This ratio trend (approximately 40% Israeli VCs versus 60% foreign funds) has remained stable for the last five years.

First investments by Israeli and foreign VC funds have slowed down compared to 2017. This was in line with a general decrease in the number of high-tech financing rounds in Israel this year. Israeli VC first investments fell by almost 17% following an especially active 2017 that saw the highest number of investments of the last five years. Foreign VCs continued their reduced participation which began in 2015, with a small decrease of 4% in 2018.

of Israeli Vs. Foreign VC Fund First Investments



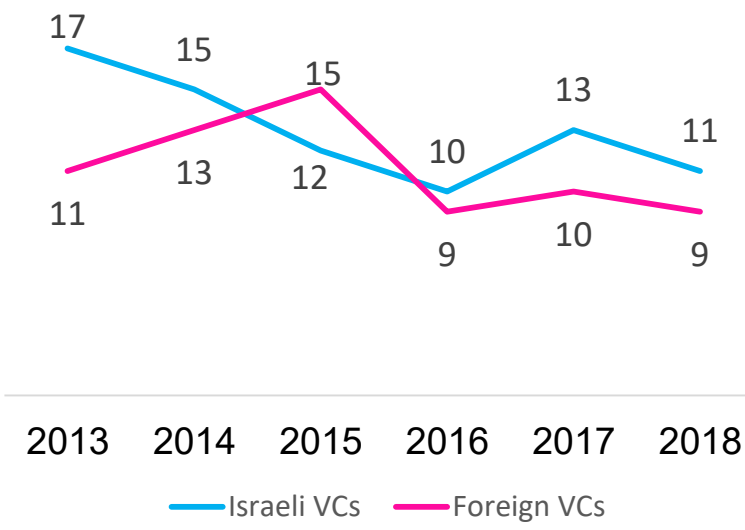
Source: IVC Research Center

There are more foreign VCs in the Israeli market in 2018, while the overall average number of first investments has slightly decreased—from an average of 1.72 investments in 2014 to 1.45 in 2018. Israeli VCs made an average of nearly 3.5 first investments, like previous years.

As in the past five years, the largest annual number of first investments was by Israeli funds. 2015 was the only exception, when an early-stage Japanese VC ranked first, with the largest number of 15 first investments, a record for foreign VCs for the entire five-year period.

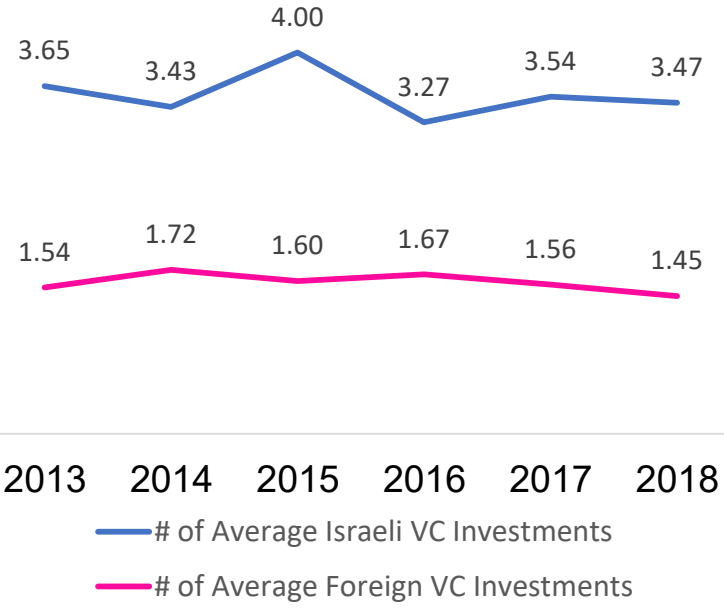
Over the past five years, the number of record first investments by Israeli VCs decreased from 17 in 2013 to 11 in 2018. Record foreign investments have also ranked lower in the three past years.

Record # of First Investments per VC Fund: Israeli Vs. Foreign



Source: IVC Research Center

of Average First Investments per VC Fund



Source: IVC Research Center

First Investments: Micro VC Funds Vs. Other VC Funds

In the Israeli high-tech market, micro VC funds (up to $50m capital under management) focus on Seed and A round financing. In 2018, 83% of their first investments went to these rounds, the same as in 2017. In the two past years, the share of micro VC funds in total first investments fell below 20%. Israeli micro VCs carried out the majority of first investments—75% in 2018.

First Investments by Round

In 2018, first investments in Seed rounds accounted for the lowest share since 2013, only 33% of all investments, compared to 35%-40% in the five previous years. The major decrease was seen among foreign VC funds, which made only 77 first investments in Seed rounds, a drop of 28% from the range during the three previous years. For the third year in a row, A rounds, with a 38% share this year, were viewed as preferable among VCs that are expanding their portfolios.

Creating Collaborations and Promoting the High-Tech Industry

Merav Kenan, CEO of the Israeli High-Tech Association

The Israeli High-Tech Association of the Manufacturers' Association of Israel is one of the leading institutions engaged in the field of high-tech and innovation in Israel. It serves as a professional home that promotes the industry and represents more than 250 Israeli and multi-national companies active in the various fields of high-tech.

At the Association, our goal is to create solutions, collaborations, and promote the real value of the high-tech industry, which is one of the anchors of the Israeli economy. As part of our work, we strive to promote production and export, increase the scope of employees in the field and reduce gaps between the high-tech and local industries. Consequently, we work to foster economic growth and representation of the industry before the government in order to help advance the processes of setting policy and removing obstacles. We collaborate with an extensive ecosystem, the Innovation Authority, the Israel Standards Institution, the Export Institute, colleges, universities, etc.

The past year, 2018, was particularly challenging for the Israeli High-Tech Companies Association at the Israeli Manufacturers' Association, as we decided to turn the Association into one of Israel's leading organizations. The Association has an important impact on government decision makers and policy setters. The goal was to develop a productive and creative high-tech industry—to search for innovative technologies and create a connection between the innovation of the Association's companies and the economy's industrial companies.

In the past year, we have succeeded in convincing the government to invest in technological innovation in a variety of fields. We conducted research and comprehensive conversations with many figures in the industry and have created an outline for assisting the Israeli high-tech industry to develop and grow. We understand that the subjects that are of central importance to these companies are primarily industry financing, advanced production, technological education, and shortage of manpower—and we have worked accordingly.

Moreover, this year, we recruited a large number of clients, including leading companies in the industry such as Flextronics, Microsoft, Avaya, Allot, and many more. We plan to expand our activity this year in the following industries: cyber, AI, digital medicine, Industry 4.0, etc. We believe that investment in these fields will help Israel become an international leader at the forefront of technology. I call upon all companies to join the force we have created at the Association and invite all of our partners to take part in creating the change that will benefit the entire industry.

WHEN ART AND TECHNOLOGY MEET

Can Computers be Artists?

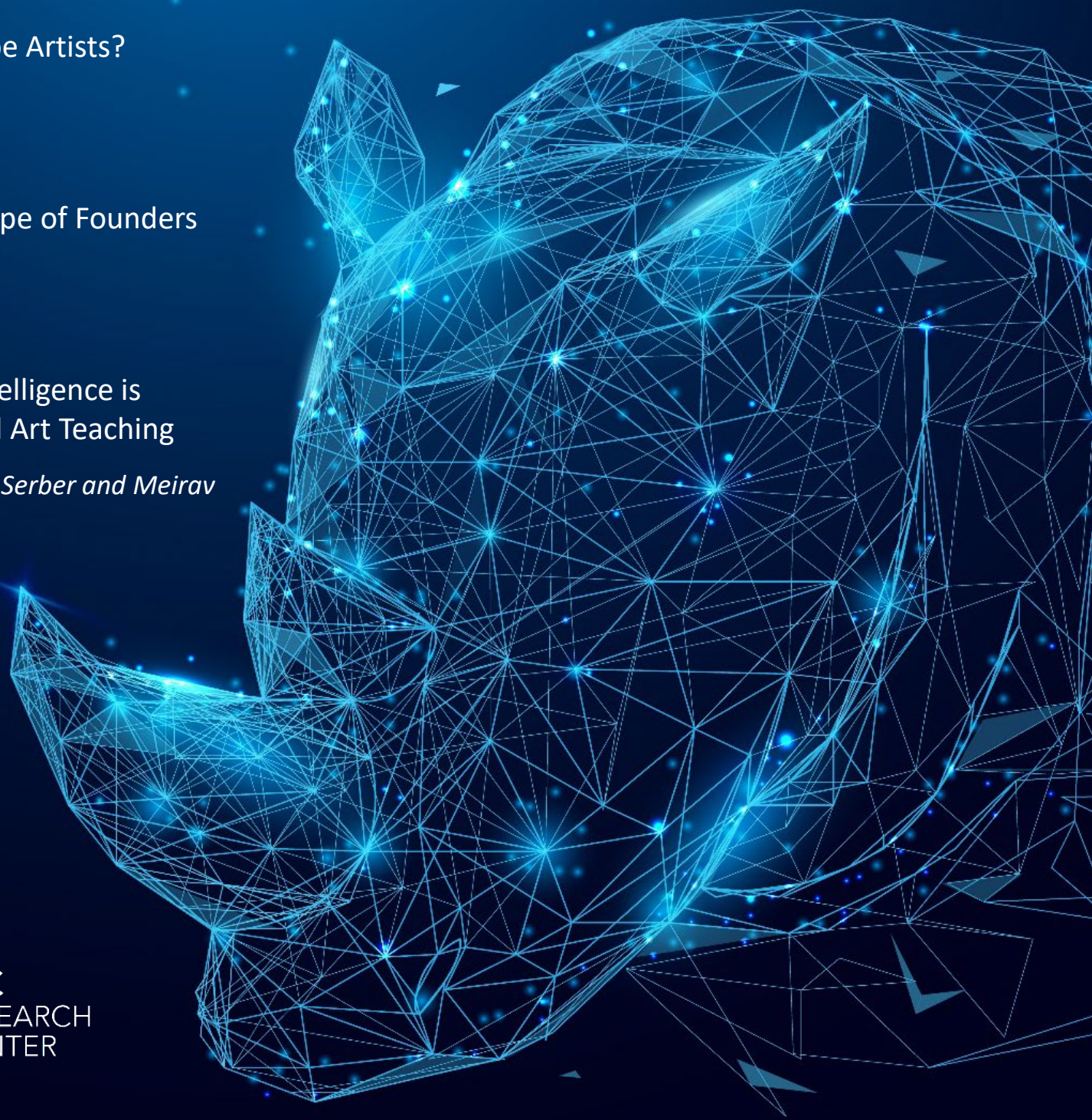
Yonatan Levy

Artists–A New Type of Founders

Nir Hindi

How Artificial Intelligence is Changing Art and Art Teaching

Eran Ehrlich, Sasha Serber and Meirav Groll



IVC RESEARCH CENTER

Can Computers Be Artists?

Yonatan Levy

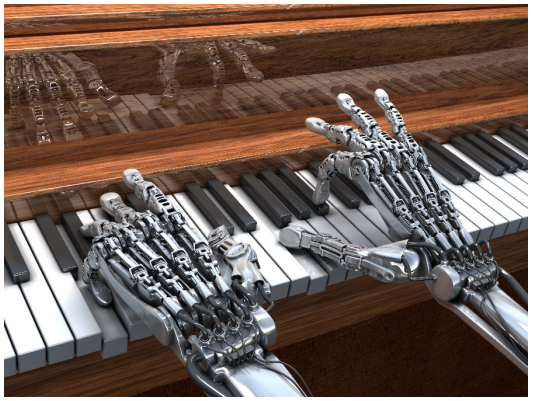
Portrait of Edmond Belamy was recently auctioned for $432,500—almost 45 times its appraised value. The crude, textured image was the first-of-its-kind to be sold at a reputable auction house. Yet it wasn't the selling price or estimated worth that sparked the heated discussions that roiled the art world; it was the fact that the portrait was created by an algorithm, a series of code developed by a Parisian collective. The artificial intelligence (AI) researchers and artists behind the piece call themselves Obvious; a curious name for those who are weaving the threads of technology and art more tightly together than ever before.

Obvious is not alone, since 2012, Professor Ahmed Elgammal and his team inside Rutgers' Art and Artificial Intelligence Lab have been building software programs that generate beautiful, original paintings. Through their research, they have watched as human judges were unable to distinguish between a machine-generated artwork and a hand-made one. Surprisingly, images created by AI were consistently ranked as more novel and more aesthetically appealing than anything made by real-life artists.

The visual art world is not the only creative realm experiencing disruption. Amper Music has developed an algorithm that considers a user's mood and preferred musical genre before returning unique, personalized music back to the listener. From IBM Watson Beat to Google Magenta's NSynth Super, Jukedeck and Melodrive to Spotify's Creator Technology Research Lab—an entire musical industry is cropping up, with AI at its core.

Defining New Standards

Collectors pride themselves on getting whatever artwork is in highest demand. Values skyrocket when an original comes on the market. A background story, unusual technique, visible and hidden mistakes, even the effort that goes into acquiring a particularly elusive piece—can drive discussion and subsequent worth (and enjoyment) of a work of art. Scarcity gives something meaningful and worthwhile to talk about. Rarity becomes a prize. While an artist can only produce so much work in a lifetime, a machine can potentially manufacture thousands of creations with the click of a button. By what criteria can these mass artworks be valued? Should the art industry be regulated and protected from meddling AI fabrications?



Though such questions have been pondered in the art world, they warrant pause in a broader context: Where is the line separating creation and entertainment? If several artists use the same machine, what happens if the final outcomes are similar? What about the architect of the machine and the person who programmed the code? Who is the creator, and who gets the credit?

As our world becomes increasingly interconnected and complex, the rights of artists and creators become more challenging to define. Until the point in which we set a new standard for authenticity and accountability within the art world, we may be trying to outbid each other on paintings—not original canvases painted by hand, but ones manufactured by computers.

Yonatan Levy is a tech product management leader, author and speaker. His products are used in industries ranging from e-commerce and financial services to social networks and cyber security. He recently co-founded STADS Technologies, the first online marketplace for sports advertising, a platform that encourages a collaborative approach for clubs and advertisers. Yonatan is the author of the #1 Amazon Bestseller **The Other Ideas: Art, Tech Products, and the Creative Mind**. For more information visit: yonatanlevy.co.

Artists– A New Type of Founder

Nir Hindi

As of December 2018, Shutterstock's market value is $1.34 billion, Snap's is $7.65 billion, Airbnb's is $38 billion, and Square's is $26.32 billion. If you think about what these companies have in common, what comes to mind? Some will say they are innovative and creative; some will say they are revolutionary. These companies have leveraged new technologies to reshape their industries and create multibillion dollar businesses. However, there is another similarity that may surprise you.

Each of these companies have founders, or co-founders, with backgrounds in art and design. Jon Oringer, the founder of Shutterstock, is a photographer; Evan Spiegel from Snap is a product designer; Joe Gebbia and Brian Chesky from Airbnb are designers, and Jim McKelvey from Square is a glass artist.

The household names in business, and especially in technology, tend to share backgrounds in finance, engineering, software development or computer science. Perhaps it's easier for us to understand them, their ideas, and how their backgrounds led them to these businesses. But how are artists relevant to technological developments? How do they contribute to new products and services? And, what is it about the artist-entrepreneur that we should know? Hint: the artist-designer-entrepreneur is certainly not limited to Gebbia, McKelvey or Oringer.

What follows is one example of this type of curious connection.

In the world of tech startups, Paul Graham is as famous as you can get. This startup guru is a successful entrepreneur and venture capitalist known mostly as the co-founder of YCombinator (YC), a Silicon Valley-based accelerator. YC is known for providing initial investments to some of the most innovative companies in existence today: Dropbox, Airbnb, and Stripe, to name just a few. With more than 200 exits and 85 billion dollars of valuation for their portfolio companies, YC's team probably knows a thing or two about startups. However, what I find interesting about Graham isn't the fact that he's a successful engineer, investor, and entrepreneur. What catches my attention is the fact that he's also a painter. After earning a Bachelor of Arts in philosophy, and a Master of Science and a Ph.D. in computer science, he went on to study painting at the Accademia di Belle Arti in Florence and later at the Rhode Island School of Design (RISD).

The relationship between Graham, YC, and RISD is tied to the story of Airbnb, the online marketplace for vacation rentals. Brian Chesky and Joe Gebbia, the two co-founders of Airbnb, met as design students at RISD, the same institution where Graham studied painting. When they were looking to accelerate their idea, they applied to and were accepted by YC. In 2009, YC, the company co-founded by Graham, became the first investor in Airbnb.

Did Chesky and Gebbia's affiliation with RISD allow Graham to see something different in these two young designers? Perhaps. One thing I'm sure of is the fact that the meeting of Graham and this creative duo worked to everyone's benefit. When asked about Airbnb, Graham replied that "we didn't love the idea of renting spare rooms to strangers … but we knew we were going to take them." Graham and his YC team believed in these founders.

What makes it remarkable is that it all happened almost ten years ago, when investing in entrepreneurs with art and design backgrounds was uncommon. The investment world was (and still is) far more inclined to invest in companies founded by programmers, engineers, and MBA graduates.

Word is spreading among investors about what YC did in 2009. Although we are living in times where valuations are reaching unimaginable numbers every few months, one interesting data point was revealed in 2016 by Kleiner Perkins, the Silicon Valley-based investment firm in their Design in Tech report. What they discovered was that approximately 20% of the global Unicorns (private VC-Backed companies with valuation over one billion dollars), at the time, had either co-founders who came from an arts and design background, including architecture, music, fine arts, media arts, or founders who had embraced this creative approach as part of the core of the company.

As founders with creative backgrounds are becoming increasingly common, some venture capital firms, right along with their multimillion-dollar portfolios, are catching up. Unsurprisingly, many of these firms have begun to add design partners to work with startups during their formative stages.

Why artists and designers, you may ask? While you might think that it's important to bring them on board to formulate aesthetics and visuals, I'd like to suggest another way to think about these founders or potential collaborators. Instead of considering art as a way of doing, that is to say, what the painting or product looks like, consider art as a way of thinking.

Two characteristics come to mind when I think of creative talent, especially as related to artists: the ability to reflect the movements and changes in human culture, and questioning and challenging the status quo.

For generations, artists, as natural explorers, have been active in the borders between what we as humans know and don't know. History shows that artists' bold experiments and inventions often encourage new behaviors, norms, and values that eventually become mainstream. If you are curious to learn about cultural changes or what lies behind the transformations in human behavior, familiarize yourself with what artists are doing today. Most likely, it will become popular in a few years' time.

Google understands this, which is why they've established the Data Art Group, the Artificial Intelligence and Art Team, and other units that work with artists in order to learn from them and have mutual exchange.

Artists are also relentless about challenging the status quo—they ask hard questions about the world around us and its social, political, and economic structures. Exploring the capabilities of technology, and its role in human life, is an essential part of this. All too often, we imagine an artist as a sixteenth-century painter locked in a studio laboring over a portrait.

Yet, artists are like us—interacting with the world in which they live, and in our era this includes working with data and technology.

Word is spreading among investors about what YC did in 2009. Although we are living in times where valuations are reaching unimaginable numbers every few months, one interesting data point was revealed in 2016 by Kleiner Perkins, the Silicon Valley-based investment firm in their Design in Tech report. What they discovered was that approximately 20% of the global Unicorns (private VC-Backed companies with valuation over one billion dollars), at the time, had either co-founders who came from an arts and design background, including architecture, music, fine arts, media arts, or founders who had embraced this creative approach as part of the core of the company.

When we think about these defining characteristics of creative talent, we understand why we must expand our horizons to include the arts in our search for new ideas. An artist's inclination to challenge their surroundings and engage with technology in a unique way can open new possibilities.

Artists such as Fujiko Nakaya, Michael Naimark, or the late Stephen Wilson are pioneers who have worked with technology since the 1960s, developing revolutionary concepts, ideas, and prototypes that have become real products such as the MeeFog or Street View technology.

Entrepreneurs are constantly being encouraged to think differently and creatively. This advice should apply to the investment world, too. Maybe, just maybe, investors should get to know the talent that comes from a program such as the Interactive Telecommunications Program (ITP) at NYU. Or how about artist incubators like The NEW INC, the first incubator led by a museum? Or, maybe we need to just keep an open mind when an entrepreneur with an MFA instead of an MBA comes calling.

Is it possible that Graham's creative background helped him see beyond the standard requirements and resume of a tech startup founder when it came to Chesky and Gebbia?

My advice is that you might have a future Chesky and Gebbia knocking at your door. Don't rush to send them, and their $31 billion idea away.

Nir Hindi is the founder of The Artian, a company which applies methods and practices from the art world in a business context to foster innovation. He is the founder of the Art & Tech event series at the Google Campus Madrid. He recently published his book Renaissance of Renaissance Thinking – A New Paradigm in Management *in Japan*.

Artificial Intelligence is Changing Art and the Teaching of Art

Eran Ehrlich, Ph.D. and Sasha Serber and Meirav Groll

Over the last decade, arts education in the West has undergone sweeping changes spurred by the revolution in technology that is continually advancing. Much like the industrial revolution of the nineteenth century, the recent innovations in technology have changed the face of art in general and arts education in particular. One might even speculate that the impact is more dramatic than the invention of photography and the implications greater than mechanical reproduction. The technological revolution has brought about a fundamental change in the way raw materials are perceived as well as in the actual production process, and the effects are being felt in art schools and studios around the world.

In Israel, however, the field of art education has reacted with uncertainty in the face of this revolution. The academy continues to cling to its conservative views and outdated concepts, favoring tradition over progress. The conservative and technophobic attitude of a majority of the instructors is out of touch with global learning programs, which have advanced beyond the traditional approaches to art-making, classical painting methods, the study of anatomy and working in the traditional materials of wood, stone, and metal.

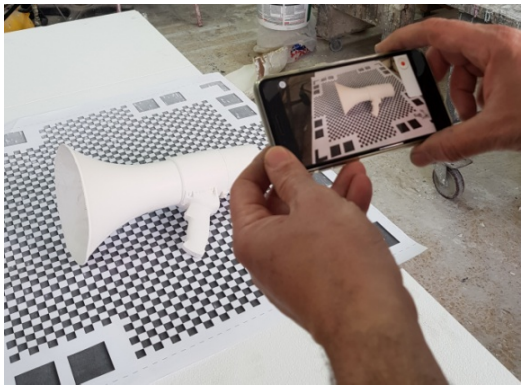
This has resulted in a generation gap in the word of art education in Israel, where workshops and courses offering new and contemporary content, and teach young artists how to utilize the most up-to-date technologies and help them to develop creative thinking that will engage with the rapid technological changes taking place around us, are unfortunately desiderata.

With more than forty years of combined teaching, lecturing and designing under our belt, we (Eran Ehrlich, Ph.D. and Sasha Serber, a professional artist) have initiated a new 3D sculpture laboratory in Bezalel Art Academy. Armed with a desire for change, we investigate this issue further by taking new and progressive steps, adapting and introducing new technologies to art and design schools in order to catch up with the current global technological revolution. Our goal is to make the virtual world accessible to art students and provide them with a new creative space in which to explore it.

Until now, attempts to introduce students to the virtual world have used complex, hard-to-learn software, which is not suitable for most art students whose natural intuition clashed with the current work methods.

The laboratory provides a means to investigate new methods that allows the students to develop their creative thinking in the virtual world without having to learn engineering software. By using accessible phone apps, such as simple and effective scans, and most importantly a new AI application called BOTS 101, it is possible to construct 3-dimensional objects, process them digitally, and generate physical objects using the new means of production.

Traditional methods meant using physical material, and processing them in classical techniques to obtain an object. Even though this is a valid method, it is important to understand that today's art and the ways it is produced, should not be limited to physical materials and work methods. Our laboratory offers the ability create a completely intuitive object, in cyberspace, using a computer, a smartphone and the internet.



Qlone Scanning App

An essential tool in the process is the above-mentioned AI application BOTS 101. This is an online platform whose purpose is to make it easier for artists and designers to take advantage of the virtual world during their work process.

The platform was developed in Israel by Eyal Nir, an architect by trade, and unlike other software such as Rhino, Solid, or Autocad, there is no need to download it or expend effort to learn it. After initial payment and uploading, the platform can be accessed from any computer with an internet connection. To communicate with the AI engine, the user must use a pre-set terminology, which will then allow him or her to create 3D objects faster and more accurately than other software programs as well as modify them by using written commands. An important aspect that distinguishes the platform from other 3D software is the user's ability to broaden the stored terminology by teaching it new commands and modifying it to meet the user's specific needs and requirements.

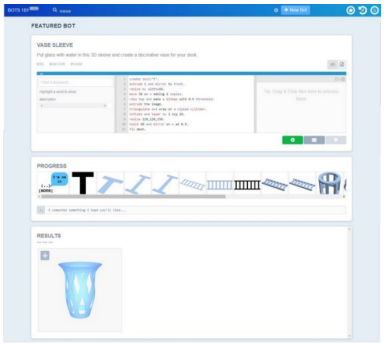
Bezalel 3D Laboratory- Introduction to Clay Printing

After we created the 3D laboratory, our first step was to experiment and communicate with the AI engine in order to formulate a large enough terminology in order to begin and then to prepare for the second step—working with our students on exhibiting the products made with its help.
There is still much to learn and develop, and the process must (and will) be simplified further. Currently, our goal is to facilitate the way files are sent to the ceramics 3D printer in order to circumvent the use of additional software.

3D Potter Clay Printer

3D Systems Sense Scanner

By 2020, we intend to create an experimental learning program that will provide students with a doorway to the amazing world of 3-D printing and cyberspace where they will be able to use cutting edge technological advancements for their artistic endeavors.



Bots 101 Website

An Arrow from the Bow of Keshet Eilon

KESHET EILON
Music Center

Keshet Eilon? What actually is Keshet Eilon? Are you an archery center where people practice with bows and arrows? These are just a few of the questions we sometimes hear at Keshet Eilon, and perhaps now is the time to talk a little about the Keshet Eilon Music Center.

Keshet Eilon Music Center was founded in 1990 in Kibbutz Eilon. Its general manager Gilad Sheba, then a music teacher at the kibbutz high school, was well aware that the mass immigration underway from what at the time was the Soviet Union, promised an influx of musicians, and he looked for a way to contribute to their successful absorption in Israel. Together with fellow musicians Itzhak Rashkovsky (today Keshet Eilon's music director) and others, he initiated Eilon's first young musicians' convention. The first group to attend Keshet Eilon's Summer Course included string musicians from England and the Soviet Union. The course was a resounding success. The participants decided to meet again the following summer – and that was how it all began. Since then, Keshet Eilon's International Summer Mastercourse has taken flight and made a name for itself all over the world.

What is Keshet Eilon's objective? To promote string-instrument playing in Israel and throughout the world. To this end, apart from the Summer Mastercourse, the Center also holds two seminars each year. These

צילום: עודד שואף

What is Keshet Eilon's objective? To promote string-instrument playing in Israel and throughout the world

two events are designed for string musicians from all over Israel, and participants include many students from Israel's Arab community.

Admission into Keshet Eilon's Summer Mastercourse isn't easy. Following scrupulous grading of the hundreds of applications sent to the Center every year, some fifty-five young string musicians between the age of 16 and 26 are finally accepted.

From among the 1,300 graduates of our International Summer Mastercourse, some are today members of the world's major orchestras, and some have become important soloists; Keshet Eilon graduates include Vadim Gluzman, Alena Baeva and leia zhu, and this is just a very partial list.

Working with young, enthusiastic students, and especially with talented young musicians is highly enjoyable, and sometimes, we even learn from them.

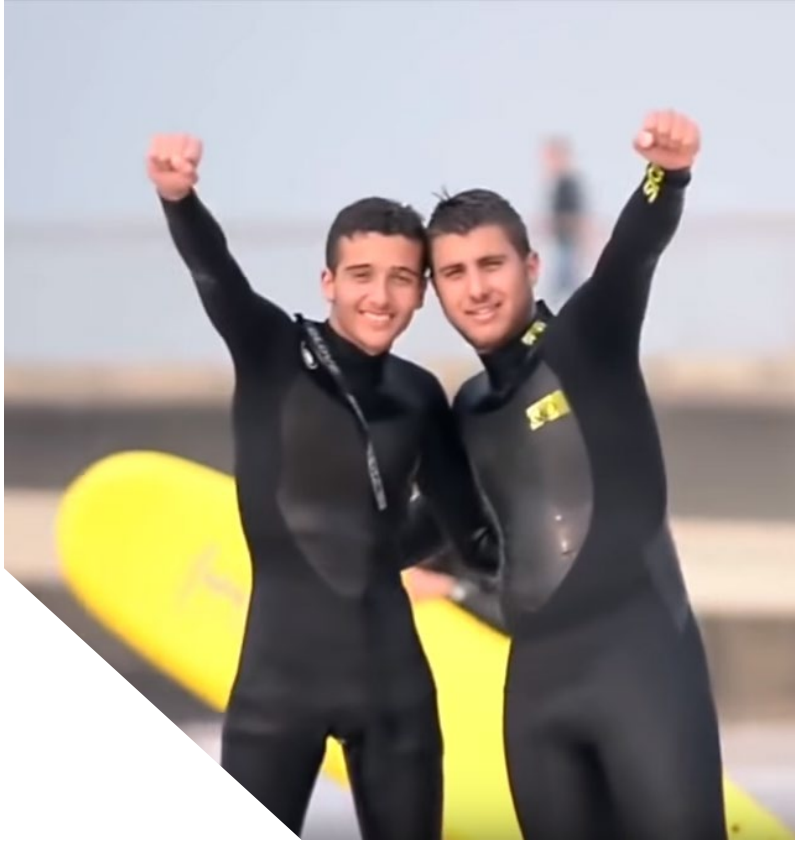
Thus, for example, our students showed us a solution to a problem that had baffled the musical world: the problem of the page-turner. Since pianists generally use both hands to play, they need someone to turn the pages of their sheet music. Observing our young pianists, we noticed that they were reading from their tablet computers and turning their own pages using a foot pedal operated by wi-fi. What a brilliant invention, we said to ourselves as we watched them. How come no one has ever thought of that before?

Want to know more about us? Visit our website at http://www.keshetei.org.il.

tmura

THE ISRAELI PUBLIC SERVICE VENTURE FUND

Share a Little Upside with Society



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Come join the over 600 companies that have allocated equity to Tmura and you too can experience the great feeling of "giving back!"

Contact Baruch Lipner: baruch@tmura.org

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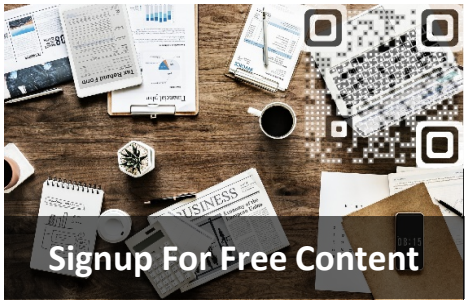

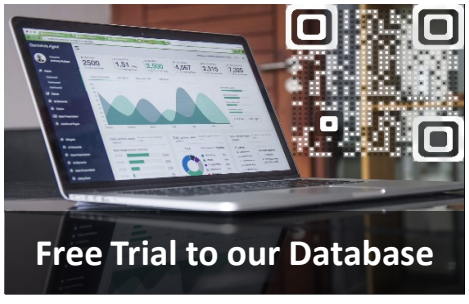

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