The role of Entrepreneurship in making Israel - Hi-Tech Nation

RAFI NAVE - 2016

The role of Innovation and Entrepreneurship in the fast moving new world

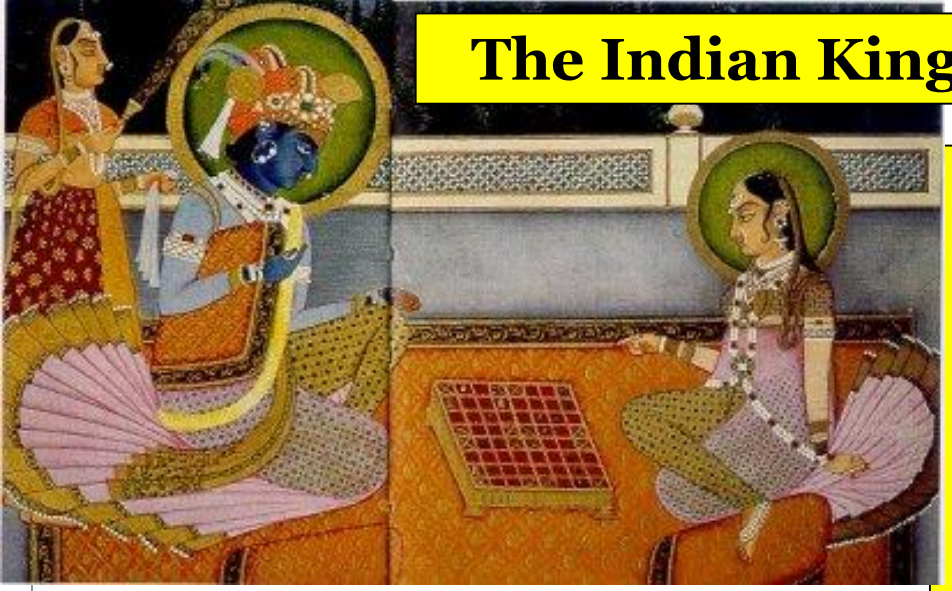
In 2000 all this didn't exist

Google

YouTube

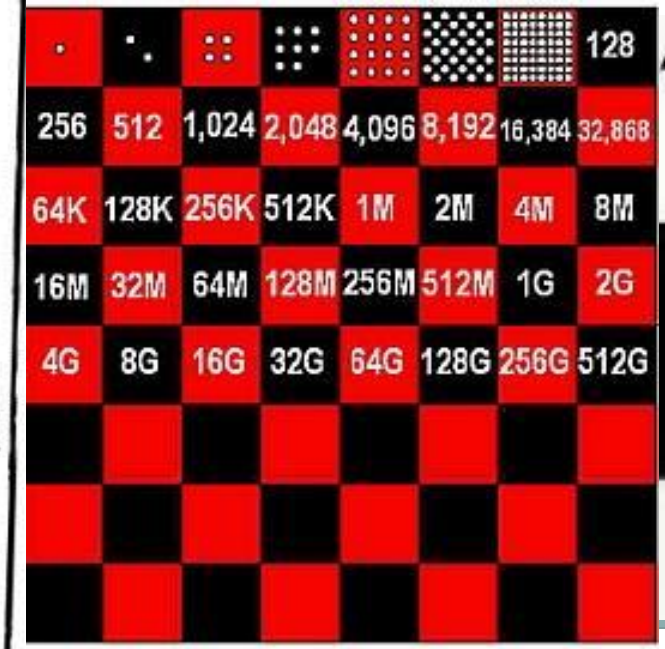
DOWNLOAD

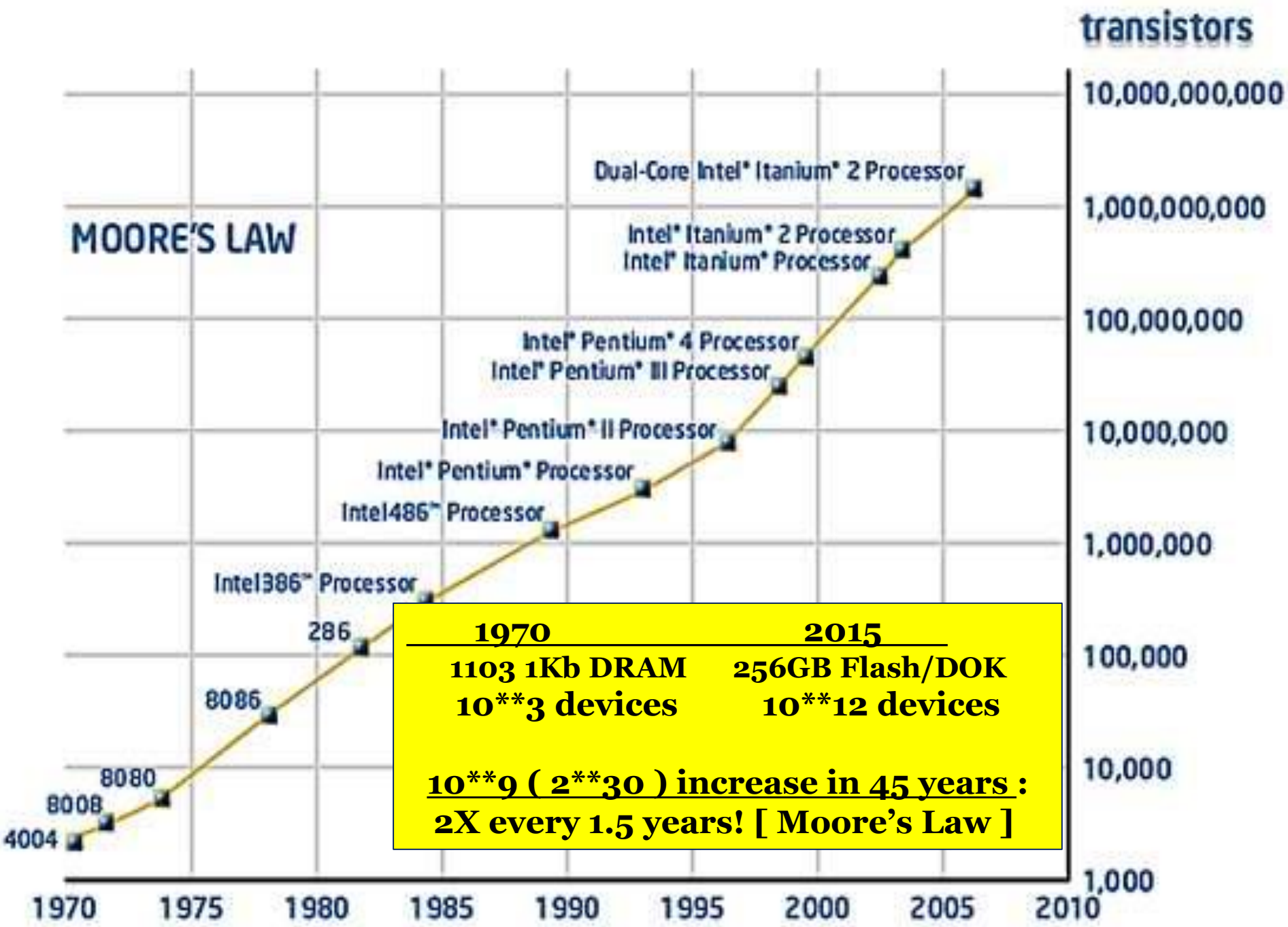
The Indian King and the Chessboard problem



If a chessboard were to have wheat placed upon each square such that one grain were placed on the first square, two on the second, four on the third, and so on (doubling the number of grains on each subsequent square), how many grains of wheat would be on the chessboard at the finish?

$$T_{64} = 2^0 + 2^1 + 2^2 + \ldots + 2^{63} = 2^{64} - 1 = \sim 2*10^{19}$$



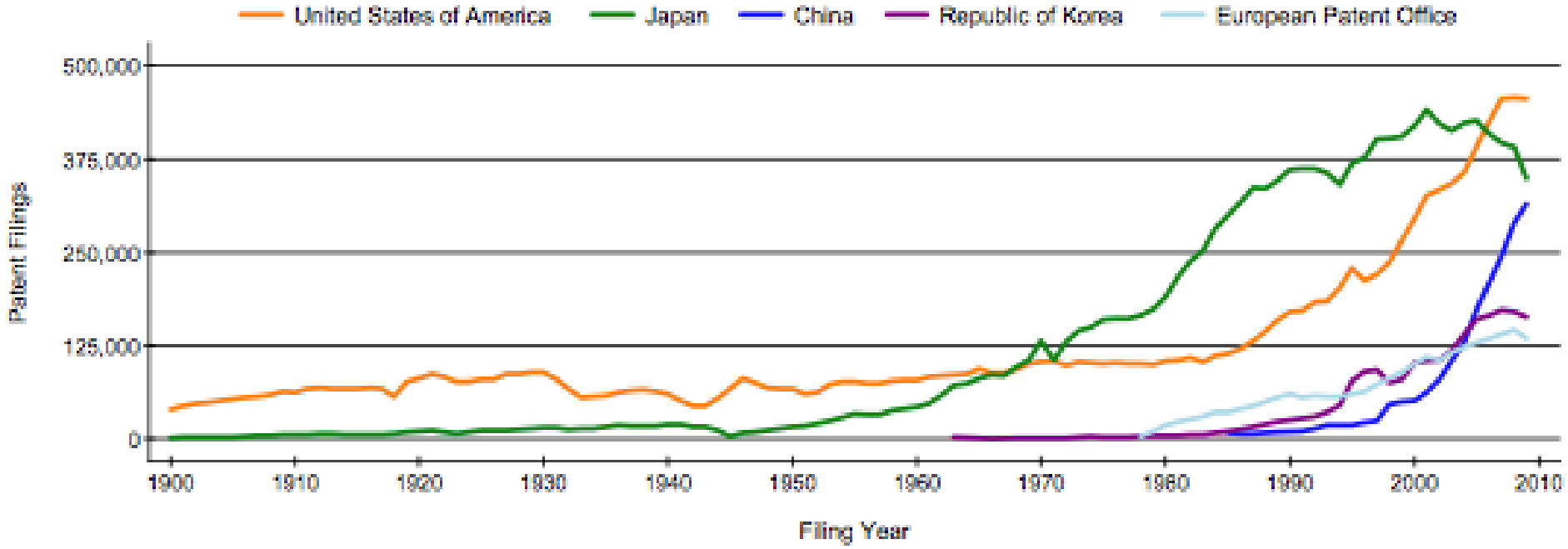


1970	2015
1103 1Kb DRAM	256GB Flash/DOK
10**3 devices	10**12 devices

109 (2**30) increase in 45 years :**
2X every 1.5 years! [Moore's Law]

Historical perspective

Exponential growth of technologies



The number of patents annually grew dramatically in recent decades

Source: WIPO Statistics Database

WIPO
WORLD INTELLECTUAL PROPERTY ORGANIZATION

Power of Technology Progress

We dramatically underestimate the power of future technology progress

Intuitive linear view:

- We think of a future period at today's rate of progress
- Our memories are dominated by our recent experience
- "rear mirror wired"

Historical based Exponential view:

- But, we are doubling our rate of progress every few years
- So, in this century, we will experience 20,000 years of progress, at today's rate!
- And we must! otherwise we'll need 5 planets!

Source: EU Perspectives 2020; WWRF 2007 **Book: "Abundance" by Diamandis&Kotler**

Some indications:

- The compute power of one current smart-phone exceeds all Mankind compute power 50 years ago!
- The amount of data/information produced in one year exceeds the data volume produced since the dawn of history till that year!
- A typical Encyclopedia fits on a Disk On Key!
- Smart-phones and PCs new models every year

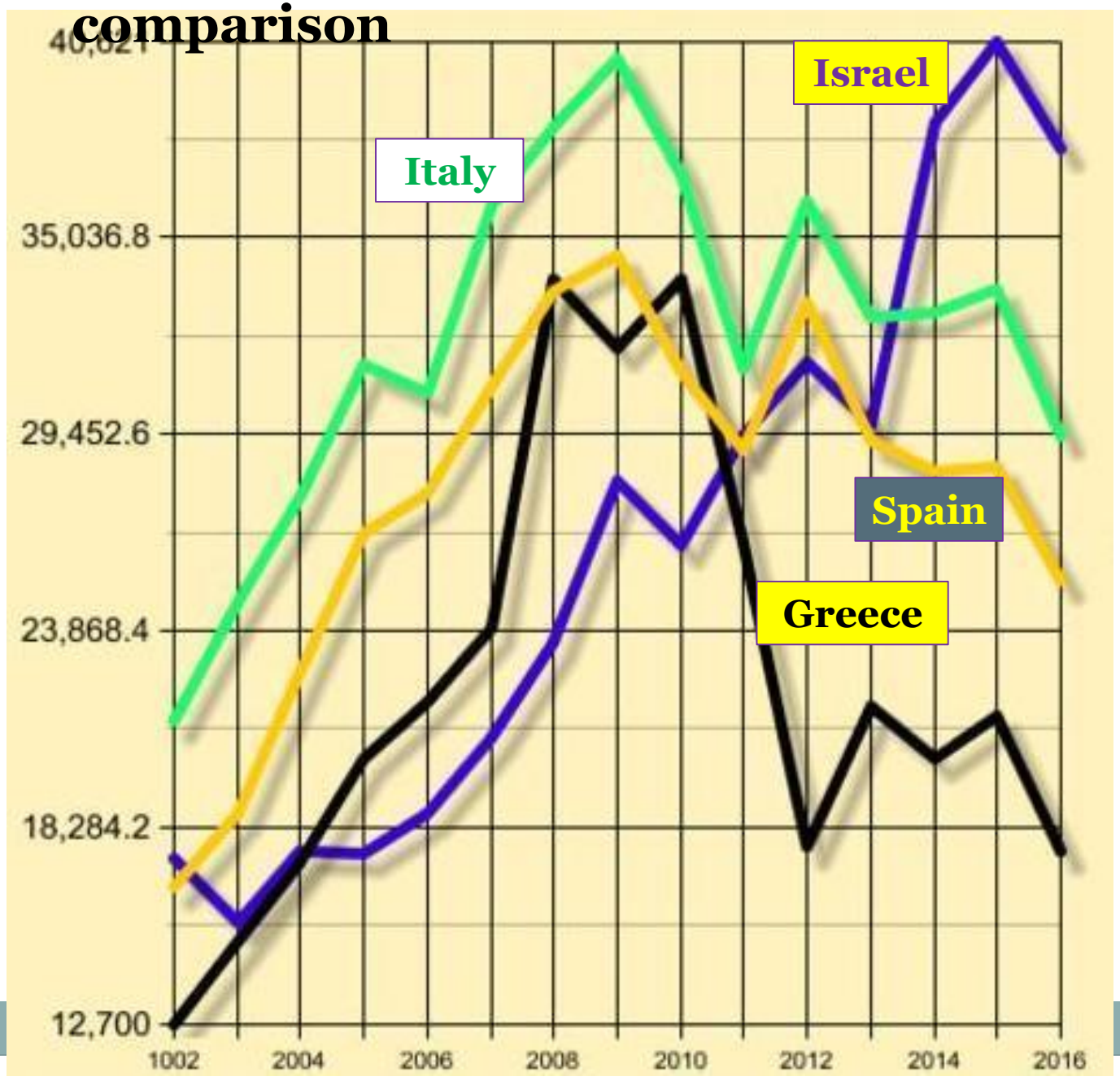
The treadmill analogy

'High Tech Nation' – How Israel exploited its pivotal role in 'the brave new world' and helped it become a better world?

- **Israel's economy doubled in the past 20 years [GDP/prs/yr : 17K → >35K]**
- **The Hi-Tec sector exceeds 50% of the Export/output**
- **Thus, Hi-Tec is the locomotive that pulls the economy train. It is the enabler of Israel becoming a developed nation!**

The GDP/person/year evolution comparison

The GDP/person/year evolution comparison



Israel Facts & Figures

- The largest per-capita number of **research papers**
- The largest per-capita number of **registered patents**
- The largest per-capita number of **startup companies**
- 70+ technology companies listed on NASDAQ (second only to the USA and China)
- 7 Nobel-prize winners in past 13 years

Success Stories – Industry Breakthroughs

- USB Flash drive - Invented by M-Systems

- Firewall – Invented by Check Point

- Instant Messaging – ICQ

- Voice Mail - Developed by Comverse

- Pill Cam- Invented by Given Imaging

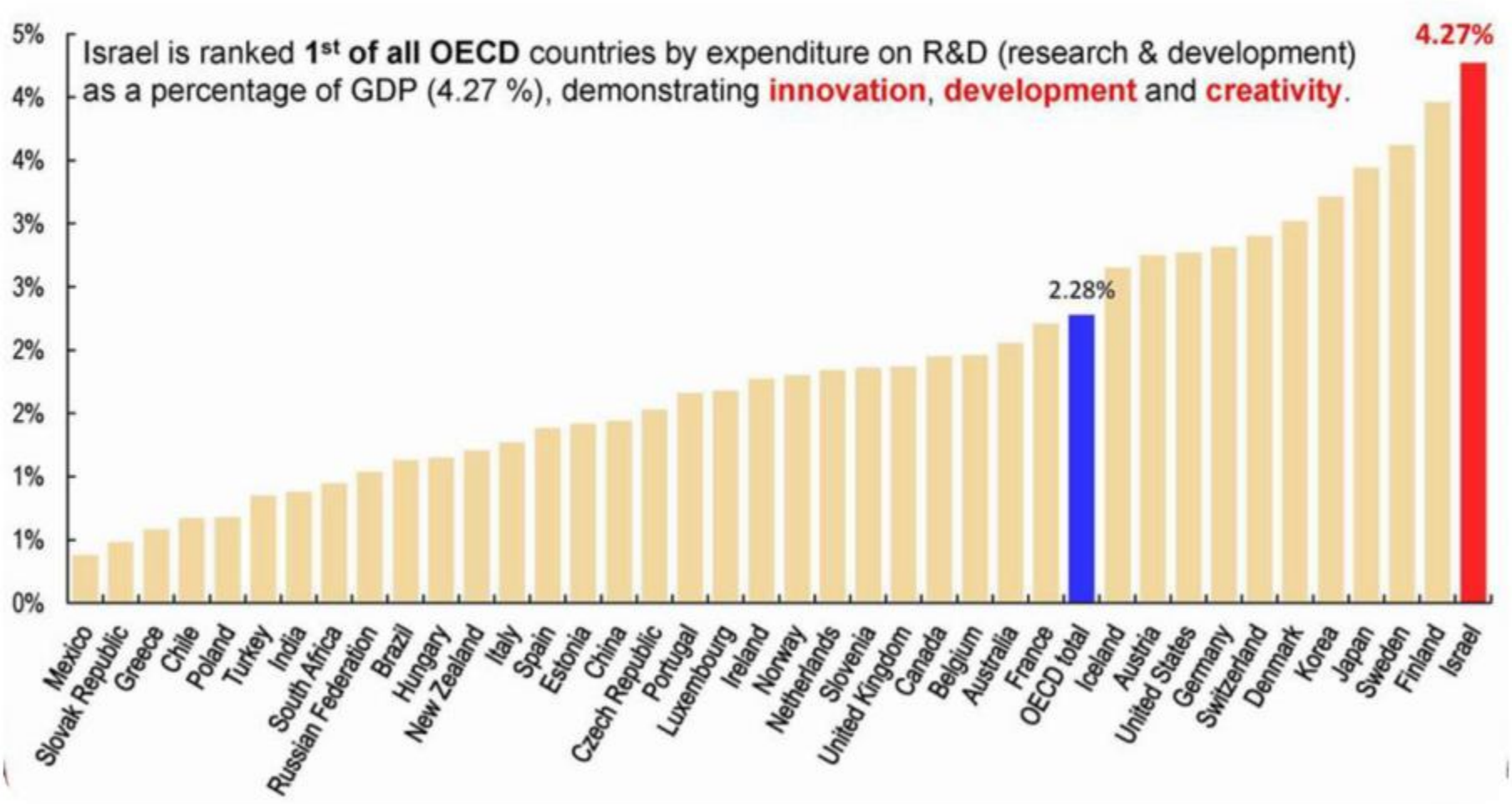
- Waze – Social navigation system

Multi – National companies presence in Israel

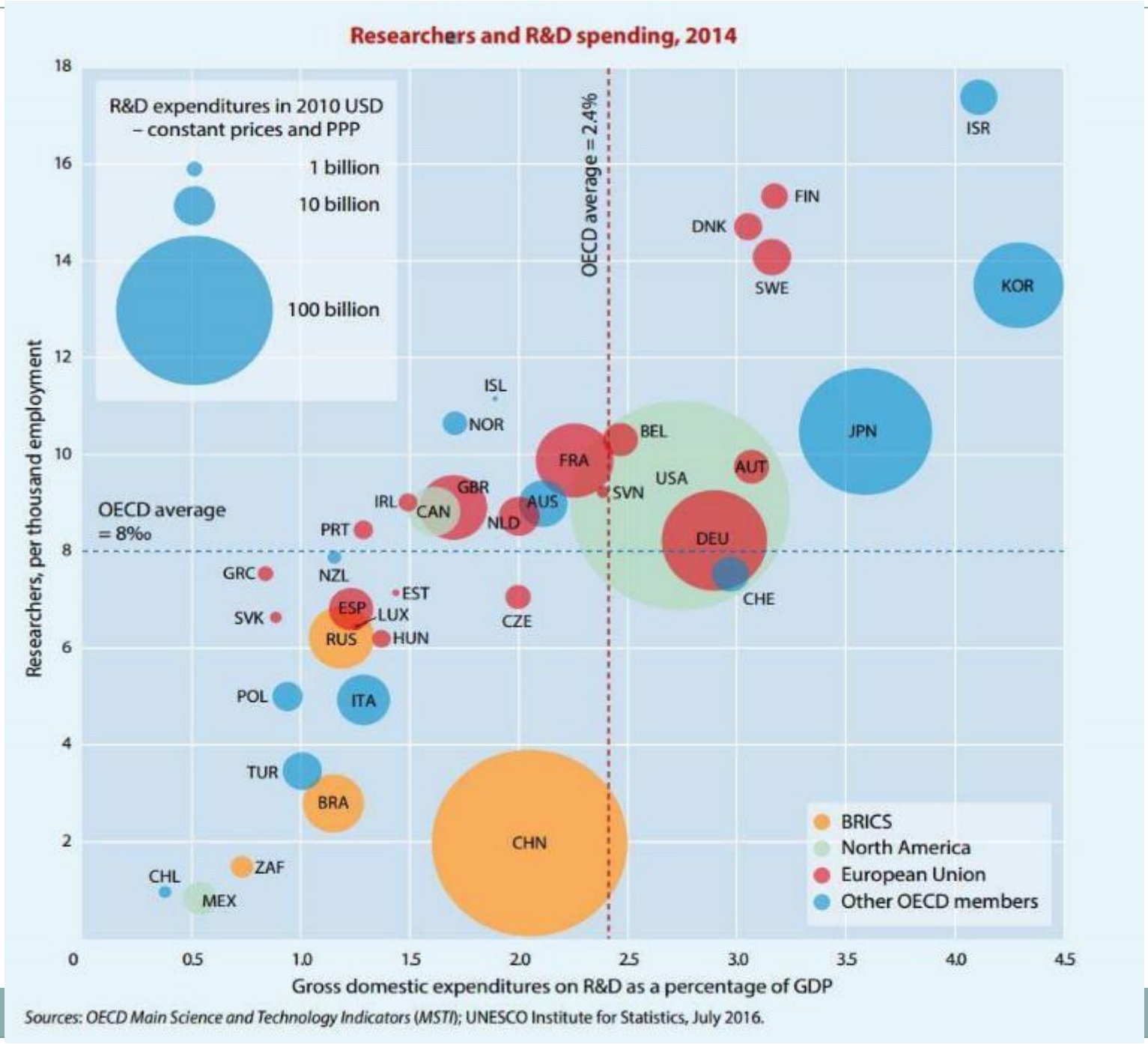
Israeli Technology M&A Deals

EY

Expenditure on R&D



EY

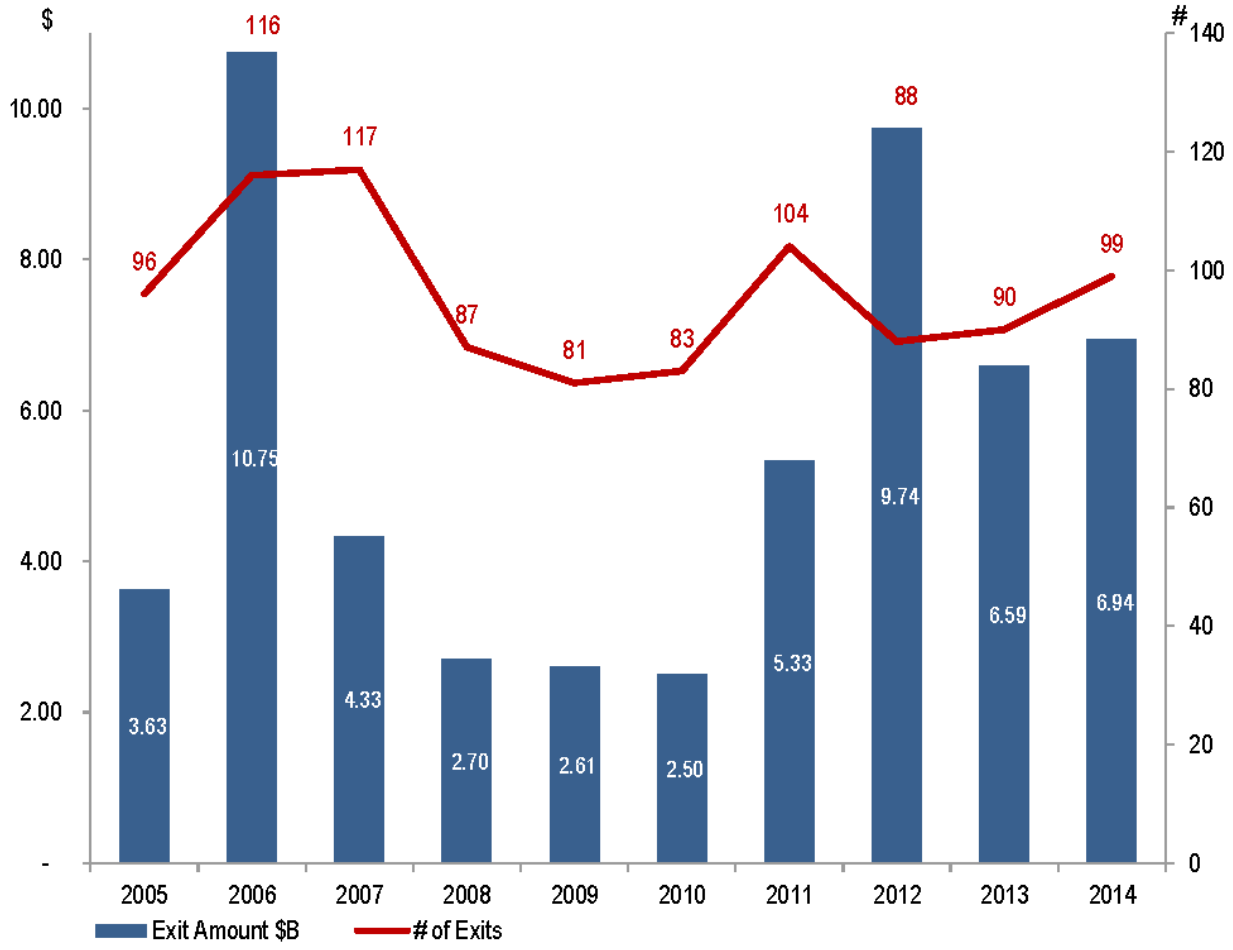


Sources: OECD Main Science and Technology Indicators (MSTI); UNESCO Institute for Statistics, July 2016.

High-Tech Exits 2005-2014

Israeli high-tech exits in 2014 reached $6.94 billion, up 5% from 2013's $6.59 billion and 29% above the $5.4 billion 10-year average.

Excluding exits above $1 billion, 2014 was the best year for Israeli exits in a decade, with 98 deals accounting for $5.91 billion. On this basis. 2013 is considered the second best year as 89 deals attracted $5.39 billion.



From Lou Kerner – Oct 10th 2016

- *As amazing as the world thinks the Israel tech ecosystem is, the world still has no idea of the innovation and value creation to come.*
- **The World Is Increasingly Beating a Path to Israel to Learn About Innovation—And That's To The Tech Ecosystem's Great Benefit**
- some of the smartest people in the world relative to the immense technical problems they're trying to solve live in Israel.

From Lou Kerner – Oct 10th 2016

- Every ecosystem, whether it is a small company, a large company, a city, a state, a country, or a University, are ALL trying to build better tech ecosystems. And they are all beating a path to Israel to learn from and work with Israel.
  And that is as much to the benefit of the entities visiting Israel, as it is for the Israel tech ecosystem.
- Shimon Peres: “When you have two alternatives, the first thing you have to do is to look for the third that you didn’t think about, that doesn’t exist. “

Startup Ecosystem Report 2012:

The Global Startup Ecosystem Index

THE TOP 20 STARTUP ECOSYSTEMS

While the United States is home to 6 of the 10 top startup ecosystems, other areas of the world are also growing exponentially. As detailed in the Startup Ecosystem Report 2012, published by the Startup Genome in partnership with Telefónica Digital and researchers at Stanford University and the University of California, Berkeley, the following city rankings* were calculated based on success in 8 key areas:

STARTUP OUTPUT
FUNDING
PERFORMANCE
ENTREPRENEURIAL MINDSET

8

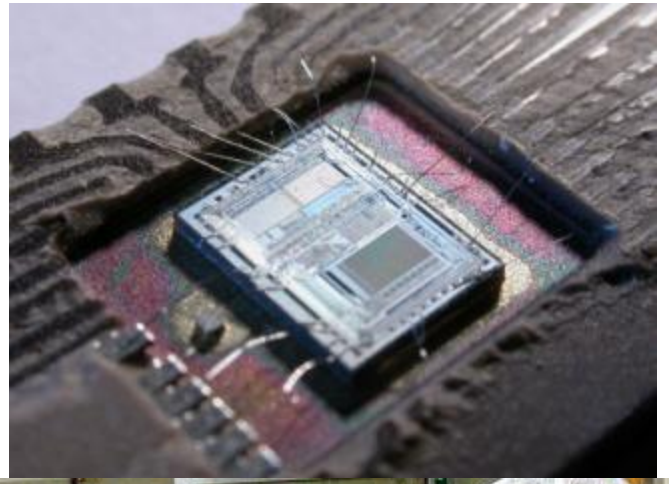
TRENDSETTING
SUPPORT
TALENT
DIFFERENTIATION

1 SILICON VALLEY	5 NEW YORK CITY	9 VANCOUVER	13 SAO PAULO	17 SINGAPORE
2 TEL AVIV	6 BOSTON	10 CHICAGO	14 MOSCOW	18 MELBOURNE
3 LOS ANGELES	7 LONDON	11 PARIS	15 BERLIN	19 BANGALORE
4 SEATTLE	8 TORONTO	12 SYDNEY	16 WATERLOO (CANADA)	20 SANTIAGO

TOP 20 STARTUP ECOSYSTEMS AROUND THE GLOBE

Source: http://blog.startupcompass.co/pages/entrepreneurship-ecosystem-report

Intel Israel



The Disk-On-Key - M-Systems – Dov Moran

SanDisk

THIS INVENTION HAS SAVED MORE TREES THAN GREENPEACE.

#CapitalismCures

TURNING POINT USA

TPUSA.com

IDENTIFY ★ EMPOWER ★ ORGANIZE

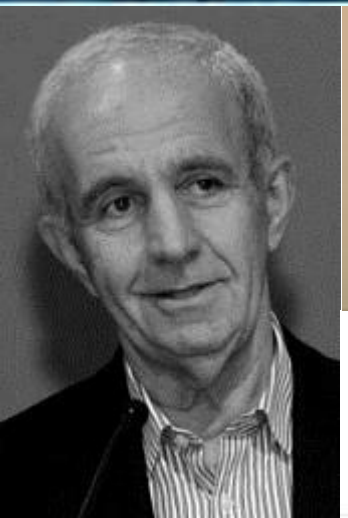
#BigGovSucks

Motorola Israel – Elisha Shahmon, Hanan Achsaf

Israel

IBM Israel – Joe Raviv, Miki Rode, Oded Cohen

IBM

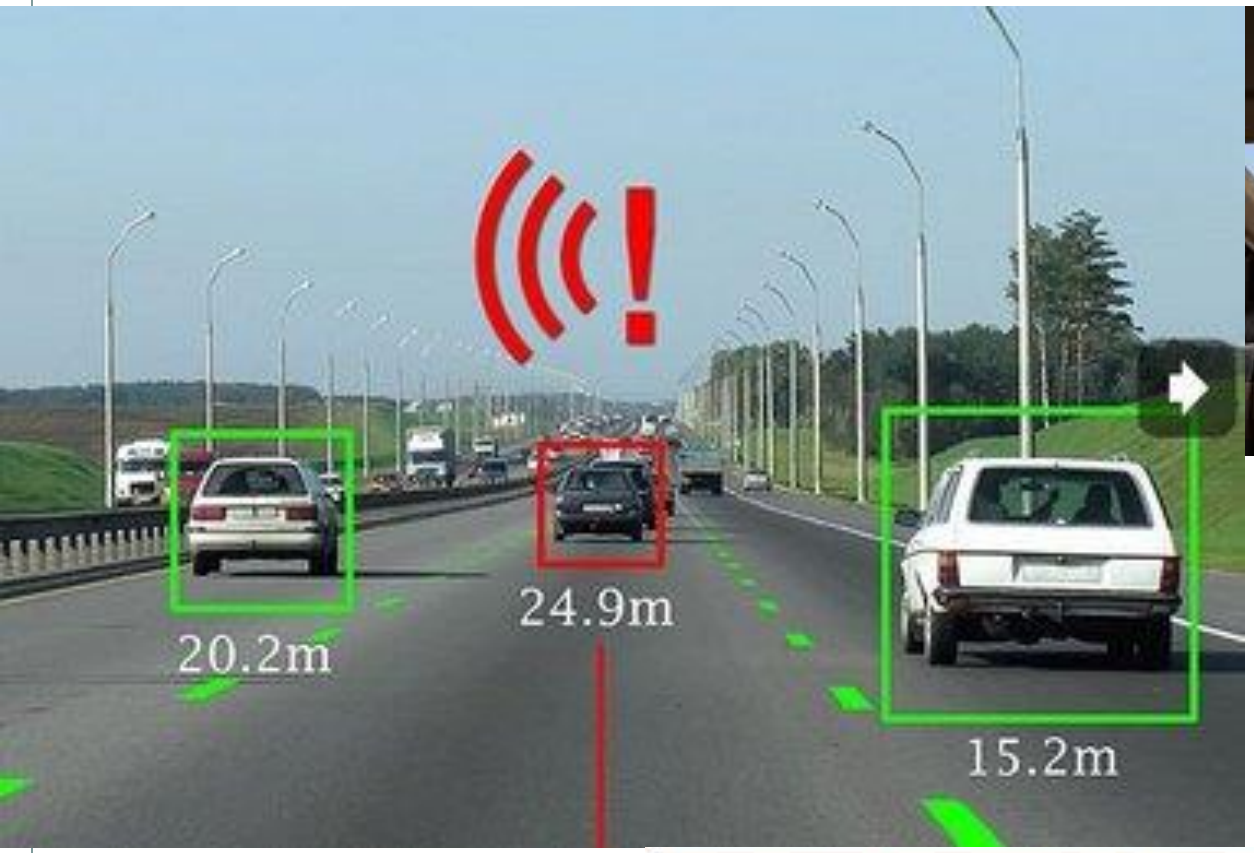


Trusteer

Color Print leader – Scitex – Effi Arazi

scitex

Drive Control - Mobileye – Amnon Shashua



MOBILEYE

The world leading Specialty Foundry – Tower-Jazz

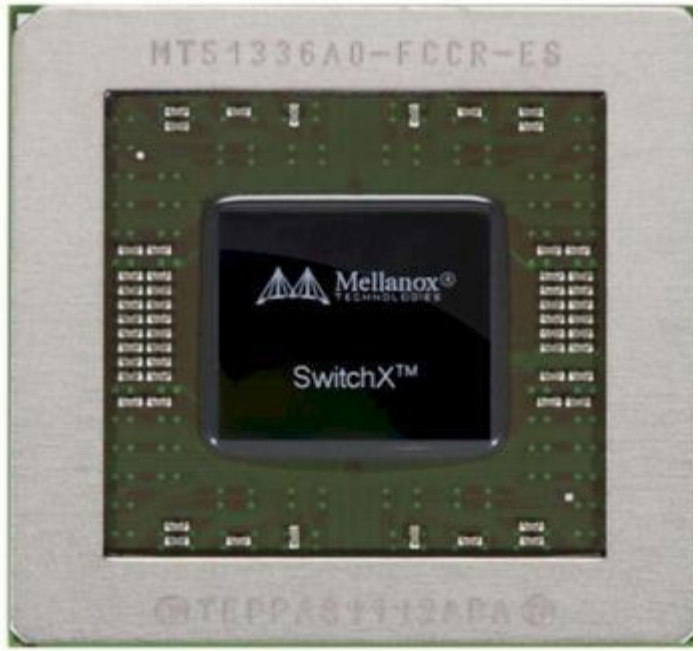
TOWERJAZZ

The Global Specialty Foundry Leader

TGS 2014

TowerJazz Global Symposiums

Infiniband – Mellanox - Eyal Waldman



Mellanox®
TECHNOLOGIES

Firewall pioneers – Checkpoint – Gill Schweid

Customer Care & Billing- Amdocs

Telecom Business Solutions - Comverse

Over a 100 Communication companies: RAD family – The Zisapels

RADVISION®
an Avaya company

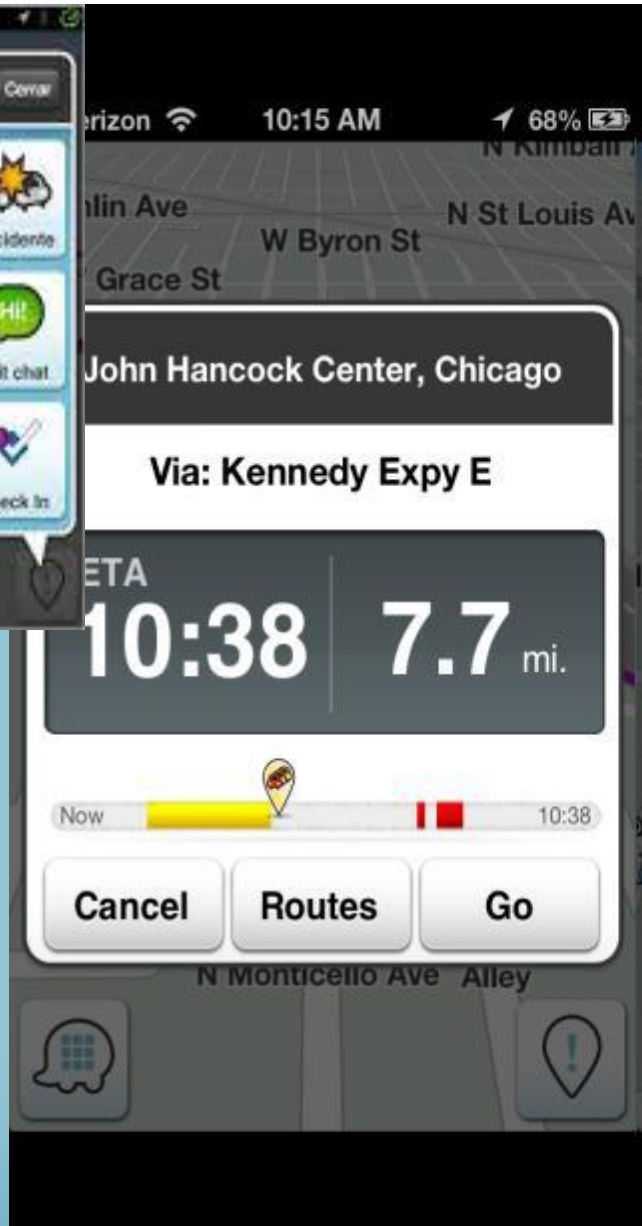
VSAT communication – Gilat -Yoel Gat

Gilat™

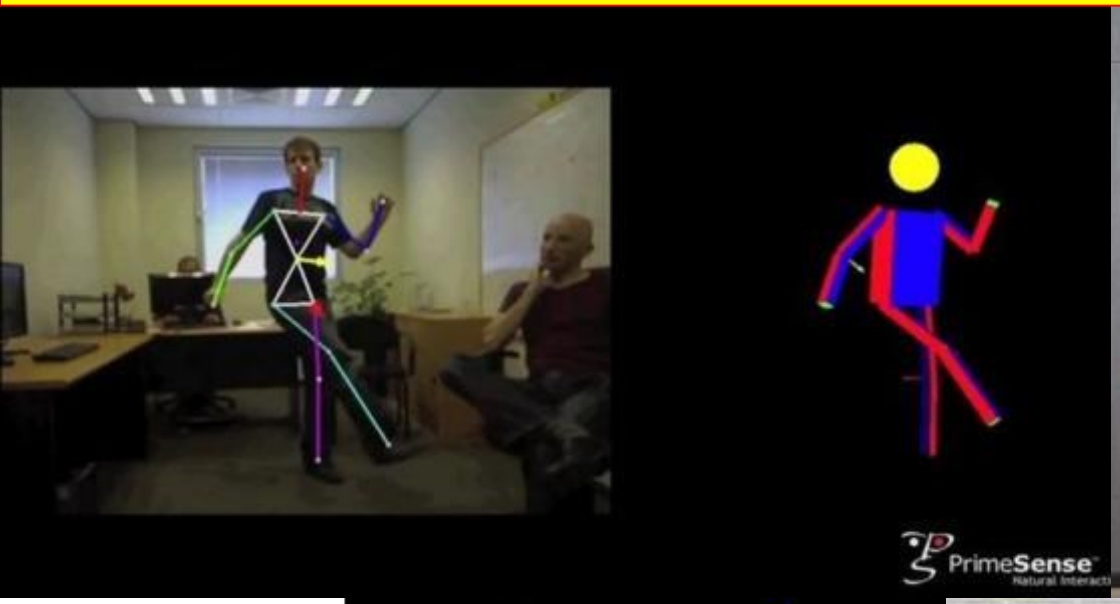
The 1st ‘Chat’ – iCQ - 4 students + Yossi Vardi

icq

The right way! – Waze – Uri Levine

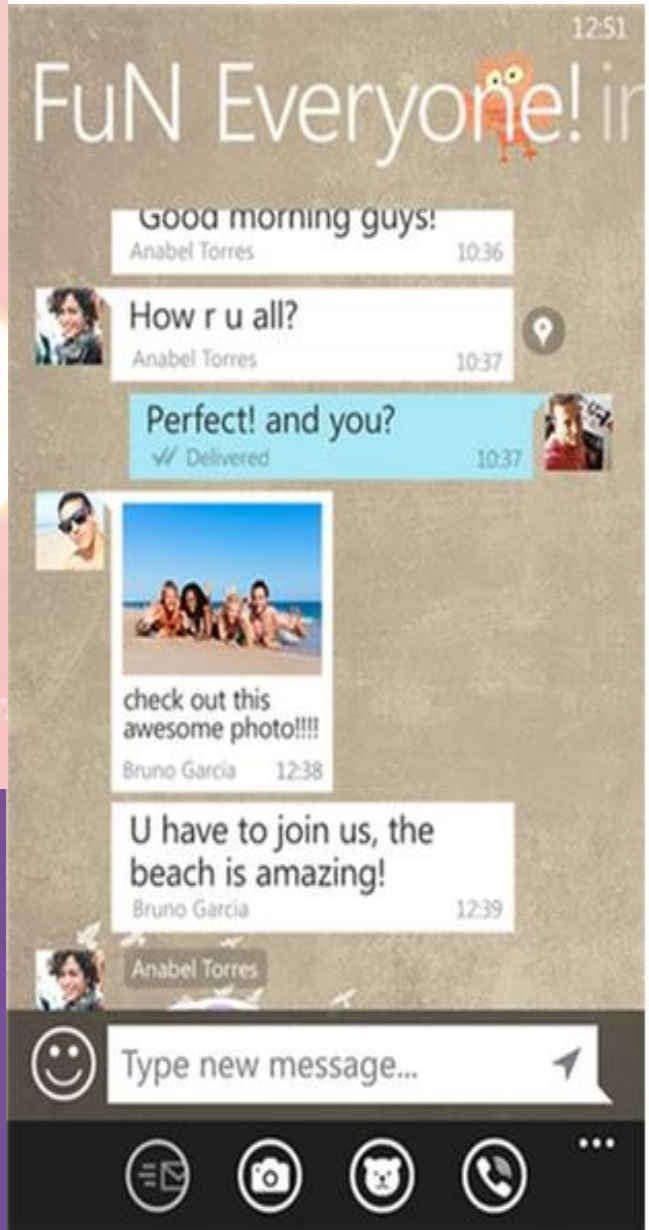


3D imaging (games etc) - Primesense



Instant Messaging & Voice over IP - Viber

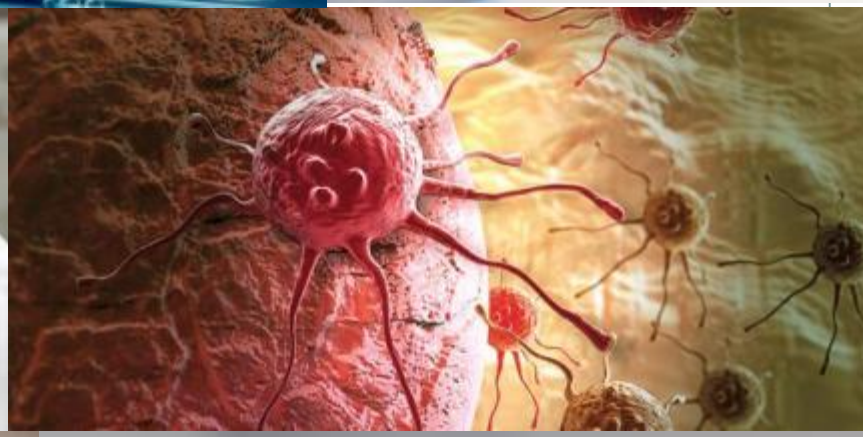
Viber



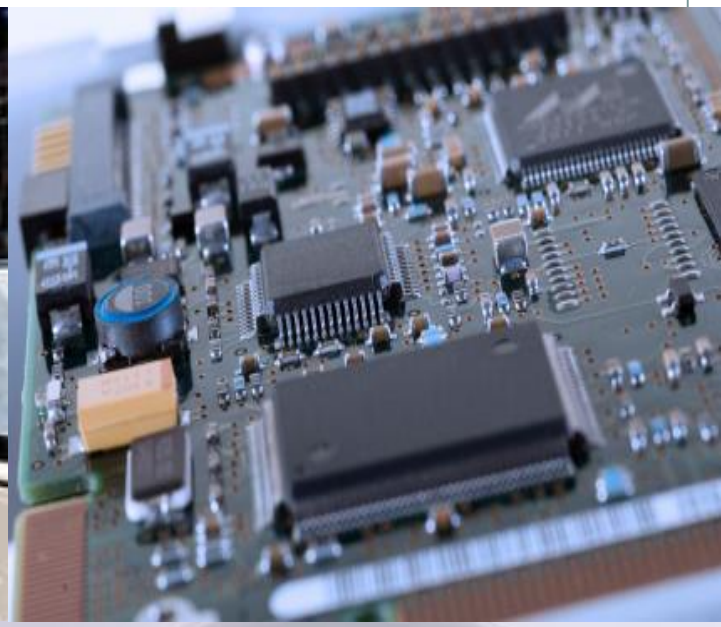
The World Leader in Generic Pharma - Teva

Drug Discovery - Compugen

compugen
www.cgen.com



CT – Tomography – Philips Healthcare [Elscint]

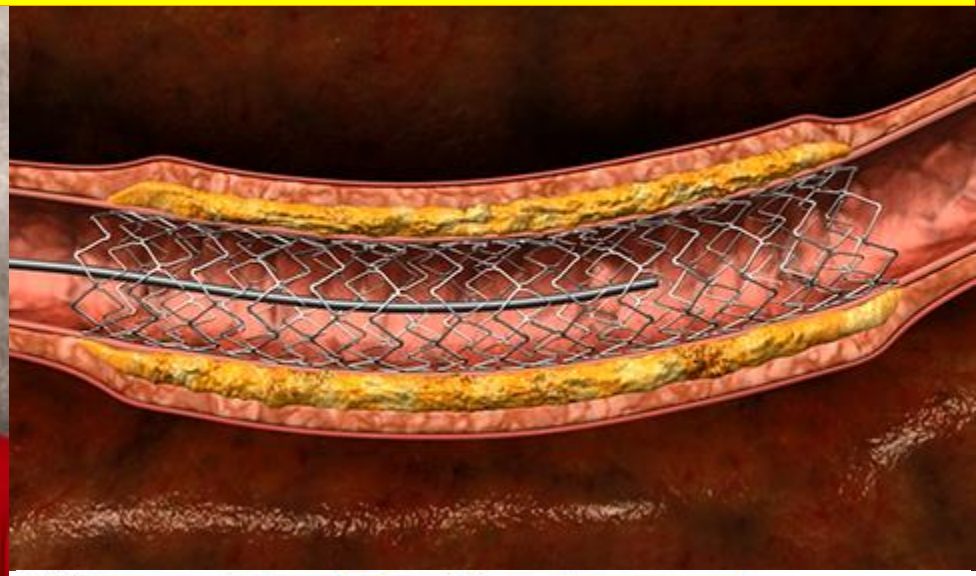


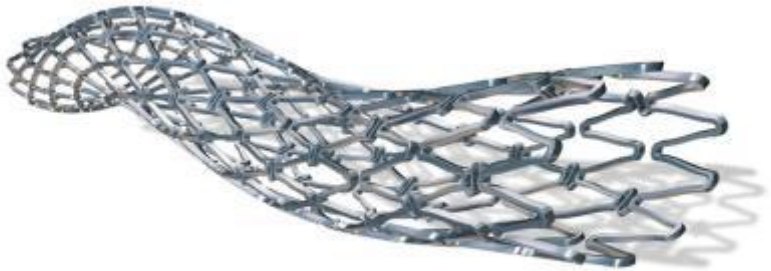
PHILIPS

Medical Imaging – MRI & CT – GE Healthcare [Elscint]

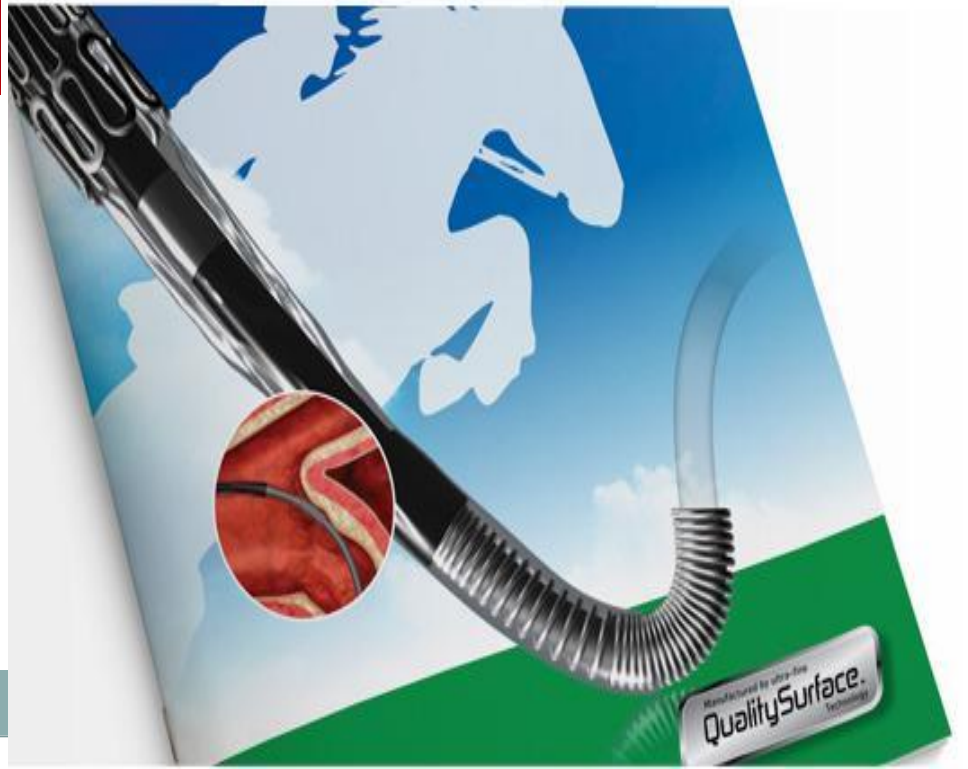
GE Healthcare

Stents – Medinol – The Richters

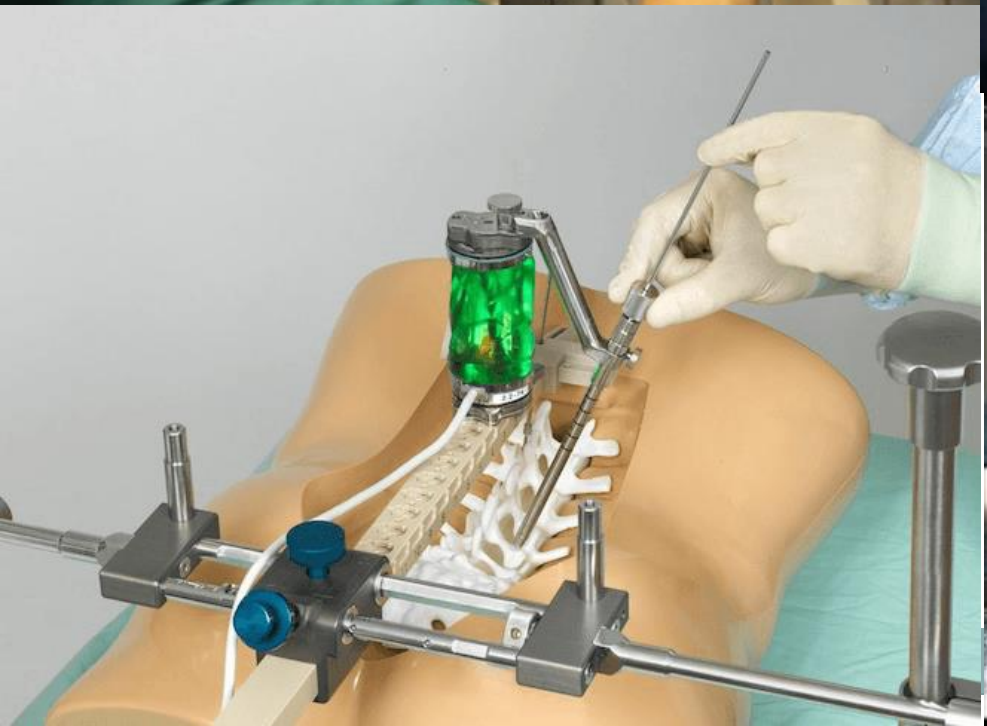




Medinol
Ingenuity for life



Spine & Brain Surgery – Mazor Robotics



ReWalk – Amit Gofer

ReWalk Robotics (formerly Argo Medical Technologies) develops, manufactures and markets wearable robotic exoskeletons for people with lower limb disabilities, such as paraplegia.

ReWalk's mission is to fundamentally change the health and life experiences of individuals with spinal cord injury.

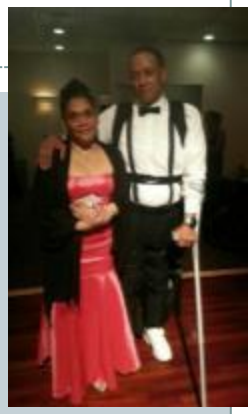
Published clinical studies demonstrate ReWalk's ability to mimic a natural gait and deliver functional walking speed

ReWalk™ Robotics



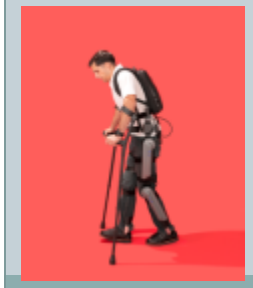














Non Invasive tumors & cells removal
Insightec - Kobi Vortman

:Technion Nation

Technion's Contribution to Israel and the World

PillCam – Given Imaging - Gabi Idan

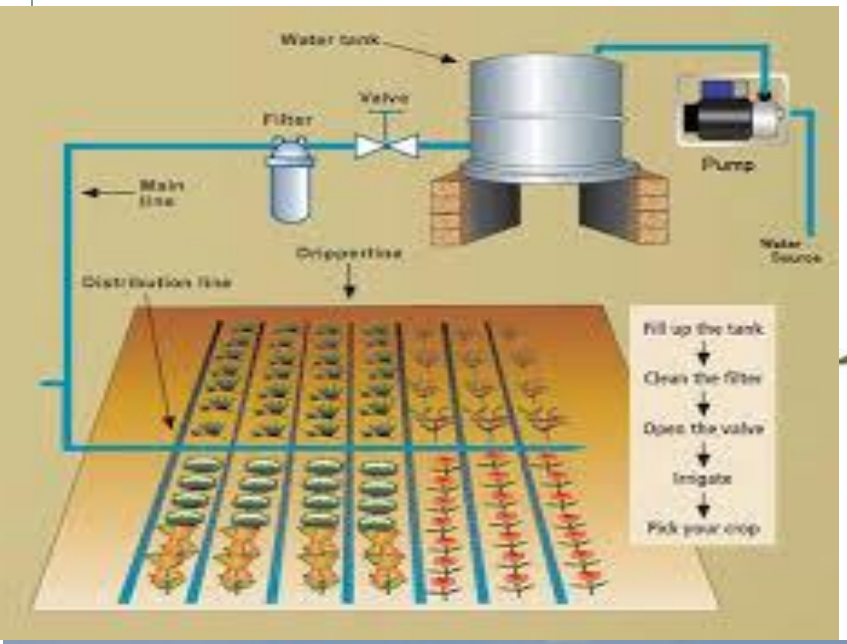
Given Imaging PillCam Video Endoscopy

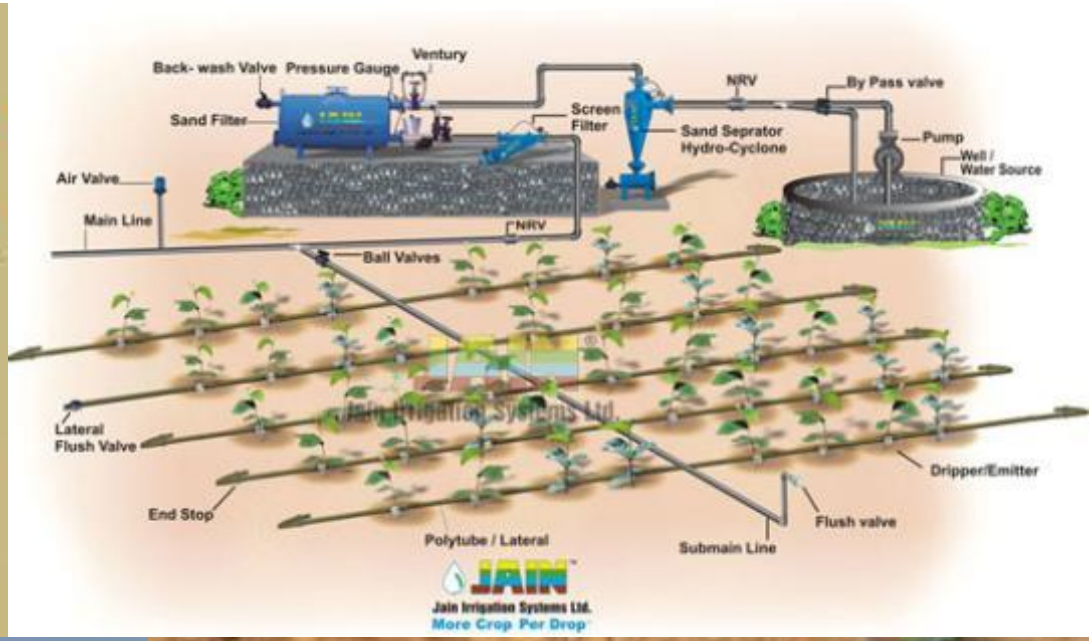
GeoThermal Energy – Ormat - The Bronicki's

ORMAT®

Solar Thermal Energy – Helio-Focus

Drip Irrigation Leadership - Netafim





Water & Wastewater Treatment -

Israel Aerospace Industries

IAI

International Defense Electronics - Elbit

Elbit SYSTEMS Ltd

Armament Development Authority - RAFAEL

RAFAEL

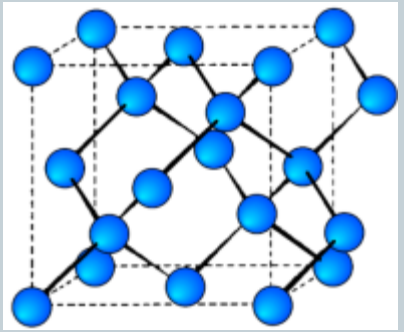
ADVANCED DEFENSE SYSTEMS LTD.

Hitting a Bullet…with a Bullet

:Technion Nation
Technion's Contribution to Israel and the World

RAFAEL
SMART AND TO THE POINT

What all this tells us?



- ‘Necessity’ is mother of invention
- ‘Unmet need’ is key to Biz success!
- Leadership!
  The individuals that made the difference!
- Teamwork, Devotion and tenacity
- Risk taking & daring!
- No shortcuts!
  [blood, sweat & tears]
- Timing (and luck!)
- Having fun along the way!

:Technion Nation
Technion's Contribution to Israel and the World

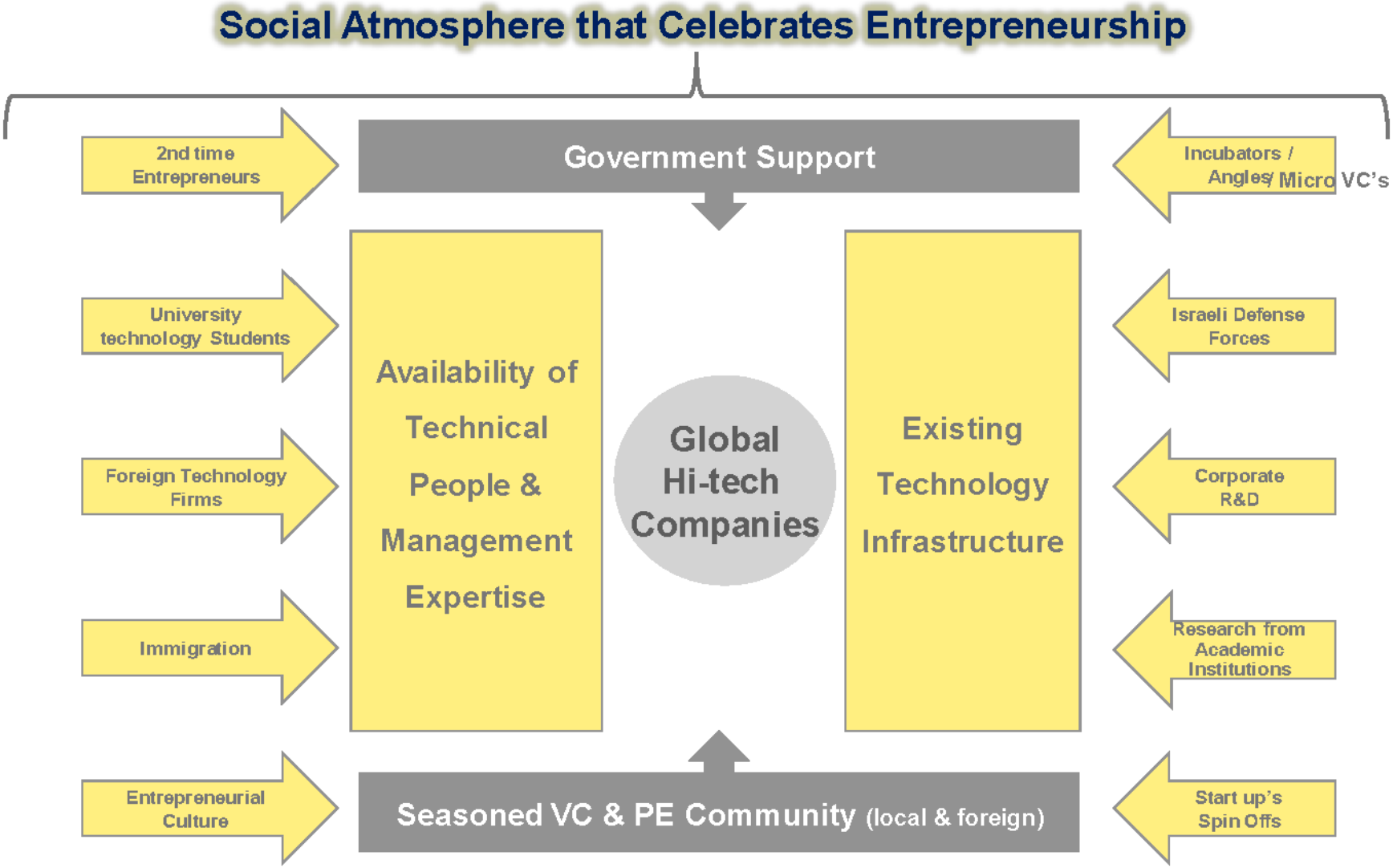
Technion Nation:
The Best Is Yet To Come!

Thank You

THE ISRAEL INNOVATION ECO-SYSTEM

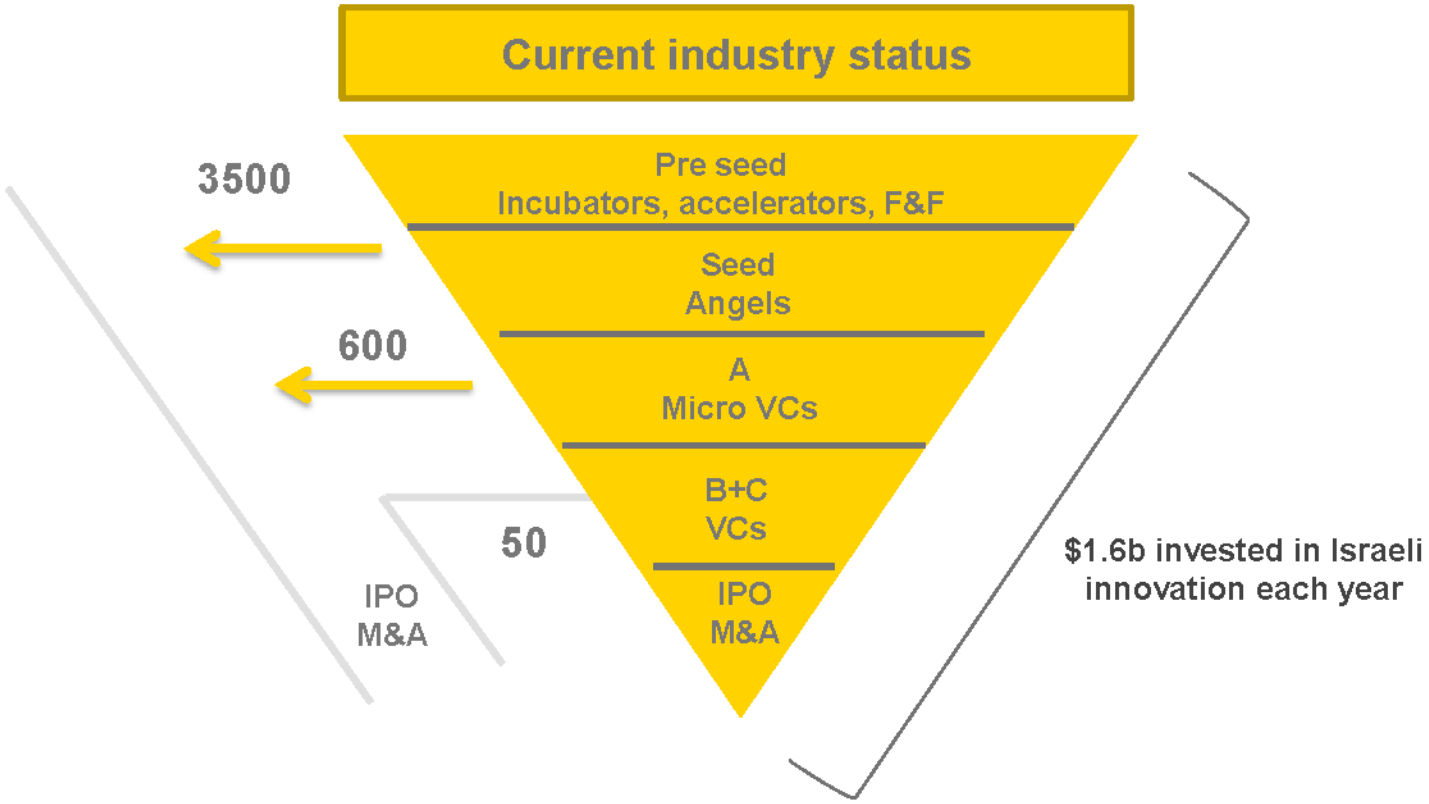
Collaboration between
Industry, Academia,
Government
and the free market

Israel's Eco-System & Business Environment

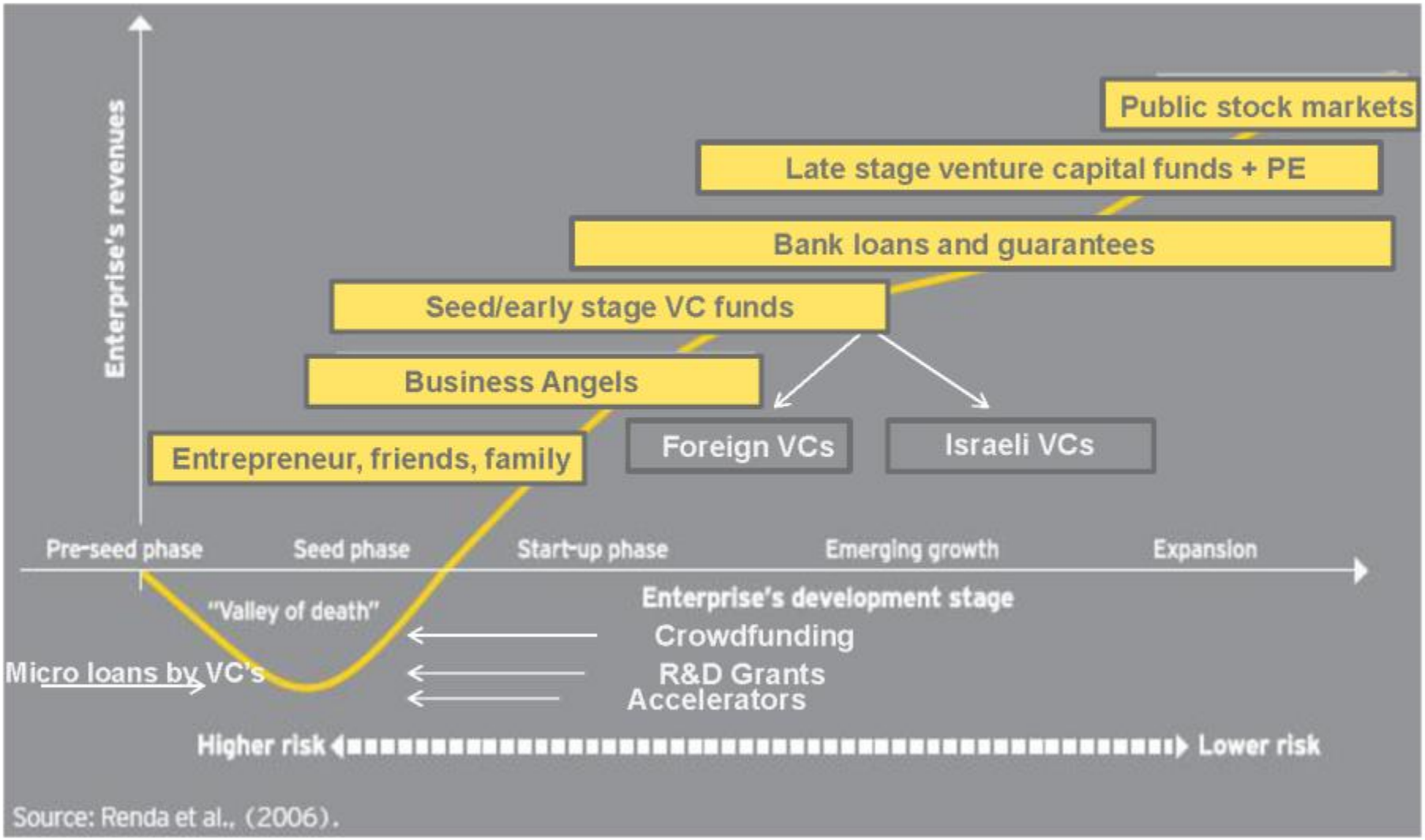


EY

The entrepreneurs' investment flow

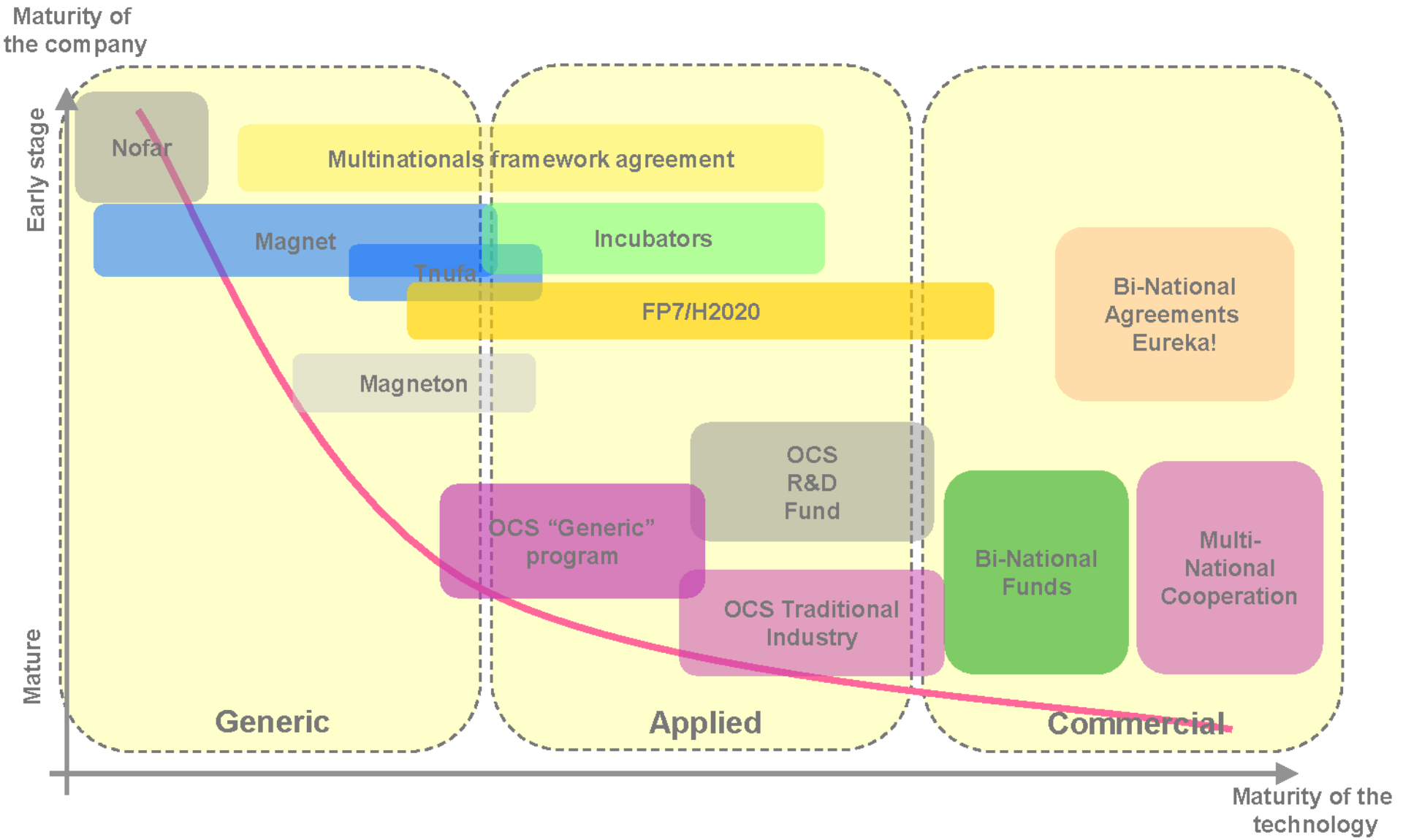


Access to funding



Source: Renda et al., (2006).

Government support



EY

OCS – Ministry of Economy

Execution of government policy for support of industrial R&D

Goal is not to make money but strengthen the industry

Enable but don't lead the market – "do no harm"

37 different programs to promote innovative R&D

OCS-Office of the Chief Scientist
MINISTRY OF ECONOMY

Innovation Policy

Neutral

Eligibility depends on **technological level** and **business potential**

Reciprocity

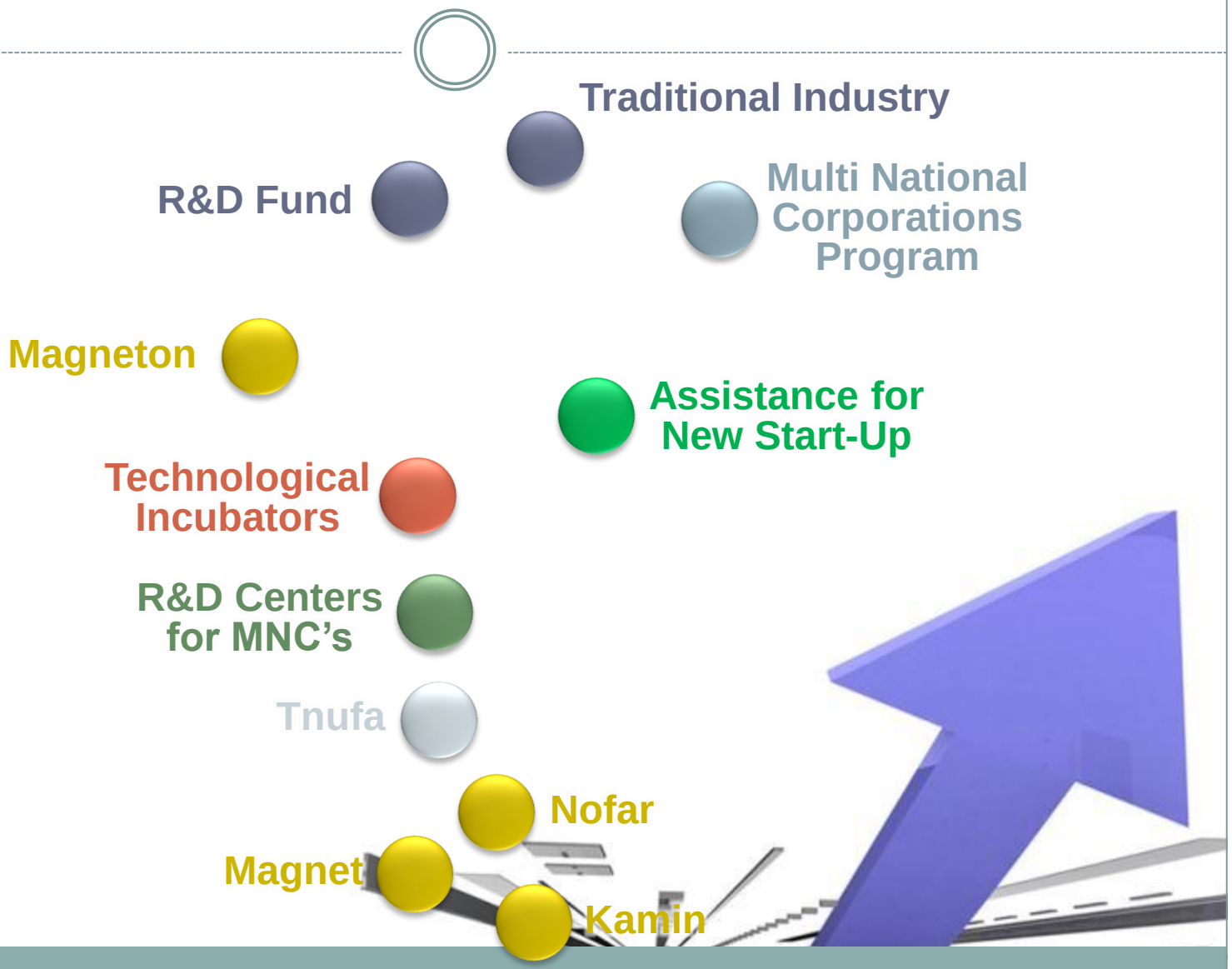
Financing firms through **grants**, payable by **royalties** (no equity)

Matching

Investments are **matched to private money**

OCS-Office of the Chief Scientist
MINISTRY OF ECONOMY

The OCS main programs:



OCS-Office of the Chief Scientist
MINISTRY OF ECONOMY

Industry – Academy Cooperation

Nofar

Bridge the gap between know-how within academia and the needs of the industry
OCS participation : 90%, industrial company: 10%, Up to $125K for a period of 15 months

Kamin

designed to translate academic research achievements into technologies of interest to the Industry
OCS participation: 85-90%,
rest by the research institute,
up to $800K for a period of 2 years

Magent

consortium of several Israeli academy and industry members
OCS participation: 66% from industry expenses and 80% from academy budget
(3-5 years, no royalties)

Magneton

promotes technology transfer from academia to industry via mutual cooperation between an individual company and an academic research group
OCS participation: 66%,
up to $760K

Pre Seed

TNUFA program

www.tnufa.org.il

Bridging the gap between Israeli inventors and the business world.

- Individual inventors / Startup companies at the pre-seed stage
- Pre-R&D goals
  - Protection of intellectual property.
  - Technological proof of concept.
  - Market research and business planning.
- ~120 qualified projects every year.
- ~20% reach the next stage of financing.

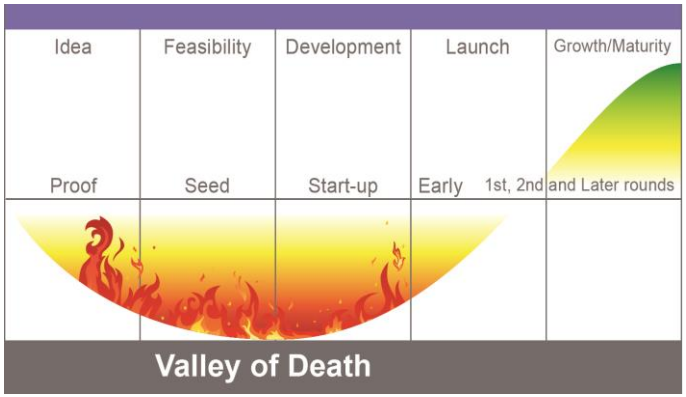
Grants of up to 85% of approved expenses up to $65,000 per project

Seed Incubating

Incubator Program

The Technological Incubators Program is a government response to a market failure.

- **Market Failure -** Early stage, high risk, innovative technological companies, can not raise money from the private sector.



- **Government Response -** Bridging the gap through the Technological Incubators Program

Seed Incubating Incubators Program

Incubator Program

- 20 incubators across the country
- 7 peripheral (preferred conditions)
- 1 biotechnology (Rehovot)
- 1 industrial (Haifa)
- International Investors

International Collaborators

nielsen · OrbiMed · Johnson & Johnson · Takeda · Hutchison Whampoa Limited · Philips · Teva · Elbit Systems

hiCenter · nielsen innovate · Targetech · Kinrot Ventures · RAD BioMed · thetime · ATI · JVP Media Labs · incubit

Misgav · TERRA Venture Partners · Explore. Dream. Discover. · ABITAL Pharma Pipelines Ltd. · Incentive · JVP Media Labs · VAN LEER · MOFET · xenia

Seed Incubating

Incubator Program

- Transformed risky innovative technological ideas into viable startup companies
- Support the formation of startup companies in order to lead them toward Round A investments.
- Since its inception in 1991, the incubator program Created 1,450 companies (2012)
- **Incubators get Equity in the projects**

Basic Conditions:

- 15% incubator: 85% OCS
- $570-860K
- Payback: 3% royalties from revenue
- Incubator Term: 2-3 years

Extended support to:

- Biotech/Pharma & Clean-Tech projects (budget, optional 3rd year)
- Projects initiated in peripheral regions

Biotechnology Incubator

- $2.025M, 85% OSC: 15% Incubator

The OCS programs:

- Location on the Product Value Chain
- National vs. International

MAGNET

Kamin

Nofar

R&D Centers for MNC's

Tnufa

Technological Incubators

Assistance for New Start-Up

R&D Fund

Bi-National Agreements

Multi National Corporations Program

OCS-Office of the Chief Scientist
MINISTRY OF ECONOMY

International Collaborations

The European

BIRDF-with U.S.A.

SIIRD-with Singapore

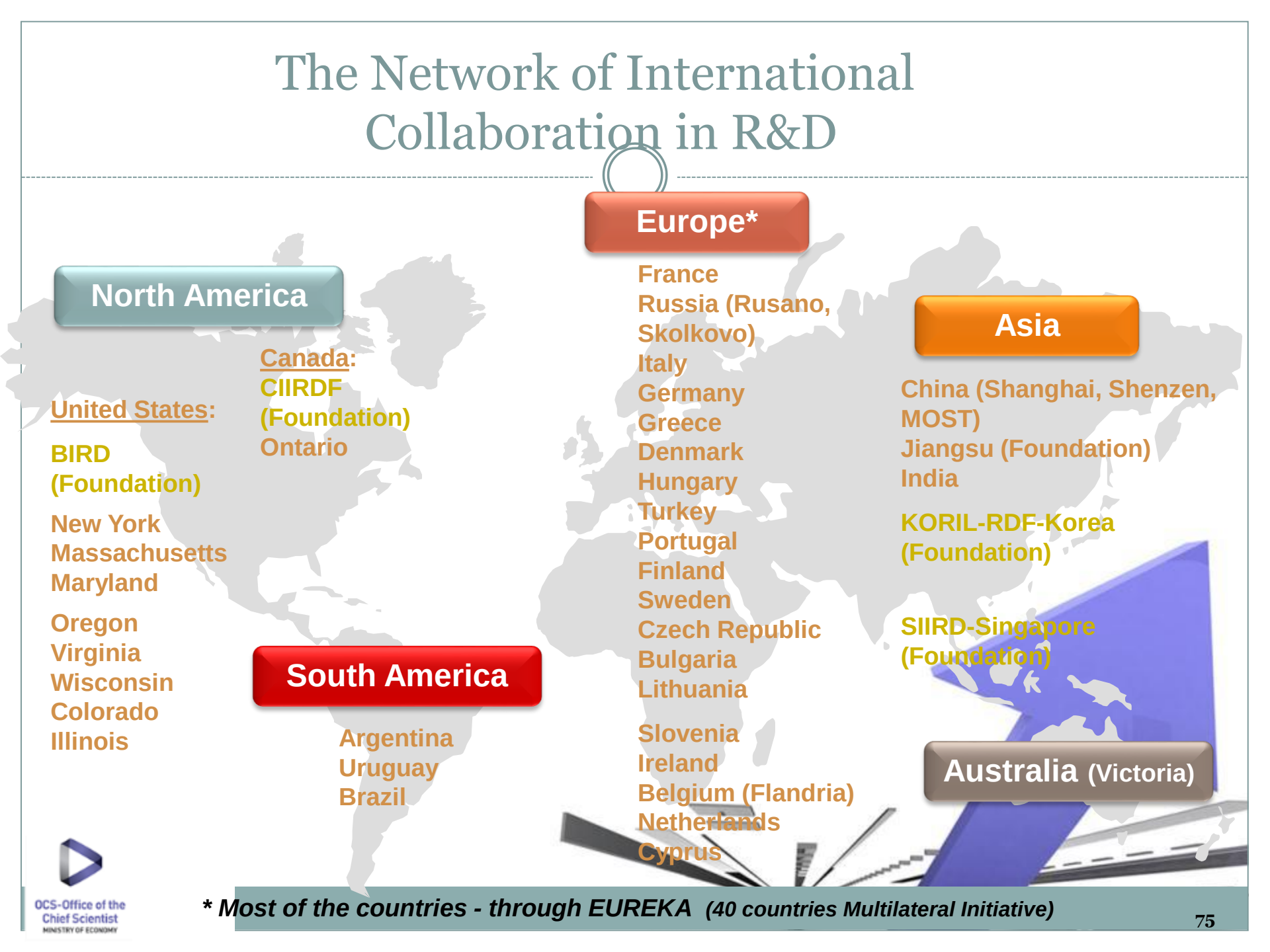
CIIRDF - with Canada

KORIL-RDF - With S. Korea

European Framework:

- FP7 – 2,100 Israel proposals were approved, enjoyed grants of 840M Euros
- Horizon 2020 – 2014-2020, 70 Billion Euros budget
- EUREKA - incorporates 40 national funding schemes

The Network of International Collaboration in R&D



North America

Canada:
CIIRDF (Foundation)
Ontario

United States:
BIRD (Foundation)
New York
Massachusetts
Maryland
Oregon
Virginia
Wisconsin
Colorado
Illinois

Europe*

France
Russia (Rusano, Skolkovo)
Italy
Germany
Greece
Denmark
Hungary
Turkey
Portugal
Finland
Sweden
Czech Republic
Bulgaria
Lithuania
Slovenia
Ireland
Belgium (Flandria)
Netherlands
Cyprus

Asia

China (Shanghai, Shenzen, MOST)
Jiangsu (Foundation)
India
KORIL-RDF-Korea (Foundation)
SIIRD-Singapore (Foundation)

South America

Argentina
Uruguay
Brazil

Australia (Victoria)

OCS-Office of the Chief Scientist
MINISTRY OF ECONOMY

** Most of the countries - through EUREKA (40 countries Multilateral Initiative)*

Thank you!

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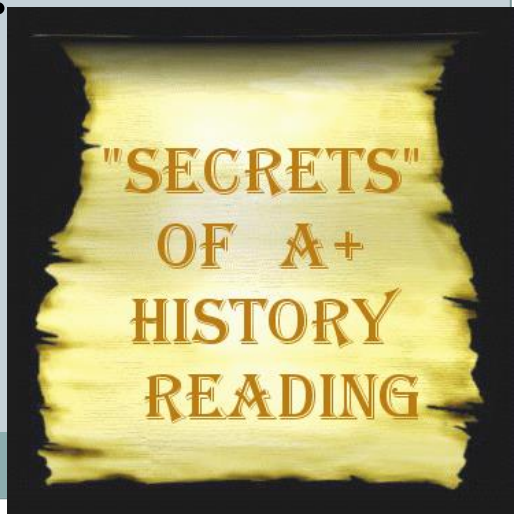
Back-up

RAFI NAVE - 2016

The early days – 'war stories'

- **The dawn of Israel's Semiconductor technology [1968 to 1973] – Prof Kidron**
- **The birth of the Israeli Semiconductor industry [1974 – 1977] – Intel Israel**
- **Spawning: National Semi; Motorola Semi, Galileo, Marvell, Mellanox…**
- **Elron – Uzia Galil → Elbit, Elscint…**
- **Scitex – Effi Arazi**
- **Tadiran**
- **RAFAEL [HEMED, Amos Horev]**



Intra-organizational entrepreneurship

- **Israel is on Intel's map!**
  - **8087**
  - **Corp CAD; Back-End [Test, QRE…]**
  - **MMX, Centrino, Multi-core**
- **Intel Corporate Intraneurship**
  - **CLE, DFM, IDC**
- **Requirements Management [NDS, Given Imaging]**
- **The ALPHA MAGNET consortium**

Breakthroughs and their challenges – GIVEN IMAGING

- **The amazing Given Imaging/PillCam story:**
  - **1982 – the problem and the idea**
  - **1998 – why did it take so long?**
  - **2001 – PillCam is born!**
  - **Market penetration**
    Regulation (FDA)
    Reimbursement
  - **Expanding**