

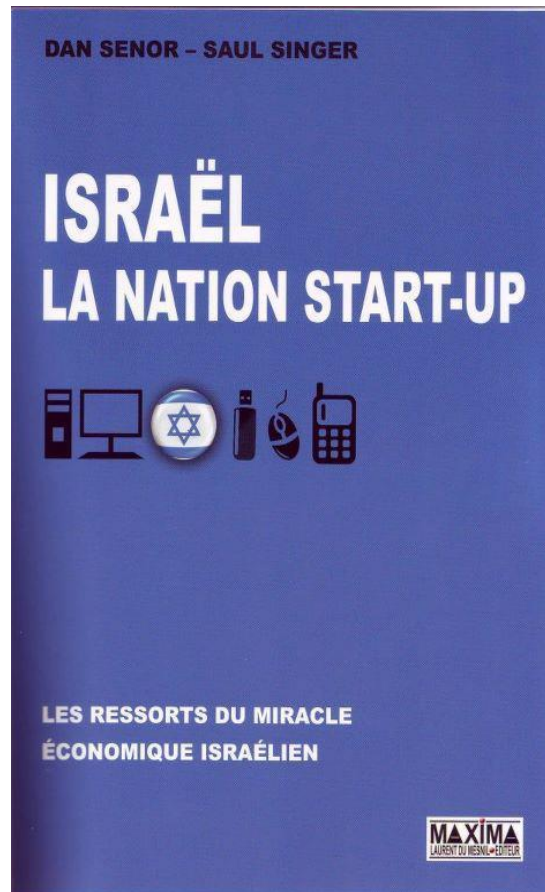
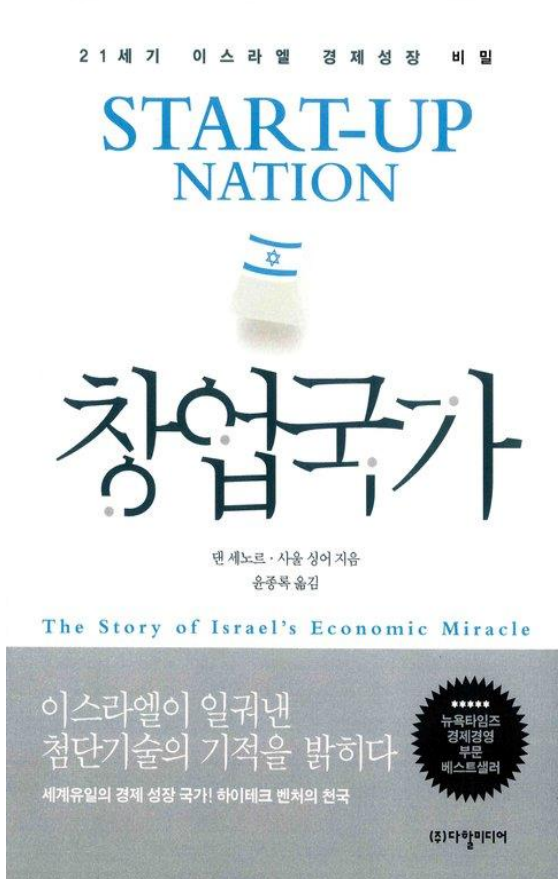
# The Israeli Hi-Tech: Explaining the success

Prof. Shmuel Ellis  
Prof. Israel Drori  
Recanati Business School  
Tel Aviv University

Tallinn, April 10

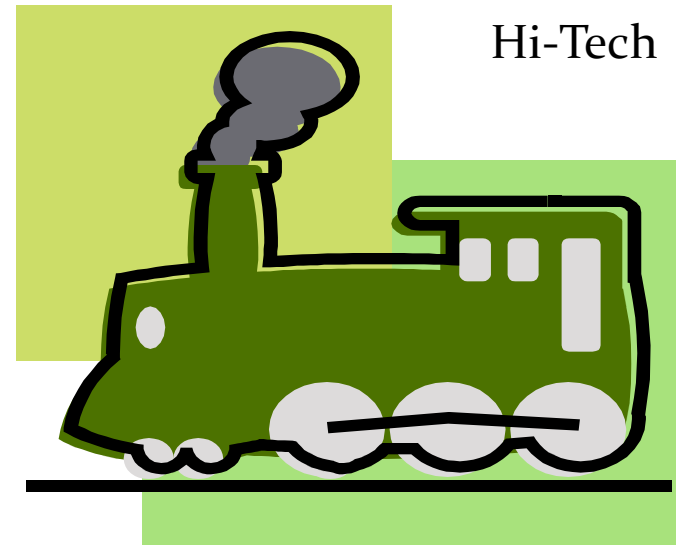
# Israel: A Start-Up Nation

[http://www.youtube.com/watch?v=KHLyANGmLjQ&feature=player\\_detailpage](http://www.youtube.com/watch?v=KHLyANGmLjQ&feature=player_detailpage)



# The Israeli Hi-Tech: Basic Information

- 41.2% of total export
- 300000 employees
- 14% of total employees in Israel business sector
- 15% of Israel's GDP
- 1980-2011 - ~ 10000 start-ups



# Israeli Breakthroughs: Examples



- Given Imaging – First ingestible video camera used to view the small intestine and diagnose disorders



- Intel's Core 2 Duo, Centrino and Pentium 4 microprocessors



- M System's Disk on Key and Disk on Chip flash memory



- GE Healthcare's portable cardiac ultrasound system



- The Phillips Brilliance CT Scanner



- IP Telephony invented by founders of Vocal Tec



- AOL Instant Messenger ICQ



- Zip compression technology



- Waze

# Most of the world's technology 'powerhouses' have established local R&D centers in Israel

Alcatel  
Analog Devices  
AMCC  
Apple  
Avaya  
BMC Software  
Boston Scientific  
Broadcom  
Computer Associates  
CEVA  
Cisco

Conexant  
Free scale Semiconductor  
GE Medical Systems  
Google  
HP (including HP Labs)  
IBM  
Infineon  
IntelInterpharm  
KLA-Tencor  
Kollmorgen Servotronix

Marvell Semiconductor  
Microsoft  
Motorola  
National Semiconductor  
Onavo  
Oracle  
Organics  
Paramic Technology  
Pfizer  
Phillips

QUALCOMM  
Samsung  
SAP  
Siemens  
Silicon Graphics  
Snaptu  
Sun Microsystems  
SunGard  
Texas Instruments  
Veritas Software

# Multinationals...

**Microsoft**<sup>®</sup>

- Microsoft built their first R&D facility outside the US in Israel

**CISCO SYSTEMS**



- Cisco built their first R&D facility outside the US in Israel



**MOTOROLA**

- Motorola's Israel facility is the company's largest development center worldwide.

**IBM**<sup>®</sup>

- IBM chose Israel for its first VC investment outside of the US



- Intel has 4 R&D facilities and 2 manufacturing centres in Israel, employing 7,000 Israelis

**Google**<sup>™</sup>

- Google opened not only one but two R&D centers in Israel

**facebook**

- Facebook -- First centre outside the US

# IPOs and M&As

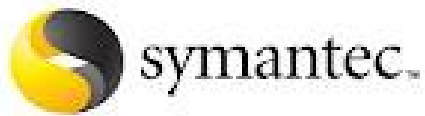
## **Over past decade:**

- \$15 Billion invested in Israeli tech companies
- \$37 Billion taken out in M&As/IPOs
- 5 year average number: 80 deals

## **In : 2011**

- Average M&A deal size was \$60 M (dramatically up from \$32.5M in 2010)
- 15 deals over \$100M in value, 5 deals were Over \$300M in value, one deal over \$500M
- 5 IPOs (down from 11 in (2010 raised \$126M)

# Who are the acquirers (2005-2012)?





# Who are the acquirers (2005-2012)?

vmware®



SIEMENS

**P&G**  
Procter & Gamble

EMC<sup>2</sup>

3M



  
MACMILLAN

twitter

PHILIPS



DELL™

BERKSHIRE HATHAWAY INC.

# Who are the acquirers (2005-2012)?

FLEXTRONICS

bmcsoftware

IBM

IAC

DST

GROUPON  
Collective Buying Power

Y!  
YAHOO!

AOL

YAHOO!



Salesforce

ORACLE



facebook

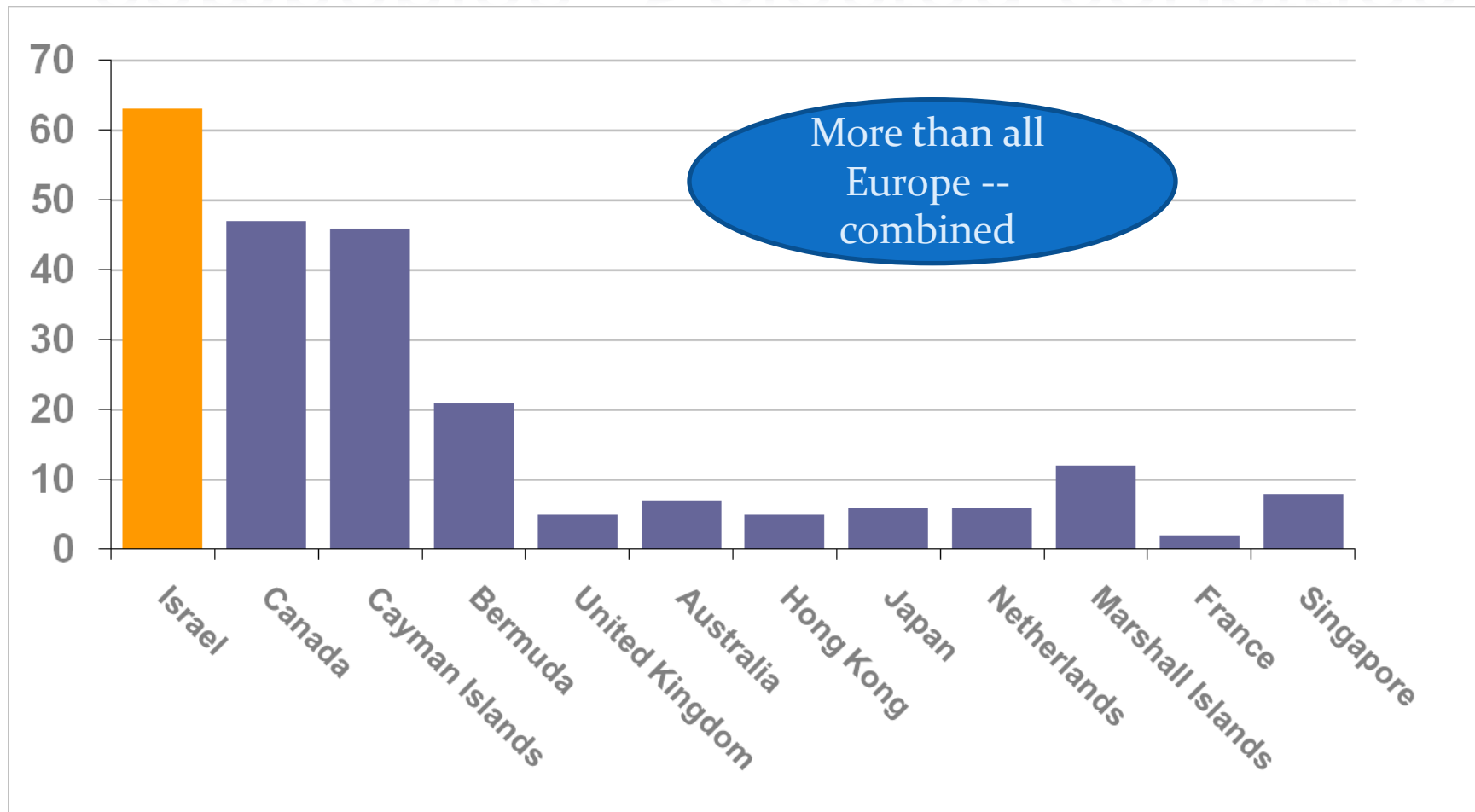
at&t

JOHN DEERE

# Who are the acquirers (2005-2012)?



# NASDAQ Non US listed companies- Selected countries

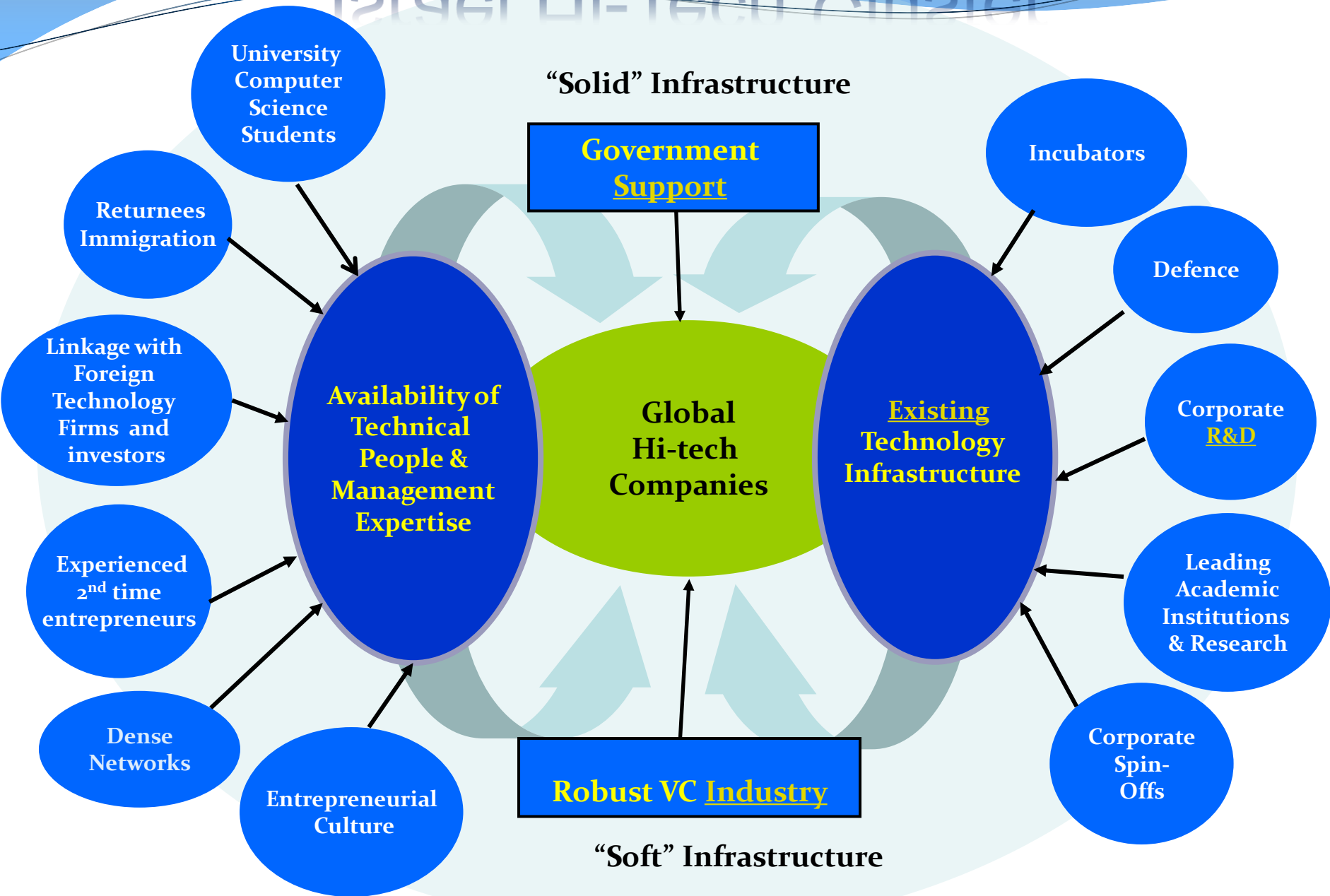




**The Traditional Explanation:**

**The Cluster Approach**

# Israel Hi-Tech Cluster



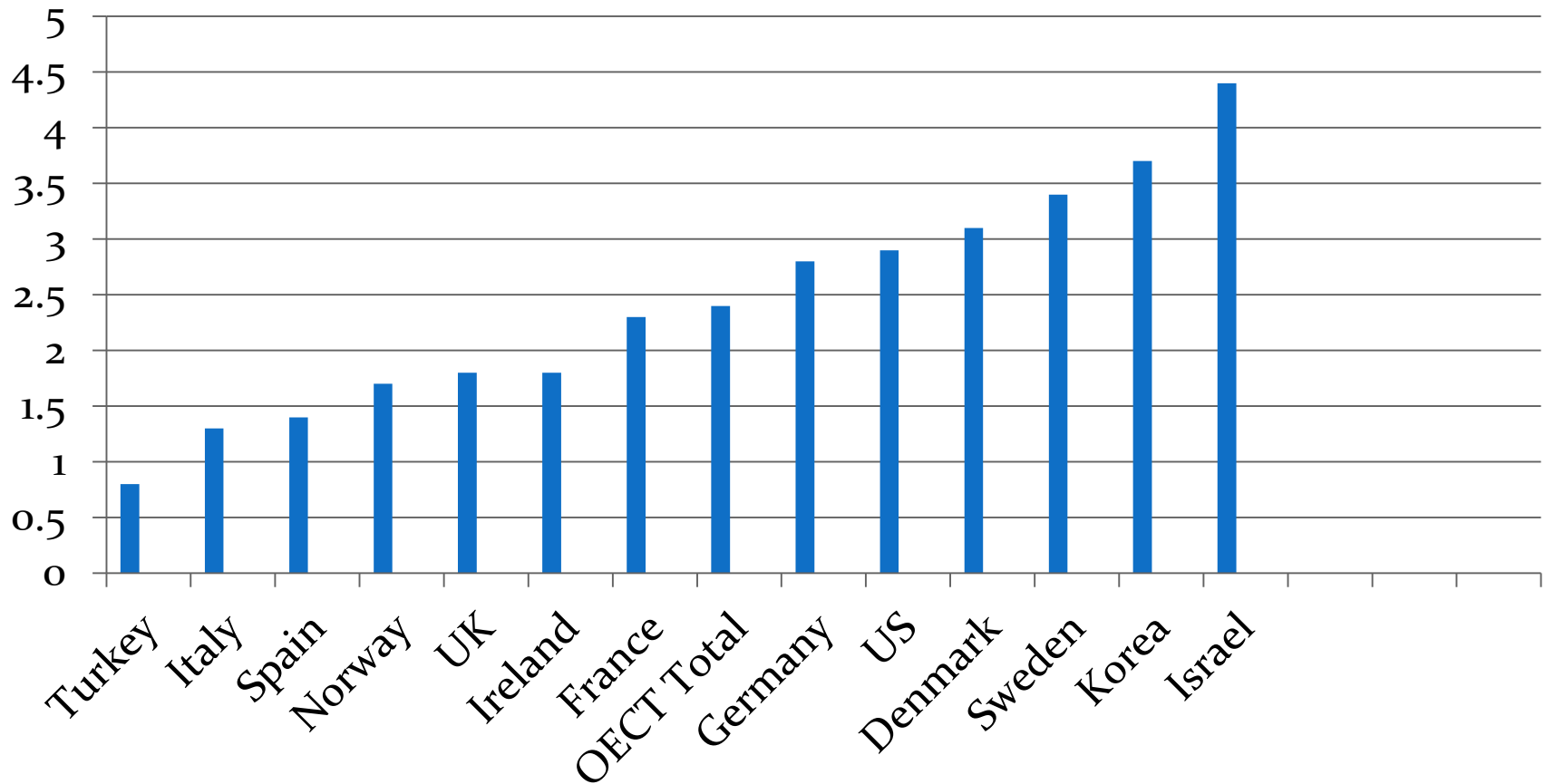
# RELATIVE WORLD COMPETITIVENESS

## (IMD World Report, 2011)

### By Factors

- Business expenditure on R&D – 1st
- Total expenditure on R&D – 1st
- Accessibility to capital markets – 1st
- Central bank policy – 1<sup>st</sup>
- Adaptability of companies – 5th
- Cyber security – 2nd
  
- Resilience of economy – 9th
- Entrepreneurship in business – 1st
- Skilled labor – 4th
- Worker motivation – 7th
- Finance skills – 8th

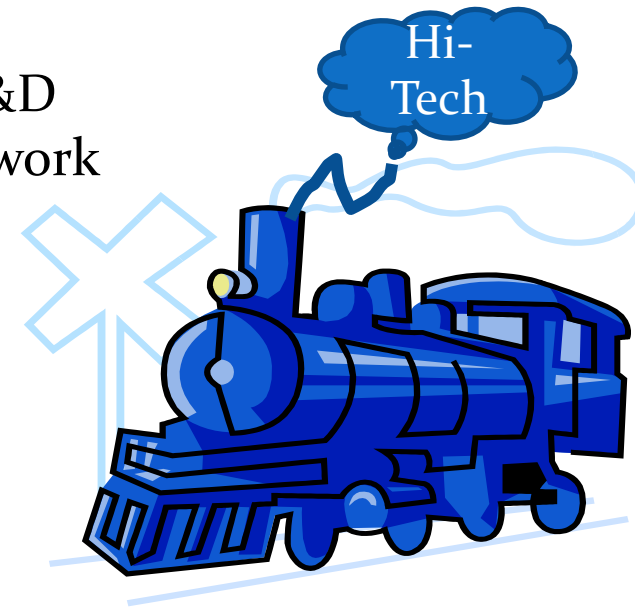
# R&D Expenditure As Percentage of GDP





# Government Support

- Office of the Chief Scientist matching grant to commercial R&D projects
- Yozma: jump started the VC industry
- Magnet: support of generic R&D consortia
- Incubator program: support from innovative ideas to start-ups
- The Law for the Encouragement of Capital Investments Competitive grant program
- Tax exemption path for manufacturing facilities
- The Law for the Encouragement of Industrial R&D
- The Global Enterprise R&D Cooperation Framework
- Bi-national funds (such as BIRDF, KORIL-RDF)
- Special tax benefits for R&D centers
- Tax exemption for venture capital investment
- Employment grant program
- Training grant program \*\*\*



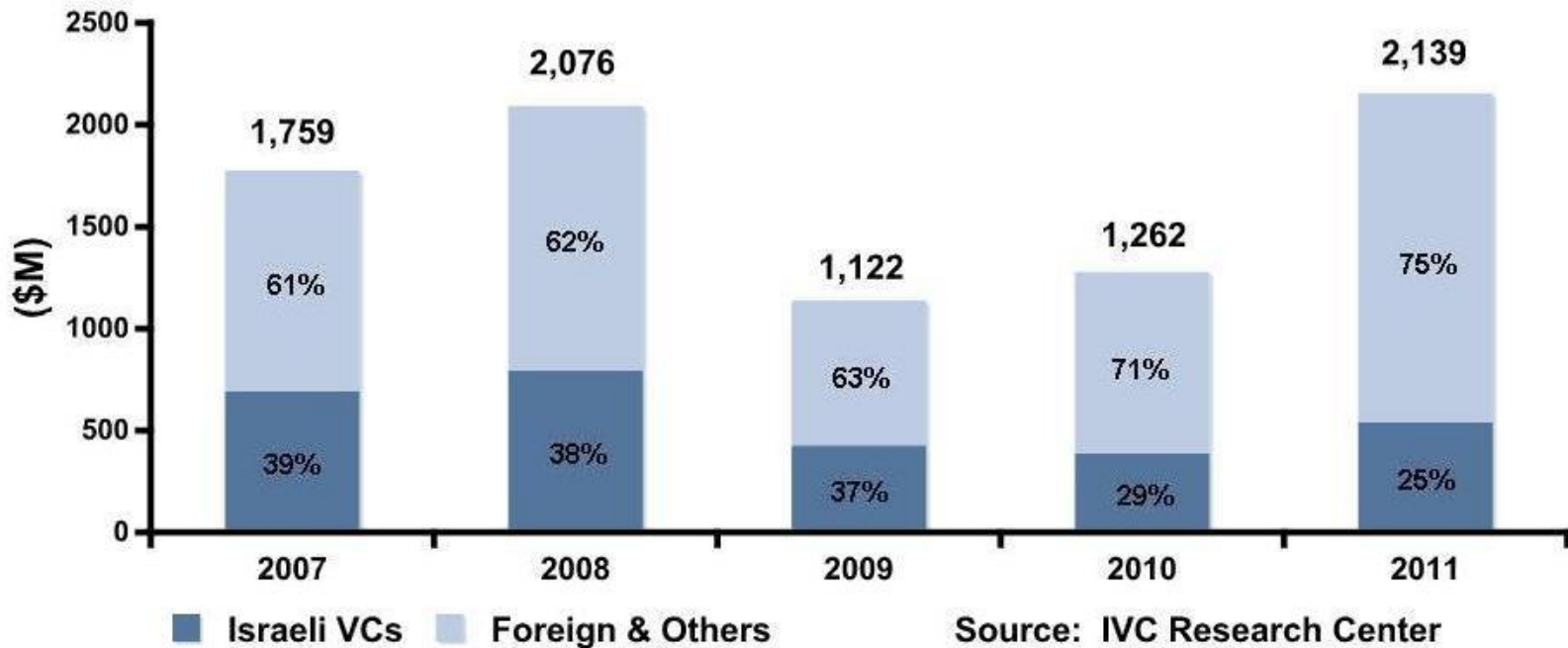
# Advanced Communication Infrastructure \*\*\*

- 89% Internet penetration to households.
- 92% Penetration of digital Multi-channel TV.
- 95% Penetration of Cable TV to households.
- 85% of Internet connections are broadband.
- 95% Penetration (of households) of telephone lines.
- 100% Home-Pass rate with 3 networks: Twisted - Pair (PPT), HFC (Cables) and 4 Wireless cellular providers.
- 104% penetration rate of Mobile phones (7.5 million).
- 6<sup>th</sup> in the World in Mobile Telephone subscribers (Per Capita).

# Robust VC Industry

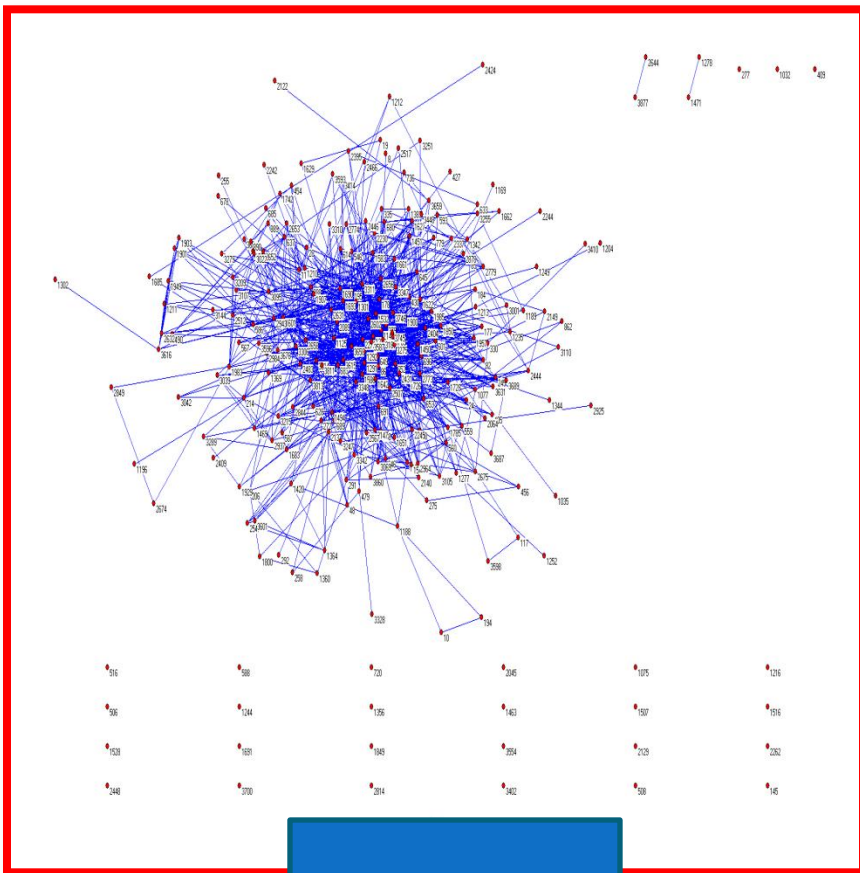
- Over the period 1992 to the present day, there have been as many as **240 VCs** in Israel, the second largest VC market after the US
- In 2005, Israel came in third (**378** start-up receiving VC investment) as a high tech region, after Silicon Valley (895) and New England (385), in VC-funded start-ups. No European country other than the UK was even close.
- VCs have invested over **\$12B**, mostly in the past decade. In proportion to GDP, this represents the highest rate in the).

# Capital recruited by Israeli high-tech companies (2007-2011)

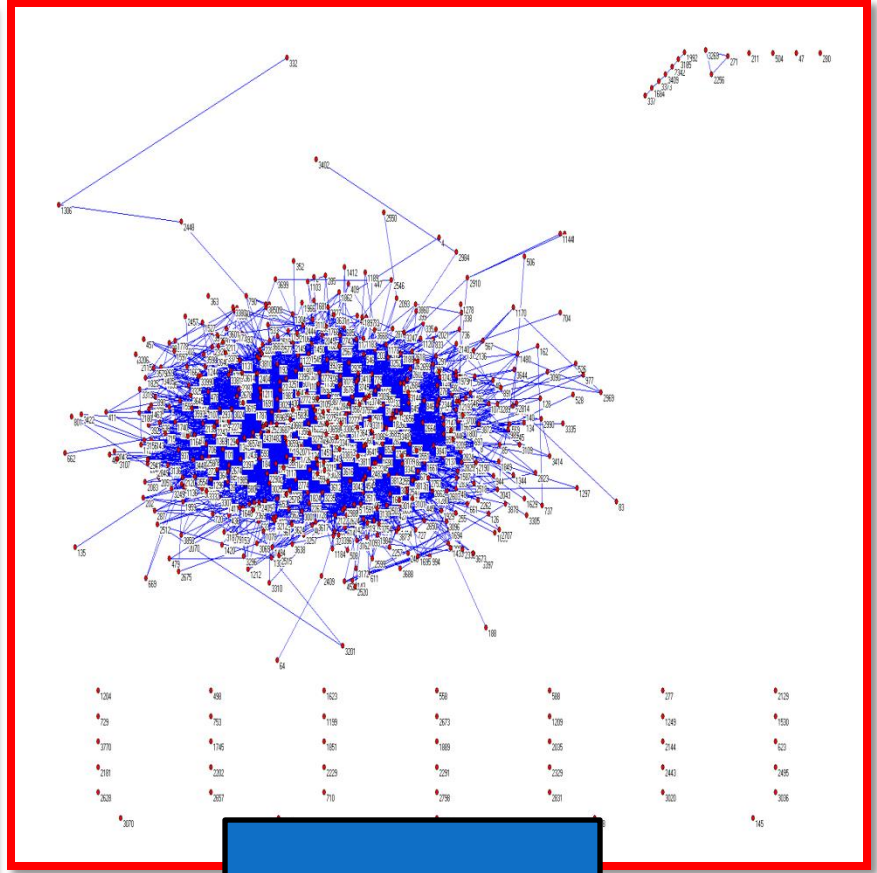




# VC Syndication



1999



2006

Do all those facts explain  
the success secret of the  
Israeli Hi-Tech?



Probably  
they don't....

The Genealogical Approach

# A hint is hiding between the lines in the following quote:

*"We are outsourcing in Romania, China and India. We transfer [out] programming jobs and knowledge, [but] that is not so important. What we have here [in Israel], beyond the technological knowledge and the hunger for success, is the collective inclination towards entrepreneurship – the appropriate values and the know-how for identifying an opportunity and putting it into practice – [this is] what is needed to create new ventures. The moment we transfer this to others, we lose our competitive edge as a leading Hi-Tec country."*

Zvi Slonimski, CEO, Alvarion



# National or Genealogical DNA

In other words, somewhere, sometime, under certain conditions, entrepreneurial characteristics (**DNA??**) are created and transferred across generations.

According to Zvi, it is our objective, the Israeli entrepreneurs, to transmit these characteristics within the local genealogies and not among our potential competitors.



How the Israeli entrepreneurial DNA is created and how it is disseminated in the Hi-tech sector?

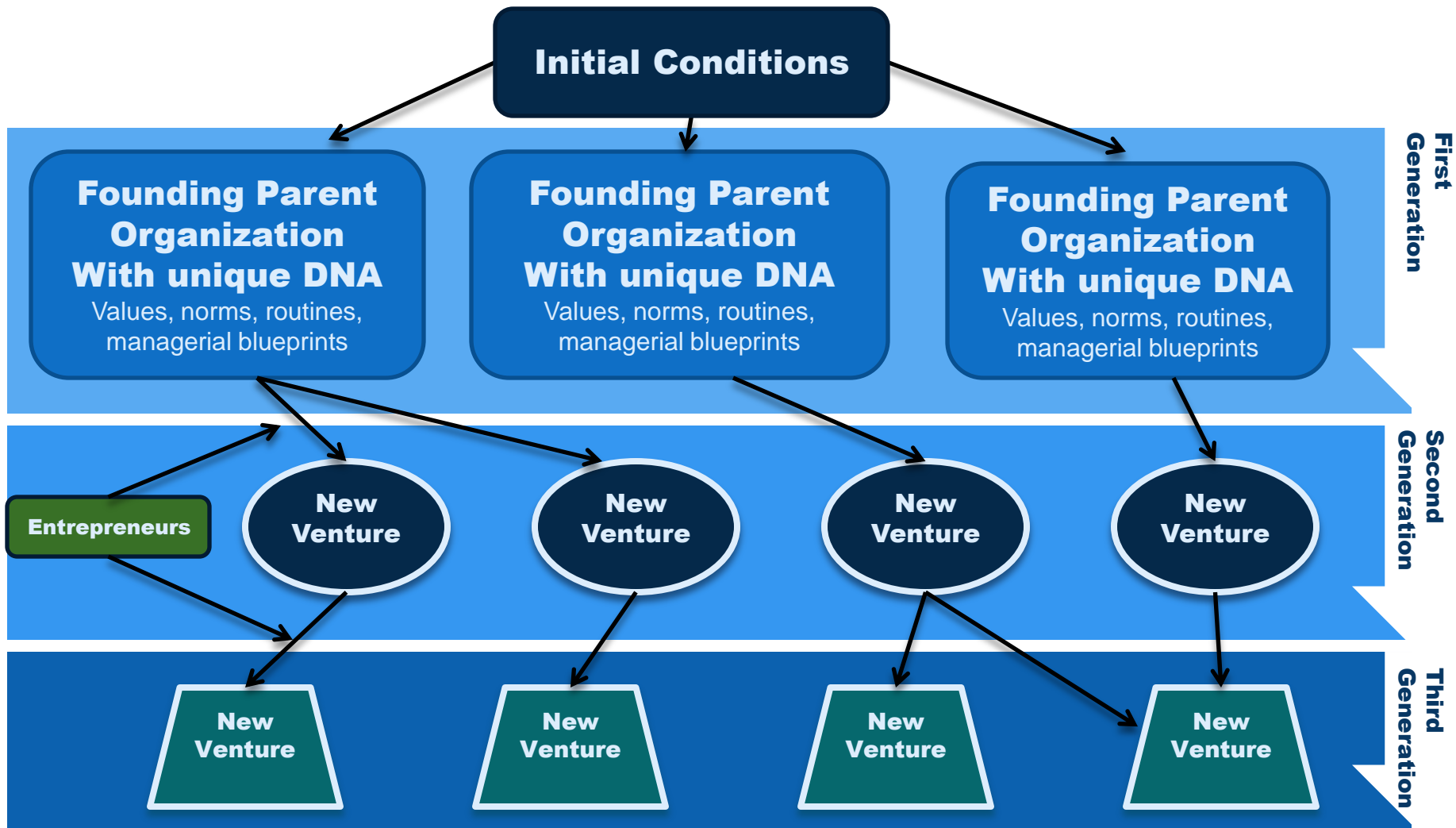
# A genealogical Approach

We suggest a **complementary approach** to the **traditional cluster approach** of industrial sectors' evolution. We explain the emergence and evolutionary trajectory of industrial sectors (such as the Israeli hi-tech) through their **founding parents characteristics** and **genealogical structures**.

Genealogy is a record of descent or lineage of a group from its ancestors to the recent generation.

Each genealogy is originated from founding parents which started the entire genealogy.

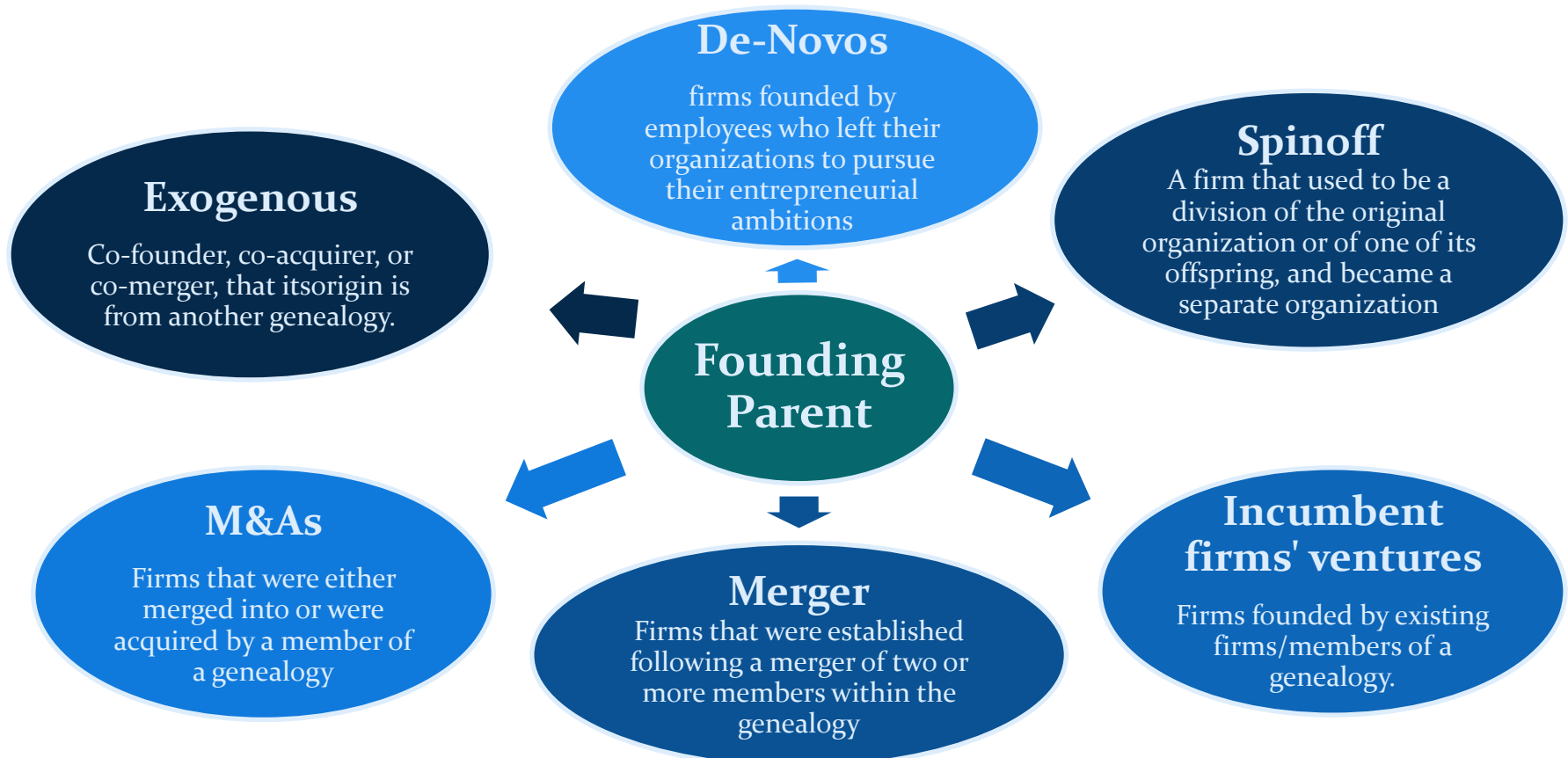
# The Genealogical Model



# Two Main Evolutionary Processes: Imprinting and Inheritance

- **Imprinting:** initial conditions at distinct points in time shape the entrepreneurial inclinations of the founding parent's firm and, consequently, determine the entrepreneurial growth of the genealogy.
- **Inheritance:** The entrepreneurial characteristics of the different genealogies are transmitted along genealogical lines, via inheritance, thus affecting the evolutionary trajectory of future generations.

# The Genealogy Members: Type of Affiliation



# How to study this phenomenon?

- If we want to learn about the dynamics of the evolution of the Israeli hi-tech, we need 2 things:
- (1) To identify the founding parents of the Israeli hi-tech and analyze the initial conditions in which they were founded.
- (2) To construct the genealogies of the founding parents.

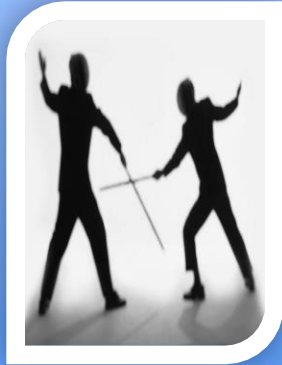
# The Research: Data Construction of the ITC Genealogies

- **Interviews:** Identifying the Genealogies
- **Data sources:** companies internet websites, IVC, D&B, newspapers, press releases, etc (total 1039 firms).
- **Analysis:** Identifying the founding parents; tracing the history and evolution of the genealogies (top-down, bottom-up), mapping (using Pajeck software)
- We have identified 9 genealogies: **Tadiran, Telrad, Elisra, Orbit, Motorola, ECI, Rad, Fibronics** and **Comverse**



# Differential Initial Conditions in the Israeli Hi-Tech

## Competitive Period



Political upheaval, shift toward a neo-liberal economy,  
substantial growth of private sector, environmental  
uncertainty, competition  
Internal Entrepreneurship=> external entrepreneurship  
Collective orientation=> individual orientation



**FIBRONICS**



## Institutional-Cooperation Period



Nation building=> Intensive state intervention, mass  
migration, priority of labor intensive industries  
Collective survival=> hard work, resilience,  
cooperation, mutual help, pattern of delayed  
satisfaction



**MOTOROLA**

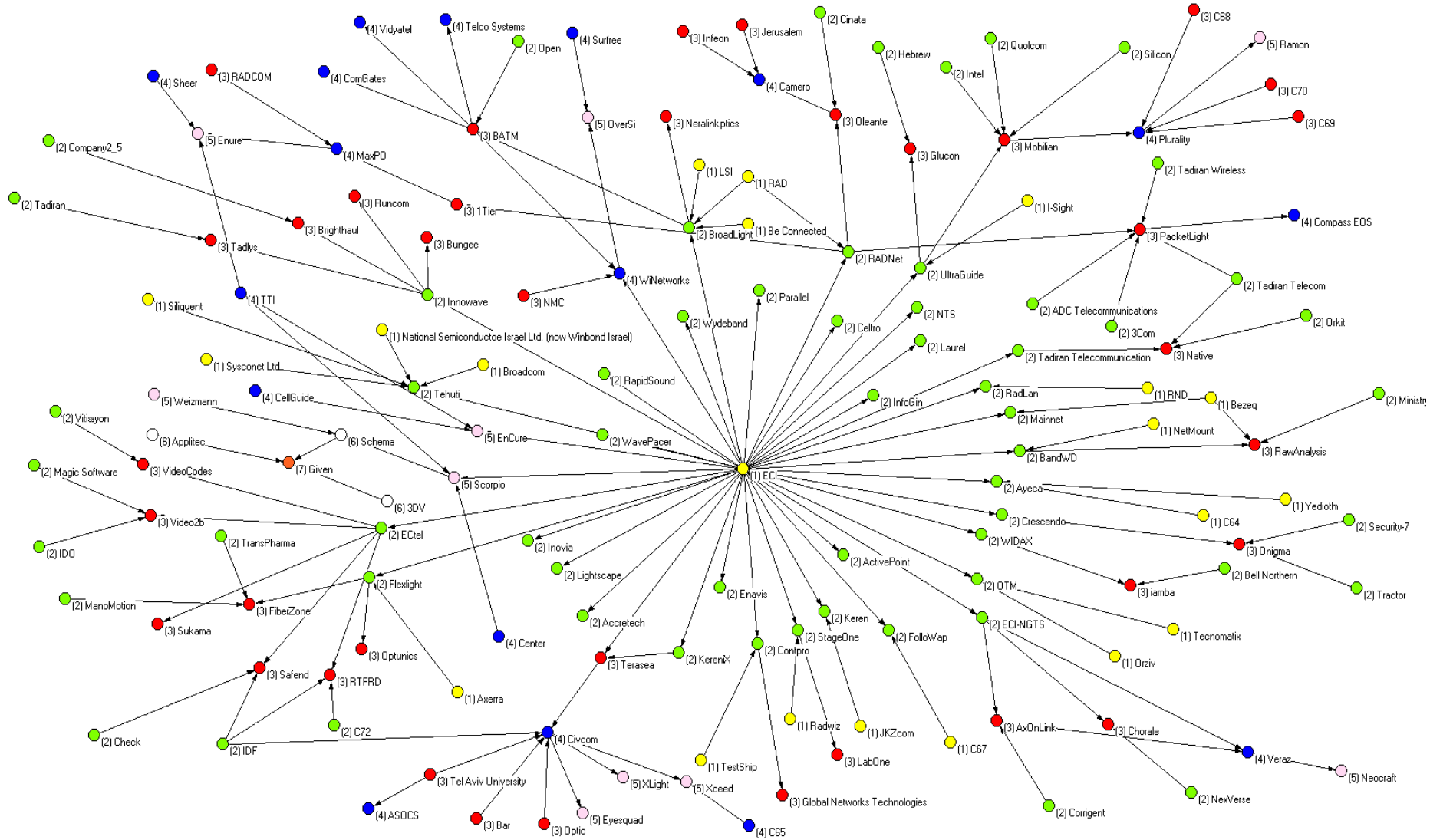




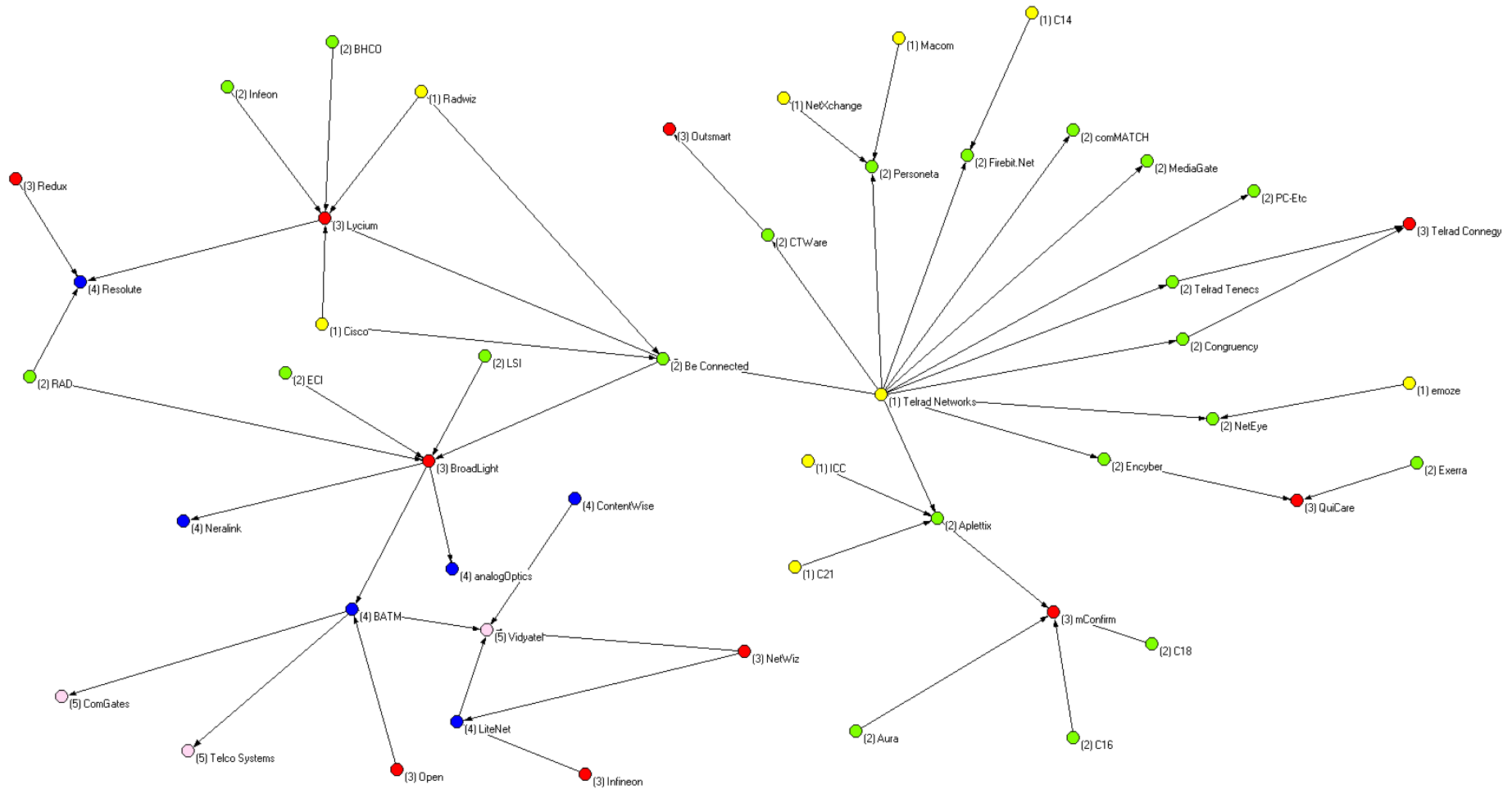




# ECI Telecom (Founded in 1961)



# Telrad (founded in 1951)

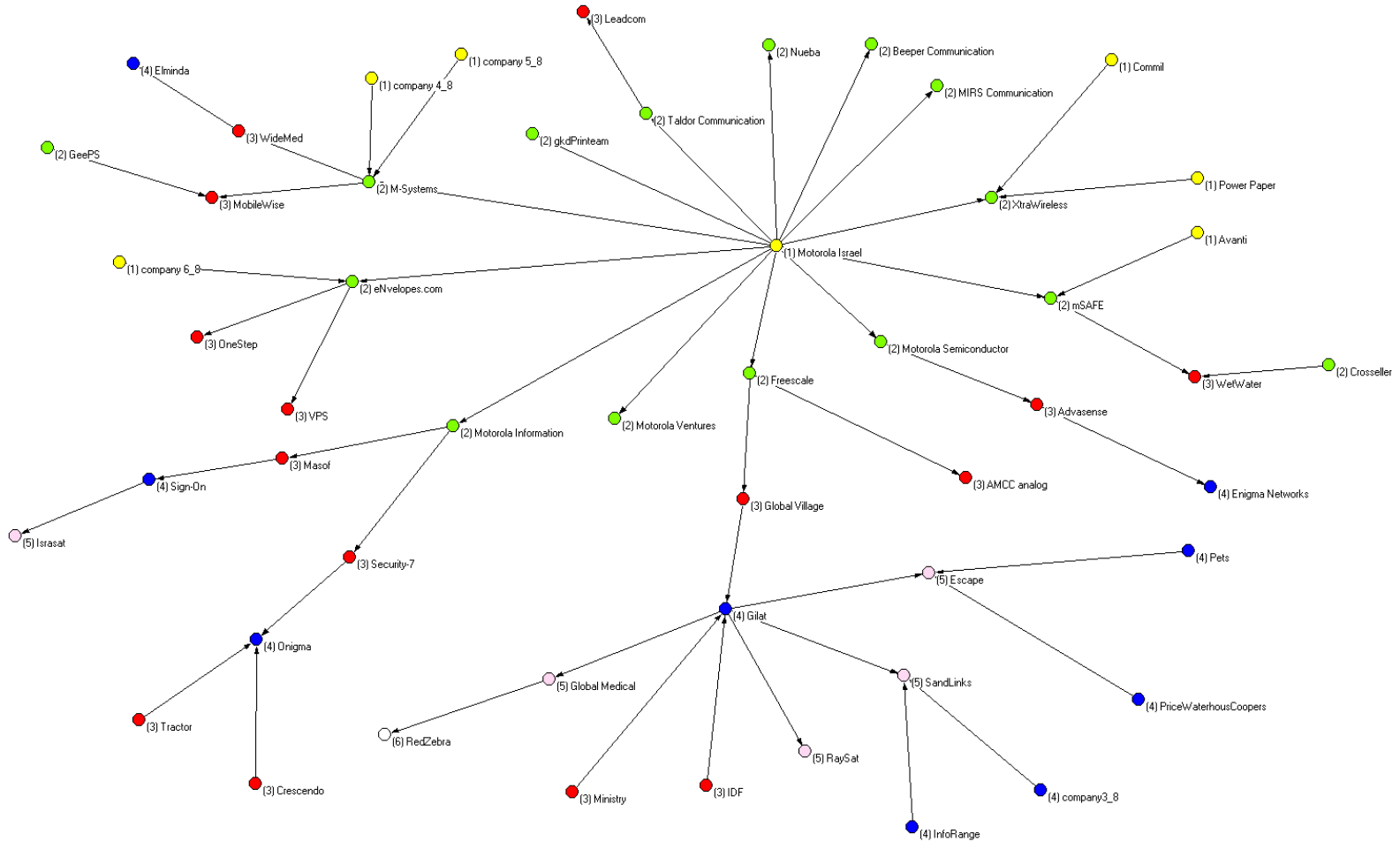




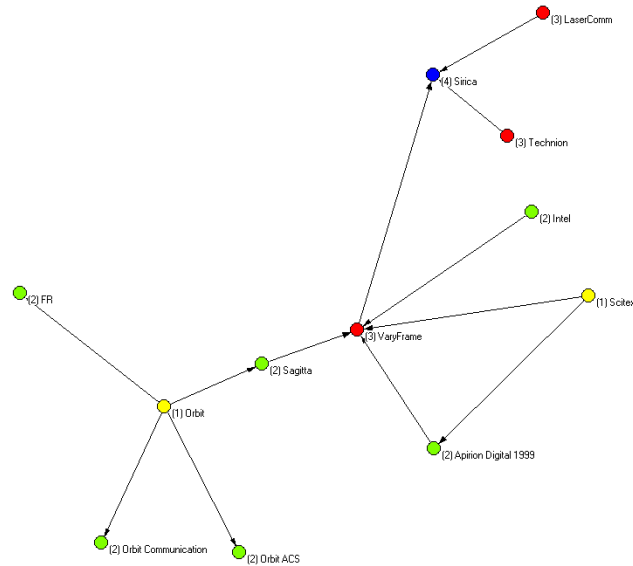




# Motorola (Founded in 1964)



# Orbit (founded in 1951)



# Potency - dependent variables

- **Volume:** the number of spawned startups founded by independent entrepreneurs who left their incumbent organizations (de-novos).
- **Pace of growth:** reflects the speed of genealogical evolution in terms of the number of years per generation, number of founded firms per generation.
- **Resilience:** Coping in time of crises

# Potency measures of the three genealogical categories – Institutional-Cooperative Economy, ECI, Competitive Economy

	Cooperative Economy	ECI	Competitive Economy
<b>Volume of De-Novos</b>			
Mean Volume	30.8	70	78.66
<b>Pace of Growth</b>			
Mean Generations	5.6	7	8.33
Mean Years	47.2	45	25
Years/Gen.	8.9	8.8	3.09
De-Novos/year	0.8	1.55	3.13
De-Novos/Gen.	4.74	10.00	9.16

# Potency measures of the three genealogical categories – Institutional-Cooperative Economy, ECI, Competitive Economy

(de-novos with double affiliations are excluded)

	Cooperative Economy	ECI	Competitive Economy
De-Novos			
Mean Volume	13.8	35.0	40.33
Pace of Growth			
Mean Generations	5.8	7.0	8.33
Mean Years	47.2	45.0	25.0
Years/Gen.	8.14	6.42	3.00
De-Novos/year	0.29	0.77	1.61
De-Novos/Gen.	2.21	5.0	4.73

# Resilience: Potency of the genealogies in the two economic periods

		1932-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005
<b>Cooperative Economy</b>	N	1	2	7	19	54	69
	Mean	0.2	0.4	1.44	3.8	10.8	13.8
<b>ECI</b>		0	0	2	5	25	38
<b>Competitive Economy</b>	N	1	2	6	26	79	121
	Mean	0.33	0.66	2.0	8.66	26.33	40.33

# Resilience: Potency of the genealogies in the two economic periods

(de-novos with double affiliations are excluded)

		1932-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005
<b>Cooperative Economy</b>	N	1	2	5	14	41	44
	Mean	0.2	0.4	1.00	2.8	8.2	8.8
<b>ECI</b>		0	0	2	4	24	25
<b>Competitive Economy</b>	N	1	2	6	33	68	104
	Mean	0.33	0.66	2.0	8.66	22.6	34.66

# Why can we argue that transmission is carried out from generation to generation?

1. Not all founding parents have a direct influence on firms across generations.
2. The influence of the founding parents is dominant mainly within, and not across, genealogies.
3. The founding parents of potent genealogies exhibit different models of growth that were inherited by their progenies
4. Variation in direct channels for inheritance (56 serial entrepreneurs in RAD genealogy, 21 in Comverse, and 30 in Fibronics . In contrast, only 11 in Telrad, 25 in Tadiran, 8 in Elisra, 11 in Motorola, 1 in Orbit and 24 in ECI); Incest relations.



# Last Step: From evolution of genealogies to evolution of an industrial sector - Convergence of genealogies

- De-novos with double affiliations facilitate the transfer of knowledge and capabilities from one genealogy to another.
- The culture of entrepreneurship inherent in the genealogies founded in the competitive period has enabled founders to share their entrepreneurial capabilities through ventures founded across genealogies.
- This explains why we may see potency within the entire genealogical configuration of the industry

# Three points to think about

- What are the initial conditions in Estonia? How do they shape the entrepreneurial inclinations of the Estonian people and ultimately their entrepreneurial potency?
- What is the entrepreneurial dissemination potential and structure in Estonia?
- Can we make a planned change?



Thank you !

# Conclusions

1. Initial environmental conditions and prior experience of the founders shaped the potency of their respective genealogies and transposed on the entire sector.
2. Entrepreneurial routines and values along genealogical lines may remain stable along generational lines. This contradicts common intuition, of a steady decay over time of the influence of founding parents over their progenies.
3. Intergenerational relations exhibit complex patterns of affinity (e.g 'incest,') and affect the presence of different genealogical structures.

# Discussion

1. Diverse genealogical evolution with varied structures and inheritance characteristics play a key role in the emergence and growth of new industrial sectors.
2. The genealogical evolution is affected not only by the nature of the environment and the population that resides within it, but also by the capacity for internal imprinting of values such as entrepreneurial inclination. Each genealogy has specific structural characteristics that reflect its potency.
3. After convergence, the stronger genealogies boost the potency of the entire sector

# Conclusions (cont.)

4. Diverse genealogical evolution with varied structures and inheritance characteristics play a key role in the emergence and growth of new industrial sectors.
5. The genealogical evolution is affected not only by the nature of the environment and the population that resides within it, but also by the capacity for internal imprinting of values such as entrepreneurial inclination. Each genealogy has specific structural characteristics that reflect its potency.
6. After convergence, the stronger genealogies boost the potency of the entire sector

# Ventures' Frequency: Genealogy by Type of Affiliation

	Telrad	Tadiran	Elisra	Orbit	MIL	ECI	Fibronics	Comverse	RAD
Initiated	3	4	1	0	3	4	0	2	33
Spinoff	2	10	2	0	4	7	1	4	6
M&A	4	5	0	0	0	5	5	8	3
Merger	2	0	0	0	0	1	0	2	2
De- Novo	15	86	23	3	27	70	85	40	111
Foundin g Parent	1	1	1	1	1	1	1	2	2
Exoge- nous	22	29	26	0	15	68	42	45	95

# Potency measures of the nine genealogies: Volume and pace of growth

	Telrad	Tadiran	Elisra	Orbit	MIL	ECI	Fibronics	Comverse	RAD
De-Novos									
N	15	86	23	3	27	70	85	40	111
Pace of Growth									
N Gen.	5	8	6	4	5	7	10	6	9
N Years	55	44	39	56	42	45	28	23	24
Years/Gen.	10.1	5.5	6.5	14	8.4	8.8	2.8	3.83	2.66
De Novos/Year	.27	1.95	.59	.053	.64	1.55	3.04	1.74	4.62
De Novos/Gen	3.0	10.75	3.83	.75	5.4	10.00	8.5	6.67	12.33



# Resilience of the nine genealogies

	1932- 1980	1981- 1985	1986- 1990	1991- 1995	1996- 2000	2001- 2005
Telrad	0	1	0	1	4	9
Tadiran	1	0	3	11	38	31
Elisra	0	0	0	5	5	12
Orbit	0	0	0	1	0	2
MIL	0	1	4	1	7	13
ECI	0	0	1	5	28	35
Fibronics	1	1	4	13	25	41
Comverse	0	0	1	4	12	22
RAD	0	1	1	9	42	58

# Resilience of the nine genealogies

(de-novos with double affiliations are excluded)

	1932-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005
Telrad	0	1	0	0	1	5
Tadiran	1	0	3	10	32	28
Elisra	0	0	0	3	1	5
Orbit	0	0	0	1	0	1
MIL	0	1	2	0	7	9
ECI	0	0	2	4	24	25
Fibronics	1	1	4	12	20	37
Comverse	0	0	1	4	12	20
RAD	0	1	1	7	36	47