

**Armenia's Stand in the IT World:  
Findings from The Global  
Information Technology Report  
2005-2006**

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Yerevan, April 3, 2006



# World Economic Forum

WEF is a non-profit independent international organization, the activities of which are aimed at the development of entrepreneurship, facilitation of economic progress, and social development.

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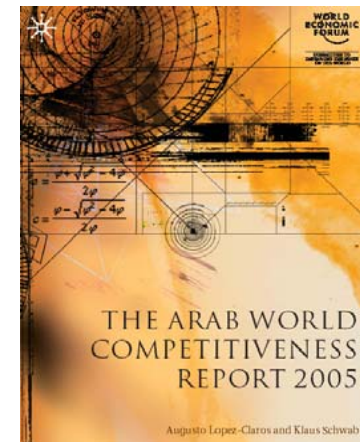
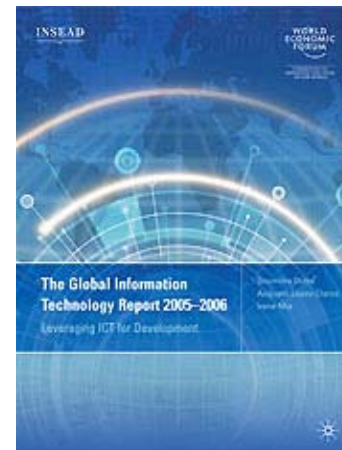
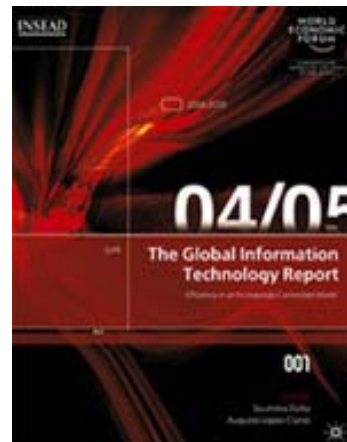
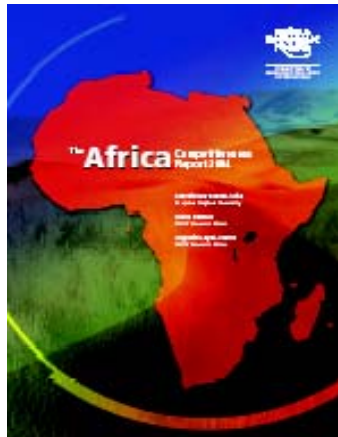
WEF has a number of other programs and initiatives, e.g.

- “Regional summits”
- “WEF in Russia”

# Global Competitiveness Programme

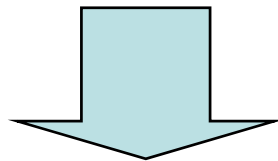
Through its reports and activities the Global Competitiveness Programme of the World Economic Forum identifies impediments to growth and thereby helps stimulate the development of relevant strategies to achieve sustained economic progress.

- Flagship product: “**Global Competitiveness Report**”.
- Preparation and publication of **regional and special topic reports** and “**The Global Information Technology Report**” in collaboration with INSEAD, France, first launched in 2002.



# The Global Information Technology Report

- ▶ The **most comprehensive data set** on the **Networked Readiness Frameworks**.
- ▶ Assesses the **preparedness (comparative strengths and weaknesses)** of the countries to capture the benefits of the Information and Communication Technology (ICT)
- Provides with an exceptional tool for **benchmarking and competitive analysis**.
- Produced in **collaboration with leading academics** worldwide and a global network of **partner (research) institutes**.



Partner Institute of WEF in Armenia is the Economy & Values Research Center. Armenia has been involved in the GITR for the first time.

# The Global Information Technology Report

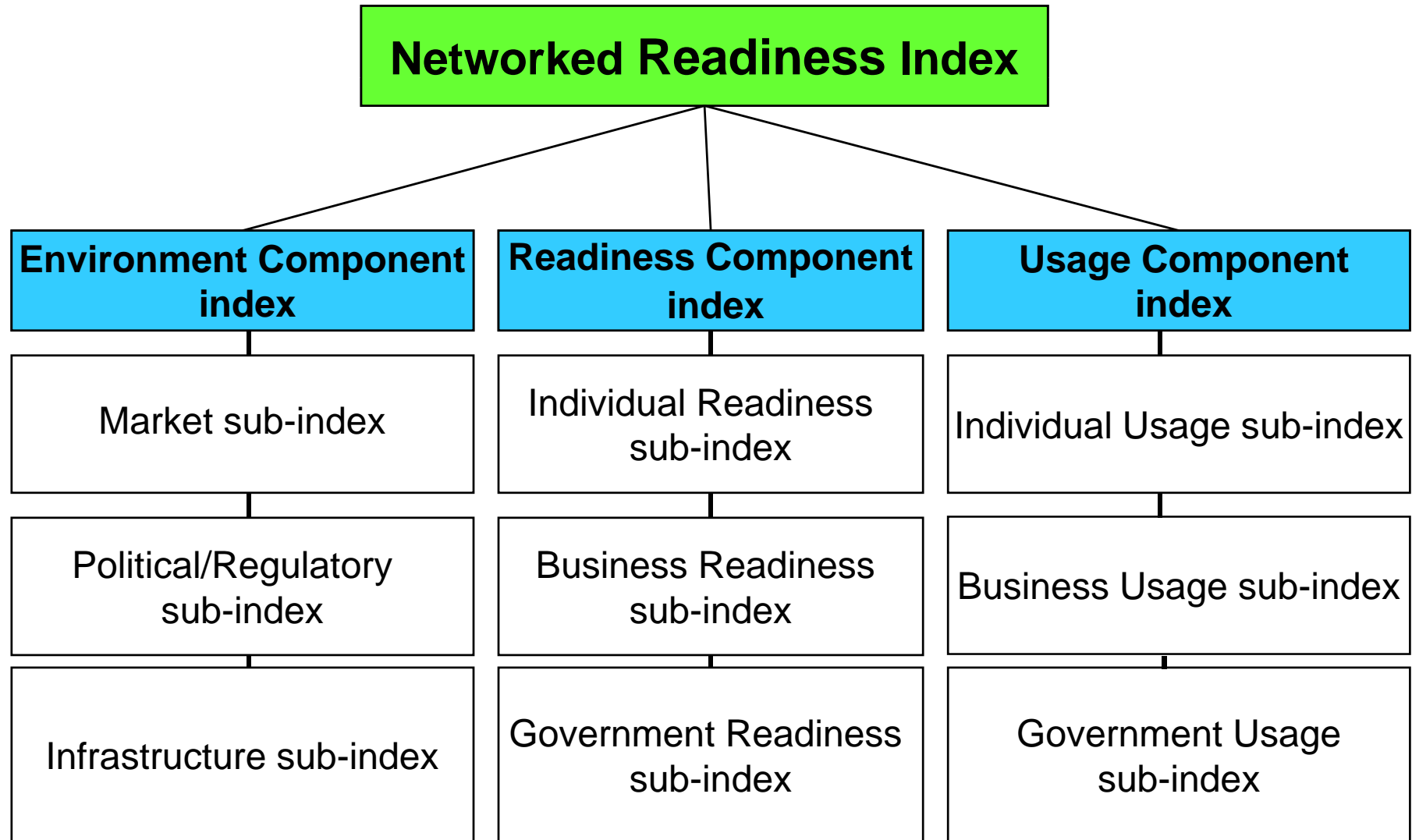
## Executive Opinion Survey

- Use of “hard data” (publicly available information) and survey data (from the Executive Opinion Survey)
- The Executive Opinion Survey records the perspectives of business leaders around the world; Survey data is indispensable, particularly for variables where no reliable hard data sources exist
- Respondents compare their own operating environments with global standards on a wide range of dimensions
- The sample of respondents is carefully selected by the Partner Institute of the WEF in a given country to reflect the structure of a country’s business environment (i.e. the composition of the sample (in percentage terms)). It is also preferable that the respondent company has international experience.

# Networked Readiness Index

- The Networked Readiness Index (NRI) is defined as a nation's degree of preparation to participate in and benefit from information and communication technology (ICT) developments
- The NRI is a useful tool for key policy decision makers charting a country's strategic direction in order to enhance national competitiveness
- The NRI allows a nation to benchmark its ICT performance and to determine the effectiveness of the policy.
- The NRI serves to highlight the areas of over- and under-performance of a given country relative to a similar set of countries, and to provide best-practice examples.

# Networked Readiness Index



# Networked Readiness Index, Armenia

<b>Key Indicators</b>	
Population (mn)	3.05
GDP per capita (PPP US\$), 2004	3,806
Internet Users per 100 inhabits, 2003	3.68
Internet bandwidth (Mbps/10,000 inhabitants)	0.3
<b>Index</b>	<b>Rank</b>
<b>Growth Competitiveness Index</b>	<b>79</b>
<b>Networked Readiness Index (2005-2006)</b>	<b>86</b>
<b>Environment Component Index</b>	<b>87</b>
<i>Market Environment sub-index</i>	70
<i>Political/Regulatory Environmnet sub-index</i>	101
<i>Infrastructure Environment sub-index</i>	71
<b>Readiness Component Index</b>	<b>78</b>
<i>Individual Readiness sub-index</i>	69
<i>Business readiness sub-index</i>	89
<i>Government readiness sub-index</i>	81
<b>Usage Component Index</b>	<b>101</b>
<i>Individual Usage sub-index</i>	79
<i>Business Usage sub-index</i>	109
<i>Government Usage sub-index</i>	89



# Networked Readiness Index, Armenia

## Environment Component Index

Index	Rank	Index	Rank
<b><u>Market Environment sub-index</u></b>	<b>70</b>	<b><u>Political/Regulatory Environment sub-index</u></b>	<b>101</b>
Availability of scientists and engineers, 2005	26	Effectiveness of law-making bodies, 2005	96
Venture capital availability, 2005	99	Laws relating to ICT, 2005	94
Financial market sophistication, 2005	109	Judicial independence, 2005	107
Technological readiness, 2005	96	Intellectual property protection, 2005	107
State of cluster development, 2004	79	Efficiency of legal framework, 2005	91
Quality of scientific research institutions, 2005	59	Property rights, 2005	65
US utility patents, 2004	57	Quality of competition in the ISP sector, 2005	108
Tertiary enrollment, 2003	66	<b><u>Infrastructure Environment Index</u></b>	<b>71</b>
Burden of government regulation, 2005	55	Telephone lines, 2003	65
Extent and effect of taxation, 2005	51	Secure Internet servers, 2004	81
Time required to start a business, 2005	28	Internet hosts, 2003	81
No. of procedures required to start a business, 2005	53	Electricity production, 2002	71
Intensity of local competition, 2005	111		

# Networked Readiness Index, Armenia

## Readiness Component Index

Index	Rank	Index	Rank
<b><u>Individual Readiness sub-index</u></b>	<b>69</b>	<b><u>Business Readiness sub-index</u></b>	<b>89</b>
Quality of math and science education, 2005	36	Extent of staff training, 2005	89
Quality of educational system, 2005	55	Local specialized research and training services, 2005	90
Quality of public schools, 2005	63	Quality of management schools, 2005	96
Internet access in schools, 2005	100	Company spending on R&D, 2005	90
Buyer sophistication, 2005	90	Business monthly telephone subscription, 2003	84
Buyer dynamism, 2004	90	Local supplier quality, 2005	80
Residential telephone connection charges, 2003	72	University/industry research collaboration, 2005	82
Residential monthly telephone subscription, 2003	63	Scientific and technical journal articles, 2001	48
<b><u>Government Readiness sub-index</u></b>	<b>81</b>		
Government prioritization of ICT, 2005	64		
Govern. procurement of adv. tech. products, 2005	77		
Importance of ICT to gov't. vision of future, 2005	64		
Government R&D subsidies, 2004	58		
E-participation index, 2004	86		
E-government readiness index, 2004	78		

# Networked Readiness Index, Armenia

## Usage Component Index

Index	Rank	Index	Rank
<b><u>Individual Usage sub-index</u></b>	<b>79</b>	<b><u>Business Usage sub-index</u></b>	<b>109</b>
Cellular telephones, 2003	103	Prevalence of foreign technology licensing, 2005	101
Telephone subscribers, 2003	88	Firm-level technology absorption, 2005	49
Personal computers, 2003	89	Capacity for innovation, 2005	48
Telephone lines, 2003	65	Availability of new telephone lines, 2004	104
Television sets, 2002	48	Availability of cellular phones, 2005	115
DSL Internet subscribers, 2003	83	Extent of business Internet use, 2005	91
Cable modem Internet subscribers, 2003	68	<b><u>Government Usage sub-index</u></b>	<b>89</b>
Internet users, 2003	86	Government success in ICT promotion, 2005	84
PC households online, 2005	66	Availability of online services, 2005	110
Internet bandwidth, 2002	96	ICT productivity, 2005	100
		ICT pervasiveness, 2005	45

# Networked Readiness Index: Top 20 countries

Country	Score	Rank
United States	2.02	1
Singapore	1.89	2
Denmark	1.8	3
Iceland	1.78	4
Finland	1.72	5
Canada	1.54	6
Taiwan	1.51	7
Sweden	1.49	8
Switzerland	1.48	9
United Kingdom	1.44	10
Hong Kong SAR	1.44	11
Netherlands	1.39	12
Norway	1.33	13
Korea, Rep.	1.31	14
Australia	1.28	15
Japan	1.24	16
Germany	1.18	17
Austria	1.18	18
Israel	1.16	19
Ireland	1.15	20

## Networked Readiness Index: Lowest 20 countries

Country	Score	Rank
Georgia	-0.82	96
Bosnia and Herzegovina	-0.87	97
Guatemala	-0.88	98
Cameroon	-0.88	99
Honduras	-0.89	100
Mozambique	-0.94	101
Madagascar	-0.99	102
Kyrgyz Republic	-1.01	103
Cambodia	-1.03	104
Zimbabwe	-1.04	105
Albania	-1.04	106
Ecuador	-1.07	107
Benin	-1.07	108
Bolivia	-1.1	109
Bangladesh	-1.11	110
Guyana	-1.11	111
Nicaragua	-1.14	112
Paraguay	-1.23	113
Chad	-1.36	114
Ethiopia	-1.39	115

# Networked Readiness Index: CIS Countries

Country	Score	Rank
Kazakhsatan	-0.24	60
Russian Federation	-0.39	72
Azerbaijan	-0.4	73
Ukraine	-0.49	76
Armenia	-0.72	86
Tajikistan	-0.77	93
Moldova	-0.78	95
Georgia	-0.82	96
Kyrgyz Republic	-1.01	103

# Environment Component Index: Top 10 countries

Country	Environment Component Index Rank	Market Environment Sub-Index Rank	Political and Regulatory Sub-Index Rank	Infrastructure Environment Sub-Index Rank
Iceland	1	5	5	1
United States	2	4	4	2
Singapore	3	1	2	15
Finland	4	8	7	5
Denmark	5	14	1	6
Canada	6	17	15	4
Norway	7	18	13	3
Switzerland	8	7	11	11
Australia	9	29	8	8
Taiwan	10	3	25	13

# Environment Component Index: CIS Countries

Country	Environment Component Index Rank	Market Environment Sub-Index Rank	Political and Regulatory Sub-Index Rank	Infrastructure Environment Sub-Index Rank
Kazakhstan	58	56	63	62
Azerbaijan	67	55	74	72
Russian Federation	78	80	95	45
Ukraine	84	87	93	54
Georgia	86	78	90	73
Armenia	87	70	101	71
Tajikistan	88	95	78	83
Moldova	94	108	88	67
Kyrgyz Republic	107	107	105	78



# Readiness Component Index: Top 10 countries

Country	Readiness Component Index Rank	Individual Readiness Sub-Index Rank	Business Readiness Sub-Index Rank	Government Readiness Sub-Index Rank
Singapore	1	1	12	1
United States	2	14	1	2
Finland	3	2	4	7
Denmark	4	8	5	3
United Kingdom	5	20	7	5
Canada	6	10	11	8
Korea, Rep.	7	19	20	4
Taiwan	8	7	16	9
Netherlands	9	4	13	10
Germany	10	21	3	14

# Readiness Component Index: CIS countries

Country	Readiness Component Index Rank	Individual Readiness Sub-Index Rank	Business Readiness Sub-Index Rank	Government Readiness Sub-Index Rank
Russian Federation	55	46	53	72
Kazakhstan	56	55	62	56
Ukraine	59	60	60	54
Azerbaijan	77	84	69	75
Armenia	78	69	89	81
Tajikistan	89	81	103	93
Kyrgyz Republic	90	83	112	87
Moldova	98	97	96	99
Georgia	101	90	100	110

# Usage Component Index: Top 10 countries

Country	Usage Component Index Rank	Individual Usage Sub-Index Rank	Business Usage Sub-Index Rank	Government Usage Sub-Index Rank
Denmark	1	2	5	2
Singapore	2	14	10	1
Sweden	3	1	8	14
Iceland	4	7	7	5
Taiwan	5	9	9	4
United States	6	12	1	9
Korea, Rep.	7	5	14	6
Finland	8	15	6	8
Hong Kong, SAR	9	6	18	10
Switzerland	10	3	12	29

# Usage Component Index: CIS countries

Country	Usage Component Index Rank	Individual Usage Sub-Index Rank	Business Usage Sub-Index Rank	Government Usage Sub-Index Rank
Kazakhstan	62	77	72	43
Azerbaijan	65	83	70	53
Russian Federation	73	53	78	91
Moldova	80	73	91	71
Ukraine	85	62	86	95
Georgia	96	78	82	100
Tajikistan	97	98	106	72
Armenia	101	79	109	89
Kyrgyz Republic	110	93	113	103


# Key Messages - *Symptoms*



## Global Competitiveness

ICT is becoming an important driver of economic growth, more countries pursue aggressive ICT-oriented policies, the pace of development is unprecedented. Armenia is lagging behind many peer countries, failing to utilize one of its strongest competitive advantages.

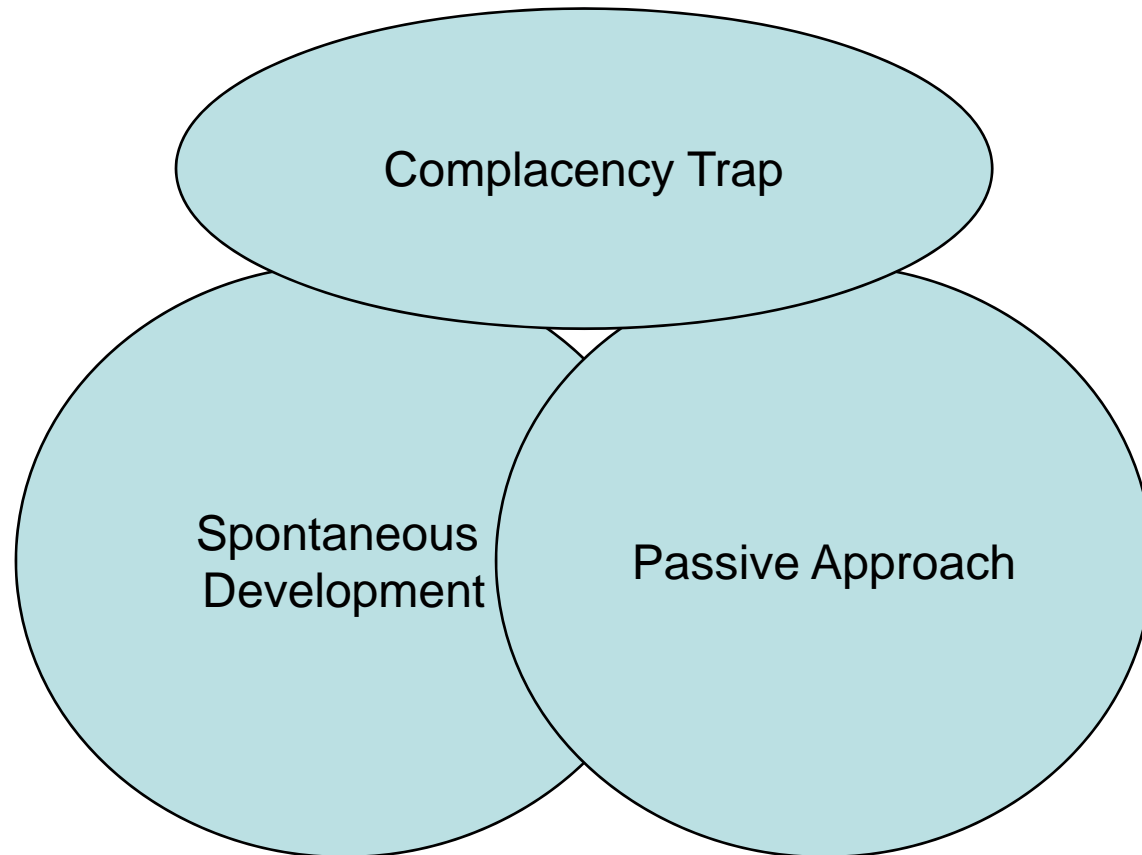
Despite the declared priority of IT in Armenia, it underperforms in its degree of preparedness for participating in and benefiting from the ICT developments.



## Networking the Economy

Capturing the benefits of ICT requires wide and comprehensive understanding of the role of technologies in the economy versus the currently dominating in Armenia narrow focus on the IT industry. The Armenian IT industry development is not anchored on the progress of the country in other aspects of ICT developments. Its logic follows the model of “oasis”.

# Key Messages - *Diagnosis*



# Key Messages - *Diagnosis*



Diverged Focus

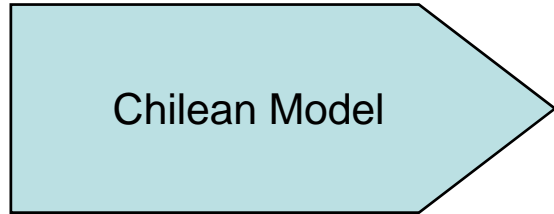
Procedural improvements, broad (non-specific) policy measures, limited scale of actions by the Government and private sector cannot provide a real boost to the ICT development in the country. Tackling only selected components of the environment is not enough. Other factors can become “bottlenecks”. Key levers that can help take off the process are not fully perceived by all stakeholders yet.



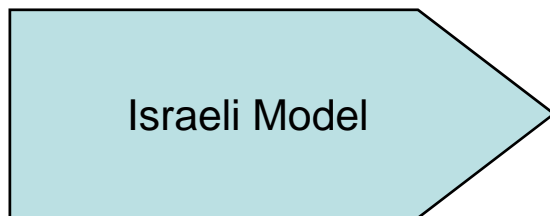
Lack of Strategic Choice

Despite the essential promotion of the “IT story” in Armenia, there has not been a strategic choice of a competitive model. In the IT industry, Armenia still competes on the exploitation of its natural resource – labor force with high intellectual potential. There is a need for a model of transition to the next stage of competitive development that will require massive investments in human skills, technologies and infrastructure.

# Key Messages - *Actions*



- No external targeting of the ICT sector
  - Private-led take off process, followed by public sector efforts
- Balanced understanding by both the Government and the private sector of the ICT's key role in economic development
- Public sector as an early mover and user of ICT



- External positioning of Israel at the center of the knowledge economy
- Government's important role in pushing the high-tech sector, with timely subsequent withdrawal
  - R&D-focused development
- Export-oriented growth
- Focused targeting of multinationals



# **Israel:**

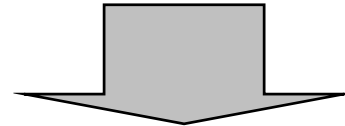
## Factors in the Emergence of an ICT Powerhouse

- Education
- Culture
- Immigration
- Government

# Introduction

The focused involvement of the Government enabled Israel to emerge as a high-tech power, encouraging and supporting the private sector to compete in international markets, ready to withdraw, however, as soon as the latter was able to continue on its own.

- Heavy investments in education
- Effective investment incentives favoring foreign investors
- Investment in R&D (4.6% in GDP, higher than of any developed nation)
- Incubator and venture capital programs



2005

- The 14<sup>th</sup> most creative country in the world
- The 6<sup>th</sup> nation in the number of US patents per capita (2004)
- The highest concentration of high-tech companies in the world after Silicon Valley
- The highest level of venture capital as a percentage in GDP in the world
- The highest high-tech start-ups density in the world (success rate 50%)

# Education

- The Universities started to be established in the 1920s.
- In 1948, the establishment of first class universities and research centers was of high priority to the Government.
- At the beginning of the 1970s six universities and research institutes were operating in Israel. The Government had liberalized the education system allowing private universities to enter the market.
- In the early 1990s, many graduates of top schools were re-trained in electronics and computer science. Public universities managed to shift the priorities to meet the needs of the high-tech sector.

## Catalytic Role of the Military

- The military select and train the brightest young people in elite computing units giving engineers considerable responsibility for project management at a young age.
- While not explicitly seeking commercialization of military IT, the skills spill over and create strong links between research teams in the military and in industry.
- The Computer and Data Communications Network Center of the army continues to train software developers when they return to the unit for reserve duty.

# Culture

- Early Jewish immigrants from Europe were self-sufficient. Finding freedom in the homeland enabled immigrants (coupled with frank and Biblical argumentation) to be exposed to the egalitarian culture, where openness, risk-taking, and individualism were highly valued.

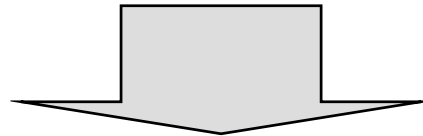
## VALUES

Ambition, openness, risk - taking, individualism, speaking freely, constantly questioning

- Ambition of immigrants to be established and succeed in the homeland and networking with Jews from well-established Diaspora were key to the competitive advantage of Israel, thus resulting in transfer of skills and connections to international companies and networks.
- High-tech industry drove many entrepreneurs, some of the them failed but started over again with the following philosophy guiding them, “*Failure is not disgraceful if you fail honestly*”.

# Immigration

- The immigrants of Jewish descent from the Eastern Europe in the late 1980s and at the beginning of the 1990s, many with advanced degrees and technical training, were ambitious and innovative. The immigration coincided with the explosion of ICT giving a major boost to the Israeli ICT industry.
- The immigrants fostered the development of the ICT sector, hence attracting successful Diasporans from the US and Europe to establish start-ups on their own or R&D centers for their employers from host countries.



The influx of 3 million Jews in 1989-1999 brought with them innovative approaches to problem solving and a strong scholastic tradition. 100,000 immigrant scientists allowed Israel to become the world leader in the number of engineers per capita - 140 engineers per 10,000 (more than twice the level of the US). (Matimop, 2005)

# The Role of the Government

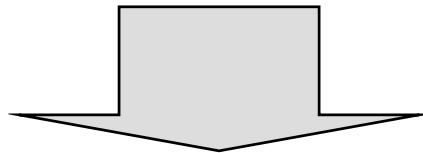
Public policies implemented by the Government coupled with private sector initiatives fostered businesses towards innovation in conditions of appropriate regulatory framework, infrastructure, and financing, coupled with factors such as Jewish culture, immigration and first class education.

## Successful Government Initiatives:

- ✓ *Investment incentives and capital market reforms*
- ✓ *Government support for R&D*
- ✓ *Technology Incubators*
- ✓ *Venture Capitals*

# Investment Incentives and Capital Market Reforms

- The Law for the Encouragement of Capital Investment (LECI) was adopted in 1959 to increase exports and employment in least developed areas and promote business initiatives. The status of “*Approved Enterprises*” or “*Beneficiary Enterprises*” was granted to private initiatives to benefit from Government grants (up to 24% of tangible assets) and tax benefits (depending on the percentage of foreign ownership and location).
  - LECI deliberately introduced a bias in favor of foreign investors. It was thought that favorable tax regime and the relative abundance of well-trained engineers would attract multinationals.
- Capital markets reforms increased the efficiency of the capital markets. The reforms resulted in the fall of the reserve requirement; reduction of the obligatory investment share by pension and provident funds (largest institutional investors) in Government bonds, increase of the efficiency of the stock market turning it into one of the most technologically advanced stock markets in the world.

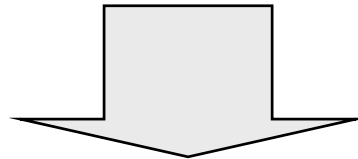


Many start-ups emerged, since it became easier to get a loan. The flow of international investors to Israel increased during the 1960s and 1970s, including high-tech giants, such as IBM, Motorola and Intel, bringing significant spillovers (access to new markets, financing, and know-how/knowledge transfer). In 2003, Intel was employing 6,000 workers, and was the top electronics exporter in Israel (\$1.6 billion).

# Government Support for R&D

The first step in this direction was done in the late 1960s by establishing the Office of Chief Scientist (OCS). The Law for the Encouragement of Industrial R&D (LEIRD) was adopted in 1984 to foster science-intensive, export-oriented private industrial R&D to absorb the growing labor force by providing grants, loans and other incentives.

The OCS implements both national and international projects (pre-seed, generic and competitive R&D). The MATIMOP (national hub) was established to assist the OCS with implementing and overseeing projects aimed at participation of Israeli industrial firms in bilateral/multilateral R&D projects.



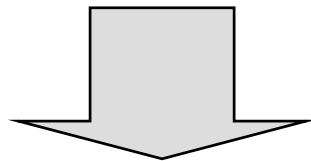
From 20% up to 50% of the proposed project budget is funded. On average \$300 million per year is allocated from the budget for 1,000 industrial R&D projects – the largest national program.



# Government Support for R&D

## Magnet Program

- was initiated in 1993 to strengthen collaboration between academia/Israeli universities and private industrial firms
- only a consortium of industrial companies and at least one academic institution was eligible for funding

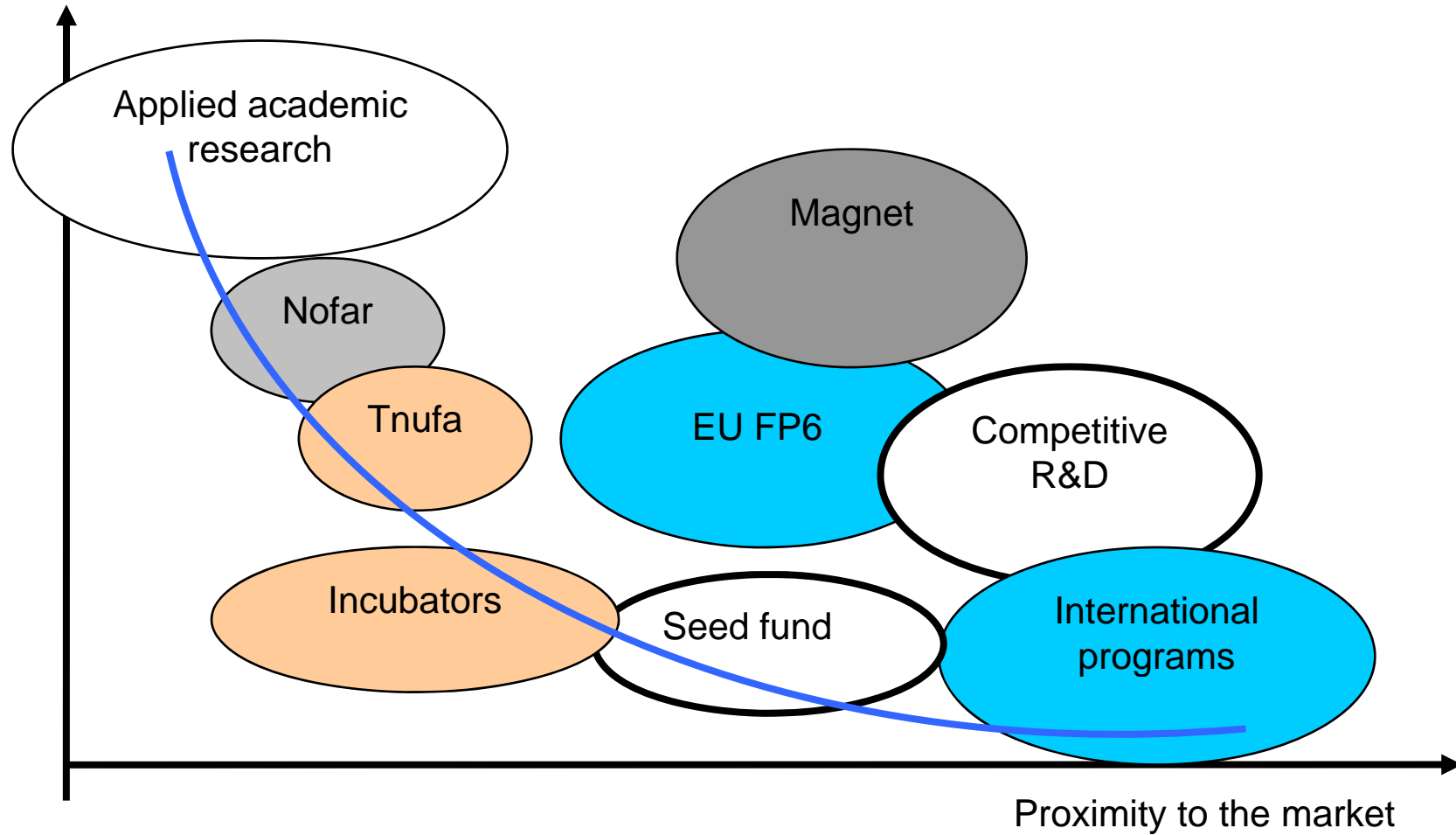


Up to 66% of the proposed project budget is funded. In 2005, 31 consortia were operating in the Israeli market.

# Government Support for R&D

OCS Support for programs in the innovative process (Source: Matimop)

Risk



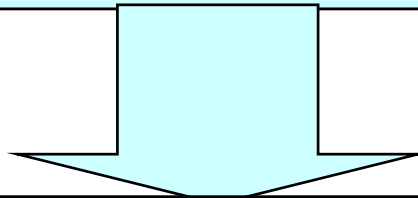
# Technology Incubators

In 1991, the Government initiated the Incubator program to assist start-ups and Soviet Union immigrants who lacked knowledge of market economy, English and Hebrew, and did not know how to get funding.

The Magnet program and the Army's Computer and Data Communications Network Center created an earlier platform for successful incubation processes to take off.

## Technology Incubator Program

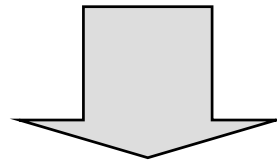
In Israel 24 technology incubators have been established. The goal of the program is "to polish the diamond" - assist those with export-oriented and innovative ideas by providing necessary investments to develop new products. The program fostered the emergence of start-ups (No 1 producer of start-ups). (Harrel, 2005)



The total Incubator program budget is \$30 million. Up to 85% of funding is provided by the Government in the form of grants and soft loans, the remainder – by the venture firm, the incubators or the entrepreneur. Each incubator is implementing 10 projects on average.

# Venture Capital Funds

- The Government played a significant role in establishing venture capital industry. In 1990, 2 venture capital funds were operating in the industry (\$59 million).
- In 1992, the OSC initiated Yozma program to accelerate the venture capital market, by providing \$100 million to attract international venture capital funds to invest high-tech firms. 10 international venture capital funds were established.

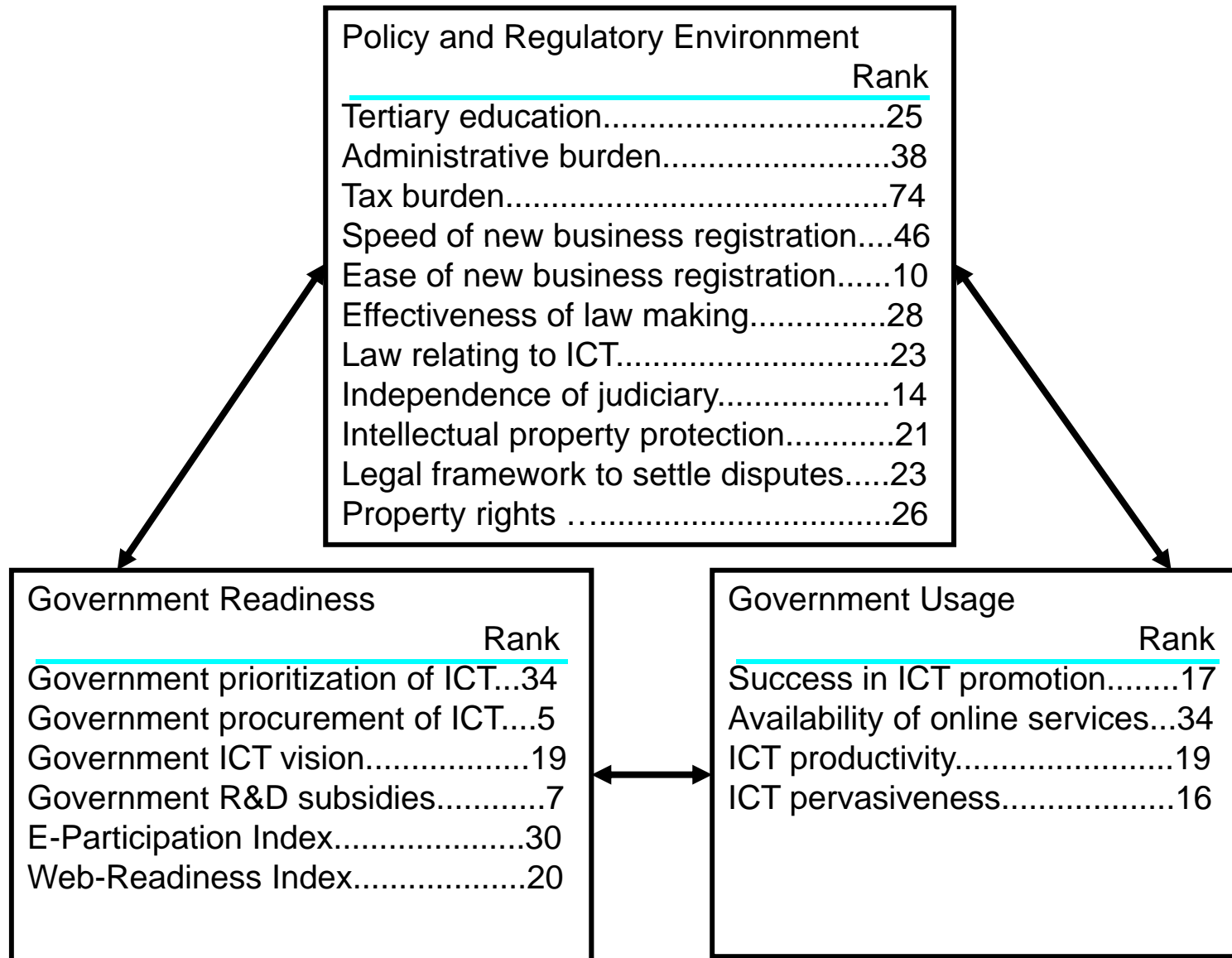


In 1995-2004, venture capital investments contributed to the 40% increase in GDP, 15% in employment, and comprised 50% of exports and 65% of foreign investments. (Harel, 2005)

- Silicon Valley Bank established its Israeli Branch in 2005 (Brown, 2004). The Israel Venture association is actively raising venture capital for Israeli start-ups worldwide. Currently there are about 50 Israeli venture capital funds (over \$12 billion) that have raised capital from the US, Europe, etc.

# The Role of the Government

## The Role of the Government in NRI in Israel



# Conclusion

The role of the Government, coupled with Jewish culture and immigration, was significant in building the national competitive advantage of Israel by:

- ✓ Building a first class higher education;
- ✓ Laying down stable macroeconomic foundation;
- ✓ Modernizing financial markets (easing access to loans);
- ✓ Sharing risks for high value-added producing companies in the 1960-1970s;
- ✓ Fostering the emergence of R&D projects by industrial firms;
- ✓ Establishing strong cooperation between academia/research institutes and private industrial companies;
- ✓ Assisting in attracting foreign R&D capital for industrial companies;
- ✓ Developing necessary skills of bright entrepreneurs in high-tech industries (both Soviet immigrants and current citizens) through technology incubator programs, providing access to both national and international venture capital funds (in the second stage).

Thank You.

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presentation will be available at:

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