Fostering Stronger Industry / University Collaboration in Emerging Economies

Response from Turkish Higher Education and Research Ecosystem

Hasan Mandal
Council of Higher Education

Grand Global Challenges

- Food supply
- Clean water
- Affordable healthcare
- Security
- Cleaner energy
- Cleaner environment
- Changing demographics
- Improve the quality of life
- Climate change
- Sustainable development

Trends in Higher Education

- Decrease in the Public Funds
- Internationalisation
- Importance of Societal Outreach
- Quality Assurance and Accreditation
- Rankings

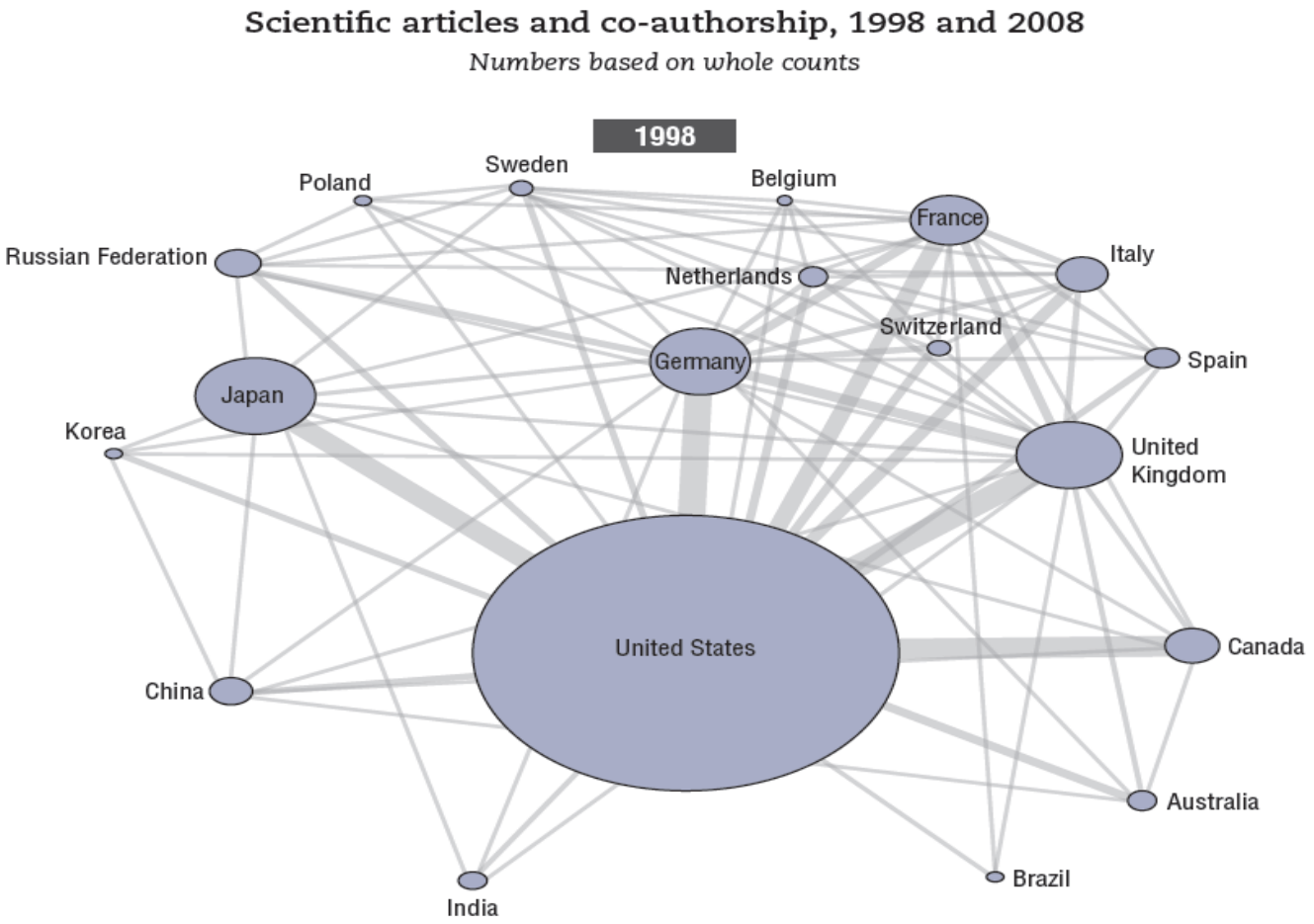
Globalization (Collaboration)

- Demand in Higher Education
- Change in Learning Environments by Information Technologies
- Diversity of HEIs (Mission Differentiation)

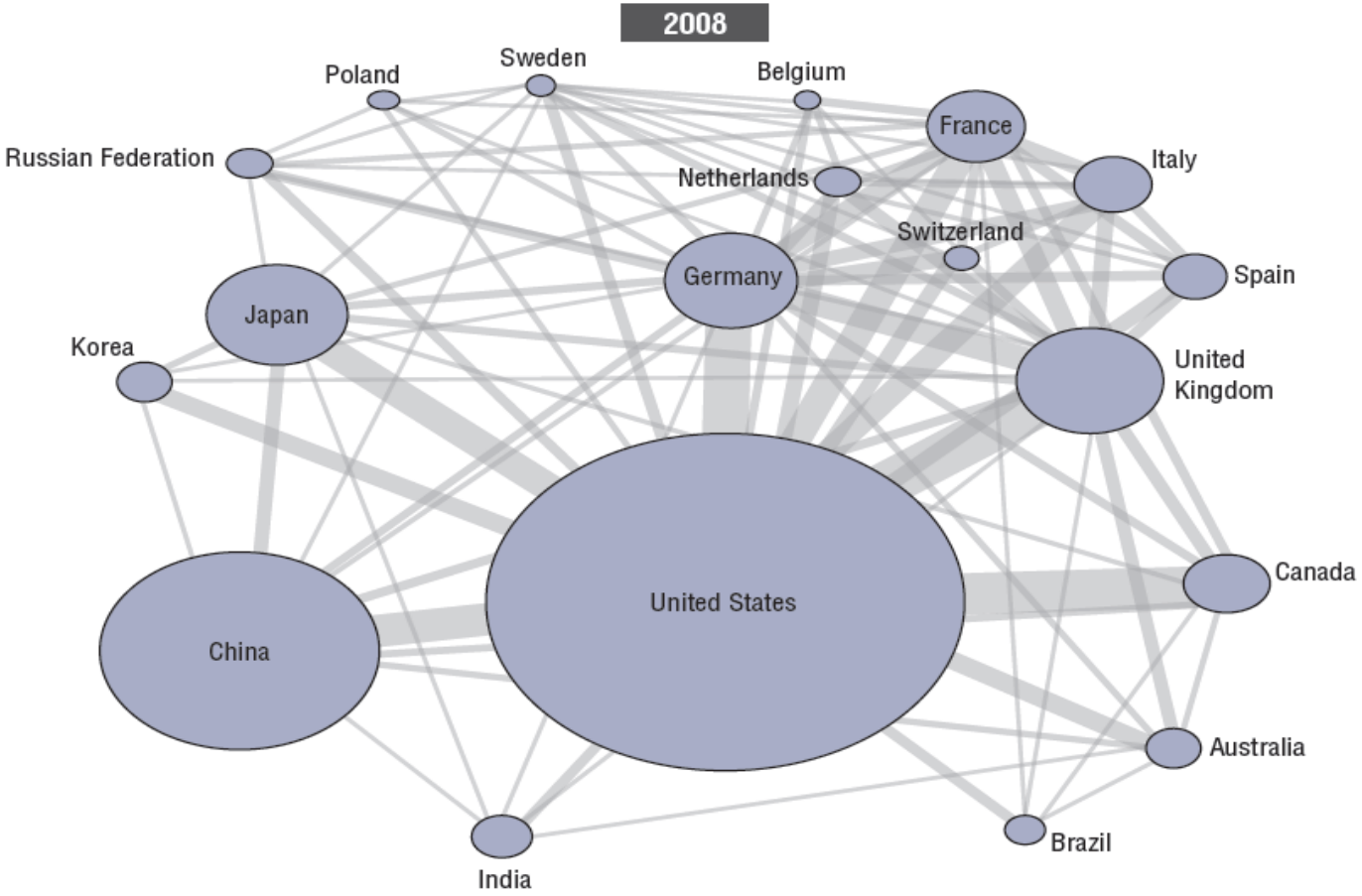
Competitiveness Evolution for Business Enterprises

- 1960's Competition with MANUFACTURING advantage
- 1970's Competition with COST advantage
- 1980's Competition with QUALITY advantage
- 1990's Competition with SPEED advantage
- 2000's Competition with KNOWLEDGE advantage
- 2010's ???
- 2010's Competition with COLLABORATION BASED KNOWLEDGE advantage (OPEN INNOVATION)

Networking and Collaborations -1-



Networking and Collaborations – 2-



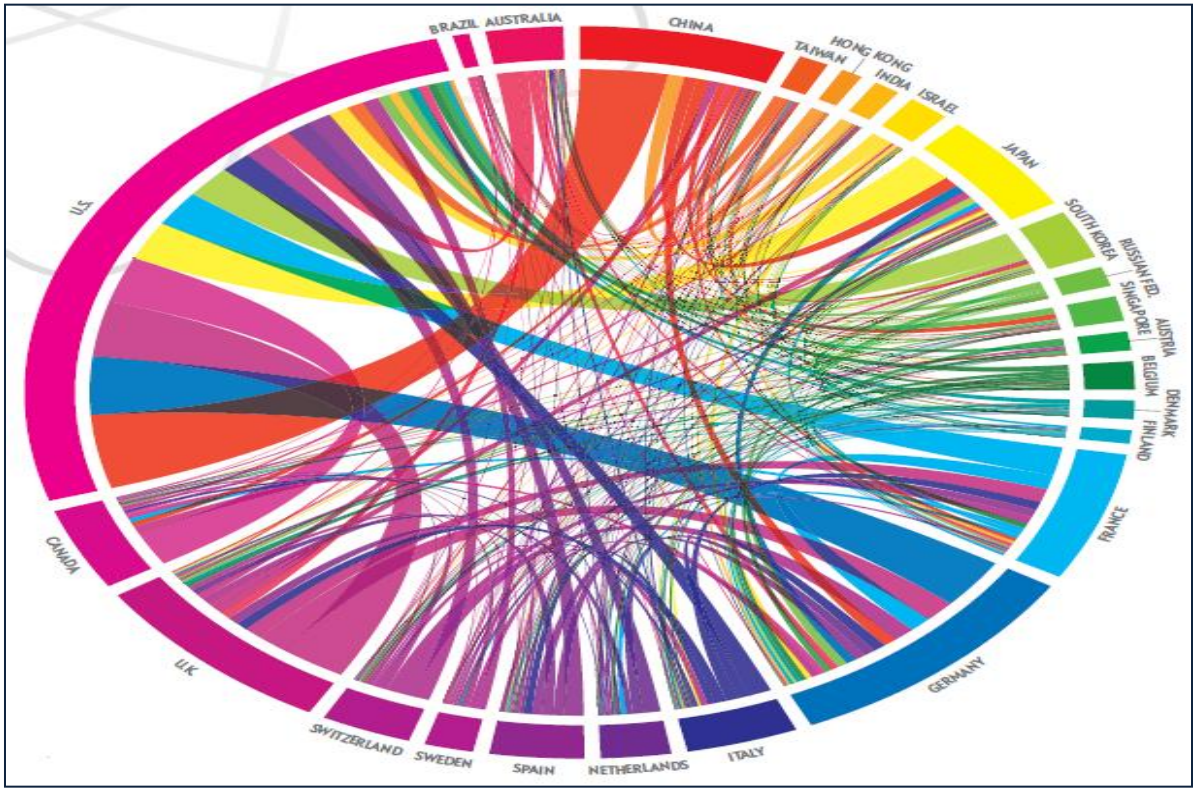
How to read this figure

The size of the bubbles reflects the number of scientific publications and the thickness of the link indicates the intensity of collaboration, *i.e.* co-authorship.

Source: OECD calculations, based on Scopus Custom Data, Elsevier, December 2009. See chapter notes.

StatLink http://dx.doi.org/10.1787/835027386353

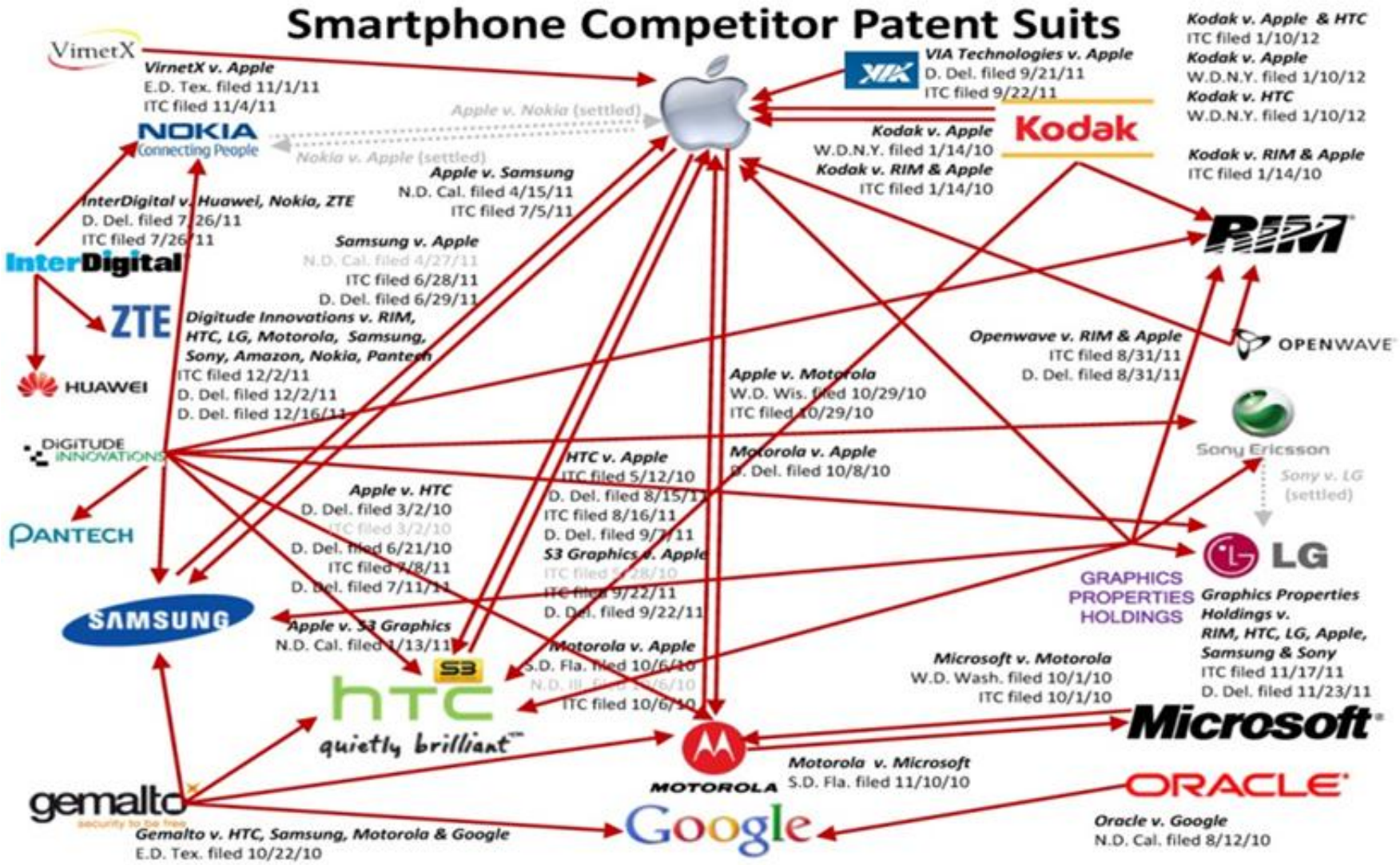
COLLABORATIONS
(25 NATIONS WITH THE LARGEST SCIENCE OUTPUT)



This circular graph shows collaboration among the 25 nations with the largest science output, as measured in scientific papers that appeared in 2011 in a select group of journals. Not included are collaborations that took place inside each country.

Source: Scientific American, October 2012

Collaboration in Smart Telephone Ecosystem



POSITION of TURKEY
in GLOBAL INNOVATION ECOSYSTEM

TURKISH HIGHER EDUCATION SYSTEM

Council of Higher Education

http://www.yok.gov.tr/

- Higher education system is centralized and managed by the Council of Higher Education (Yükseköğretim Kurulu-YÖK in Turkish)
- CoHE is a non-political and autonomous supreme corporate body

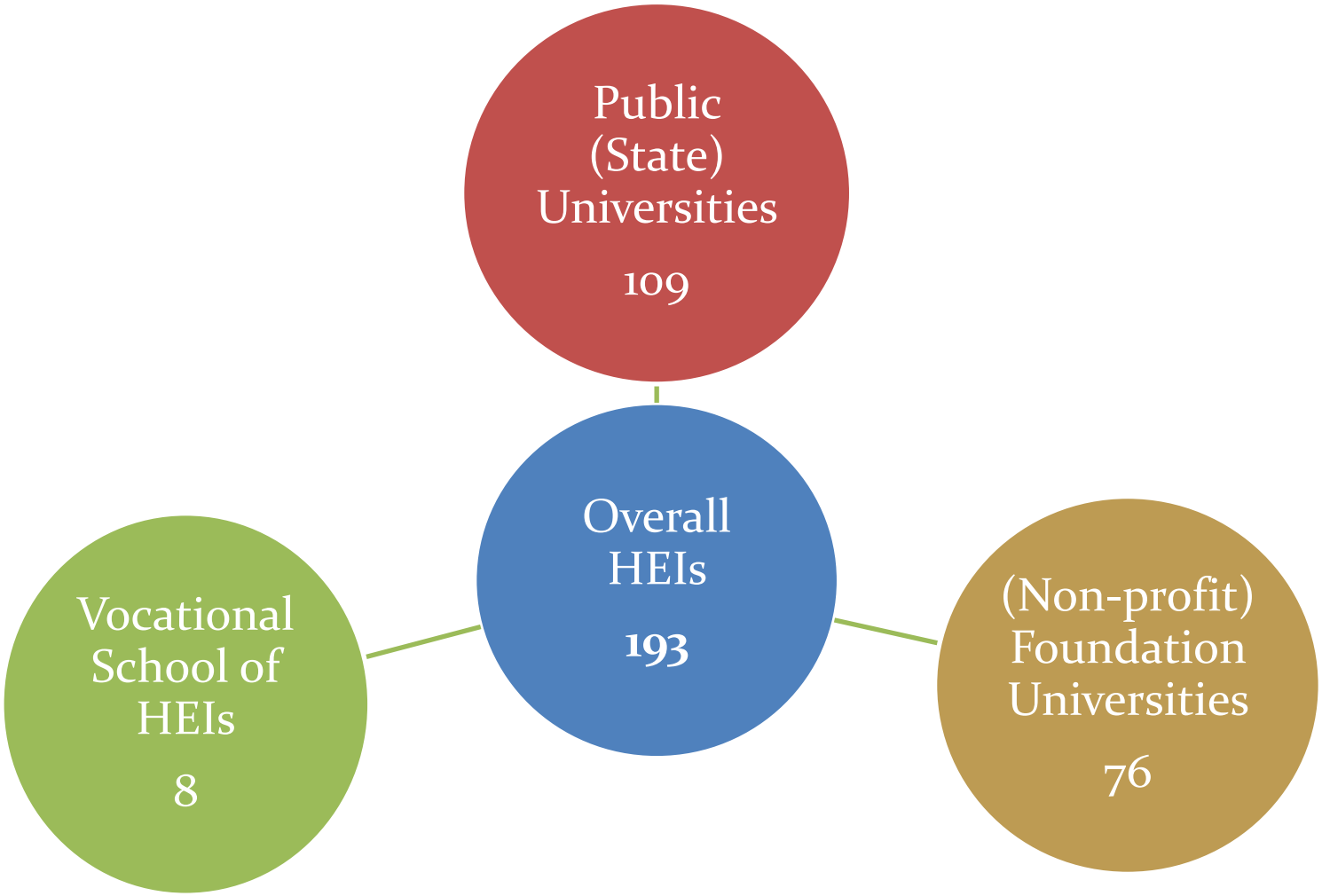
Structure of the Higher Education System

- Higher education system includes all post-secondary programs

- It embodies
  - State (Public)Universities
  - Foundation (Non-profit)HEIs (Universities and Vocational Schools)

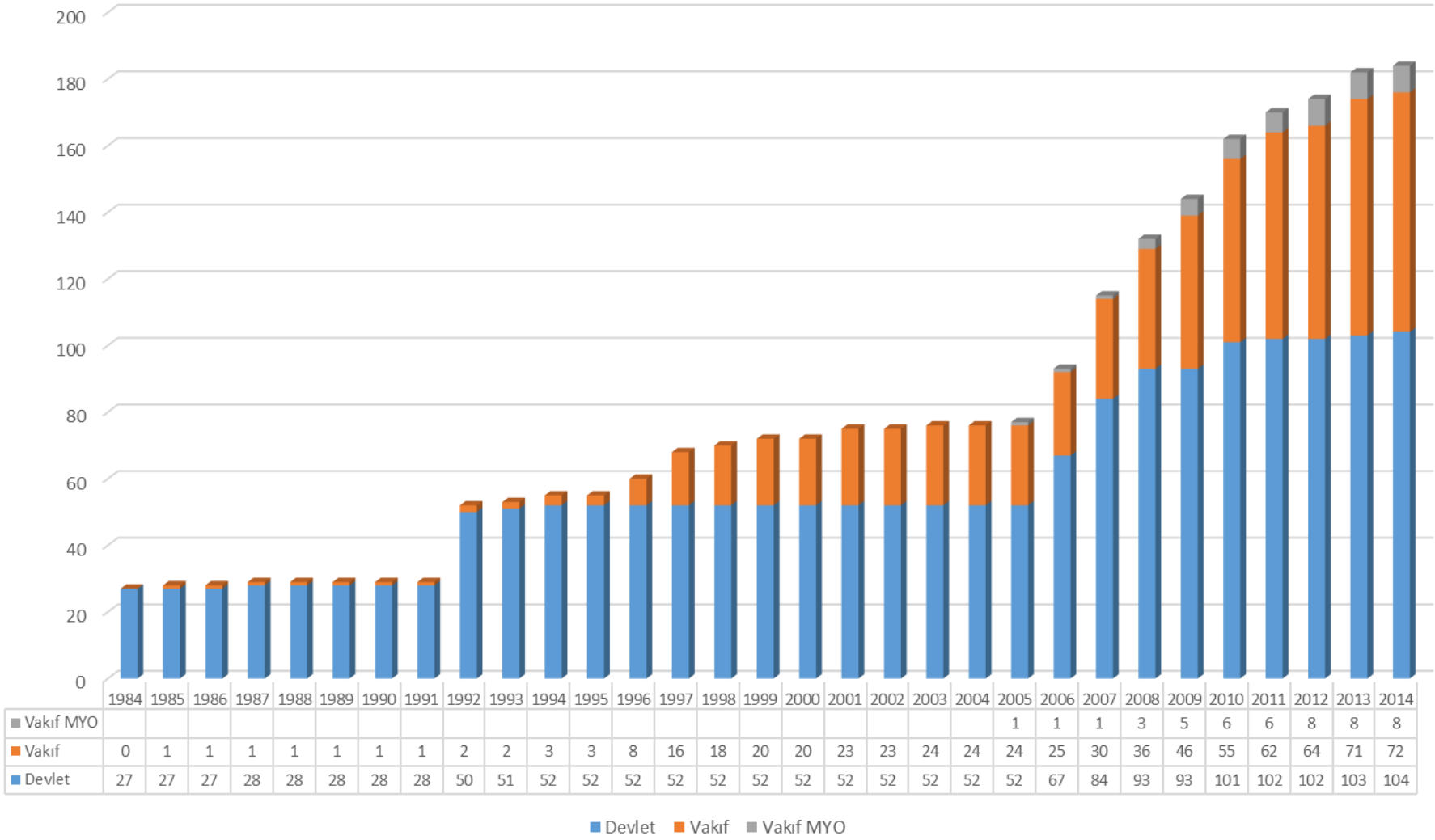
- Four different degrees
  - Associate (2 year)
  - Undergraduate
  - Master
  - Doctorate

Numbers of Higher Education Institutions



Information On The Higher Education in Turkey

NUMBERS OF HIGHER EDUCATION INSTITUTIONS BY YEARS
(YÜKSEKÖĞRETİM KURUMLARININ YILLARA GÖRE SAYILARI)

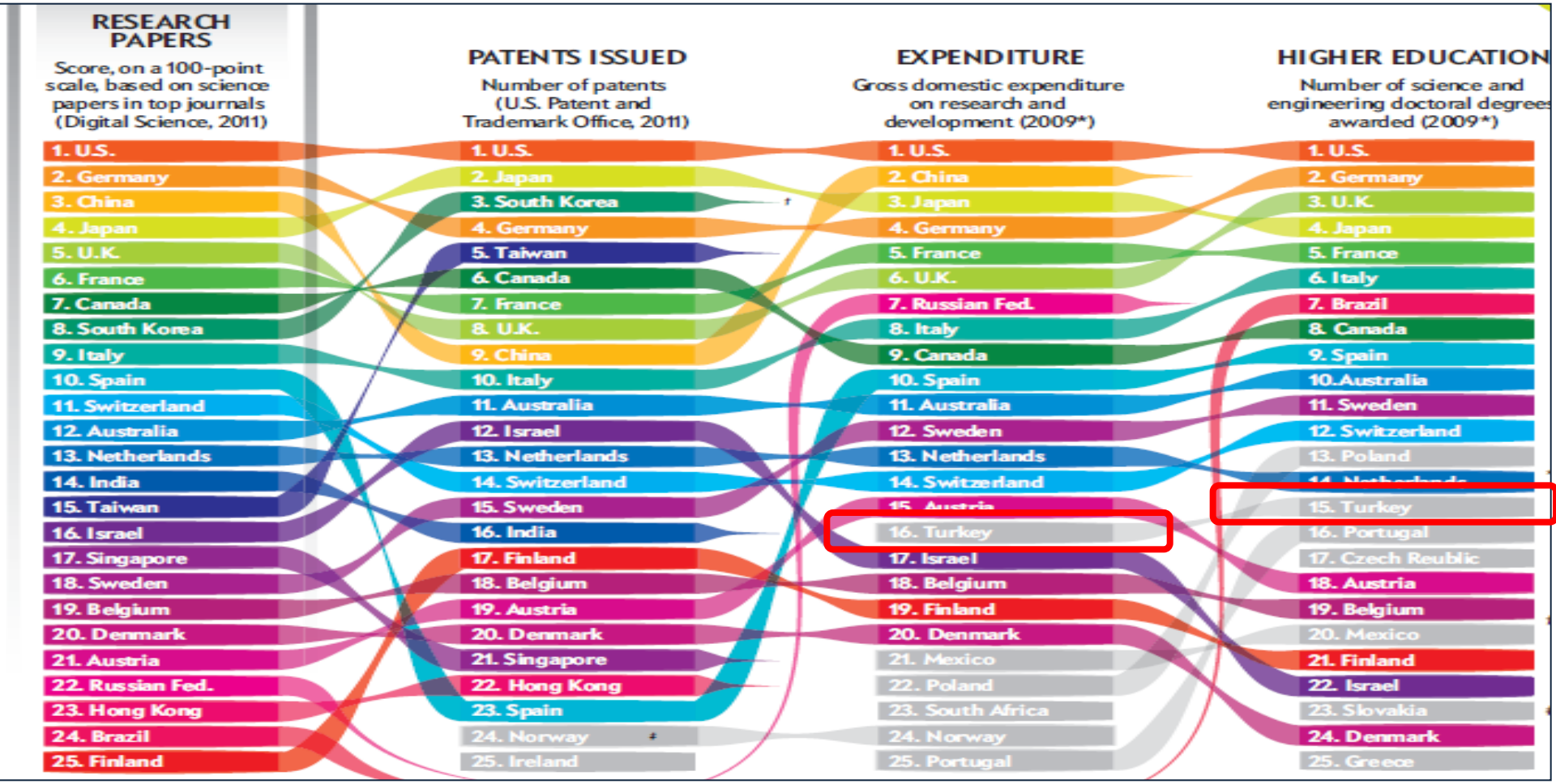


	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Vakıf MYO																						1	1	1	3	5	6	6	8	8	8
Vakıf	0	1	1	1	1	1	1	1	2	2	3	3	8	16	18	20	20	23	23	24	24	24	25	30	36	46	55	62	64	71	72
Devlet	27	27	27	28	28	28	28	28	50	51	52	52	52	52	52	52	52	52	52	52	52	52	67	84	93	93	101	102	102	103	104

Total Number of Students (2014-2015)

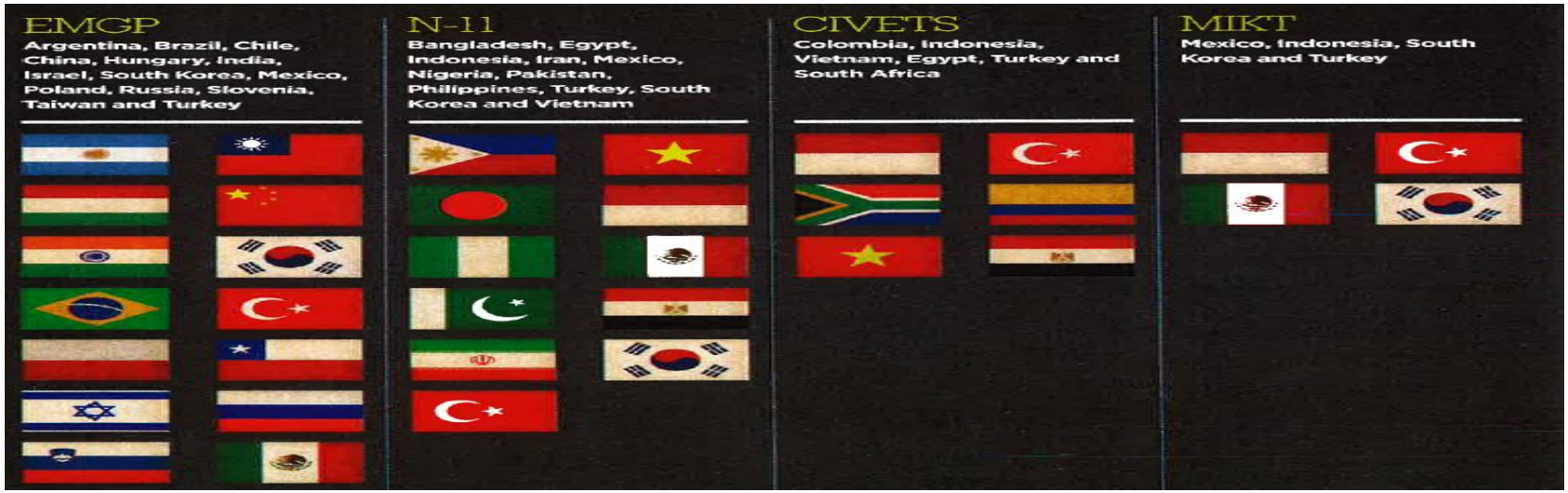
Total	**6.063.680**
Short Cycle (associate)	2.013.078
First Cycle (bachelor)	3.628.871
Second Cycle (master)	343.979
Third Cycle (Phd)	77.752

LEADING COUNTRIES IN SCIENCE AND TECHNOLOGY



Source: October 2012, ScientificAmerican.com

ECONOMIST LOOK AHEAD TO THE NEXT HOT AND EMERGING MARKETS



Columbia University created a list of Emerging Market Global Players (EMGP) this year that its economists believe to be up-and-coming.

Goldman Sachs economist Jim O'Neill, who coined the term BRIC to identify the four countries (Brazil, Russia, India and China) whose emerging economies should be watched, then identified the Next 11 or N-11 in 2005.

In 2009, economist Robert Ward drew attention to these countries as the next group of emerging markets (the acronym coincidentally links to a nocturnal mammal, the civet, native to several of the CIVETS countries).

O'Neill narrowed his picks for promising markets for investors in 2007.

Source: Executive Travel, October 2012

TOP 20 COUNTRIES BY GDP

(Current Price GDP; Billion $)

		2012		2013		2014
1	ABD	16.244.575	ABD	16.724.272	ABD	17.437.856
2	Çin	8.221.015	Çin	8.939.327	Çin	9.761.201
3	Japonya	5.960.269	Japonya	5.007.203	Japonya	5.228.495
4	Almanya	3.429.519	Almanya	3.593.238	Almanya	3.747.066
5	Fransa	2.613.936	Fransa	2.738.676	Fransa	2.862.508
6	İngiltere	2.476.665	İngiltere	2.489.674	İngiltere	2.627.351
7	Brezilya	2.253.090	Brezilya	2.190.218	Rusya	2.215.373
8	Rusya	2.029.813	Rusya	2.117.831	Brezilya	2.169.802
9	İtalya	2.014.078	İtalya	2.068.366	İtalya	2.147.968
10	Hindistan	1.841.717	Kanada	1.825.062	Kanada	1.886.679
11	Kanada	1.821.445	Hindistan	1.758.216	Hindistan	1.749.965
12	Avustralya	1.541.700	Avustralya	1.487.971	Avustralya	1.458.907
13	İspanya	1.323.500	İspanya	1.355.660	Meksika	1.395.563
14	Meksika	1.177.398	Meksika	1.327.021	İspanya	1.394.371
15	G. Kore	1.129.536	G. Kore	1.197.506	G. Kore	1.271.252
16	Endonezya	878.536	Endonezya	867.468	Türkiye	867.325
17	Türkiye (*)	785.753	Türkiye	822.763	Endonezya	863.208
18	Hollanda	770.867	Hollanda	800.535	Hollanda	830.006
19	S. Arabistan	711.050	S. Arabistan	718.472	S. Arabistan	746.819
20	İsviçre	631.183	İsviçre	646.199	İsviçre	671.899

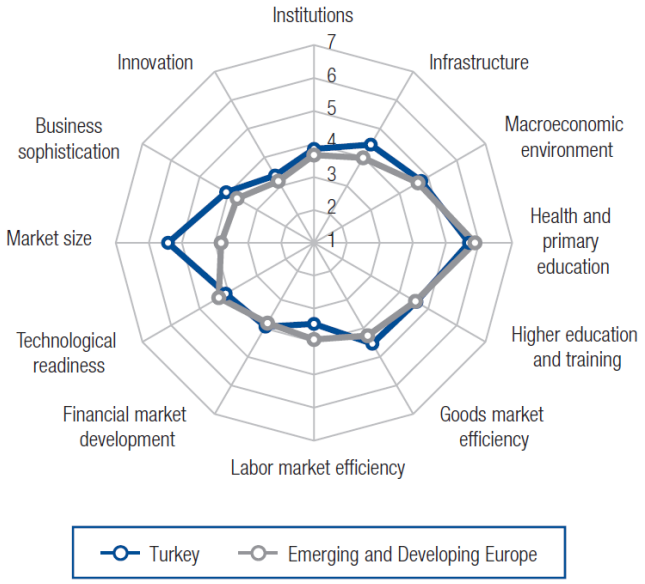
Kaynak: Türkiye için OVP hedefleri, diğer ülkeler için IMF veri tabanı.

(*): IMF veri tabanında Türkiye için 2013'te 821.8 milyar, 2014'te 851.4 milyar dolarlık GSYH öngörülüyor.

THE WORLD ECONOMIC FORUM
GLOBAL COMPETITIVENESS REPORT 2015–2016

Global Competitiveness Index

	Rank (out of 140)	Score (1–7)
GCI 2015–2016	**51**	**4.4**
GCI 2014–2015 (out of 144)	45	4.5
GCI 2013–2014 (out of 148)	44	4.5
GCI 2012–2013 (out of 144)	43	4.5
Basic requirements (36.3%)	**57**	**4.7**
1st pillar: Institutions	75	3.8
2nd pillar: Infrastructure	53	4.4
3rd pillar: Macroeconomic environment	68	4.7
4th pillar: Health and primary education	73	5.7
Efficiency enhancers (50.0%)	**48**	**4.3**
5th pillar: Higher education and training	55	4.6
6th pillar: Goods market efficiency	45	4.5
7th pillar: Labor market efficiency	127	3.5
8th pillar: Financial market development	64	3.9
9th pillar: Technological readiness	64	4.1
10th pillar: Market size	16	5.4
Innovation and sophistication factors (13.7%)	**56**	**3.7**
11th pillar: Business sophistication	58	4.1
12th pillar: Innovation	60	3.4



Stage of development

Source: The World Economic Forum Global Competitiveness Report 2015–2016

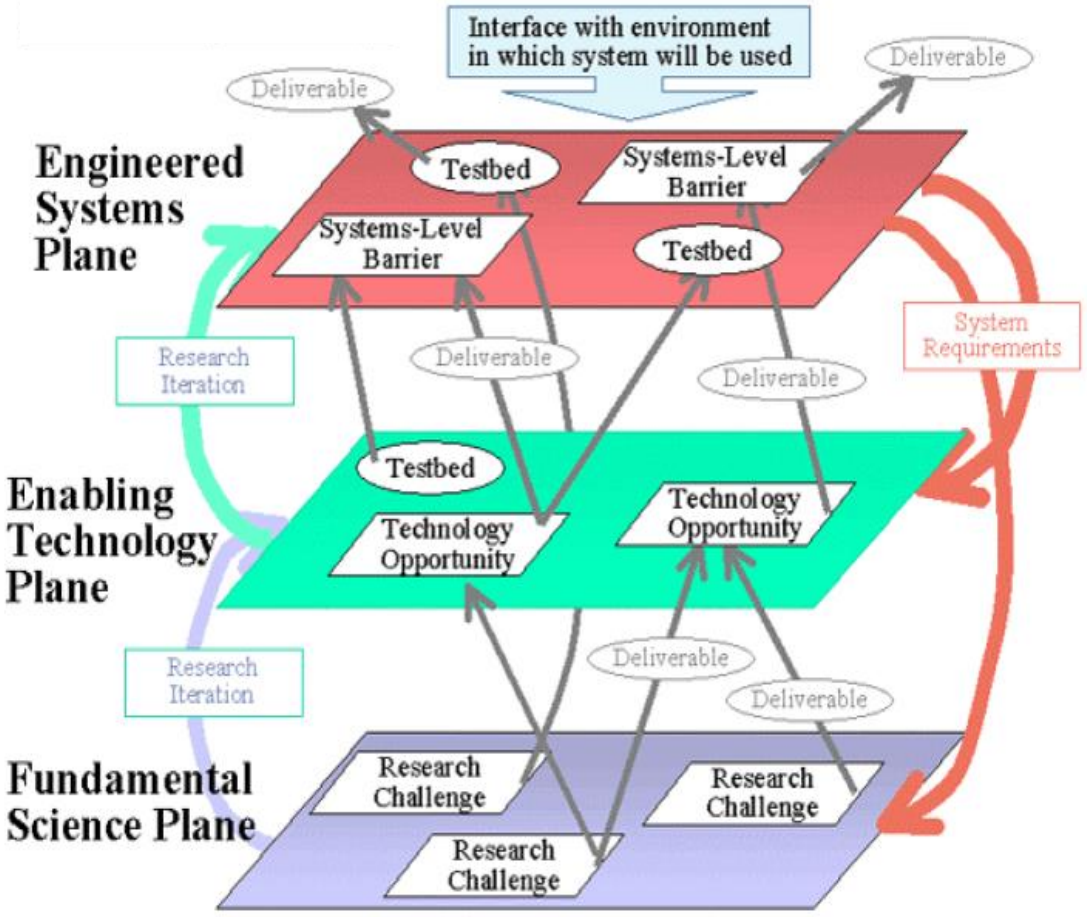
THE MAIN TARGET FOR TURKEY TO BE ONE OF THE WORLD'S TOP TEN ECONOMIES IN 2023!!!

Challenges and Opportunites

Technology Level	% in Exports in 2002	% in Exports in 2010
High	6.2	3.4 ↓
Above Average	24.3	32.2 ↑
Below Average	22.8	31.8 ↑
Low	46.8	32.6 ↓

Ref: TUIK, OECD-STAN Database

Transition to Commercialization at Advanced Technologies



* NSF ERC Research Management Guidelines

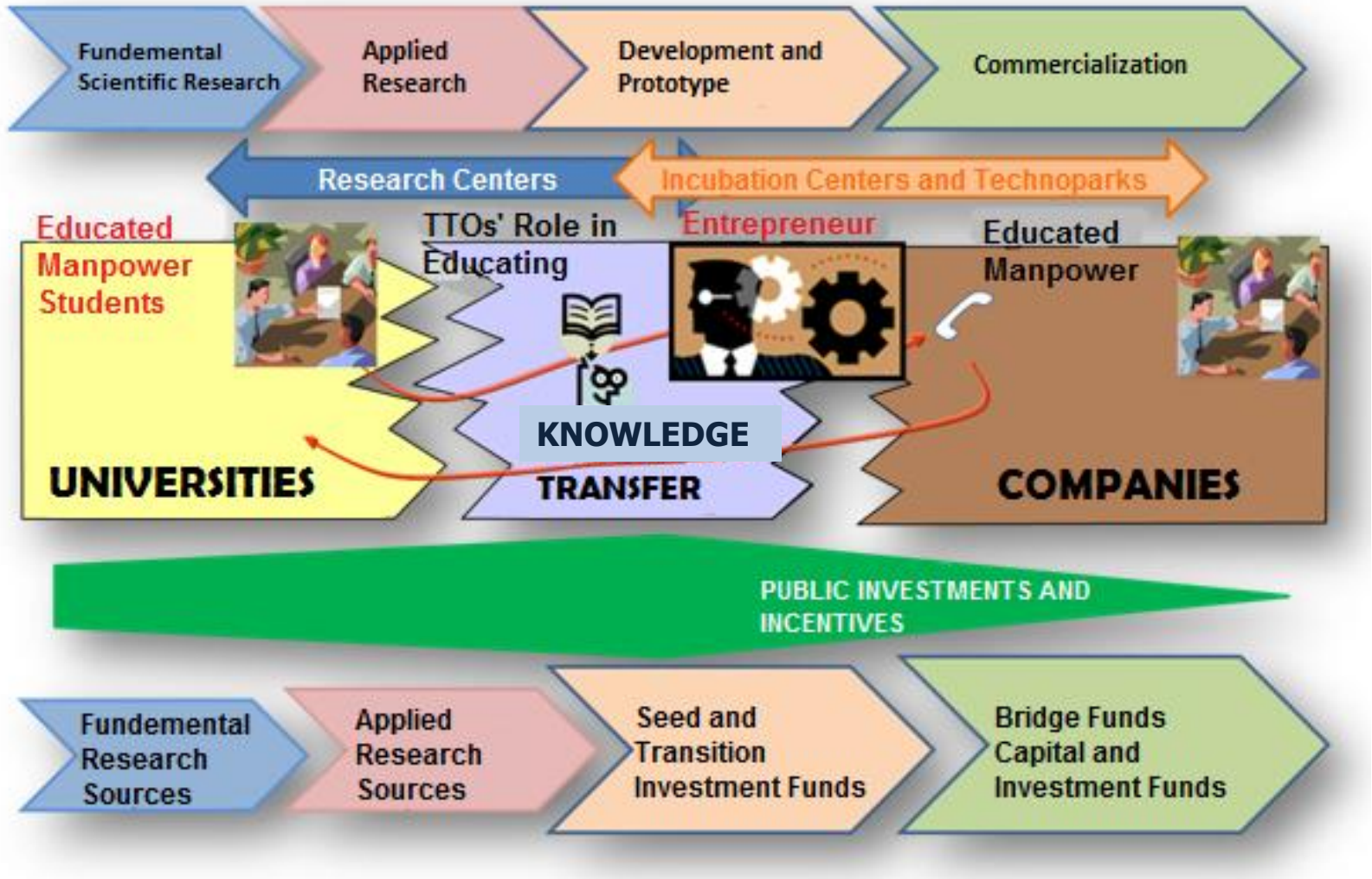
Multi-layer structure
Integrative thematic R&D

Contribution of all stakeholders (academics, researcher, student) – team science

Work necessary at all three layers

Synery effect: total value of all components are larger than every segments' value

Knowledge Transfer Processes



A New Knowledge Production Management System for the Universities

Instead of knowledge production approach which is shared only among disciplines and colleagues, a close connection with all actors in daily life through the application of inter-disciplinary (further transdisciplinary/industry-university collaboration) knowledge production approach

Success Management Differences at HEIs and Industries

R&D management (HEI)

- **Research is the process during which I do not know exactly what I am doing**
  Wernher Von Braun
- **Did I make a mistake? No! Now, I know 10.000 things that are not working**
  Thomas Edison
- **Do not look at the spot that you fell, instead look at the place that you slipped!**
  African Proverb

FAILURE MANAGEMENT

Product Development Management (Industry)

SUCCESS FOCUSED MANAGEMENT

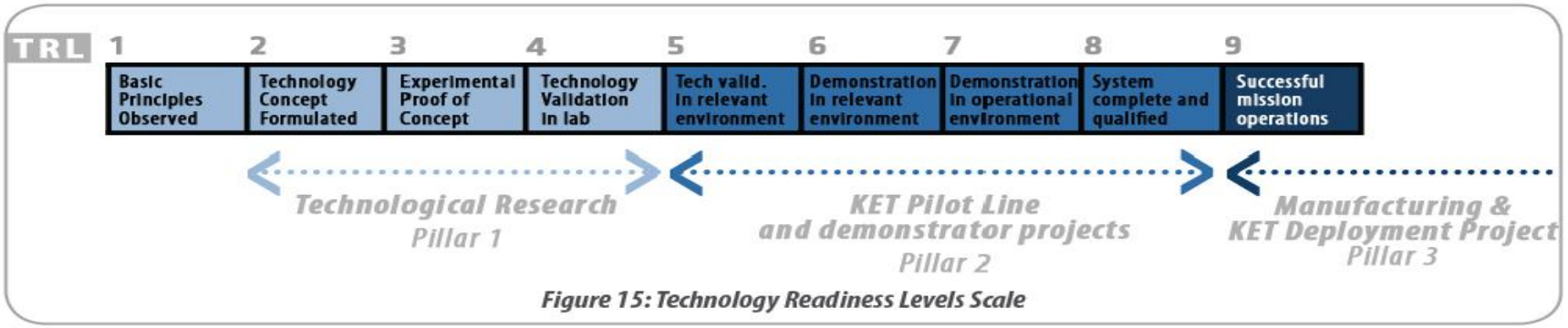


Figure 15: Technology Readiness Levels Scale

THE MAIN TARGET FOR TURKEY TO BE ONE OF THE WORLD'S TOP TEN ECONOMIES IN 2023!!!

STRATEGIES & POLICIES

- ***Development and Improvement of Knowledge Transfer Ecosystem***

- **Development and Improvement of Higher Education System and therefore Human Resources System**

Road Map for Achieving National Innovation System 2023 Targets

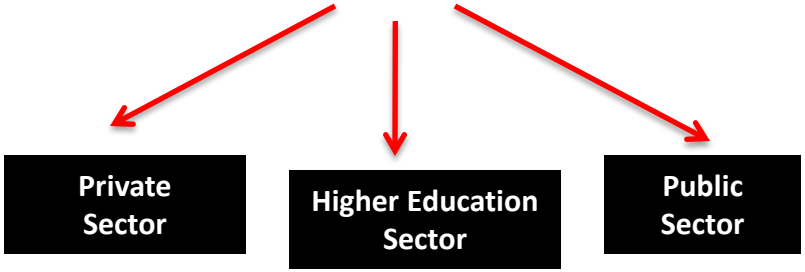
National Innovation and Entrepreneurship System

- Creating Economic Value Added Technologies
- Competent Human Capacity

Policies/Strategies

- Creating Support Mechanisms for Technology Transfer Offices
- Creating Support Mechanism for Incubation Centers
- Entrepreneurial and Innovative University Ranking
- Creating a Venture Capital Fund
- Change in Academic Promotion Criteria
- Dissemination of Entrepreneurial Culture
- Designing Public Procurement Policies for the Promotion of R&D
- Establishing Mission and Need Oriented Support Programs

R&D and Innovation "Ecosystem"



Sources: The 23nd meeting of Supreme Council for Science and Technology

ENTREPRENEURIAL AND INNOVATIVE UNIVERSITIES RANKING
by MINISTRY OF SCIENCE, INDUSTRY AND TECHNOLOGY

Dimension 1: Scientific and Technological Research Competence (%20)

Dimension 2: Intellectual Property Pool (%15)

Dimension 3: Cooperation and Interaction (%25)

Dimension 4: Entrepreneurship and Innovation Culture (%15)

Dimension 5: Economic Impact and Commercialisation (%25)

PARAMETERS FOR THE ENTREPRENEURIAL AND INNOVATIVE UNIVERSITIES RANKING

Dimension 1: Scientific and Technologic Research Competence (Weight Ratio: %20)

- Number of scientific publications
- Number of citations
- Number of projects taken from R&D and innovation support programmes
- Fund sum taken from R&D and innovation support programmes
- Number of national and international science awards
- Number of Phd graduates

Dimension 2: Intellectual Property Pool (Weight Ratio: %15)

- Number of patent applications
- Number of patent documents
- Number of useful model/industrial design documents
- Number of international patent applications

Dimension 3: Cooperation and Interaction (Weight Ratio: %25)

- Number of R&D and innovation projects carried out in the University-Industry cooperation
- Fund sum taken from the projects carried out in the University-Industry cooperation
- Number of R&D and innovation projects carried out with International cooperation
- Fund sum acquired from the international R&D and innovation cooperations
- Number of students/academic members in exchange

Dimension 4: Entrepreneurship and Innovation Culture (Weight Ratio: %15)

- Number of entrepreneurship, technology management and innovation management courses on undergraduate and graduate level
- Number of full-time employees working in Technology Tranfer Office, Technopark, Incubation Centers and TEKMER
- The existence of Technology Transfer Office structuring
- Number of entrepreneurship, technology management and innovation management training/certificate programmes intended for outside universities.

Dimension 5: Economic Impact and Commercialisation (Weight Ratio: %25)

- Number of active firms where the academicians are shareholders or owners in Technoparks, Incubation Centers and TEKMERs
- Number of the active firms where the university students or the graduates of last five years are shareholders or owners in Technoparks, Incubation Centers and TEKMERs
- Number of employees in the firms where the academicians are shareholders or owners in Technoparks, Incubation Centers and TEKMERs
- Number of licenced patented/useful model/industrial designs

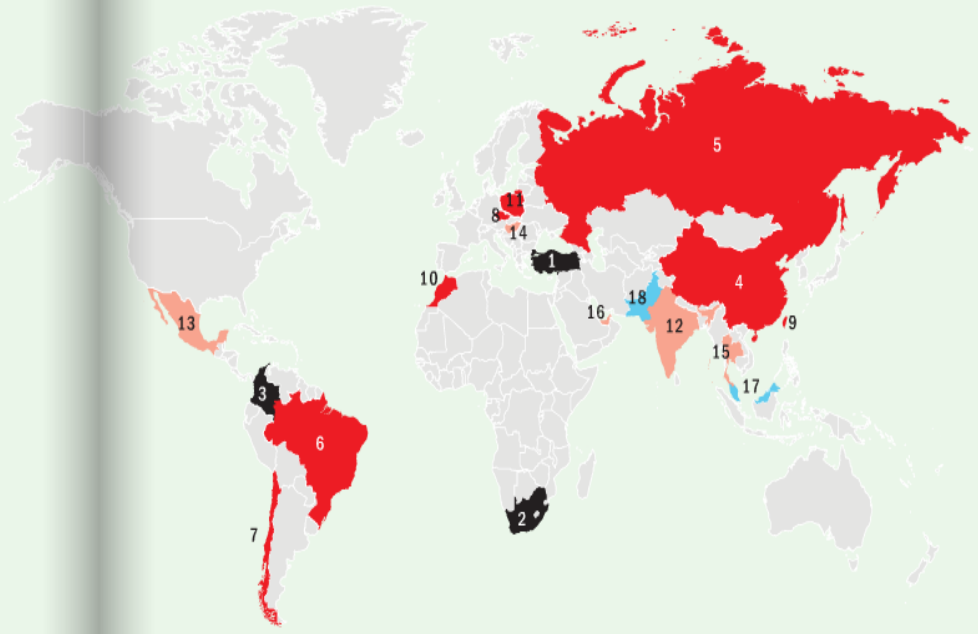
Turkish Universities in International Ranking Lists

The Times Higher Education ***World University Rankings*** **2014**	**Quacquarelli Symonds (QS) World University Ranking 2014**	**URAP World University Ranking 2014**
• 6 Turkish universities in the top 400 university list, and 4 of them are in the top 200	• 10 Turkish universities took place among the top 800 world universities, and 5 of them in the top 500	• 19 Turkish universities took place among the top 1000 world universities

THE BRICS & Emerging Economies Rankings 2015

National comparisons of performance

Which countries have the most universities in the top 100 and how do they compare on average scores? China has the highest number, but Turkey's institutions are concentrated at the top end of the rankings. Visual analysis of the data reveals the underlying picture

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Recommendations

Capacity of countries to perform in the KE depends critically on the availability of highly skilled, innovative and flexible human resources, especially in the area of science and engineering

Adjusting education and learning systems for the KE requires sustained investments and strategic and systemic interventions

It also requires a new partnership between the government, the private sector and civil society

What is most needed is a different type of leadership and capacity development across the various education and learning systems

THANK YOU !

For contact:
Prof. Dr. Hasan Mandal
Council of Higher Education, Member of Executive Board
Bilkent, Ankara / Turkey
Tel: +90 312 298 7234
E-mail: hmandal@yok.gov.tr