

6 Myths of Global Innovation

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GLORAD Center for Global R&D and Innovation

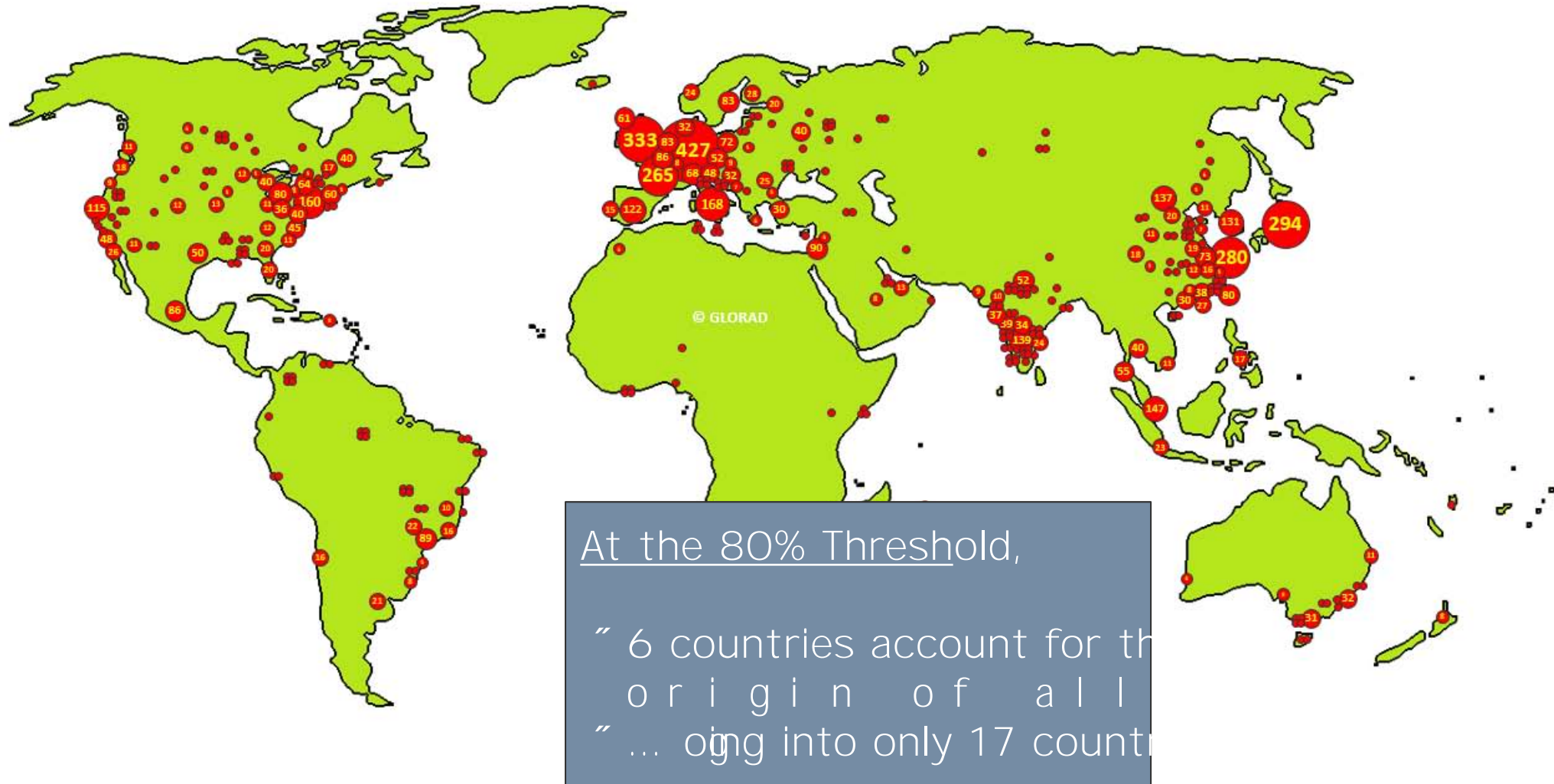
www.glorad.org, max@post.harvard.edu

Shanghai, PRC | Silicon Valley, USA | Göttingen, CH | Kaunas, CEE | Heilbronn, DE | Sao Paulo, LATAM

Myth #1

The World is Flat.

Location Matters: In Innovation, the World is Spiky!



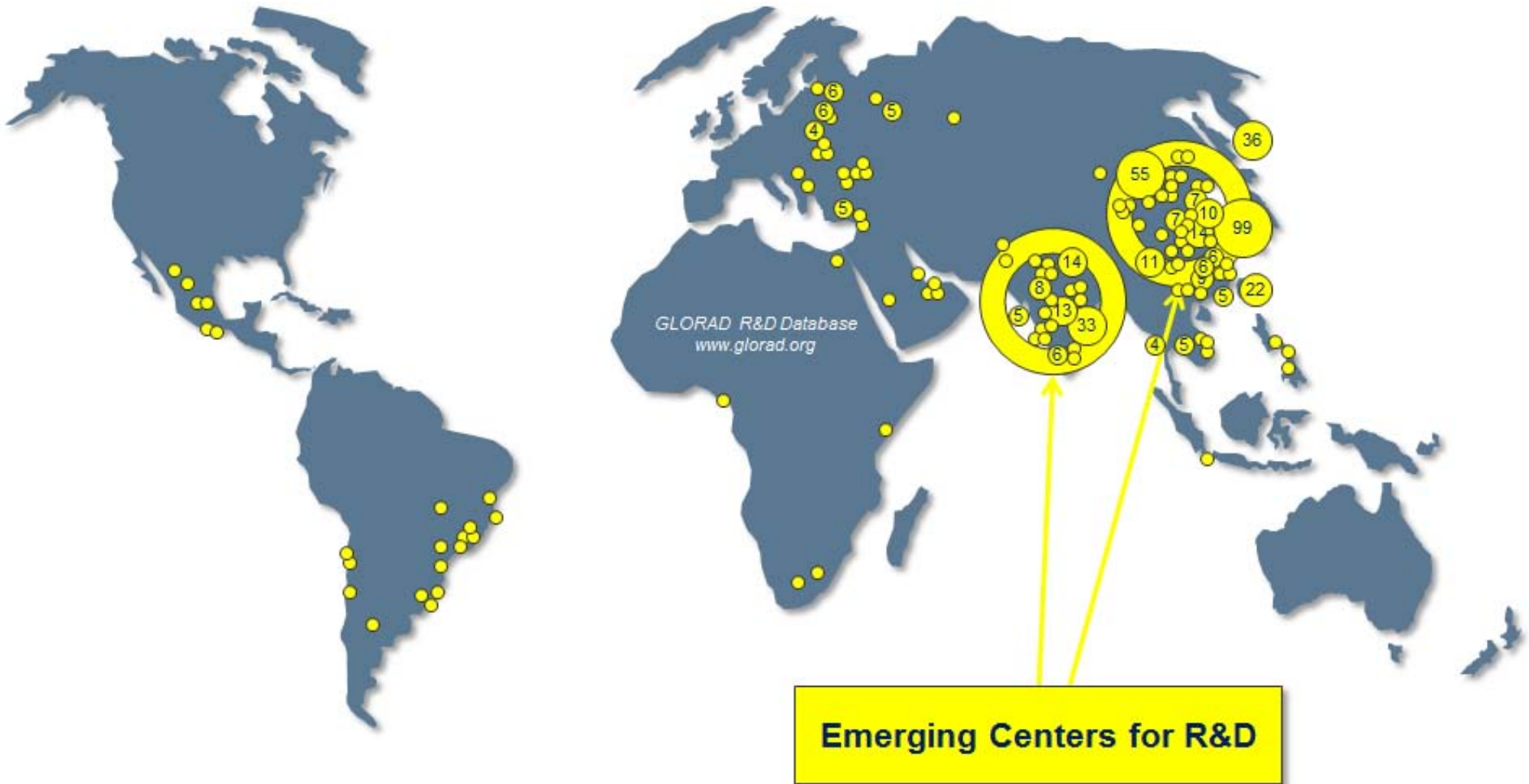
Number of transnational R&D centers: 5,077.

Myth #2

Strong IP Regimes Matter.

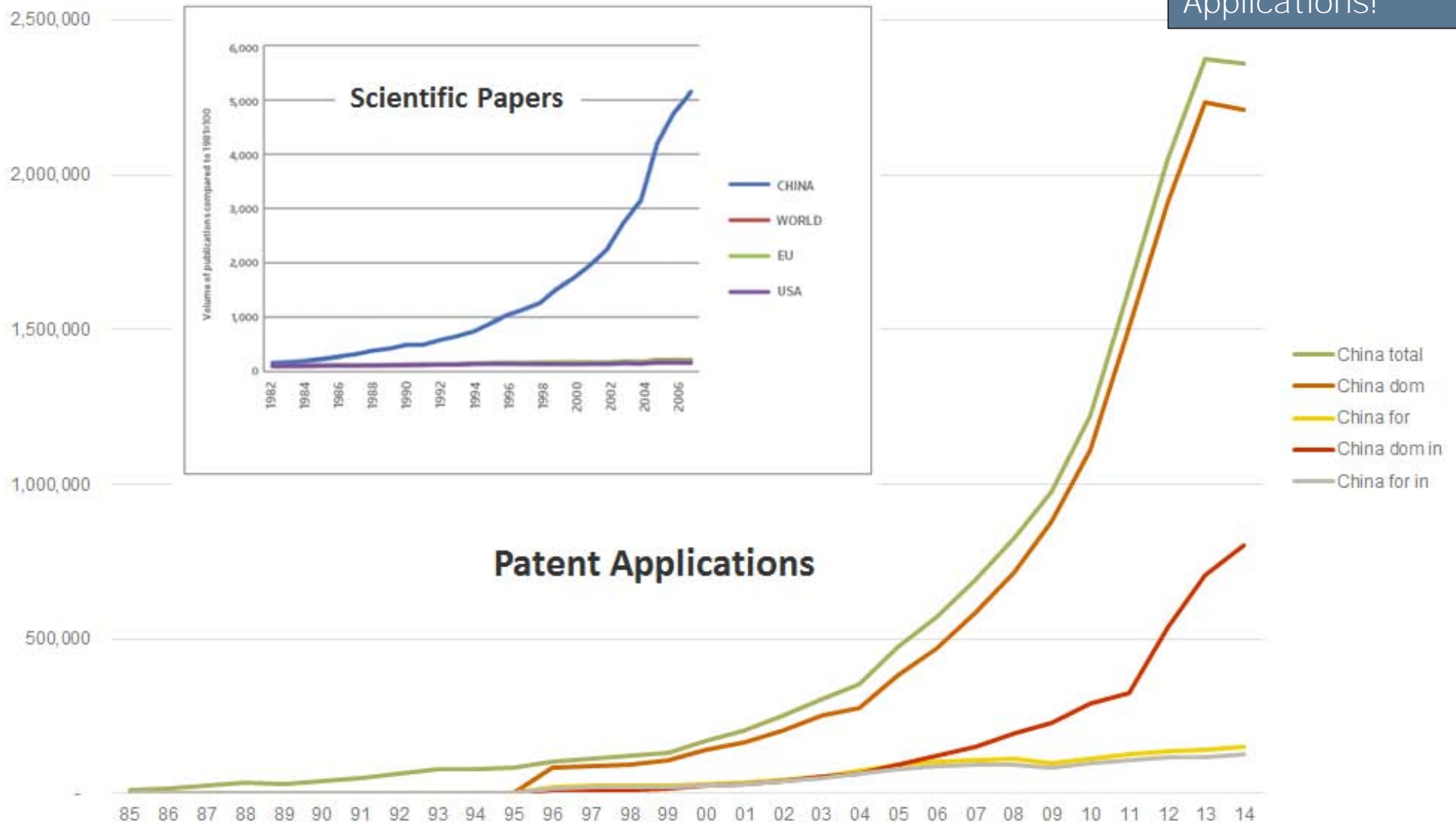
#1 The World Is Flat.

New Global R&D Locations 2000-2010 (Poor IP Countries!)



Patent Applications in China: Now #1 in the World

2,377,000 Patent Applications!



Myth #3

We No Longer Matter.

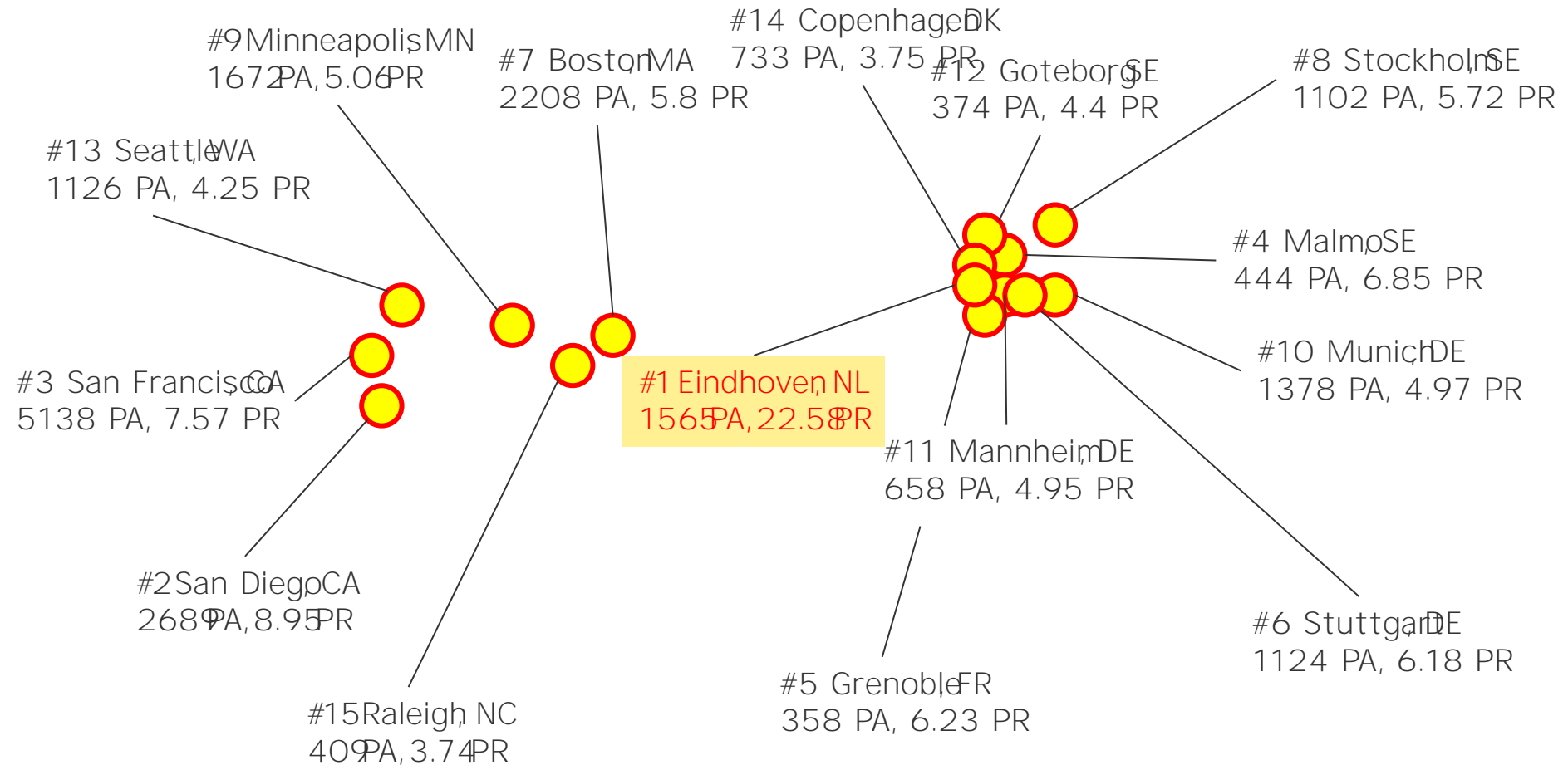
#2 Strong IP Regimes Matter.

#1 The World Is Flat.



**There are more people living inside
this circle than outside of it.**

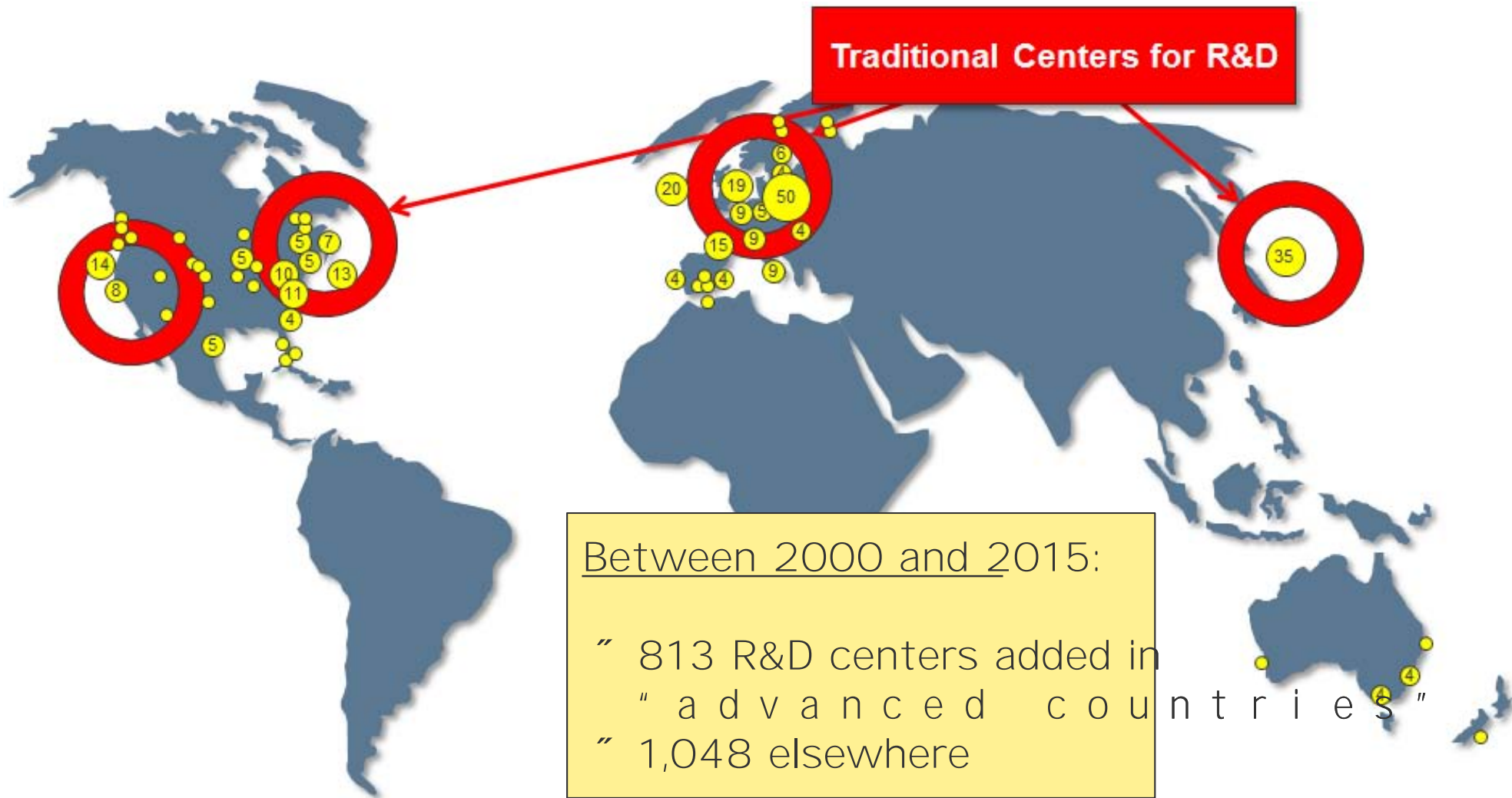
The World's Most Inventive



PA = PCT patent applications

PR = PCT patent applications per 10,000 residents

New Global R&D Locations 2000-2010 (Traditional Loc.)



Global Flow of Cross-Border R&D Investments

SOURCE	Rest	146	86	44
	BRIC	192	23	66
	Triad	3,131	1,332	1,235
		Triad	BRIC	Rest
		DESTINATION		

BRIC, RoW relatively unimportant still in total cross-border R&D

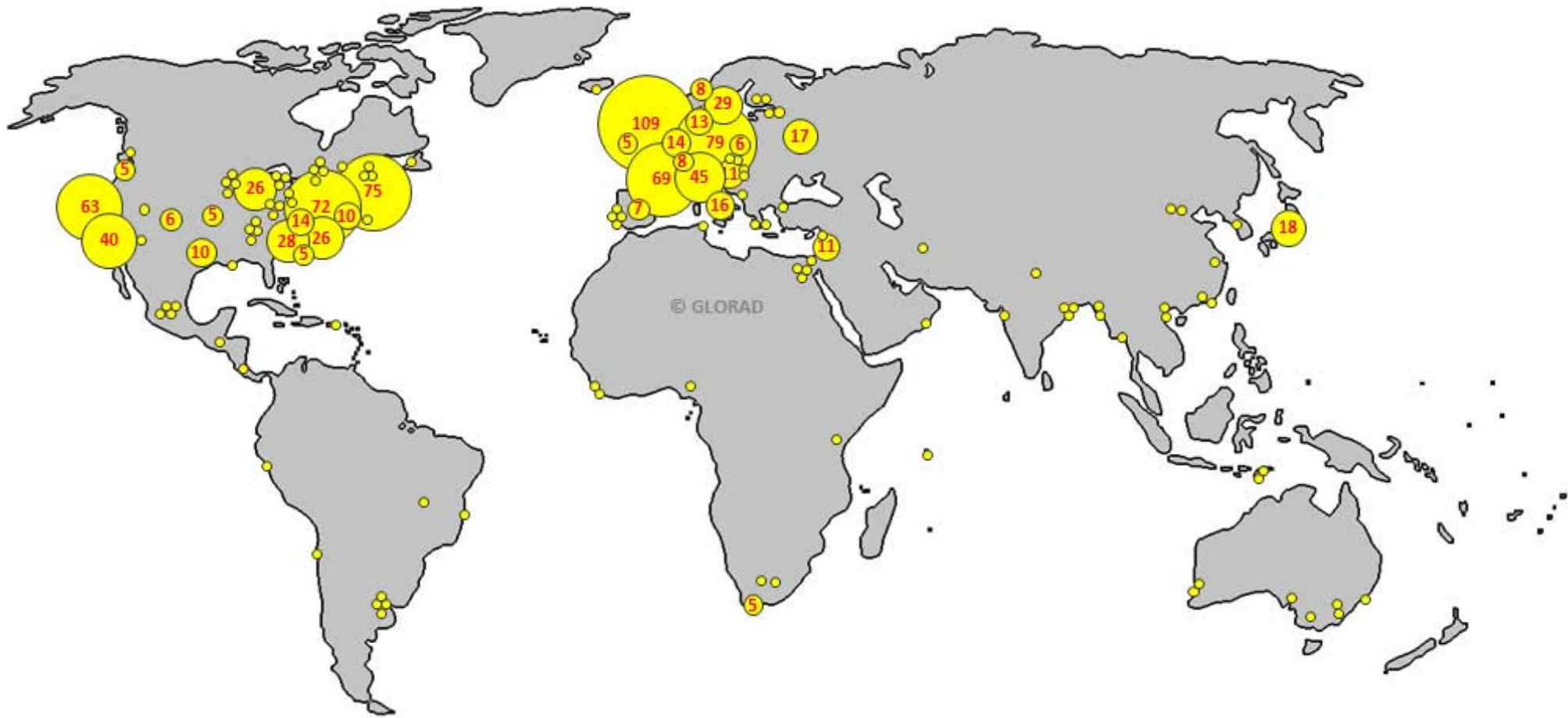
§ Inter-triad R&D still dominant

§ Triad leads also as source in other countries

§ Non-triad destinations split between BRIC and Rest of the World

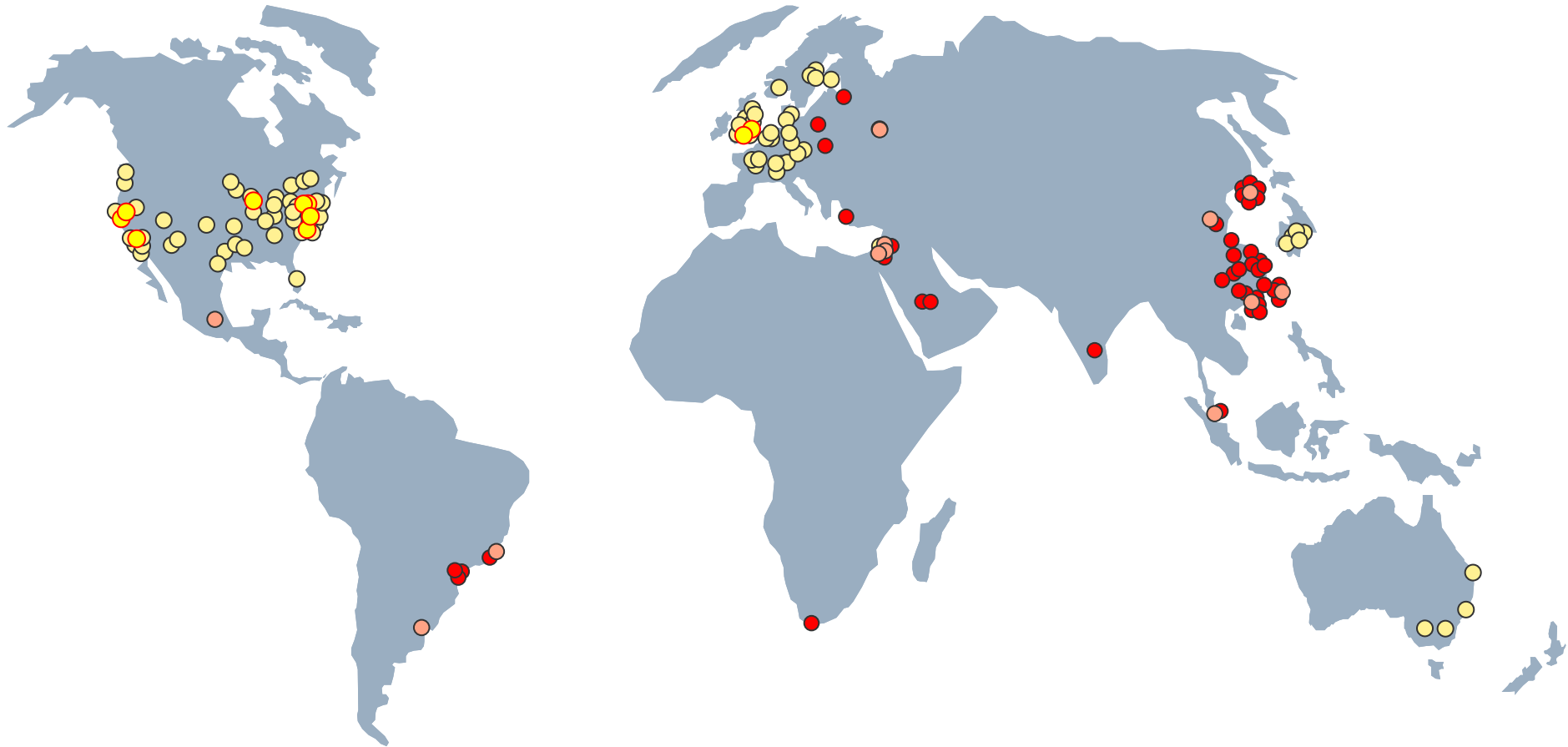
§ BRIC, RoW each about one third of inter-Triad investment

Prizes (Nobel, Turing, Britzke)



958 Prize Winners in total (up to 2012)

Academia Mostly Western



1. Top 10 US + UK

2. Top 100: The "Developed World"

3. Top 1000 emerging + SEA: Scattered Picture

4. Top 2000 emerging + SEA: The Rise of China

Myth #4

One Size Fits All.

#3 We No Longer Matter.

#2 Strong IP Regimes Matter.

#1 The World Is Flat.

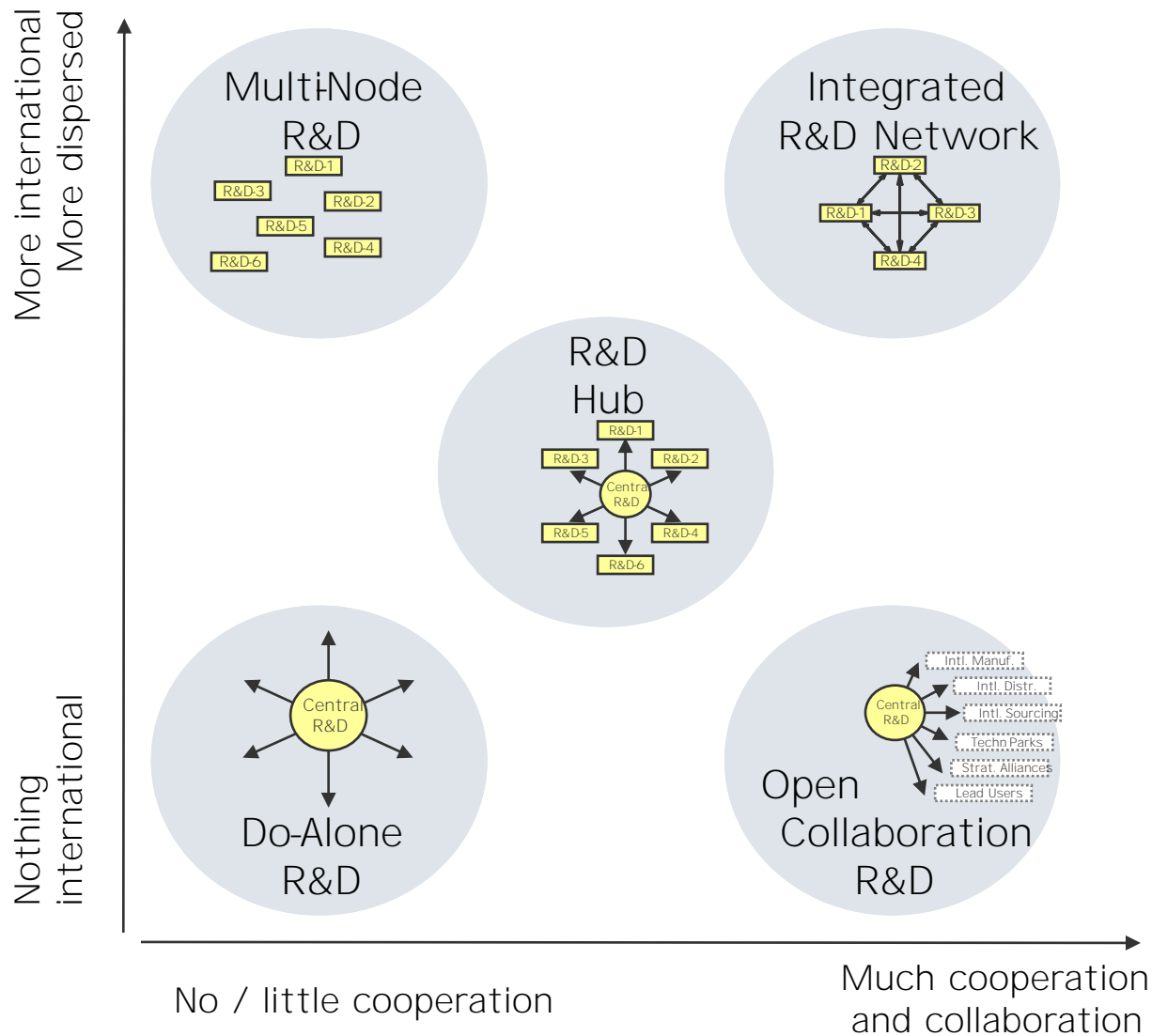
Global Innovation Survey

" In a global inn how should flow from the k headquarters to overseas innovation centers, not the other wa around . "

DO NOT AGREE AT ALL						COMPLETELY AGREE			
9	18	17	2	12	3	4	11	14	10



" Different Horses for Different



Do-Along R&D

- ~ Single R&D center in home country makes all technologies and products
- ~ Economies of scale and protection of IP, but not very innovative

Open Collaboration R&D

- ~ R&D center leverages outside expertise from partners, suppliers, universities
- ~ Misses out on local talent and cannot overcome local content regulations

R&D Hub

- ~ Strong R&D center controls dispersed small overseas R&D units
- ~ Very efficient, but insensitive to local creativity and entrepreneurship

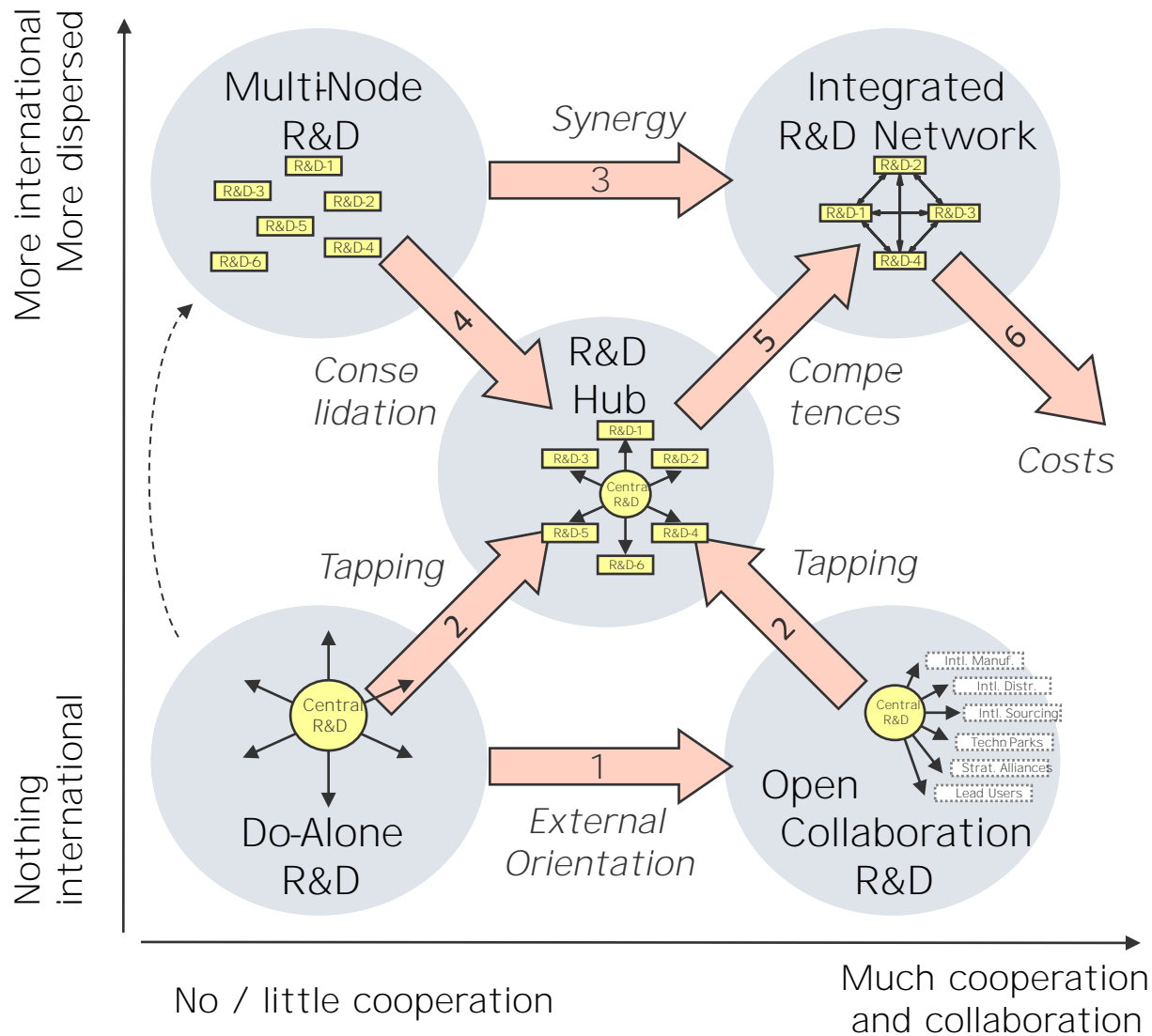
Multi-Node R&D

- ~ Uncoordinated dispersed R&D units
- ~ Highly sensitive to local customers
- ~ No critical mass and often inefficiency

Integrated R&D Network

- ~ Mutually coordinated competence centers
- ~ High coordination costs and complex to manage

Global Innovation Networks Evolve



Trend 1: External Orientation

- “ Open up to foreign hires
- “ Foreign R&D joint ventures and suppliers

Trend 2: Tap into Overseas Resources

- “ Set up overseas technology listening posts
- “ Develop small R&D outposts to support local markets

Trend 3: Exploit Synergy

- “ Reduce area overlaps and coordinate multiple contributing teams
- “ Globalize limited scope of local R&D units

Trend 4: Consolidate

- “ Consolidate, reposition and integrate local R&D unit by centralizing control over budgets, projects, and key headcounts

Trend 5: Link Internal Competences

- “ Allow local R&D units to develop indigenous sources of expertise
- “ Cross-link mature R&D units

Trend 6: Recentralize due to Costs

- “ Co-locate smaller R&D units into large R&D centers

Myth #5

Emerging Market Companies Compete on
Costs Only.

#4 One Size Fits All.

#3 We No Longer Matter.

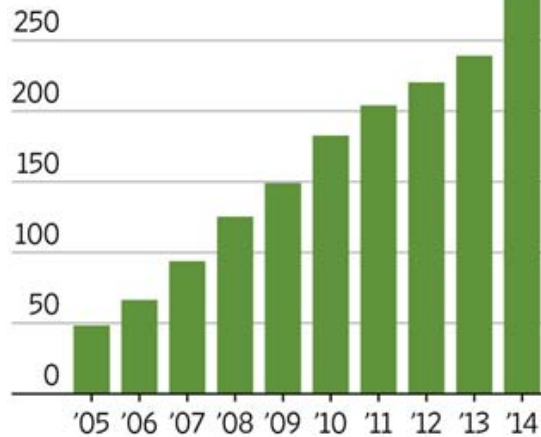
#2 Strong IP Regimes Matter.

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Huawei Internationalization of High Tech

Revenue

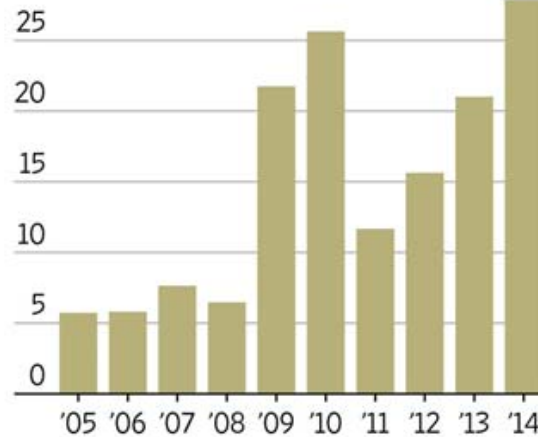
300 billion yuan



10 billion yuan = \$1.61 billion Source: the company

Net profit

30 billion yuan



THE WALL STREET JOURNAL.

World's largest telecom equipment maker

1988: Founded

1996: HK

1997: Russia, Latin America

1998: Middle East, North Africa

2000: Europe

2001: US

2003: Cisco lawsuit

2007: 72% of sales from overseas markets

1737 PCT patents (#1)

2010: \$28bn in revenues

\$3.7bn in profits

\$3.7bn in R&D

140,000 employees

2014: \$46bn in revenues

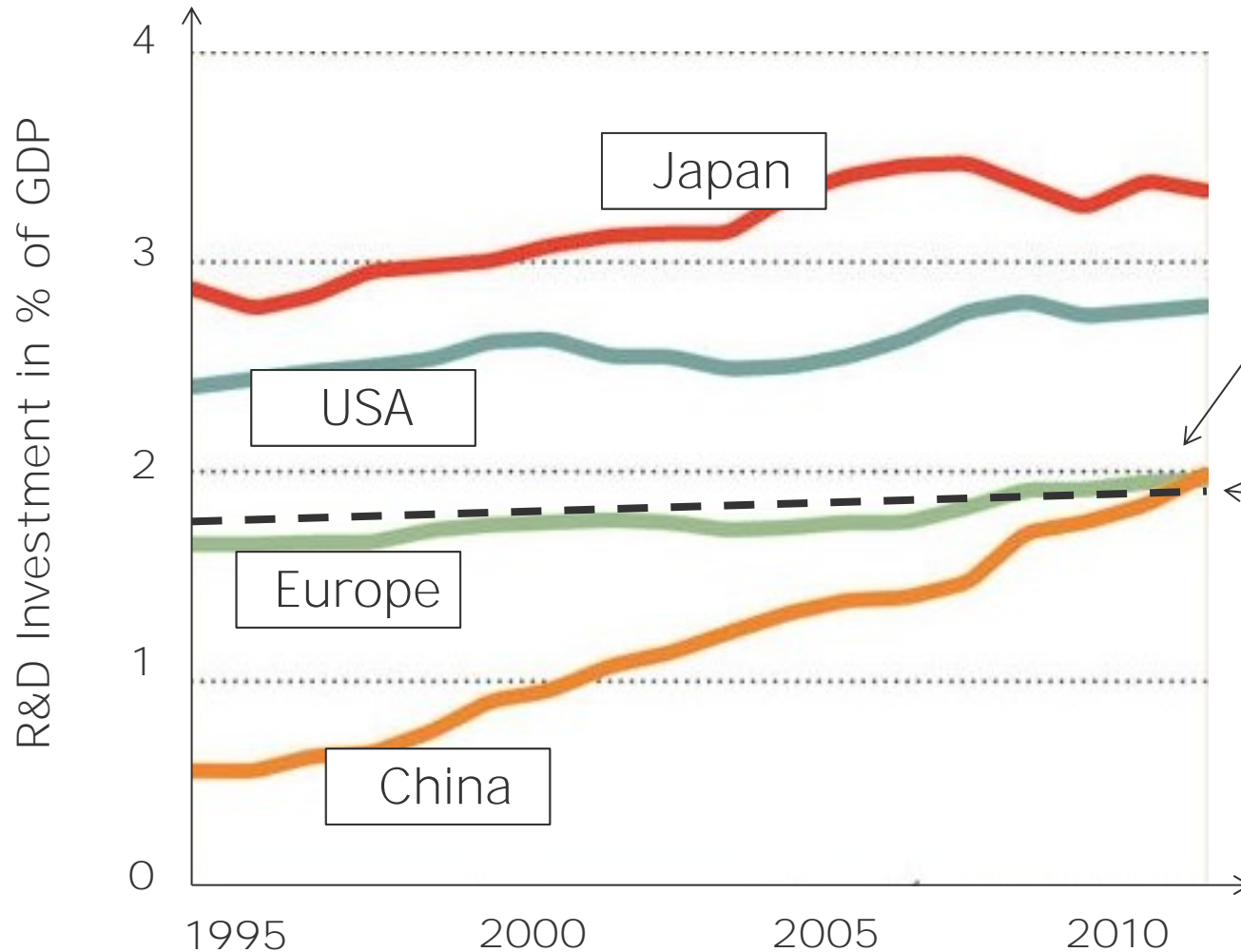
\$4.5bn in profits

\$6.4bn in R&D

170,000 employees



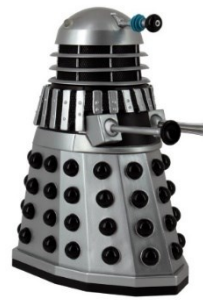
China Now a Net Contributor to Global R&D Balance



2011 China passes the world average R&D ratio of 1.9%.

2012 With GDP to R&D ratio of 1.98% China passed Europe (average of 28 member states) with ratio of 1.96%.

Robots On The Rise



AnBot

§ 1.49m, 18 km/h, 78 kg

§ Developed by the National Defense University in 2016

§ @

own. It is equipped with weapons to prevent and control violence by remote control. Moreover, it could be a service



§ Edward Snowden



JiaJia/ "Girlfriend"

§ Most beautiful robot so far

§ Takes orders directly from the cloud

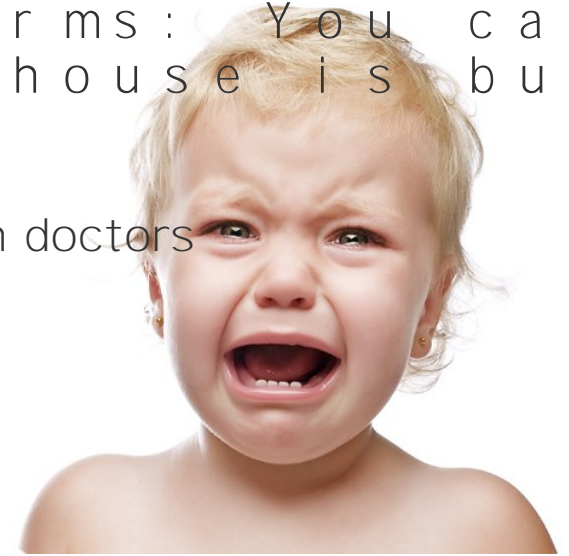
§ Built by the University of Science & Technology in Hefei



What “Whaaaah” Means: A Taiwanese App Helps!

“ Babies are like smoke alarms: You can't taste the toast or if the whole house is burning.”

Infant Cries Translator



§ Developed by National Taiwan University Hospital Yunlin doctors Chang Chuanyuan and Dr Chen-Sa

§ Differentiates between 4 types of cries:
Hunger, diaper wet, sleepy, pain (within 10 seconds)

! 92% accurate for babies less than 2 weeks old

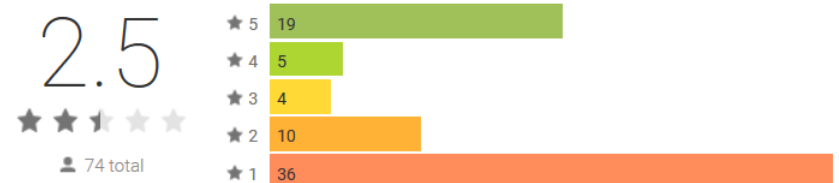
! 84% accurate if less than 2 months old

! 77% accurate if less than 4 months old

§ Collected 20,000 cries from 100 newborn babies over a two year period. Parents now upload new cries along with diagnosis to the cloud that the App taps into with a learning algorithm.

§ Available as an App since 2015 (\$2.99)

§ †



Competition Never Sleeps

§ Recent scan revealed at least a dozen competing apps on Google Play

Example of Improving Quality of Life



Goodbaby

- § Mission: improve the quality of life for children
- § Established in 1989
- § #1 in China as stroller brand
- § >40% volume in Europe
- § Present in 100+ countries

Goodbaby Products

- § Five global brands
- § Over 100 patents in 15 countries
- § In China: 1,617 patents

Quality

- § Deployed in 100+ countries
- § The US Patent Office awarded Goodbaby 10 patents in 2010 and 2011
- § 2010 Goodbaby was named 'Quality of this Year'



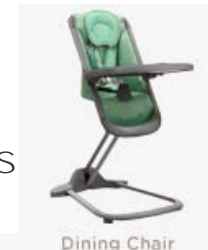
quality of life

让爱拥抱你
with love
from gb

20,000 €



Stroller



Dining Chair

of existing products

or patent req



Playard

absid Fall



Children's Car Seat

Myth

T h a n k G o o d n e s s ... W e '

#5 Emerging Market Companies Compete on Costs Only.

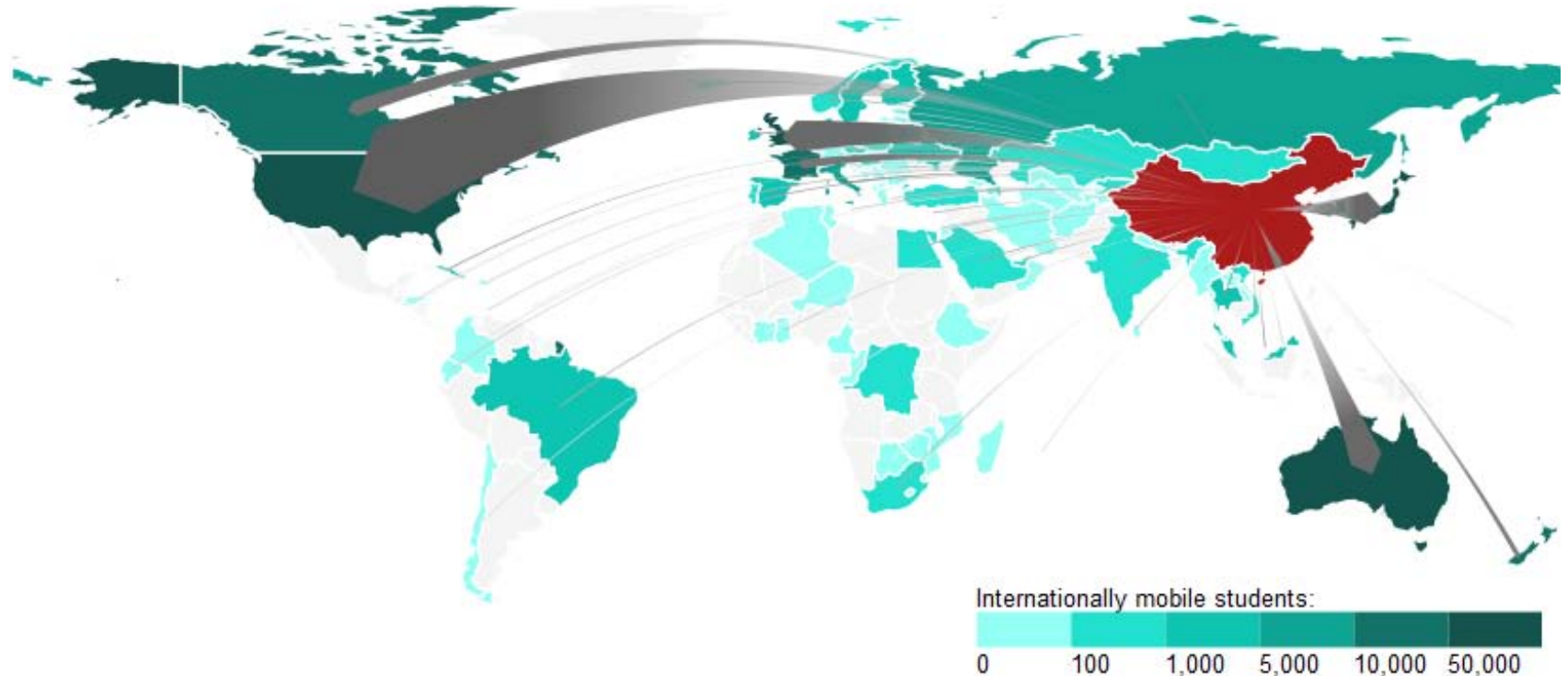
#4 One Size Fits All.

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#2 Strong IP Regimes Matter.

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Migrant Brainpower Chinese Researchers



Overseas Chinese Study Power

- § Approx. 500,000 Chinese students leave China every year for overseas studies
- § About half go to the US, about 90,000 each to the UK, Japan, and Australia
- § Tsinghua is the largest source of PhD students in US universities; Peking University

China Has The WeDrain ProblemL a r g e

Of 3.05 million students, 1.44 million have returned (as of 2014)

- § Returnees bring back Western values
- § 27,400 Chinese studied in US universities, 20,000
- § Of 4,121 Chinese STEM PhDs, only 15% had returned to China five years after graduation only Iran has less with 8%

High-Level Overseas Talent Recruitment Program (generous research funding) brought back since 2008

- § 4,100 PhDs
- § 1,400 professors
- § 46 foreign science and engineering academicians
- § 3 Nobel Prize winners



Robin Li
Baidu



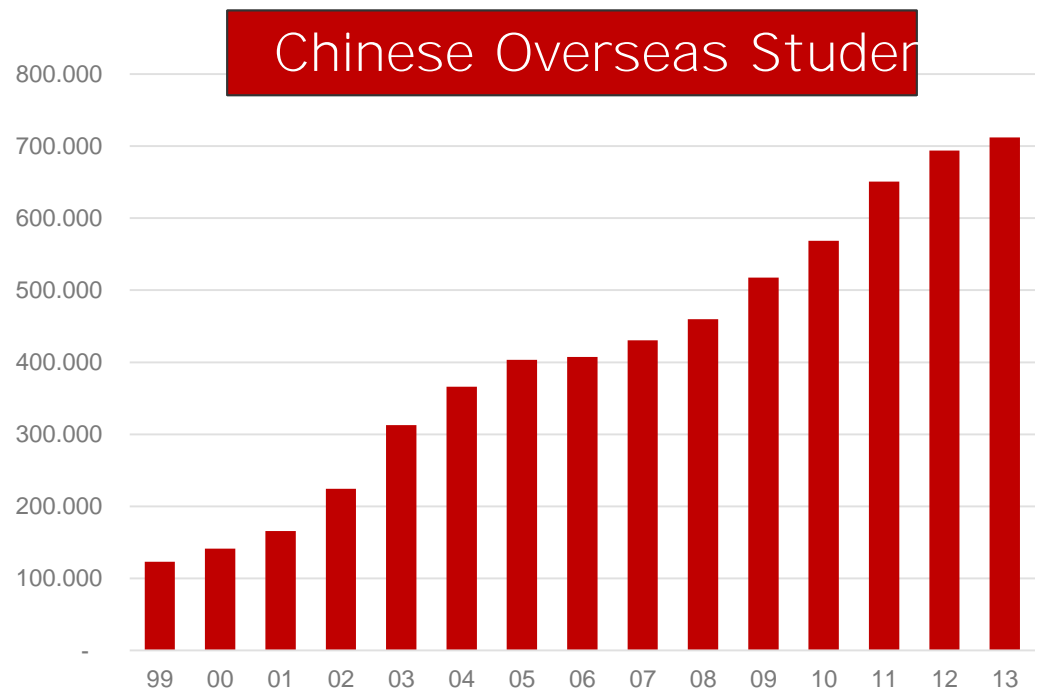
Wan Gang
MOST



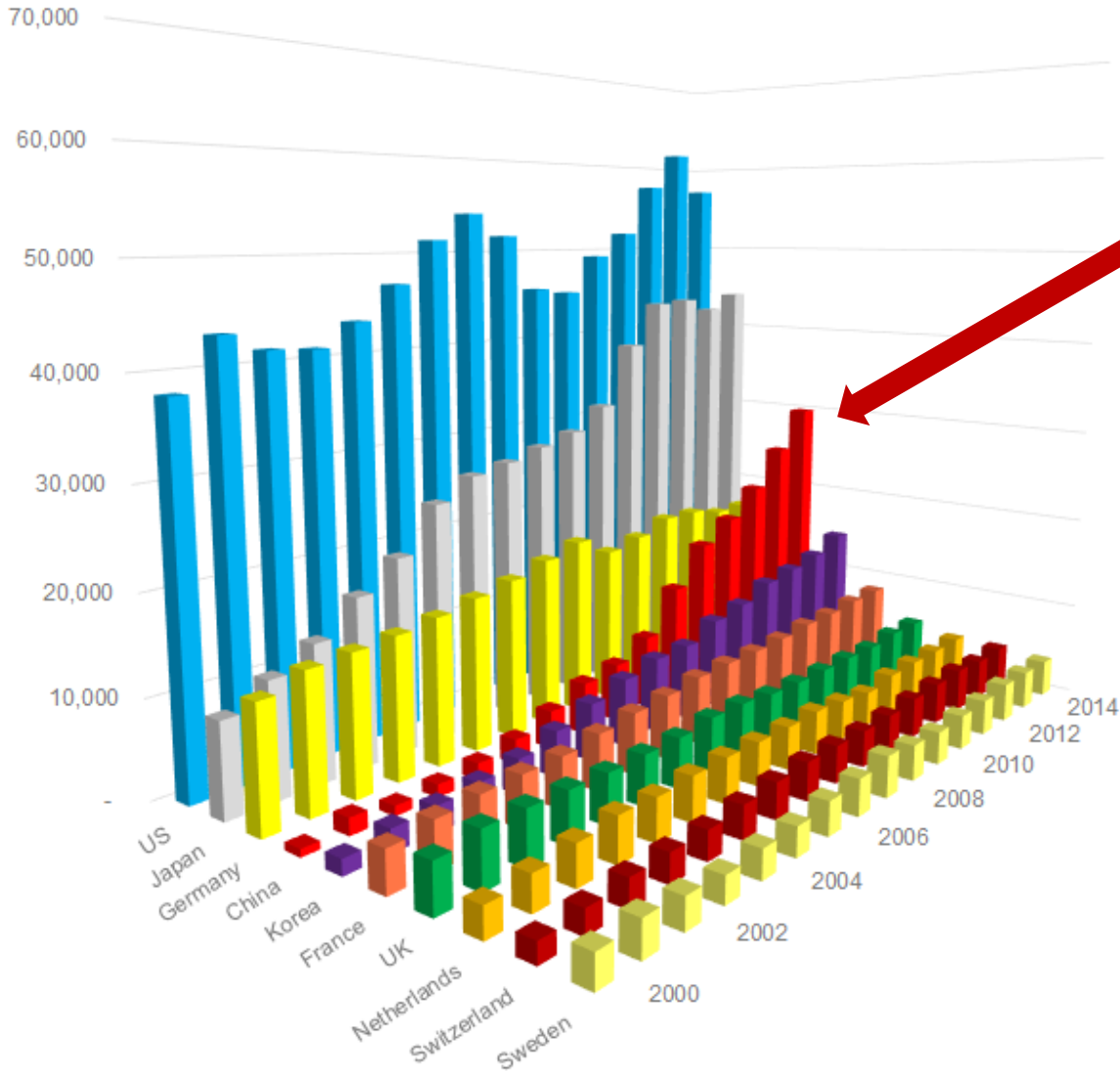
Deng Xiaoping
Chairman



Qian Xuesen
Rocket Scientist



PCT Filings by Country of Origin: China Growth since 2000



2015 Filings (CAGR)

1. US: 57,086 (2.7%)
2. JP: 44,052 (10.7%)
3. CN: 29,835 (27.5%)
4. DE: 18,003 (2.4%)
5. KR: 14,564 (16.0%)
6. FR: 8,417 (4.8%)
7. GB: 5,289 (0.6%)
8. NL: 4,334 (2.6%)
9. CH: 4,265 (5.2%)
10. SE: 3,842 (1.5%)

Winners 1'500

- § CN: up from 781 (27.5%)
- § KR: up from 1,582 (16%)
- § IN: from 190 to 1,412 (14.3%)
- § Japan: up from 9,569 (10.7%)
- § Mexico: from 72 to 317 (10.3%)

Less than 3% Growth

- § UK, Sweden, Netherlands, Germany, US

Global Locations by Origin: Chinese R&D Centers



Concluding Remarks

6 Myths of Global Innovation

#1 The World Is Flat.

#2 Strong IP Regimes Matter.

#3 We No Longer Matter.

#4 One Size Fits All.

#5 Emerging Market
Companies Compete
on Costs Only.

#6 Thank Goodness ...
We're Safe Here!

- 1) What will be Europe's
§ 0
§ More cooperation among countries and European firms
§ Harness potentials of immigrants
- 2) What is the role of Chinese innovation for global innovation?
§ More global R&D from emerging countries
§ Slowdown in domestic growth will only spur innovation seeking abroad
§ What will be the impact in European innovation?
- 3) Best times for global innovation still ahead
§ Leading emerging countries to become SOURCES of technology
§ New technologies and processes help Western firms to leverage global footprint
§ \ from replication to innovation

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