Building a Resilient Business: Before, During, and After a Disaster

Entrepreneurs Support Practitioners

Module 3

Puerto Rico Science, Technology & Research Trust

Resiliency and Business Innovation

Center for Resilient and Sustainable Communities

Organized by the Puerto Rico Science, Technology & Research Trust

Sponsored by: U.S. Economic Development Administration

June 2, 2020 6:00pm-8:30pm

Linton Wells II, J.P. Auffret, Robert Rogers

*C-RASC consists of researchers from George Mason's Volgenau School of Engineering , the School of Business, the Schar School of Policy and Government, the Jimmy and Rosalyn Carter School of Peace and Conflict Resolution, the College of Science, and the College of Heath and Human Services

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Comparative Strategies of Resilience and Innovation

J.P. Auffret, Ph.D.

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Puerto Rico Science, Technology & Research Trust

Gloria Viscasillas Aponte

HACOPRW

Resiliency and Business Innovation

Organized by the Puerto Rico Science, Technology & Research Trust and the Resiliency and Business Innovation Program Sponsored by the U.S. Economic Development Administration under the US Department of Commerce

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Building a Resilient Business: Before, During, and After a Disaster

Lesson 3

Comparative Strategies of Resilience and Innovation

Puerto Rico Science, Technology & Research Trust

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Agenda

- Comparative Strategies for Resilience and Innovation
- Break
- Digital Puerto Rico
- Lesson 3 – Protection of People, Data and Operations (June 4th)
- Lesson 4 – Protection of Inventor, Equipment and Buildings (June 11th)

Agenda

Comparative Strategies for Resilience and Innovation

- Bangkok 2011 Floods
- National, State and Regional Strategies for Resilience
- Industry Clusters and “The Cambridge Phenomenon”
- Elements of ICT Innovation and National ICT Innovation Policies

Social Media and Resilience – Bangkok Floods 2011

Source: http://www.bangkokpost.com/photo/photo/262533/splash-from-the-past

Source: http://www.nytimes.com/2011/11/07/business/global/07iht-floods07.html?_r=0

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Bangkok Flood and HDD Manufacturers 2011

Table 9
Damages to major HDD makers.
Source: Press release.

Company	Place of factories	Damage	State of operation /production
Western Digital	1) Bang Pa-in Industrial Estate 2) Nava Nakorn Industrial Estate	Factories inundated (2 m)	- Stopped production since Oct 16, 2011 - Partly restored on Nov 30, 2011 - Needed days to restore:46 days
Toshiba	Nava Nakorn Industrial Estate	Factory was inundated (1 m)	- Stopped production since Oct 11, 2011 - Alternate production in Philippines - Partly restored Thai factory on Feb 1, 2012 - Need dates to restore: 114 days
Seagate Technology	1) Seagate Teparuk, Amphur Muang, Samutprakarn Province 2) Seagate Korat, Amphur Sungnoen, Nakhon-Ratchasima	Factories were not inundated	- Some adjusted production due to the lack of supply from suppliers
Samsung	In South Korea	Factories were not inundated	- Some adjusted production due to the lack of supply from suppliers

Source: Haraguchi and Lall (2011)

Bangkok Flood and HDD Manufacturers 2011

Table 6
Impacts of the Thailand floods on Japanese major automakers.
Source: Press release of each companies.

Statistics	Toyota	Honda	Nissan
Number of lost cars at global due to Thailand floods (thousand cars)	240	150	33
Operating profit (billion yen)	270 ($3.4B)[a]	200 ($2.5B)	510 ($6.4B)
Lost operating profit due to Thailand floods (billion yen)	100 ($1.25B)	110 ($1.4B)	5.9 ($0.07B)
Percentage of loss of operating profit caused by Thailand flood to operating profit	37.04%	55.00%	1.16%
Operating Profit (% compared to 2020)	−42.30%	−64.90%	−4.70%
Net profit (billion yen)	200 ($2.5B)	215 ($2.7B)	290 ($3.6)
Net profit (% compared to 2010)	−57.50%	−59.70%	−9%

[a] The exchange rate was used for 80 Japanese yen for 1 U.S. dollars, which was the rate at that time.

Source: Haraguchi and Lall (2011)

Japanese Government and Bangkok Floods

Risk countermeasures	Effects of business improvement and competitiveness enhancement
Increase/diversification of procurement sources	Cost reduction effect
Acceleration of adopting standardized products	Simplified production adjustment
Facilitate the adoption of products produced in other factories (review of certification system)	Improvement of production development speed
Review of reliability assessment	Realizing intensive investment in priority development products
Clarification/expedition of decision making process	Prompt review/improvement of business strategy
Visualization/simplication of supply chains	Enhancement of cooperation with parts manufacturers

Note: It is necessary to note that all the elements do not always correspond to each other. Source: Created by METI using Nikkei Electronics (2012) as a reference.

National and Regional Strategies for Resilience and Innovation

https://www.areadevelopment.com/siteSelection/jan2011/industry-clusters-evolve-location-decision93090.shtml

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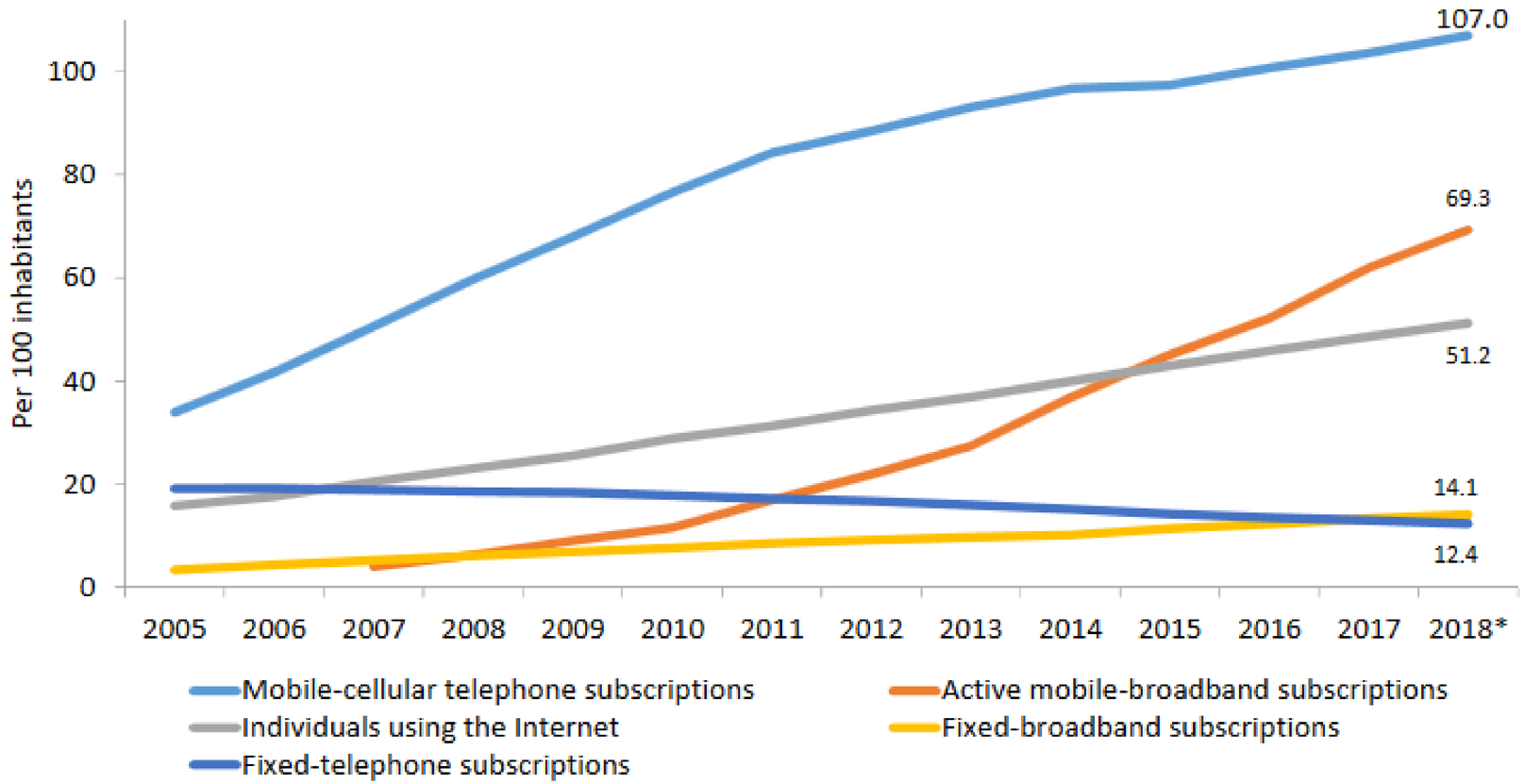
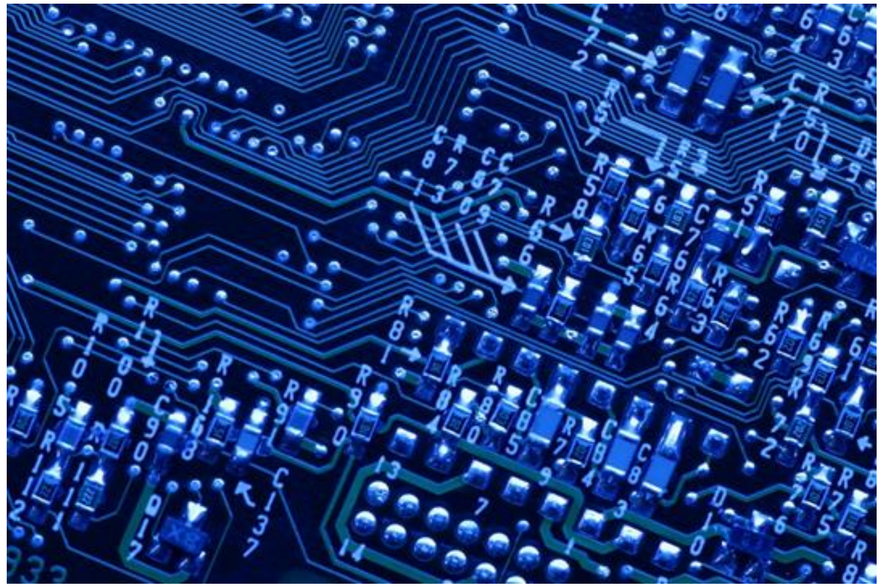
Technology Foundations - Global ICT Development (2005 – 2018) (ITU)



Note: * ITU estimate.
Source: ITU.

Source: ITU Measuring the Information Society 2018

Storage, Transmission and Computer Processing



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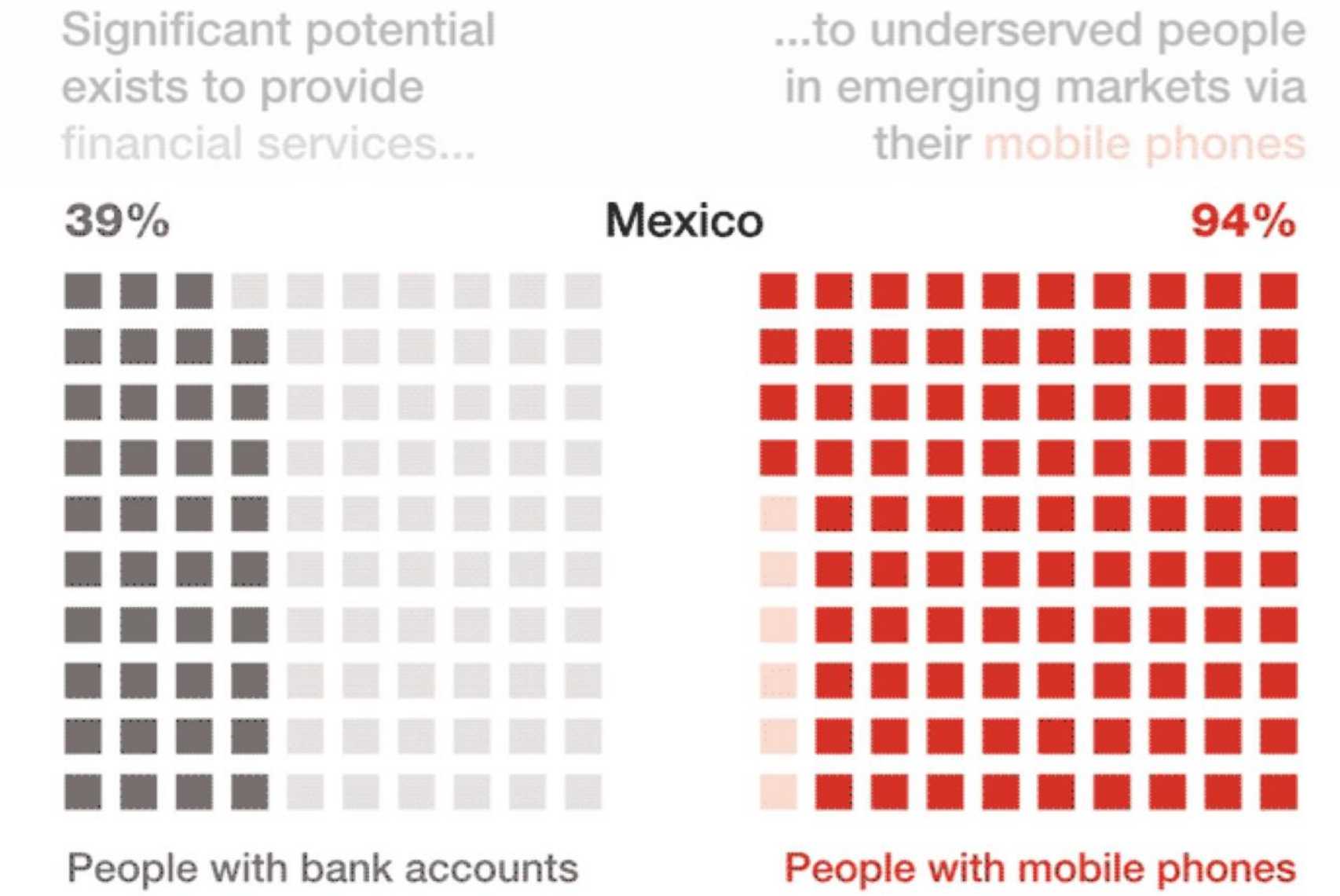
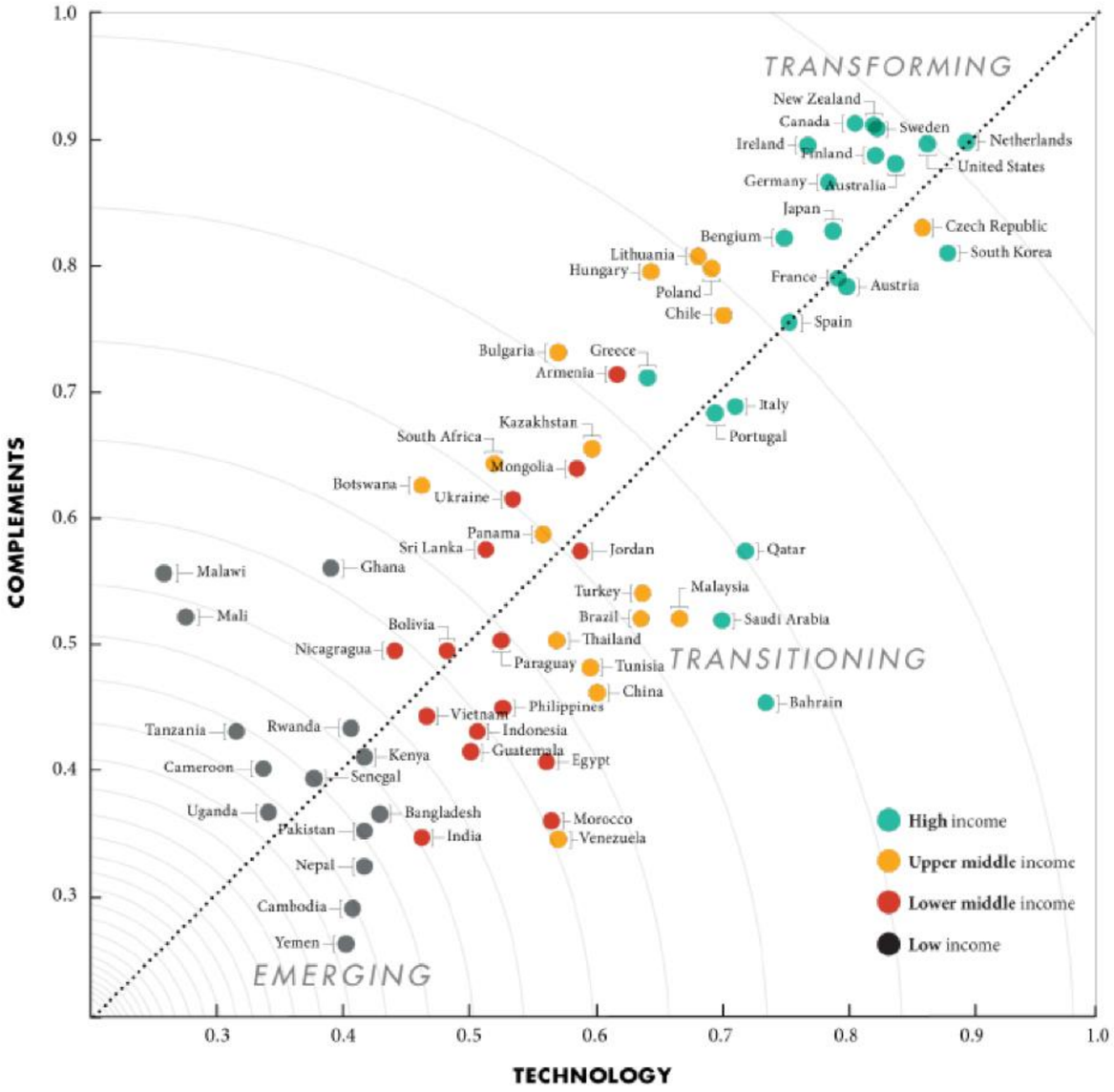


Source: GSMA; Global Findex database 2014, World Bank; *World development indicators*, World Bank

McKinsey&Company

#financialinclusion

Race Between Technology and Complements



Complements: Index of quality of institutions, skills and regulations.

Technology: Index of quality of access to internet and related technologies.

Source: WDR 2016 Team, Doing Business, World Economic Forum; Trade in Services Restrictiveness Index and World Development Indicators.

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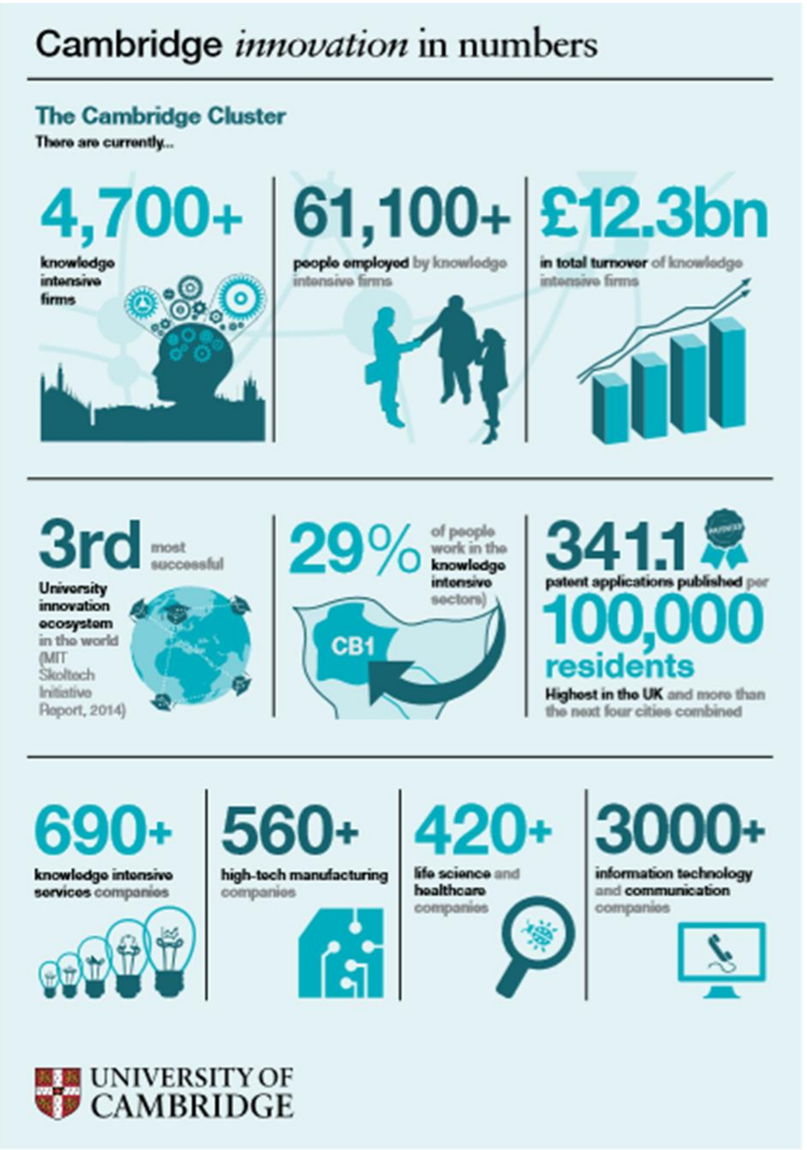
Business Environment Quality (Porter 1990)

"The Cambridge Phenomenon"



Source: http://www.access.trin.cam.ac.uk/gallery/#jp-carousel-146

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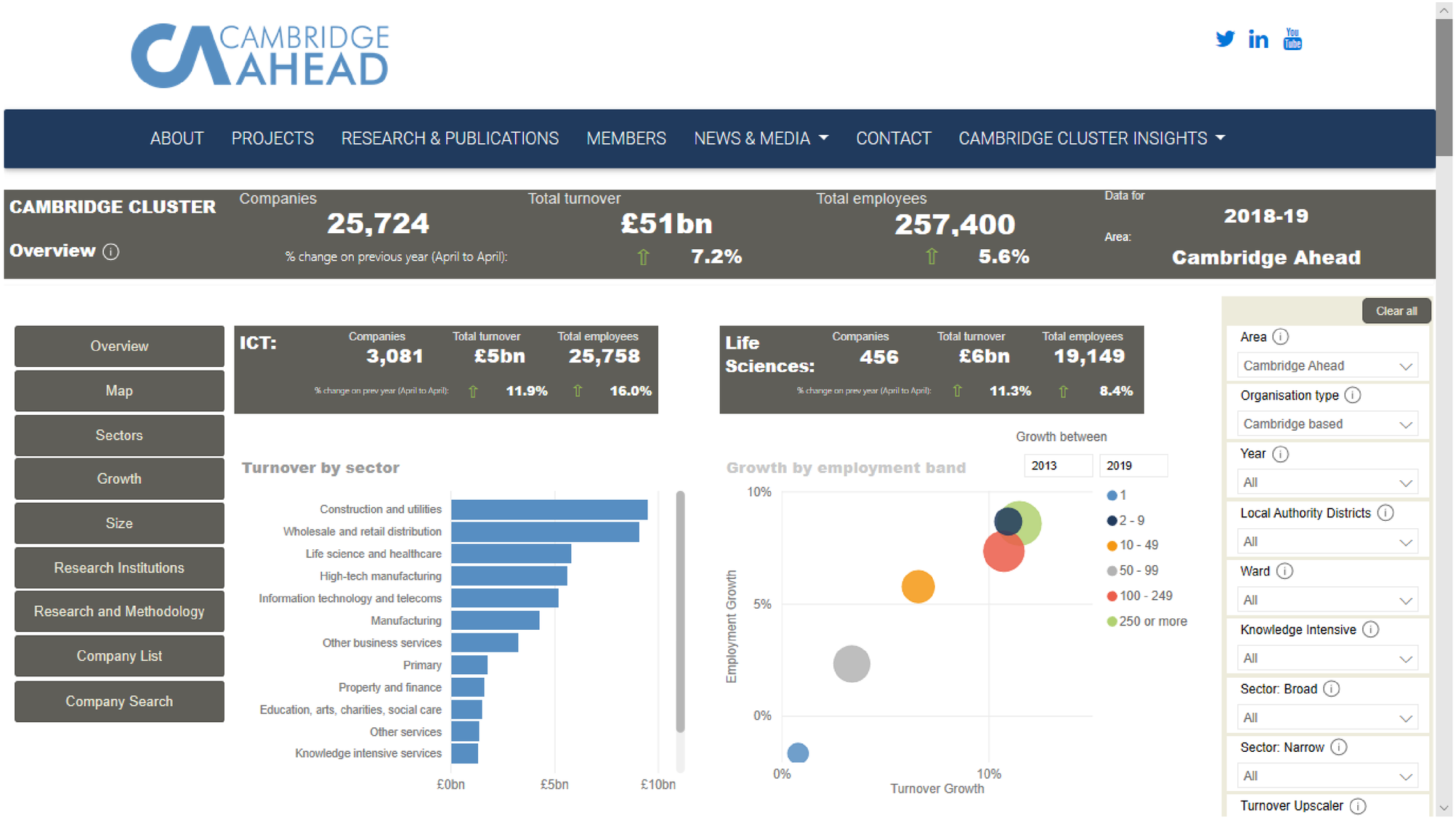

Source: https://www.cambridgeahead.co.uk/cambridge-cluster-insights//

SILICON VALLEY U.S.A.

(This is the first of a three-part series on the history of the semiconductor industry in the Bay Area, a behind-the-scenes report of the men, money, and litigation which spawned 23 companies — from the fledgling rebels of Shockley Transistor to the present day.)

By DON C. HOEFLER

It was not a vintage year for semiconductor start-ups. Yet the 1970 year-end box score on the San Francisco Peninsula and Santa Clara Valley of California found four more new entries in the IC sweeps, one more than in 1969.

The pace has been so frantic that even hardened veterans of the semiconductor wars find it hard to realize that the Bay Area story covers an era of only 15 years. And only 23 years have passed since the invention of the transistor, which made it all possible.

For the story really begins on the day before Christmas Eve, Dec. 23, 1947. That was the day, at Bell Telephone Laboratories in Murray Hill, N.J., three distinguished scientists, Dr. John Bardeen, Dr. Walter Brattain and Dr. William Shockley, demonstrated the first successful transistor. It was made of germanium, a point-contact device that looked something like a crystal detector, complete with cat's whiskers.

The three inventors won the Nobel Prize for their efforts, but only one of them, Dr. Shockley, was determined to capitalize on the transistor commercially. In him lies the genesis of the San Francisco silicon story.

It was only by a quirk of fate, however, coupled with lack of management foresight, that Boston failed to become the major semiconductor center San Francisco is today. When Dr. Shockley left Bell Labs in 1954, he headed first for New England to become a consultant to Raytheon Co., with a view toward establishing a semiconductor firm there under its auspices.

Source: http://www.theatlantic.com/technology/archive/2012/06/what-happened-to-silicon-values/258905/

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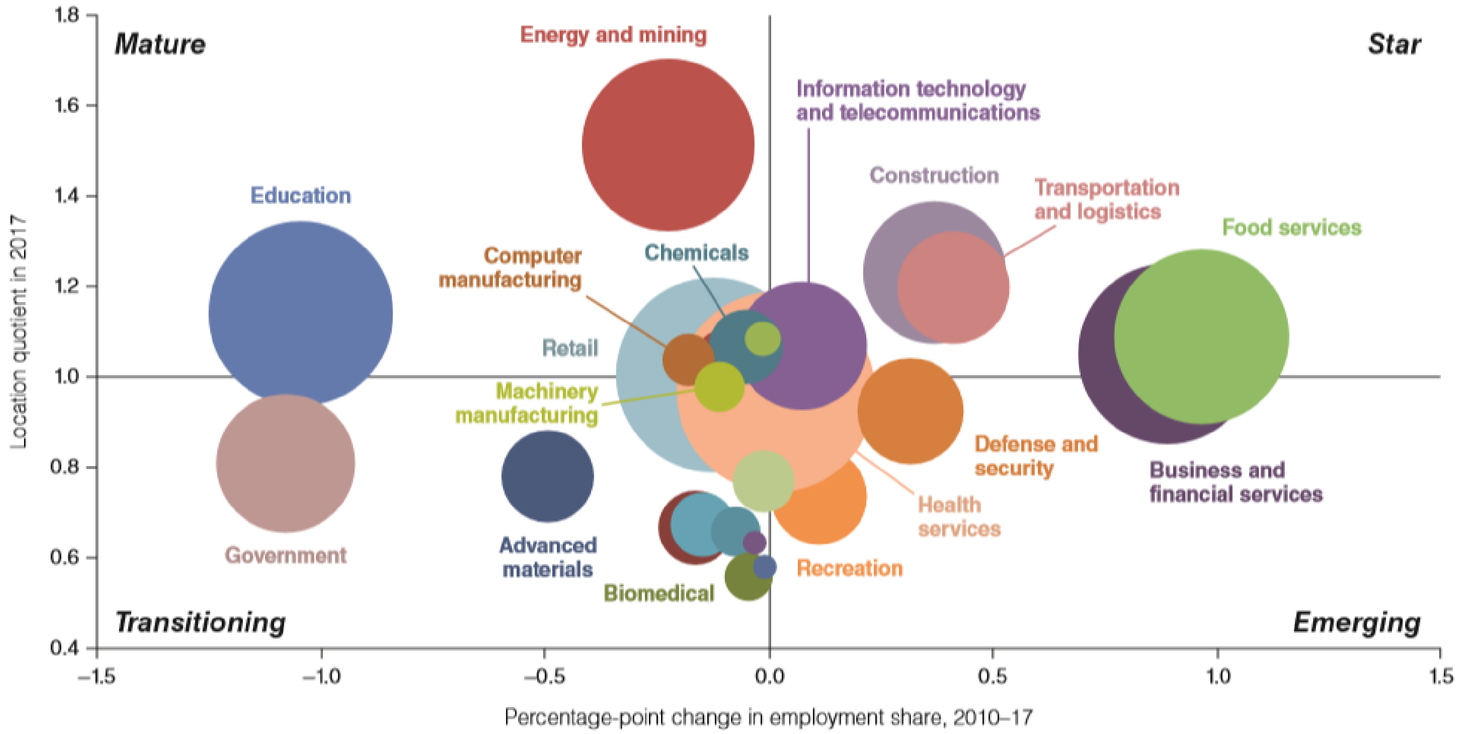
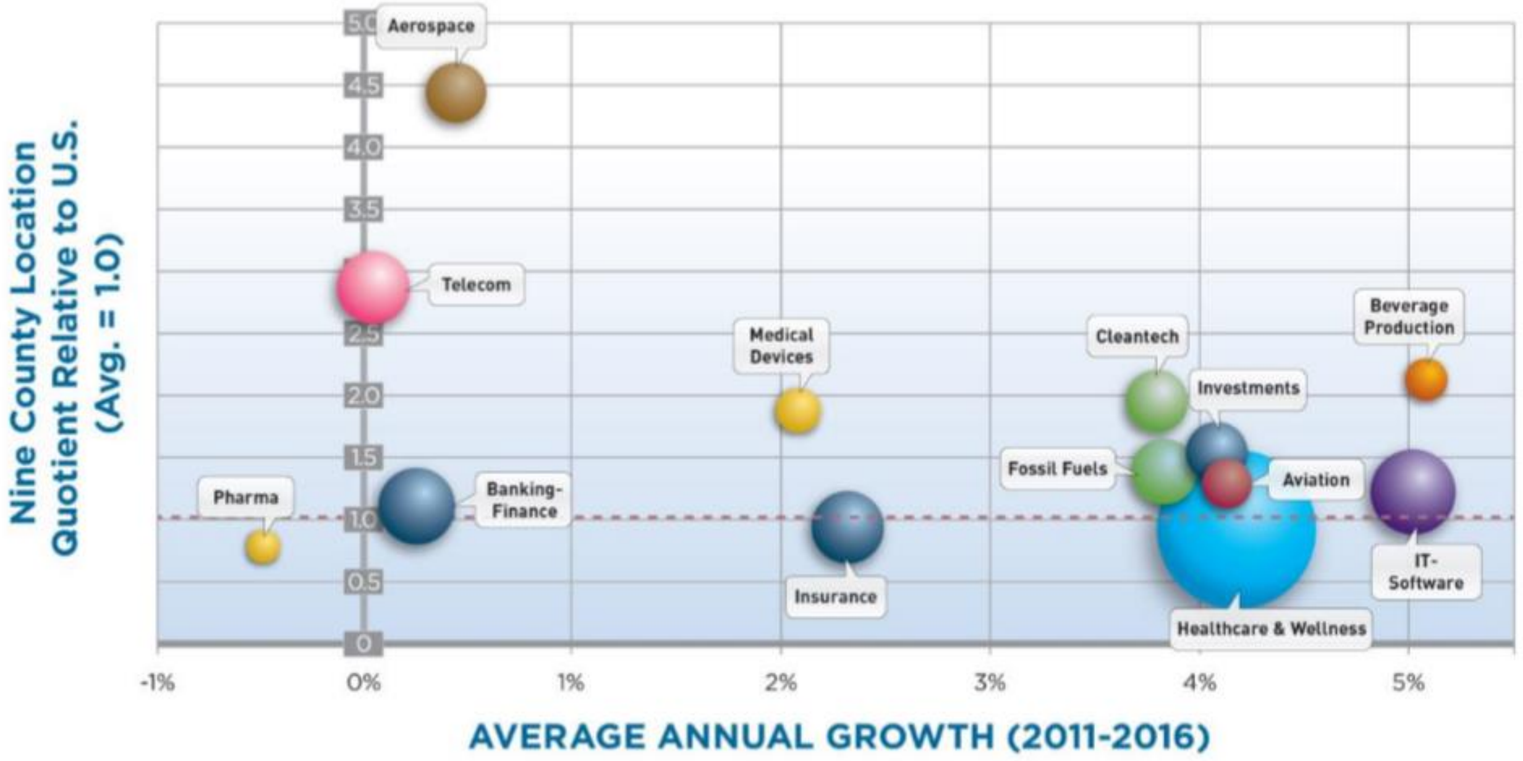
Texas Industry Clusters



NOTE: Bubble size represents cluster share of metropolitan statistical area employment.
SOURCES: Texas Workforce Commission; Bureau of Labor Statistics.

Source: https://www.dallasfed.org/research/heart/overview/

Texas Industry Clusters



Source: /http://www.metrodenver.org/media/230157/2017-industry-cluster-study-full-report-.pdf

Source: :http://www.sipa.gov.tw/english/index.jsp

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Source: http://www.yrp.co.jp/en/outline/index.html

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Estonia's technology cluster

Not only Skype

Jul 11th 2013, 15:00 BY L.S. | TALLINN

IT TAKES just five minutes to register a firm in Estonia, says Mihkel Tikk, the head of the country's online portal, a one-stop-shop for e-government services. Entrepreneurs wishing to start a firm log in with their national electronic identity-card and a few clicks later the confirmation arrives by e-mail. That service and many other equally convenient electronic offerings are a big reason why Tallinn, Estonia's capital, is now mentioned in the same breath as Berlin, London and even Silicon Valley. According to one estimate, Estonia holds the world record in start-ups per person—a sizeable feat considering that the country has only 1.3m people.

Source: http://www.theatlantic.com/technology/archive/2012/06/what-happened-to-silicon-values/258905/

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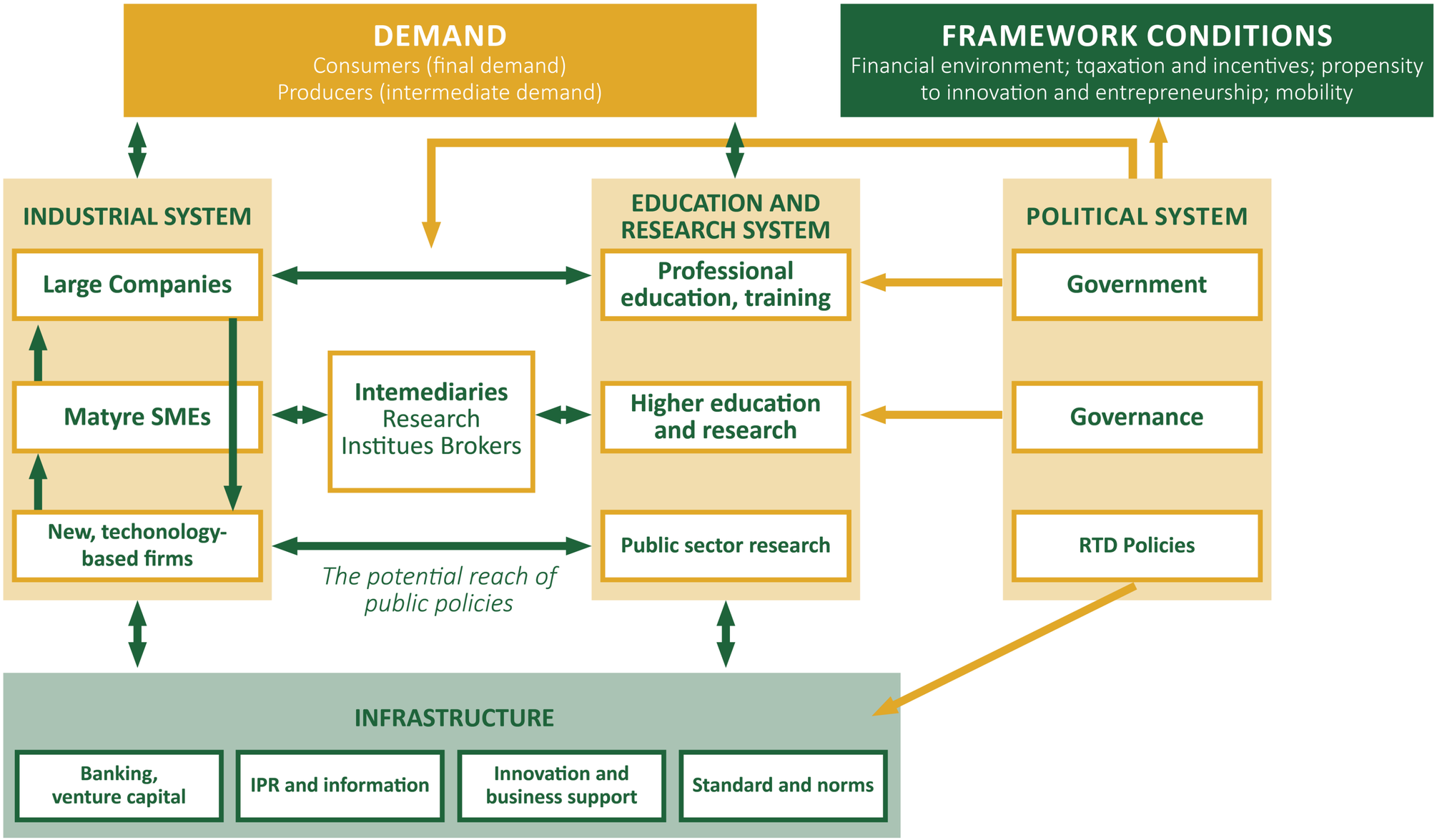
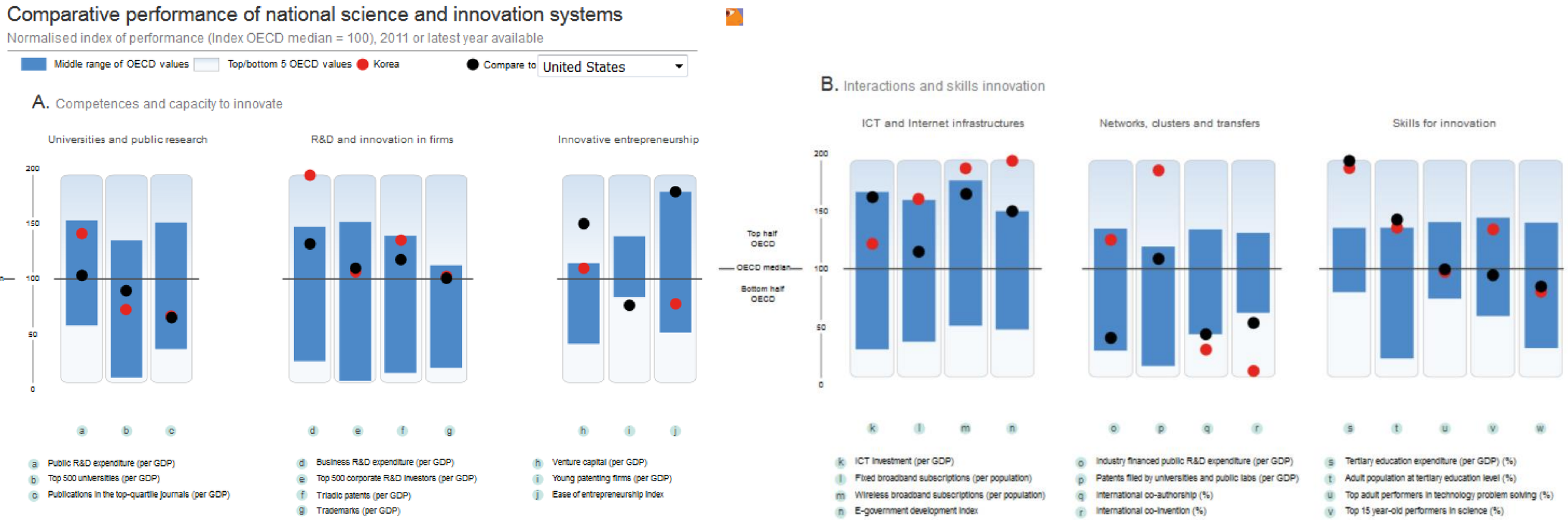
National Models of Innovation



A Comparative Snapshot of Innovation Systems



Source: http://innovationpolicyplatform.org/STICharting/benchmark.htm?iso=kr

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Elements of ICT Innovation

- Universities and IP
- Entrepreneurs and Highly Skilled Managers and Technical Talent
- Firms and Sectors
- Access to Capital
- Infrastructure
- Local Quality of Life
- Global Connections
- Policies and Processes

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Universities and IP

Source: http://www.ranepa.ru/

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https://www.theweeklyjournal.com/business/upr-secures-26-patents/article_4350d0da-5291-11ea-924b-93c53f465ef0.html

FEATURED

BUSINESS

UPR Secures 26 Patents

From breast cancer drugs to solar panels, researchers and scientists at the institution are creating technology to improve public health and quality of life

Cynthia López Cabán, The Weekly Journal
Feb 19, 2020

The University of Puerto Rico has secured 98 patents and is awaiting approval to the exclusive rights of another 50 inventions. (Courtesy)

Universities and IP

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Entrepreneurs and Highly Skilled Managers and Technical Talent

Source: http://www.entrepreneurshiplife.com/what-it-takes-be-an-entrepreneur/

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Firms and Sectors

Source:
http://www.ntt.co.jp/kankyo/e/protect/greenntt/docomo.html

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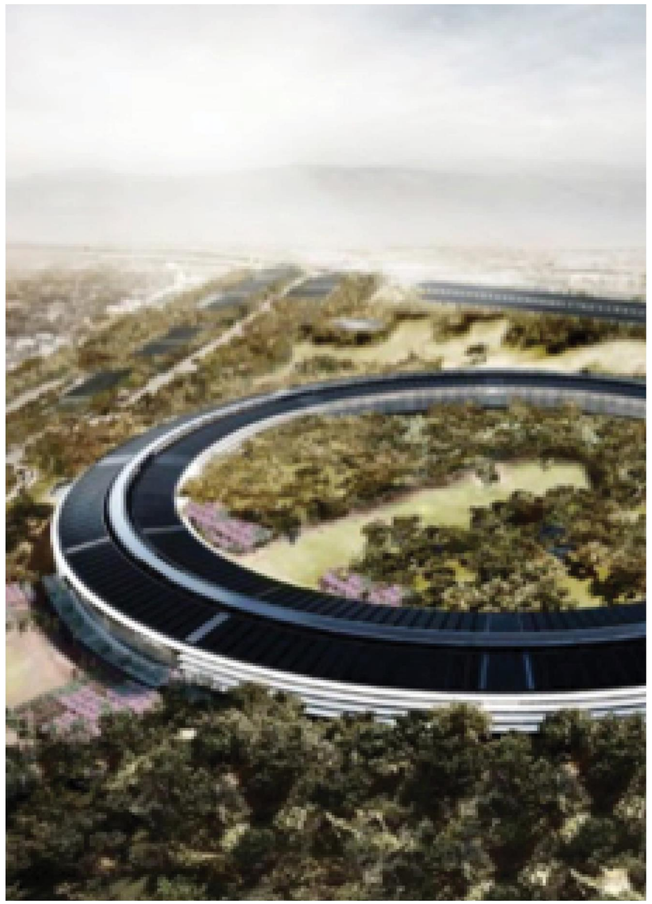
Firms and Sectors

Source: https://www.teslamotors.com/about /l

Source: http://www.samsungengineering.com/aboutUs/globalOffice/common/goView



Source: http://www.wired.com/2013/11/a-glimpse-into-apples-crazy-new-spaceship-headquarters/ l

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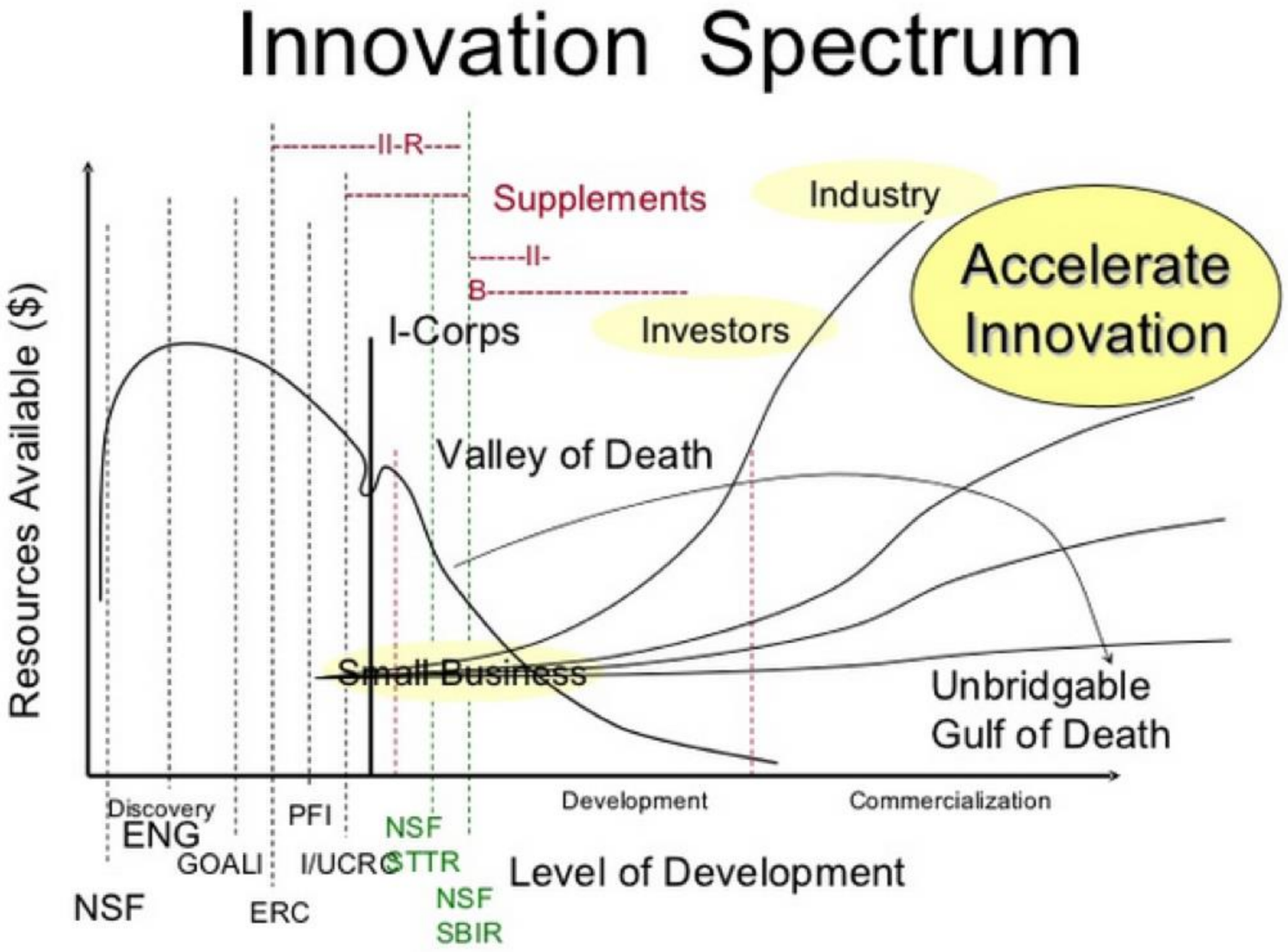
Access to Capital



Morro Venture Partners Launches Puerto Rico's First Tech Venture Fund with $17.5 Million

San Juan – February 27, 2019. With tech entrepreneurship booming in Puerto Rico since Hurricane Maria, Morro Venture Partners, under parent company Advent-Morro Equity Partners, has launched a $20 million early-stage venture fund to support and fuel the growth of technology companies from the island.

Following decades of success as a growth equity investor, Advent-Morro recognized a significant gap in the early-stage tech investment market given the accelerated growth in the Latin American tech markets and the high quality of the companies and management teams coming to Puerto Rico's Parallel18 tech accelerator program. "Our initial goal was to raise $10 million; however, strong investor interest both locally and from the mainland has pushed our ultimate target to $20 million. A first close at $17.5 million, with a highly sophisticated investor base, is a great validation to the opportunity in establishing Puerto Rico as a hub for Latin American tech," commented Cyril Meduña, Managing Partner of Advent-Morro.

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Infrastructure

https://www.businessinsider.com/japan-infrastructure-projects-2019-5

Local Quality of Life

Source: http://koreajoongangdaily.joins.com/news/article/Article.aspx?aid=2995172

Source: Fairfax County Economic Development Authority

Local Quality of Life

Source: http://www.dailymail.co.uk/news/article-2545762/Kevin-Mullins-photograph-Tokyos-skyline-Sky-Tree-Tower-earns-landscape-photographer-year.html

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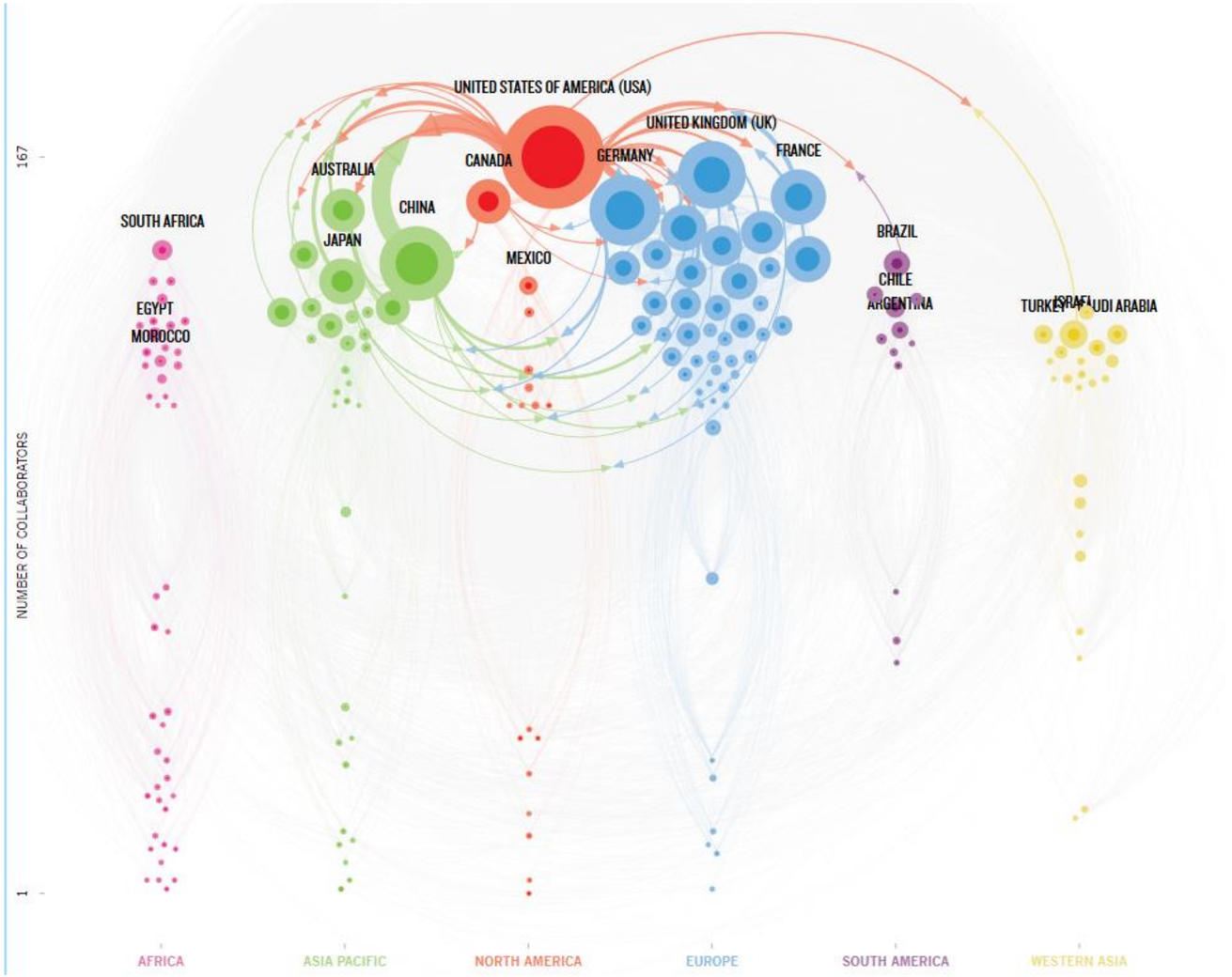

Global Research Collaborations – Nature Index

Source: https://www.natureindex.com/country-outputs/collaboration-graph

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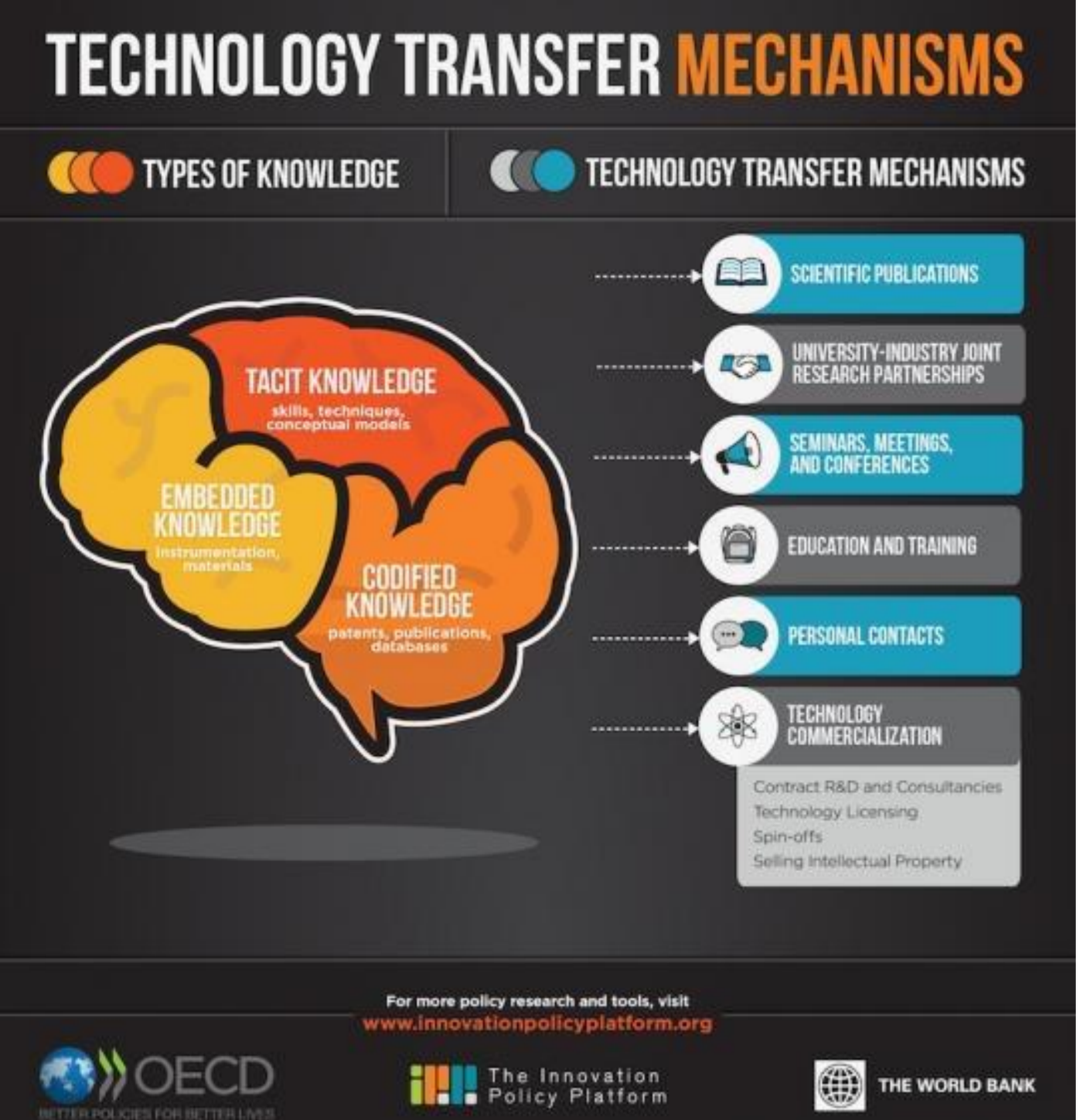

Policies and Processes

Source: OECD Innovation Policy Platform, 2015

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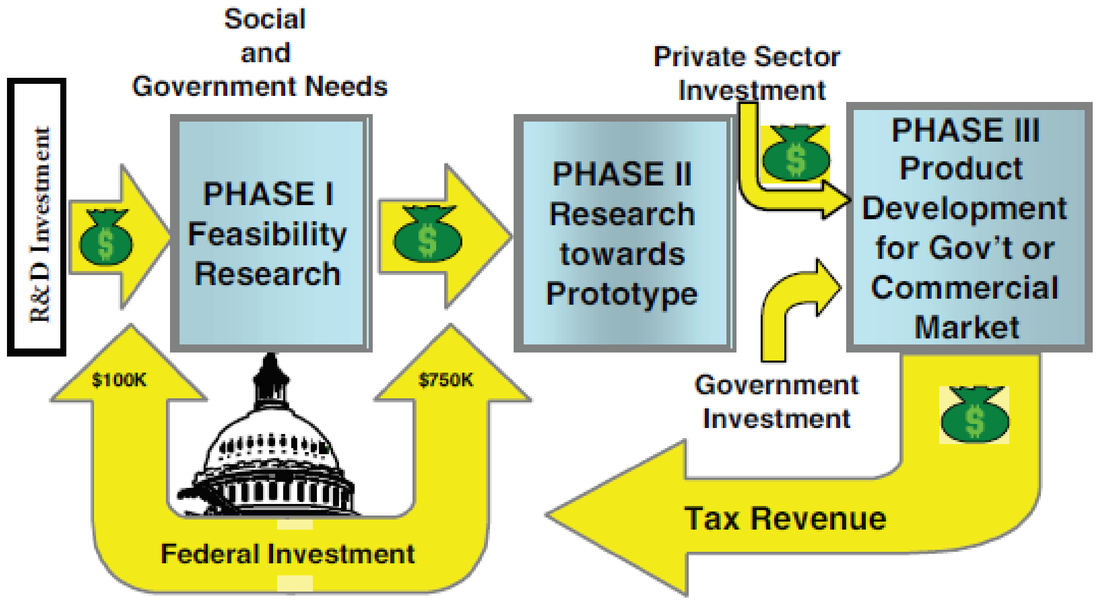
Small Business Innovative Research Program – “America’s Seed Fund”



- 150,000 Awardees
- $42 billion in Funding

genzyme A SANOFI COMPANY

Google

QUALCOMM

Symantec

iRobot

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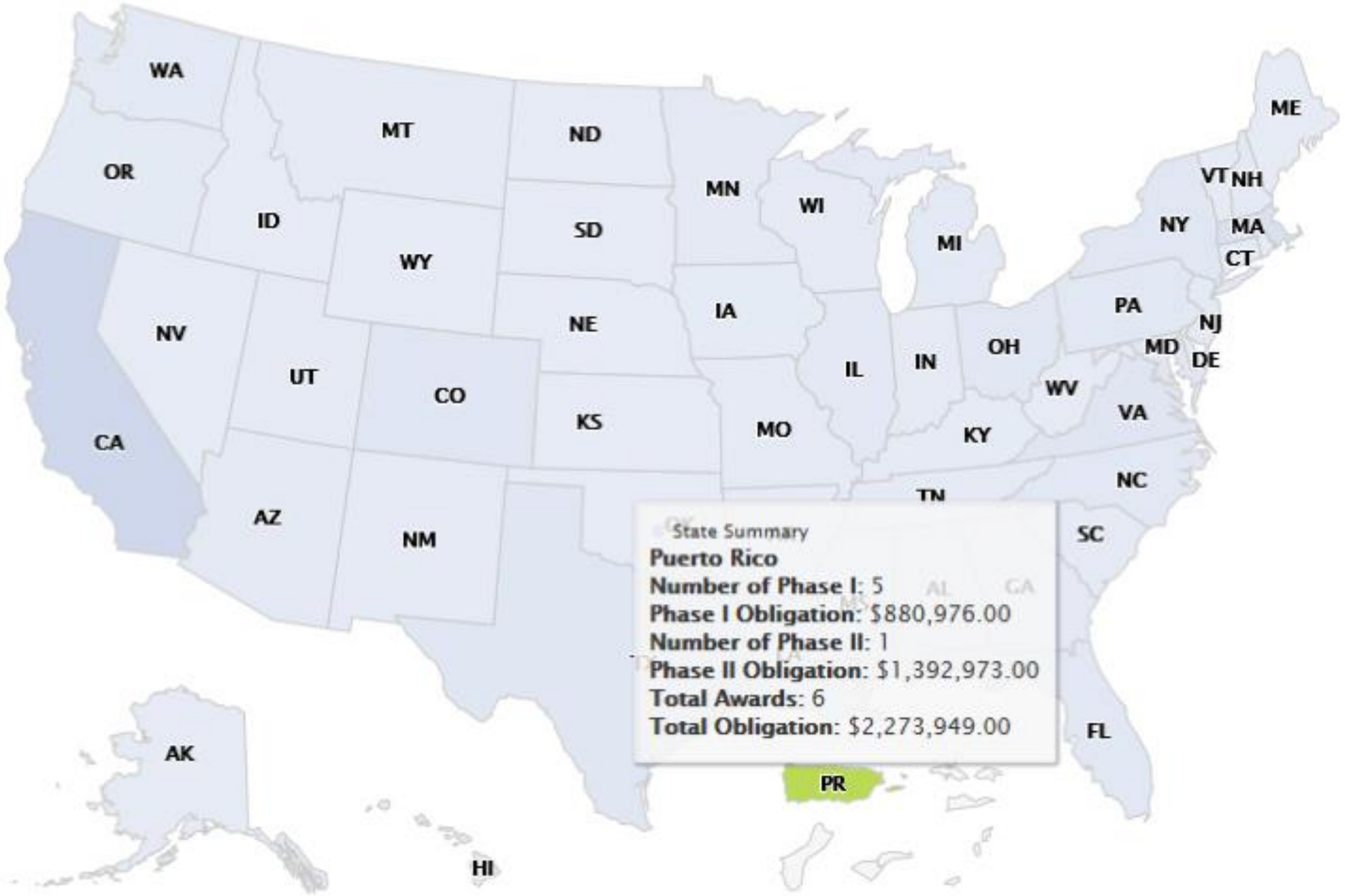

Puerto Rico SBIRs 2019

Source: https://www.sbir.gov/reports/state-summary?year%5B%5D=2019

Defense Advance Research Projects Agency (DARPA)

- ARPNET
- First Weather Satellite
- Stealth Technology
- First Computer Mouse
- GPS
- Rare Earth Magnets
- Head Mounted Displays
- High Productivity Computers
- Quantum Key Distribution Network

Source: http://www.bostondynamics.com/robot_bigdog.html

	PRACTICAL USE? NO	PRACTICAL USE? YES
QUEST FOR FUNDAMENTAL UNDERSTANDING? YES	PURE BASIC RESEARCH BOHR	USE-INSPIRED BASIC RESEARCH PASTEUR
QUEST FOR FUNDAMENTAL UNDERSTANDING? NO	UNNAMED	PURE APPLIED RESEARCH EDISON

arpa-history-and-timeline?PP=4Source: https://hbr.org/2013/10/special-forces-innovation-how-darpa-attacks-problems

Source: http://www.darpa.mil/about-us/darpa-history-and-timeline?PP=4

Arecibo Observatory

On November 6, 1959, Cornell University signed a contract with ARPA to conduct development studies for a large-scale ionospheric radar probe and how such an instrument might also serve in radioastronomy and other scientific fields. Four years later, on November 1, 1963, an inauguration ceremony was held in Arecibo, Puerto Rico, for the Arecibo Ionospheric Observatory, later to be known more generally as the Arecibo Observatory.

Its telescope "dish"—the largest in the world until 2016 with the completion in China of the FAST dish telescope—is 1,000 feet (305 meters) in diameter, 167 feet (51 meters) deep, and covers an area of approximately 20 acres (0.08 square kilometers). Development of the Arecibo facility was initially supported as part of the DEFENDER program, a broad-based missile defense program. The observatory was designed to study the structure of the upper ionosphere and its interactions with electromagnetic communications signals.