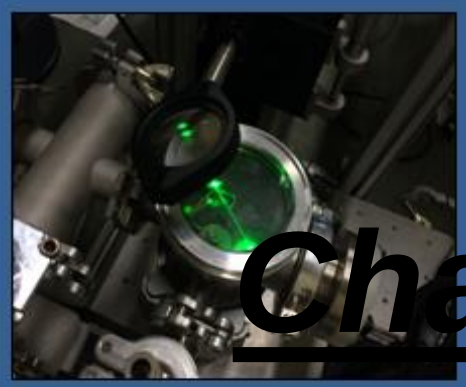
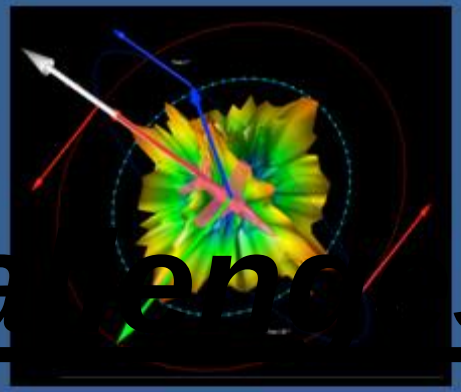
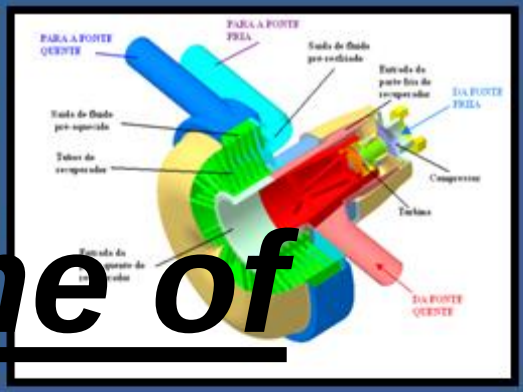
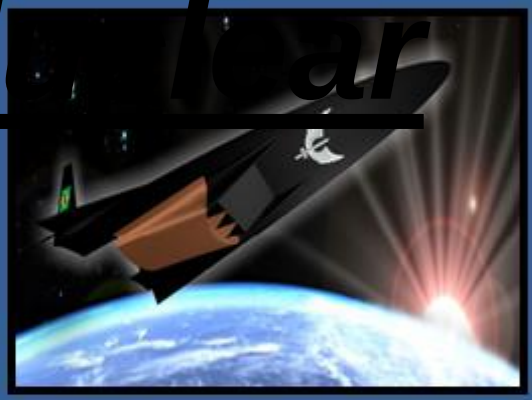
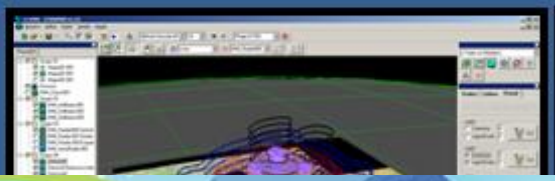



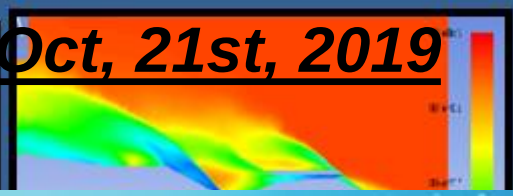


Challenges in time of crisis: Managing Nuclear Researches







Oct, 21st, 2019

Generating Power Assymetry

Mission of IEAv

Expand scientific knowledge and the dominion of strategic technologies to strengthen the Brazilian Aerospace Power

Instituto de Estudos Avançados – IEAv

O futuro da Tecnologia Aeroespacial começa aqui

Space

Hypersonic

IEAv

Nuclear

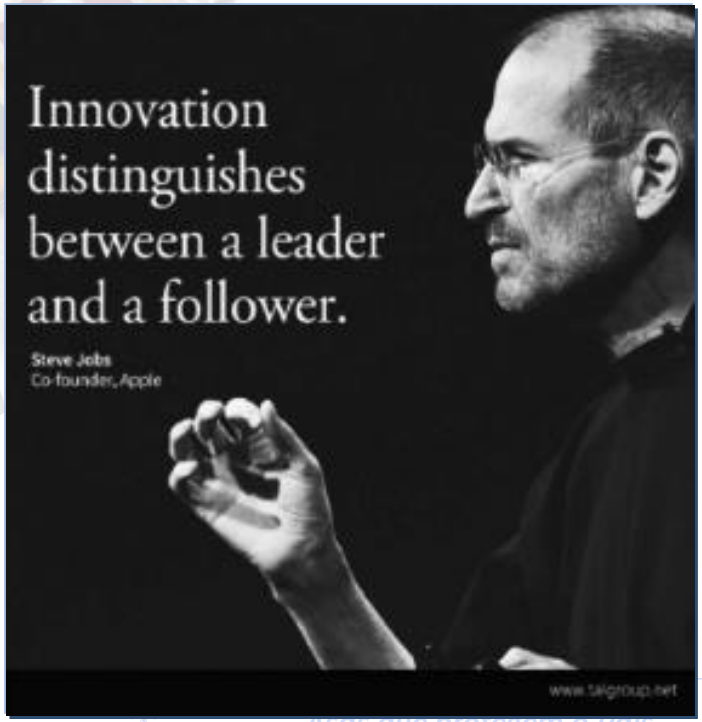
Cyber

What's our deal???

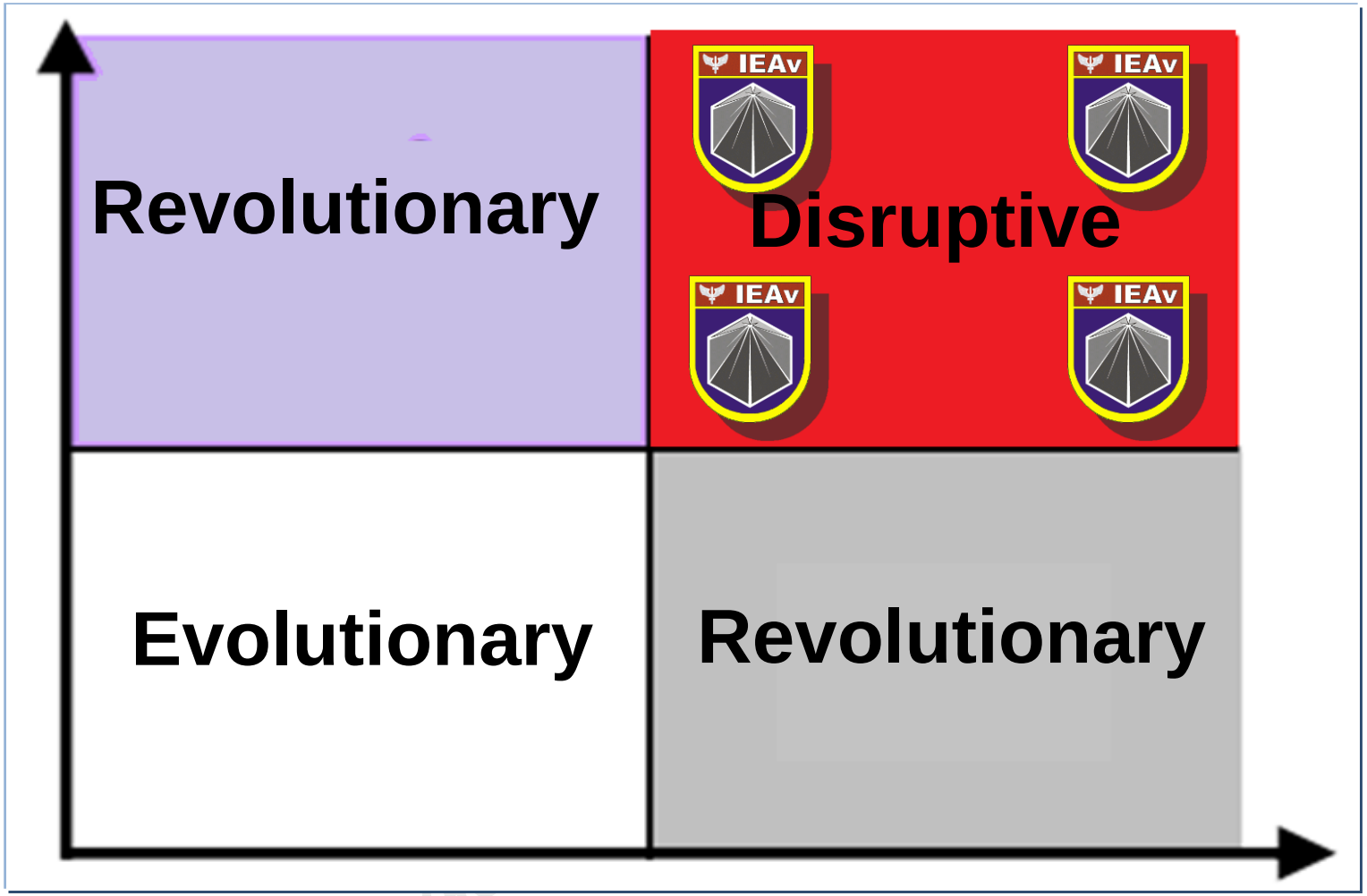
Science, Technology and Innovation!!!

*"Innovation is the only **guarantee against irrelevance.***
*It's the only way to **built long-term customer loyalty**.*
*It's the only strategy to **overcome a tough economy**"*

(Gary Hamel, Forbes 2012)



Types of Technology Innovation



What's the World reference??


Office of
NUCLEAR ENERGY
About Us
REACTOR TECHNOLOGIES
INITIATIVES
INFORMATION RESOURCES
Office of Nuclear Energy
Energy Department Invests Nearly $50 Million at National Laboratories and Universities to Advance Nuclear Technology
JUNE 27, 2019

Nuclear Energy University Program (NEUP)

DOE is awarding more than $28.5 million through its Nuclear Energy University Program (NEUP) to support 40 university-led nuclear energy research and development projects in 23 states. NEUP seeks to maintain U.S. leadership in nuclear research across the country by providing top science and engineering faculty and their students with opportunities to develop innovative technologies and solutions for civil nuclear capabilities.

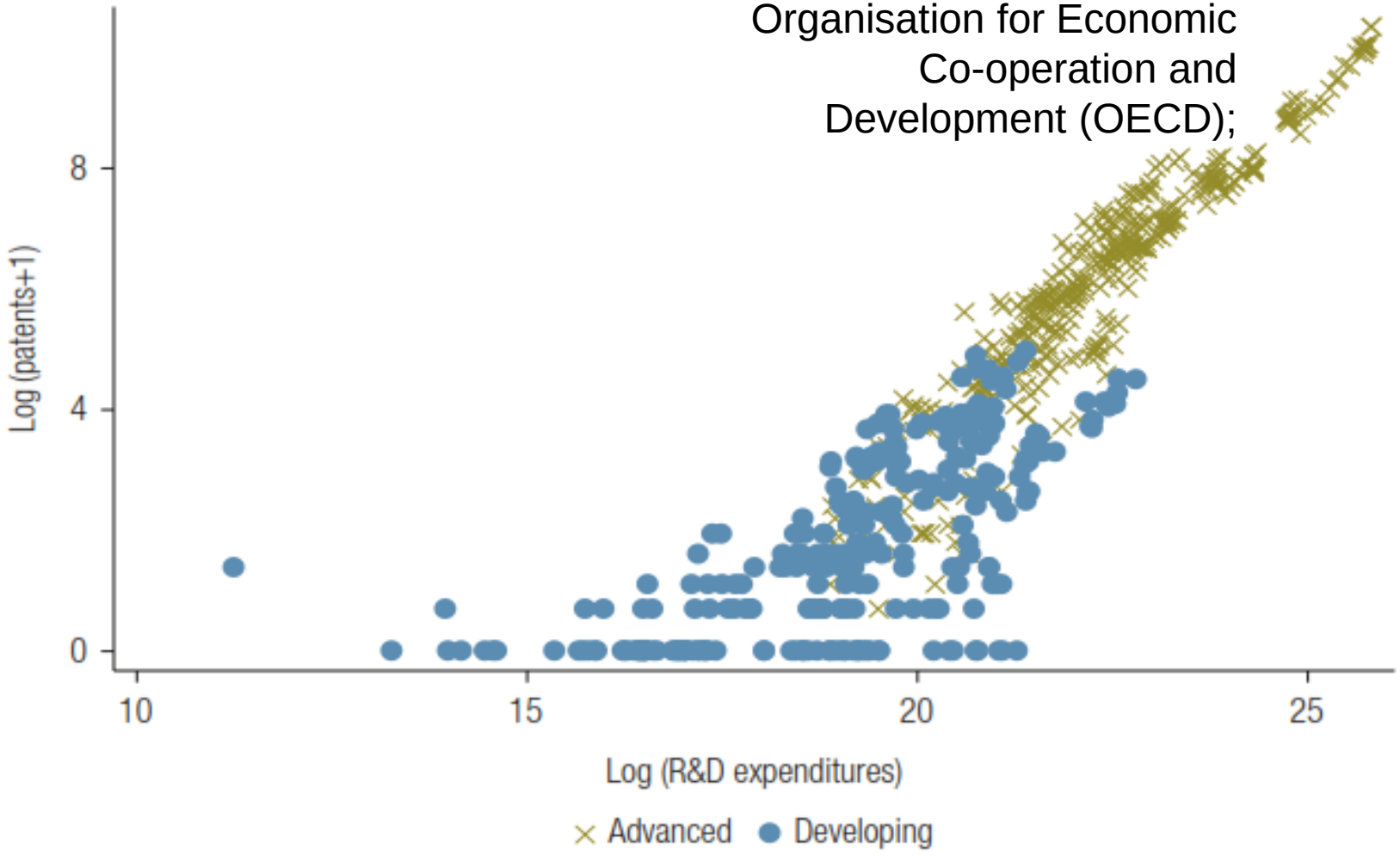
Crosscutting Research Projects

Five research and development projects led by DOE national laboratories and U.S. universities will receive $4.5 million in funding. Together, they will conduct research to address crosscutting nuclear energy challenges that will help to develop advanced sensors and instrumentation, advanced manufacturing methods, and materials for multiple nuclear reactor plant and fuel applications.

Investments are enough??

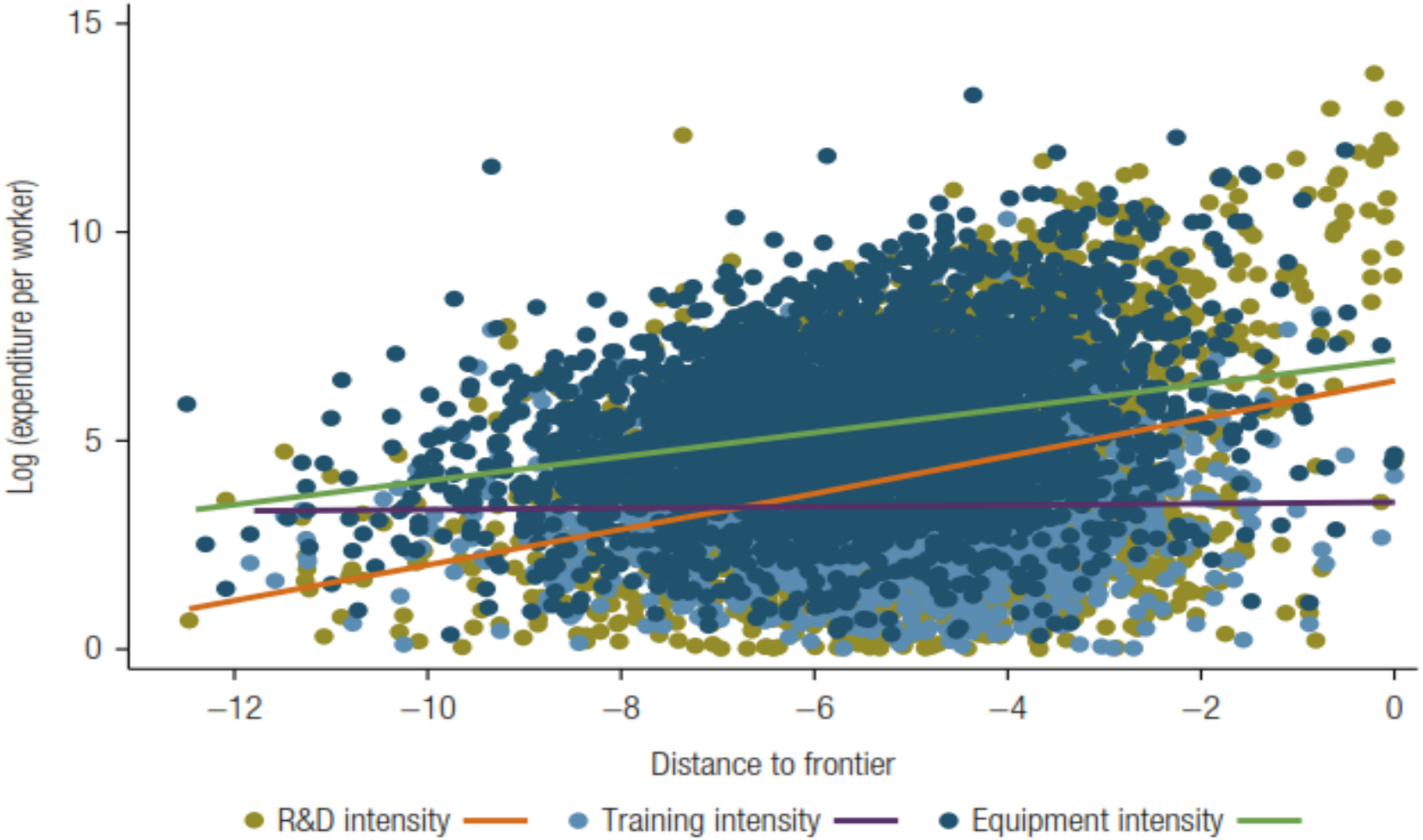
FIGURE 2.6 **Patents and R&D Expenditures Are Closely Related and Rise with Income**

Organisation for Economic Co-operation and Development (OECD);



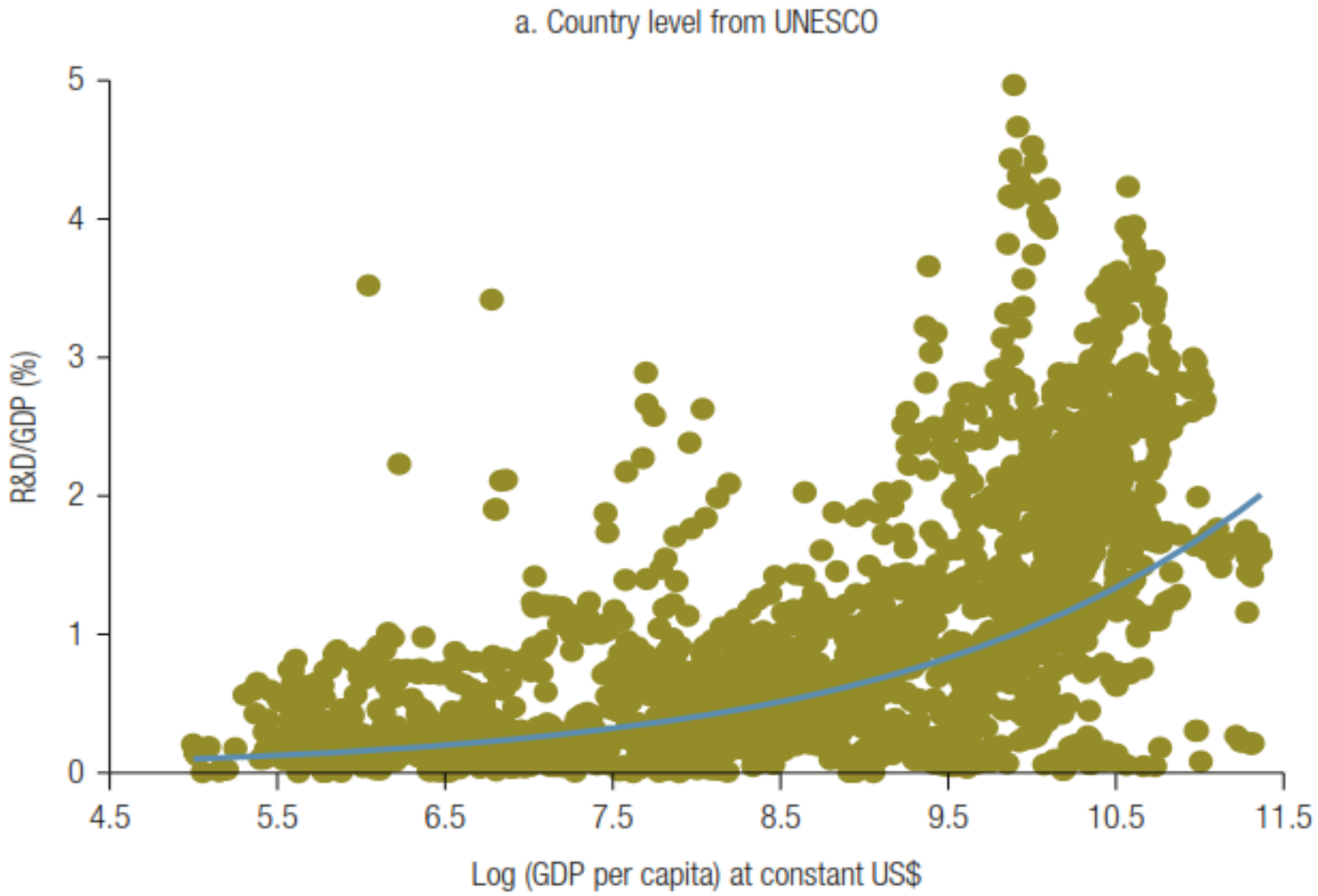
Source: Bosch, Lederman, and Maloney 2005.

FIGURE 2.11 **Like R&D, Expenditures on Equipment and Training Are Higher in Firms Closer to the Frontier**



Source: Elaboration using Enterprise Survey data (www.enterprisesurveys.org).

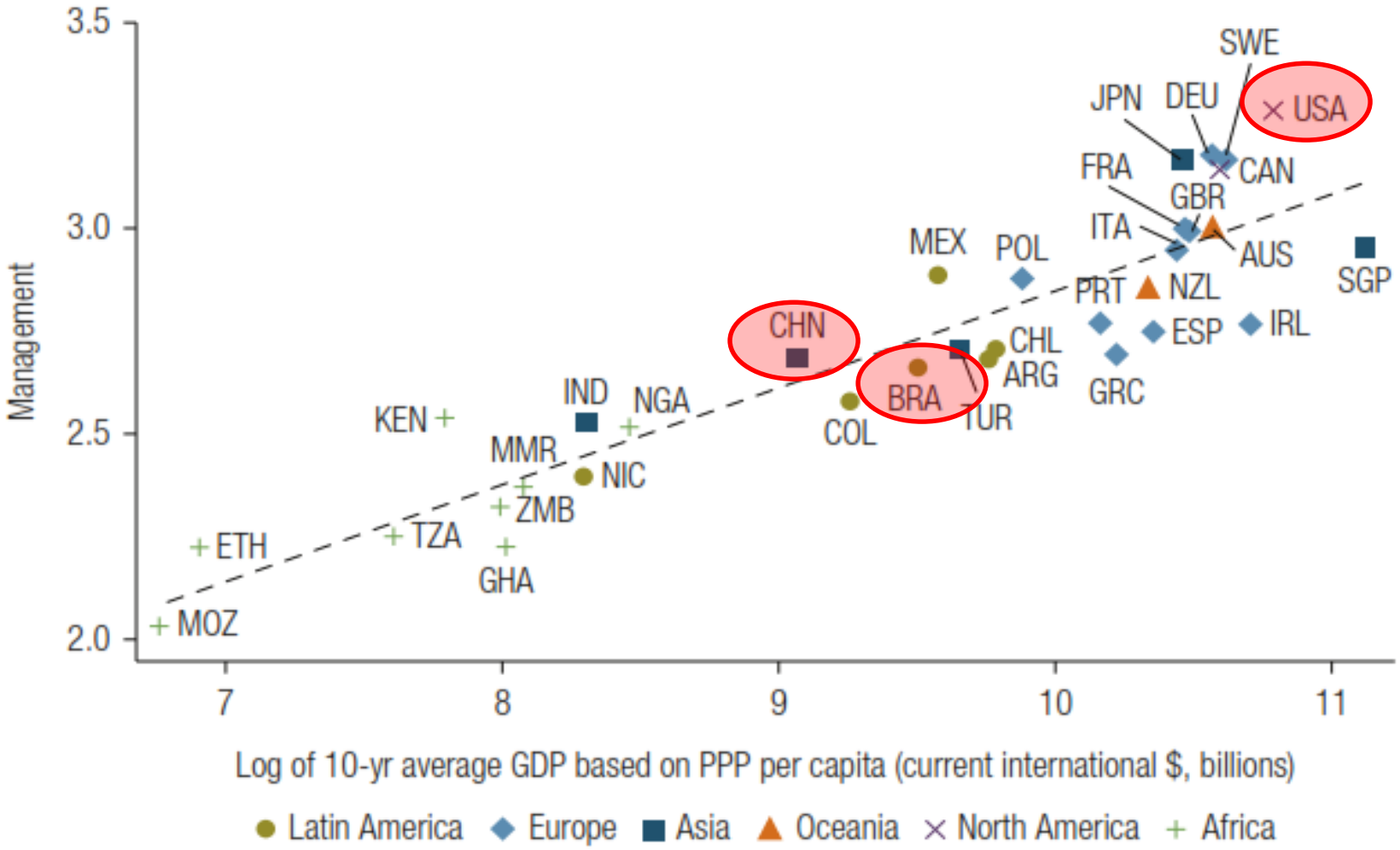
FIGURE 2.7 R&D Intensity Rises with Convergence to the Productivity Frontier



Types of Innovation

Organizational	Management	Business Models
Technological	Process	Product
	Focusing on the company	Focusing on the market

FIGURE 2.12 Managerial Practices Are Better in Richer Countries



Source: World Management Survey 2012.

Operate in a new and challenging scenario!!!

Where we need to understand the level and impact!!!

“Overall Management”

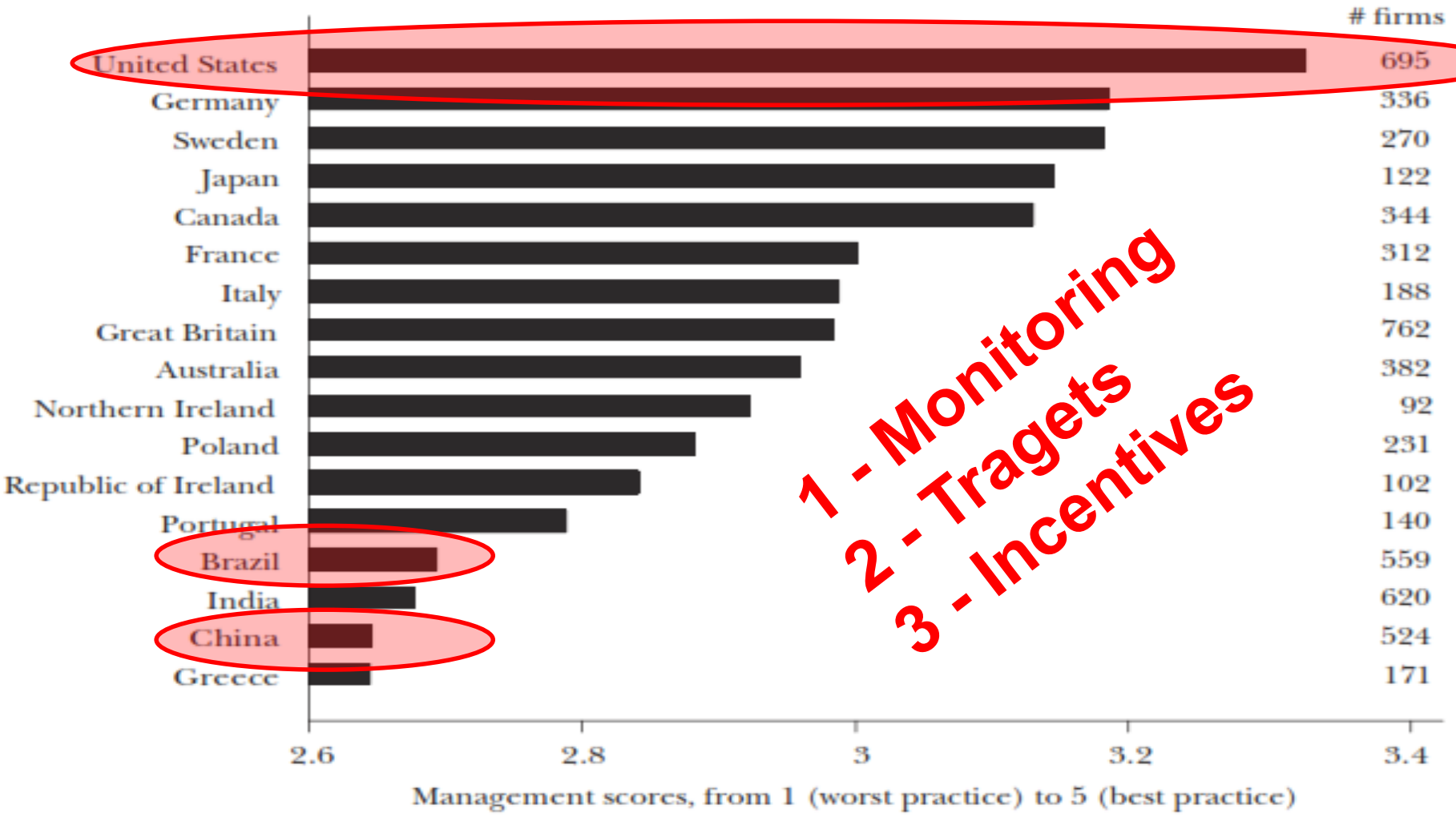
- 18 questions
- Monitoring
  1 – 6
- Targets management
  8 - 12
- Incentives
  7, 13 - 18
- 6.000 companies
- 17 countries
- All continents
- Values from 1 to 5

Management Practice Scores by Country

Country	*Overall management*	*Monitoring management*	*Targets management*	*Incentives management*	*# of firms in the sample*
Australia	2.99	3.27	2.96	2.76	382
Brazil	2.69	2.81	2.68	2.60	559
Canada	3.13	3.35	3.02	3.02	344
China	**2.64**	2.72	**2.53**	2.66	524
France	3.00	3.28	2.98	2.78	312
Germany	3.18	3.40	**3.24**	2.95	336
Great Britain	2.98	3.16	2.93	2.88	762
Greece	2.65	2.90	2.56	**2.50**	171
India	2.65	**2.62**	2.66	2.67	620
Italy	2.99	2.98	2.80	2.73	194
Japan	3.15	3.20	3.25	2.90	188
Northern Ireland	2.91	3.01	2.84	2.86	92
Poland	2.88	2.88	2.93	2.85	231
Portugal	2.79	3.07	2.72	2.61	140
Republic of Ireland	2.84	2.95	2.76	2.81	102
Sweden	3.18	**3.54**	3.22	2.86	270
United States	**3.33**	3.44	3.23	**3.30**	695
Average	*2.94*	*3.09*	*2.91*	*2.84*	*344*

Notes: "**Overall management**" is the average score in across all 18 questions. "**Monitoring management**" is the average score across questions 1 to 6 in Table 1. "**Targets management**" is the average score across questions 8 to 12. "**Incentives management**" is the average score across questions 7 and 13 to 18. The lowest and highest country-level scores in each column are highlighted in bold.

Management Scores across Countries

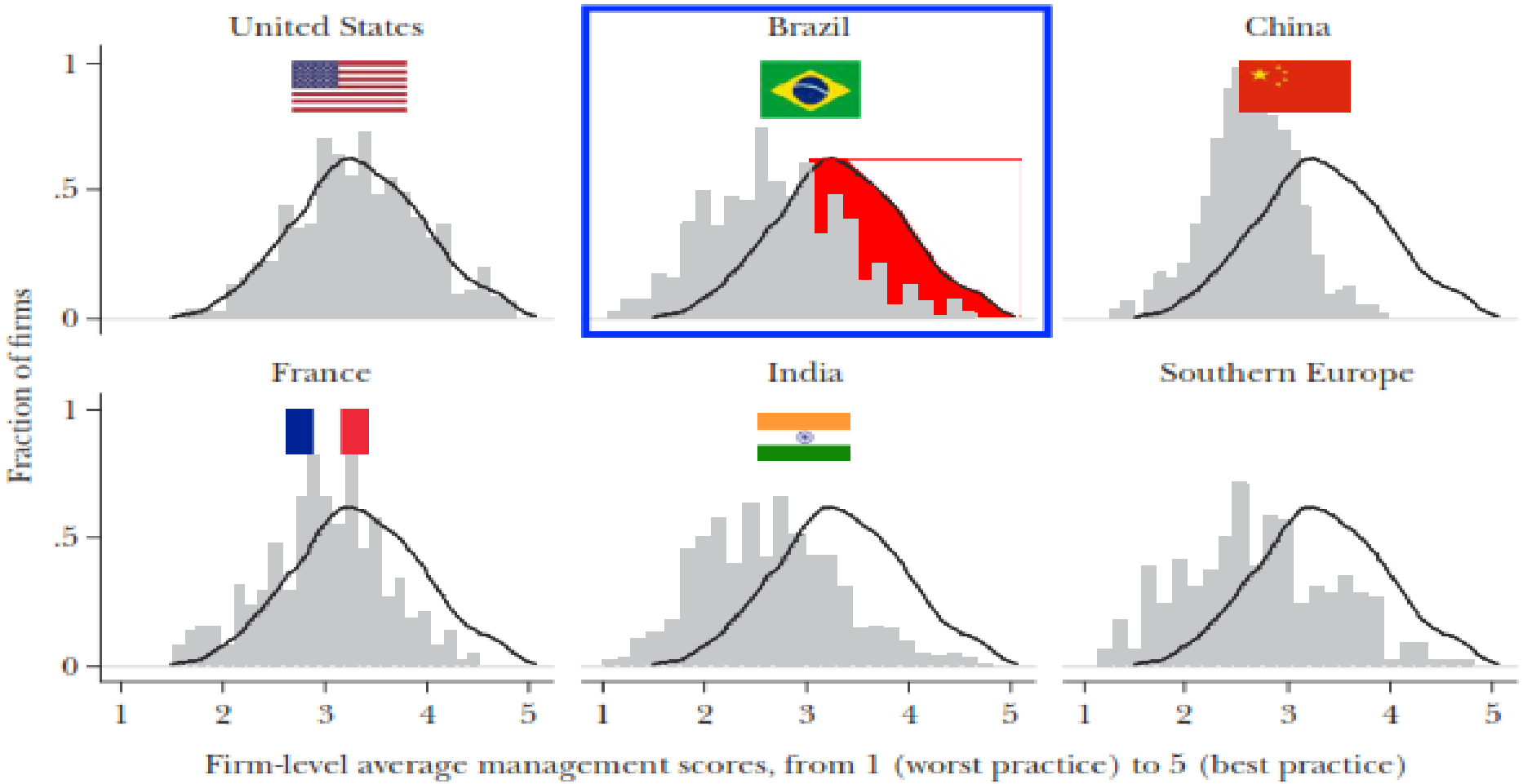


Source: Bloom, Genakos, Sadun, and Van Reenen (2009).
Notes: Averages are taken across all firms within each country. There are 5,850 observations in total. Firms per country are in the right column.

Normalizing the results

Figure 2

Management Practice Scores across Firms



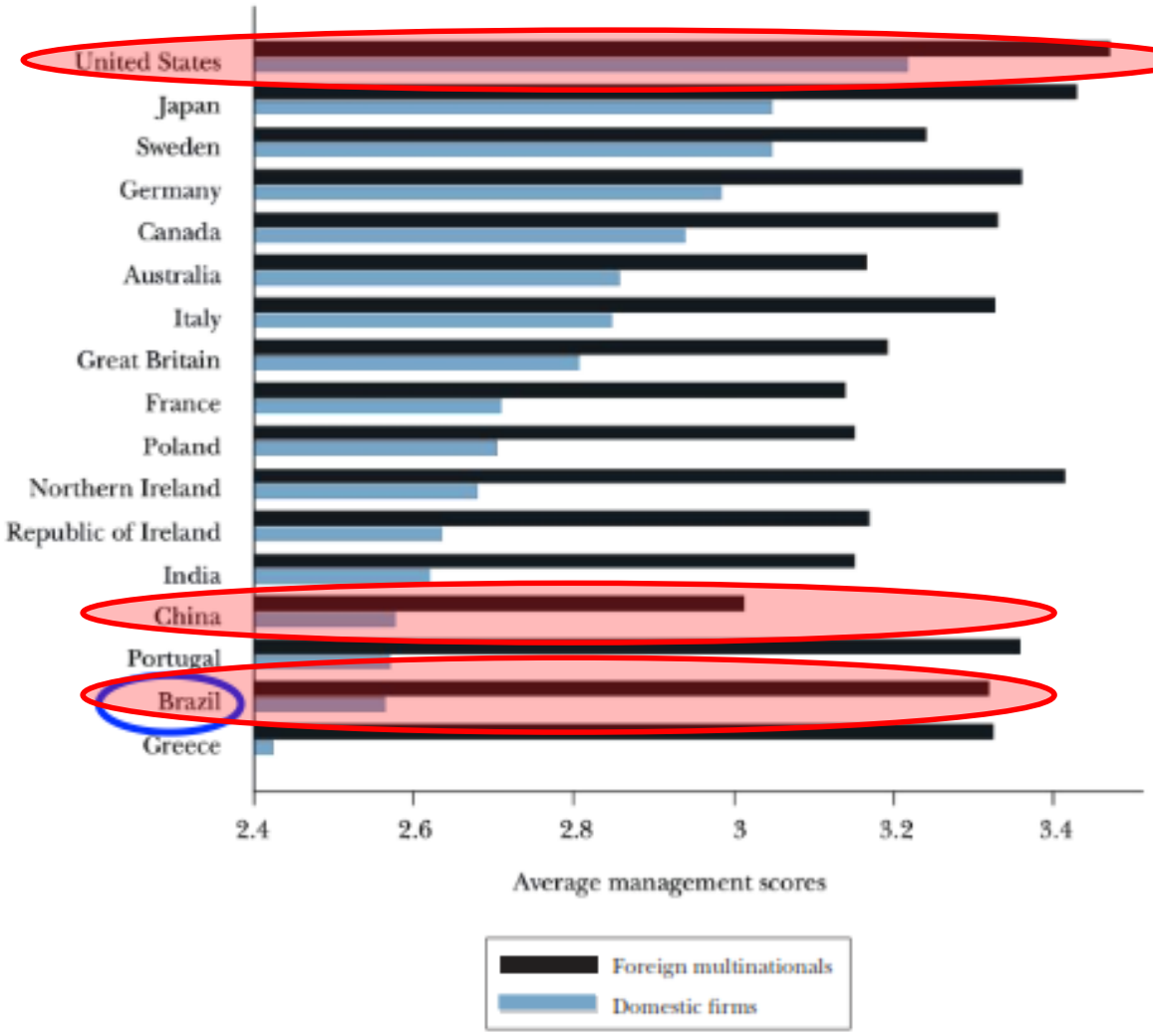
Source: Bloom, Genakos, Sadun, and Van Reenen (2009).

Notes: Bars are the histogram of the actual density. The line is the smoothed (kernel) of the U.S. density for comparison. Southern Europe combines Greece and Portugal.

Multinational X Domestic

Figure 5

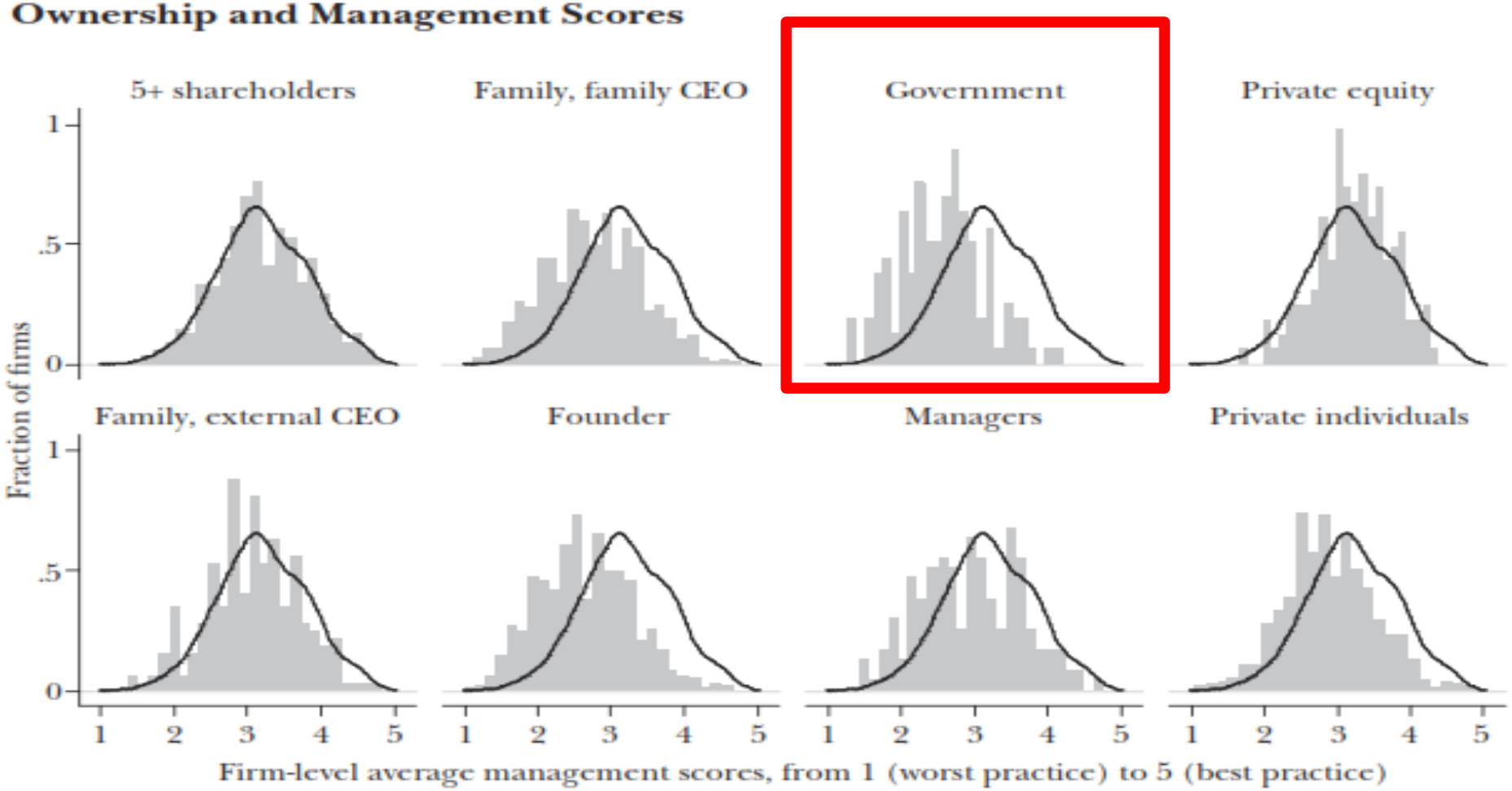
Multinationals Are Well Managed in All Countries



Source: Bloom, Genakos, Sadun, and Van Reenen (2009).

Figure 4

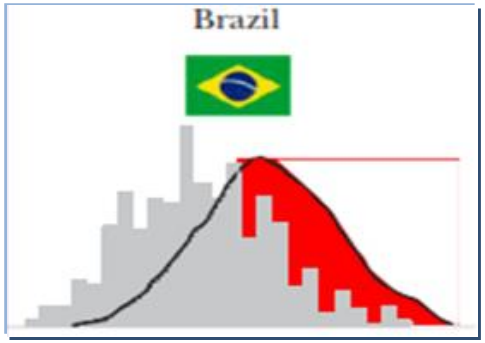
Ownership and Management Scores

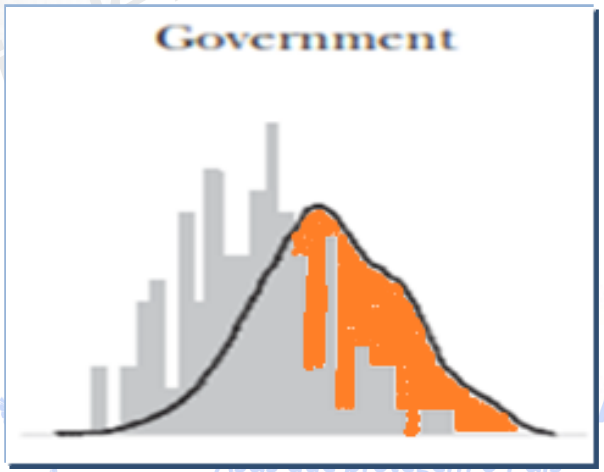


Source: Bloom, Genakos, Sadun, and Van Reenen (2009).

Notes: Graphs show the distribution of firm management scores for firms with different types of management. The overlaid line is the kernel density for dispersed shareholders, the most common U.S. ownership type.

What can be expected from our Organizations??



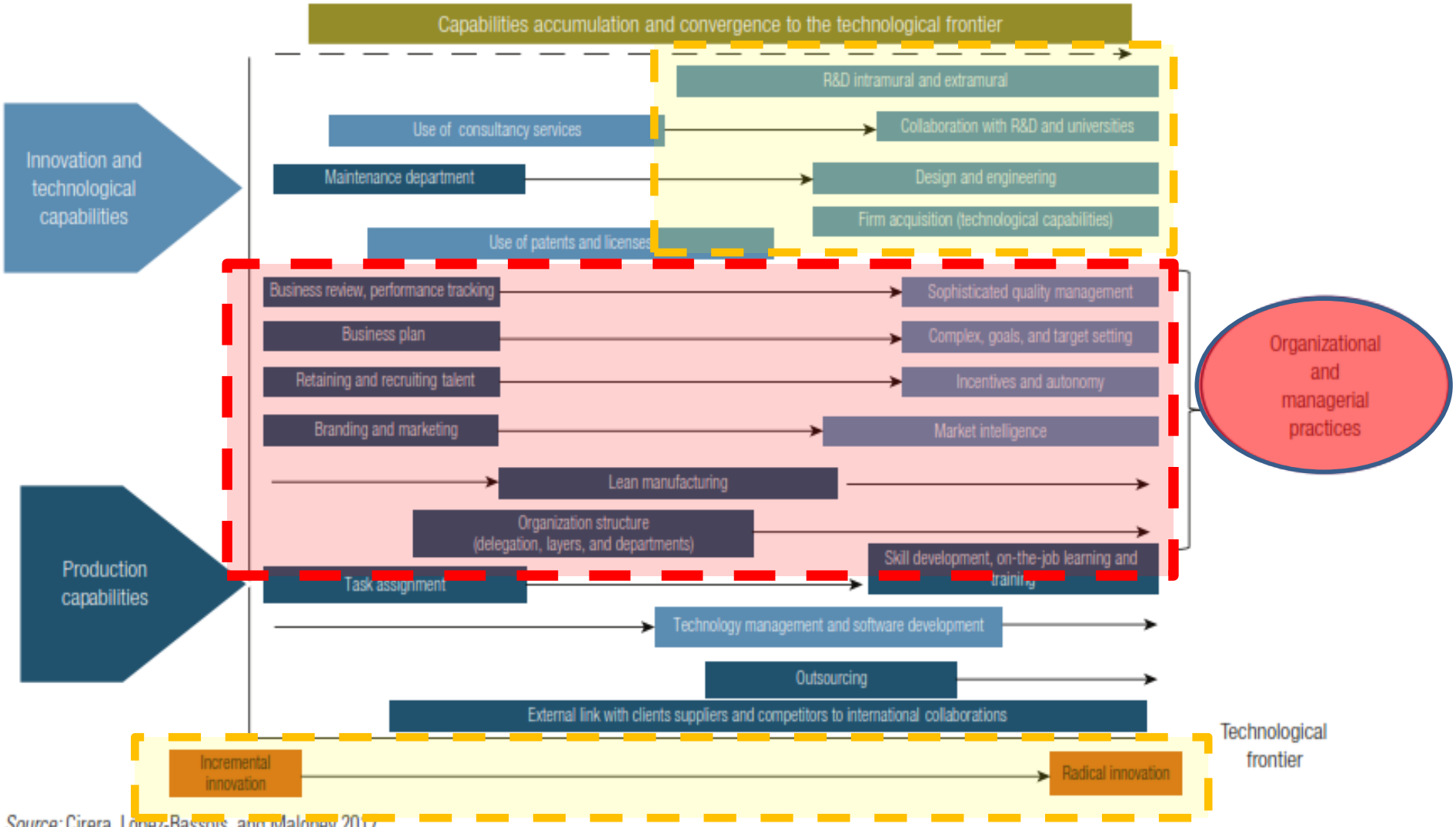


Lots of possibilities for improvements!!

And if we consider Innovation??

It's far worst!!!

FIGURE 4.1 Firm Capabilities for Innovation



Source: Cirera, López-Bassols, and Maloney 2017.

Note: Those capabilities in blue are the ones that are often used intensively for innovation. However, in practice, some can also be used in normal production processes; and, vice versa, production capabilities are also key complementarities in the innovation process. R&D = research and development.

FIGURE 4.2 **The Quality of R&D and of Management Practices Are Highly Correlated**

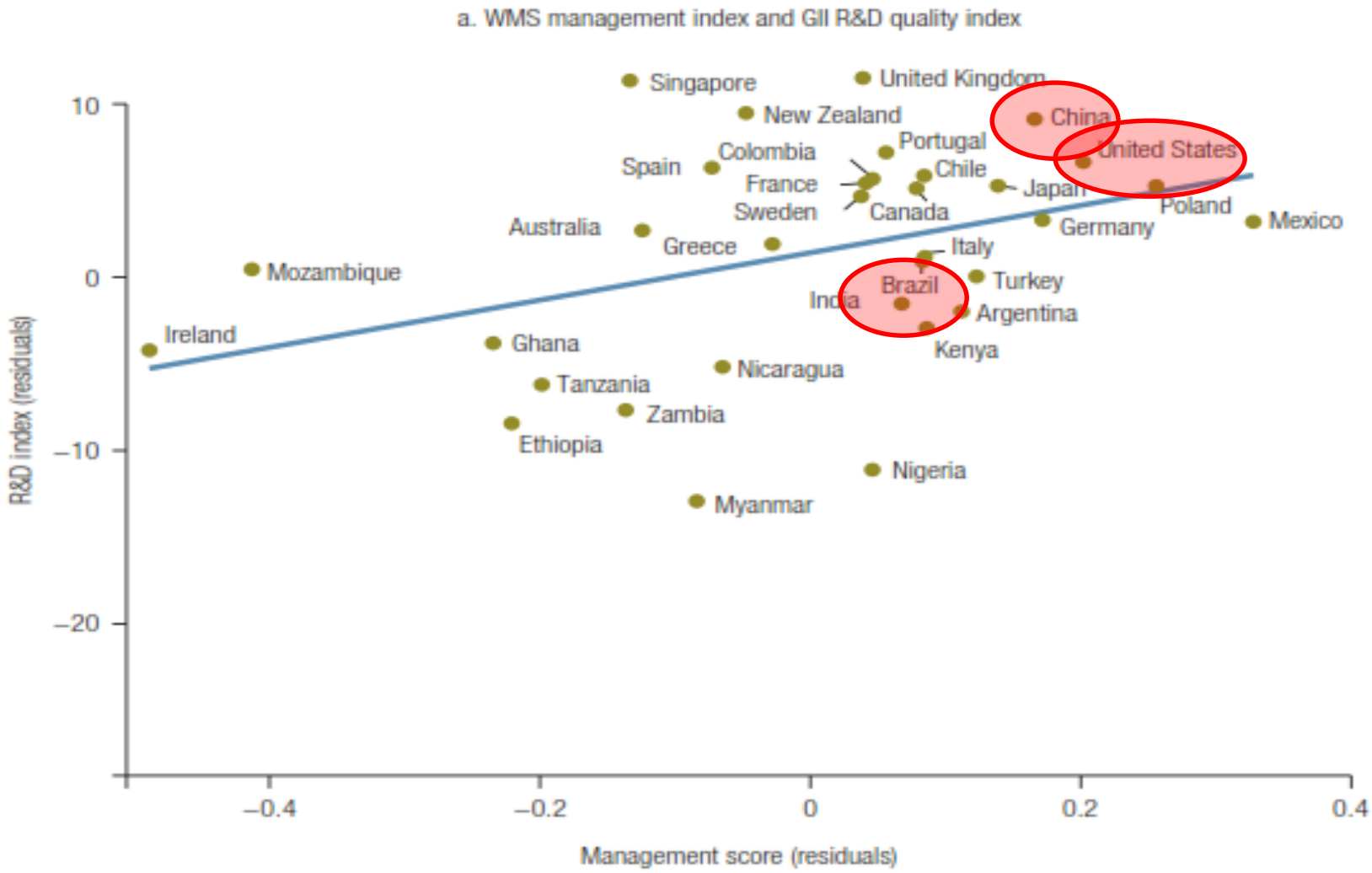
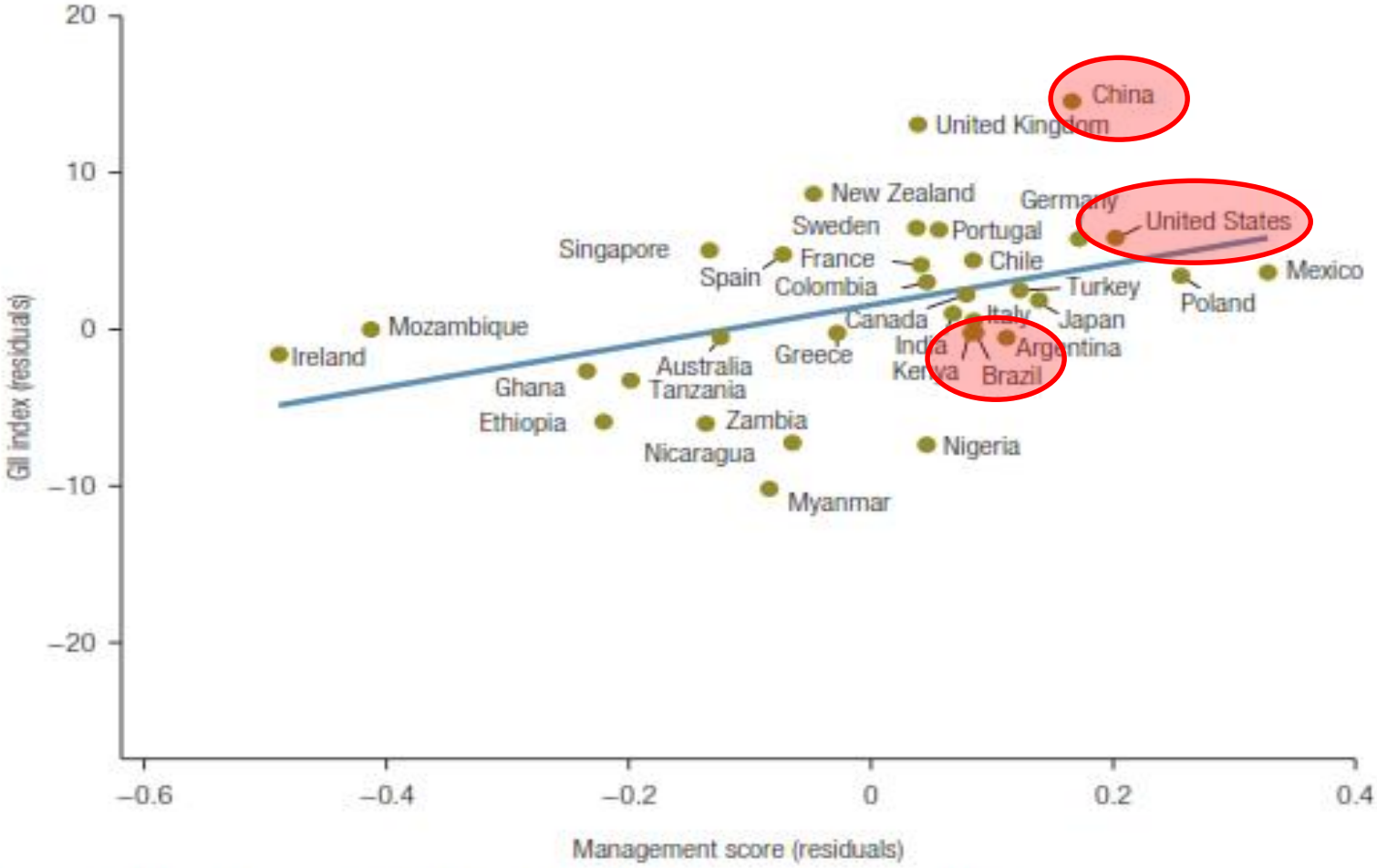


FIGURE 4.3 Innovation Outputs Are Associated with Better Management Practices



Source: Elaboration from Global Innovation Index 2015 and World Management Survey 2015.

Note: The residuals of regressing the Global Innovation Index and management on gross domestic product per capita are plotted to control for the impact of income per capita in driving the correlation.

But...

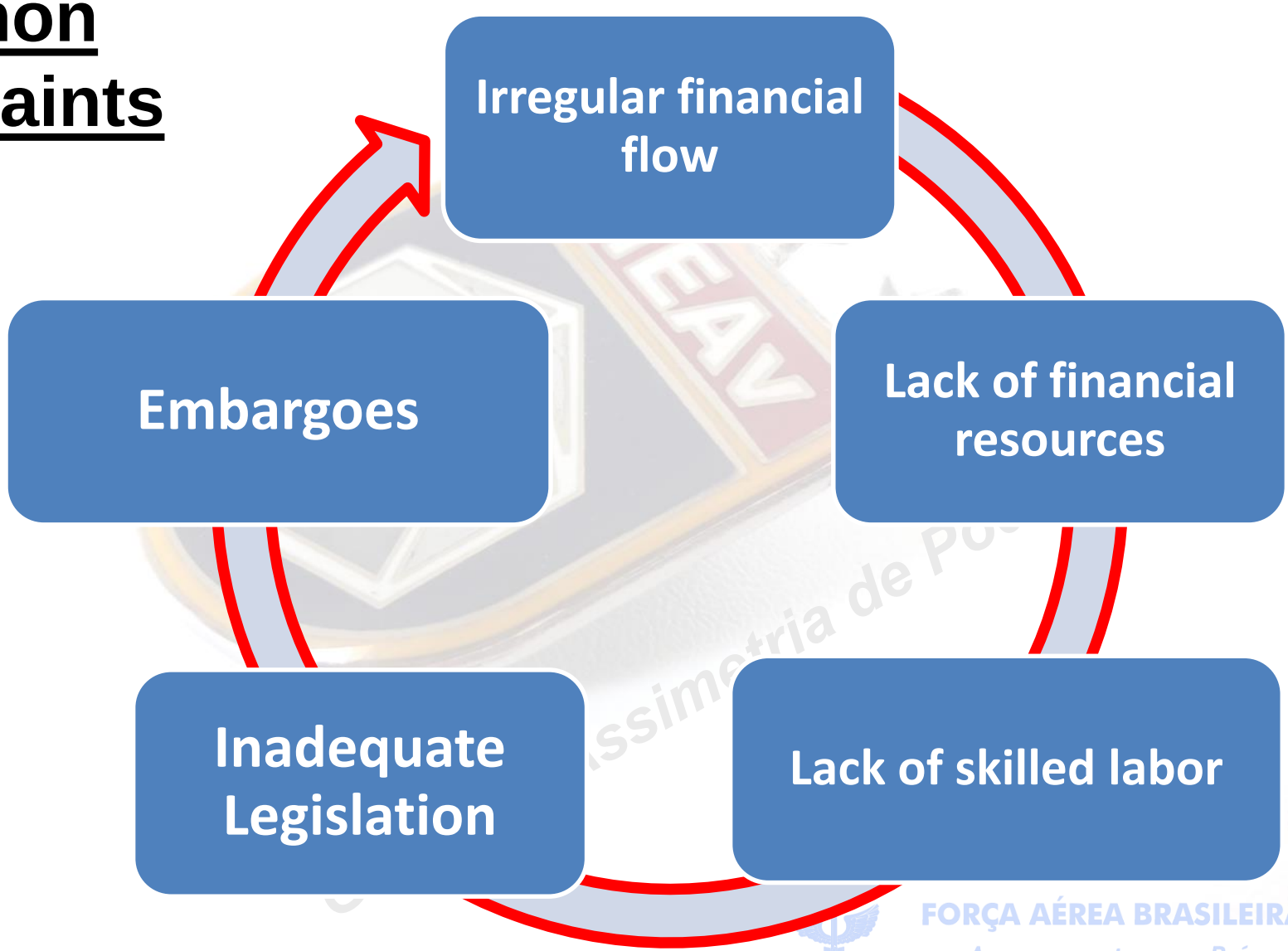
People do not know what "they do not know"!!!"

FIGURE 7.5 **Managers Tend to Overrate Their Abilities (Measured versus Self-Evaluated Management Practices Score)**

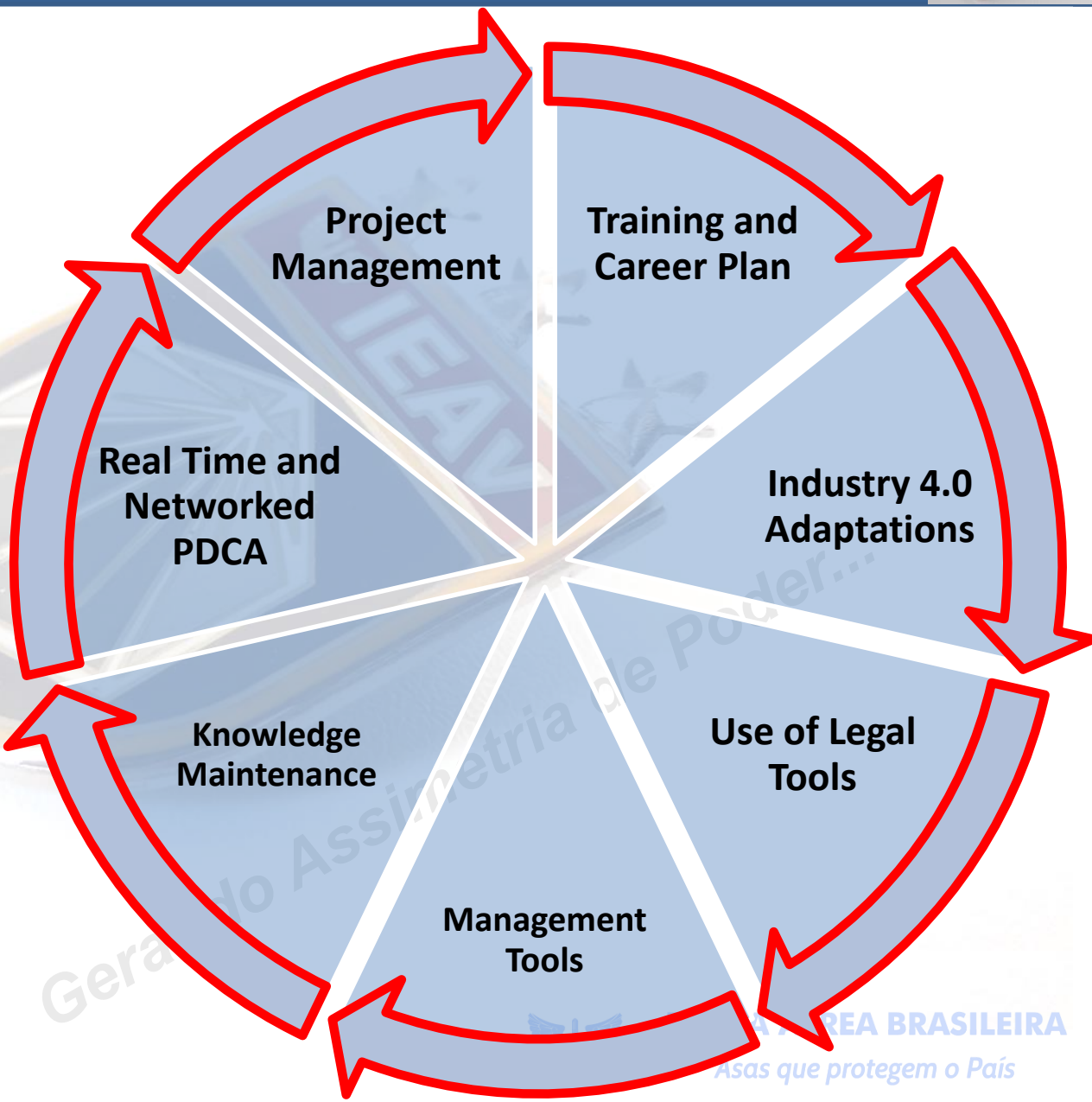
Source: World Management Survey; Bloom and Van Reenen 2007; and Maloney 2017b.

What we need to prepare ouselves for?

Common complaints



Solution Compass



Comprehensive Management

Project management 1.0	***- First Industrial Revolution - Empirical stage***
Project management 2.0	***- Second Industrial Revolution -Gantt Charts***
Project management 3.0	***- Third Industrial Revolution -CPM, PERT, GERT, EVM***
Project management 4.0 (The Fourth Industrial Revolution)	

Digitization, virtualization, transnationalization, professionalization, changing from Waterfall to Agile

Research and innovation framework

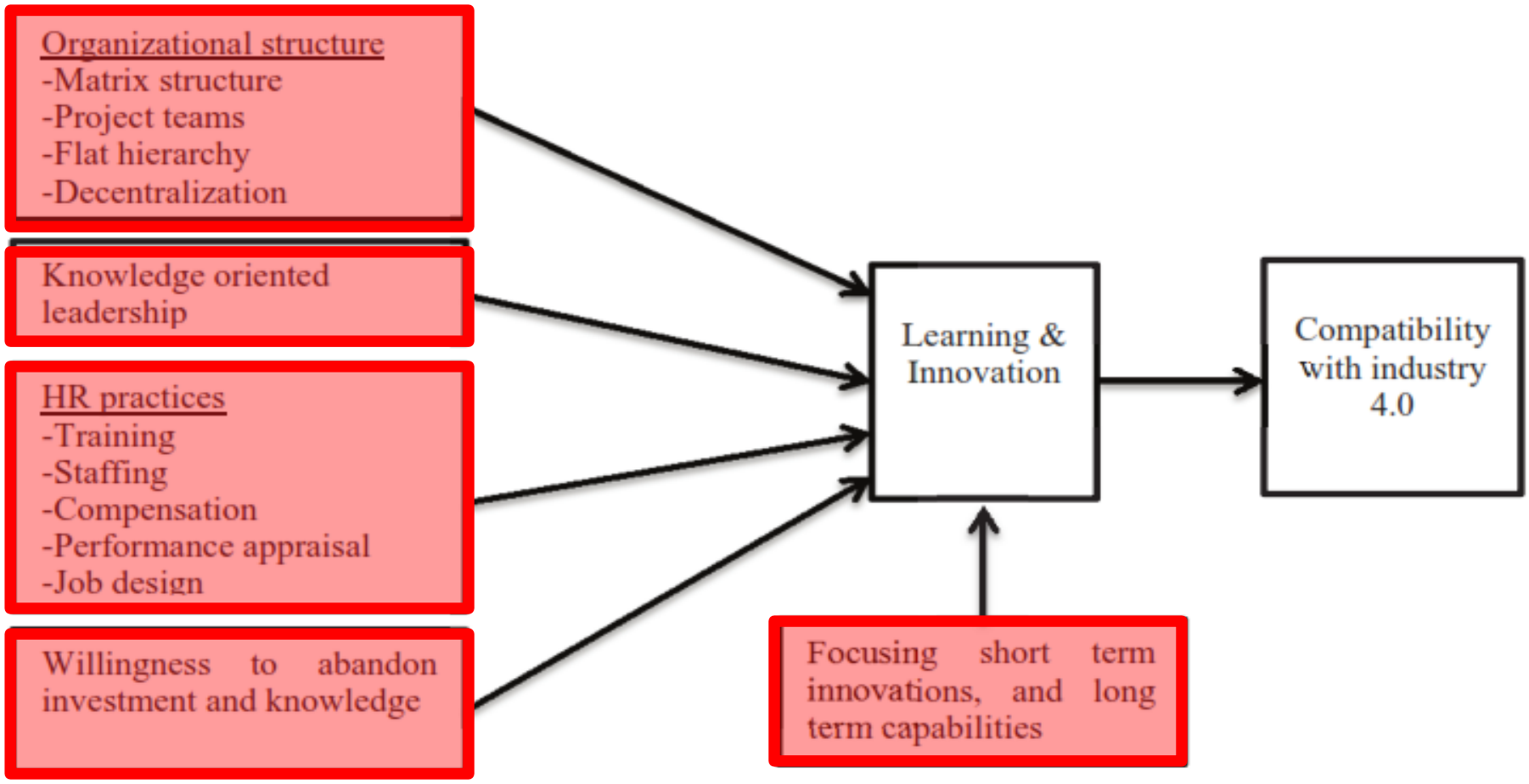


Figure 4 Framework for future research

ENERGY GENERATION

IEAv: Innovative Technologies for Orbit and Deep Space Access

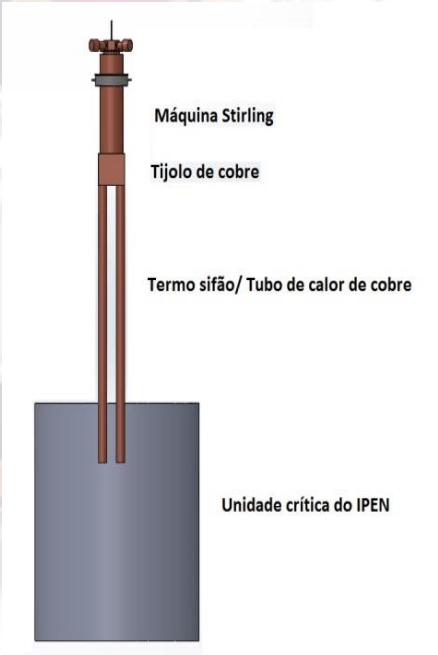
- ✓ Aerothermodynamics and Hypersonics
- ✓ Lasers and their applications
- ✓ Sensors
- ✓ Space Nuclear Applications
- ✓ C4ISR

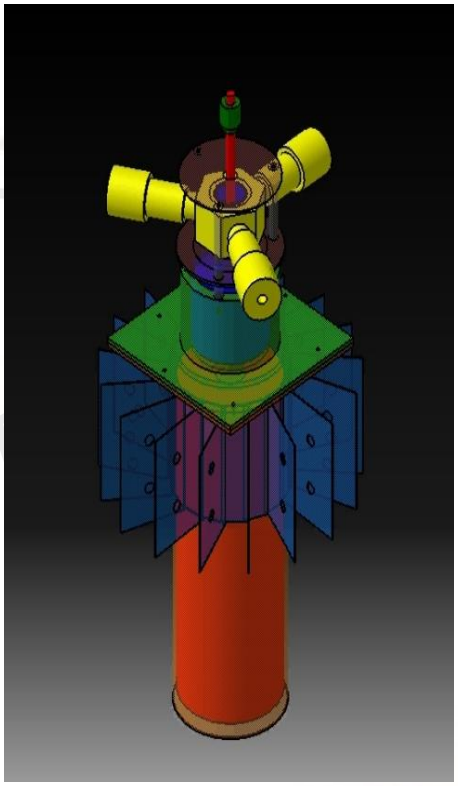
Project TERRA – Technology of Advanced Rapid Reactors

Termo-Electrical Conversor

Heat Pipes

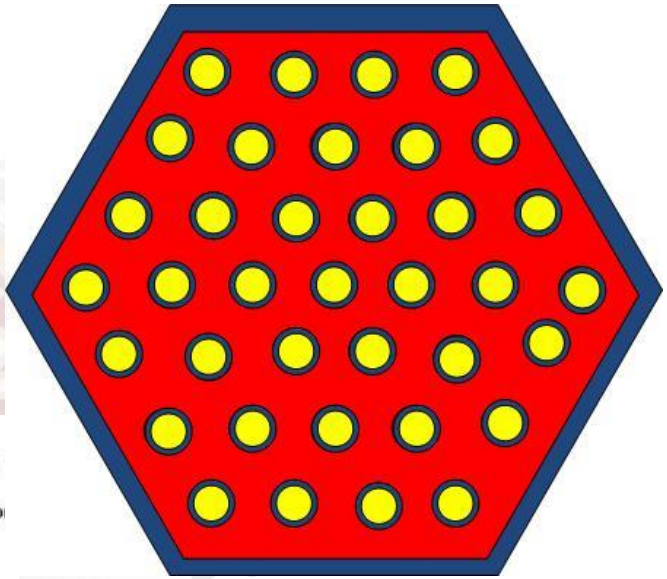
Nuclear Micro Reactor

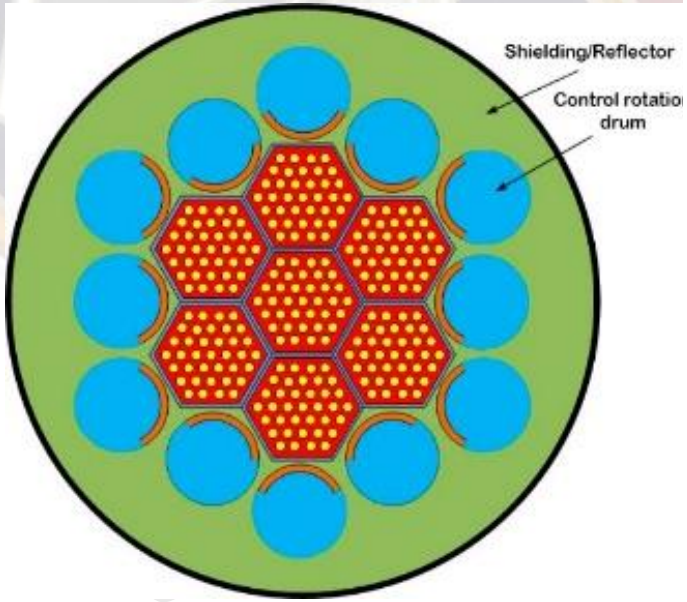




Nuclear Micro Reactor

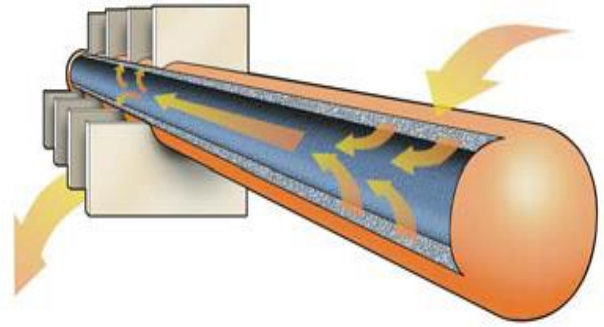
- Termo-Electrical Conversor
- Heat Pipes
- Nuclear Micro Reactor

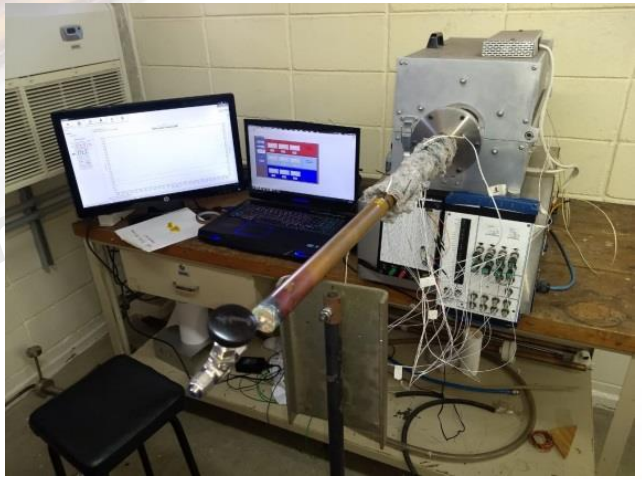




Heat Pipes

- Termo-Electrical Conversor
- Heat Pipes
- Nuclear Micro Reactor

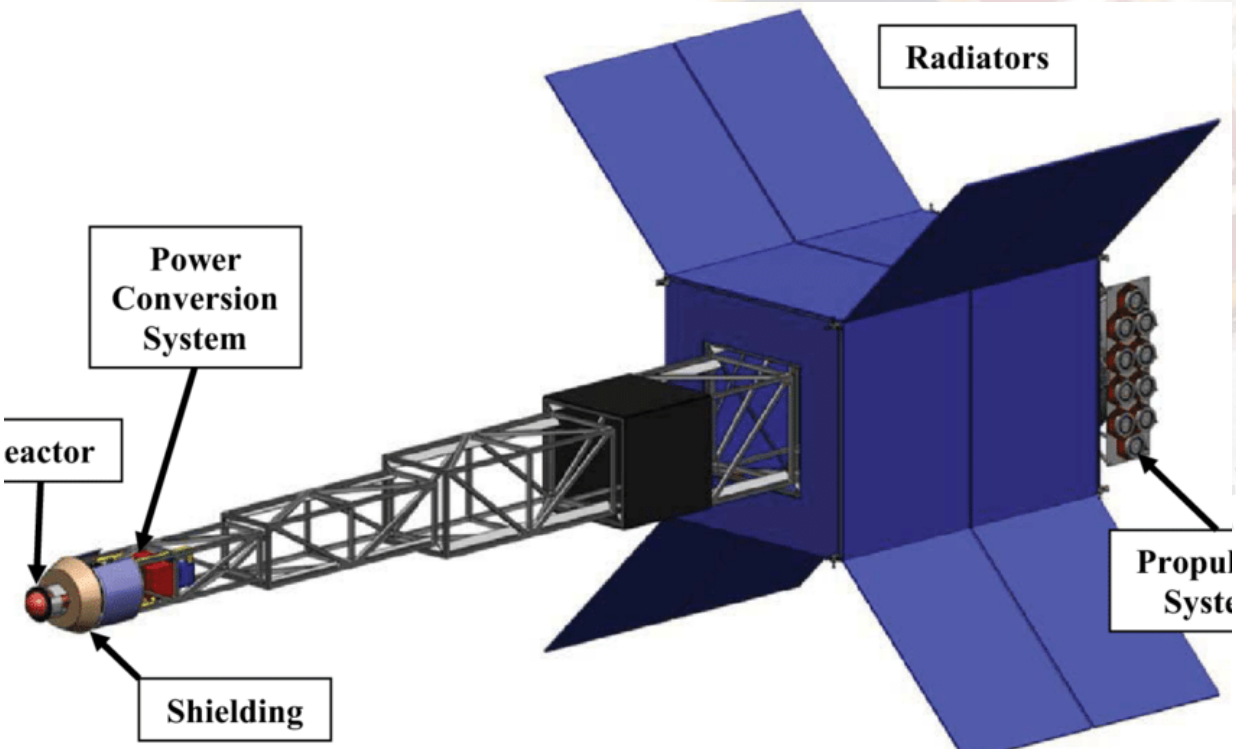


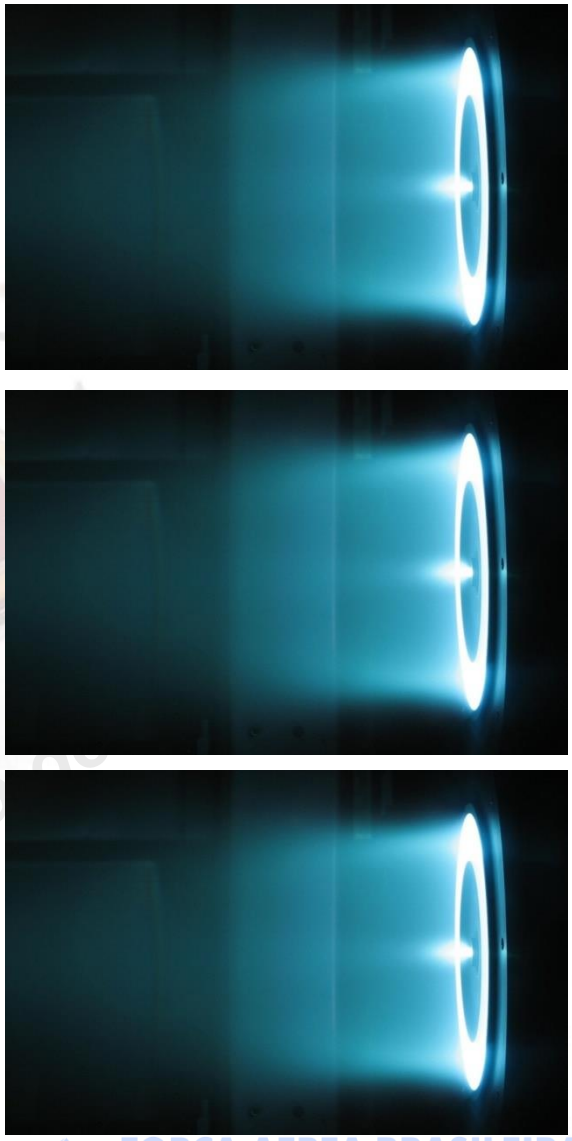


Stirling Machines

- Termo-Electrical Conversor
- Heat Pipes
- Nuclear Micro Reactor

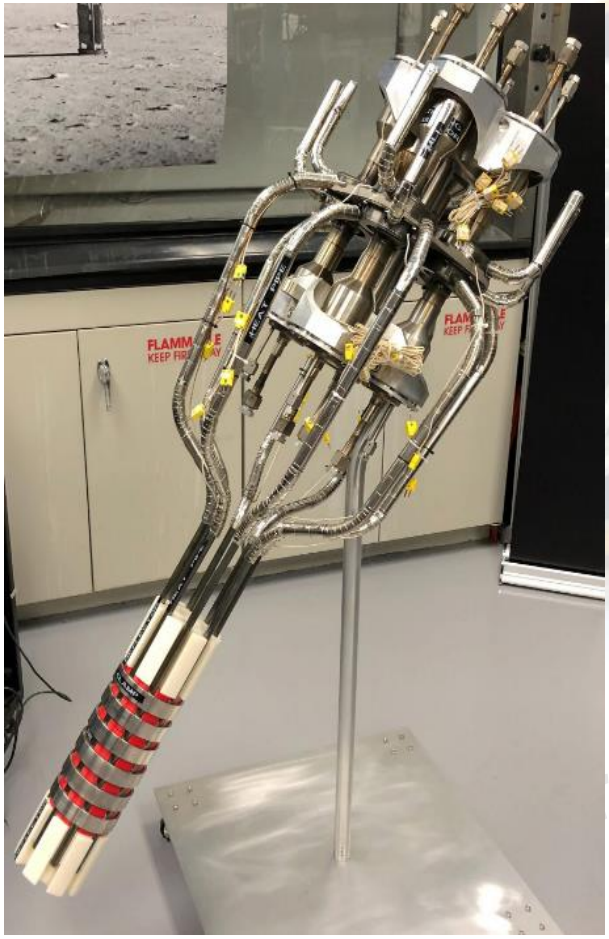
Electric Nuclear Propulsion System

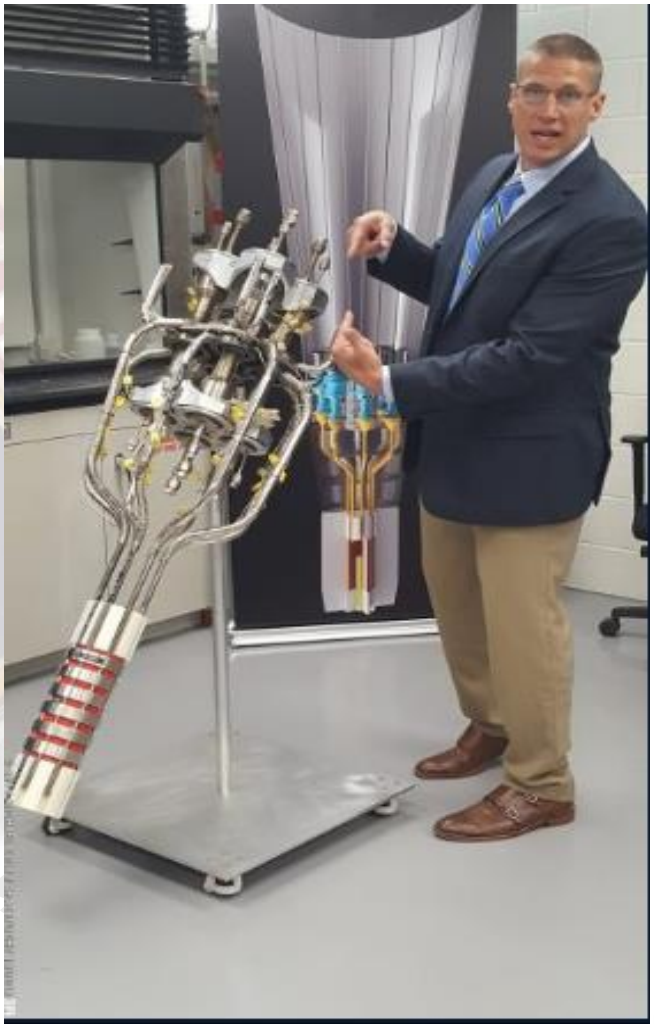




propulsor Hall no “Jet Propulsion Lab”

Nuclear System using Stirling



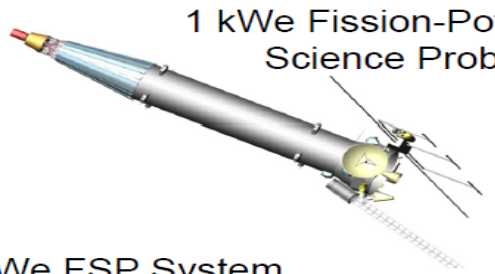


Marc Gibson, NASA Glenn's Kilopower Lead Engineer, explains the operation of the KRUSTY Kilopower prototype design to members of the media at NASA Glenn's Sterling Research Lab in Cleveland, Ohio. Photo Credit: Michael Cole / Spaceflight Insider

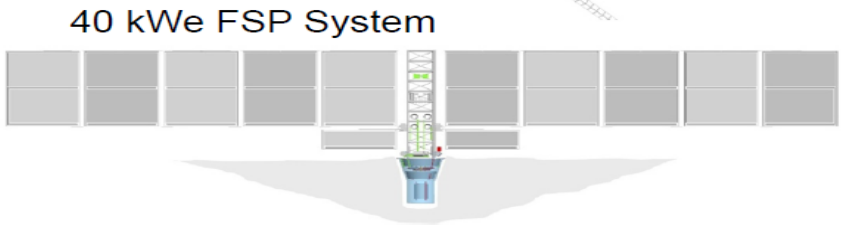
Electricity Applications

Projected NASA Applications for Fission Power Systems

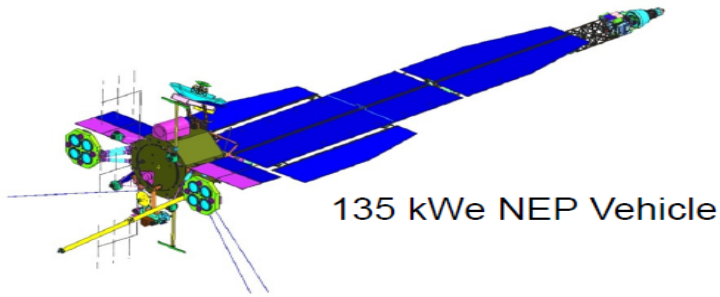
1. **Planetary/Space Science**
   - <1 to 10 kWe
   - 10 to 20 yr life
   - Unmanned, Autonomous
   - Low Mass; Competitive with RTGs
   - Non-Obtrusive; Shouldn't interfere with Science Objectives



2. **Fission Surface Power (FSP)**
   - 10 to 100 kWe
   - 5 to 10 yr Life
   - Human-rated
   - Robust and Reliable; Mass is Secondary
   - Adaptable to Multiple Missions and Environments



3. **Nuclear Electric Propulsion (NEP)**
   - 100 kWe to Several MWe's
   - 5 to 15 yr Life
   - Cargo or Piloted Missions to Mars
   - Low Specific Mass (kg/kW); Must provide benefits over SEP
   - Flexible Operations: Thrust, Coast, Science, Standby



Institute for Advanced Studies - IEAv

Generating Power Asymmetry!!!

<u>Each day, new challenges… But the same protagonism!!!</u>