



## INDUSTRIALIZATION OF EDUCATION: PISA AS BIG SCIENCE



**TERESA TEIXEIRA LOPO** (teresa.lopo@ulusofona.pt)

**VÍTOR ROSA** (vitor.rosa@ulusofona.pt)

CeiED, Lusófona University, Portugal

# Summary

- Analyse the organization, formalization and adoption of research and knowledge production practices within the big science paradigm with relevance to the PISA program;
- Examine the reception of the concept of big science in Portugal and its influence in the process of transforming the conditions of scientific work on education.

## Big science: concept



- Production of an enormous amount of data, provision of technology, mobilization of significant financial and human resources, in a matrix of interdisciplinary work with the teams, eventually, widespread geographically.

## Big science: initial approach to the concept

- Popularized in 1961 in the USA; coined by the American nuclear physicist Alvin Martin Weinberg (1915-2006), in a paper published in *Science* entitled *Impact of Large-Scale Science on the United States*;
- In 1962 the English physicist Derek de Solla Price (1922-1983) promoted four lectures in New York, that later were published in 1963 in the book *Little Science, Big Science... and Beyond*. The book describes the historical and sociological transition from *little science* to *big science* and the qualitative differences between the two.

## Big science: modern approach to the concept



- It embodies the particle accelerator, the networks of telescopes, the large laboratories under the supervision and responsibility of the States that stimulate the scientific development in a range of fields (e.g., chemistry, molecular biology, genetic engineering, computational biology, disease genetics, dynamic physics, artificial intelligence).

# Pisa as big science



Can PISA be included in the big science descriptor?

# PISA: Programme for International Student Assessment

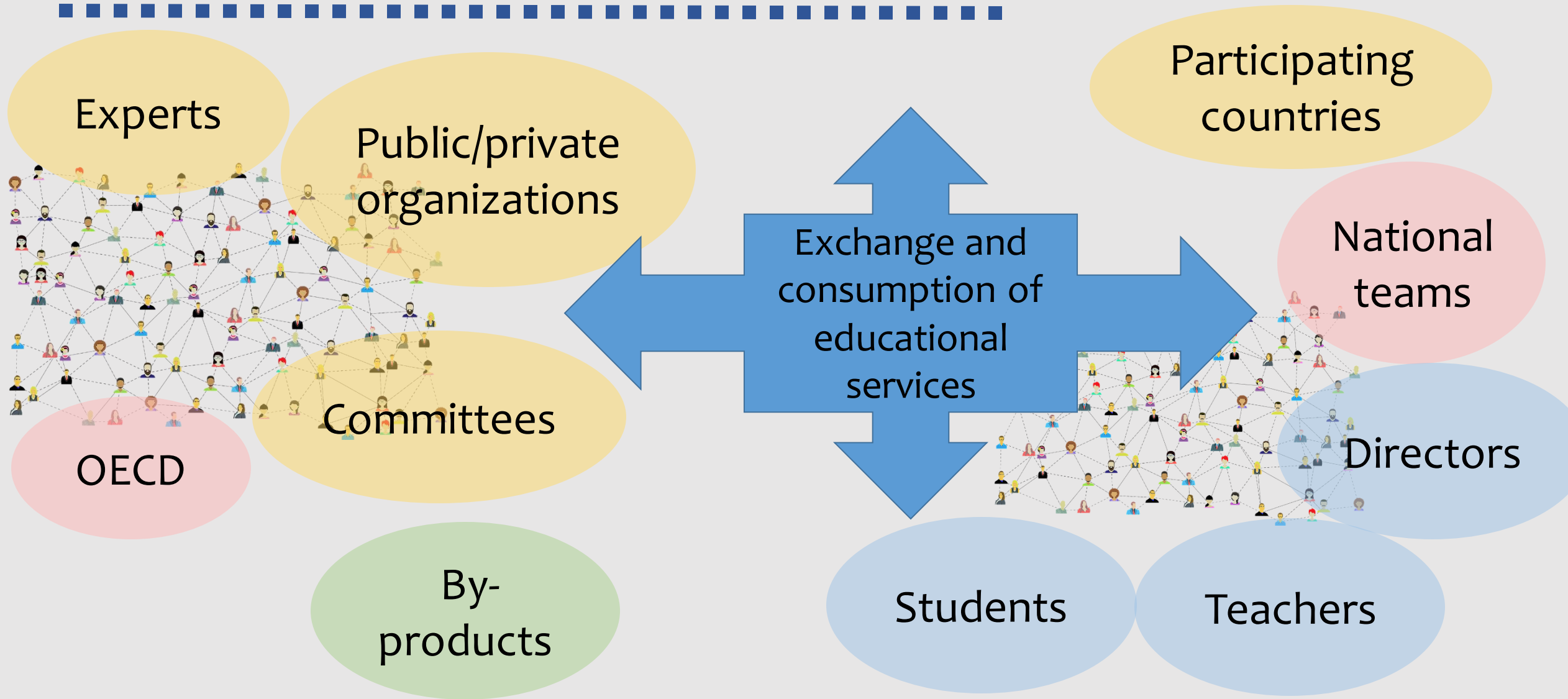
- Measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills to meet real-life challenges;
- Along with assessing the achievements of students, PISA collects detailed contextual information from students, parents, teachers, and directors (context questionnaires):
- Since the year 2000, PISA has been implemented every three years;
- The number of countries participating in PISA has increased from 32 in 2000, to 88 in 2022 (one of the largest ILSA);

# PISA: Programme for International Student Assessment

- PISA is a project of the Organisation for Economic Co-operation and Development (OECD);
- The activity of OECD: in its educational policy-making and knowledge mediator role has been linked to the exercise of a particular type of power, commonly referred to as soft power, or soft mode of regulation, that would have been leveraged precisely by the sophistication and reorganization of its statistical work, in particular, since the creation in 1968 of the Center for Educational Research and Innovation (CERI).



# Pisa as big science



# Pisa as big science



Frameworks

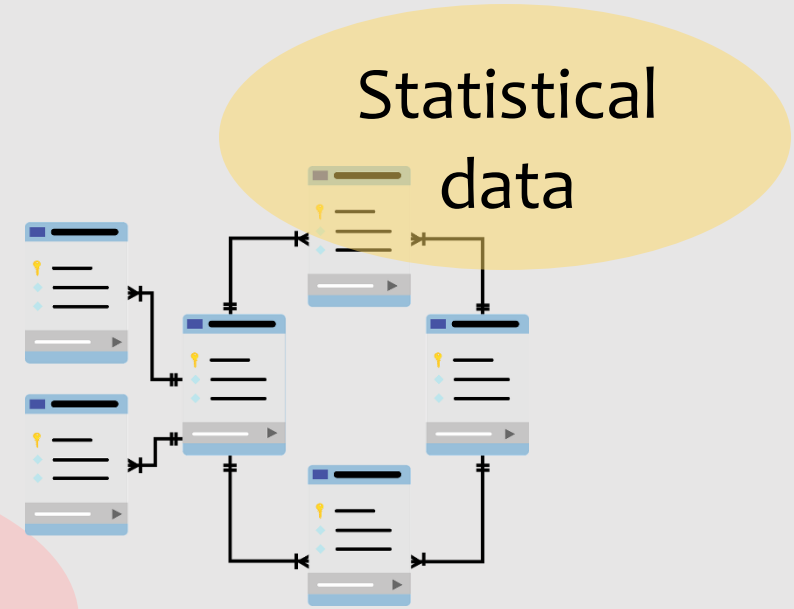
Reports

Newsletters

Briefs

Size

Complexity



# The impact of the concept of big science in the academic community



- We seek to analyse the reception in Portugal of the article “Impact of Large-Scale Science on the United States” (Alvin Martin Weinberg; in 1961), and of the book Little Science, Big Science... and Beyond (Derek de Solla Price, 1963);
- To this end, we scrutinized a universe of 18 scientifically-reviewed journals in the area of the social sciences, open to the publication of work in the field of education;
- Thirteen of them were published by research centres and/or university higher education institutions, whereas five were published by schools/institutions of polytechnic higher education.

Journal	Year of publication of 1st issue	Total number of issues available online
R&D centres and/or university higher education institutions		
Análise Social	1963	229
Configurações - Revista de Sociologia	2008 <sup>a</sup>	22
Desenvolvimento e Sociedade: Revista Interdisciplinar em Ciências Sociais	2016	5
Educação, Sociedade & Culturas	1994	53
Fórum Sociológico	1992	34
Revista Crítica de Ciências Sociais	1978	117
Revista de Educação	2004 <sup>a</sup>	14
Revista Lusófona de Educação	2003	42
Revista Portuguesa de Educação	1988	23
Revista Portuguesa de Investigação Educacional	2001 <sup>a</sup>	18
Revista Portuguesa de Pedagogia	1960	31
Sociologia	1991	36
Sociologia On Line	2010	18
Sociologia, Problemas e Práticas	1986	58
Institutions of polytechnic higher education		
Aprender	1987	38
EduSer - Revista de educação	2009	20
EXEDRA		
Interacções <sup>b</sup>	2005	49
Saber & Educar	1996	25
Total	-	832

**a** Date when open-access publication began; **b** no access to EXEDRA editions. Last available issue: 2018

# The impact of the concept of big science in the academic community



- Regarding results (albeit exploratory and confined to the universe of Portuguese journals in the field of social sciences with online editions): very tepid reception of the works by Weinberg and/or Derek de Solla Price;
- Papers focusing big science were published in more recent years and in two journals exclusively: *Revista Crítica de Ciências Sociais* and *Análise Social*;
- In the other sociology and education journals, not only is the reception to the works by Weinberg and Price inexistent, but big science was not address in any paper either;

# The impact of the concept of big science in the academic community



- None of the scientific articles analysed focused on the relation between big science with research on education (continuities and breaks), or on the work of the education researcher.

# A success story? Portugal and the PISA (2000-2015)

<http://pisa.ceied.ulusofona.pt/en/>

Research project funded by FCT – Portuguese Foundation for Science and Technology  
(PTDC/CED-EDG/30084/2017)

E-mail: [teresa.lopo@ulusofona.pt](mailto:teresa.lopo@ulusofona.pt)



**FCT** Fundação  
para a Ciência  
e a Tecnologia

