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# Rethinking (Research) Infrastructures

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# Rethinking (Research) Infrastructures

- Aim is to reveal the internal dynamics that regulate their functioning and the relation among their stakeholders
- Proposes a novel conceptual framework which examines them as complex and dynamic structures composed of material, social, political and organizational elements
- This presentation is composed of three parts:
  - starts with an overview of the literature on RIs
  - focus on the evolution of the concept of infrastructure (the general one)
  - finally progress toward the analysis of research infrastructures, delineating a possible theoretical framework

# Brief history of Research Infrastructures

- 1959 Conseil européen pour la recherche nucléaire - CERN
- 1973 European Molecular Biology Laboratory - EMBL
- 1988 European synchrotron Radiation Facility - ESRF
- 2000 European Research Area - ERA
- 2009 European Research Infrastructure Consortium - ERIC

# Existing literature on (Research) Infrastructures

- interfaces that assemble a mediating set of technologies for research and resource discovery, collaboration, sharing, and dissemination of scientific output (Edmonds et al, 2020)
- always embedded in research practices (Anderson, 2013)
- Last but not least RI are also strategic instruments (see the ERICs) whose existence is possible by the strategic research agenda of the EC (Moskovko et al., 2019)
- RI as technical implementations to support research (Ribes and Lee, 2010)
- they are hidden and visible upon break-down (Star, 1999)
- susceptible to the organisational aspect that support the uptake of technology (Edwards et al. 2007)
- = common understanding of RI doesn't exist

# Neighbouring terms

- Knowledge Infrastructures (Edwards et al, 2007; Borgman 2010)
- Information Infrastructures (Star & Ruhleder, 1996)
- Cyber Infrastructures
- E-Infrastructures (Ribes & Lee, 2010)
- Infrastructuring (Karasti et al., 2018)

# How to retrace common traits in Research Infrastructures, when the landscape is so diverse?

# Evolution of the term Infrastructure

- Rather than looking at the "differences" in the existing terminology, **I propose to examine the common root that each of these terms develops from: infrastructure**.
- The hypothesis presented here is that by retracing the development and evolution of the general concept  of infrastructure, new aspects of RIs can be observed.

# Evolution of the term Infrastructure

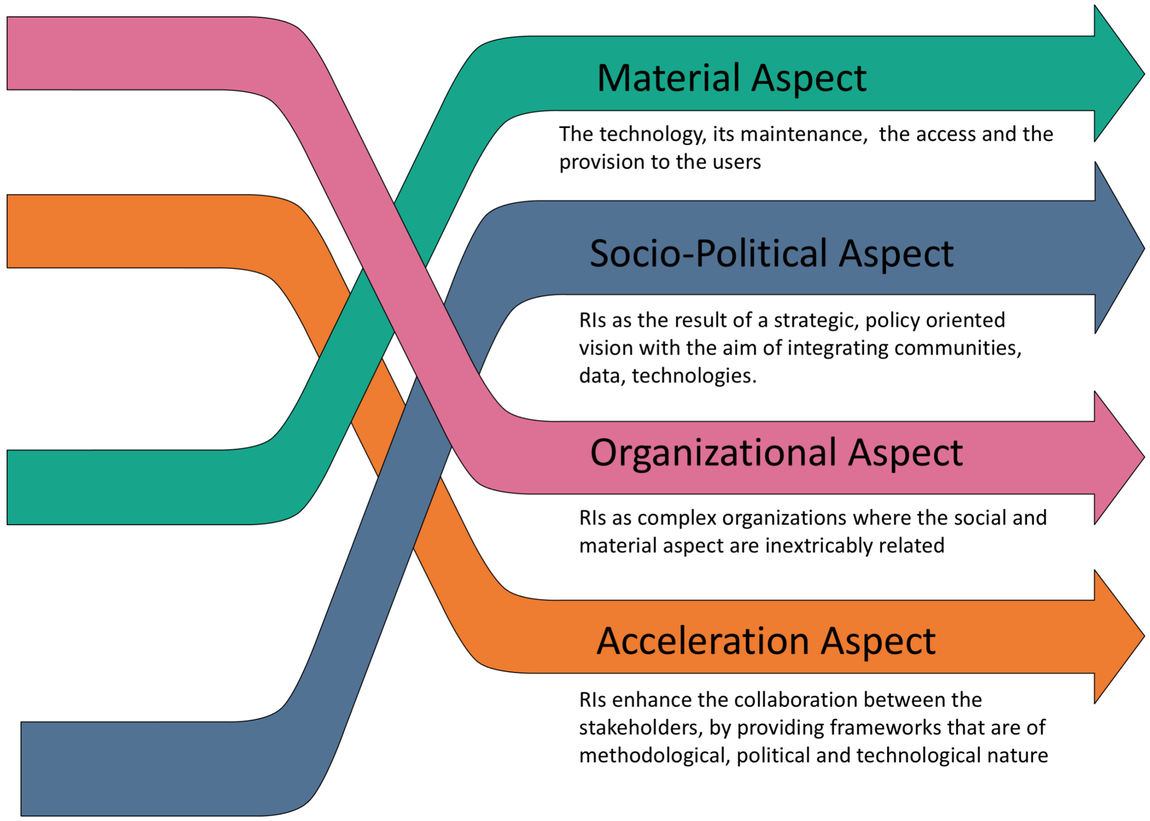
- Marx’s infrastructure and superstructure
- Infrastructure as an engineering concept (from 1876)
- The economic and conceptual turn of Infrastructure (from 1960)
- The research policy turn of Infrastructure (from 2000)

# Recurring themes in the analysis of Infrastructure

- Infrastructure as a socio-political construct
- Infrastructures as a material construct (streets, bridges, tracks, electricity, technology)
- Infrastructure as an organization (an assemblage of agents - including stakeholders and technology)
- Infrastructures as an accelerator (which stimulates the stakeholders' potentialities by creating links)

# A new understanding of Research Infrastructures

- **Material Aspect**
- **Socio-Political Aspect**
- **Organisational Aspect**
- **Accelleration Aspect**



# RIs as socio-political systems

- RIs are not neutral: complex interrelation between social and political relations
- Visible as the result of a strategic, policy oriented vision of the EU
- Fight to fragmentation of research efforts —> Integration
  - to provide researchers large instruments (e.g. European spallation source - ESS)
  - RIs as data catalogues (e.g. European Social Survey - ESS)
  - RIs as connectors between research communities (e.g. DARIAH-ERIC)

# RIs integrating research communities

DARIAH-EU

Theatralia

Research Data Management

Bibliographical Data (BiblioData)

Digital Practices for the Study of Urban Heritage

Artificial Intelligence and Music (AIM)

#dariahTeach

Digital Numismatics

DH Course Registry

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# RIs as material construct

- Probably the first “reading" of Infrastructure: RI as the meeting place of technology and user (expressing situatedness)
- **Technology as a service**: ERICs offer services to their users to facilitate new discoveries
- **Centralised, single-sited, distributed**
- **Framed access** to services and technology
- **Maintenance**
- Infrastructural inversion (Bowker, 1994) VS infrastructure as a black box


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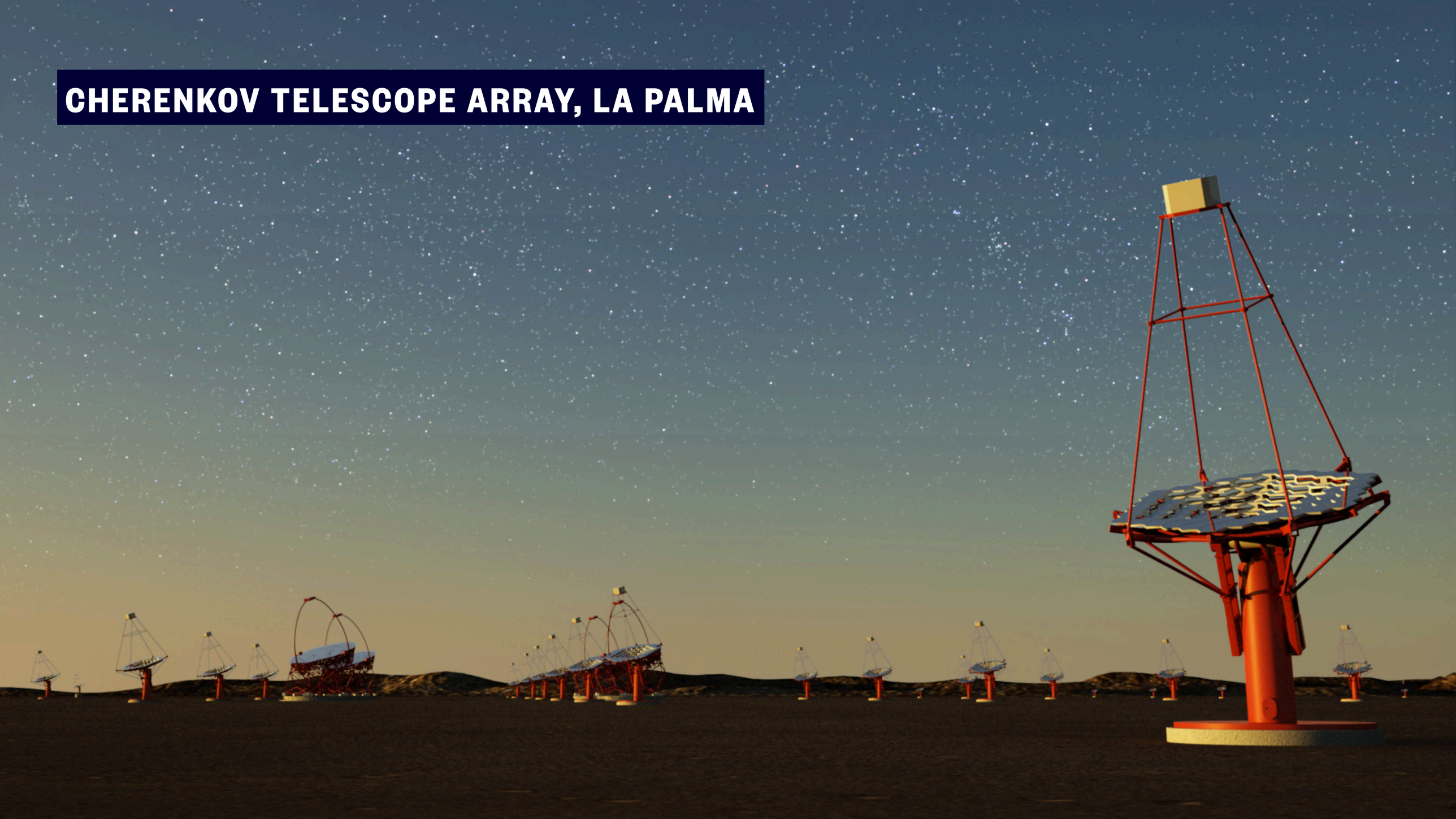
# RIs as organizations

- complex organisations in which technical systems are connected to social and immaterial components
- social and material aspects are equally important
- CTA telescope
- roots in sociomateriality (Orlikowski, 2007)

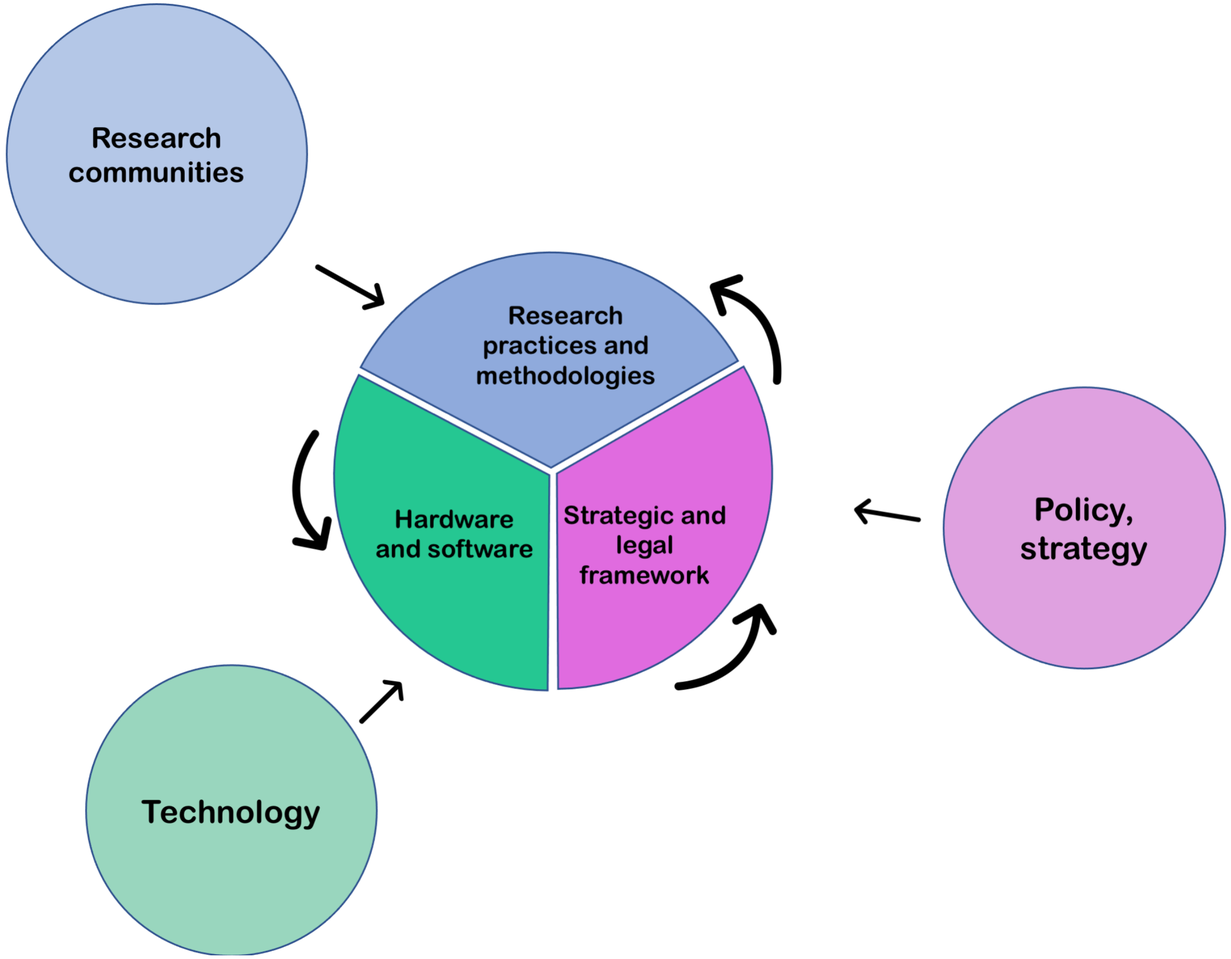
# CHERENKOV TELESCOPE ARRAY, LA PALMA



# RIs as accelerators

- roots in the idea that infrastructures multiply the exchanges among stakeholders (Jochimsen, 1966; Buhr, 2003)
- RIs have a similar function in stimulating the exchanges between the stakeholders - they offer a vantage point for each agent which couldn't be reached if they were not part of the RI
- technology, research community and policy: best possible conditions to encourage the creation of new knowledge

# RIs as accelerators



# Conclusions

- Concept of Infrastructure
- Common traits passed on to research Infrastructures
- Theoretical framework (socio-political; material; organisational; acceleration)
- Acceleration aspect - stakeholders and provided framework are central

# Thanks for listening!

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