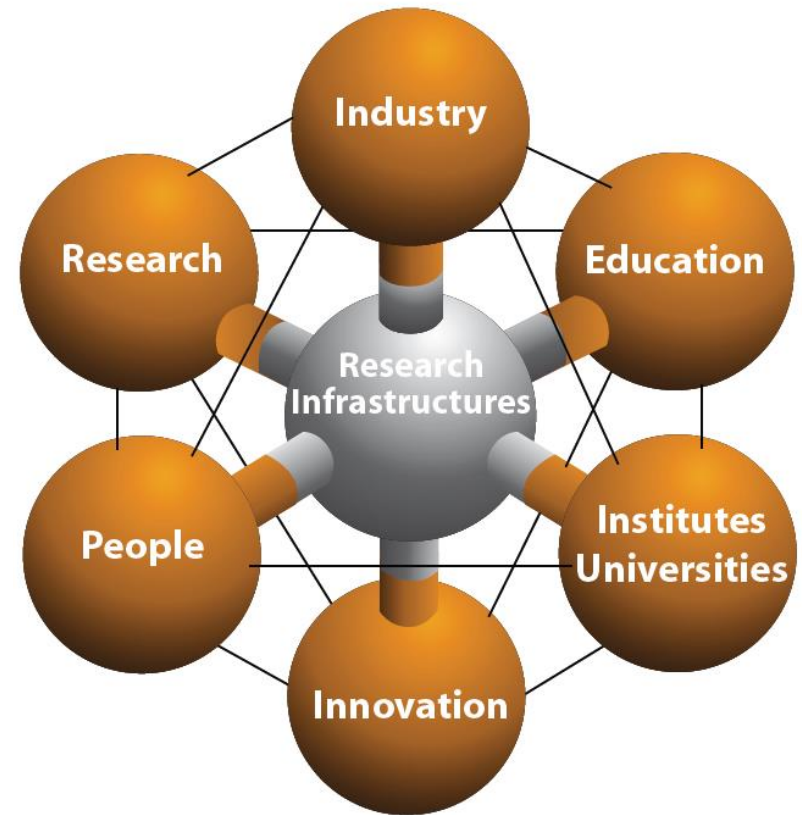


Ethics issues in scientific data and service provision: evidence and challenges for the *European Plate Observing System (EPOS)*

Massimo Cocco, Lilli Freda,
Florian Haslinger, Kuvvet Atakan
& the EPOS Consortium

Critical Role of Research Infrastructures

- Responsible for **virtual access** to data, data-products, services & software
- Responsible for **physical access** to facilities
- Allow **communication** with different stakeholders
- Tackle **sustainability challenge** from a technical, legal & governance and financial point of view
- Strengthen **data management and interoperability** through e-science innovation



The EPOS infrastructure

A **long-term plan for the integration**

of research infrastructures for solid Earth Science in Europe

EPOS integrates the existing and future advanced European facilities into a single, distributed, sustainable infrastructure taking full advantage of new e-science opportunities for Open Science



Several PetaBytes of solid Earth Science data will be available

Several thousands of users expected to access the infrastructure

EPOS

Integrates national and transnational research infrastructures for solid Earth science

for

Goals

seamless access to pan-European data and services

Guarantees open access to multidisciplinary Research Infrastructures

for

cross-disciplinary and transnational research

Creates novel e-infrastructure and integrated core services

for

a multidisciplinary community of users

Fosters scientific, technological and ICT innovation

for

successfully addressing global Grand Challenges in Earth science

Improves geo-hazard assessment, risk mitigation, and sustainable management of georesources

for

a safe and prosperous society

EPOS Data and Services

Seismology

Seismic waveforms (ORFEUS)
Seismological products (EMSC)
Hazard & risk products (EFEHR)
Computational seismology

Near fault observatories

NFO multidisciplinary data & products
Borehole data
Virtual laboratory & early warning test beds

GNSS data and products

GNSS primary data & derived products
Processing and visualization tools

Satellite data

SAR interferograms
Integrated satellite products
On-line processing tools

Volcano observations

Multidisciplinary volcanic data & products
Hazard products
TNA to volcano observatories

EPOS Data and Services

Anthropogenic hazards

Data for AH episodes
Multi-hazard simulator - multi-risk assessment
AH data visualisation

Geomagnetic observations

Global and regional geomagnetic models
Magnetotelluric data

Geological information
and modeling

Geological multi-scale data
Integrated geological maps
Borehole visualization

Multi-scale laboratories

Experimental & analogue data
TNA to experimental & micro-analytical facilities

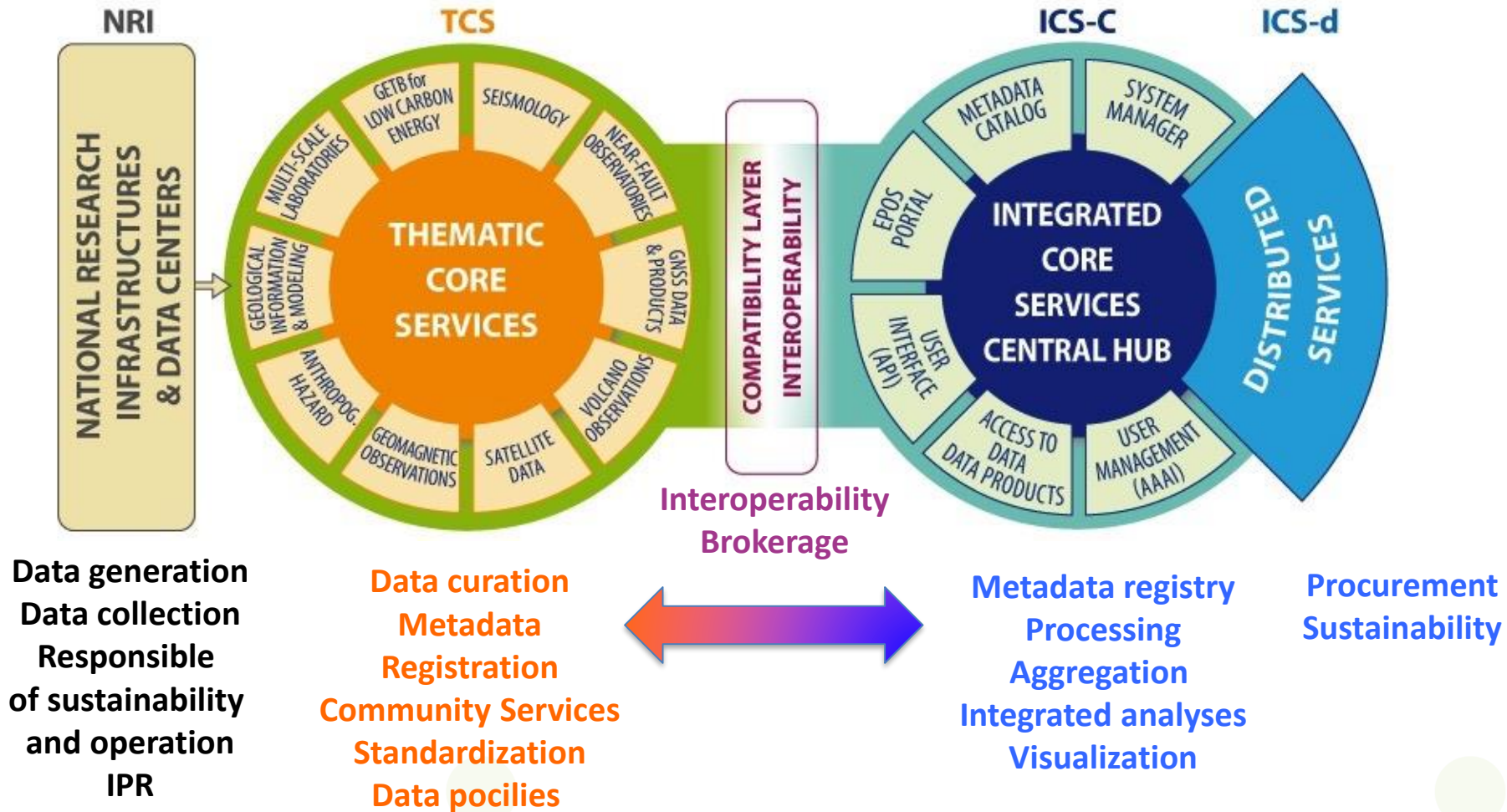
Geo energy test beds
for low carbon energy

Geo energy test beds
Access to in-situ GETB experiments

EPOS Architecture for Implementation

community-specific integration

novel e-infrastructure



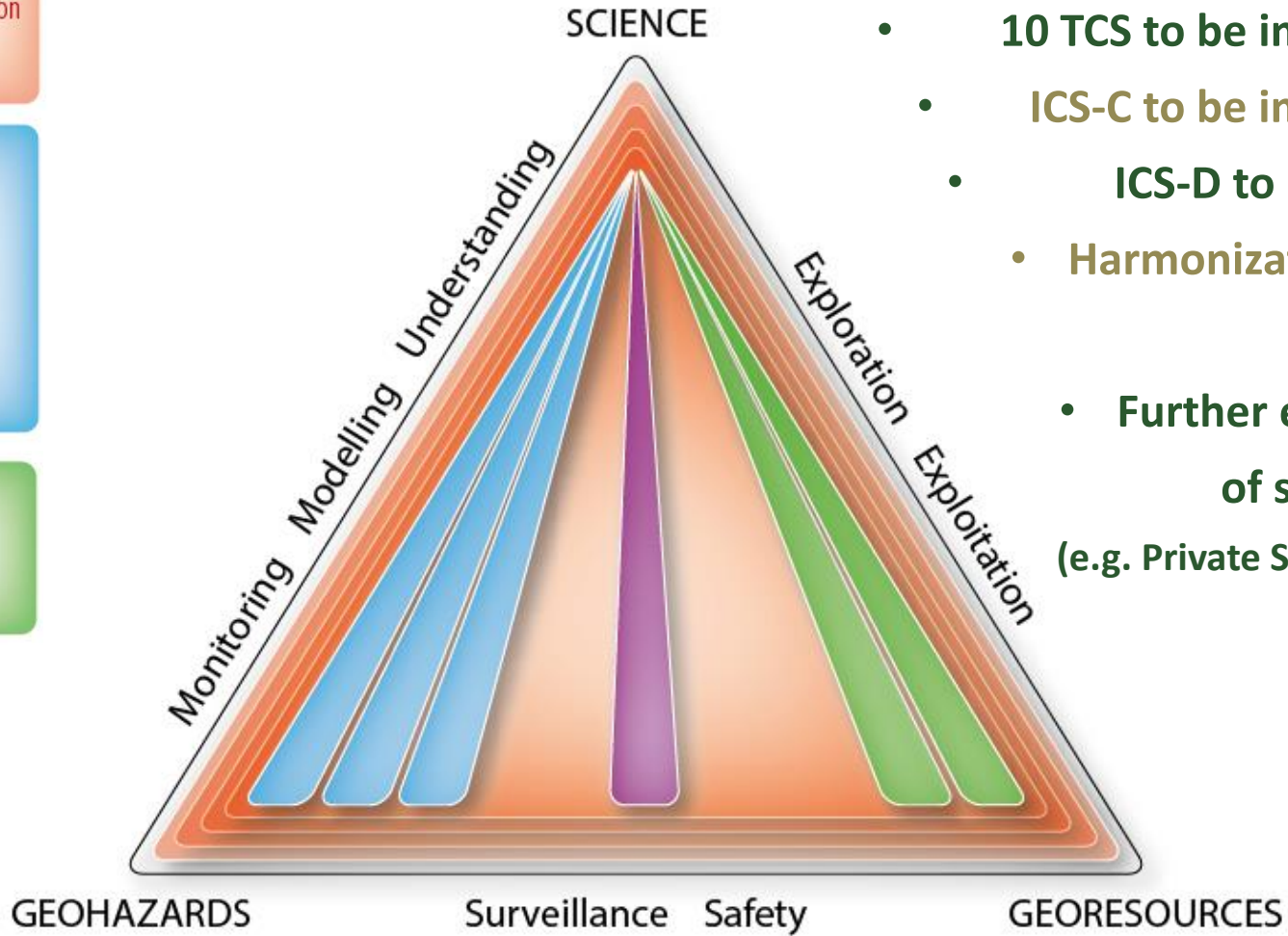
EPOS challenges

TCS Seismology
TCS Volcano Observations
TCS GNSS Data & Products
TCS Geological Information and Modeling

TCS Anthropogenic Hazards

TCS Satellite Data
TCS Near Fault Observatories
TCS Geomagnetic Observations

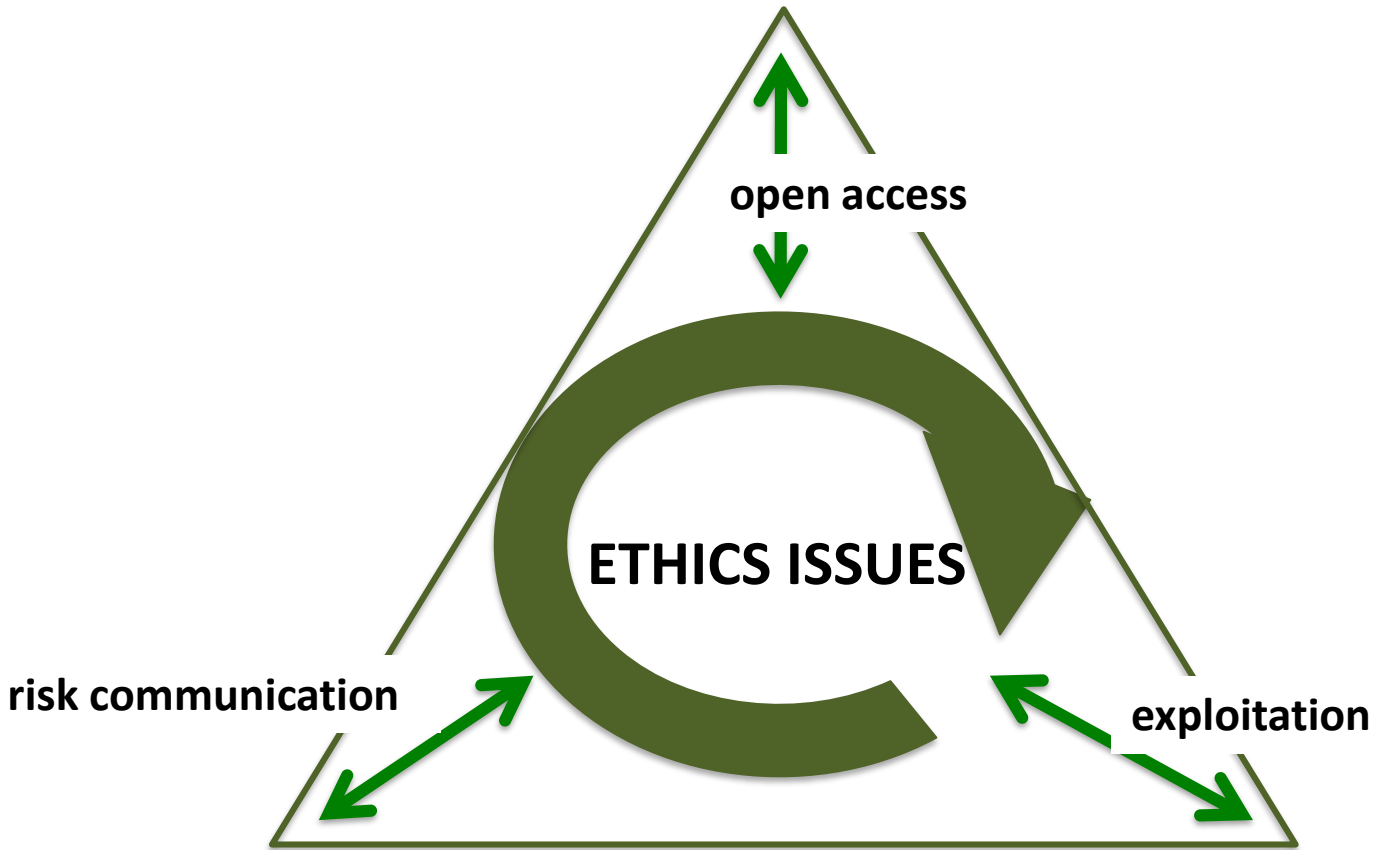
TCS Multi-scale Laboratories
TCS GETB for Low Carbon Energy



- 10 TCS to be implemented
- ICS-C to be implemented
- ICS-D to be designed
- Harmonization with 25 countries
- Further engagement of stakeholders (e.g. Private Sector, Society)

Addressing Ethics Issues for environmental sciences

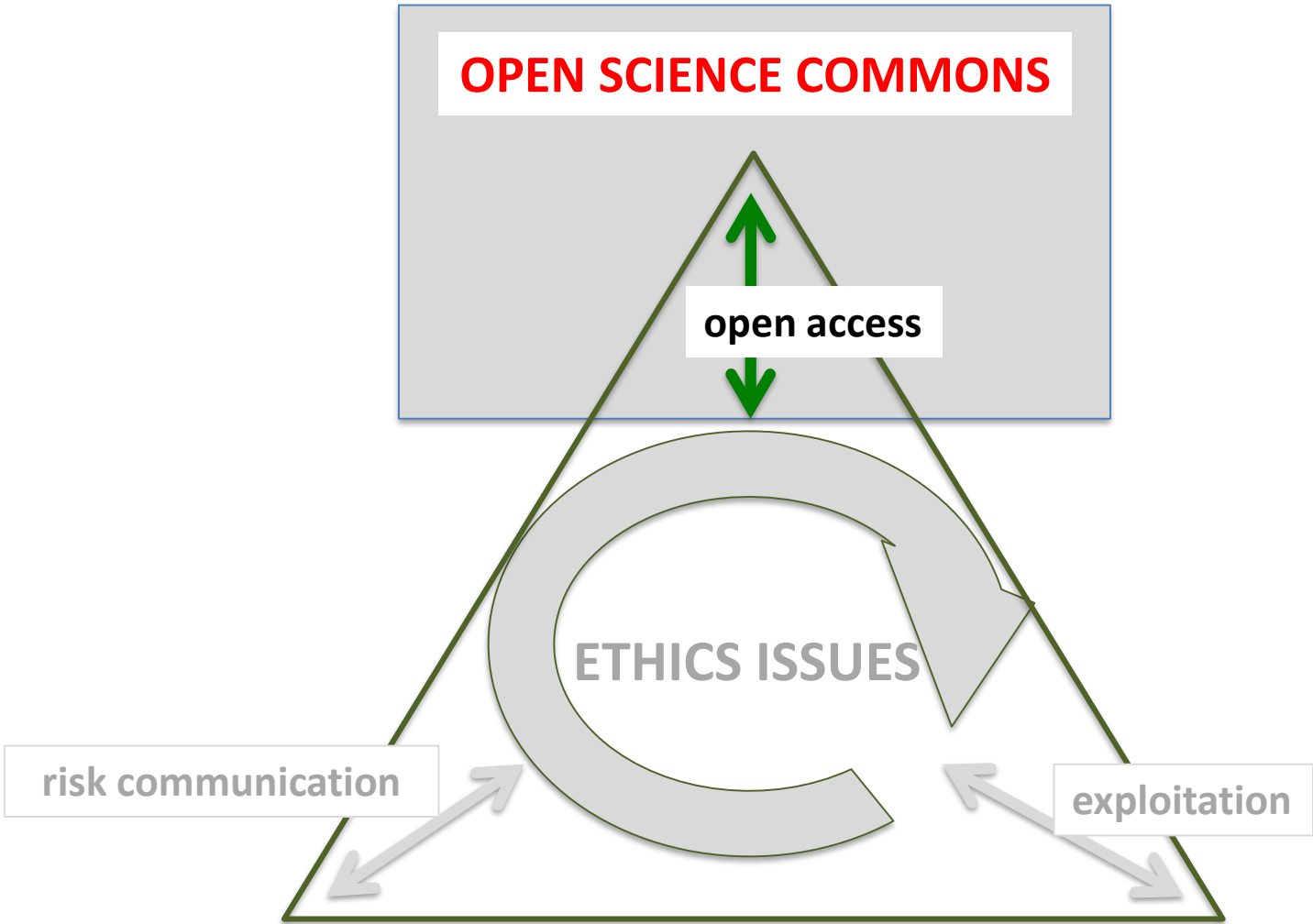
OPEN SCIENCE COMMONS



RISK MITIGATION

PRIVATE SECTOR

Addressing Ethics Issues for environmental sciences



RISK MITIGATION

PRIVATE SECTOR

Open Science

EC Principles for Open Science:

- *Open Access to Literature from Funded Research*
- *Data from Funded Research in the Public Domain*
- *Access to Research Tools from Funded Research*
- *Invest in Open Cyber-infrastructures*

Principles drafted by Science Commons and presented at [Policy and Technology for e-Science](#) during the [Euroscience Open Forum \(ESOF\) 2008](#)

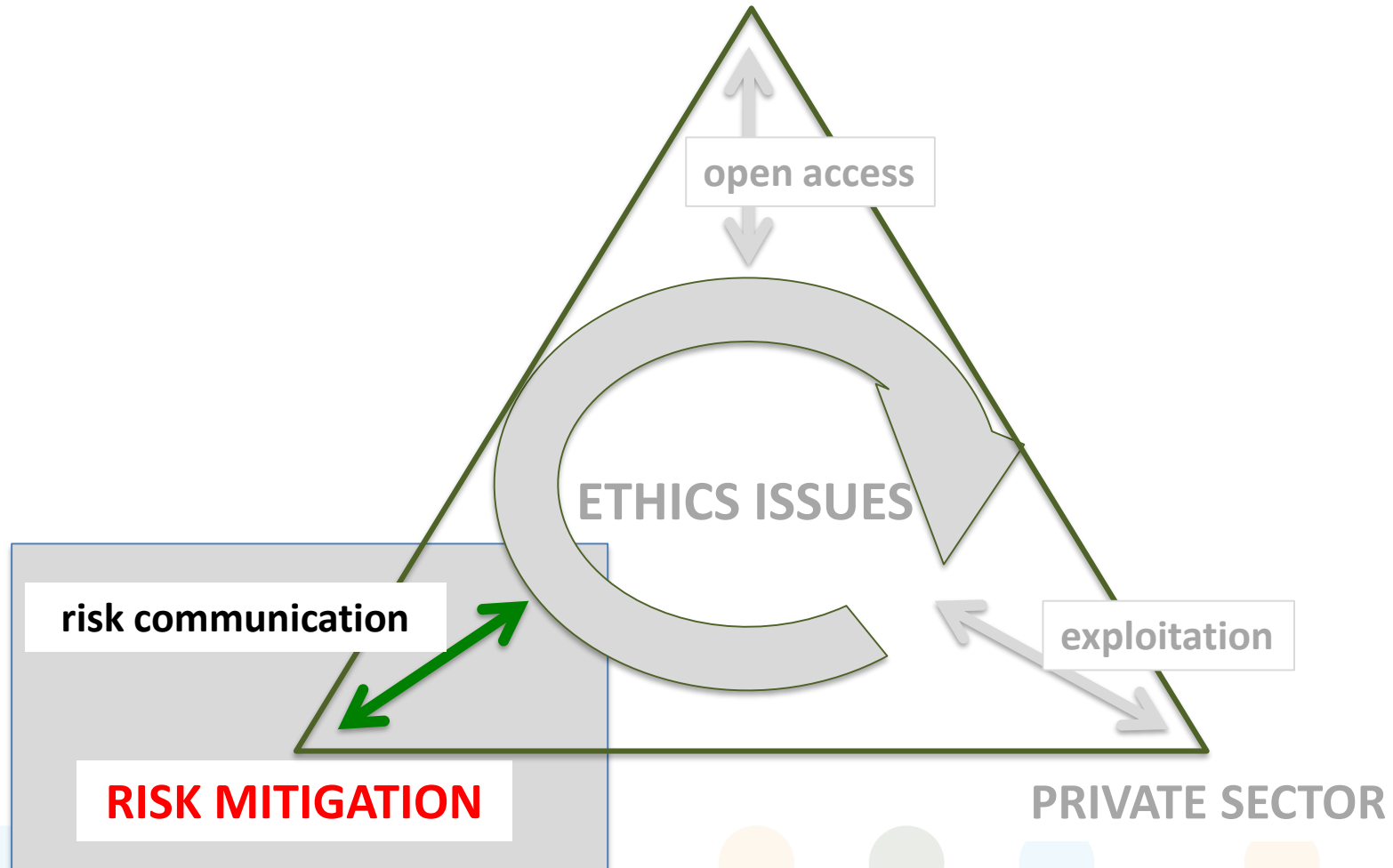
Open Science

Applying open science and access requires:

- **Dedication of appropriate resources and skills including ICT to use e-science innovation (user identification, authentication, authorization, accounting/registration - IAAA)**
- **Suitable architectures including legal and financial issues (data policy, public funding)**
- **Access rules to allow commercial use of data (pricing)**
- **Communication plans to engage stakeholders**
- **Effective strategies for dissemination & services to society (education and training)**

Addressing Ethics Issues for environmental sciences

OPEN SCIENCE COMMONS



Geo-Hazards & Geo-Resources

Observing systems have dual use:

- **monitoring of geological processes** for scientific progress (understanding)
- **surveillance of national territory** for natural and anthropogenic hazards (risk mitigation)

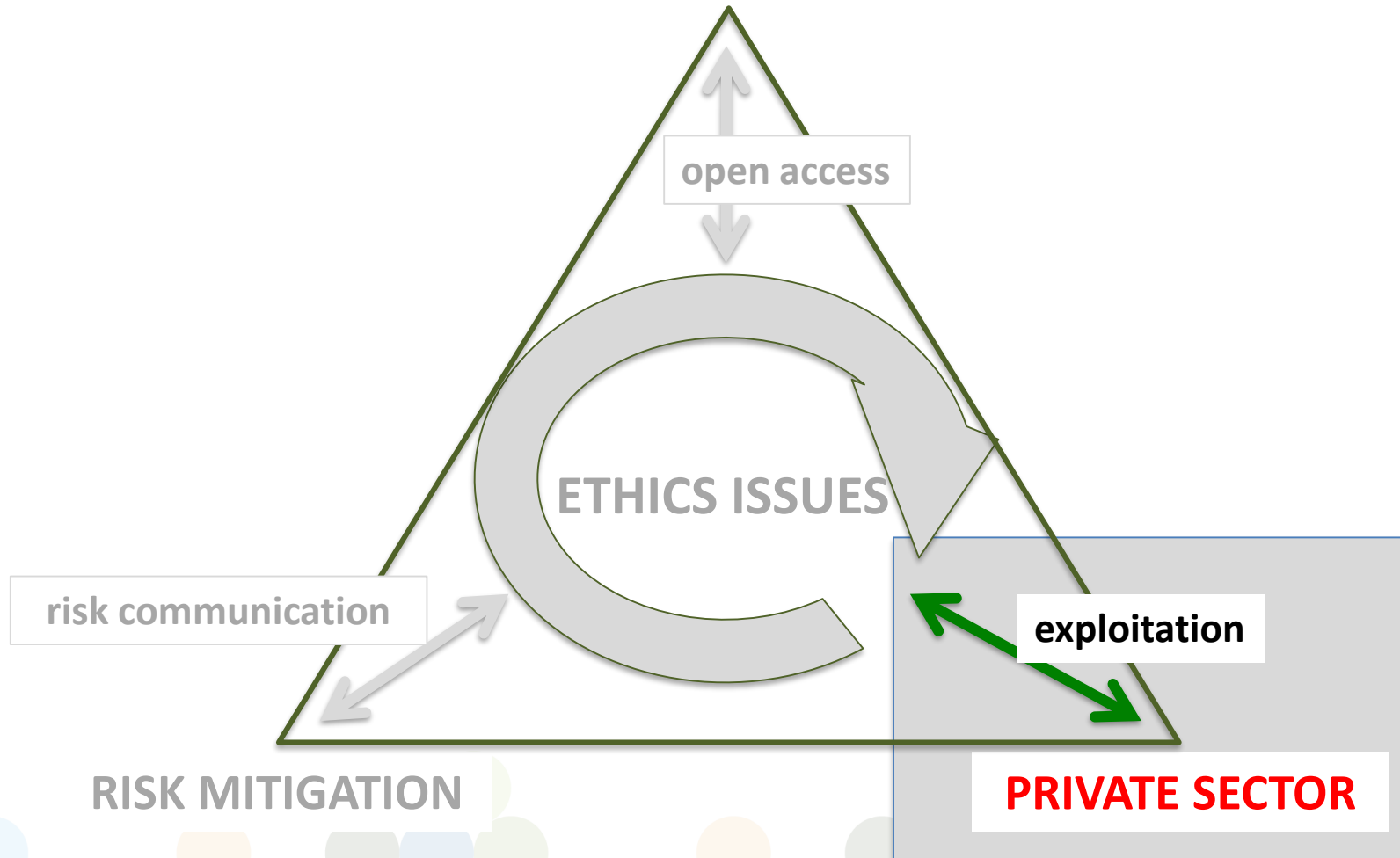
Many Research Infrastructures involved in EPOS are committed for the territorial surveillance

Distinction of roles is needed to gain trust and credibility from public and society in risk communication – important to maintain an **independent role** in the society

Foster multidisciplinary research for the **safe management of geo-resources**

Addressing Ethics Issues for environmental sciences

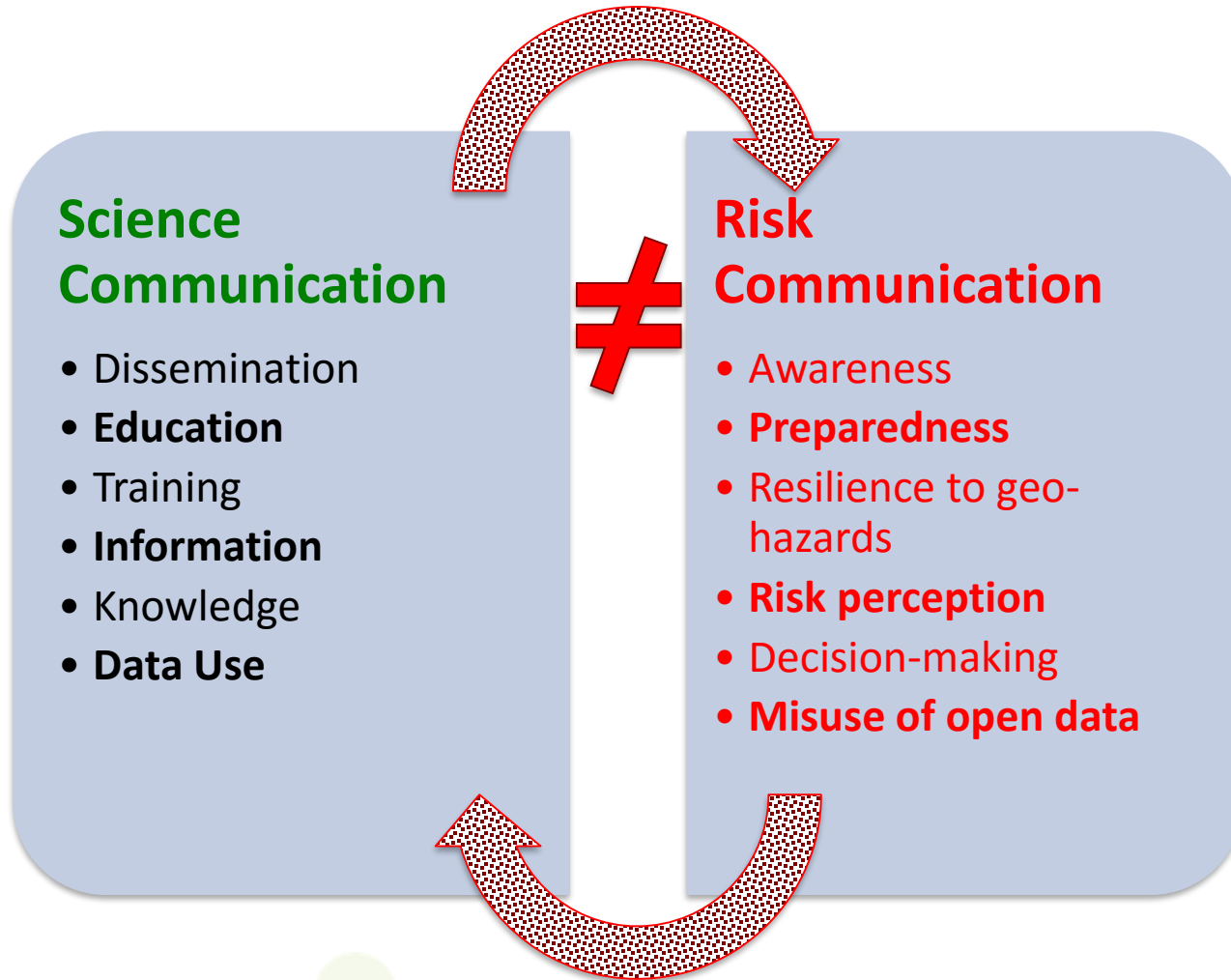
OPEN SCIENCE COMMONS



Collaborations with Private Sector

- Exploitation of natural resources requires a **transparent cooperation framework** between industry and public research organizations for guaranteeing a safe and sustainable management of geo-resources
- Industry cooperates with scientists and scientific organizations mostly through **bilateral collaborations at regional scale**
- Access to data concerning anthropogenic hazards caused by industrial activities is difficult and demands **specific agreements and the establishment of collaborative frameworks**
- Anthropogenic hazards involve not only the **scientific community, but also the industry and the regulative authorities**
- As such the **independent role of the scientific communities** based on data from research infrastructures becomes crucial

Implications for Ethics Issues



Conclusive Remarks

- Ethics has very high priority in EU funded research. All activities carried out under Horizon 2020 **must comply with ethical principles** and relevant national, Union and international legislation
- **EPOS Ethics Issues concern:**
 - Protection of personal data
 - Misuse/abuse of data
 - Communication and societal impact
- **Environmental Research Infrastructures must address ethics issues** balancing between open science commons, communicating science and risks to society and fostering innovation and development

Thank you for your attention!