EPOS SP – Grant Agreement no. 871121

D6.1 – First report on ethical implications of EPOS Services to Society

Date	31 July 2021
Document title	Analysis of data collected with the questionnaire "Ethical Issues in the EPOS Research Infrastructure"
Lead Partner	Istituto Nazionale di Geofisica e Vulcanologia
Main Authors	Giuseppe Di Capua, Silvia Peppoloni
Contributing authors	Questionnaire "Ethical Issues in the EPOS Research Infrastructure": Lilli Freda, Massimo Cocco, Edmund Nickless
Reviewers	Questionnaire "Ethical Issues in the EPOS Research Infrastructure": Michèle Barbier, Michel Campillo, Michel Diament, Florian Haslinger, Michèle Marti, Hazel Napier, Ortwin Renn. Deliverable: WP5 and WP7 Leaders
Acknowledged by	Executive Board
Target audiences	EPOS Research Infrastructure community
Keywords	Ethics, conflicts of interest, data, data misuse, personal data, data products, open science, public good, responsibility, scientific knowledge, service provision
Deliverable nature	Report
Dissemination level	Public
Delivery date	M18
Version/Date	V2 /02 August 2021

HISTORY OF CHANGES		
VERSION No 1	DATE: 31.07.2021	Original version
VERSION No 2	DATE: 02.08.2021	Version updated by WP7 Leader Kuvvet Atakan

TABLE OF CONTENTS

SUMMARY

EPOS SP pays close attention to ethical responsibilities that the EPOS ERIC, as a Research Infrastructure (RI), have towards their employees, stakeholders, partners, and society in particular with respect to the sustainability phase. The main aim of Task 6.1 is to explore and collect relevant ethical implications of existing and future EPOS services in order to guide the future development of EPOS services, especially when those services are directly addressed to society (i.e. directly accessible by the general public or private sector users).

The Task 6.1 investigated the ethical and social implications of EPOS's own perception on its scientific and technological activities, at the Thematic Core Services (TCS) level. This is done, in order develop ethical guidelines concerning the protection of personal data, management of data and data provision, service provision, data misuse, and conflicts of interests.

In the preliminary stage, documents on issues concerning research integrity, science ethics, data management, and ethics in geosciences were collected in order to carry out the structure of the questionnaire.

This deliverable is focused on the questionnaire used in the ethical survey and results obtained.

1. INTRODUCTION

Research infrastructures such as the EPOS-ERIC have ethical responsibilities towards their employees, stakeholders, partners, and society as a whole. This derives from the fact that they provide data and services helpful for hazard monitoring and studies, risk mitigation, and georesources management.

In addition, ethical issues are often related to conflicts of interest, conflicting requirements, multiple objectives and different stakeholders involving public-private sector relationships and science-society interface. Ethical issues involving working environment, publication ethics, and relationships among colleagues in order to achieve common goals are no less important for the success of the activities carried out in EPOS.

Some of the practical issues related to EPOS services that can emerge are: the protection of institutional and personal data; the misuse of scientific data and technological information, also in extreme cases like terrorism or other criminal purposes; risk communication, with particular reference to crises and emergency phases; societal impact at the interface between civil protection officers and scientists, and other societal stakeholders. Important and specific ethical concerns also raise when considering the two-way communication between individuals and EPOS services, such as citizen science activities for observations of natural and anthropogenic phenomena, as well as potential conflicts between industrial needs and development, and societal safety. Especially important in this regard, is the objective and impartial role of Research Infrastructures in presenting scientific data and results, where such conflicting interests exist.

For all these reasons, firstly the Task 6.1 "Ethical implications of EPOS service provision to society" of the WP6 "Value for Society" has carried out an online survey through an *ad hoc* questionnaire to investigate which is the EPOS community perception of the ethical and social implications of its scientific and technological activities.

Results obtained through the questionnaire are important to establish a shared ethical framework of reference, to be proposed to EPOS ERIC, aimed at increasing the awareness of EPOS community on the importance of ethical aspects in its own activities, and to define the perimeter of the EPOS ERIC responsibilities in decision-making and problem-solving.

In fact, according to the overall objectives of the Task 6.1, activities carried out in this task intend (a) to clarify the ethical implications of the EPOS data and service provision, (b) to analyse the ethical implications of cooperating with the private sector, (c) to reinforce the EPOS value for society (intended in its several target audiences, such as students at any level and general public).

2. BACKGROUND

The Ethics Working Group, established in the framework of the EPOS Implementation Phase project (EPOS IP), identified the following macro-categories to map ethical issues in EPOS:

- Protection of personal data: activities involving collecting or processing personal data.
- Misuse/abuse of data: activities having potential for terrorist or criminal abuse.
- Communication and societal impact: communicating science vs. communicating risk.
- Impartiality for public good.

These four macro-categories have been associated with three strategic actions characterizing the activity plan of the EPOS Research Infrastructure (EPOS RI), namely: fostering Open Science, contributing to risk mitigation, and enhancing cooperation with Private Sector. The link between these strategic actions and ethical implications is shown in Figure 1.

Figure 1. Graphical representation of the ethical implications associated with EPOS data and service provision.

The EPOS RI has implemented a communication plan in which the following stakeholder categories have been identified: Scientists; Governments; Private Sector; Society.
Each of these stakeholder categories is subdivided into target audiences, as for example data providers and users within and outside solid Earth science in category 1, Civil Protection Agencies and Funding Agencies in category 2. All key target audiences are illustrated in Figure 2.

Figure 2. Stakeholder categories and target audiences in EPOS (scheme by Ethics Working Group of EPOS IP).

The EPOS questionnaire has been designed to collect information and perceptions concerning the ethical implications associated with data and service provision through the EPOS ERIC and its delivery framework.

3. PRELIMINARY ACTIVITIES

In the first stage of activities key documents to define relevant ethical implications of existing and future EPOS services were explored and collected. These documents are useful to frame the matter (for example: on ethical issues in data management, conflict of interests, relation between public-funded science and private sector, code of ethics/conduct) and to define relevant ethical implications of existing and future EPOS services and related to the interaction of EPOS with society overall.These documents concern the ethics of science communication, research integrity, citizen science, research data, ethics in science education and research, ethics education in science, disaster risk reduction, rights and responsibilities of scientists, and geoethics. In addition, some results of the European project ENVRIplus about ethical issues were taken into consideration.

This literature is the knowledge and cultural background, preliminary to the development of subsequent activities of the Task 6.1. Documents, reports, white papers collected are listed below:

- Global Research Report "**Research Integrity: Understanding our shared responsibility for a sustainable scholarly ecosystem**" (by Szomszor M. and Quaderi N.). Institute for Scientific Information, October 2020: https://clarivate.com/webofsciencegroup/campaigns/research-integrity-understanding-our-shared-responsibility-for-a-sustainable-scholarly-ecosystem/.
- **Sorbonne Declaration on Research Data Rights** (Association of American Universities (AAU), African Research Universities Alliance (ARUA), Coordination of French Research-Intensive Universities (CURIF), German U15, League of European Research Universities (LERU), RU11 Japan, Russell Group, The Group of Eight (Go8), U15 Group of Canadian Research Universities), 27 January 2020: https://sorbonnedatadeclaration.eu/data-Sorbonne-declaration.pdf.
- **Ethics in Science Education, Research and Governance** (Edited by Muralidhar K., Ghosh A., Kumar Singhvi A.). Indian National Science Academy, New Delhi, India, 2019, ISBN: 978-8193948217: https://www.insaindia.res.in/pdf/Ethics_Book.pdf.
- **D13.4 - Development of public education/dissemination material on ethical and social issues** (by Marti M., Haslinger F., Di Capua G., Peppoloni S., ENVRIplus project), 2019: http://www.envriplus.eu/wp-content/uploads/2019/06/Ethical-Guidelines-for-RIs_13.4-1.pdf.
- **EPOS Data Policy**, July 2018: https://gnss-metadata.eu/Guidelines/EPOS-Data_Policy.pdf.
- **D12.2 – White paper on general guidelines, recommendations and best practices on communication and decision making under uncertainty for environmental hazards and natural disasters** (by Cauzzi C., Haslinger F., Marti M., Douglas Zechar J., ENVRIplus project), 2018: http://www.envriplus.eu/wp-content/uploads/2015/08/D12.2-White-paper-on-general-guidelines-recommendations-and-best-practices-on-communication-and-decision-making-under-uncertainty-for-environmental-hazards-and-natural-disasters.pdf.
- **D13.1 – Questionnaire to analyse the ethical and social issues and assessment report on questionnaire answers** (by Peppoloni S., Di Capua G., Haslinger F., ENVRIplus project), 2017: http://www.envriplus.eu/wp-content/uploads/2015/08/D13.1.pdf.
- **Statement on Science and Technology for Disaster Risk Reduction** (member academies of IAP - InterAcademy Partnership for Science), November 2017: https://www.interacademies.org/sites/default/files/2020-05/Statement%20on%20Science%20and%20Technology%20for%20Disaster%20Risk%20Reduction.pdf.
- **The rights and responsibilities of scientists position statement** (by AGU - American Geophysical Union), April 2017: https://www.agu.org/-/media/Files/Share-and-Advocate-for-Science/Position-Statements/AGU-Responsibilities-and-Rights-of-Scientists-Position-Statement-Adopted-2017-1.pdf.

- **Guidelines on Implementation of Open Access to Scientific Publications and Research Data** (by European Research Council - ERC), April 2017: https://erc.europa.eu/sites/default/files/document/file/ERC%20Open%20Access%20guidelines-Version%201.1._10.04.2017.pdf.
- **Guidelines on FAIR Data Management in Horizon 2020** (by European Commission), 26 July 2016: https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf.
- **Cape Town Statement on Geoethics** (by IAPG – International Association for Promoting Geoethics), 2016: https://www.geoethics.org/ctsg.
- **Freedom, Responsibility and Universality of Science** (by International Science Council), August 2014: https://council.science/wp-content/uploads/2017/04/CFRS-brochure-2014.pdf.
- **White Paper on Citizen Science for Europe** (by Sanz F.S., Holocher-Ertl T., Kieslinger B., Sanz García F. and Silva C.G.). European Commission, 2014: https://ec.europa.eu/futurium/en/system/files/ged/socientize_white_paper_on_citizen_science.pdf.
- **Geoethical Promise** (by Committee on Geoethics of the FIST – Italian Federation of Earth Sciences), 2014: http://www.geoethics.org/promise.html.
- **Ethics Education in Science** (by the ALLEA Permanent Working Group on Science and Ethics), September 2013: https://www.allea.org/wp-content/uploads/2015/07/Statement_Ethics_Edu_web_final_2013_10_10.pdf.
- **Statement of Principles for Research Integrity** (by the Global Research Council), 2013: https://www.globalresearchcouncil.org/fileadmin/documents/GRC_Publications/grc_statement_principles_research_integrity_FINAL.pdf.
- **The Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations**, 2013: https://wcrif.org/documents/354-montreal-statement-english/file.
- **Singapore Statement on Research Integrity**, 2010: https://wcrif.org/documents/327-singapore-statement-a4size.
- **Statement on promoting the integrity of science and the scientific record** (by International Science Council, September 2008: https://council.science/publications/promoting-the-integrity-of-science-and-the-scientific-record-2008/.
- **The European Charter for Researchers** (by European Commission), 2005: https://euraxess.ec.europa.eu/sites/default/files/am509774cee_en_e4.pdf.
- **Science and Society: Rights and Responsibilities** (by International Science Council), July 2005: https://council.science/wp-content/uploads/2017/04/Science-and-Society-2005.pdf.
- **Standards for Ethics and Responsibility in Science** (by Evers K., International Science Council), September 2001: https://council.science/wp-content/uploads/2017/05/SCRES-Background.pdf.
- **Declaration on Science and the use of Scientific Knowledge** (by UNESCO and International Science Council, adopted by the World Conference on Science), 1999: http://www.unesco.org/science/wcs/eng/declaration_e.htm.
- **Standards for Ethics and Responsibility in Science: An Empirical Study** (by International Science Council, The Standing Committee for Responsibility and Ethics in Science - SCRES), 1999: https://council.science/wp-content/uploads/2017/05/SCRES-Standards-Report.pdf.
- **Best Practices for Ensuring Scientific Integrity and Preventing Misconduct** (by Organisation for Economic Co-Operation and Development Global Science Forum): https://www.oecd.org/science/inno/40188303.pdf.

- **Research integrity: preventing misconduct and dealing with allegations** (by Organisation for Economic Co-Operation and Development Global Science Forum): www.oecd.org/dataoecd/29/4/42713295.pdf.
- **Codes of ethics and codes of conduct** (by geoscientific associations, organizations and societies): http://www.geoethics.org/codes.html.

4. ONLINE SURVEY ON ETHICAL ISSUES

The objective of the survey on ethical issues through an online questionnaire, was to map the ethical implications associated with data and service provision through the EPOS ERIC. These data and services will be accessible to users through the EPOS delivery framework (composed by the TCS and the ICS).

The questionnaire had also the aim of being a mean to make participants more aware about issues related to ethics in the professional activities and in science-society interface.

The questionnaire addressed the EPOS internal community of data and service providers, where information was gathered to enable the quantification and qualification of ethical implications connected to the data and service provisioning. This information will serve as input and knowledge base to elaborate the Ethics Principles and Guidelines for the EPOS ERIC.

In order to avoid problems of misunderstandings main definitions and concepts used within the online questionnaire were reported before the sections of questions to be answered, by serving as a glossary. These main concepts are listed below:

Data misuse
Is the inappropriate use of data, as defined when the data was initially collected. In other words, it refers to data which have been initially willingly provided but are later used for purposes which are outside the scope of legitimate reasons for the initial data collection.

Ethics
Reflects on the conduct of humans and the criteria with which to evaluate behaviors and choices in order to identify "true good" including the means to achieve this goal. It also addresses the moral duties of humans towards themselves and others, and what is the right thing to do when facing a decision. Regarding the research activity and more in general the practice of a profession, ethics is the identification of duties and rights that regulate the working activity (deontology) by members of a social group, who are characterized by the possession of specific technical-scientific knowledge, methods and tools for its application.

Open science
Can be defined as a set of practices that increase the transparency and accessibility of scientific research, including publications, data, physical samples, and software, to all levels of society. Open science is often defined as comprising "open data, open access, open source, open methodology, open peer-review, open educational resources".

Public good
Refers to all those elements, information, and services provided for the benefit or well-being of the public, including individual and collective safety, knowledge development, and health.

Responsibility
Expresses the commitment to answer to someone for own actions and their consequences – the duty to satisfactorily perform a task, which has a consequent 'penalty for failure', to be conceived not only in legal terms, but also in terms of loss of personal and/or professional credibility of who acts

EUROPEAN PLATE OBSERVING SYSTEM www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

in an irresponsible way. Therefore, in the concept of 'responsibility', the person emerges as the center of ethical action, and as the conscious subject of action.

The initial version of the questionnaire was reviewed by several experts on ethical issues in geosciences. Then it was sent to the Task 6.1 members and to the members of the ethical board of EPOS ERIC for a further review. Their suggestions were considered to improve the questionnaire and release its final version. Then, the questionnaire was digitalized to get an online version. Finally it was requested to the EPOS SP Executive Board to define the target audience of the survey, that was identified by the selected data providers in each TCS.

The topics of the questionnaire concern research and data integrity (science ethics) and truthful conduct of research, societal commitments of scientists/technicians, open access policies, data protection, dissemination of data and services inside and outside the RI, science, hazard, and risk communication, conflicts of interests and data misuse, public institutions-private sector relationships, dissemination of scientific knowledge to the public. Particular attention is dedicated to the topic of data and service accessibility and related issues like traceability, authorization, user profiling. Topics are considered from communication and societal impact perspectives.

Before starting to answer the questions, the person interviewed is informed about the objectives of the survey, the structure of the questionnaire, the approximate time needed for filling in it, and the procedures for data management.

Regarding the latter aspect, it is explained that the information in the questionnaire are collected following ethical principles concerning the secure use of personal data and results will be shown in an integrated form, without identifying individual responses. Moreover, procedures for data collection, storage, protection, retention and destruction comply with the "EU GDPR" policy (European Union - General Data Protection Regulation): https://ec.europa.eu/info/law/lawtopic/data-protection/data-protection-eu_en.

The questionnaire is then filled out anonymously. The collected data and responses to the questionnaire refer to the institutional role played by the person and to his/her activities within the research infrastructure, therefore without implying personal data, without any reference to the physical, physiological, mental, economic, cultural or social identity. The questionnaire doesn't contain any reference to political, religious or racial items.

The recruitment of persons for filling in the questionnaire is on a purely voluntary basis, and before filling in the questionnaire, the person interviewed has to give his/her consent.

The consent form asks to confirm that (a) the interviewed has read and understood the information provided about the survey and have had the opportunity to ask questions, (b) that the participation in the survey is voluntary and that the interviewed is free to withdraw at any time, without giving any reason and without his/her legal rights being affected, (c) that it isn't mandatory to indicate name and email for filling in the questionnaire, so that it can be completely anonymous, (d) he/she agrees to take part in the survey.

The questionnaire was circulated (from 21 December 2020 to 31 January 2021) among the target audience.

The results of the survey have been included in the Milestone MS73 (M14) of the project.

4.1 Questionnaire "Ethical issues in the EPOS Research Infrastructure"

The questionnaire, available online at https://form.jotform.com/203353366085354 and attached as Appendix A, has the following structure:

a) Consent form.
b) Information about participant (all fields are optional): name, gender, country, age, affiliation, email). This section is named "About me".

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

c) Short glossary (main reference concepts listed above).
d) 5 topic sections (see below).
e) 99 questions (in some cases, it has been used a typical five-level Likert scale to investigate the agreement/disagreement with a given sentence; in other cases, the answer to the question requires the interviewee to choose one or more items from a predefined list).

The topic sections have been organized to separate three distinct aspects of the EPOS provision to users:

- access to scientific data and products;
- access to services to visualize and analyse data;
- access to scientific information describing the contents of the provision to scientists and society.

The topic sections are the following:

1. <u>General questions</u> (referring to ethics, reference values, ethical and/or social implications).
   This section is dedicated to general aspects related to ethics applied to science, the personal perception of the importance of ethics in one's activities and their ethical and/or social implications, scientists-society relationship, social role of scientists, information regarding conflict of interests. Through the questions, it has been possible to investigate and understand the level of knowledge of the matter, the main values and key-words the interviewee thinks to be essential when analyzing the relationship between ethics and science. This section has the goal to get information about individual considerations on ethical issues and to stimulate interviewed people to reflect on their working roles and responsibilities towards society.
2. <u>Protection of personal data</u> (activities involving collection or processing of personal data).
   This section is dedicated to investigate opinions about personal data accessibility and protection. This topic involves access policy that should be adopted by EPOS RI, in particular on user registration/authentication/profiling issues to access data and services.
3. <u>Ethical issues associated with data and data products provision</u>.
   This section is focused on issues related to data life cycle (acquisition, storage, elaboration, sharing, management) policies, open science practices (for example on how EPOS data and data products should be managed, and on policies for governing EPOS metadata), possibility for data misuse and possible reasons for this, risk communication and societal impact of data and data products (in particular, referring to hazard and risk), impartiality for public good.
4. <u>Ethical implications associated with service provision</u>.
   This section is organized in three sub-sections related respectively to fostering open science (related to services for data visualization, analyses, processing, and modeling generating new data products), communication and societal impact of EPOS hazard and risk services (with issues related to stakeholders involved), impartiality for public good (with a focus on the awareness of the existence of conflicts of interests and on how they should be managed).
5. <u>Ethical issues associated with scientific knowledge</u>.
   This final section investigate opinions about the potential use of EPOS products and services for educational activities for non-expert audiences/end-users, in order to improve the scientific knowledge into society.

4.2 Results

Through the online survey, 18 questionnaires were collected. Participants in the survey were TCS coordinators and members. In the next pages, tables and graphs related to all the questions are shown, while general considerations about results are discussed in 3.3.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

4.2.1 Section "About me"

8 interviewees indicated their first and last names, and email addresses.

Gender	N.	%
Female	4	22
Male	7	39
No indication	7	39

Age	N.
20-40	3
41-60	12
>60	1
No indication	2

Country	N.
France	1
Germany	1
Iceland	1
Italy	2
The Netherlands	1
Poland	1
Portugal	1
Spain	1
Switzerland	1
United Kingdom	1
No indication	7

Affiliation	N.
BKG	1
BRGM - French Geological Survey	1
CSIC	1
ETH Zürich	1
INGV	1
Institute of Geophysics PAS	1
OGS	1
UBI	1
Utrecht University	1
No indication	9

4.2.2 Section "1. General questions"

For each question (in bold) is indicated also its number in the questionnaire.

1.1) How important is ethics for geosciences?
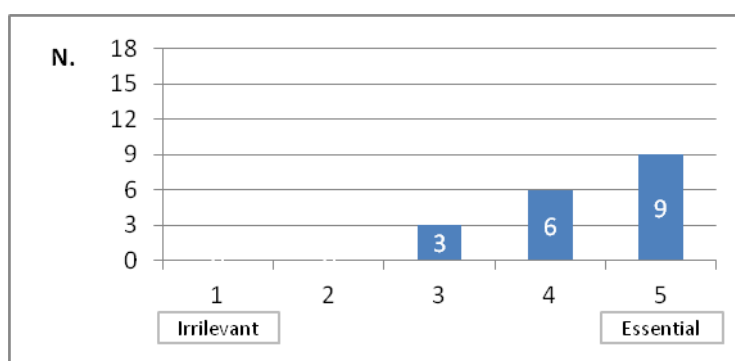
EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

1.2) How important is ethics in research activities?

Chart: N. axis 0–18. Bars: 4 → 8, 5 → 10. Labels: 1 Irrilevant, 5 Essential.

1.3) How important is ethics for EPOS management and activities?

Chart: N. axis 0–18. Bars: 3 → 2, 4 → 4, 5 → 12. Labels: 1 Irrilevant, 5 Essential.

1.4) How much are ethical issues taken into consideration in EPOS management and activities?

Chart: N. axis 0–18. Bars: 2 → 2, 3 → 5, 4 → 9, 5 → 2. Labels: 1 Not considered, 5 Fully considered.
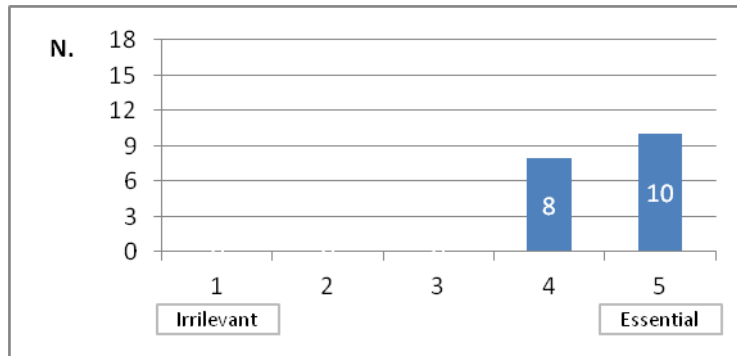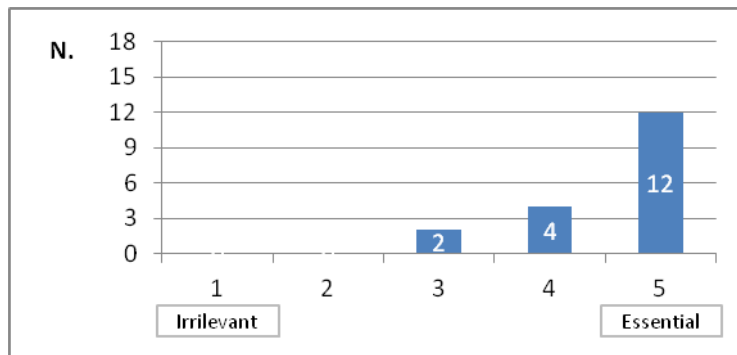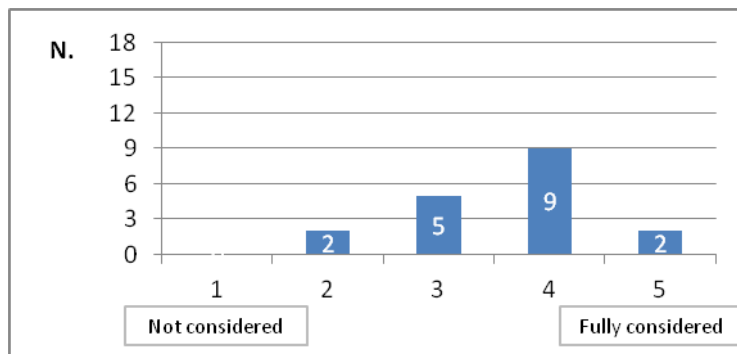
1.5) In your research/scientific and technological activities, which of the following are the most important reference values for you? (Please, choose up to 3)

1.6) In your work, which elements are of most importance? (Please, choose up to 3)
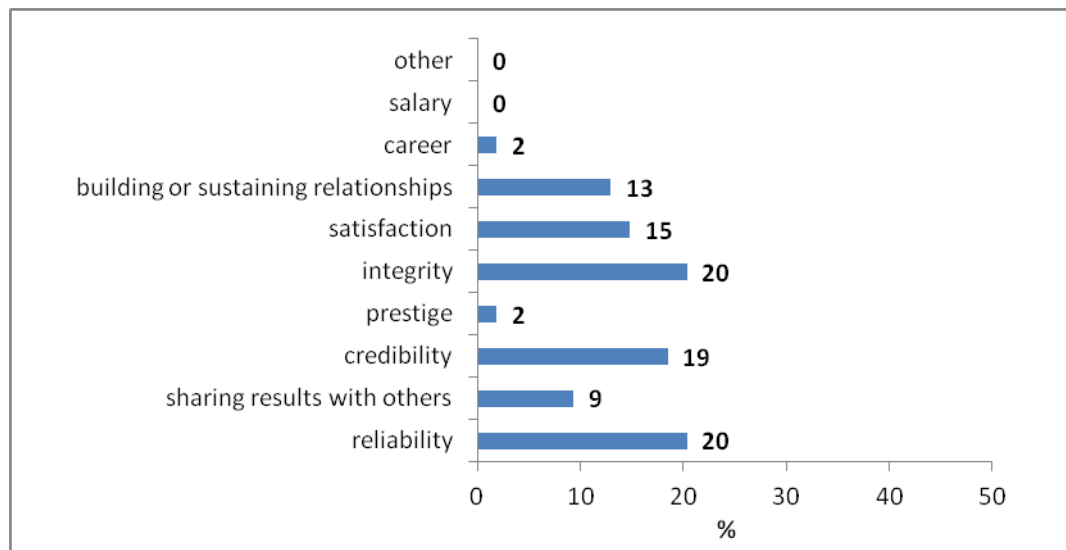
EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

1.7) Among the following fields of activities, where do you see clear ethical and/or social implications? (multiple choice)

Item
risk reduction
environmental monitoring
data acquisition, storage, elaboration, sharing and management (data life cycle)
science education
science communication
hazard and risk communication
natural resources exploration, exploitation, and management
relationships between geoscientists, media, and decision makers
workplace climate
other

1.8) Do you think that your activities have an impact on society?
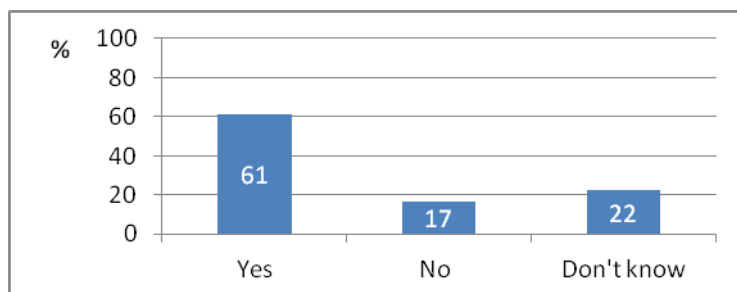
1.9) How much do you agree with the following statements? Please, express your agreement/disagreement through a ranking from 1 (disagree) to 5 (fully agree)

As a scientist, I have responsibilities towards society
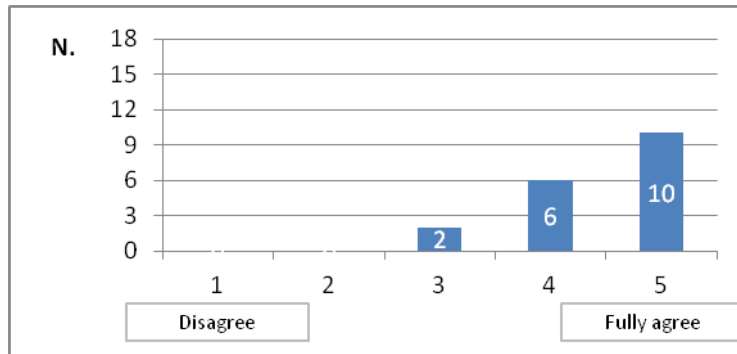
Geoscientists have a social obligation to serve society
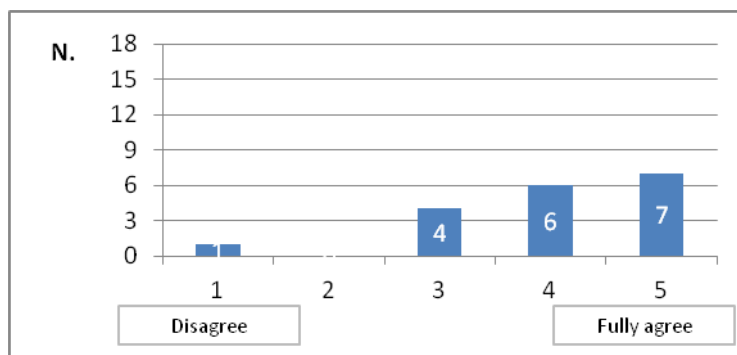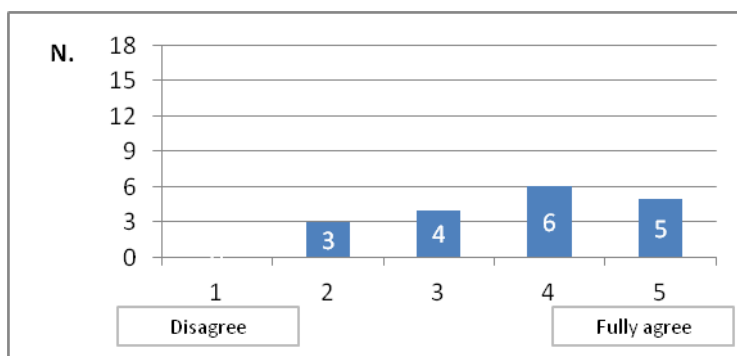

The primary duty of geoscientists is to benefit society
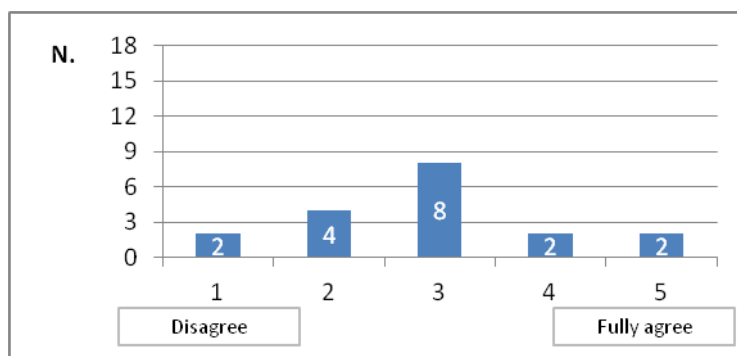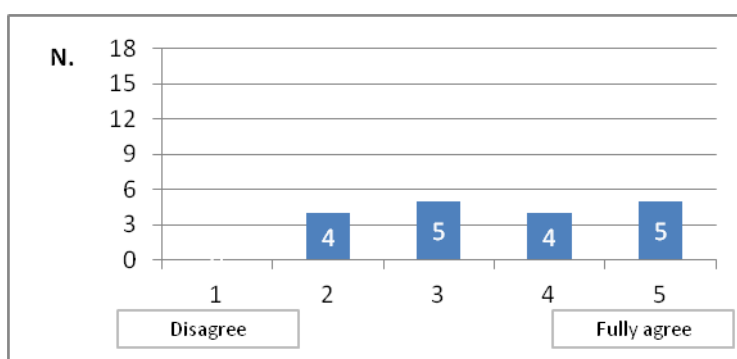

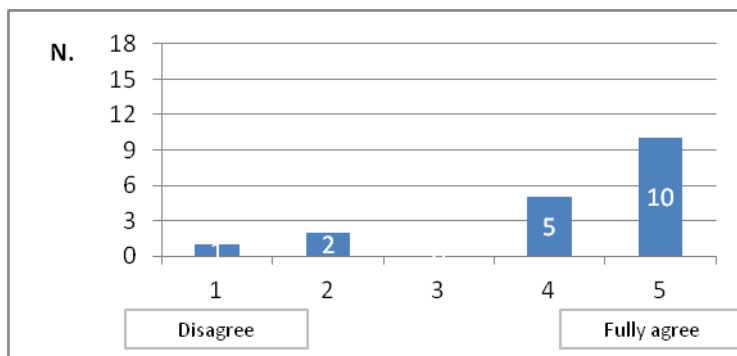## Impartiality for public good is an ethical duty for a geoscientist
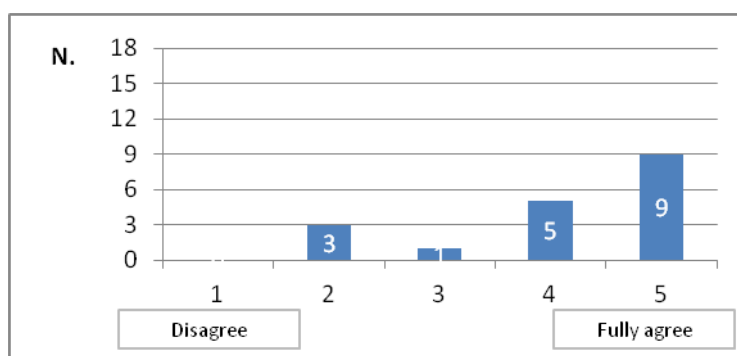
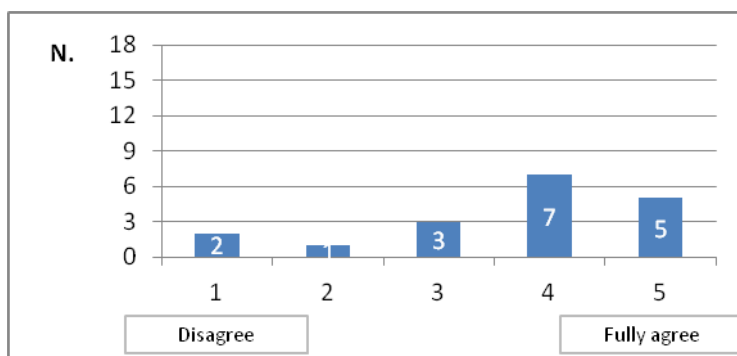## Geoscientists should aim to be good science communicators

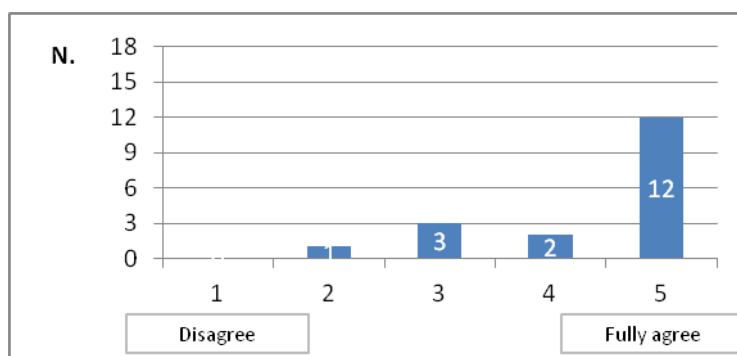## Geoscientists should aim to be good hazard and risk communicators

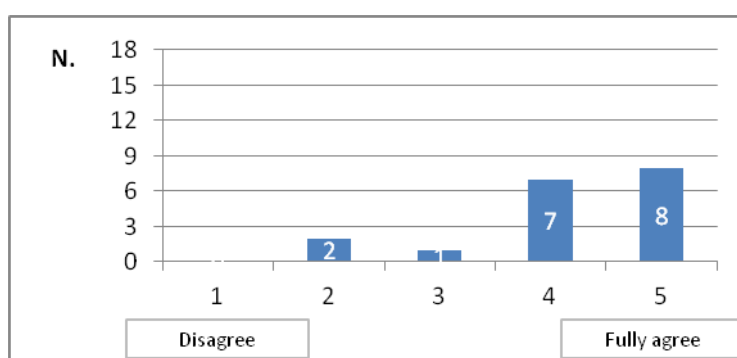## There are differences between science communication and hazard/risk communication

There is a difference in the role played by geoscientists in hazard communication and risk communication
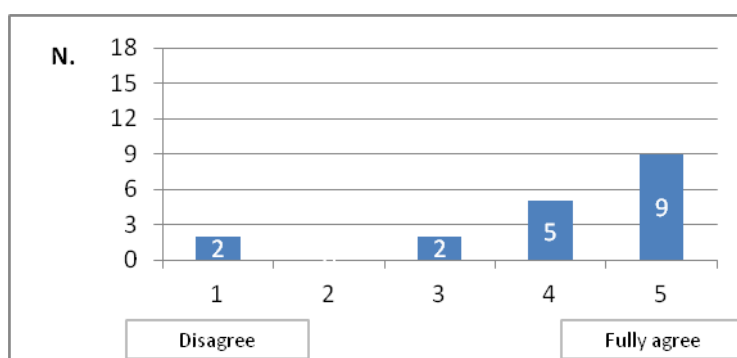
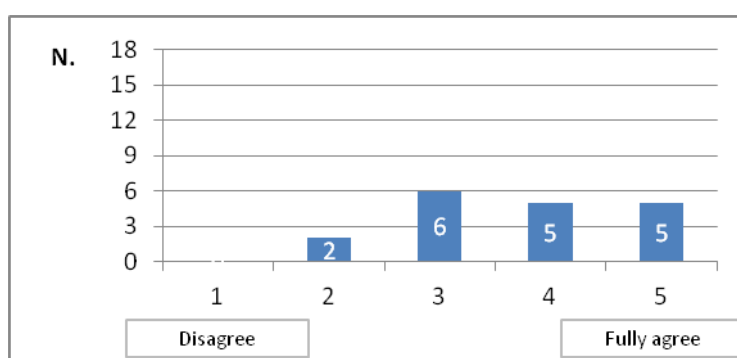**Geoscientists are science advisors and not decision makers**

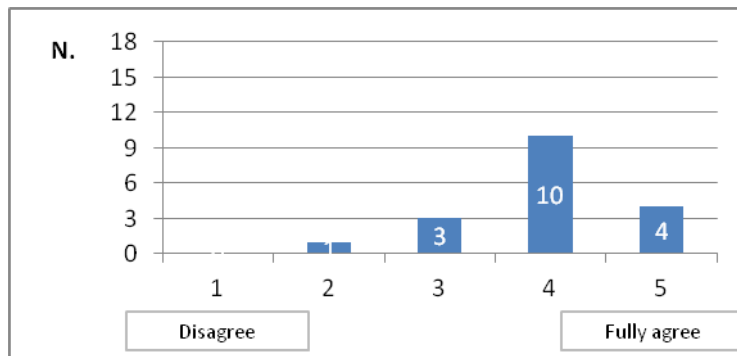**The primary goal of geoscientists is to do excellence science**

The general public should have open access to scientific information
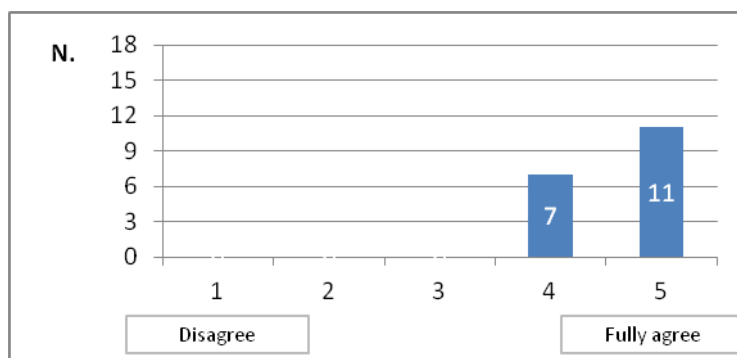

The activity of geoscientists involved in hazard communication may have legal implications

The activity of geoscientists involved in risk communication may have legal implications

Hazard communication is a multidisciplinary activity

Risk communication is a multidisciplinary activity
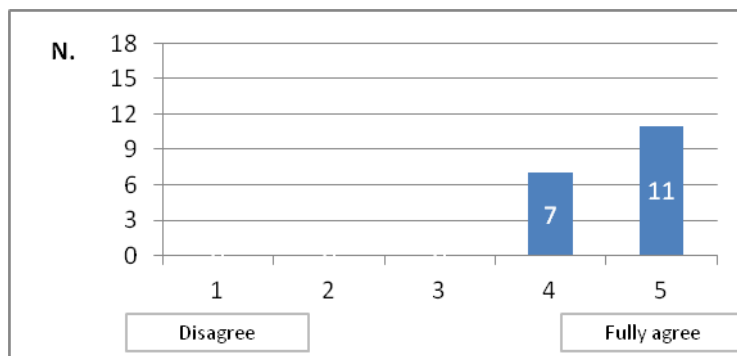
Social scientists should be involved when designing hazard communication
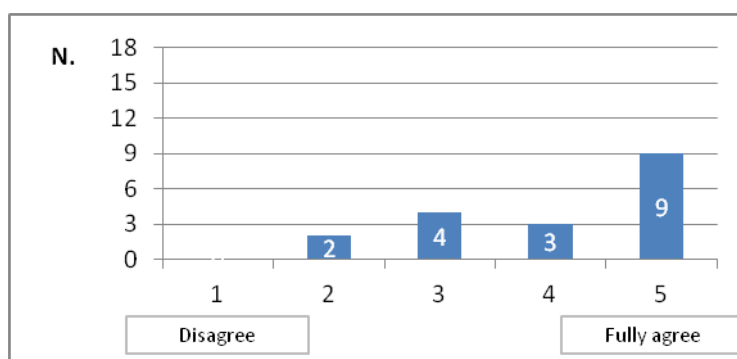
Social scientists should be involved when designing risk communication
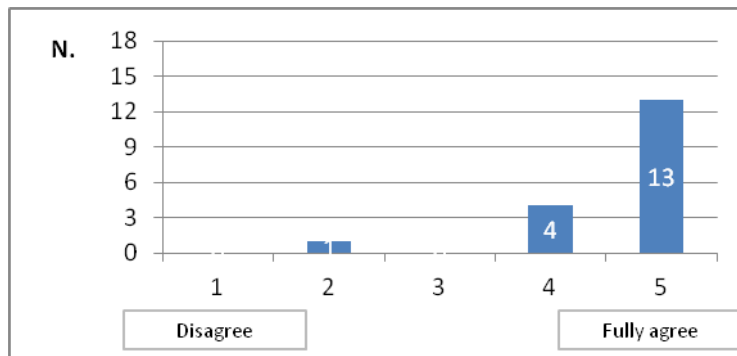
Geoscientists have an ethical duty to expose their hazard and risk data to society

Geoscientists have an ethical duty to share their hazard and risk data with colleagues

Risk communication changes over time during a crisis
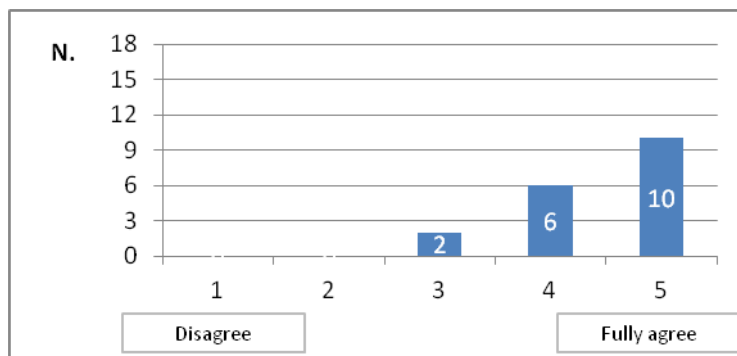
Comments of interviewees to question 1.9

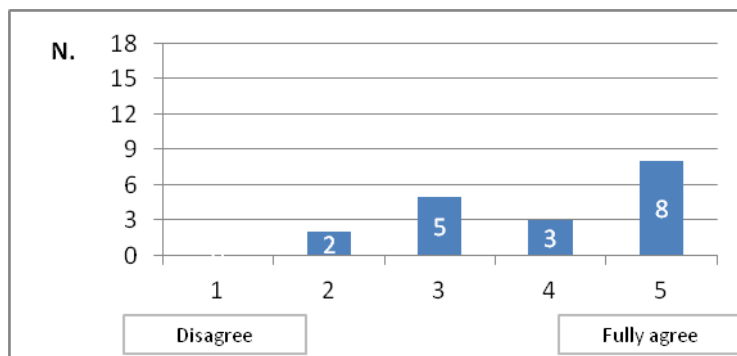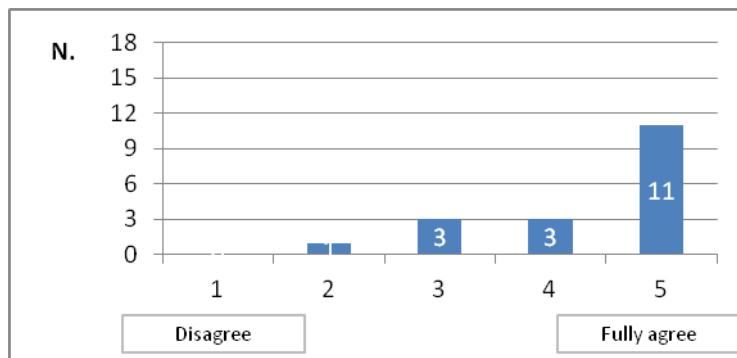| |
|---|
| Thank you for putting my attention to the difference between "hazard" and "risk". |
| A good scientist has to be necessarily a good communicator. That is a job for which you need to be prepared. |
| The question that communication may have legal implications is a tricky one. Science evolves over time and is not error free. If work is peer-reviewed or verified by other means, then the legal implications for the scientists who got it wrong should be limited. Avoid creating fear for scientist to publish results to avoid legal consequences. |

1.10) What does the expression "conflict of interests" mean for you? (Please, choose up to 2)
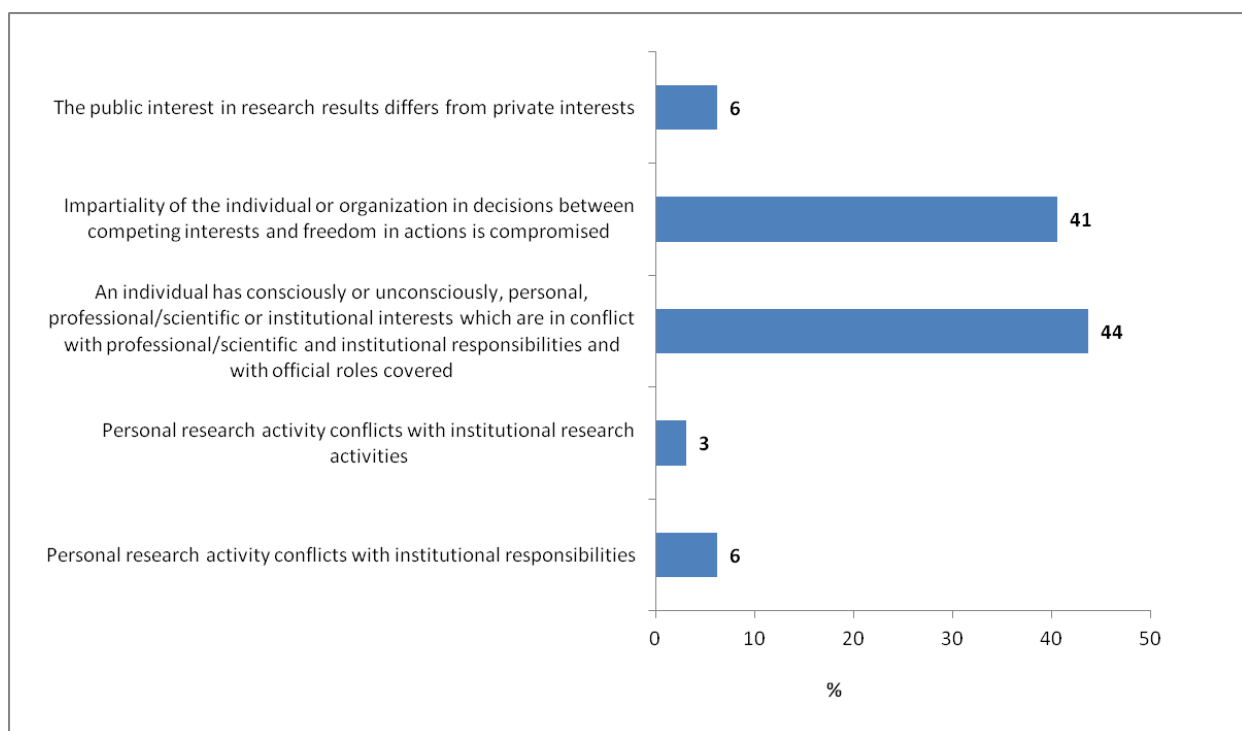
1.11) Does your Institute/University receive funding from private sector (industry, commercial undertakings, etc.) or NGOs?
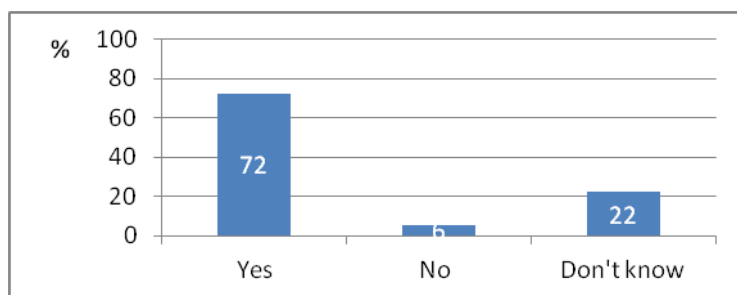
Comments of interviewees to question 1.11 (from all those who answered YES)

I think this is a new aspect for my Institution. I totally disagree mainly if this is happen without a clear (dedicated/specific) governmental regulation.
Yes, but this funding does not necessarily have a relation with EPOS.
This is even growing and necessary as the national funding is decreased by political decisions.

1.11a) If the answer to the question 1.11) is "YES", does funding from private sector (industry, commercial undertakings, etc.) or NGOs to your Institute/University lead to conflict of interests, real or potential?
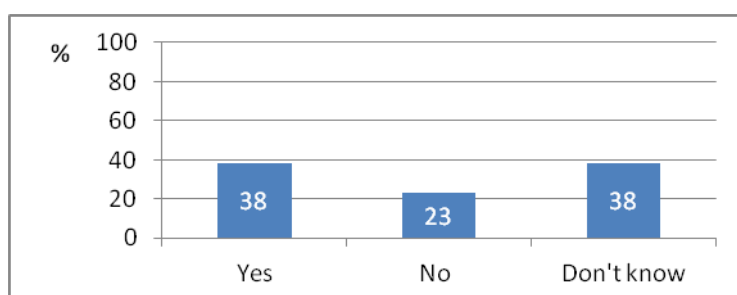
Comments of interviewees to question 1.11a

In general, I would say no.
Yes, because it is in principle possible, but we take active measures against it.
Potential yes, there is always such risk when taking commercial obligations to contractors who are not indifferent to the delivered product's content (e.g., to hazard and risk assessments). However, it can be easily eliminated by strict compliance with the Code of Ethics.
A code of conduct has been purposely established and is enforced.
Most industrial partners keep the produced data for business needs and/or interest. It is not therefore possible to share them publicly.

4.2.3 Section "2. Protection of personal data"

For each question (in bold) is indicated also its number in the questionnaire.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

2.1) Are you aware that a personal data protection policy is necessary for EPOS data and service provision?
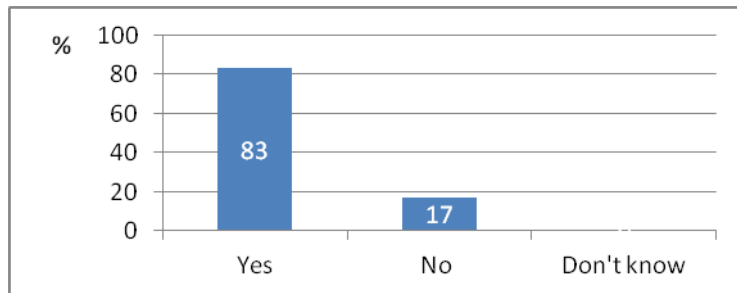
2.2) Is the protection of personal data a good reason to avoid registration/authentication of users?
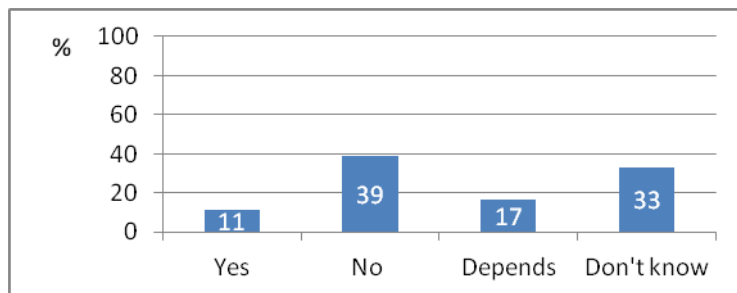
2.2a) If the answer to the question 2.2) is "DEPENDS", what does it depend on? (Please explain)

In those cases where the 'advantages' of registration/authorization are rather theoretical / irrelevant (no convincing use case), it should not be asked for. This question should be asked / answered transparently every time a decision for / against registration/authorization is made.
Registration/authentication of users can in many cases be in the interest of the user herself. Think for instance of the possibility of sustainably storing search results of collected data.
If registration/authentication is for information or tracking only, it should be avoided. If registration/authentication is necessary for, e.g., protecting against misuse or scaling or steering requests, it could be done.

2.3) Should EPOS require user registration/authentication to access data and services?
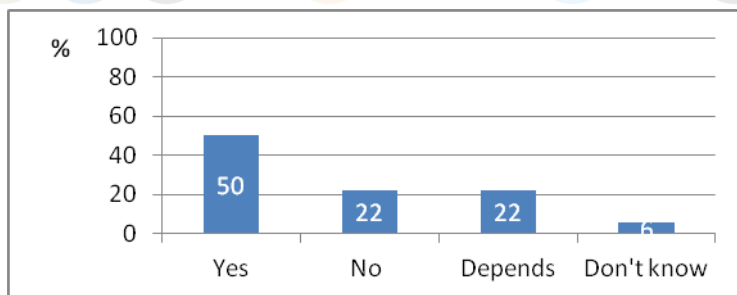
2.4) Should EPOS require user authorization to access data and services?
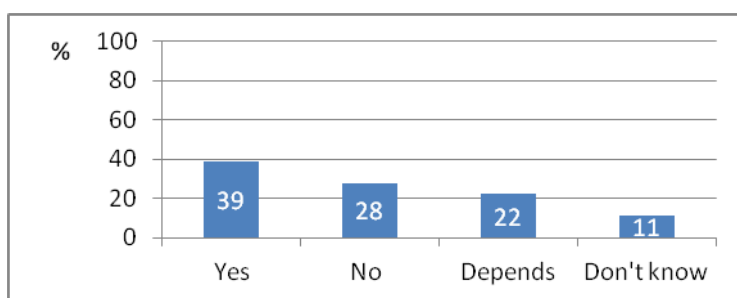
2.5) Should EPOS collect information to profile the user?
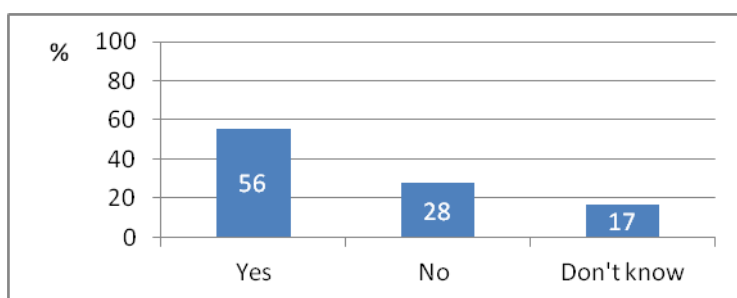
Comments of interviewees to question 2.5

I think yes, but at the same time EPOS should ensure not to use such information for anything but statistics.
To monitor that the services are being used by the geoscience community and stakeholders and to help tailor the services to the targeted users.
EPOS should not in principle require authentication or authorization, but may for particular scenarios certainly do it (those scenarios may also be / become the majority, but it should still not become a principle).
Yes, to better know the user profile which justify or not the EPOS investments. But this collect should be an opt-in possibility.
Thank you for putting my attention to the difference between "authentication" and "authorization".
Only partially and not necessarily.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

With users consent.
Perhaps not all info but enough or analytical reasons at least.
Only general information to know the profile of user in order to improve EPOS.

2.6) Should EPOS collect information concerning the purpose the user wants to accomplish by having access to data and services?
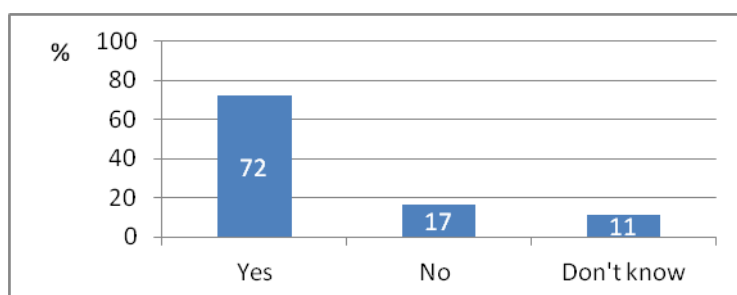
Comments of interviewees to question 2.6

I think yes, but at the same time EPOS should ensure not to use such information for anything but statistics.
In principle no, this goes against my understanding of Open science - EPOS should however encourage users to suggest changes / improvements to its offerings (by which users will have a chance to get EPOS 'improved' towards their needs).
I do not have a clear picture of such cases.
Yes, to the necessary minimum. In general, no, but in some cases, it is required by data suppliers who set constraints on data use.
Yes, to better know how the EPOS contents are used. But this should be an opt-in possibility.
… but not necessarily and only generic ones.
With users consent.
This is important for improving and prioritizing EPOS services.
It may propose a box to fill-in optionally.
Only general information to know the profile of user in order to improve EPOS.

4.2.4 Section "3. Ethical issues associated with data and data products provision"

For each question (in bold) is indicated also its number in the questionnaire.

EUROPEAN PLATE OBSERVING SYSTEM   **www.epos-eu.org** | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

3.1) Does your Institute/University have a policy for the data life cycle (acquisition, storage, elaboration, sharing and management)?
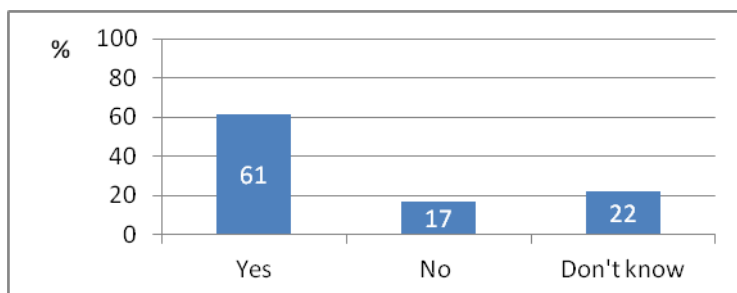
Comments of interviewees to question 3.1

Partially yes, partially it is an ongoing process.
To archive and preserve data for future use.
Only a very general one, more in development.
… in progress.
It is "under construction".

3.2) Do you see differences in ethical issues related to data provision versus service provision?
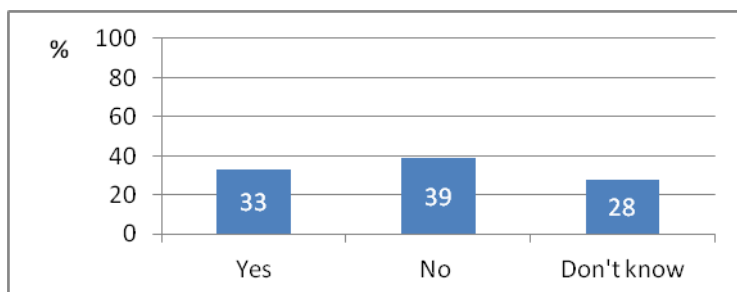
Comments of interviewees to question 3.2

I do not have clear distinctions at hand.
Here, I mean services that may have significant societal impacts (e.g., software apps enabling hazard or risk assessments). Such services impose the risk of unintentional misuse or intentional abuse.
Data provision may transfer the responsibility of correct use or misuse to the user. Service provision includes the proper processing and handling of the data and, hence, contains a lot of responsibility to the service provider because a user may or will trust in the service.
Data could be completely open while services may be targeted.

3.3) Open Science Practices

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

3.3a) Should publicly funded data be freely accessible?
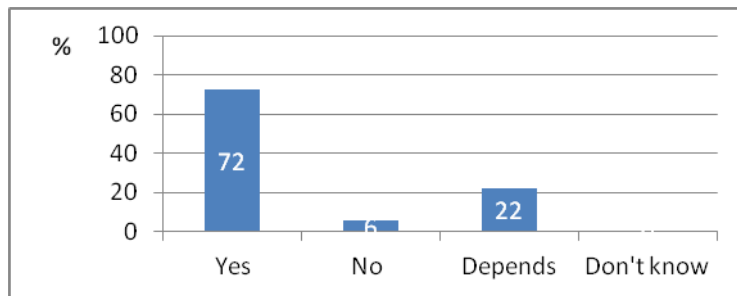
3.3aa) If the answer to the question 3.3a) is "DEPENDS", what does it depend on? (Please explain)

Data can be freely accessible once the purpose for which they have been collected has been fully fulfilled. Hence, an embargo for some time (from days to years) can be a good solution.
In many cases, data acquisition is the most time/money-consuming part of the research. Therefore, those who finance and make data acquisition should have the right to impose on data access a specified embargo period.
Depends on the nature of the data.
Scientists want to publish using the data before it is made accessible. A grace period should cover this problem.

3.3b) Is the open access to data a duty for geoscientists?
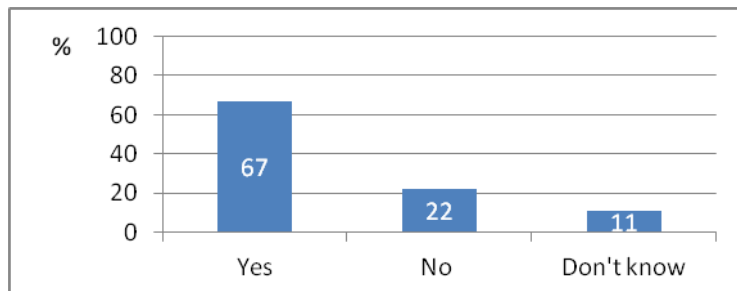
Comments of interviewees to question 3.3b

Working with private, data are owned by them. But you can ask to use them, and also publish, provided some limitations. Similarly, I think that the geoscientist has the duty of showing the results, explain the method, with the whole transparency, and, upon request, give the access to data.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

A predefined embargo should be acceptable for access to data related to on-going research projects. Funding for research projects should also include provision for preparing/quality checking/validating the data to be openly shared.
Yes, but I don't like the concept of 'duty' - it should be supported by the right mindset.
With the reservation as in 3.3aa: In many cases, data acquisition is the most time/money-consuming part of the research. Therefore, those who finance and make data acquisition should have the right to impose on data access a specified embargo period.
The actual implementation of open access should be done by IT teams, not the geoscientists themselves.

3.3c) In your personal opinion, data should be open for: (Multiple choice)
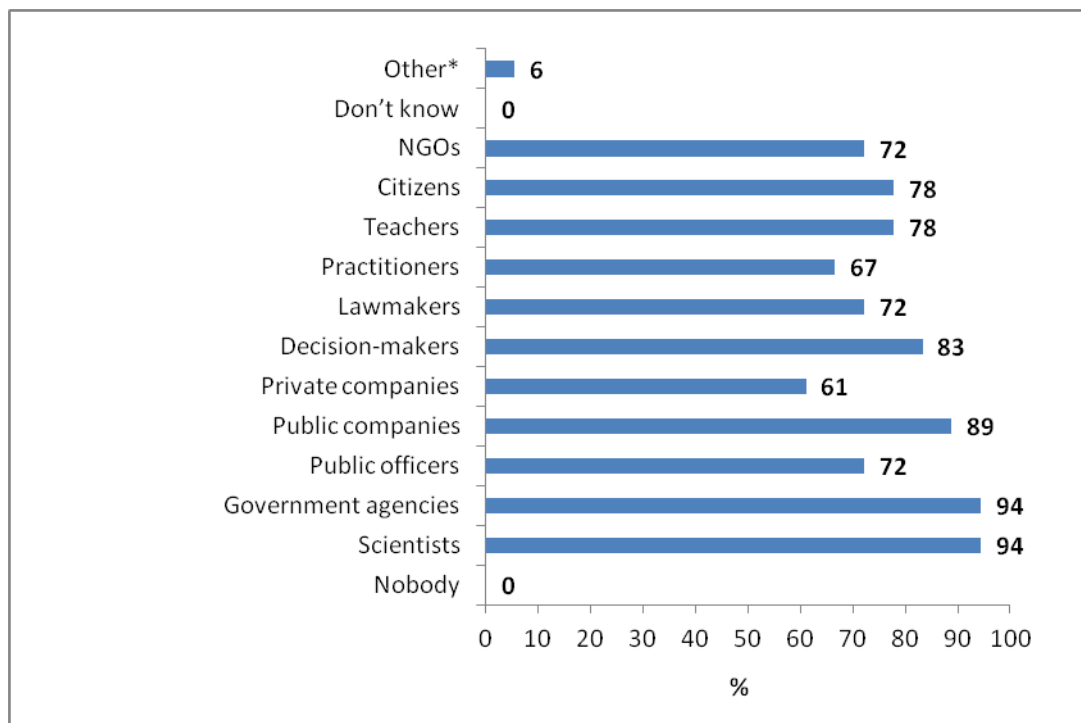
* Depends on the type of data and the level of elaboration (raw vs. data products)
Comment by a respondent: whether for all the ticked or some only depends on the kind of data.

3.3d) Should open data be provided together with easy-to-understand description of the contents and instructions on how to read/process the data?

EUROPEAN PLATE OBSERVING SYSTEM www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121
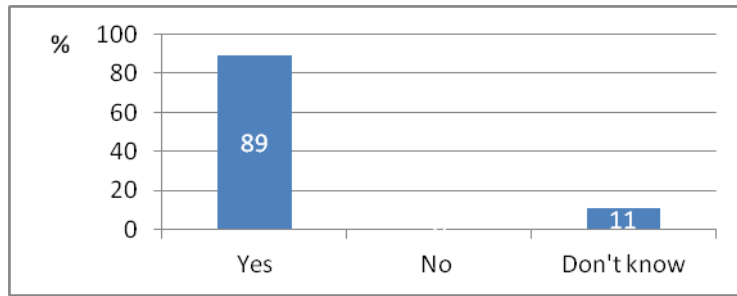
Comments of interviewees to question 3.3d

I would have said "Yes" if processing were not mentioned. A "read-me" file shall not replace school education.
If there is funding available for that.
This is a very important prerequisite. If this information is available then I feel authorization should be avoided.
Description of the contents - yes, instructions on how to read (formats) - yes, instructions on how to process - no.
Yes, this is essential to prevent misuse and misunderstanding.
I would differentiate between description of the contents (mandatory) and instructions on how to process the data (optional).
Otherwise it is obfuscated data.
Of course this takes time which is a commodity we don't have much of.

3.3e) How should EPOS data be managed? (Multiple choice)

Item
full open access (no restriction)
licensing
user registration
access with limits for different users
open access for scientists and scientific institutions
to private industry or commercial organizations on payment
open access for scientists and citizens
open access for government agencies
data release limited on the basis of type of request
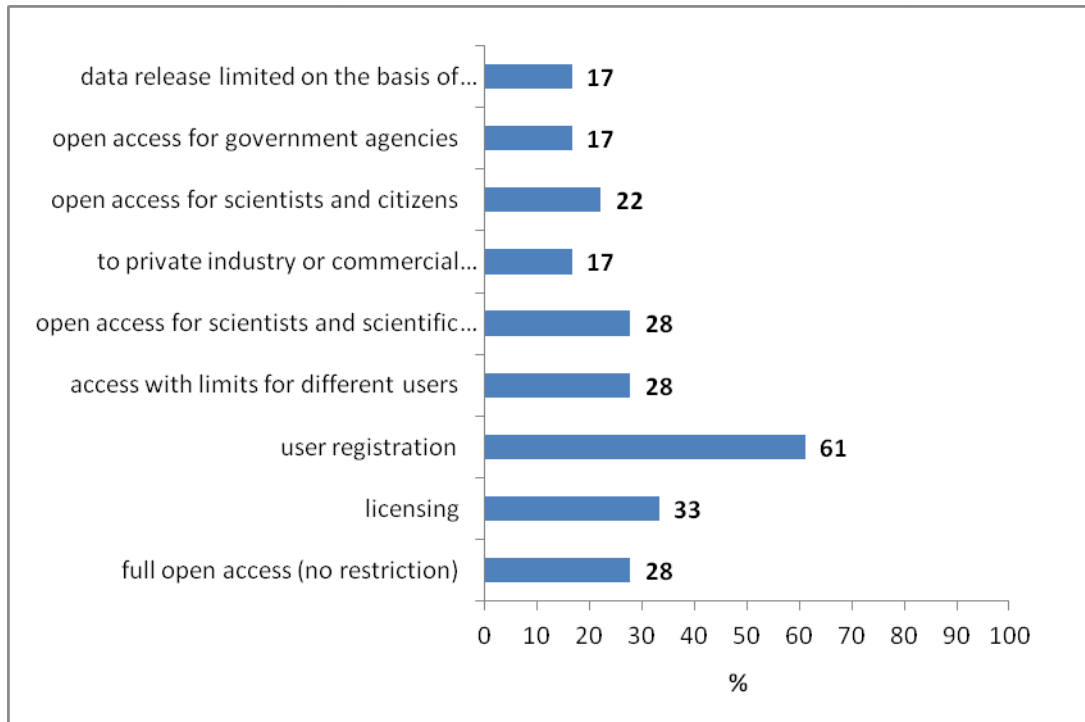
Comment by a respondent: industrial/private sector partners should be strongly encouraged to share their data when they use data collected via EPOS.

3.3f) Which kind of EPOS data should be subject to an open access policy? (Multiple choice)
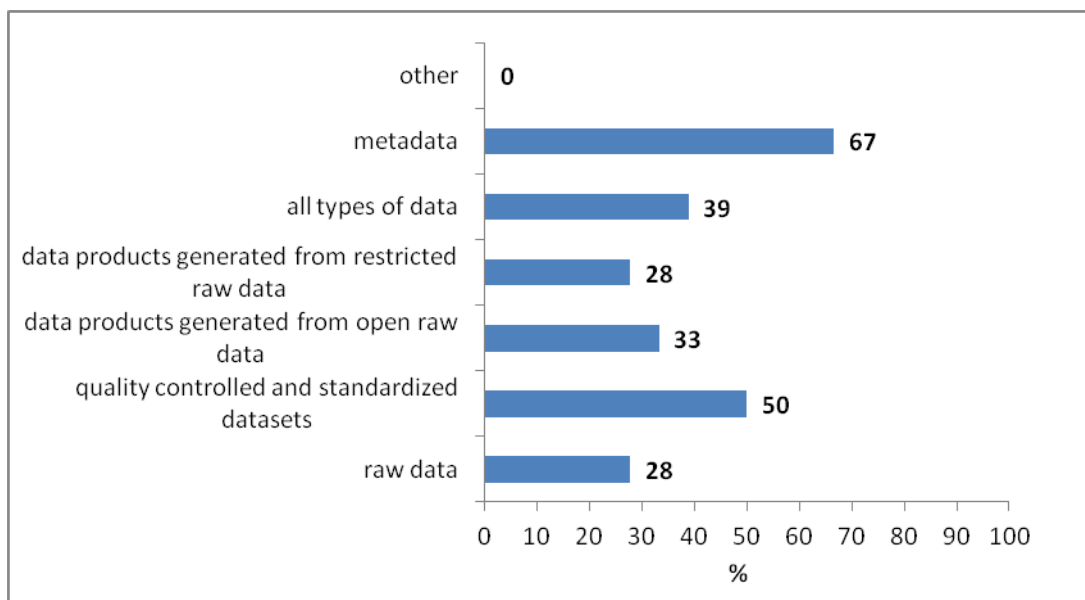
3.3g) In your personal opinion, which policy should be governing metadata in EPOS? (Single choice)
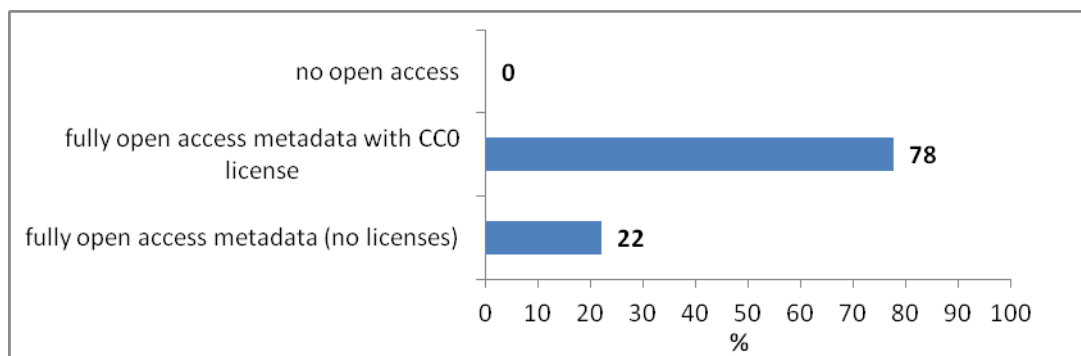
3.4) Misuse of data

3.4a) Can you imagine occasions in which EPOS data may be subject to misuse?
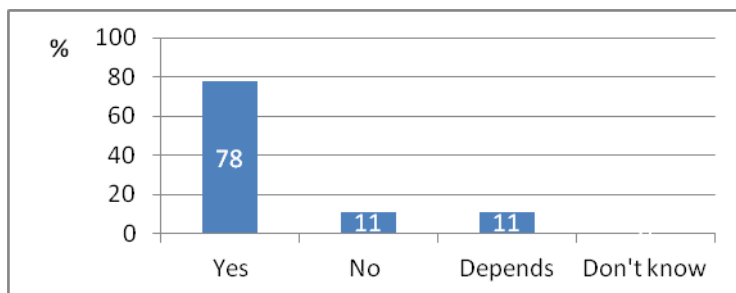
3.4b) Is it possible to reconcile the conflict between open access and potential data misuse?
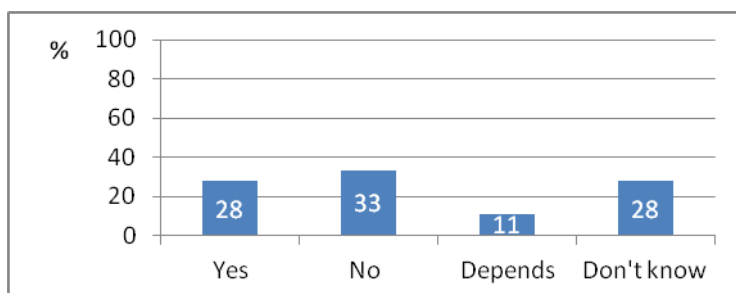
3.4ba) If the answer to the question 3.4b) is "DEPENDS", what does it depend on? (Please explain)

… from the rules.
I can see misuse possible related to a poor understanding of the collected dataset. Reconciliation should be possible by either permitting contact to the author of the data and the user for instance.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

3.4c) Which kind of EPOS data misuse should be considered? (Multiple choice)
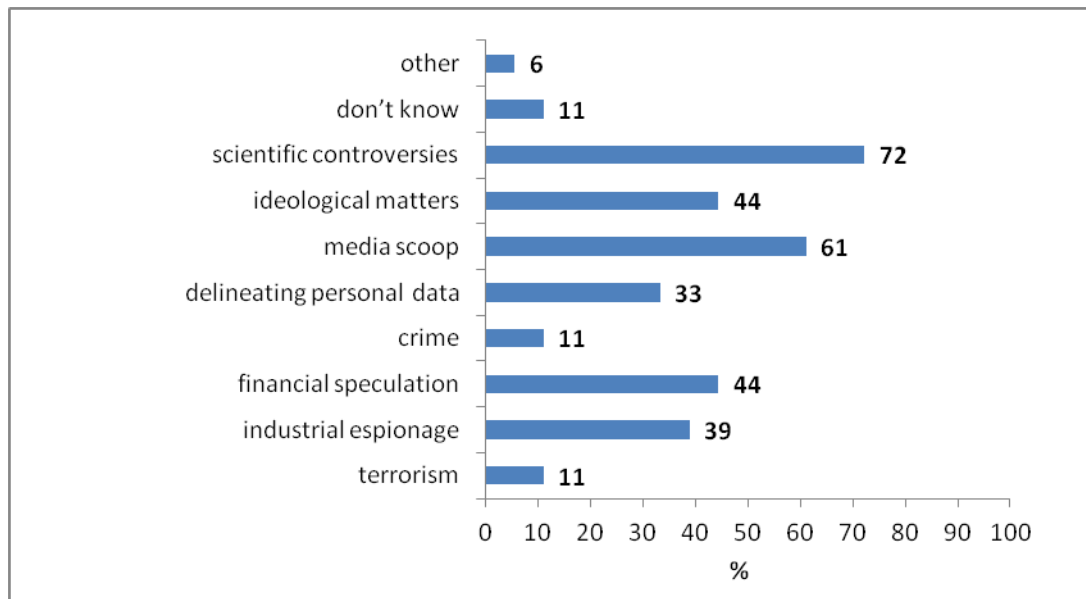
Comments of interviewees to question 3.4c

Real-time data used to develop and publish irresponsible forecasts about imminent or ongoing hazard could potentially cause harm to citizens as well as companies/industries.
Most misuse I can see comes from 'internal' - access to user profiles / activity logs by competitors / wrongdoers to find out about ideas / plans, using that info to discredit them, … (I don't consider EPOS being hacked here...)
I am not an expert. I image there are many possibilities.

3.4d) Should possible misuse of data limit or prevent open access?
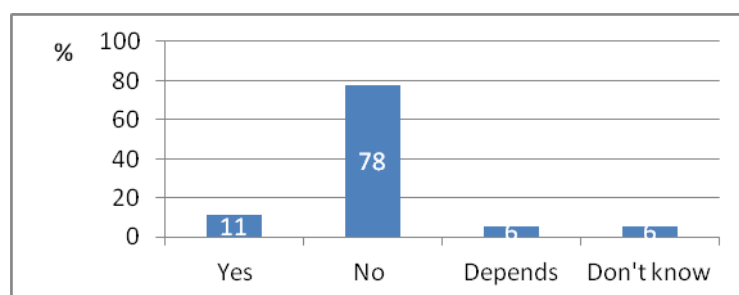
3.4da) If the answer to the question 3.4d is "DEPENDS", what does it depend on? (Please explain)

Depends on datasets and also whether they are available in real time or not. Delayed access to data can prevent their misuse in forecasts.

3.4e) Are regulations for data provenance, traceability and accountability of data providers useful to avoid or mitigate data misuse?
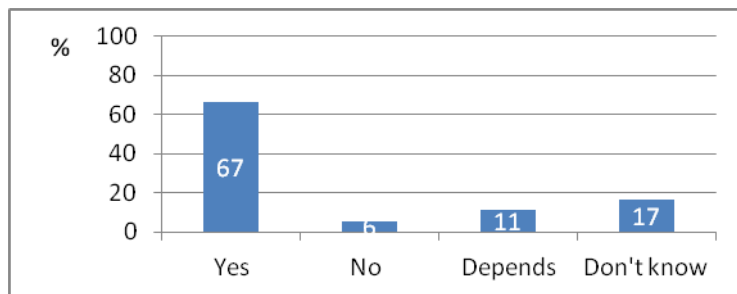
3.4ea) If the answer to the question 3.4e) is "DEPENDS", what does it depend on? (Please explain)

On the regulations, their implementation, and the type of misuse.
In times of inflationary "fake news", the traceability of data and data products is useful. However, it does not prevent from any intentional misinterpretation.

3.5) Risk communication and societal impact

3.5a) Are you involved in communicating data and data products associated with hazard or risk assessment/ mitigation?

3.5b) Which are the most important challenges in risk communication to different stakeholders? (Multiple choice)

Challenge	%
other	0
translating scientific knowledge into generally understandable communications	67
raising awareness of the legal implications	17
meeting the expectations of scientists and society at large	17
promoting or sustaining credibility and trust (i.e., recognizing the authoritative role of involved institutions)	50
understanding role and responsibilities of media	33
help users to reduce their personal risks	33
using social media	22
providing information on probability and uncertainties associated with the risk	56
fostering completeness, clarity and accessibility of information	50
assuring speed in producing reliable scientific information	33
developing digital skills for an effective management of social media	0
providing multidisciplinary scientific approaches	17
having specific competences in communication available	28
engaging multidisciplinary skills	33

3.6a) Impartiality for public good regarding data and data products: always acting in the public interest

3.6b) Does your TCS contribute to monitoring activities for geo-hazards?
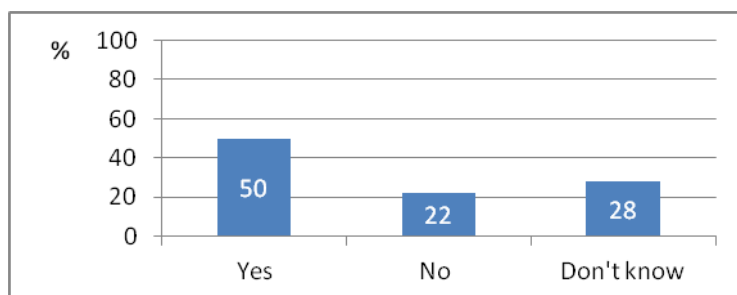
3.6ba) If the answer to the question 3.6b) is "YES", has your organization adopted regulations to manage impartiality for public good in undertaking monitoring services?
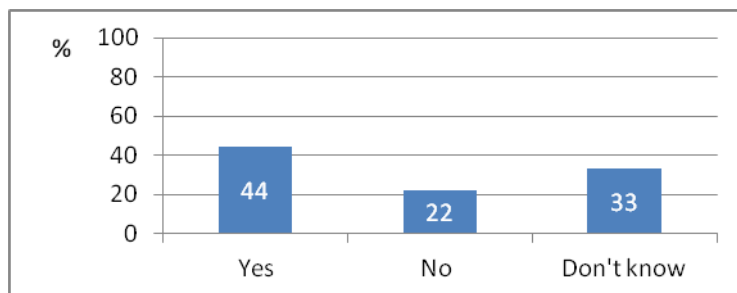
Comments of interviewees to question 3.6ba

I am not sure what sort of regulations this could be.
… partially.

3.6bb) If the answer to the question 3.6b) is "NO", do you believe that some regulations would be necessary to manage impartiality for public good in undertaking monitoring services?

EUROPEAN PLATE OBSERVING SYSTEM   **www.epos-eu.org** | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121
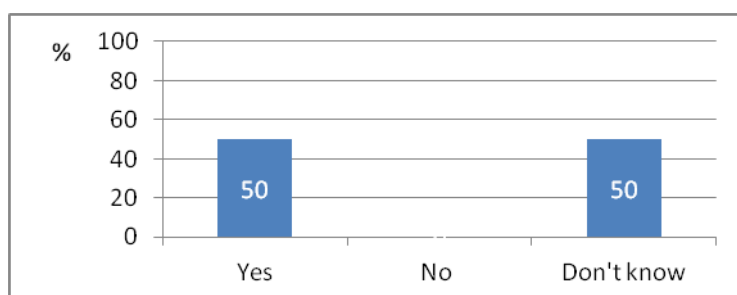
3.6c) According to your experience, who should be in charge of ensuring impartiality for the public good? (Multiple choice)
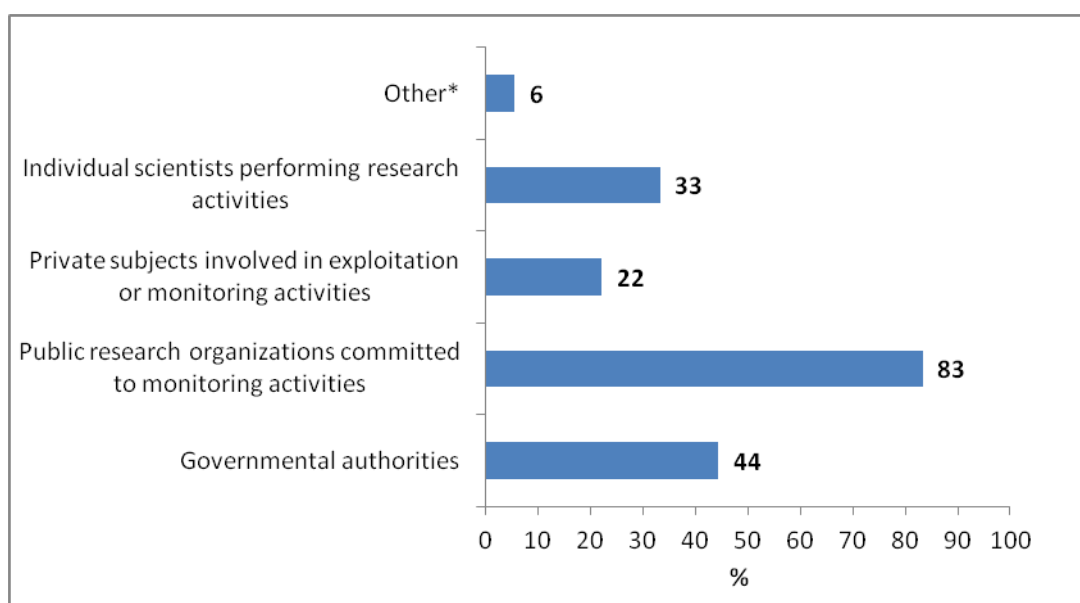
3.6d) Should impartiality for the public good imply open access to data for all stakeholders?
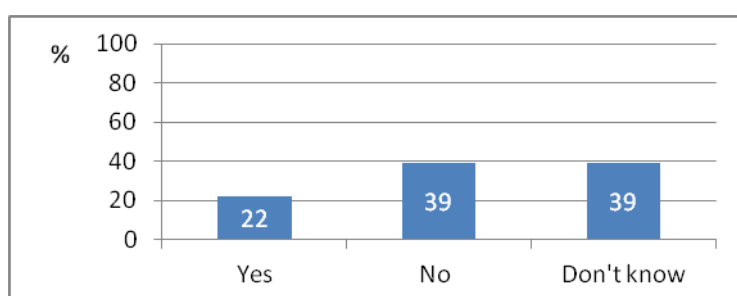
Comments of interviewees to question 3.6d

Answer NO: Depends on the level of scientific content, i.e. must be 'digestable' or 'understandable'.
Answer NO: There are aspects that have to be necessarily publicly driven.

4.2.5 Section "4. Ethical implications associated with service provision"

For each question (in bold) is indicated also its number in the questionnaire.

4.1) Fostering Open Science

4.1a) Should EPOS provide open access to services for data visualization and analysis?
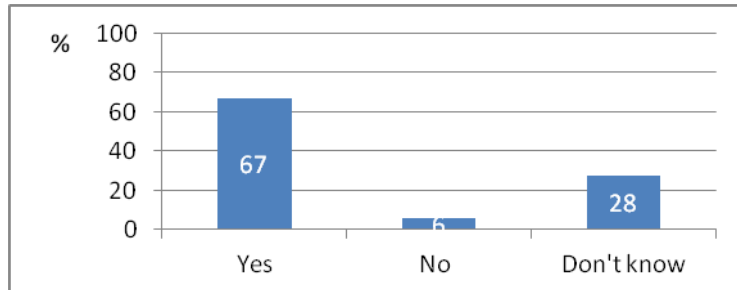
Comments of interviewees to question 4.1a

Answer DON'T KNOW: It depends: for visualization yes. For analysis, no, but it could refer, or have links to other sites.
Answer YES: in principle …
Answer YES: Access to some sensitive analytical services should be limited to the predefined classes of users.
Answer DON'T KNOW: The question 4.1a is not clearly formulated. Does this question mean to use the services (also) for my own data? Or to visualize the existing data in the EPOS system?

4.1b) Should EPOS provide open access to services for data processing and modeling generating new data products?
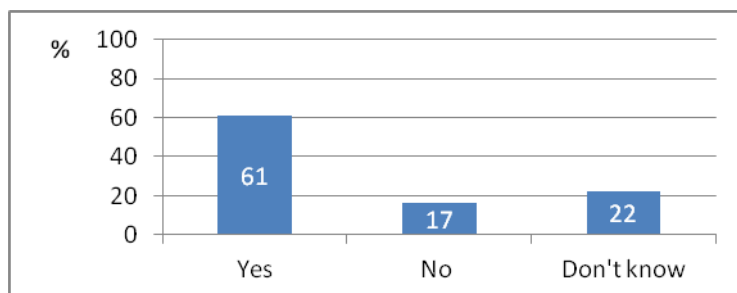
Comments of interviewees to question 4.1b

Answer DON'T KNOW: No, but it could refer, or have links to other sites.
Answer YES: Access to some sensitive analytical services should be limited to the predefined classes of users.
Answer DON'T KNOW: The question 4.1b is not clearly formulated. Does it mean, that I can upload my own data to an EPOS service to be processed there?
Answer YES: … if/when possible.

4.1ba) If the answer to the question 4.1b) is "YES", should EPOS provide users with open access to the generated data products?
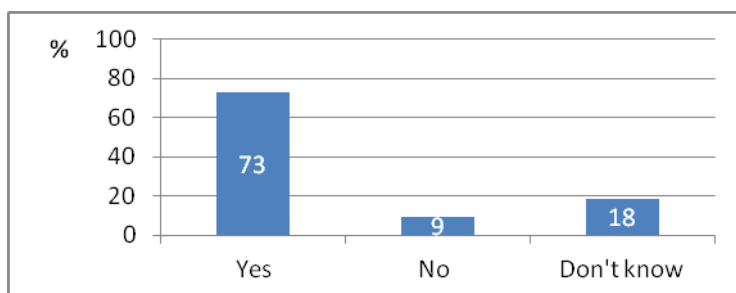
Comments of interviewees to question 4.1ba

Answer YES: After these data products have passed rigorous quality control.
Answer NO: No directly. If the generated products are created and validated by scientists, they can be incorporated as new data following the usual scientific methods.

4.1baa) If the answer to the question 4.1ba) is "YES", should generated data products be findable and accessible through EPOS?
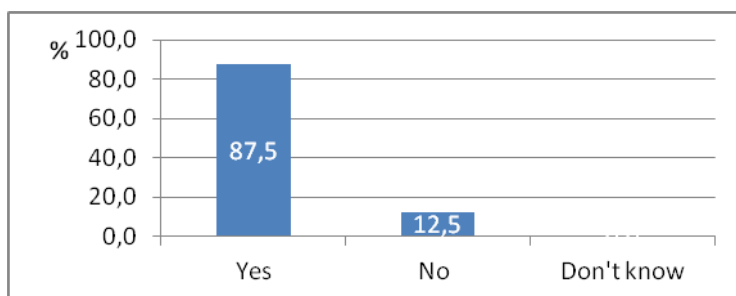
Comments of interviewees to question 4.1baa

Answer YES: After these data products have passed rigorous quality control.

4.1c) Should the available services contain description of the contents and instructions/recommendations to assist users?

EUROPEAN PLATE OBSERVING SYSTEM   **www.epos-eu.org** | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121
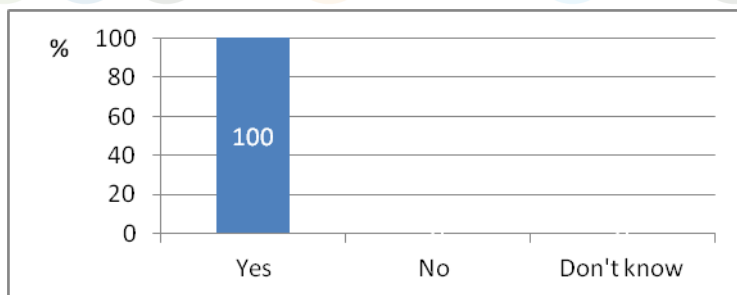
Comments to question 4.1c

Answer YES: Minimal.
Answer YES: If there is funding for that.

4.1d) Should the access to EPOS services be open to: (Multiple choice)
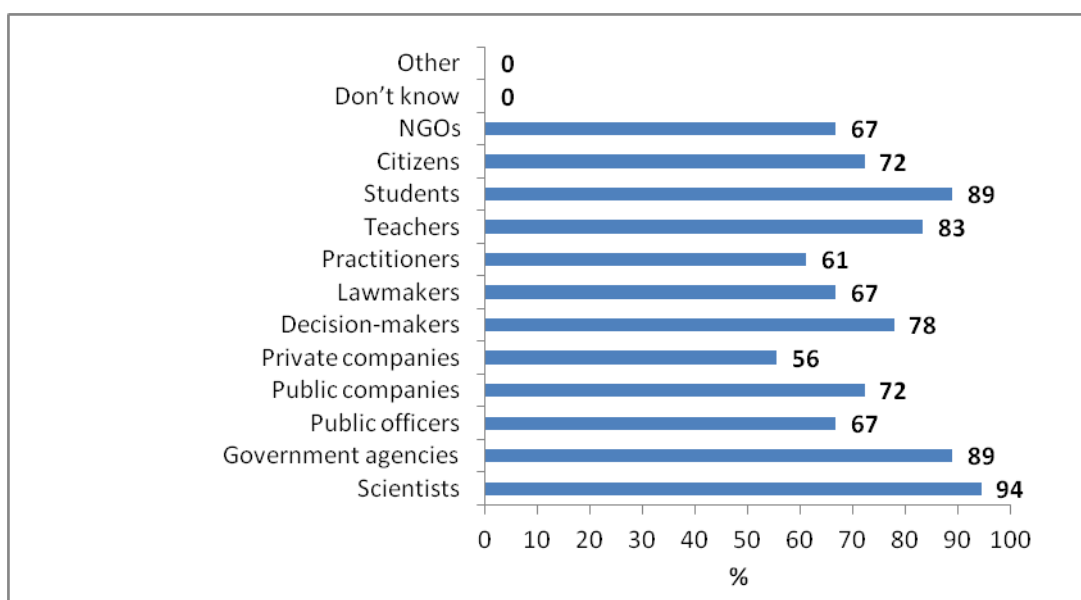
4.1e) Should user authorization be required depending on the type/content of the EPOS services?
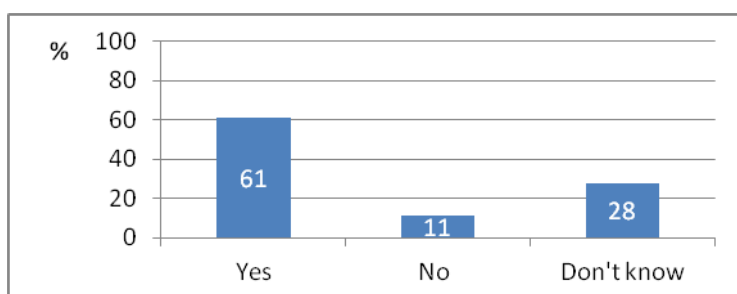
Comments of interviewees to question 4.1e

Answer YES: This is the only base on which that decision should be made.

Answer DON'T KNOW: Again, this may depend on the usefulness in a specific content: what is the possible danger involved when misinterpreting the data?
Answer DON'T KNOW: Who is deciding about the type/content? Based on which perimeters, e.g. ethics, sensitivity?
Answer YES: In general, I think that the relation/connection with private companies has to be specifically regulated.

4.1f) Should EPOS provide access related to relevant scientific products to National Authorities, Civil Protection Agencies and Local Authorities?
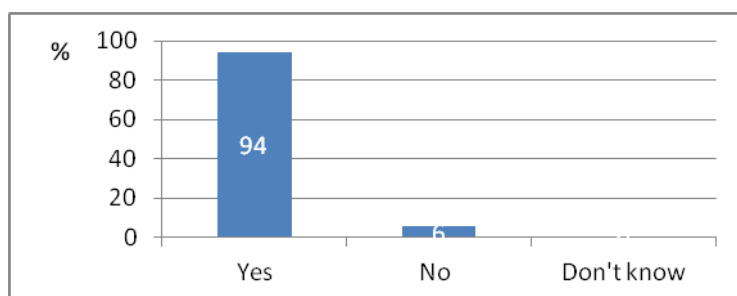
Comments of interviewees to question 4.1f

Answer NO: Usually, there are other agreements between such authorities and the scientists that feed EPOS. It is important that EPOS helps them, not interfere or compete with them.
Answer YES: ... if the user generates, through EPOS services, information interesting for these public agencies, they could/should be shared/opened. But I am not saying that this should be an EPOS task. EPOS provides data and services, not relevant or specific products for Agencies. This is a duty of National Institutions also differently regulated in diverse countries.

4.2) Communication and societal impact of EPOS hazard and risk services

4.2a) Does your TCS provide access to services associated with geo-hazard assessment?

Comments of interviewees to question 4.2a

Answer DON'T KNOW: An option "Not sure" would have been my better fitting answer here.
Answer YES: Data are always related to … geo-hazard …

> Answer NO: No, our TCS represents just one observation technique and cannot provide the required multidisciplinary picture.

4.2aa) If the answer to the question 4.2a) is "YES", is the use of these services limited to authorized users?
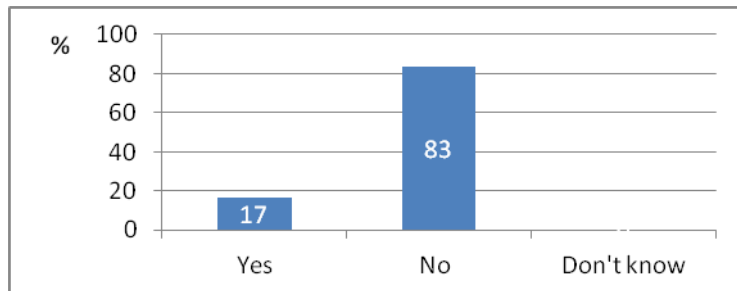
Comments of interviewees to question 4.2aa

> Answer NO: But the user must be registered. In our TCS, unregistered users can only see the contents of our resources, info on these resources, and pre-set data visualizations.

4.2b) Does your TCS provide access to services associated with risk mitigation?
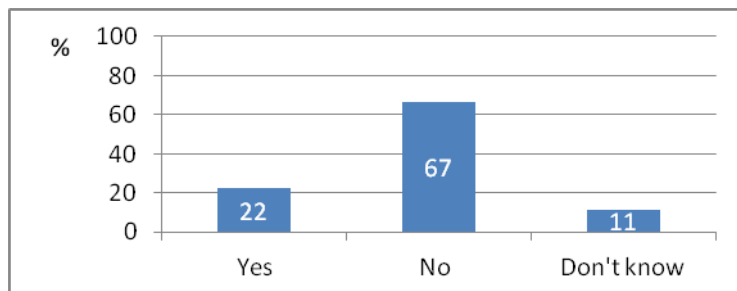
Comments of interviewees to question 4.2b

> Answer NO: No, our TCS represents just one observation technique and cannot provide the required multidisciplinary picture.

4.2ba) If the answer to the question 4.2b) is "YES", is the use of these services limited to authorized users?

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121
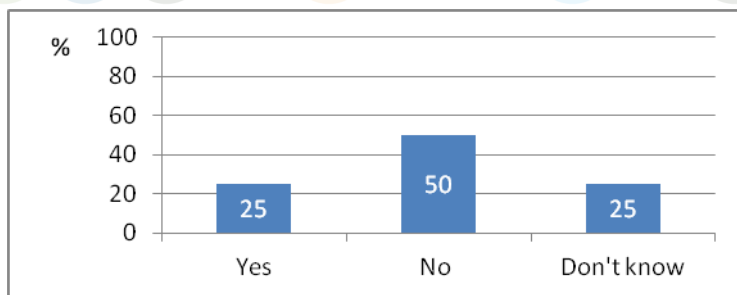
Comments of interviewees to question 4.2ba

Answer YES: The key points are to regulate the private sector and to not work in real time.

4.2c) Does your TCS provide access related to relevant services to National Authorities, Civil Protection Agencies and Local Authorities committed to hazard and risk assessment?
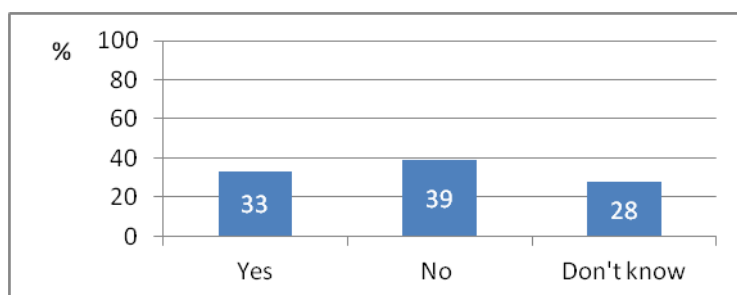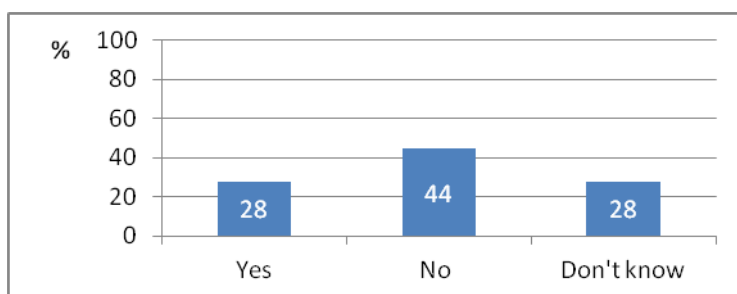

Comments of interviewees to question 4.2c

Answer DON'T KNOW: In principle, yes, but they just use the same access services than anybody else.
Answer YES: All registered users, independent of their affiliation, receive access to all services.
Answer YES: … ideally yes, but not in real time.
Answer NO: No, our TCS represents just one observation technique and cannot provide the required multidisciplinary picture.

4.2d) Does your TCS provide information/recommendations to scientists and experts to allow conscious and responsible use of available products/services?
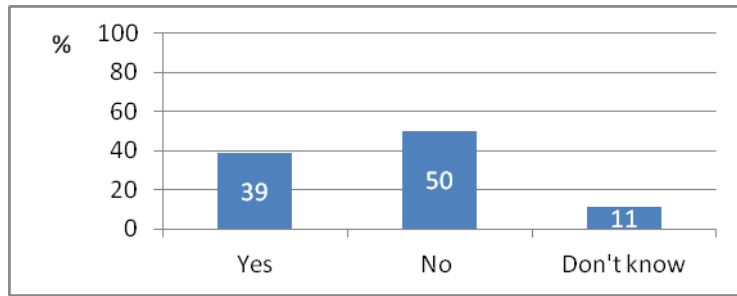
Comments of interviewees to question 4.2d

Answer NO: I am not sure what this actually would mean.
Answer DON'T KNOW: We plan to put more effort on the support of exchange of experiences (e.g. lab experiences).
Answer NO: We do not provide information of this kind while the user works with such services. But, in the framework of limited workforce and finances for educational purposes, we conduct workshops, training sessions, and the like.
Answer NO: Planned. Not yet available.
Answer YES: ... not fully ready yet, of course.
Answer NO: Not yet. We are still working on these aspects. Keep in mind that our services are still not working on line.
Answer NO: Not yet, because this requires man power (and some help would be useful).
Answer YES: But there is room for improvement.

4.3) Impartiality for Public Good regarding service provision: always acting in the public interest

4.3a) Which stakeholders are important for your activities? (Multiple choice)
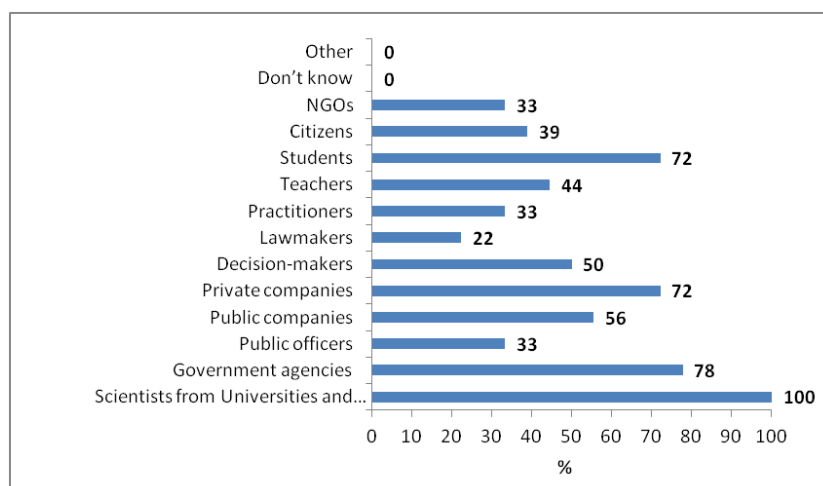
4.3b) Does your TCS provide relevant data-based services for improving the safety of society?
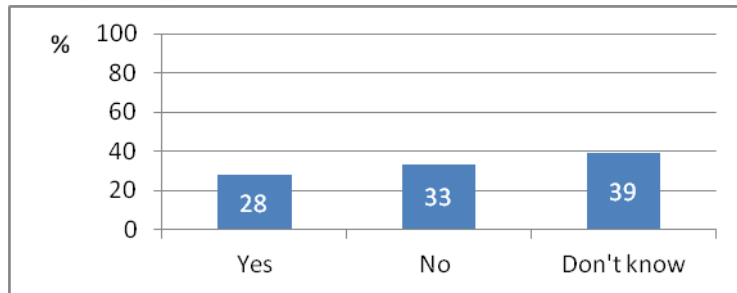
Comments of interviewees to question 4.3b

| |
|---|
| Answer NO: Not directly; as I said we don't work in real time. But in general, our data can actively contribute to the safety of society. |
| Answer NO: No, our TCS represents just one observation technique and cannot provide the required multidisciplinary picture. |
| Answer YES: The TCS GNSS Data & Products services are used in many multi-disciplinary studies and in this way improves directly or indirectly the safety of society. |

4.3ba) If the answer to the question 4.3b) is "YES", how are those data-based services communicated to decision-makers? (Single choice)
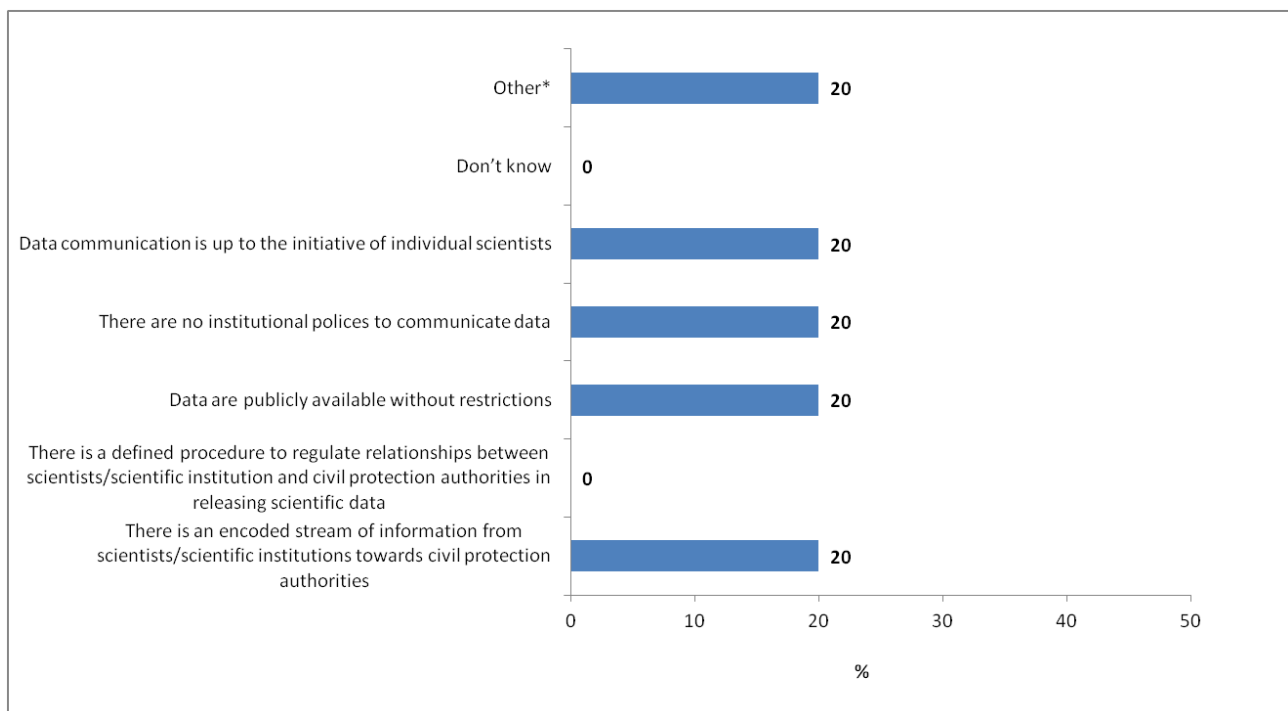
Comments of interviewees to question 4.3ba

Answer OTHER: All of the three first bullet points apply in some cases.

4.3c) Do you agree with the following statements? Please, express your agreement/disagreement through a ranking from 1 (disagree) to 5 (fully agree)

Conflict of interests is frequent in the EPOS service management
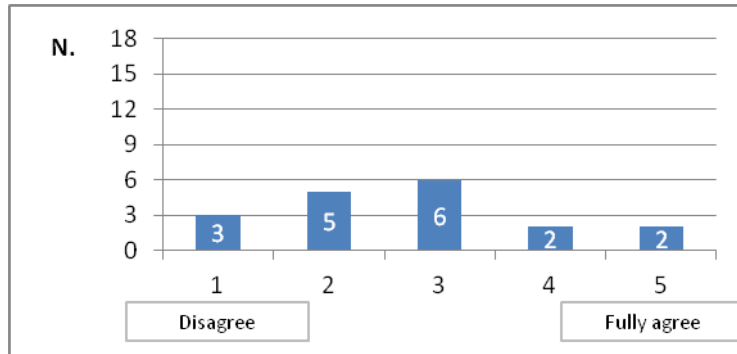
Conflict of interests is inevitable in the EPOS service management
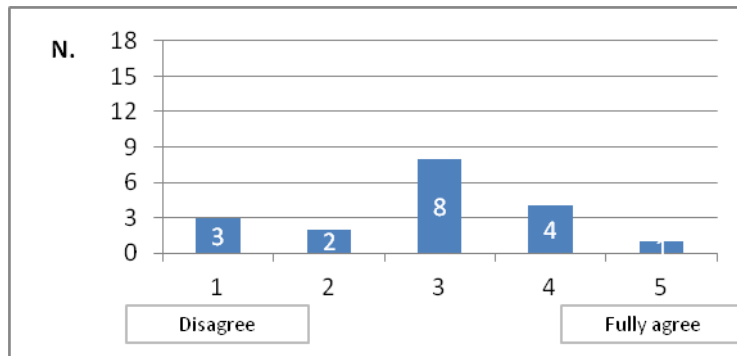
Conflict of interests can be solved by adopting appropriate codes of conduct
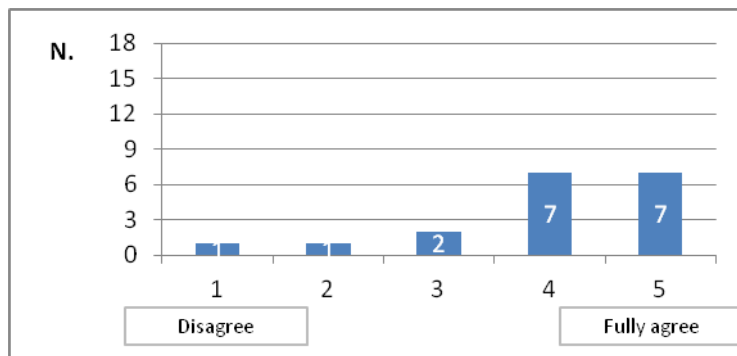
Conflict of interests can be solved by increasing the ethical awareness of scientists
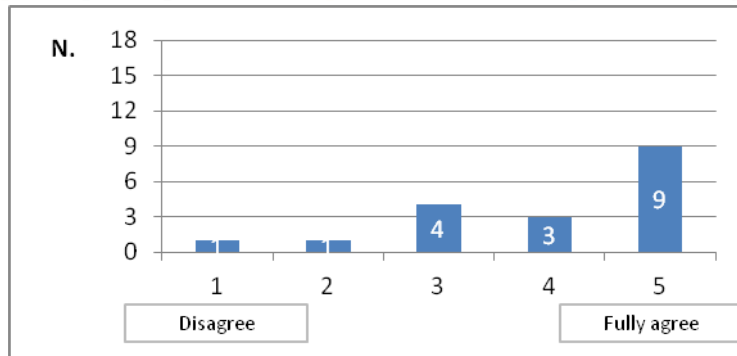
Conflict of interests can be solved by declaring potential and current conflicts in advance to the respective institutional governing offices
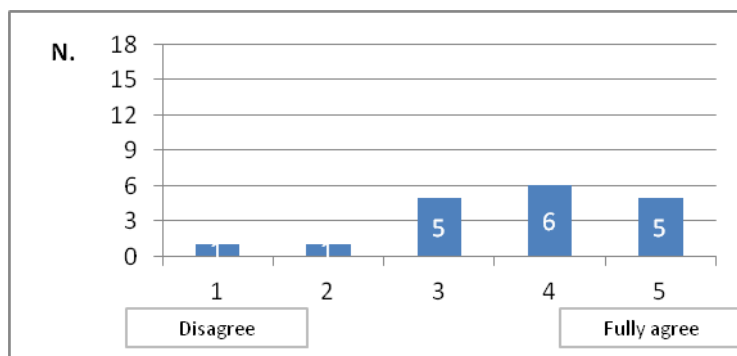
Personal conflict of interests can be solved by avoiding one's own involvement in activities that could lead to conflict, even if potential
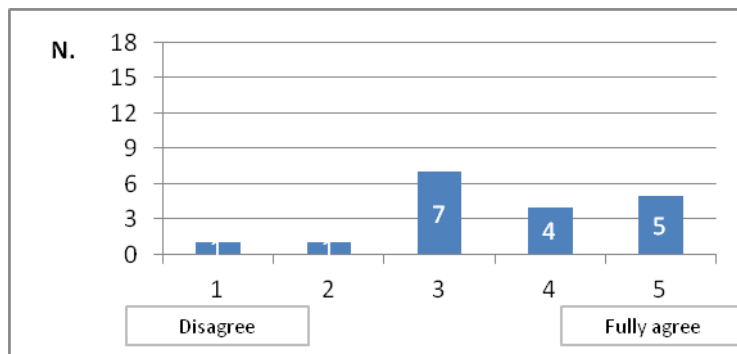
Conflict of interests compromises individual and institutional reputation and credibility
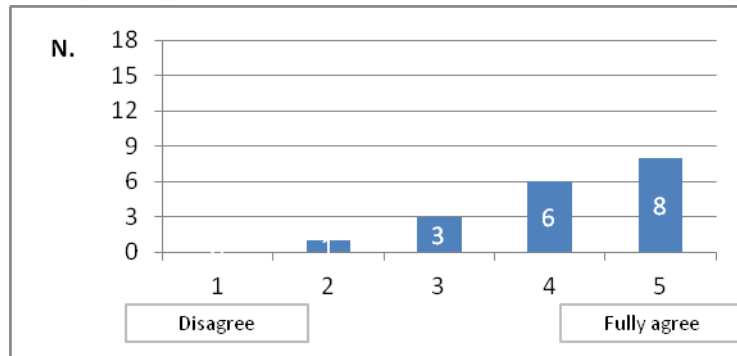
In principle, public funded data should not be released to private industry or commercial undertakings for free
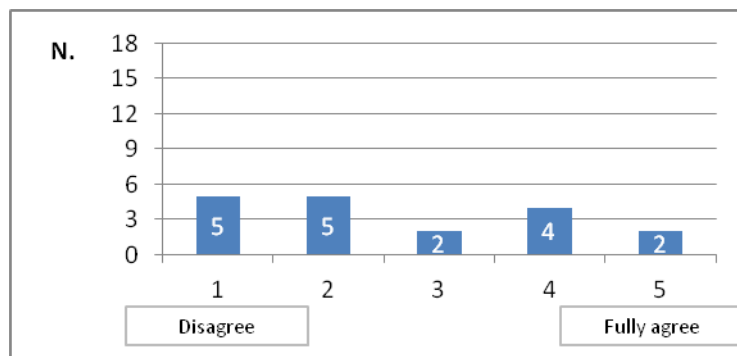
Public funded data should be released to private industry or commercial undertakings for free only if such data can help them to develop better technologies for the safety of society
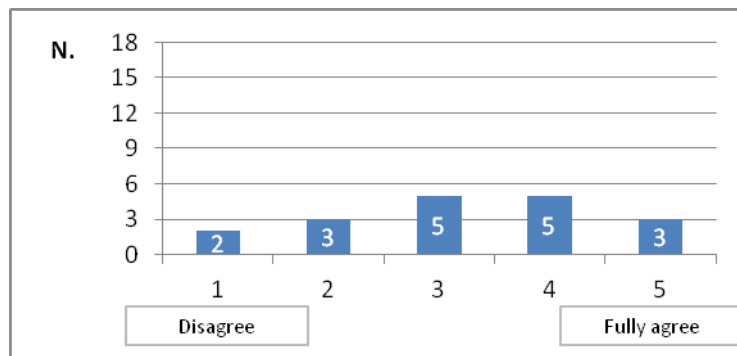
EPOS activities should be based on the principle "impartiality for public good"
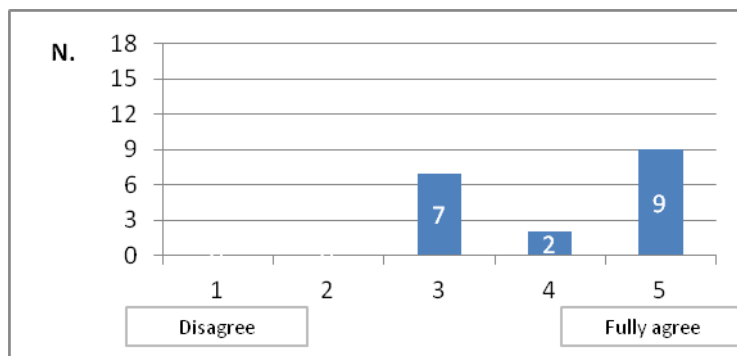
EPOS services should be available for all stakeholders
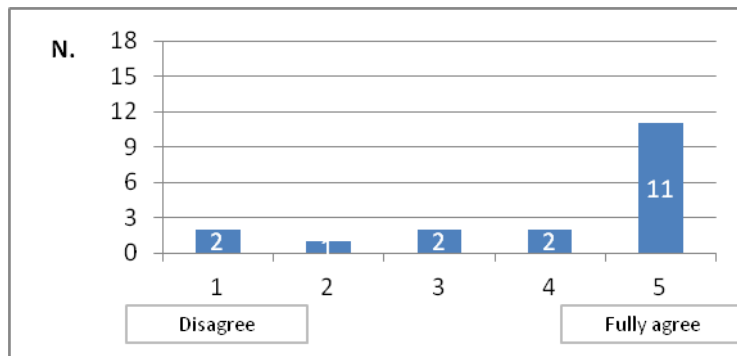
Comments of interviewees to statements in 4.3c (optional)

I believe that persons with high ethical standards easily manage the issue of conflict of interest. I think that the vast majority, if not all members, of the EPOS community have such standards. I do not believe that regulatory action by governmental institutions can substitute personal compliance with ethical principles. The well-being and development of societies largely depend on the success of private sector activities. Most of the public money comes from taxes from private sector activities. Therefore, as a general rule, public-funded data and services should be made available to private organizations to support the development of all their activities.
… pay attention to the private sector.

4.2.6 Section "5. Ethical issues associated with scientific knowledge"

For each question (in bold) is indicated also its number in the questionnaire.

5.1) Should EPOS provide tools to improve the understanding of scientific content to non-expert audiences?
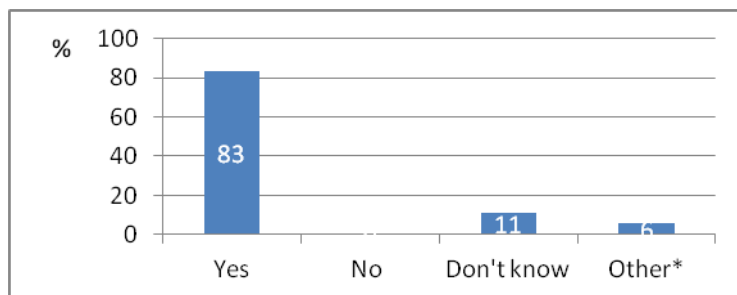
Comments of interviewees to question 5.1

Answer OTHER: EPOS cannot / shall not become a public learning initiative, but where possible / feasible it should endeavor to improve the understanding / usability of data / services for the general public.
Answer YES: It may only be linked to existing product, but it should at least provide something to help in that matter too.

EUROPEAN PLATE OBSERVING SYSTEM   www.epos-eu.org | info@epos-eric.eu | epos@ingv.it

THE EPOS SP PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N° 871121

5.2) Which channels/tools should be used by EPOS to improve the understanding of scientific content of different end-users, including non-expert audiences? (Multiple choice)
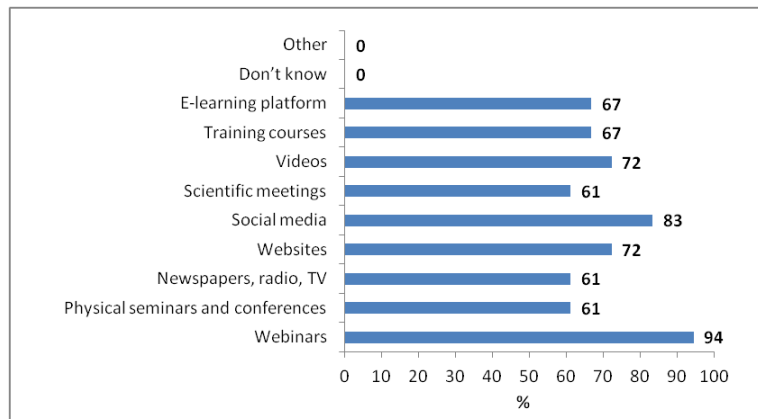
Comments of interviewees to question 5.2

Difficult question. To avoid asking again more of the EPOS scientists, new people are needed to perform this role of bridge between scientists and non-experts.
Whatever the best; in more than 2 formats at least, as users can have many or little capacity to access it.

5.3) Which issues may be related to the provision of scientific contents to non-expert audiences by EPOS? (Multiple choice)
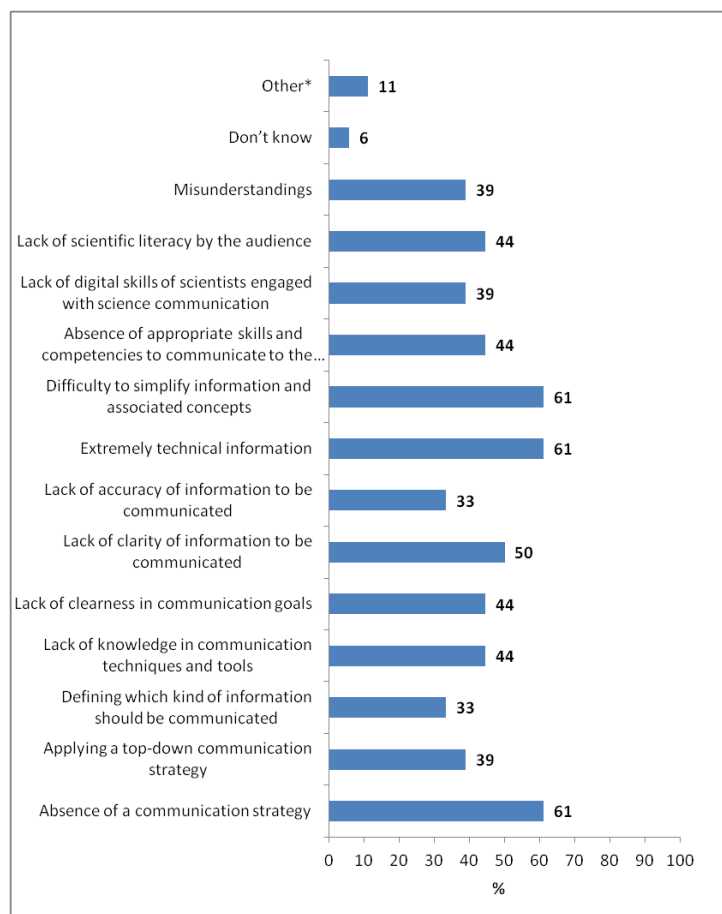
Comments of interviewees to question 5.3

Answer OTHER (Lack of time): Working for EPOS means being expert in legal & financial aspects, be aware of ICS interoperability demands and trying to deliver the TCS services. There is simply no time left to prepare scientific contents to non-expert audiences.

5.4) Does your TCS provide scientific knowledge to different end-users?
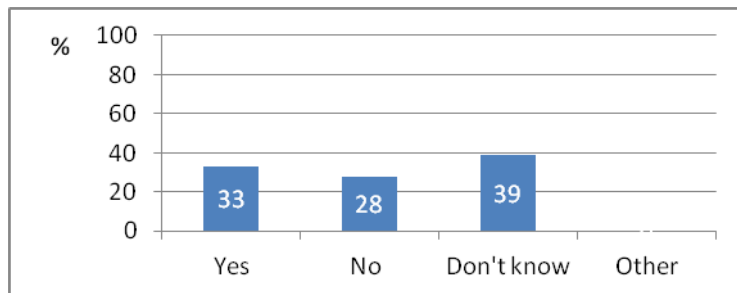
Comments of interviewees to question 5.4

Answer NO: Currently the group of end users is solely comprised of peer researchers.
Answer NO: Not yet.
Answer NO: Most of the data are still provided with the specialist scientist in mind, unconsciously at least.

5.4a) If the answer to the question 5.4) is "YES", could you indicate which kind of scientific knowledge is provided by your TCS? (Provide a short description)

Seminars, public events also very different from a frontal seminar, videos.
Volcanic activity reports, forecasts of ash/gas dispersion in the atmosphere, hazardous exposure to volcanic gas. Scientific information about active volcanoes and their eruption history.
Knowledge about seismological phenomena in general (from seismic events to Earth structure to seismic hazard and risk).
Currently, the TCS Anthropogenic Hazards, mostly, though not exclusively, integrates research infrastructure - data and software applications, related to anthropogenic seismicity and its issued hazard. In such a context, we primarily familiarize end-users with the anthropogenic seismic hazard assessment's notions and practice. The practical training is based on the hazard analysis facilities of the IS-EPOS Platform (tcs.ah-epos.eu). Particular attention is devoted to the possibilities of uncovering relations between technological activities for exploration and exploitation of geo-resources and the seismicity and hazard. However, to reach this goal, holistic training also includes topics on data pre-processing backed by software applications implemented on the Platform.

Description of boreholes to be used for underground water resource exploration, mineral resources exploration, civil engineering, underground CO_2 storage, etc.

Tectonic and geodynamic models, paleomagnetic data, analytical data, rock physics data.

5.4b) If the answer to the question 5.4) is "YES", could you indicate the main end-users of your TCS? (Multiple choice)
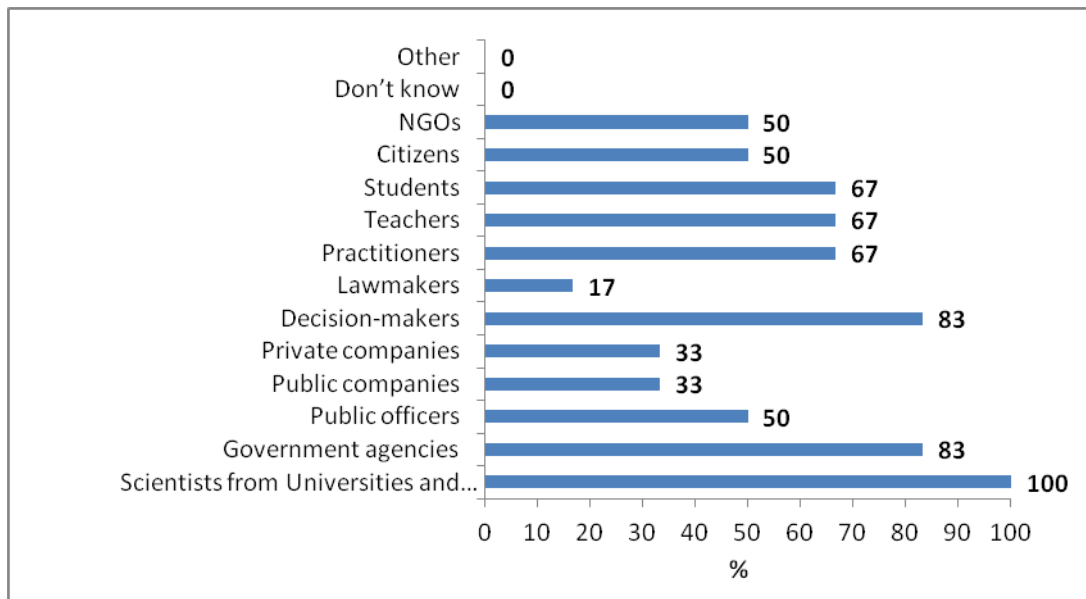
5.4c) If the answer to the question 5.4) is "YES", which of the following channels/tools are used by your TCS? (Multiple choice)
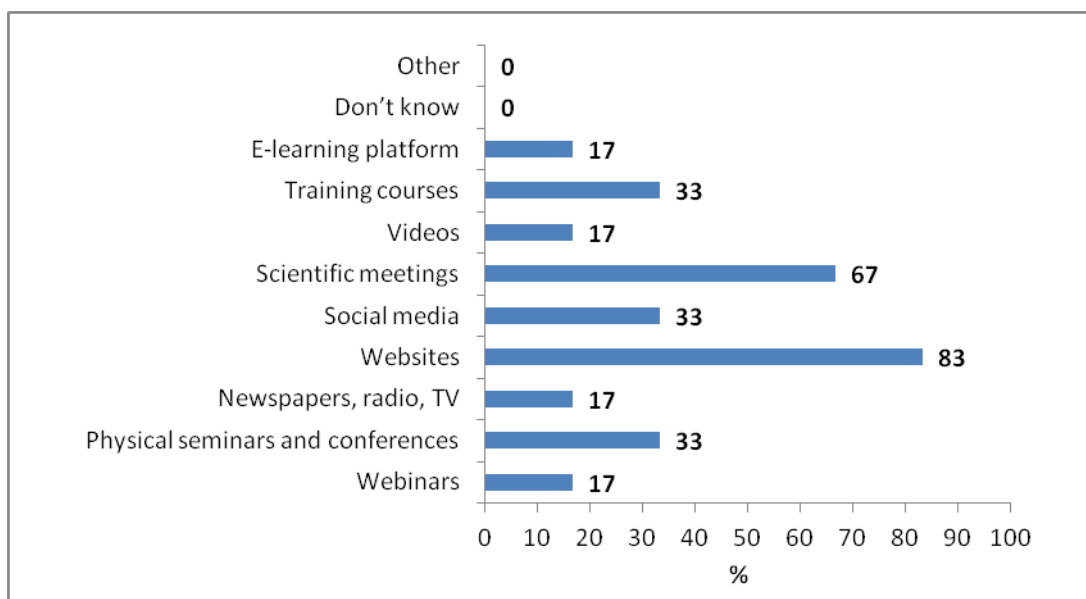
4.3 Discussion

Despite the number of questionnaires received is low (18), the results of the survey show several clear indications to be considered for the development of the EPOS ethical guidelines.

The majority of respondents (10/18) filled in the questionnaire in an anonymous way, 10/18 indicated the country in which they work and 9/18 their affiliation (see 4.2.1).

4.3.1 Section "1. General questions"

Regarding questions more specifically addressed on ethics (from question Q1.1 to Q1.7) the majority of respondents (15/18) considers ethics in geosciences an important issue while 3/18 ones consider it neither essential nor irrelevant. All respondents think that applying ethics to research activities is essential, 16/18 ones that ethics is very important for EPOS management and activities, but for 7/18 ones ethical issues are not so considered in EPOS.

Professional courtesy, fairness in working with others, honesty, transparency, and doing excellent science are the most important reference values for the research/scientific and technological activities of the respondents. Moreover integrity, reliability, credibility, satisfaction, and building or sustaining relationships are values of great importance for one's work, more than sharing results with others, prestige, and professional career. No one consider salary a value for doing its work.

Among fields of activity respondents believe that hazard and risk communication, relationships between geoscientists, media, and decision makers, environmental monitoring, natural resources exploration, exploitation, and management are the main topics that imply clear ethical and social implications. Just over half of respondents see those implications in the data life cycle and in risk reduction topics, whilst science communication and education, and workplace climate received less consideration for their ethical and social aspects.

Regarding questions focused on scientists-society relationships (from Q1.8 to Q1.11a), few respondents think that their activities don't have an impact on society, whilst a not negligible number don't know about this.

16/18 respondents think that scientists have responsibility towards society, but a lower number of them believes that geoscientists have social obligation to serve society, and only 4/18 ones are in agreement with the sentence that the primary duty of geoscientists is to benefit society. In any case, for 14/18 ones, geoscientists have the ethical duty to act in an impartiality way for assuring the public good.

If geoscientists should be good science communicators or hazard/ risk communicators seems to be not clear, since opinions on it are different. In any case nobody disagree on this aspect and majority of respondents (15/18) think that there are differences between science communication and hazard/risk communication. 12/18 ones agree that there is a difference in the role played by geoscientists in hazard communication and risk communication. 10/18 ones believe that hazard communication may have legal implications, whilst a higher number (14/18) agree that risk communication may have.

14/18 of respondents agree that geoscientists are science advisors and not decision makers, and that their primary goal is to do excellent science (15/18). There is a general agreement that hazard and risk communication are multidisciplinary activities, and that social scientists have to be involved in designing risk communication strategies, but there is no consensus about this point when it refers to hazard communication.

Most of respondents (16/18) think that risk communication changes over time during a crisis.

11/18 of respondents agree that geoscientists have an ethical duty to expose their hazard and risk data to society, but 2/18 ones partially disagree on this. A slightly shift in the agreement occurs when it refers to the duty to share geoscientists' hazard and risk data with colleagues.

Finally, majority of respondents (14/18) agree that general public should have open access to scientific information, whilst 2/18 ones disagree.

Regarding the issue of conflict of interests, most of respondents choose the following two sentences among the five proposed:

- An individual has consciously or unconsciously, personal, professional/scientific or institutional interests which are in conflict with professional/scientific and institutional responsibilities and with official roles covered.
- Impartiality of the individual or organization in decisions between competing interests and freedom in actions is compromised.

72% of respondents declare that his/her Institute/University receive funding from private sector (industry, commercial undertakings, etc.) or NGOs that may lead in few cases to real or potential conflict of interests.

4.3.2 Section "2. Protection of personal data"

83% of respondents are aware that a personal data protection policy is necessary for EPOS data and service provision (Q2.1), but for 39% ones this is not a good reason to avoid registration/authentication of users, whilst 33% don't have a clear idea on this point (Q2.2). Among 17% ones who answered "depends", it is worthy to be mentioned the following comment: "If registration/authentication is for information or tracking only, it should be avoided. If registration/authentication is necessary for, e.g., protecting against misuse or scaling or steering requests, it could be done." (Q2.2a)

About this issue, half of respondents (50%) think that EPOS should require user registration/authentication to access data and services (Q2.3). A less percentage (39%) agree to require user authorization (Q2.4), whilst 56% ones believe that EPOS should collect information to profile users (Q2.5), with several comments to be considered:

- EPOS should ensure not to use such information for anything but statistics.
- EPOS should monitor that the services are being used by the geoscience community and stakeholders and to help tailor the services to the targeted users.
- EPOS should not in principle require authentication or authorization, but may certainly do it for particular scenarios (those scenarios may also be / become the majority, but it should still not become a principle).
- EPOS should collect information of users to better know the user profile which justify or not the EPOS investments. But this collection should be an opt-in possibility.
- Only partially and not necessarily.
- With user's consent.
- Perhaps not all info but enough or analytical reasons at least.
- Only general information to know the profile of user in order to improve EPOS.

Wider agreement (72%) exists about the need for EPOS to collect information concerning the purpose the user wants to accomplish by having access to data and services (Q2.6), even if some concerns are expressed in the comments to this question.

4.3.3 Section "3. Ethical issues associated with data and data products provision"

61% of respondents declare that their Institute/University have a policy for the data life cycle (acquisition, storage, elaboration, sharing and management) (Q3.1).

72% of colleagues think that publicly funded data should be freely accessible. Among 22% ones who answered "depends", it seems that an embargo period might be a solution to guarantee property and publication rights to those who collected those data or elaborated data products (Q3.3a).

The answers to the question 3.3b confirm that the majority of respondents (67%) agree on open access for data and data products. And as already previously written, even 14/18 ones agree that the general public should have open access to scientific information (see 4.3.1).

In one of the comments to the question 3.3b is reported that "Working with private, data are owned by them. But you can ask to use them, and also publish, provided some limitations. Similarly, I think that the geoscientist has the duty of showing the results, explain the method, with the whole transparency, and, upon request, give the access to data."

Regarding those users for which data and data products should be open, some perplexities are shown for private companies, but in any case, each item included in the list of users has been chosen by a percentage of interviewees greater than 60%, with a maximum percentage of 94% for scientists and government agencies (Q3.3c). 89% ones agree that open data should be provided together with easy-to-understand description of the contents and instructions on how to read/process the data, also in order to prevent misuse and misunderstandings (Q3.3d).

A critical point could be ways to manage accesses to EPOS data. To this regard, 61% of respondents think that user registration is the best method, followed by licensing (33%), and, with a percentage of 28%, by open access for scientists and scientific institutions, access with limits for different users, and full open access (without restrictions) (Q3.3e).

If the issue is related to the types of data and data products to be open access, 67% of respondents choose metadata, 50% quality controlled and standardized datasets, 39% all types of data, and 33% data products generated from open raw data (Q3.3f).

Moreover, 78% of respondents agree that metadata should be fully open access with CC0 license ("No Rights Reserved") (Q3.3g).

A key topic for the EPOS RI is the possible misuse of data. Some questions have tried to investigate opinions about this aspect.

78% of respondents think that EPOS data may be subject to misuse (Q3.4a), but there are perplexities about the possibility to reconcile the conflict between open access and potential data misuse (Q3.4b).

Most of respondents (72%) believe that EPOS data can be misused to feed scientific controversies (in one comment is mentioned the risk of "internal" misuse) or (61%) media scoop (a comment cites that "Real-time data used to develop and publish irresponsible forecasts about imminent or ongoing hazard could potentially cause harm to citizens as well as companies/industries"). The possibility that EPOS data and data products are used for crime purposes and terrorism is not considered of great importance (Q3.4c).

In any case 78% of respondents don't believe that possible data misuse can limit or prevent open access to EPOS data (Q3.4d). One interviewee suggests that a delayed access to real-time data can prevent their misuse in forecasts (Q3.4da).

In order to avoid or mitigate data misuse, 67% think that regulations for data provenance, traceability and accountability of data providers are useful tools (Q3.4e), even if intentional misinterpretation cannot be excluded in any case (Q3.4ea).

67% of respondents declare to be involved in communicating data and data products associated with hazard or risk assessment/mitigation (Q3.5a). Moreover, another 67% consider translating scientific knowledge into generally understandable communications the most important challenge in risk communication to different stakeholders (Q3.5b). Other important challenges on this topic are (Q3.5b):

- providing information on probability and uncertainties associated with the risk (56%);
- fostering completeness, clarity, and accessibility of information, as well as promoting or sustaining credibility and trust (i.e. recognizing the authoritative role of involved institutions) (50%).

Moreover, 33% of respondents include: understanding role and responsibilities of media; helping users to reduce their personal risks; fostering speed in producing reliable scientific information; engaging multidisciplinary skills among the most important challenges of risk communication.
Surely, all the respondents agree that impartiality for public good regarding data and data products is fundamental for always acting in the public interest (Q3.6a).
Among 50% of those involved in monitoring activities for geo-hazards (Q3.6b), 44% work for in organization that adopted regulations to manage impartiality for public good in undertaking monitoring services (Q3.6ba), whilst for 22% of those who are not involved in monitoring activities for geo-hazards (Q3.6b), 50% believe that some regulations would be necessary (Q3.6bb).
83% agree that public research organizations committed to monitoring activities should be in charge of ensuring impartiality for public good, 44% are convinced that also governmental authorities should guarantee this principle, whilst 33% think that individual scientists performing research activities should be also in charge for ensuring it (Q3.6c).
There are perplexities about a direct link between the principle of impartiality for the public good and the open access to data for all stakeholders: 39% of respondents don't agree on this, 22% agree, 39% don't know (Q3.6d).

4.3.4 Section "4. Ethical implications associated with service provision"

The first block of questions refers to fostering open science (Q4.1).
For 67% of respondents EPOS should provide open access to services for data visualization and analysis, and a 28% that don't know (Q4.1a). 61% believe that open access should be adopted also in the case of services for data processing and modeling generating new data products (Q4.1b), with a 27% that are against that or doesn't know if EPOS has to provide users with open access to the generated data products (Q4.1ba), and 87.5% that in any case agree that generated data products should be findable and accessible through EPOS (one interviewee suggests that generated data products should be made available only after them have passed rigorous quality control) (Q4.1baa).
For all respondents available services should contain description of the contents and instructions/recommendations to assist users (Q4.1c), and for the majority be open to all stakeholders, particularly to scientists, government agencies, students, and teachers (Q4.1d).
For 61% of respondents user authorization should be required depending on the type/content of the EPOS services (Q4.1e), and 94% agrees that EPOS should provide access related to relevant scientific products to National Authorities, Civil Protection Agencies and Local Authorities (Q4.1f). About this aspect in one comment is specified that "If the user generates, through EPOS services,

information interesting for these public agencies, they could/should be shared/opened. But I am not saying that this should be an EPOS task. EPOS provides data and services, not relevant or specific products for Agencies. This is a duty of National Institutions also differently regulated in diverse countries."

The second block of questions is focused on communication and societal impact of EPOS hazard and risk services (Q4.2).
33% of respondents affirm that their TCS provide access to services associated with geo-hazard assessment (Q4.2a), and among them 83% answer that those services are not limited to authorized users (Q4.2aa), and in one case is reported that user must be registered in any case.
Only 22% serve in TCS that provide access to services associated with risk mitigation (Q4.2b), and 50% of them report that those services are not limited to authorized users (Q4.2ba).
Even a low percentage of interviewees (28%) serve in TCS that provide access related to relevant services to National Authorities, Civil Protection Agencies and Local Authorities committed to hazard and risk assessment (Q4.2c).
Finally, 39% indicate that their TCS provide information/recommendations to scientists and experts to allow conscious and responsible use of available products/services (Q4.2d).

The third block of questions relates to impartiality for public good regarding service provision (Q4.3). This topic implies issues related to conflict of interests.
Respondents indicate that in their activities, scientists are the main stakeholder (100% of cases), followed by government agencies (78%), private companies and students (72%), and public companies (56%). All the other stakeholders show lower percentages (Q4.3a). It seems significant that in 72% of cases private companies are reference stakeholders for scientific/technological activities. This implies that ethical issues related to relationships between scientists andprivate companies, should be carefully considered in the future EPOS ethical guidelines.
To this aim, results from a set of sentences to be in agreement or not by using a Likert rating scale seems to be of great interest (Q4.3c).
Most of respondents think that conflicts of interests are not so frequent and inevitable in the EPOS service management.
14/18 of respondents believe that conflict of interests can be solved by adopting appropriate codes of conduct, by increasing the ethical awareness of scientists on it (12/18), or by declaring potential and current conflicts in advance to the respective institutional governing offices (11/18). 50% of respondents (9/18) think that personal conflict of interests can be solved by avoiding one's own involvement in activities that could lead to conflict, even if potential.
In any case, for 14/18 respondents, conflict of interests compromises individual and institutional reputation and credibility. It deserves to be mentioned a comment by one interviewee to the issue of conflict of interests: "I believe that persons with high ethical standards easily manage the issue of conflict of interest. I think that the vast majority, if not all members, of the EPOS community have such standards. I do not believe that regulatory action by governmental institutions can substitute personal compliance with ethical principles. The well-being and development of societies largely depend on the success of private sector activities. Most of the public money comes from taxes from private sector activities. Therefore, as a general rule, public-funded data and services should be made available to private organizations to support the development of all their activities."
The issue regarding public funded data released to private industry or commercial undertakings for free, even if such data can help them to develop better technologies for the safety of society, seems to be "controversial" and will deserve to be carefully discussed among the EPOS community.
Finally, nobody disagrees that EPOS activities should be based on the principle of impartiality for public good, and 13/18 agree that EPOS services should be available for all stakeholders.

83% of respondents think that EPOS should provide tools to improve the understanding of scientific content to non-expert audience (Q5.1). This doesn't mean that EPOS has to become a public learning initiative, as commented by one of the interviewees who chose the option "Other" to answer, but where possible/feasible, it should endeavor to improve the understanding/usability of data/services for the general public.

Webinars (94%) and social media (83%) are considered the main channels/tools to be used by EPOS to improve the understanding of scientific content of different end-users, including non-expert audiences (Q5.2). In any case, the majority of respondents (higher of 60%), indicate all the listed channels/tools in question Q5.2.

Problems related to the provision of scientific contents to non-expert audiences by EPOS might arise due to the absence of a communication strategy (61%), extremely technical information and difficulty to simplify information and associated concepts (61%), lack of clarity of information to be communicated (50%). Other problems are indicated by lesser percentage of respondents (Q5.3).

In 33% of cases, respondents declare that their TCS provide scientific knowledge (Q5.4), of different types as indicated in the table (Q5.4a) and to different end-users (Q5.4b). Channels/tools more used to spread scientific knowledge are websites and scientific meetings (Q5.4c).

5. CONCLUSIONS

Ethics is a key topic for the development of a modern scientific and technological research infrastructure. Assuring excellent science and technological activities needs high skills and awareness about specific roles and responsibilities of scientists, technicians, and administrative supporting units, in order to manage complex issues affecting science-society interface.

The importance of ethics in scientific and technological activities seems to be clear for the majority of those who participated in the survey promoted by the Task 6.1. But despite this encouraging signal, there are some considerations to be done:

1) the questionnaire was filled in by a low number of colleagues and most of them answered to the questions only after several reminders following a first expired deadline. This was probably due to the number of other questionnaires to which those colleagues were asked to fill in with EPOS SP. But it cannot be excluded that in some cases the importance of a cooperative approach in carrying out the project has been underestimated. A more active attitude towards cooperation and the development of a more organic vision of the project would be desirable, leading each of the participants to go beyond the specific task assigned within the various working groups.

2) Generally, ethical issues are considered important from an ideal point of view, but there is not particular interest to deepen practical aspects of ethics related to one's and/or others' activities. Ethics is perceived as something theoretical. It seems common the thought that ethics is important, but it doesn't refer to own activities. Moreover, there is scarce capacity to refer ethics to real cases or behaviours.

3) It cannot be ignored that 44% don't see clear ethical and social implications in the data life cycle (Q1.7).

To these general considerations, it can be added other more specific ones, related to the issues treated in the survey:

a) Responsibility of scientists towards society is generally recognized as an important issue, but it is not considered a duty for themselves. Impartiality for public good is a principle that should be included in the future EPOS ethical guidelines.

b) Differences between science communication and hazard/risk communication (that are multidisciplinary activities) are recognized by majority of respondents, who agree that risk communication can have legal implications.

c) It is clear that scientists are science advisors and not decision makers. They have to expose the relevant hazard and risk related data to society, and general public should have open access to scientific information.

d) Personal data protection policies are necessary for EPOS. Majority of respondents agree on open access for data, data products, metadata (metadata should be fully open access), services for data visualization and analysis, and services for data processing and modeling generating new data products to all stakeholders, particularly to scientists, government agencies, students, and teachers. Some concerns have been expressed about data, products, and services released to private companies, especially because in many cases they are reference stakeholders for scientific/technological activities. This implies that ethical issues related to relationships between scientists and private companies should be carefully considered in the future EPOS ethical guidelines. Open data should be provided together with easy-to-understand description of the contents and instructions/recommendations to assist users. Discussion about how to guarantee open access to data, needs to continue, in order to clarify if and when user registration/authentication and/or authorization and/or profiling should be adopted. This topic has to be still debated, even if user registration is considered the best method. There is a wider agreement about the need for EPOS to collect information concerning the purpose the user wants to accomplish by having access to data and services. EPOS should provide access related to relevant scientific products to National Authorities, Civil Protection Agencies and Local Authorities.

e) EPOS data are considered subject to be misused, particularly to feed scientific controversies and media scoop. In any case, this should not affect the open access to them and could be avoided or mitigated through ad hoc regulations.

f) Impartiality for public good regarding data and data products is fundamental for always acting in the public interest. Firstly, public research organizations committed to monitoring activities and secondly governmental authorities should be in charge of ensuring this principle.

g) Conflicts of interests compromises individual and institutional reputation and credibility, but they are not so frequent and inevitable in the EPOS service management. In case, they can be mainly solved by adopting appropriate codes of conduct, by increasing the ethical awareness of scientists on it, or by declaring potential and current conflicts in advance to the respective institutional governing offices.

h) EPOS should consider to develop tools to improve the understanding of scientific content to non-expert audience. A communication strategy would help on this.

EPOS SP should take into consideration to extend the survey on ethics (by using a simplified version of the questionnaire in the Annex) to all project participants. This will enlarge the number of opinions about crucial issues for the life of the research infrastructure and will give the possibility for many colleagues to be stimulated to take a bit of time to think about ethical and social implications of research and technological activities, with positive repercussions on the personal growth and awareness about fundamental topics to be addressed, in order to make EPOS RI more efficient and effective in serving the scientific community and society as a whole.

With regard to lack of interest and in depth understanding of ethical implications of operating a research infrastructure testified by the scarce participation in the survey, it would be important to find appropriate mechanisms to raise awareness in ethical issues. Dedicated tools, such as workshops, training sessions, videos, would be useful to stimulate individual reflections and a wider discussion within EPOS community.

6. ANNEX

Questionnaire "Ethical issues in the EPOS Research Infrastructure".

EPOS SP project
WP6 - Task6.1

Questionnaire

"Ethical issues in the EPOS Research Infrastructure"

Authors: **Giuseppe Di Capua**, **Silvia Peppoloni**, **Lilli Freda**

with the contribution of: Massimo Cocco, Edmund Nickless

and the review of: Michèle Barbier, Michel Campillo, Michel Diament, Florian Haslinger, Michèle Marti, Hazel Napier, Ortwin Renn

Person responsible for data collection and storage:

Giuseppe Di Capua (giuseppe.dicapua@ingv.it)

Istituto Nazionale di Geofisica e Vulcanologia (Italy)

Objectives

The objective of the questionnaire is to map the ethical implications associated with data and service provision through the EPOS RI. These data and services will be accessible to users through the EPOS delivery framework (composed by the TCS and the ICS). With this questionnaire, addressed towards the EPOS internal community of data and service providers, we want to gather information to enable the quantification and qualification of ethical implications connected to the data and service provisioning. This will serve as input and knowledge base to elaborate the Ethics Principles and Guidelines for the EPOS RI.

Structure

The questionnaire comprises five main sections preceded by a "Consent Form":

1. General questions.
2. Protection of personal data: activities involving collection or processing of personal data.

3. Ethical issues associated with data and data products provision.
4. Ethical implications associated with service provision.
5. Ethical issues associated with scientific knowledge.

This structure has been adopted to separate three distinct aspects of the EPOS provision to users:

- access to scientific data and products;
- access to services to visualize and analyse data;
- and access to scientific information describing the contents of the provision to scientists and society.

Time needed for filling in the questionnaire

You should be able to complete the survey in 45 minutes.

Procedures for data management

The questionnaire information will be collected following ethical principles concerning the secure use of personal data and results will be shown in an integrated form, without identifying individual responses.

INGV's procedures for data collection, storage, protection, retention and destruction comply with the "EU GDPR" policy (European Union - General Data Protection Regulation): https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en.

Contact

For further information, please, send an email to silvia.peppoloni@ingv.it and giuseppe.dicapua@ingv.it

Please try to complete all questions marked with an asterisk, unless you prefer to remain anonymous.

CONSENT FORM

I accept

I confirm that I have read and understood the information provided about the survey and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my legal rights being affected.

I know that it isn't mandatory to indicate my name and email for filling in the questionnaire, so that it can be completely anonymous.

I agree to take part in this survey.

Date

Day   Month   Year

ABOUT ME

First name (optional)

Last name (optional)

Gender (optional)

Country (optional)

Age (optional)

< 20

20-40

41-60

>60

Affiliation (optional)

Email (optional)

example@example.com

MAIN REFERENCE CONCEPTS

Data misuse
Is the inappropriate use of data, as defined when the data was initially collected. In other words, it refers to data which have been initially willingly provided but are later used for purposes which are outside the

scope of legitimate reasons for the initial data collection.

Ethics

Reflects on the conduct of humans and the criteria with which to evaluate behaviors and choices in order to identify "true good" including the means to achieve this goal. It also addresses the moral duties of humans towards themselves and others, and what is the right thing to do when facing a decision. Regarding the research activity and more in general the practice of a profession, ethics is the identification of duties and rights that regulate the working activity (deontology) by members of a social group, who are characterized by the possession of specific technical-scientific knowledge, methods and tools for its application.

Open science

Can be defined as a set of practices that increase the transparency and accessibility of scientific research, including publications, data, physical samples, and software, to all levels of society. Open science is often defined as comprising "open data, open access, open source, open methodology, open peer-review, open educational resources".

Public good

Refers to all those elements, information, and services provided for the benefit or well-being of the public, including individual and collective safety, knowledge development, and health.

Responsibility

Expresses the commitment to answer to someone for own actions and their consequences – the duty to satisfactorily perform a task, which has a consequent 'penalty for failure', to be conceived not only in legal terms, but also in terms of loss of personal and/or professional credibility of who acts in an irresponsible way. In the concept of 'responsibility' therefore emerges the person as the center of ethical action, as the conscious subject of action.

<h2 style="text-align:center;color:red">1. GENERAL QUESTIONS</h2>

Please, answer the questions below according to your personal opinion on the subject.

1.1) How important is ethics for geosciences? *

        1 2 3 4 5

Irrelevant   Essential

1.2) How important is ethics in research activities? *

        1 2 3 4 5

Irrelevant   Essential

1.3) How important is ethics for EPOS management and activities? *

        1   2   3   4   5

Irrelevant   Essential

1.4) How much are ethical issues taken into consideration in EPOS management and activities? *

        1   2   3   4   5

Not considered   Fully considered

1.5) In your research/scientific and technological activities, which of the following are the most important reference values for you? (Please, choose up to 3) *

doing excellent science

honesty and transparency in all aspects

accountability

professional courtesy and fairness in working with others

being compliant with laws and regulations

assuring societal benefits

considering impacts on social equity and fairness

ensuring environmental protection

1.6) In your work, which elements are of most importance? (Please, choose up to 3) *

reliability

sharing results with others

credibility

prestige

integrity

satisfaction

building or sustaining relationships

career

salary

1.7) Among the following fields of activities, where do you see clear ethical and/or social implications? (multiple choice) *

risk reduction

environmental monitoring

data acquisition, storage, elaboration, sharing and management (data life cycle)

science education

science communication

hazard and risk communication

natural resources exploration, exploitation, and management

relationships between geoscientists, media, and decision makers

workplace climate

Comment (optional)

1.8) Do you think that your activities have an impact on society? *

Yes

No

Don't know

1.8a) If the answer to the question 1.8) is "YES", what are these impacts? (please explain) *

1.8b) If the answer to the question 1.8) is "YES", which particular stakeholders do you have in mind? (multiple choice) *

citizens

political decision-makers

lawmakers

scientists

government agencies

industry

practitioners

1.9) How much do you agree with the following statements? Please, express your agreement/disagreement through a ranking from 1 (disagree) to 5 (fully agree)

As a scientist, I have responsibilities towards society *

1   2   3   4   5

Disagree   Fully agree

Geoscientists have a social obligation to serve society *

1   2   3   4   5

Disagree   Fully agree

The primary duty of geoscientists is to benefit society *

1   2   3   4   5

Disagree   Fully agree

Impartiality for public good is an ethical duty for a geoscientist *

1   2   3   4   5

Disagree   Fully agree

Geoscientists should aim to be good science communicators *

1   2   3   4   5

Disagree   Fully agree

Geoscientists should aim to be good hazard and risk communicators *

1   2   3   4   5

Disagree   Fully agree

There are differences between science communication and hazard/risk communication *

1   2   3   4   5

Disagree   Fully agree

There is a difference in the role played by geoscientists in hazard communication and risk communication *

1 2 3 4 5

Disagree   Fully agree

Geoscientists are science advisors and not decision makers *

1 2 3 4 5

Disagree   Fully agree

The primary goal of geoscientists is to do excellence science *

1 2 3 4 5

Disagree   Fully agree

The general public should have open access to scientific information *

1 2 3 4 5

Disagree   Fully agree

The activity of geoscientists involved in hazard communication may have legal implications *

1 2 3 4 5

Disagree   Fully agree

The activity of geoscientists involved in risk communication may have legal implications *

1 2 3 4 5

Disagree   Fully agree

Hazard communication is a multidisciplinary activity *

1 2 3 4 5

Disagree   Fully agree

Risk communication is a multidisciplinary activity *

1 2 3 4 5

Disagree   Fully agree

Social scientists should be involved when designing hazard communication *

1 2 3 4 5

Social scientists should be involved when designing risk communication *

1 2 3 4 5

Disagree   Fully agree

Geoscientists have an ethical duty to expose their hazard and risk data to society *

1 2 3 4 5

Disagree   Fully agree

Geoscientists have an ethical duty to share their hazard and risk data with colleagues *

1 2 3 4 5

Disagree   Fully agree

Risk communication changes over time during a crisis *

1 2 3 4 5

Disagree   Fully agree

Comments to statements in 1.9) (optional)

1.10) What does the expression "conflict of interests" mean for you? (Please, choose up to 2) *

Personal research activity conflicts with institutional responsibilities

Personal research activity conflicts with institutional research activities

An individual has consciously or unconsciously, personal, professional/scientific or institutional interests which are in conflict with professional/scientific and institutional responsibilities and with official roles covered

Impartiality of the individual or organization in decisions between competing interests and freedom in actions is compromised

The public interest in research results differs from private interests

1.11) Does your Institute/University receive funding from private sector (industry, commercial undertakings, etc.) or NGOs? *

Yes

Comment (optional)

1.11a) If the answer to the question 1.11) is "YES", does funding from private sector (industry, commercial undertakings, etc.) or NGOs to your Institute/University lead to conflict of interests, real or potential? *

Yes

No

Don't know

Comment (optional)

2. PROTECTION OF PERSONAL DATA (ACTIVITIES INVOLVING COLLECTION OR PROCESSING OF PERSONAL DATA)

We remind you that personal data protection policy must be compliant with the EU GDPR (more information: https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en)

2.1) Are you aware that a personal data protection policy is necessary for EPOS data and service provision? *

Yes

2.2) Is the protection of personal data a good reason to avoid registration/authentication of users? *

Yes

No

Depends

Don't know

2.2a) If the answer to the question 2.2) is "DEPENDS", what does it depend on? (Please explain) *

2.3) Should EPOS require user registration/authentication to access data and services? *

Yes

No

Depends

Don't know

2.3a) If the answer to the question 2.3) is "DEPENDS", what does it depend on? (Please explain) *

2.4) Should EPOS require user authorization to access data and services? *

Yes

No

Depends

Don't know

2.4a) If the answer to the question 2.4) is "DEPENDS", what does it depend on? (Please explain) *

2.5) Should EPOS collect information to profile the user? *

Yes

No

Don't know

Comment (optional)

2.6) Should EPOS collect information concerning the purpose the user wants to accomplish by having access to data and services? *

Yes

No

Don't know

Comment (optional)

3. ETHICAL ISSUES ASSOCIATED WITH DATA AND DATA PRODUCTS PROVISION

3.1) Does your Institute/University have a policy for the data life cycle (acquisition, storage, elaboration, sharing and management)? *

Yes

No

Don't know

Comment (optional)

3.2) Do you see differences in ethical issues related to data provision versus service provision? *

Yes

No

Don't know

Comment (optional)

3.3) Open Science Practices

3.3a) Should publicly funded data be freely accessible? *

Yes

No

Depends

Don't know

3.3aa) If the answer to the question 3.3a) is "DEPENDS", what does it depend on? (Please explain) *

3.3b) Is the open access to data a duty for geoscientists? *

Yes

No

Don't know

Comment (optional)

3.3c) In your personal opinion, data should be open for: (Multiple choice) *

Nobody

Scientists

Government agencies

Public officers

Public companies

Private companies

Decision-makers

Lawmakers

Practitioners

Teachers

Citizens

NGOs

Don't know

3.3d) Should open data be provided together with easy-to-understand description of the contents and instructions on how to read/process the data? *

Yes

No

Don't know

Comment (optional)

3.3e) How should EPOS data be managed? (Multiple choice) *

full open access (no restriction)

licensing

user registration

access with limits for different users

open access for scientists and scientific institutions

to private industry or commercial organizations on payment

open access for scientists and citizens

open access for government agencies

data release limited on the basis of type of request

3.3f) Which kind of EPOS data should be subject to an open access policy? (Multiple choice) *

raw data

quality controlled and standardized datasets

data products generated from open raw data

data products generated from restricted raw data

all types of data

metadata

3.3g) In your personal opinion, which policy should be governing metadata in EPOS? (Single choice) *

fully open access metadata (no licenses)

fully open access metadata with CC0 license

no open access

Comment (optional)

3.4) Misuse of data

3.4a) Can you imagine occasions in which EPOS data may be subject to misuse? *

Yes

No

Depends

Don't know

3.4aa) If the answer to the question 3.4a) is "DEPENDS", what does it depend on? (Please explain) *

3.4b) Is it possible to reconcile the conflict between open access and potential data misuse? *

Yes

No

Depends

Don't know

3.4ba) If the answer to the question 3.4b) is "DEPENDS", what does it depend on? (Please explain) *

3.4c) Which kind of EPOS data misuse should be considered? (Multiple choice) *

terrorism
industrial espionage
financial speculation
crime
delineating personal data
media scoop
ideological matters
scientific controversies
don't know

Comment (optional)

3.4d) Should possible misuse of data limit or prevent open access? *

Yes

No

Depends

Don't know

3.4da) If the answer to the question 3.4d is "DEPENDS", what does it depend on? (Please explain) *

3.4e) Are regulations for data provenance, traceability and accountability of data providers useful to avoid or mitigate data misuse? *

Yes

No

Depends

Don't know

3.4ea) If the answer to the question 3.4e) is "DEPENDS", what does it depend on? (Please explain) *

3.5) Risk communication and societal impact

3.5a) Are you involved in communicating data and data products associated with hazard or risk assessment/ mitigation? *

Yes

No

3.5b) Which are the most important challenges in risk communication to different stakeholders? (Multiple choice) *

engaging multidisciplinary skills

having specific competences in communication available

providing multidisciplinary scientific approaches

developing digital skills for an effective management of social media

assuring speed in producing reliable scientific information

fostering completeness, clarity and accessibility of information

providing information on probability and uncertainties associated with the risk

using social media

help users to reduce their personal risks

understanding role and responsibilities of media

promoting or sustaining credibility and trust (i.e., recognizing the authoritative role of involved institutions)

meeting the expectations of scientists and society at large

raising awareness of the legal implications

translating scientific knowledge into generally understandable communications

3.6) Impartiality for public good regarding data and data products: always acting in the public interest

3.6a) Do you agree that EPOS activities should be based on the principle "impartiality for public good"? *

          1   2   3   4   5

Disagree   Fully agree

Comment (optional)

3.6b) Does your TCS contribute to monitoring activities for geo-hazards? *

Yes

No

Don't know

Comment (optional)

3.6ba) If the answer to the question 3.6b) is "YES", has your organization adopted regulations to manage impartiality for public good in undertaking monitoring services? *

Yes

No

Don't know

Comment (optional)

3.6bb) If the answer to the question 3.6b) is "NO", do you believe that some regulations would be necessary to manage impartiality for public good in undertaking monitoring services? *

Yes

No

Don't know

Comment (optional)

3.6c) According to your experience, who should be in charge of ensuring impartiality for the public good? (Multiple choice) *

Governmental authorities

Public research organizations committed to monitoring activities

Private subjects involved in exploitation or monitoring activities

Individual scientists performing research activities

3.6d) Should impartiality for the public good imply open access to data for all stakeholders? *

Yes

No

Don't know

Comment (optional)

4. ETHICAL IMPLICATIONS ASSOCIATED WITH SERVICE PROVISION

4.1) Fostering Open Science

4.1a) Should EPOS provide open access to services for data visualization and analysis? *

Yes

No

Don't know

Comment (optional)

4.1b) Should EPOS provide open access to services for data processing and modelling generating new data products? *

Yes

No

Don't know

Comment (optional)

4.1ba) If the answer to the question 4.1b) is "YES", should EPOS provide users with open access to the generated data products? *

Yes

No

Don't know

Comment (optional)

4.1baa) If the answer to the question 4.1ba) is "YES", should generated data products be findable and accessible through EPOS? *

Yes

No

Don't know

Comment (optional)

4.1c) Should the available services contain description of the contents and instructions/recommendations to assist users? *

Yes

Comment (optional)

4.1d) Should the access to EPOS services be open to: (Multiple choice) *

    Scientists

    Government agencies

    Public officers

    Public companies

    Private companies

    Decision-makers

    Lawmakers

    Practitioners

    Teachers

    Students

    Citizens

    NGOs

    Don't know

4.1e) Should user authorization be required depending on the type/content of the EPOS services?
 *

Yes

No

Don't know

Comment (optional)

4.1f) Should EPOS provide access related to relevant scientific products to National Authorities, Civil Protection Agencies and Local Authorities? *

Yes

No

Don't know

Comment (optional)

4.2) Communication and societal impact of EPOS hazard and risk services

4.2a) Does your TCS provide access to services associated with geo-hazard assessment? *

Yes

No

Don't know

Comment (optional)

4.2aa) If the answer to the question 4.2a) is "YES", is the use of these services limited to authorized users? *

Yes

No

Don't know

Comment (optional)

4.2b) Does your TCS provide access to services associated with risk mitigation? *

Yes

No

Don't know

Comment (optional)

4.2ba) If the answer to the question 4.2b) is "YES", is the use of these services limited to authorized users? *

Yes

No

Don't know

Comment (optional)

4.2c) Does your TCS provide access related to relevant services to National Authorities, Civil Protection Agencies and Local Authorities committed to hazard and risk assessment? *

Yes

No

Don't know

Comment (optional)

4.2d) Does your TCS provide information/recommendations to scientists and experts to allow conscious and responsible use of available products/services? *

Yes

No

Don't know

Comment (optional)

4.3) Impartiality for Public Good regarding service provision: always acting in the public interest

4.3a) Which stakeholders are important for your activities? (Multiple choice) *

Scientists from Universities and research institutes
Government agencies
Public officers
Public companies
Private companies
Decision-makers
Law-makers
Practitioners
Teachers
Students
Citizens
NGOs
Don't know

4.3b) Does your TCS provide relevant data-based services for improving the safety of society? *

Yes

No

Don't know

Comment (optional)

4.3ba) If the answer to the question 4.3b) is "YES", how are those data-based services communicated to decision-makers? (Single choice) *

There is an encoded stream of information from scientists/scientific institutions towards civil protection authorities

There is a defined procedure to regulate relationships between scientists/scientific institution and civil

protection authorities in releasing scientific data

Data are publicly available without restrictions

There are no institutional polices to communicate data

Comment (optional)

4.3c) Do you agree with the following statements? Please, express your agreement/disagreement through a ranking from 1 (disagree) to 5 (fully agree)

Conflict of interests is frequent in the EPOS service management *

       1   2   3   4   5

Disagree   Fully agree

Conflict of interests is inevitable in the EPOS service management *

       1   2   3   4   5

Disagree   Fully agree

Conflict of interests can be solved by adopting appropriate codes of conduct *

       1   2   3   4   5

Disagree   Fully agree

Conflict of interests can be solved by increasing the ethical awareness of scientists *

       1   2   3   4   5

Disagree   Fully agree

Conflict of interests can be solved by declaring potential and current conflicts in advance to the respective institutional governing offices *

       1   2   3   4   5

Disagree   Fully agree

Personal conflict of interests can be solved by avoiding one's own involvement in activities that could lead to conflict, even if potential *

       1   2   3   4   5

Disagree   Fully agree

Conflict of interests compromises individual and institutional reputation and credibility *

       1   2   3   4   5

Disagree   Fully agree

In principle, public funded data should not be released to private industry or commercial undertakings for free *

       1   2   3   4   5

Disagree   Fully agree

Public funded data should be released to private industry or commercial undertakings for free only if such data can help them to develop better technologies for the safety of society *

       1   2   3   4   5

Disagree   Fully agree

EPOS activities should be based on the principle "impartiality for public good" *

       1   2   3   4   5

Disagree   Fully agree

EPOS services should be available for all stakeholders *

       1   2   3   4   5

Disagree   Fully agree

Comments to statements in 4.3c (optional)

5. ETHICAL ISSUES ASSOCIATED WITH SCIENTIFIC KNOWLEDGE

5.1) Should EPOS provide tools to improve the understanding of scientific content to non-expert audiences? *

Yes

No

Don't know

Comment (optional)

5.2) Which channels/tools should be used by EPOS to improve the understanding of scientific content of different end-users, including non-expert audiences? (Multiple choice) *

Webinars

Physical seminars and conferences

Newspapers, radio, TV

Websites

Social media

Scientific meetings

Videos

Training courses

E-learning platform

Don't know

Comment (optional)

5.3) Which issues may be related to the provision of scientific contents to non-expert audiences by EPOS? (Multiple choice) *

Absence of a communication strategy

Applying a top-down communication strategy

Defining which kind of information should be communicated

Lack of knowledge in communication techniques and tools

Lack of clearness in communication goals

Lack of clarity of information to be communicated

Lack of accuracy of information to be communicated

Extremely technical information

Difficulty to simplify information and associated concepts

Absence of appropriate skills and competencies to communicate to the public

Lack of digital skills of scientists engaged with science communication

Lack of scientific literacy by the audience

Misunderstandings

Don't know

Comment (optional)

5.4) Does your TCS provide scientific knowledge to different end-users? *

Yes

No

Don't know

Comment (optional)

5.4a) If the answer to the question 5.4) is "YES", could you indicate which kind of scientific knowledge is provided by your TCS? (Provide a short description) *

5.4b) If the answer to the question 5.4) is "YES", could you indicate the main end-users of your TCS? (Multiple choice) *

Scientists from Universities and/or research institutes

Government agencies

Public officers

Public companies

Private companies

Decision-makers

Lawmakers

Practitioners

Teachers

Students

Citizens

NGOs

Don't know

5.4c) If the answer to the question 5.4) is "YES", which of the following channels/tools are used by your TCS? (Multiple choice) *

Webinars

Physical seminars and conferences

Newspapers, radio, TV

Websites

Social media

Scientific meetings

Videos

Training courses

E-learning platform

Don't know

Comment (optional)

Leave a comment on the questionnaire (optional)