EOSC and the Free Riders

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Abstract

Big Data, Open Science and Technology are the topics on the agenda of the European Commission (EC) on one side and on the other side, ministries, research funding organizations, universities and public research institutions together with university libraries are bringing complaints about the access to scientific publications and research data also to the EC. Against these facts the EC has taken on the responsibility to realize the idea of Open Science and to favour the implementation of an European Open Science Cloud (EOSC), which "aims to develop a trusted, open environment for the scientific community for storing, sharing and reusing scientific data and results" (COM 2016). A High Level Expert Group (2016) has worked on the definition, the key trends in Open Science and the answer, how EOSC will be realized for the target group of European researchers and professionals in science and technology. The EOSC is an EU Member State Project. Non-European researchers can join the EOSC as free riders. Based on the findings of the HLEG this research will explore the question: What is the advantage for a research community from an emerging country to get a free rider position on the EOSC?

This research is primarily a literature review. Discussions with international researchers and Ethiopian university management presents insights about the advantages of a free ride position on the EOSC. An overview between the free rider problem as discussed in economic literature and the invitation to free ride on WIKIPEDIA and EOSC will conclude this research.

Keywords: Open Access, Open Science, 4th industrial revolution, free riding, innovation, Big Data

1. Background

The European Commission (EC) is discussing the 4th industrial revolution. In the European Open Science Cloud Workshop on June 29, 2016 on Governance and Funding, ,Andrus Ansip, the Vice President of the Single Market in the EC states, "[T]he industrial revolution of our time is digital. We need the right scale for technologies such as cloud computing, data-driven science and the internet of things to reach their full potential. The EU has this scale." European Commission (2016) Guenther Herman Oettinger, EU Commissionaire for Digital Economy and Market communicates the vision that the "European Cloud Initiative will unlock the value of big data by providing world-class supercomputing capability, high-speed connectivity and leading-edge data and software services for science, industry and the public sector." European Commission (2016) Carlos Moedas, EU Commissionaire for Research, Science and Innovation suggests that "[T]he European Open Science Cloud will make science more open, efficient and productive." European Commission (2016) The expected outcome is seen in the European Open Science Cloud.

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Data, Open Science and Technology are defined by the EC as the keys for the 4th industrial revolution and are packed in the European Open Science Cloud Initiative, which is built on the Digital Single Market (DSM) Strategy. "It aims to develop trusted, open environment for the scientific community for storing, sharing and reusing scientific data and results. … It aims to deploy the underpinning super-computing capacity, the fast connectivity and the high-capacity cloud solution. Focusing initially on the scientific community, the user base will be expanded to the public sector and to industry, creating solutions and technologies that will benefit all areas of the economy and society.(European Commission, 2016) As the target group of the EOSC EC has defined 1,7 million European Researchers and 70 million professionals in science and technology; additionally the higher education sector will have access to the EOSC from the beginning. Over time, the EOSC will be opened to government and business users.

The European Commission Directorate-General for Research and Innovation (RTD) sees the future of EU economic development in the "Open Access to Scientific Publication and Open Research Data"[i] and promotes the dissemination of the original ideas in science and research into a functional system. The term Open Science has been introduced and enriched by the term 'Open Access' in the sense of Open Access to research data as the key for development and innovation. RTD's Background Note highlights the benefits of the Open Access as improved scientific research, accelerated innovation and involved citizens and society. This all inclusive Open Access approach could result in an avalanche of information 'Big Data', which needs to be designed, collected, handled, stored, disseminated, mined and used. A Cloud, which combines data infrastructure, high-bandwidth networks and powerful computers will accommodate this 'Big Data'.

A Commission High Level Expert Group (HLEG) has been assigned by the EC to work on the European Open Science Cloud (EOSC), its definition, the key trends in Open Science, and the answer how EOSC could be realized. Based on the findings of the HLEG this research will explore the answer to the question: What is the advantage for a research community from an emerging country to get a free rider position in the EOSC?

2. Methodology

This research aims to analyse the policy and governance recommendations provided by the HLEG and will elaborate on the example of Ethiopian research institutions and the Ethiopian Ministry of Education as the representative of all public Ethiopian Universities how to participate in the EOSC. Since Non-EU-Member States are not foreseen as partners in the EOSC they are pushed to take on a "free rider" position in order to participate and benefit from the EOSC. Discussions with researchers are used to structure the requirements of a successful free ride on EOSC and to overcome the general obstacles widely seen at Ethiopian universities.

3. Findings

Supporting arguments for Open Science come from different angles and have started already in 2012. For example, the Vice President of the European Commission responsible for the Digital Agenda mentioned that "Openness and sharing are not exclusive to the scientific community. … open data package … shows that there are benefits for web entrepreneurs, ordinary citizens, governments … But sharing data, and having the forum to openly use and build on what is shared are essential to science. They fuel the progress and practice of scientific discovery. According to Kroes (2012), "That's why scientists have long sought out new tools and new ways to share their knowledge"

All European Academies (2013) (ALLEA) states in October 2013 that the traditional system for the publication and dissemination of scientific journals has shown some limits and

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highlights on one side that in the scientific publishing sector is concentrated to some big players and on the other side to the fact that "public bodies which subsidise research have also to pay for permitting other researchers to access published research results." University and research libraries are complaining about increasing prices for journals, while their budgets are static. Therefore, the libraries "have regularly cancelled serial subscriptions to accommodate price increases of the remaining current subscriptions. … [G]overnments, research funding bodies and research performing institutions world-wide have therefore developed open access policies to improve the access to the scientific publications resulting from the research they funded." (Directorate-General for Research and Innovation (RTD) 2016)

Stakeholders such as ministries, research funding organisations, universities and public research institutions involve themselves in the definition and implementation of policies as well as in programmes, the production and dissemination of scientific results in order to widen the access to research results deriving from publicly funded research projects. At the supranational level organisations such as the Organisation for Economic Cooperation and Development (OECD), the European Union (EU) and the United Nations for Educational Scientific and Cultural Organisation (UNESCO) get engaged in defining agreements and setting the ground for Open Science. The EC has taken on the responsibility to bring the idea of Open Science into action and has started to coordinate the Open Science approach throughout the Member States. In a first step the EC intended to make publicly funded research (scientific publications and research data) openly accessible. The HLEG will advice the EC on the EOSC.

3.1 EOSC

Since the EOSC should not be understood as just the virtual cloud in a server room, the HLEG first defined the EOSC as "a supporting environment for Open Science and not an 'Open Cloud' for science. The EOSC aims to accelerate the transition to more effect Open Science and Open Innovation in a Digital Single Market by removing the technical, legislative and human barriers to the re-use of research data and tools, and by supporting access to services, systems and the flow of data across disciplinary, social and geographical borders."[ii] Discussing the EOSC in the context of Open Science the HLEG refers to the EOSC as a need emerging from 'conservative understanding of science to the current requirements'. This transition refers to the new modes of scholarly communication, modern rewards and recognition, increasing reliance on data experts, cross-disciplinary collaboration, fostering transition from science to innovation, etc.

In the frame of a "data-driven economy" (European Commission 2014) the term Big Data has been introduced and refers to large amounts of different types of data produced with high velocity from a high number of various types of source. In general, the importance of data is understood as the key for analyses that leads decisions making processes at all levels. Data analyses are guiding towards perceptions and knowledge, which are seen as source of innovation and employment. The Vice President of the European Commission responsible for the Digital Agenda justifies the EC lead in the Open Science discussion as "Big Data needs big collaboration"(Kroes 2012). In her speech, the Vice President made it clear that Open Science isn't just about opening up data, but also about sharing research findings. In the Gremium of Open Science it is widely discussed to provide Open Access to peer-reviewed publications as well as to all research data that is funded by the public, to preserve data and to allow the re-use of scientific information. The HLEG sets out the data requirements for a successful EOSC as Findable, Accessible, Interoperable and Reusable (FAIR) and highlights the support through data related elements (software, standards, protocols, workflows) and the aspect of data management and long-term stewardship. The e-infrastructure necessary to handle Big Data and

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to cooperate among EU partners has been organized by National Research and Education Networks (NRENs). The EU Member State NRENs cooperate under the umbrella of the GEANT University and Research Network.

The First Report and Recommendations of the HLEG (High Level Expert Group 2016) has structured the possible realization of the EOSC in to the sections of Policy, Governance and Implementation. For the sake of the elaboration of this research, the focus is brought just on Policy and Governance.

The HLEG comprises the Policy Recommendations into

P1. Take immediate, affirmative action on the EOSC in close concert with Member States
P2. Close discussion about the perceived need
P3. Build on existing capacity and expertise where possible
P4. Frame the EOSC as the EU contribution to an Internet of FAIR Data and Services underpinned with open protocols.

The Policy Recommendations address primarily to the EU Member States except P4, which opens the door for non-Europeans to participate in EOSC.

In terms of Governance Recommendations, the HLEG lists the following:

G1. Aim at the lightest possible, internationally effective governance
G2. Guidance only where guidance is due
G3. Define Rules of Engagement for service provision in the EOSC
G4. Federate the Gems (and Amplify Good Practice).

The governance recommendations could be understood as an invitation for Non-EU Member States to join the EOSC as free riders.

3.2 Free Riders

The economic literature mentions widely the problem of 'Free Riding', where a free rider is an individual that may be able to obtain the benefits of a good without contributing to the costs. The free rider discussion refers primarily to public goods, where the provider cannot exclude non-payers. But free riders also seen in cartels, where competitive producers restricting output and increasing price. In general, "[w]hen property rights are not clearly defined and enforced, the individual motivated by self-interest has an economic incentive to free ride at the expense of others in the group who attempt to promote self-interest through group behavior. … [I]n the case of collusive behavior to restrict competition, the free rider serves a beneficial role acting as an impediment to anti-competitive behavior."(Pasour 1981)

With reference to the discussion about "The Trouble with 'Free Riding' (Lee 2008) it is demonstrated that free riding

1. not just refers to public goods;
2. does not request for government regulations;
3. is not necessarily a problem, but might also be a wishful situation to improve collective actions initiated by individuals;
4. attracts contributors and users (free riders).

Subsequently, the EOSC could take the Wikipedia success story as a best practice to make knowledge openly accessible. The major differences are seen in the following:

1. content refers to previously publicly funded projects;
2. dissemination of research findings for further exploitation;

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3. acceleration of innovation processes through out all sectors by building on conducted research projects and their research data;
4. users and contributors to EOSC are primarily European researchers and professionals in science and technology, who are confronted in their daily life with research questions and hypotheses.

3.2.1 Free Riding on the EOSC

In the case of EOSC free riders demonstrate their self-interest on using research data and publication for continuous scientific/academic exploitation and education purposes and not for individual benefits as widely explored in economic literature. The objective of the free rider is to use research data for his/her own research projects as built on to accomplished research projects and to confront previously collected data with new assumptions, new research questions and hypotheses, in order to gain new (additional) perspectives and subsequently innovative ideas, which were not discovered under the initial research context.

Although there is a clear invitation to free ride on EOSC, there are clear limitations for becoming a free rider in the accessibility to the high-speed internet for the education and research sector; the so called national research and education networks (NREN). The access to NRENs (in Ethiopia the EthERNet) is the precondition to link with the Pan-European research and education network (GEANT) as the European knot for all European universities on one side and on the other side there is the accessibility to the e-infrastructure facilities at the workstation at the universities and research centres.

Since the term 'free riding' has a negative touch, but is understood as welcoming in the EOSC case, promotion has to reach out to research institutions from outside EU Member States. The invitation to free ride focuses on the exploitation of the research data and contribution to the findings communicated on the EOSC. University managements have to communicate the benefits of stepping in into a free rider position and have to promote the university's strategy towards researchers and lecturers to encourage them to take on their individual free rider position on the EOSC.

Discussions with researchers showed that:

a) A successful free rider position on EOSC requires university internal:

- Commitment to the understanding that research is important for the development of disciplines and the update of the lecture contents;
- Understanding that economic growth and nation's development depend on education and innovation. Universities and politics work together to set the framework for a smooth development;
- Implementation of multi-disciplinary research teams: Positions of data experts/analysts as link between EOSC, IT-experts of the NREN and the researchers.

b) A series of obstacles universities face - for example in Ethiopia - needs to be overcome in order to accommodate an international research culture at the Campus so that facilities offered will be used. Some of those are the following:

- Three-fold risks (human resource, time & money): the provided means to participate in the EOSC community won't be taken; this leads to the capacity of the lecturers to participate in research; it needs also to become aware that many lecturers have long-term jobs besides their lecturing assignments, which are time consuming; the funding of research project is often insufficient that researchers/lecturers with a 2nd job

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assignment will not risk losing their positions outside the universities for a short-term research project;

- Practice (client) oriented universities: most universities have the focus on teaching and not on research;
- Leadership issues: senior researchers and research assistants are not teamed up; in many universities the system to work in teams of senior and junior lecturers and researchers is not practiced;
- Lack of pro-active communication by national researchers towards the international research community: the researchers are used to be addressed by international researchers; they are not used to promote their own research project and research teams for international collaboration;
- Lack of confidence to approach international research communities: many researchers PhD degrees from Western universities are hesitating to approach their Western universities or doctor-fathers/-mothers for support in their research interests.

3.2.2 Advantages for 'Free Riding'

In general, as a free rider, are searcher has the possibility to 'slip-in' into research projects and research communities.

More precisely, some of the advantages in a free ride on EOSC could be seen in the following non-exhaustive list:

1) Access to primary data collection that has been collected and funded by others;
2) Use, additional scrutiny, iteration and modelling of collected data with locally relevant assumptions might discover new insights and perceptions;
3) Access to international research communities with the same research interests;
4) Possibility to adjust research approaches from EU countries to make them fit to the local situation;
5) Each researcher - without big research budget - could find and excel in his/her niche at an international level;
6) Adjustments to research results published on the EOSC might lead to innovation and economic development in different local and national context;
7) Possibility of participating in high quality research at low costs;
8) Provision of a series of PhD topics;

4. Conclusion and Recommendation

The EOSC has means to disseminate research results and data as well as a source where researchers could find resources for further exploration and exploitation in different global contexts in order to accelerate innovation and development.

The EOSC enables accesses to researchers and professionals in science and technology in the following way:

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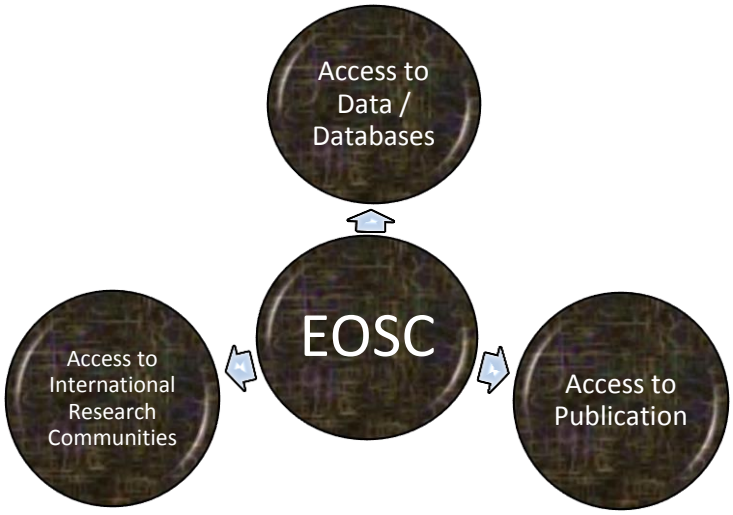

Figure 1: Accesses provided by EOSC

Evaluating discussion with researchers and the WIKIPEDIAs success it is clearly stated that in the context of collective actions on the Internet have turned the free rider position from an economic problem to a wishful situation that moves away from the philosophy of public goods and government regulations.

Summarising the typical free ride discussion and comparing that with facts from WIKIPEDIA and EOSC brings out the following:

Differentiations in:	Typical Free Ride	Wikipedia	EOSC
Kind of goods	Public goods (tangible and intangible)	Private good (intangible)	EU initiated good (intangible)
Remuneration	Tax, fee, fine, royalty	None	None
Objective	To provide goods that would/are not be provided from the private sector	An online encyclopaedia project edited solely by experts, by providing additional draft articles and ideas for it.	To develop a trusted, open environment for the scientific community for storing, sharing and reusing scientific data and results.
Purpose	To provide services to the community for free or against levy or taxes based on the volume of consumption or social affordability	To feed the Nupedia project, which produces a free online encyclopaedia.	To make publicly funded research accessible for the global research community; To provide research data for further exploration and exploitation; To accelerate innovation providing access to research data from completed research projects to researchers and educators.
Target group	Citizens of a nation	Not defined by Wikipedia	- European researchers - Professionals in science and technology
Free riders' local characteristics	Nationals	Citizens, who are using Wikipedia, but not contributing to its development.	Researchers form outside of EU Member States

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Free riders' consideration	To obtain the benefits of a good without contributing to the cost	To use and eventually to contribute to the overall result, if wished	- To use, model, iterate and exploit information provided on the EOSC; - To contribute to EOSC and the research community, if specific results for further research have been achieved.
Access	No exclusion	No exclusion if web- and computer facilities are available and accessible	Most likely just from the national education and research network (NREN)

In comparison the free rides on WIKIPEDIA run by itself, whereas EOSC will require facilitators to encourage university managements to provide the floor for possible free rides and to encourage researchers to join and contribute to the international research communities presenting their research data on EOSC. Allocating the advantages of free rides on EOSC depend very much on the framework set by the respective university management, which could accommodate the following:

- Information to researchers and lecturers about the applicability of Open Science, the access to EOSC and the potentials to cooperate with NRENs and GEANT;
- University administrations' responsibility to promote the access to the high speed internet for research/study/teaching purposes;
- The active involvement of the triangle of the individual NREN, national Higher Education Facilitator and University present the frame that individual academics and students could participate in the EOSC.

The driving force of successful free rides are the self-interests of free ride researcher and their will to contribute to international research projects. The free ride on the EOSC is rather a gain than an economic problem as cited in literature. It will not cause damage to the genuine research team, because in general, once the data of the initial project has been published, the research project has been accomplished and the research team is - most likely – already in for the next project or is working on specific sequences of the original findings. Instead of bringing the research data in an archive the EOSC is promoting further exploration and exploitations.

The reuse, scrutiny and analyses of the provided data from a different cultural angle additional and new insights might be gained, which the previous research team has not thought of.

The free ride on EOSC could be seen as a win-win situation for the genuine research team in the same way as for the funding organization and the supporting private sector. A hierarchical approach could structure the free ride participants in three levels: the ground layers (genuine research team), the explorers and exploiter (free riders) and those commercializing the results (funding organisations and respectively the private sector).

The visualization of the cooperation hierarchy between the immediate research team, the mediate research team and the commercialiser lets assume that there is a gaining position for all parties. The mediate research team is not considered to lower the share of the immediate research team rather it will add to the ground layers' results, what the immediate research team was not able to add. The share of the commercialiser gets increased by the contribution of the mediate research team.

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The cooperation between the immediate (genuine) and mediate (free rider) research teams should become the common code of contact among them that an active exchange of thoughts could take place. Communication about the modelling, iterating and working process on the provided research data and newly found insights and perception could be discussed prior the free riders feed back their 'manipulated' research to the EOSC for the wider discussion in the global research community.

Overall, the global data stewardship and the creation of a global level playing field in scientific data sharing and data-driven science as mentioned in The European Open Science Cloud Workshop in June 2016 presents a clear invitation to a long-term free rider position but also to contributions, if the reuse, iteration and modelling of data led to specific results.

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