



Deliverable D7.4 - Policy report on gender issues in peer review, impact measurement and dissemination practices

OPENingUP new methods, indicators and tools for peer review, impact measurement and dissemination of research results

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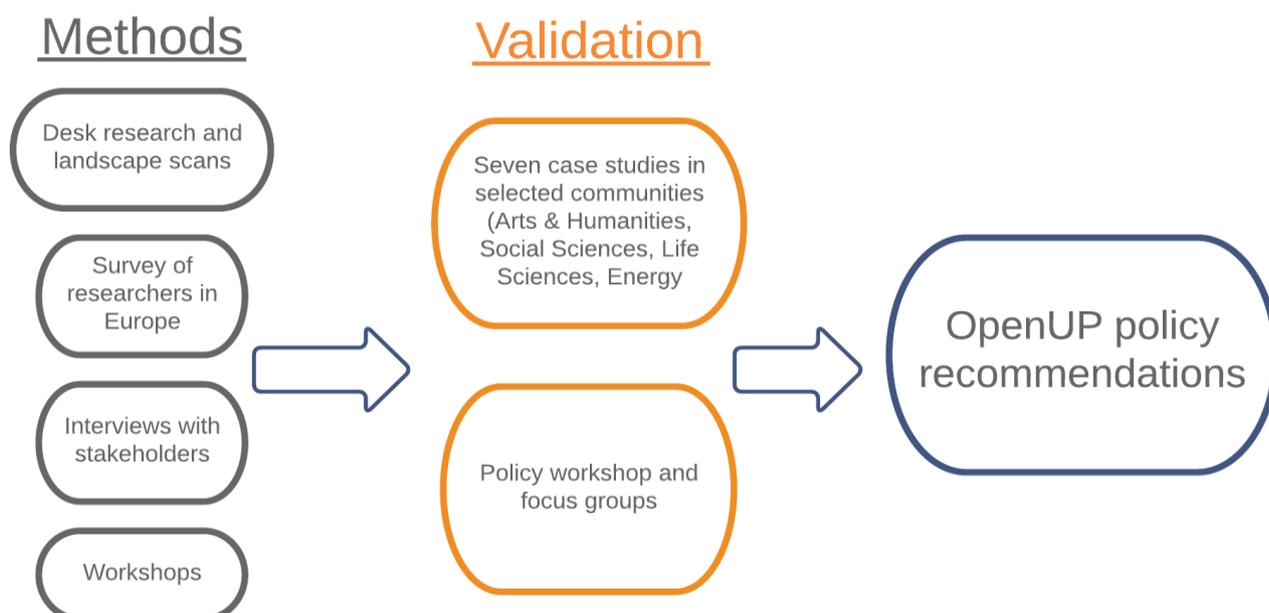
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1. Introduction and methodology

Open Access and Open Scholarship have revolutionised the way scholarly artefacts are evaluated and published, while the introduction of new technologies and media in scientific workflows has changed “how” and to “whom” science is communicated. The modes of interaction between the public and the scientific community are also changing due to the internet and social media. The OpenUP project studied key aspects and challenges of the currently transforming science landscape to provide a cohesive framework for the review-disseminate-assess phases of the research life cycle that is fit to support and promote Open Science.

The OpenUP partners engaged in an overarching research exercise throughout the project (see Figure 1 for the outline of OpenUP’s methodology). It included landscape scans of literature and a Europe-wide survey of researchers on the key topics of the project: Open Peer Review (OPR), innovative dissemination and altmetrics. The consortium reached out to the main experts and stakeholders in the review-assess-disseminate areas to gather their inputs on the current practices, challenges, and the latest developments through interviews. OpenUP engaged with all the stakeholders via a series of outreach and training events. Project results were tested through a series of pilots involving researchers from four scientific communities (Life Sciences, Social Sciences, Arts & Humanities, Energy). In addition, key conclusions were validated during the OpenUP’s high-level expert workshop in Brussels.

Figure 1. An outline of the methodology of the OpenUP project.



Gender was a horizontal cross-cutting theme of the project. All research activities conducted were assessed through or included a gender lens and data analysis always encompassed a gender dimension analysis. Research conducted in work packages 3, 4, 5, 6 and 7 focused on the three core topics of the project, but gender issues were always taken into consideration. Through desk research we identified specific issues related to gender and provided an overview of the current situation in the review-assess-disseminate cycle. The interviews with gender experts, research funders, researchers, librarians, infrastructure providers and other stakeholders gave inputs on various practices and initiatives promoted nationally and beyond to improve gender equity in research and academia. The OpenUP

survey data helped to identify the different attitudes and practices among female and male researchers to various aspects of OPR, innovative dissemination and alternative metrics.

The current report gives an overview of the main gender issues in research and academia that emerged during the course of OpenUP research. The report outlines OpenUP findings on gender inequities and biases in the three project topics, peer review, research dissemination and research assessment. It also presents key conclusions and a recommendation that highlight the relevant areas for policy intervention by EU, national and institutional policy makers, funders and publishers.

2. Gender inequities in research and academia

The number of women becoming students and graduating universities has been growing in the past decade. Currently the global share of female researchers is 28.8% although the proportion in some regions (Central Asia and Latin America and the Caribbean) reaches almost 50%.¹ In the EU, the proportion of female researchers is 33% (while the share is somewhat higher in central and eastern Europe than in western Europe).² Still, there are several areas in research and the academic world where women remain underrepresented. In Europe, female researchers in sub-fields of science and engineering, make up less than 25% of all researchers.³ Women are also significantly under-represented in research and academic leadership positions. In the EU-28, the largest gender discrepancy is observed at the highest level of the academic career ladder, where women comprised on average 21% of Grade A staff.⁴

Gender inequality in these areas has a considerable impact on authorship as well as recognition and evaluation of women researchers. They translate to wide variations in the quality of working conditions of female researchers as well as opportunities for career advancement and participation in academic decision-making. OpenUP researchers have studied sex and gender-related biases in the following areas of academic work relevant to the themes of the project:

- Publication peer review processes and contribution to editorial boards;
- Research dissemination;
- Research and researcher evaluation.

In further sections, we briefly present selected results from research activities in work packages 3-7 relevant for the core topics of the project. We also highlight key findings and conclusions of OpenUP and give a recommendation on actions needed to address gender and diversity issues in research.

¹ UNESCO Institute for Statistics. (2018). Women in Science. Fact Sheet No. 51.

<http://uis.unesco.org/sites/default/files/documents/fs51-women-in-science-2018-en.pdf>

² European Commission. (2015). *She Figures 2015*. European Union, 2016.

³ European Commission. (2015). *She Figures 2015*. European Union, 2016.

⁴ Grade A represents the data for staff at the level corresponding to the rank of full professor in the majority of the countries, or otherwise representing the highest post at which research is normally conducted. Detailed explanation is available at: https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-final.pdf p.130.

2.1. Gender bias in the peer review process and editorial boards

Key finding 1.

Traditional peer review processes face various criticisms. One of the issues is that female scientists face biases when they publish research articles, in particular during peer review. Open peer review methods could help address some of those criticisms by introducing transparency and accountability aspects into the process. However, the full effects of such practices are still unclear. **More evidence is needed to better understand the effects and impact of open peer review practices on gender biases in peer review processes.**

One factor that contributes to gender inequality in research is gender bias in the peer review process of scientific publications. Multiple studies confirmed that the attributes of referees, such as gender and region, can act as determinants when handling manuscripts, particularly in terms of the number of manuscripts being reviewed, review time and rejection rate.⁵ The judgement of reviewers in peer review is affected by their cognitive biases that could be unrelated to the scientific merit of a particular publication. Throughout the interviews conducted for OpenUP, many respondents agreed that explicit and implicit biases threaten the objectivity of the peer review process. Scientific publications can be evaluated based not only on their scientific content but rather on the sex of its author. The lack of gender diversity on editorial boards further contributes to disparities in editorial and peer review processes.

Open peer review may help to address gender bias in the current peer review process. For example, some of the interviewed researchers and journal editors suggested that by making the review reports and identities of reviewers openly available, it would be possible to expose gender biases. It would also help finding gender imbalances in editorial boards. However, it was also acknowledged that OPR alone will not change the reviewers' selection or determine whether balance is achieved among the reviewers and editorial boards. There is also a concern that OPR could further escalate gender disparity in peer review. Researchers, particularly female, who are already in more vulnerable positions due to biases against their sex, might be considerably affected by the open identity aspect of the process.⁶ Additional factors such as young age or early career stage may further compromise researchers' ability to reveal their identities openly due to fear of retaliation from more established scientists within their fields. Due to these reasons their reviews may not offer substantial criticism, especially when knowing that the author of the output under review may be making hiring or tenure decisions and evaluating their grants in the future.

Our research showed that opinions whether OPR would help to advance or hinder gender equality vary among different research stakeholders and further gathering, and examination of evidence in this area is needed. In particular, data of platforms and journals employing traditional and novel peer review methods could contribute to such an evidence base. It might reveal the points at which biases arise and the best ways to address them. More data in this area would also enable a detailed comparison of how OPR, double blind review and even triple blind review help to advance or hinder gender bias.⁷ Other specific areas that are still largely contested among researchers could also be explored including the awareness among editors of the gender of the reviewers and authors, and if gender influences the quality of the review.

⁵ Grod, O. N., Budden, A. E., Tregenza, T., Koricheva, J., Leimu, R., Aarssen, L. W., & Lortie, C. J. (2008). Systematic Variation in Reviewer Practice According to Country and Gender in the Field of Ecology and Evolution. *PLoS ONE*, 3(9), e3202. <http://doi.org/10.1371/journal.pone.0003202>

⁶ Nature Neuroscience. (1999). Pros and cons of open peer review. Editorial. https://www.nature.com/articles/nn0399_197

⁷ See Görögh, E., et al. (2017). [Deliverable D3.1– Practices, evaluation and mapping: Methods, tools and user needs](#). OpenUP project.

2.2. Gender lens in research dissemination

Key finding 2.

OpenUP identified four aspects of sex and gender analysis that should be considered when planning and conducting research dissemination⁸:

- Gender distribution within the team responsible for research and dissemination;
- Representation of gender, gender sensitivity and inclusiveness of the disseminated materials;
- Gender sensitivity and inclusiveness of the dissemination tools, platforms and strategies used;
- Gender of the target audience, e.g. their gender distribution, and any relevant gender-sensitive aspects in this regard (e.g. when disseminating research results in medicine).

Discrimination based on gender can occur across the whole cycle of knowledge production, application and communication. Therefore, gender analysis is needed at every step of the research process from designing a search strategy (what questions are asked, how and to whom), to collecting and analysing data, drawing conclusions (what discoveries are selected for innovation and who is involved in idea creation), identifying shortcomings, and communicating results (who is perceived as the target audience).⁸

Although not all areas of research have sex or gender aspects relevant to the content of the study itself (e.g. gravitational waves), they might be relevant for outreach (e.g. encouraging girls and boys in schools to take up physics), for researcher training (on historical gender bias in science knowledge and methods), and for policy recommendations (e.g. feeding the pipeline, maximising impact of investment in research).

During the interviews conducted by OpenUP researchers, different stakeholders evaluated this approach to sex and gender inclusiveness. Members of scholarly societies and journal editors expressed stronger support for implementation of such approaches compared to researchers. The latter doubted that gender-regulating measures in dissemination would help achieve gender equity, but rather, add additional requirements and workload to researchers, preventing them from conducting research.

This result confirms our finding that the growing need for improved and more interactive public communication of fact-based science is accompanied by a substantial gap in the current science communication system. Today, communicating and interacting with the public in an inclusive way (i.e. without discriminating gender or diversity) is essential to improve perception and awareness of science. To fill the current gap in interactive, inclusive and open science communication and to better distribute available resources it is recommended to create and fund new science communication roles and positions⁹.

⁸ Kraker, P. et al. (2017). Deliverable D4.1 – Practices evaluation and mapping: Methods, tools and user needs. OpenUP Project. http://openup-h2020.eu/wp-content/uploads/2017/01/OpenUP_D4.1_Practices-evaluation-and-mapping-Methods-tools-and-user-needs.pdf

⁹ Vignoli, M., Rörden, J. (2018). Deliverable D4.2. [Role description: Dissemination to businesses and the public](#). OpenUP project

2.3. Gender bias in research evaluation and review panels

Key finding 3.

Alternative impact measurements have a potential to improve current research assessment processes. They could also contribute to a more overarching evaluation of researchers. However, there is still a low level of understanding among researchers of what alternative metrics entail. There is also a lack of evidence on how such metrics could be applied and if they could address gender inequality issues in researcher evaluations.

Currently, bibliometric indicators like the h-index¹⁰ or the Journal Impact Factor (JIF)¹¹ are used extensively in measuring and assessing the impact of research outputs as well as when evaluating researchers. However, they receive significant criticism. In particular, the h-index is believed to have a systematic bias towards senior researchers and the JIF mainly reflects the overall impact of an average journal article and not that of a specific article.¹² Reliance on bibliometric indicators is also criticised as it does not account for a broad range of activities researchers engage in (review work, teaching, supervising, public talks, social media, etc.).¹³ Therefore, bibliometric indicators are failing to prove their suitability for measuring research outputs and their impact, in the context of a movement towards Open Science.¹⁴

Alternative metrics have a potential to give a better recognition of researchers' expertise and all type of research activities they engage in.¹⁵ This is particularly important to female researchers as studies show that bibliometric indicators cannot account for all the research activities they participate in. A recent bibliometric analysis conducted by Elsevier showed that scholarly output (articles, reviews, or conference proceedings) of female researchers is slightly lower compared to males.¹⁶ Another study also found female underrepresentation among authors of scientific publications (with exceptions of some countries).¹⁷ Further studies have addressed these issues from a disciplinary perspective.¹⁸ The OpenUP survey found that female researchers are more likely to disseminate their research through non-traditional dissemination methods (press releases, popular science publications and events for the general public) and target audiences other than academic audiences compared to male researchers (see table below).¹⁹ Such efforts are not acknowledged by traditional researcher evaluation methods and research impact measurements. Altmetrics introduces other ways of measuring and rewarding all the

¹⁰ Hirsch, J. E. (2010). An Index to Quantify an Individual's Scientific Research Output That Takes into Account the Effect of Multiple Coauthorship. *Scientometrics* Vol. 85, no. 3, pp: 741–54, <https://doi.org/10.1007/s11192-010-0193-9>.

¹¹ Garfield, E. (1972). Citation Analysis as a Tool in Journal Evaluation. *Science* Vol. 178, pp: 471–79, <http://dx.doi.org/10.1126/science.178.4060.471>.

¹² The San Francisco Declaration on Research Assessment (DORA). (2012). <http://www.ascb.org/dora/>; Hicks, D. et al. (2015). Bibliometrics: The Leiden Manifesto for Research Metrics, *Nature News* Vol. 520, pp: 429-31. <https://doi.org/10.1038/520429a>.

¹³ Gauch, S., and Blümel, C. (2016).

¹⁴ The Working Group on Rewards under Open Science. (2017). Evaluation of Research Careers fully acknowledging Open Science Practices: Rewards, incentives and/or recognition for researchers practicing Open Science. European Union. Available at: https://ec.europa.eu/research/openscience/pdf/os_rewards_wgreport_final.pdf

¹⁵ Wilsdon, J. et al. (2017). [Next-generation metrics: Responsible metrics and evaluation for open science](https://ec.europa.eu/research/openscience/pdf/report.pdf). Report of the European Commission Expert Group on Altmetrics. Available at: <https://ec.europa.eu/research/openscience/pdf/report.pdf>

¹⁶ Elsevier. (2017). Gender in the Global Research Landscape. Analysis of research performance through a gender lens across 20 years, 12 geographies, and 27 subject areas. *Elsevier*.

¹⁷ Larivière, V. et al. (2013). Global gender disparities in science. *Nature*. Vol 504, pp: 211-213.

¹⁸ E.g. Holman, L., Stuart-Fox, D., & Hauser, C. E. (2018). The gender gap in science: How long until women are equally represented? *PLOS Biology*, 16(4), e2004956. doi:10.1371/journal.pbio.2004956; Topaz, C. M., & Sen, S. (2016). Gender Representation on Journal Editorial Boards in the Mathematical Sciences. *PLOS ONE*, 11(8), e0161357. doi:10.1371/journal.pone.0161357; Mihaljević-Brandt, H., Santamaría, L., & Tullney, M. (2016). The Effect of Gender in the Publication Patterns in Mathematics. *PLOS ONE*, 11(10), e0165367. doi:10.1371/journal.pone.0165367.

¹⁹ See Kraker, P. et al. (2017).

research efforts. Through more overarching research assessments, they could improve the recognition of female researchers (and all researchers). However, it must be noted that alternative metrics also have its biases (e.g. perceived female users are retweeted less often than perceived male and gender ambiguous users).²⁰

Table 2. Proportions of respondents who target audiences listed in the table “always, or almost always” and “most of the time”, analysed by gender

| | Male | Female |
|---|-------|--------|
| Researchers from my own discipline/area | 98,1% | 99,2% |
| Researchers from other disciplines/ areas | 69,7% | 68,3% |
| Teachers | 28,3% | 39,8% |
| Students | 58,4% | 67,1% |
| Policy makers & government | 29,4% | 46,2% |
| Practitioners | 37,5% | 51,6% |
| Industry/business | 29,4% | 29,8% |
| General public | 29,2% | 38,8% |
| Journalists | 23,3% | 27,2% |
| Charities/NGOs | 11,6% | 16,7% |
| Children up to the age of 14 | 7,1% | 12,3% |

Note: Responses to question “3.2 - How often do you target the following audiences when disseminating your research findings?” N= [835 - 941]. The percentages show a share of respondents who chose “Always, or almost always (90-100% of the time)” and “Most of the time (60-89% of the time)” answer categories.

Another important aspect for promoting gender equality in research assessments concerns the review panels for grant applications. A lack of diversity of researchers on the review panels (not only in terms of gender but also other factors, such as career stage, ethnic backgrounds or interdisciplinarity) translates to specific groups of researchers receiving fewer grants. Through the interviews with the stakeholders we identified that in several countries across the EU there are efforts to monitor such panels and their compositions as well as to introduce various measures that control the implicit biases.²¹ These efforts could also advance the recognition and fairer evaluation procedures of female researchers.

Throughout OpenUP interviews and workshops many stakeholders stated that a broader set of research and researcher evaluation criteria are needed in today’s research life cycle. Alternative metrics offer the possibility to implement more comprehensive assessments. This could also contribute to improved recognition and evaluation of female researchers throughout their careers. However, the concept of alternative metrics is still new, and a rather small proportion of researchers are aware of it, and even fewer use these metrics. More conceptual scrutinization is needed in to establish what alternative metrics can measure and how they can inform researchers’ and policy makers’ decisions. Also, dedicated trainings for researchers on alternative metrics are needed to provide clear guidance on what activities such metrics consider. This confirms the findings of the Next Generation Metrics Report by the Altmetrics Expert Group mandated by the European Commission²².

²⁰ Nilizadeh, S., Groggel, A., Lista, P., Srijita Das, Ahn, Y.-Y., Kapadia, A., & Rojas, F. (2016). Twitter’s Glass Ceiling: The Effect of Perceived Gender on Online Visibility. Presented at the Tenth International AAAI Conference on Web and Social Media, Cologne, Germany. Retrieved from <https://www.aaai.org/ocs/index.php/ICWSM/ICWSM16/paper/view/13003>.

²¹ Banelyte, V. et al. (2017). [Deliverable D7.2 – Completed Policy review and mapping and field research activities](#). OpenUP project

²² Wilsdon, J. et al. (2017). [Next-generation metrics: Responsible metrics and evaluation for open science](#). Report of the European Commission Expert Group on Altmetrics.

3. Validation workshop and focus groups

To validate the final results of the project, the OpenUP team organised a high-level expert workshop on the role of Open Science in the future EU and national research programmes. It was held in Brussels on 28 June 2018. The list of attendees included the main stakeholders of the project, namely publishers, funders, association members, librarians, infrastructure providers and policy makers. One of the core workshop aims was to collect feedback from key experts in the project topics on the results and conclusions of OpenUP. The participants of the workshop received a briefing note outlining OpenUP’s results and conclusions as well as three possible policy scenarios on how OPR, innovative dissemination and alternative impact measurement could be implemented. The results and analysis of the scenarios were presented to the workshop participants and discussed in two focus groups. One focus group was dedicated to OPR and the second one to innovative dissemination and alternative metrics.

The sets of questions discussed in each of the focus groups included a question on gender and diversity issues (see table below). The participants of both focus groups could choose a few questions from the sets and discuss them in detail. Overall, the questions on gender received less interest and discussions mainly focused on the other questions in both focus groups. The research team saw a few possible explanations for that. The focus groups were to a large extent dedicated to the three key topics of the project (OPR, innovative dissemination and alternative measurements). Although gender and diversity issues are a cross-cutting and can affect the different practices employed during the entire research life cycle, there still seems to be a lack of understanding and evidence on these effects among academic stakeholders. For example, some see OPR as having a potential to diminish the bias existing in peer review procedures and hence increase the number of female-authored publications. However, others state that female researchers could be at a disadvantaged position in the peer review process if their names are revealed. Therefore, the main conclusion that the OpenUP consortium took away from the focus groups discussions (as well as from previous research activities) was that more studies and data are needed to establish how Open Science practices can impact gender and diversity issues in research.

Table 3. Sets of questions used to discuss the OpenUP policy scenarios in the focus groups of the OpenUP high-level expert workshop.

| Questions discussed in OPR focus group | Questions discussed in innovative dissemination and altmetrics focus group |
|---|--|
| Q1. How can successful practices and/or early adaptations of novel review methods in separate communities be dispersed within other research groups and disciplines? | Q1. How can policy-makers create incentives for and strengthen monitoring of innovative dissemination and altmetrics activities? |
| Q2. How would data sharing improve the review process? | Q2. How can we build evidence on the efficacy of innovative dissemination and altmetrics? How can we ensure quality and fair use of data in altmetrics and innovative dissemination? |
| Q3. How could participation in alternative review processes be incentivized among researchers? | Q3. How do gender and diversity issues relate to innovative dissemination and altmetrics? |
| Q4. Which national infrastructural changes would enable a wide uptake of alternative publishing and review system? | Q4. Which national or international infrastructural initiatives could foster innovative dissemination and altmetrics? |
| Q5. What would be the possible effects of open review practices (open identities, open report, open participation) on gender equality and diversity in research and academia? | Q5. What dedicated support and training could improve uptake of these practices? |

4. Conclusions and recommendation

Recommendation

Through increasing transparency, Open Science offers mechanisms which could improve gender inequities in research and academia. However, issues such as monopolization of knowledge production or vulnerability of individuals or minority groups through increased exposure persist in an open science ecosystem. **To fully understand the potential of Open Science practices for solving gender and diversity issues in research, more dedicated investigation is needed.**

Despite some progress in the past decade, gender inequity in research and academia is still evident. It can be observed in all research processes, from research team compositions and roles, publication preparation and reviewing to granting funding and evaluation of research(ers).²³ National initiatives at country levels aim at raising awareness on the issue and promote practices that could increase gender equity in research. In addition, various initiatives are introduced by research organisations, funders and publishers that aim to decrease the gender bias in *reviews-assess-disseminate* cycle of scholarly publishing. Aspects of Open Science (such as OPR, innovative dissemination and alternative metrics) also offer some solutions by introducing transparency and inclusiveness to the research cycle. Some of these solutions could help reduce the persistent gender bias present currently in academia. However, they also pose risks and many researchers and other stakeholders still question their unconditional applicability and implementation. There are gaps in data on the effects and impacts of OPR, innovative dissemination and alternative metrics on gender equality in research and academia.

The OpenUP project identified and investigated gender inequality in research. But it was beyond the scope of OpenUP to delve into and analyse the issues and to what extent they could be addressed with by open science. The impacts of OPR, innovative dissemination and alternative metrics on gender equality in research and academia not clear at the moment that further research, e.g. in a dedicated gender and open science project, is needed.²⁴ European and national policy makers as well as funders and publishers should further investigate the impact of Open Science practices on gender and diversity issues by collecting and analysing data on such practices.

²³ However, recent research has shown that some of such biases can be addressed through the review criteria which are applied on the methods applied: e.g. female grant applicants are equally successful when peer reviewers assess the science, but not when they assess the scientist. Cf. Witteman, H. O., Hendricks, M., Straus, S., & Tannenbaum, C. (2017). Female grant applicants are equally successful when peer reviewers assess the science, but not when they assess the scientist. Preprint. bioRxiv. doi:10.1101/232868

²⁴ Such as Genderaction project <http://genderaction.eu/horizon-europe/>