



‘Peer review’ by EU-ANSA Agencies – a reflection paper^{a,b,c}

Preamble: The context and purpose for this reflection paper

The European Code of conduct for research integrity (1) identifies a core set of principles for ensuring the integrity of scientific endeavours and their appropriate communication to the outside world. These include, but are not limited to: *honesty in communication; reliability in performing research; objectivity; impartiality and independence; and, openness and accessibility*. It is also explicitly recognised that the pursuit of scientific integrity is also dependent on sound policies and procedures, appropriate training and robust management processes. Intended as a *‘canon for self-regulation’* the code can be viewed as issuing a challenge for all bodies working with scientific data in Europe to reflect on the appropriateness of their practices.

This reflection paper can be seen in part as a response to this challenge, specifically through the work of the European Union agencies network of scientific advice (EU-ANSA). The EU-ANSA is a ‘sub-network’ of the EU Agencies^d that have in common the task of providing scientific and technical advice (including opinions, reports, assessments, guidelines, recommendations and/or other relevant outputs developed with a scientific method) to EU Institutions, Member States and other relevant audiences. The sub-network was set up with the aim of fostering exchange of best practice and experience concerning the ‘scientific methods’ they have in common. An EU-ANSA review paper that provides an overview of the scientific activities of the agencies participating in the network can be found at (2).

The principle of objectivity, enshrined in the European code is elaborated in that: *‘interpretations and conclusions must be founded on facts and data capable of proof and secondary review; there should be transparency in the collection, analysis and interpretation of data, and verifiability of the scientific reasoning’*. This principle is grounded in a core tenet of the scientific approach – that methods and analysis should be transparent and available for critical scrutiny. One of the main tools used in the scientific community to achieve this – peer review – is the topic for this reflection paper.

Scientific advancement is based on the accumulation of knowledge over time; and the principle that scientists should present their results for review by their peers has been a driving force for the establishment of learned journals from the 17th Century onwards (3, 4). Today, peer review, which can in simple terms be defined as the independent assessment of the competency, significance and often originality of a scientific paper or finding, is generally regarded as a necessary prerequisite for the acceptance of scientific findings (5). The importance of peer review to the international science community was highlighted by an international study conducted in 2009 which found that the peer review process was highly regarded by the vast majority of researchers with most (93%) also agreeing that peer review had ‘improved the quality’ of the last paper they had published (6).

^a Authors: William Cockburn (Corresponding author, Head of the Prevention and Research Unit, EU-OSHA), Mike Catchpole (Chief Scientist, Office of the Chief Scientist, ECDC), Beatrice Comby (Director of Capacity Building, FRONTEX), Hubert Deluyker (Chair EU-ANSA, Scientific Adviser to the Executive Director, EFSA), Hans-Georg Eichler (Senior Medical Officer, EMA), Joanna Goodey (Head of Freedoms and Justice Department, FRA), Paul Griffiths (Scientific Director, EMCDDA), Derek J Knight (Senior Scientific Advisor, ECHA), David Stanners (Senior Adviser & Head of International Cooperation, EEA), Erika Mezger (Deputy Director, Eurofound), Steve Purser (Head of Technical Competence Department, ENISA).

^b This paper is the product of a collaboration under the EU-ANSA initiative. The views expressed are those of the authors and should not be understood or quoted as being made on behalf of or reflecting the position of the agencies or organizations with which the authors are affiliated.

^c Acknowledgement: The EU-ANSA wishes to thank the members of the DG JRC Scientific Committee for their review and suggestions.

^d <http://europa.eu/about-eu/agencies/>



It should be noted that peer review is not only important as a quality assurance tool but also facilitates the acceptance of new ideas by wider society (7) and is relevant to the handling of scientific advice within, and to, government (8, 9). The topic of peer review and the processes that support it are therefore important issues for the agencies participating in the EU-ANSA network to consider. This is not only because the approach is likely to be helpful for ensuring the quality of their scientific work, but also because it has potential implications for the credibility and impact of its communication, to both the public and institutional stakeholders.

Developments in information technology and open access publishing, along with the increased pressure on researchers to publish and the corresponding increase in the volume of scientific output and associated proliferation of scientific publications, are all drivers of the current debate in this area (10, 11, 12). A number of authorities have noted that whilst peer review may be regarded as a valuable tool to safeguard scientific standards it is an imperfect one (13). Recent evidence shows that many studies that pass through the peer review process are not replicable or are methodologically flawed (14, 15, 16) and this may be a particular problem for some disciplines. This has prompted reflections on: the appropriate role of the peer review process; how procedures can be strengthened to ensure peer review performs better (17, 18, 19, 20); and whether new approaches facilitated by new technologies can be helpful (21, 22, 23). Not all these issues are directly relevant to the current use of peer review approaches within the EU-ANSA context. Nonetheless, following these discussions is important for the network, as developments in this area may have implications for both future practice and more generally the assessment of the value of research publications.

This reflection paper is grounded in the rationale that sharing experiences of EU-ANSA members in complex areas such as this has value, even though the technical disciplines and substantive tasks of the agencies involved vary considerably. It is not the intention here to review the topic of peer review in any general sense, although we note that for those wishing to explore this issue in more detail a number of good web based resources now exist that provide a good point of entry to the subject^{e,f,g}. Nor is this paper intended to be binding or restrictive in any way on the internal process, rules, or procedures used by the participating agencies for review purposes.

Most of the discourse in the area of peer review takes place within the context of the assessment of papers for inclusion in scientific journals. There is a need to explore the use of peer review within the very specific context of the work of agencies providing scientific advice and technical support and identify the specific challenges of utilising peer review in this environment. The paper provides a reflection on the key principles applicable to the use of peer review approaches within the context of such agencies. It differs in a number of ways from the classical peer review in academic publishing. This reflection is also intended to contribute to an on-going debate on developments taking place within the broader scientific community in relation to peer review.

^e <http://www.nature.com/nature/peerreview/debate/>

^f <http://blog.scielo.org/en/tag/peer-review/>

^g Serving and Strengthening Science: peer review, evaluation, project management, hosting experts. European Science Foundation (ESF) (2015). Available at: http://www.esf.org/fileadmin/Public_documents/Publications/Serving_and_Strengthening_Science.pdf



Peer review within the context of the work of the agencies^h

In order to be regarded as useful and reliable, the evidence and advice provided by each of the agencies in EU-ANSA needs to be of high quality. In line with recent research (24), quality is measured with respect to four criteria: **Saliency** or relevance (e.g. to the policy debate in question); **Credibility** (i.e. underpinned by science); **Legitimacy** (i.e. the level of acceptance by the audience); and **Accessibility** (i.e. results which are available for scrutiny).

A system that strengthens the scientific quality of agencies' outputs requires management commitment as well as processes that are clear, adhered to, verifiable, regularly reviewed and if necessary adapted. Quality arises out of the design at the outset of an appropriate process for developing scientific advice, rather than being only verified and fixed at the end. However, within this system, peer review of the draft outcome of scientific work is recognised as an important part of the process of achieving high scientific quality.

Hence, EU-ANSA agreed that the use of peer-review type methods for ensuring the quality of scientific outputs was a topic that should be developed further within the sub-network. It was decided that a reflection paper should be produced summarising:

- The value of peer review as part of the scientific quality assurance process frequently used by scientific agencies
- How peer review carried out by agencies differs from peer review in academic publishing
- Common challenges identified in EU-agencies related to peer review processes
- Six 'guiding principles' that should be followed to ensure meaningful peer review

This paper sets out the inherent value of peer review and the related challenges, with the aim of supporting further discussion in EU-ANSA and other fora and providing a road-map for further EU-ANSA activities in this area. It aims to improve understanding of how the EU-ANSA agencies work and the credibility of their outputs.

Definition and scope

EU-ANSA understand peer review as referring to the use of experts to check or validate a document or report to ensure that it is accurate and thorough with respect to its content and objectives, and is based on a sound methodology. In this sense, it is a scientific and technical 'quality check'. Peer reviewing should evidently be undertaken prior to publication, adoption or implementation of research findings.

For the purposes of the work carried out by the EU-ANSA agencies work, 'peer-review' does not refer to formal procedures commonly used by scientific journals that lead to a decision as to whether or not a paper is worthy of publication, and which typically adopt specific procedures - for example, ensuring that authors and reviewers do not know each other's identity ('blind' peer review). It rather implies an approach that seeks comment or validation from qualified experts prior to publication instead of a formal acceptance, request for changes or rejection. As such, peer review in agencies may be described as a key step in the process whereby the scientific quality can be checked to ensure the desired levels of quality have been met prior to publication. Transparency on the comments received and how they were taken on board would be part of this.

Building on the classic peer review elements concerning the validation of scientific aspects, such as the design and application of the methodology used to produce the output and the robustness of the

^h In this document the term agencies is used in a restricted sense to refer only to those agencies participating in the EU-ANSA network.



conclusions drawn; for agencies in EU-ANSA the approach to peer review proposed is to assess outputs against the four quality criteria of Saliency, Credibility, Legitimacy and Accessibility:

- Saliency
 - o Check that the original terms of reference have been adhered to.
- Credibility
 - o Check the accuracy and credibility of the information or data used, for example as regards the situation at national level.
 - o Check the appropriateness of the methods used. Validate a new or untested approach. Check compliance with internal norms and procedures and thus ensure consistency in methodological approaches across similar scientific outputs.
 - o Check that underlying assumptions have been clearly explained and uncertainty handled appropriately. Ensure that the appropriate steps have been taken to reduce or eliminate bias.
- Legitimacy
 - o Check on the divergence of the output, either as a whole or in part, from previous opinions either from the same or other comparable agencies and organisations.
 - o Identify gaps in knowledge, assist in its interpretation and help identify a way forward
 - o Advise on consistency with relevant strategies and policies, and ensure that, where appropriate, consultation has taken place and the views from all concerned stakeholders are properly presented.
- Accessibility
 - o Check that relevant documentation explaining key decisions during the development of the output are available for scrutiny. Make suggestions to improve the clarity of the document.

Peer review applies to scientific research deliverables that are intended for official publication by Agencies as final products. It is not intended to encompass deliverables such as policy papers for conferences or briefings for key stakeholders, which may be considered as being closer to working papers.

Reviewer selection

The reviewers may be selected specifically for a particular review because of their expertise, or may form part of an existing group of scientific experts, such as national representatives in an agency network or the agency's scientific panels (or scientific 'committees') of external experts. It is important that agencies avoid selecting reviewers who would have a conflict of interest and this is foreseen in each agency's policy on conflict of interest. Thus, while a variety of peer reviewers are used in the agencies, what they have in common is that they are external to, or independent of, the research process that produced the output being examined.

Public consultation, although sometimes directed at interest groups or other persons with some specialist knowledge, is considered outside the scope of peer review.

Value

Particularly where findings are sensitive, the peer review process can strengthen the soundness of the scientific advice and help address potential concerns of bias or other criticisms of the work carried out.

A peer review process also distinguishes agencies that have a scientific remit. In this sense, agencies such as those in EU-ANSA generally to adhere to scientific principles; for example in how they address uncertainties and the transparent description and communication of these and of specific risk estimations.



Challenges

It is important to ensure that the peer review is meaningful and is not reduced just to a formality. Apart from adding little or no value to the publication, a poor peer review can have a negative impact by creating a false expectation that content has been checked and validated. The use of standard templates, with a checklist of issues to be addressed, or feedback tools can help ensure that reviewers perform their task to a required standard.

Adequate resources need to be dedicated to running the peer review process, so that reviewers are identified in a timely manner, comments given are acted upon promptly and workloads for all involved in the process are managed fairly. The reviewing itself can take a lot of time and the compensation or other motivation of the reviewers is a particular challenge for the agencies, which generally are not able to offer levels of professional recognition or prestige equivalent to those of scientific journals. Financial compensation is possible, but may not be straightforward within the rules on budget implementation. Within these constraints, it is important to address the challenge of motivation for reviewers, such as through financial compensation and public recognition of their contribution.

In some cases, timing can present a challenge; annual budget cycles may mean that more outputs are delivered towards the end of the year, leading to an overload of the review process.

Reviewers must give an independent opinion, ideally adhering to principles such as those set out in the European Code of Conduct for Research Integrity (1). However, the contexts that agencies work in mean that it is sometimes difficult to ensure this, or to demonstrate it adequately. In particular, it is important to find reviewers with a sufficient 'international perspective' in addition to their national expertise.

Guiding principles

Based on the above considerations, the following guiding principles are proposed, although their application will vary according to the specific context of each agency.

1. *The procedure should be clearly defined*

As described above, the term 'peer-review' can refer to a range of processes. When used by agencies, it is important that the main aspects of the procedure are clearly defined to support good implementation of the process, ensure consistency of application across different agency products, and create external assurance and buy-in of the process (including, for example, clarity over the level of formality), which is crucial for achieving legitimacy.

2. *Expertise*

The quality of a peer review is fundamentally dependent on the reviewers' level of expertise appropriate to the material being reviewed. Selection of experts should therefore follow an assessment of the appropriateness of potential reviewers' knowledge for the task at hand required to be able to provide a valid opinion on the publication (including independency).

3. *Transparency*

If all aspects of the peer review process are clearly explained and are openly available, this will help demonstrate the credibility of the output and absence of bias of the agency. Aspects that should be explained include the process for selection of experts (including any measures to ensure absence of conflicts of interest), the working methods (including financial compensation), and how the outcome of the peer review procedure is documented. A report providing transparency on the comments received and how they were taken on board could be developed and made available in the public domain. This could take the form of a log of suggested changes and revisions implemented.

Ideally the identities of the experts should be made available, but individuals' rights to data protection need to be respected.



4. Resourcing

Adequate resources – mainly in terms of staff time – need to be dedicated by the agency to setting up and running the peer review process. Experts need to be given appropriate support, the process needs to be monitored and documented and, depending on the volume of work, this can entail one or more full time staff. Adequate resourcing is also relevant to the peer review process itself; depending on the type and length of the document, and the experts' needs to be given sufficient time to carry out their review. The resources that the expert is able to dedicate to the review will depend on whether it is a voluntary arrangement or there is financial compensation. In any case, the workload must be realistic or the quality of the reviews will suffer.

5. Technical support

A variety of tools are available to support the peer review process. These range from a simple template for reviewers, to on-line systems that monitor the progress of multiple on-going reviews. The level of sophistication should correspond to the number of peer reviews undertaken, but at the lowest level, a common template should be regarded as essential. Examples of templates used in academic publishing and those that may exist within EU-ANSA, can serve as a starting point for setting up a new peer review process.

6. Integration

The peer-review process should not stand alone in the agency context, but should be integrated in the wider quality and performance systems. As such, it will be subject to the same periodic reviews (and possibly audits) as other elements of such systems. Improvements should be made on the basis of findings from the reviews and further developments may be considered.

Discussion and conclusions

The proposed approach differs in a number of ways from the classical peer review in academic publishing.

The main goal of the approach to peer-review proposed by EU-ANSA is to ensure the quality of scientific outputs. For that purpose, it focuses the evaluations on the assessment of quality aspects related to the linkage between science and policy/decision-making: saliency, credibility, legitimacy and accessibility. Credibility includes appropriateness of the methodology and robustness of the conclusions (how much the findings support the conclusions). Novelty and originality aspects, used by scientific journals, do not apply in this context.

The proposed role of the reviewers is to validate the report, rather than to make a decision on acceptance or rejection. However, the comments may include the need for a profound revision, short of which the report should not be issued. Additionally, it is understood that the comments need to be explicitly addressed and this process needs to be transparent.

Reviewers need to be external to the production of the document but can have link to the agency producing the report. It could thus be that the reviewers have personal or professional relationships with the authors and may e.g. have been working with them on other reports. Hence, the importance of declaring all interests that are relevant for the purpose of the review.

The reviewers are preferably not 'blinded'. This may raise a concern about reviewers refraining from giving their frank opinion e.g. for fear of public criticism. However, this needs to be weighed against sacrificing the transparency of the process and the rapidly developing jurisprudence in this field.

The report also discusses how to engage and motivate reviewers. Ensuring that the peer-review gives added-value and is not reduced to a formality is a key challenge. One can make the analogy with the case of reviewing grants, which takes much longer than reviewing a paper. While grant reviewers are normally paid, reviewers of scientific journals are generally not. When a reviewer is expected to dedicate



significant effort financial compensation would seem normal. Additional forms of recognition could include a formal nomination as an agency's regular reviewer.

In conclusion, this paper should be viewed as the initiation point for an on-going reflection on the use of peer review by the ANSA network. The group remains committed to both continuing to share their experiences of utilising peer review approaches and following closely the debate in the wider scientific community on this issue.

References:

1. The European Code of Conduct for Research Integrity, European Science Foundation (ESF); All European Science Academies (ALLEA) (2011). Available from: http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf
2. Overview of the scientific processes of the EU agencies, Network for Scientific Advice, (EU-ANSA), Publications Office of the European Union, Luxembourg, (2015). Available from: http://bookshop.europa.eu/is-bin/INTERSHOP.enfinity/WFS/EU-Bookshop-Site/en_GB/-/EUR/ViewPublication-Start?PublicationKey=TM0115491
3. 350 years of scientific publication: from the "Journal des Sçavans" and Philosophical Transactions to SciELO. SciELO in Perspective. Available from: <http://blog.scielo.org/en/2015/03/05/350-years-of-scientific-publication-from-the-journal-des-sçavans-and-philosophical-transactions-to-scielo/>
4. BENOS, J., Bashari, E., Chaves, J. et al. The ups and downs of peer review. *Advances in Physiology Education*. June 2007. Vol 31,2 pp145-152.
5. SCIENTIFIC ELECTRONIC LIBRARY ONLINE. *Peer review: bad with it, worse without it*. SciELO in Perspective. [viewed 01 September 2015]. Available from: <http://blog.scielo.org/en/2015/04/17/peer-review-bad-with-it-worse-without-it/>
6. MULLIGAN, A., HALL, L., and RAPHAEL, E. Peer Review in a changing world: an international study measuring the attitudes of researchers. *Journal of the American Society information Science and technology* 2013, vol. 64,(1), pp.132-161.
7. Peer Review and the Acceptance of New Scientific Ideas. Discussion paper from a Working Party on equipping the public with an understanding of peer review. Sense about Science. 2004. [viewed 01 September 2015] Available from: <http://www.senseaboutscience.org/data/files/resources/17/peerReview.pdf>
8. Scientific Advice, Risk and Evidence Based Policy Making. Seventh Report of session 2006-06. House of Commons Science and Technology Committee, (2006) The Stationary Office London.
9. KENNEDY, D. Intelligence Science: Reverse Peer Review? *Science*. 2004.
10. WALKER, R., ROCHA da SILVA, P. Emerging trends in peer review – a survey. *Frontiers in Neuroscience*. (2015).
11. Technical solutions: Evolving peer review for the internet: Peer review needs to adapt to the pace and volume of information published online. *Nature*, (2006), [viewed 01 September 2015]. Available at: <http://www.nature.com/nature/peerreview/debate/nature04997.html>



12. BOHANNON, J. (2013) Who's afraid of peer review. *Science*. 2013: vol. 342 no. 6154 pp. 60-6.
13. HORTON, R. What's medicine's 5 sigma. *The Lancet* Vol. 385, 1380, April 11, 2015 (<http://www.thelancet.com>)
14. MOONESINGE, R., KHOURY,A.,JANSSENS,W. Most published research findings are false – But a little replication goes a long way. (2007) *PLOS Medicine* Vol 4.,2,0218-0221.
15. SIMMONS,J.,NELISON,L.,SIMONSOHN,U. False-positive psychology: undisclosed flexibility in data collection and analysis allows presenting anything as significant. (2011) *Psychological Science* 22(11)1359-1366
16. OPEN SCIENCE COLLABORATION, Estimating the reproducibility of psychological science. *Science*, (2015): Vol. 349 no. 6251.
17. SCHROTER,S.,BLACK,N.,EVANS.,GODLEE,F. et al. What errors do peer reviewers detect, and does training improve their ability to detect. *Journal of R SOC Med* (2008).
18. GROVES, T. Best practice in peer review and editing, ensuring article quality. *British Medical Journal*, (Editorial), London. (2010).
19. GASPARYAN, A., KITAS, G. Best peer reviewers and the quality of peer review in biomedical journals. *Croat Med Journal*. 2012;53:386.9
20. SCHROTER,S.,BLACK, N.,EVANS,S.,CARPENTER,J. et al. Effects of training on quality of peer review: randomised controlled trial. *British Medical Journal*, (2004).
21. AMSEN,E. Outreach Director at F1000 Research Guide to open science publishing. (2015) http://f1000.com/resources/F1000R_Guide_OpenScience.pdf
22. KRIEGESKORTE,N. Open evaluation: a vision for entirely transparent post-publication peer review and rating for science. (2012). *Frontiers in Computational Neuroscience*. Vol 6.(79).
23. PÖSCHI.U. Multi-stage open peer review: scientific evaluation integrating the strengths of traditional peer review with the virtues of transparency and self-regulation. *Frontiers in Computational Neuroscience*. Vol 6 (33).
24. Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M. et al. (2003) 'Knowledge systems for sustainable development', *PNAS*, 100/14: 8086–91.

Luxembourg: Publications Office of the European Union, 2015

Cataloguing number: TE-02-15-981-EN-N

ISBN: 978-92-9240-891-6

Doi:10.2802/55121

© EU-ANSA, sub-network of the Network of Heads of Agencies, 2015.

Reproduction is authorised provided the source is acknowledged.