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Abstract: Psychosociology theories indicate that individual evaluation is part of the recognition of professional activities. Following Christophe Dejours conclusions, this recognition is shaped by two complementary judgments: the "utility" judgment given by the hierarchy and the "beauty" judgment given by the peers. The aim of this paper is to explain how at INRAE individual assessment of scientists is operated, following a qualitative and multicriteria-based process by peers, that provides congrats and advices to the assessed scientists (the "beauty" judgment). We explain as well how INRAE regularly adapts this process to the evolution of research pratices, such as interdisciplinarity or open science, since assessment requires to be in phase with how research activities are performed.

Keywords: multicriteria assessment, open science, peers, qualitative evaluation, research assessment

Why an assessment of scientists?

Scientists' life is punctuated by different types of evaluations: during recruitment, promotions, calls for projects and throughout the career.

In France, civil-servant scientist (with permanent position) assessment is mandatory and legislated by decree 83-1260 (30th December 1983[1]) setting the statutory rules common to the French research organisations. This obligation is an opportunity to think a mean for making assessment by peers useful to both the concerned scientist and the research organization.

How can we assess "work"? The word « work » has several meanings such as « labour » and « artwork ». Evaluation has to take into account these two senses of work as « executing a task » and « creating something new ». Following the theories of Christophe Dejours (2003), "work" itself (in its two meanings) cannot be assessed: only the *results* of the work are visible and accessible to evaluation. Assessment of the results of the work can be and is commonly performed by measuring, counting, consisting on a quantitative approach. All efforts, tricks and intelligence put in reaching prescribed objectives represent the very essence of work and are often not visible to the evaluator. The real "work" defined by Christophe Dejours must be assessed through qualitative criteria, the ones based on "telling", "relating", "explaining", "clarifying", all verbs that tell a "story". Consequently, the persons who are the more appropriate to identify and assess the "work" in the sense of Dejours are peers: they perform the same job, they know the rules, they face similar difficulties and themselves create new tricks to reach their objectives.

These assessments proposed by Christophe Dejours are general and not specific for assessment of scientist work. But this represents a context, a frame in which INRAE (French National Research Institute for Agriculture, Food and Environment) proposes an assessment procedure to approach the best as possible a qualitative assessment of scientists: an evaluation performed by peers in a collegial manner, aiming at giving advices (and not penalties or rewards), and taking into account a large diversity of missions and activities corresponding to personal and professional trajectories. In addition, INRAE is aware that criteria for qualitative evaluation require regular adaptation, just as today for open science practices or scientific integrity.

1 http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000316777&fastPos=1&fastReqId=1906599245&categorieLien=cid&oldAction=rechTexte

Peers for a qualitative assessment scientists work

Why peer-assessment of scientists work is important and necessary? Back to theory in sociology, recognition is essential for well-being at work, for each worker, including scientists. Christophe Dejours again indicates that recognition involves two kinds of judgments: the "utility" judgment and the "beauty" judgment. They are complementary and necessary. The first one is given by the hierarchy, indicating that activities and work of the worker are useful for the organisation; this gives a meaning to the work performed by the worker. The second one is given by peers, people who know the work simply because they do the same job. Peers are thus the only ones who understand and consider the difficulties encountered by the assessed person; they can even catch hidden parts of the work developed to reach the objectives, in addition to the usual prescriptions.

Most of assessment methods applied by organisations (and not only by research organisations but also by funders) have been or are still centred on quantitative criteria which are useful for evaluating the *results* of the work, but not the work itself. Counting achievements (such as publications for scientists) is easy but is now considered as imperfect and even unfair: how to take into account the fact that some achievements (e. g. publications) are much easier to produce than others, depending on the discipline and the driven hypotheses? One of the solutions to quantify production in research is (was) the impact factor of the journal where the articles are published. This is based on the idea that because it is harder to publish in a high-ranked journal, the work is better than if published in a low-ranked journal. Nowadays, and since only a few years, these quantitative parameters (number of publications, impact factor, H index, quartile rank of the journal, …) are less in used and even banned from several organisations (DORA, the San Francisco Declaration on Research Assessment[2]), because of their restrictive view of the work. The challenge today for research organisations, for their managers and for the scientists is to have access to an assessment method more appropriate than a strictly quantitative one. The aim is to grasp the « hidden » activities (success, but also difficulties, failures, strategies to overcome problems) of researchers that represent the real work (and not only the results of the work). This is the role and responsibilities of peers.

At INRAE, individual assessment of scientists is performed by groups of peers called "Specialized Scientific Commissions" (SSC), organized by disciplines or groups of disciplines. The 13 SSC cover all the types of disciplines present at INRAE (**Table 1**), and each INRAE scientist selects the SSC which corresponds the best to her/his activities. Each of the 13 INRAE SSC is a group of 20-24 scientists nominated or elected for four years - half of them not belonging to INRAE - and headed by a president who is also external to INRAE. Each of the SSC follows the precise guidelines given by INRAE since

[2] https://sfdora.org/read/

several years (Direction de l'Evaluation, 2022).

Table 1: List of the 13 INRAE Specialized Scientific Commissions (SSC). Alphabetical order.

Agronomy, Livestock and Forest
Animal Biology
Ecology, Population biology and ecosystems dynamics
Economics, Sociology and Management science
Environmental sciences: earth, water and atmosphere
Interactions between Pests, Symbionts or Commensals with their Hosts
Mathematics, Informatics, Digital sciences, Artificial intelligence and Robotics
Microbiology, Microbial ecosystems, Agri-food systems, Biotechnology
Nutrition and Toxicology
Plant and Animal Genetics
Plant Integrative Biology
Research support and management
Science and food, materials and bio-based products engineering, Materials, Residual Resources

The SSC produce sovereign assessments, independently of INRAE hierarchy. SSC give advices which are collegially discussed. Specific referees are appointed for each evaluated scientist but remains unknown for him/her, and this confidentiality is important since the judgment of "beauty" is thus given by a community of peers, and not by only one peer, in order to strengthen the value and the significance of the assessment. The output of this process is a personal and dedicated "beauty" judgment emitted through a written message every two or three years by peers of the discipline towards the evaluated INRAE scientists.

An advice-based assessment

As stated above, scientist assessment is based on the "beauty" judgment made by peers. The aim for INRAE is not to punish or reward, but to give advices in a humanely manner and with good will. The advice is usually balanced between congratulations on the positive aspects evaluated by the peers, and opinions on the choices that has been made by the scientist (for instance on methods), the dynamics and relevance of the research, or orientation that could be followed (for instance in terms of collaboration). This general advice concerns the trajectory of the evaluated scientists and may differ between a junior an a senior scientist. One particular element taken into account is the coherence of their work with the global strategy of INRAE, even if this specific point, from a theoretical point of view is more an "utility" judgement.

By reading the whole file written by the evaluated scientist, and since it is highly recommended to write it in a "telling story" mode, the peers can detect in some cases different types of difficulties the evaluated person might encountered, and transmit it to the hierarchy. Either because the evaluated person relates a difficult situation in the document, or because the SSC members detect a lack of dynamics or motivation. This action enables the hierarchy to do what is needed (e. g. contacting the scientist, the head of the lab,…) with the help of professional human resources people at INRAE to understand and help the person and the lab to disentangle the situation and to make it resolved as far as it is feasible. In **Table 2**, we give an example of types of such situations detected in 2020 (60 concerned scientists) and 2021 (74 concerned scientists) for a total of 1454 assessed scientists. Most of the situations (78%) are easily resolved in a few months: a simple discussion between the scientist and her/his hierarchy is sufficient to clarify the issue and resolve it. For other cases, both parties agree that a change is necessary and different solutions are examined, such as a change of team or laboratory, or even missions. It may take a year. And in a very few cases, the situation is very degraded (for any reason) and a deep analysis is performed, with several professional of human resources management.

Table 2: Types of difficulties identified by the peers, for 2020 et 2021. This corresponds to 105 different assessments (scientists). For each scientist, the difficulty might fit with different types.

Type	Junior scientists	Senior scientist	Total
Weak project	50	5	55
Lack of autonomy, motivation, dynamism…	14	1	15
Level of activity (lack of scientific output, dispersed activities…)	37	2	39
Working environment, conflicts, medical issue, overwork…	49	17	66
Non-delivered document or incomplete records	7	4	11

In conclusion, the role of peers is essential to help scientists having a recognition via a "beauty" judgement, and to anticipate difficulties in order in most cases to be able to prevent a situation from escalating. We pay particular attention to junior scientists during their first years at INRAE: this consists on three assessments during the five years following their recruitment, in order to help them to stabilize their project and first achievements.

A multicriteria assessment

There are several reasons for taking into account different criteria during scientist assessment. First, INRAE is a research institute that combines basic and applied approaches in order to get finalized objectives towards the society; this encompasses several kinds of disciplines and expertises that each requires specific criteria (an agronomist working with farmers towards a molecular biologist at the

bench). Second, missions of scientists are not limited to the production of knowledge but include expertise, education and management. Third, missions of scientists change during the career and senior scientists tend to get more involved in management.

In the mid-2000s, INRA and Irstea (the two founding organizations of INRAE) created and participated to the inter-institutional working group on the evaluation of the finalized research called EREFIN ("Evaluation de la REcherche FINalisée" which stands in French for "Assessment of Finalized Research"). The aim was to promote a comprehensive assessment enlarging the single assessment of producing and disseminating new knowledge to the other missions mentioned above such as expertise, training, contribution to scientific culture... This resulted in a production of tools allowing a topology of possible activities, a list of possible products and descriptors, as well as criteria for assessment (EREFIN 2011). Today, this consists on tools that are still largely used in different organizations and assessments in France.

At INRAE, and based on EREFIN, we propose the scientists to declare their involvement in the different expected activities in four main types (**Figure 1**):

- Production of knowledge.
- Expertise and knowledge mobilization.
- Training through research, initial and continuing training.
- Animation or direction of institutional groups, major instruments, resources, programs or networks.

This list is a representation of the different possible areas of actions; it is not expected that a given scientist "ticks" all of these activities. As a consequence, the peers will not criticize a scientist for not being active in the four activities. Peers have thus to evaluate how the scientist manages her/his different activities and if this is consistent with her/his objectives and stage in her/his career. Assessment at INRAE aims - as well - at examining the trajectory of scientists since we do not expect the same distribution of time among the four different main types between a junior and a senior scientist. Depending on age, experience, trajectory, scientific domain, researchers may sign in at different levels these four main types (**Figure 2**).

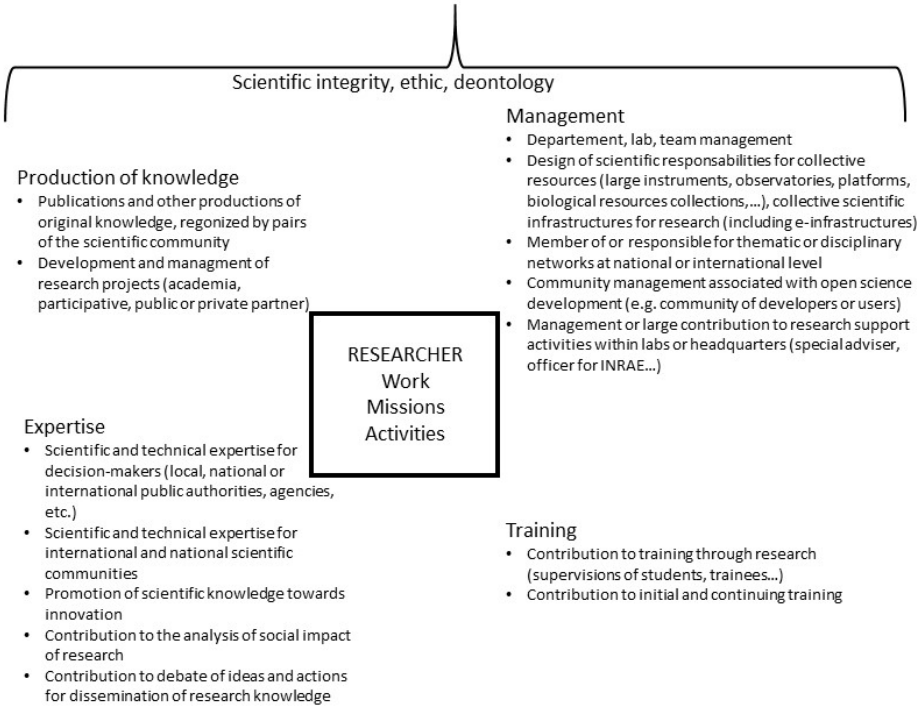

Figure 1: description of the four main types of activities at INRAE that scientists under assessment can mention and develop in their report.

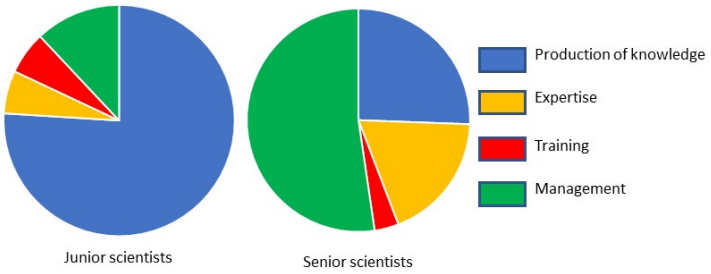

Figure 2: example of repartition of the activities of junior and senior INRAE scientists. CRCN: Chargé de Recherche Classe Normale (first degree of scientist recruitment at INRAE). DREX: Directeur de recherche classe Exceptionnelle (last degree of promotion at INRAE). Based on 4989 responses of scientists on a period of 2015-2021 years.

Evolution of qualitative assessment criteria

Qualitative assessment by SSC members is based on a frame and guidelines given to the scientist to drive the writing towards a "story telling mode" centred on i) facts and achievements, and ii) a reflexive analysis of the activity (success, failure, difficulties…).

Assessment based only on (inappropriate) quantitative metrics appears to be the easiest way for an automatic or administrative assessment by non-pairs, who people are unable to analyse the real quality of work and of products of work. Generalising the switch of assessment from quantitative metrics to a qualitative approach requires the definition and implementation of "qualitative indicators" In 2019, Wouters et al. (2019) proposed a framework with about 150 indicators and evaluated their relevance for different kinds of assessments (infrastructures, research and funding organisations, individual researcher activity, career progression and recruitment). This approach helps in defining qualitative indicators but the temptation could be to qualitatively assess with a too long list of indicators, and to eventually fall back into the paradox of a quantitative approach for a qualitative assessment. So i) indicators are necessary to limit the risk that subjectivity operates during qualitative assessment, and ii) the use a multicriteria approach - as performed at INRAE - might limit this risk by buffering each criteria to - at the end - define the profile of each scientist by the distribution of her/his types of activities.

For an organizarion such as INRAE, qualitative assessment has to take into account possible new orientations of research practices. Recently, INRAE decided to strengthen activities and visibility on different aspects that are developed below : expertise, partnership, interdisciplinarity and open science.

Expertise and support for public policies: the aim of expertise is to make available to actors responsible for public policies (ministries, agencies, local authorities, European and international institutions, universities etc.), scientific and technical knowledge, tools and methods that help inform, design, implement and evaluate public policies. At INRAE, these activities take various forms: collective scientific expertise, prospective, studies and research for and on public policies, training, working groups, participation in bodies of public actors, design and management of observatories or databases… All these aspects are listed in the guidelines provided to the scientists who are invited to describe those activities in their assessment files. Peers will check how these expertise activities suit with the three other types of activities, and how they are coherent with the personal trajectory of the assessed scientist, how they were performed with which outputs and if they are disseminated to the correct audience.

Research in partnership with a view to contribute to all forms of innovation: the innovations are the result of diversified partnerships between research or training establishments, technical centers or

technical agricultural and agro-industrial institutes, competitiveness clusters, public and private economic actors, civil society actors; this aims at favoring the co-construction of the value creation process between all the actors of the project. INRAE defends the concept of diversity of innovations which means research may innovate for economic, political, environmental, societal or health issues. Being partner is to produce with others outputs that are enriched and different from what would have been produced alone. It is therefore essential in terms of assessment that the researcher partnership approach is made explicit in terms of co-design, co-construction and co-realization, on long-term programs, punctuated by more targeted projects, partnership that asks and answers questions of original and useful research.

Practices of interdisciplinarity: by definition, a partnership aims to create novelty, to do more together, by combining differences, ideas, skills, expertise and resources. "Collaborating" therefore implies working with people who are sometimes from different scientific backgrounds. The success of an interdisciplinary partnership implies the ability to dialogue between people from different disciplines. Thus, whether the partnership is academic, private, public or / and citizen, at the national level or by mixing nationalities, interdisciplinarity must be set in motion positively in the process of co-construction and co-realization. Taking into account interdisciplinarity in the assessment process is necessary in order to recognize the cost linked to this interdisciplinary effort and to focus, in this context, on the quality of the questioning of research and the relevance of this strategy. However, because each SSC is centred on a given discipline, they might have difficulties to assess scientists who are at the interface of different disciplines: the peers of a given SSC might not be able to deliver an complete and adapted "beauty" judgment. As a consequence, INRAE gives the possibility to scientists to be assessed by two different SSC, covering the disciplines they use for their research (for instance mathematics and ecology). However, this is still a proxy of assessment at the interface between two disciplines, since each SSC evaluates only one discipline.

Practices in open science: Open Science (OS) is a broad approach developed to improve reproductibility, transparency and robustness of research (Susi et al., 2022). Since several years, there is a strong international and European politics to strengthen OS practices mainly for publications (open access), data, code and computer programs, and citizen science. Most of the international scientific institutes and universities have signed different manifesto – such as DORA (https://sfdora.org/read/) and Leiden (Hicks et al; 2015) – and several countries (as well as the European Community) have define roadmaps to encourage scientists to follow these new practices. The main line of this implication is that the scientific content of an article is more important than the publication indicators, and that all data must be FAIR[3] and well described by metadata.

[3] FAIR data are data which meet principles of findability, accessibility, interoperability, and reusability.

Recently, in february 2022 during an OSEC (Open Science European Conference) in Paris (France), a large number of European universities, research organisations (including INRAE) and funders signed the "Paris Call on Research Assessment"[4]. The objective is to strengthen the common European vision on rewarding quality and the various impacts of research meeting the highest standards of ethics and integrity, on valuing the diversity of research activities, on rewarding not only the research outputs but also the appropriate conduct of research. Research organizations (including INRAE) have thus a well delimitated frame to engage OS practices assessment. In that context, we performed a benchmark to analyse how different countries and organizations take into account OS practices. This benchmark was based on a corpus of twenty documents produced by different international organizations, states or universities (Bristol, UCL, Utrecht, ...) between 2015 and 2022 (**Table 3**).

Universities	
Utrecht University	Recognition and Rewards Vision - 2021
Delft University of Technology	Open Science Programme 2020-2024 Research and Education in the Open Era Evaluation 2021 & Work plan 2022 - 2021
University of Bristol	Academic Promotions Framework 2021-2022 - 2021
Universities Norway	NOR-CAM - A toolbox for recognition and rewards in academic careers - 2021
Maastricht University	Room for everyone's talent at Maastricht University - 2020
University College London	UCL Academic Careers Framework - 2018
University Medical Center Utrecht	Guide for reviewers/evaluators that use the UMC Utrecht indicators for impact - 2016
Ghent University	Vision Statement For Evaluating Research At Ghent University - 2016
University of Glasgow	Academic Promotion Criteria
Others entities	
YUFE Alliance	Open Science Assessment and Incentives at the YUFE Alliance - 2022
LERU	A Pathway towards Multidimensional Academic Careers - 2022
VNSU, KNAW, NWO	Strategy Evaluation Protocol – 2021. Standard Evaluation Protocol - 2015
DORA, EUA, SPARC Europe	Reimagining Academic Career Assessment: Stories of innovation and change - 2021
TJNK, TSV	Good practice in researcher evaluation. Recommendation for the responsible evaluation of a researcher in finland - 2020
FOLEC	Towards A Transformation Of Scientific Research Assessment In Latin America And The Caribbean - 2020
VNSU, KNAW, NWO and ZonMw	Room for everyone's talent - 2019
European Commission	Evaluation of Research Careers fully acknowledging Open Science Practices - 2017

Table 3: Corpus used to compare and constrast scientist assessment at INRAE and other organizations. YUFE: Young Universities of the Future Europe. LERU: League of European Research Universities. KNAW, NWO and VSNU: association of universities in the Netherlands, which had already signed the DORA declaration. DORA: Declaration of San Francisco. EUA: European University Association. TJNK: Finish Committee for Public Information. TSV: Federation of Finnish Learned Societies. FOLEC: Latin American Forum on Research Assessment. ZonMw: The Netherlands Organisation for Health Research and Development.

[4] https://osec2022.eu/paris-call/

Our benchmarking concerns mainly universities, national roadmaps and clusters of organisations (League of European Research Universities, European Commission…) that have broader objectives than INRAE with finalized objectives.

As a starting point, we checked how the four main activities used to structure the assessment of INRAE scientists (in brief, Production of knowledge, Expertise, Training and Management) cross referenced with criteria taken into account by other international organizations. First, the four INRAE activities cover all the types of activities detected in other organization assessment procedures in an OS context. In **Figure 3**, we show the correspondence between INRAE and other organization categories. There is a strong match, even if the vocabulary is different (for instance, as many organizations are universities, the term "Education" is more appropriate for them than "Training"). There are terms that are not clearly mentionned in INRAE activities such as "Soft Skills" or "Leadership": in our opinion, they refer to skills that affect the whole types of activites, and that are difficult to assess since they concern behaviour and abilities. And eventually, "Impact" assessment is proposed by other organizations but not directly by INRAE. INRAE has developed and applies tools (called ASIRPA[5]) that define, describe and measure "impact" of research, but not at an individual level. This concerns economic, societal, political, environmental and health impacts of research on the mid- long-term based on projects or long-term research (Joly and Matt 2017; Joly et al. 2019). And INRAE considers that impast assessmentcannot be appropriate to one person (the scientist) tsince an impact is systemic and include several actions and people.

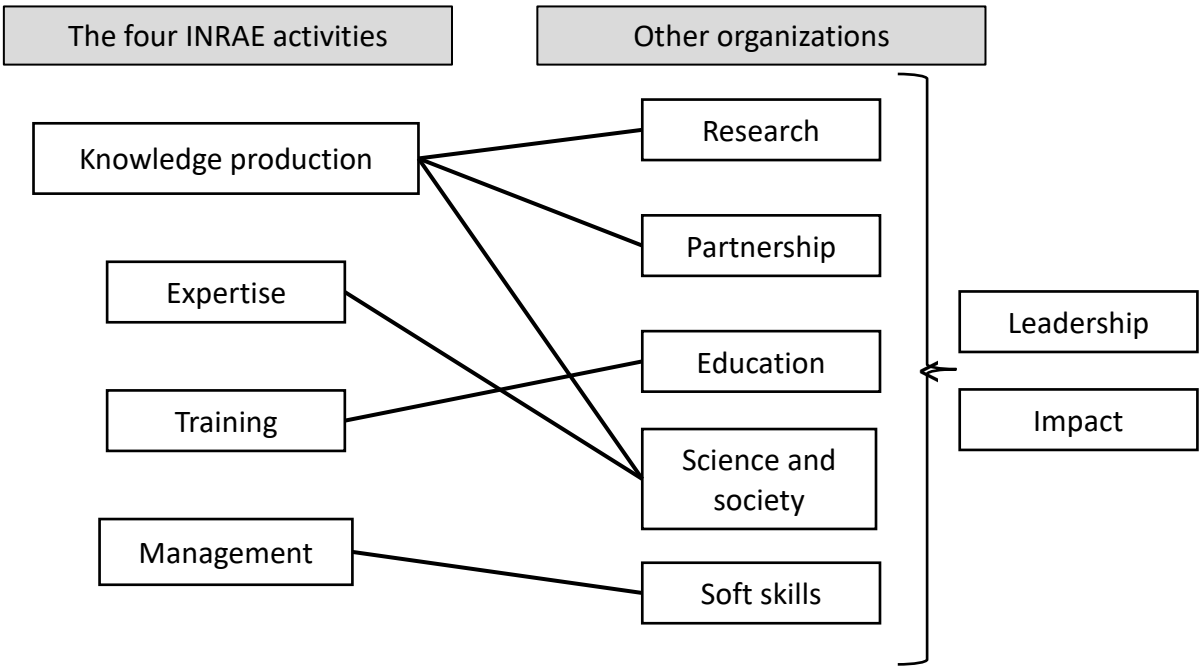

Figure 3: comparison of categories used for assessment of research activities between INRAE (left) and other organizations (right).

[5] https://www6.inrae.fr/asirpa_eng/

Based on the different axes (**Figure 3**), there is thus not a large discrepancy in the mode of research assessment between INRAE and other international organizations, and INRAE is one of the organisation that has set up procedures and criteria specific to OS assessment. Practically, we recommend the evaluated person to mention her/his possible involvement in OS by i) listing new products specific to bibliodiversity (e. g. preprints, data repositories…), ii) describing actions towards obtaining FAIR data, iii) describing her/his strategy in OS (e. g. choice of diamond or golden journals…), and if this is the case iv) explaining her/his personal implication or actions in OS such as participation in different OS initiative (e. g. Peer Community In, open peer reviews, processes for sharing data, citizen science…).

OS practices question scientific integrity since new audiences are targeted, large dissemination of science results and production are promoted; as a consequence, a mis-use of these information might occur (social network, preprints considered as validated science…). This implies an enhanced vigilance for ethical and deontological views, transparency and traceability of research processes, and greater attention paid to research data, to their management, and whenever it is relevant, to their sharing. In terms of assessment of scientific integrity, INRAE gives the possibility to the scientists to express in their report how they step back their scientific integrity in general and more specifically facing OS practices.

Conclusions and tracks for the near future

The 20th July 2022, the "Agreement on reforming research assessment" was published by the European Commission (via Science Europe)[6], after a consultation of more than 350 organisations from 40 countries. This declaration implements 10 commitments that the signatories – including INRAE – undertake to follow and apply. Most of the commitments are already applied at INRAE for individual assessment of researchers: diversity of contributions, qualitative evaluation, abandon of inappropriate metrics, resources for reforming research assessment, multi- and adapted criteria, transparency of the processes. Of course, there is still improvement to make, such as extending the exchange of practices with our partners, communicating the progress made (this paper is part of it), and evaluating our pratices. The following elements represent the evolution that we see to be important for INRAE in order to regularly take into account, even anticipate, evolutions of context and practices in the job of being a scientist.

Training for assessment. Emphasis on several missions like involvement in expertise and support for public policy and the generalisation of OS practices could be perceived by researchers as an unwelcome "top-down" imposition that increases the workload without any benefit. Moreover, in some disciplines

[6] https://www.scienceeurope.org/our-resources/agreement-reforming-research-assessment/

(such as biology/medicine compared to mathematics), for structural or historical reasons, appropriation of such practices may be slow. Advocacy and training are thus essential for the researchers to understand the benefits for them. Such training is also important for the peer members of SSC in order to help them in applying an appropriate "beauty" judgment on these new practices.

A shared assessment between organizations. It is essential that all stakeholders involved in assessment share the common main objectives and use similar processes with appropriate indicators (see above). Assessment of researchers occurs not only regularly by specific commissions such as INRAE SSC, but also at keypoints of their careers during their recruitment or promotion and the different juries have to apply the same general guidelines towards qualitative and multicriteria evaluation, including OS practices. And assessment of collective structures or projects must as well share a common base. In France, HCERES (the national agency for research and education assessment of organisations and laboratories) and ANR (national funding agency for research) do use multicriteria approach for assessment and recognize OS contributions, reducing the use of metrics such as H index and impact factor (the European ERC committees proceed the same)[7]. These are signs that assessment processes are changing and that a general common framework is shared at all assessment levels of researchers activities, funding and career development.

Towards assessment by interview. INRAE has today a roadmap that concerns several items such as integrating elements of scientific integrity on the report of the scientists. But it is still difficult to define criteria or indicators for it (Moher et al. 2020). One option could be to include an interview between the assessed scientist and the SSC; this might allow to question more deeply how the scientist faces scientific integrity on four main aspects: reliability, honesty, respect and responsability. As well, interviews could include other aspects related to soft-skills which are more easy to appreciate by an oral exchange. And interviews will be an opportunity to deepen scientific discussions in order as well to help the scientitists in their professional trajectories. Even if in the report scientists are invited to mention difficulties, failures they may have encountered, an interwiew is probably more adapted for them to explain these possible delicate situations. There as thus many advantages for considering interviews in the process of individual assessement. But today, there are at least two obstacles: first, the number of scientists at INRAE (approximately 2,500) is too high to organize such interviews, and second, interviews - by definition - will break the confidentiality rule of assessment. However, one intermediate track for setting these interviews could be to select a subset of assessed scientists based for example on a specific period in the career, and thus to accept that for these cases, confidentiality is broken.

[7] In French: https://openscience.pasteur.fr/2022/01/17/le-hceres-signe-dora-et-fait-le-choix-dune-evaluation-multi-criteres-et-plus-qualitative/#626207478e82ce3af6eb/archives, https://anr.fr/fr/actualites-de-lanr/details/news/lanr-en-soutien-dune-science-ouverte/, page 6 of https://anr.fr/fileadmin/documents/2022/ANR-COP-2021-2025.pdf

Environmental impact. Evolution of assessment procedures and criteria is required since it follows the evolution of scientist missions and way of working. Professionnal environment is influencing the way scientists do their job. A simple exemple is the impact of the Sars-Cov-2 epidemia on in-house working and teleworking. But more deeply, the general environmental and societal contexts (not directly linked to science activities) may trigger new ways to consider the job of scientists: at INRAE, some scientists are aware of the impact of their activities on climate change and carbon footprint: they might orientate their plans for experiments that are more energy-friendly, as well as reducing international traveling by air. These changes in pratices might affect sizing of experiments and/or international collaborations. It is too early to see whether those putative changes will set up on a long term, but this is an example of how assessment procedures might evolve to take into considerations environmental impact of research activities.

Acknowledgments: Odile Hologne and Emmanuelle Jannes-Ober from the Open Science Direction at INRAE (DipSO) are acknowledged for fruitful discussion. Camille Brard was funded by INRAE under the supervision of Odile Hologne and Emmanuelle Jannes-Ober (DipSO). Christian Lannou (assistant-director of science and innovation at INRAE) participated to the discussion as well. Françoise Simon-Plas and her group on deontology at INRAE are acknowledged for their inputs on scientific integrity. Figure 2 was taken from analyses made by Denis Vile (INRAE, LEPSE, Montpellier, France). Some elements described herein where discussed in a seminar in september 2021 with the presidents of the SSC and the heads of INRAE Divisions who are greatly acknowledged.

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