Sciences, Environnements and Societies
The SEnS Workshop
Inria Grenoble - Lyon

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Preamble

Context. The ongoing environmental disaster (loss of biodiversity, climate change...) and the warnings by the scientific community about the need to rethink our models of production and consumption make it impossible to ignore the issue, whatever the context. So, what about scientific research? Beyond its direct environmental footprint (for example due to flying to conferences), what role does it play in the destructive behavior of our societies, and how would it fit in a mid- or long-term trajectory toward sustainability? This question opens up a wider discussion that scientists rarely have: *Does our research contribute to building a world that corresponds to our values?* To tackle this question, we must learn to make explicit the values that shape how we work, and understand the complex relationships between our research, the environment and the societies in which we or others live. This requires some understanding of the history, economics, law, philosophy, sociology, politics, and ethics of our disciplines, for which many of us have received no training. The SEnS workshop has been designed to provide tools and resources for this purpose, to a group of 5 to 15 people working in academia, including at least one having already participated in such a workshop and who will facilitate it.

Objectives. The main goal of this workshop is to provide a setting to collectively discuss the consequences of our research, the values that it conveys, and more generally how scientific research fits in the Anthropocene. The objective is not to reach a consensus between the participants, but rather to provide everyone with the opportunity to reflect and take a stance on current environmental issues in a respectful and constructive setting. By confronting ideas and sharing knowledge, the goal is then to find common ground. Besides, the workshop provides an introduction to science and technology studies, in particular to the philosophy, history, and sociology of science.

Organization. One could be reluctant to a rather formal setting, with its rules and roles, for discussing such complex questions; we were too. Still, we see several reasons to adopt this format. First, we need rules to make sure everyone can speak freely. Then, we want to avoid an exchange that is limited to preconceived ideas on the subject, in favor of a collective effort to find some common ground without hiding differences. Finally, a setting that differs a bit from the standard in academia can help participants take a step back to reflect on their work and feel safe while discussing topics on which they are not specialists. For all these reasons, it is important that participants agree at the beginning of the workshop on the confidentiality of the opinions and experiences shared during the workshop.

Dissemination. A SEnS workshop gathers up to 15 people working in scientific research: researchers, but also engineers, administrative or community staff whose work is related to the production of knowledge and technology. A research group, a lab or a university can for example host a SEnS workshop. One or two persons are in charge of facilitating the workshop. At least one of them must have already participated in a SEnS workshop, read the documentary resources, and completed his/her preparations by discussing with other people who have themselves facilitated such a workshop. Anyone fulfilling these conditions can organize the workshop in the context that suits them best. It is of course possible to adjust the proposed

setting as one sees fit. Everyone who has attended a SEnS workshop is welcome to make it his/her own, to adapt it to their own research context and to contribute to its improvement[1]. The workshop's documents (program, cards, questions) are distributed under the CC-BY-NC 4.0 license.

Required equipment (to be prepared by the facilitator)

- No computers for participants! The workshop can take place indoors or outside.

- Pens, tape, scissors, a table and a large white paper sheet (A0 or larger). One can replace the table by a board (in that case, prepare sticky notes rather than blank cards).

- A timer (a watch, a smartphone etc.) to keep track of time.

- 10 blank cards (on card stock, 6 cm by 4 cm) per participant, plus 20 extra cards. Cards can be replaced by sticky notes.

- One copy per participant of this document.

- One copy of the resource-cards for the mapping of values and dependencies.

- One copy of the question-sheets for the exchange based on the documentary resources.

- For the documentary resources, it is recommended to bring one printed copy of each text (or several copies of the texts that the facilitator would like to read), and possibly a computer with a projector and speakers to correctly show the video-resources.

- Between 5 and 10 copies of the event-sheets for the foresight session.

- One blank sheet for everyone to write down bibliographic references to be shared with the group.

Role assignment

- The facilitator is in charge of the following tasks.

  - *Before the workshop*: familiarize herself with this document, the documentary resources, possibly get in touch with other workshop facilitators, prepare the necessary material (printed documents etc.). The program may be adjusted to best suit the group.
  - *At the beginning of the workshop:* explain the context and the objectives, present the program and the rules, organize role assignment.
  - *During the workshop*: introduce the sessions, facilitate them while keeping track of time.
  - *After the workshop*: collect the documents and send a copy to all participants. If relevant, attend a debrief a few weeks later, ask the participants for some written feedback etc.

- A time keeper, who notifies the group at the end of each period: preparation, discussion, break etc.

- Someone who makes sure everyone gets a fair chance to speak and will watch out for any imbalance in the discussion (e.g. gender or age based).

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Schedule

- **9h-9h30: Welcome and introduction.**

- **9h30-10h15: Why do you work in scientific research?** Beyond individual answers that mix personal interests and opportunities, participants are encouraged to consider the social and economic elements that have shaped their experience.

- **10h45-12h30: Mapping of values and dependencies.** Make explicit and discuss important dependencies, tensions, contradictions or imbalances between different components (epistemic, economic, social, environmental) of our work in research.

- **14h-15h15: Discussion based on documentary resources.** Identify polarizing questions in the group and start a discussion around them relying on relevant texts from the human and social sciences.

- **15h30-16h45: Foresight.** Formulate possible scenarios for scientific research in 2035; assess them for their likelihood, impact and desirability so as to envision a common scenario that could form the basis for more in-depth discussions.

- **16h45-17h: Final remarks.**

Detailed program

Participants are encouraged to take notes if they want to, and organizers to ask for feedback at the end of day and/or by email in the following days. It may be useful to have a blank sheet on which everyone can write down bibliographic references to be shared with the group.

9h-9h30: Welcome and introduction

1. (15 minutes) **Introduction by the facilitator.**

   - Presentation of the context and objectives of the workshop (cf preamble)
   - Discussion of the organization of the day (cf preamble) and of the schedule
   - Role assignment

2. (15 minutes) **Around the table.** Participants briefly (at most one minute per person) share in turn their expectations and potential apprehensions about the workshop.

9h30-10h15: Why do you work in scientific research?

1. (5 minutes) **Presentation of the objectives of the session.** Identify key factors that have influenced individual experiences. It is a way to learn how we end up being part of the same community, and which social, economic, historical and psychological forces have shaped the landscape of research. The common lack of reflection and discussion about this question is underlined by the mathematician Alexander Grothendieck in a 1972 conference given at CERN and entitled "Will we keep on doing research?"

   I am a mathematician. I have dedicated most of my life to doing research in mathematics. As far as research in mathematics is concerned, the research I did and that made by the colleagues with whom I have been in contact, it seemed to me very far from any kind of practical application. For this reason, I felt for a long time particularly little inclined to ask myself questions about the implications, in particular the social impact, of this scientific research.

   It is only quite recently, for the past two years, that I have started, gradually, to ask myself questions about this topic. [...] I do not only ask them to myself. I also ask colleagues [...] I take every opportunity [...] to raise these questions. In particular: "Why do we do scientific research?"

The extraordinary thing is to see how incapable of answering this question my colleagues are. In fact, for most of them, this question is simply so strange, so extraordinary, that they refuse to even consider it. In any case, they hesitate a lot to give an answer, whatever it may be. When one does succeed in extracting a response in public or private discussions, what one usually hears is, by order of decreasing frequency: "Scientific research? I do it because it makes me happy, because I find some intellectual satisfaction in it." Sometimes, people say, "I do scientific research because I have to make a living, because I get paid for it."

2. (20 minutes) **Exchange in small groups of at most 4 people.** In turn, each participant tries to answer the question "How did you end up working in scientific research? Why this research?" Other members of the group can help by asking more specific questions such as: By which mix of constraints, choices and opportunities have you arrived where you are? Why not a completely different job? Can you identify a decisive moment? A moment where you hesitated? At this point, everyone is encouraged to propose a personal answer and reflect on the past rather than discuss his/her current situation.

3. (20 minutes) **General discussion.** One person per group provides a summary (2-3 minutes) of the previous discussion without repeating personal anecdotes told by others. The objective is now to look for similarities and differences in personal experiences, and to identify major factors explaining the various trajectories: a decisive encounter, the possibility of a grant, etc. Other members of the group may complete the overview. A general discussion follows, where everyone is invited to reflect on the social, economic, historical and psychological forces have shaped the landscape of research in the group.

10h15-10h45: Break

10h45-12h30: Mapping of values and dependencies

1. (5 minutes) **Presentation of the objectives of the session.** Allow participants to reflect on, and make explicit: what drives (or pushes) them when they work, in particular their values; the social and environmental conditions on which they depend for their work; and the consequences their work has outside academia. The goal is then to identify and discuss tensions, contradictions, instabilities and lock-ins between these different components of scientific research.

We usually call "value" what gives meaning and significance to an action. [...] In science, these values can be of two types: epistemic or non-epistemic. Epistemic values, also called "cognitive values", "rational values", or "truth values", are choice criteria at the heart of knowledge production, for example to choose between two theories. [...]

Non-epistemic values relate to ethical, social, and contextual values, not specific to the scientific approach. It is impossible to make an exhaustive list; they can refer to positive aspects (social justice, environmental sustainability, care, etc.) as well as negative ones (sexism, racism, etc.). The history and philosophy of science have shown that these values are not foreign to science; that, on the contrary, they have a strong influence on the way knowledge is produced, and that the distinction between epistemic and non-epistemic value is not always obvious[2].

2. (10 minutes) **Individual preparation.** Participants describe on sticky notes up to 5 *drivers* (one per post-it, in a few words). Drivers may be values that guide us in our daily practice of research, key features of our jobs that attach us to them (for better or worse), or external constraints that push us to behave in ways we may not like or approve of.

3. (25 minutes) **First round of mapping.** In turn, each participant describes in one sentence a driver, places the corresponding sticky note on the table, either close to a similar one or alone. The facilitator can move post-its around (with the permission of the participants) to structure the map around

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[2]Excerpt from the article "Faire du commun dans les sciences" by Vincent Israël-Jost et Léo Coutellec, philosophers, published in Medecine/Science 2021.

categories representing the various stakeholders, like "research community", "research institutions", "social components"... This sequence repeats until all cards have been put on the table.

4. (40 minutes) **Second round of mapping.** Now that all sticky notes have been placed, the facilitator materializes with a pen the identified categories. Participants are then invited to:

   - Propose additional sticky notes that make explicit the social and environmental conditions on which they depend for their work, as well as the (direct or indirect) social and environmental consequences their work has outside academia. The facilitator may also contribute, for example using some of the cards provided in the workshop material.
   - Discuss and draw links between the elements represented on the map[3].
   - Identify on the map elements that have no consequences. Are those elements means or ends? For instance, what is the purpose (if any) of academic freedom, or knowledge, or rationality?
   - Focus on instabilities and dynamics that point to scenarios in which some drivers may be lost.

5. (25 minutes) **Around the table.** In turn, each participant points either to a driver that s/he cares particularly about, or to a driver that (in his/her opinion) should be renounced given its consequences, or to a link that is important to preserve, introduce or break. A general discussion can follow.

12h30-14h: Lunch

14h-15h15: Discussion based on documentary resources

1. (5 minutes) **Presentation of the objectives of the session.** Identify polarizing questions in the group and start a discussion around them relying on relevant texts from the human and social sciences.

2. (20 minutes) **Vote on polarizing questions.** Among the ten questions provided with the workshop material (chosen because they frequently arise and tend to polarize discussions), the facilitator or the group chooses five. The goal at this point is not to debate but simply to provide everyone with the opportunity to reflect and take a stance, despite the ambiguity of some questions. Participants indicate on the question-sheets the position which better represents their view. To allow for some personal reflection, the vote can be done in two stages: first on individual sheets, then on the collective question-sheets.

3. (15 minutes) **General discussion of the answers.** Spontaneously, but making sure that speaking time is divided fairly, participants identify questions on which there is a relative consensus, and those on which opinions are divided. A brief discussion can take place to ensure apparent disagreements do not result from a different understanding of the question.

4. (10 minutes) **Reading** out loud by voluntary participants of one or two texts from the documentary resources. The texts are selected by the facilitator based on previous discussions, prioritizing the most polarizing questions[4].

5. (25 minutes) **Around the table.** Participants are invited to share their reaction to the selected texts, e.g. what they find interesting, what they disagree with, whether their position on the initial question has changed, if it could change after a more in-depth study, etc.

15h15-15h30: Break

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[3]For instance, do you see a link between research and environmental impact? Between research, economic growth and funding? Between social relevance and funding? Do you see a tension or a contradiction between academic freedom and an environment and social responsibility of research? Between expertise and democracy? Etc.

[4]Questions are associated with elements of the documentary resources, see the workshop material for the mapping.

15h30-16h45: Foresight

1. (5 minutes) **Presentation of the objectives of the session.** The goal of this last session is to reflect on, share and discuss visions of the future (with 2035 as the horizon), and our desire to act upon it, in order to start building a common prospective scenario on which to work together. Foresight is a field that investigates the future as an entity to be built rather than revealed. It is a systemic and multidisciplinary approach that takes into account the past and the present as well as the future, trends as well as discontinuities.

   Foresight was not clairvoyance. It is in no way premonition or prophecy. It is not prediction either, not even forecast, which is the minimum usually expected. Strategic foresight does not describe the future. Simply, the future is its object of study, and we have at our disposal, to explore it, a very elaborated toolbox. [...] We do not seek to predict the future, simply to prepare it, which leads us to consider the future not as a territory to be explored, but as a territory to be constructed. We owe the French philosopher Gaston Berger this key idea in foresight that the future is inseparably linked to action[5].

2. (10 minutes) **Individual preparation.** Each participant lists at most 3 scenarios that may come true by 2035, and that would impact his/her work. Such a scenario may be likely or not, desirable or not. It could be a trend (increase, worsening etc.) or a discontinuity (shortage, progressive rejection of something), rapid or slow. It may relate to any part of our natural environment and/or our social organization, be large-scale and small-scale.

3. (15 minutes) **Exchanges in small groups of at most 4 people.** After discussing the scenarios proposed by its members, each group chooses (and clarifies if needed) one or two of them, ensuring a diversity between trends and discontinuities, desirable and undesirable scenarios, large-scale and small-scale changes, etc. Each selected scenario is described on a specific sheet provided by the facilitator.

4. (15 minutes) **Vote on scenarios.** For each scenario, all participants indicate on the corresponding sheet their view on 1) the probability that the scenario will come true; 2) the impact that this would have on their work; 3) the desirability of such a scenario; 4) to what extent they think that their scientific community is prepared or will be prepared for such a scenario. Like before, the vote can be organized in two stages (first individually and then collectively).

5. (30 minutes) **General discussion of the answers:** By examining the results of the vote, the group discusses a common scenario of which they would like to act upon.

16h45-17h: Final remarks

1. (15 minutes) **Around the table.** In 1-2 minutes, each participant shares his/her feelings about the day (new insights, concrete ideas, frustration etc.), and possible next steps to follow up on the discussion, e.g. by investigating further one polarizing question or working on one of the prospective scenarios.

Acknowledgments

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[5]Excerpt from "La clef USB" by Jean-Philippe Toussaint, published at Éditions de Minuit 2020.

[6]https://www.furtherfield.org/utopoly-playing-as-a-tool-to-reimagine-our-future-an-interview-with-neil-farnan/

[7]https://fresqueduclimat.org/

[8]http://www.bruno-latour.fr/node/825.html