



B-DEBATE

International Center
for Scientific Debate
BARCELONA



Synopsis

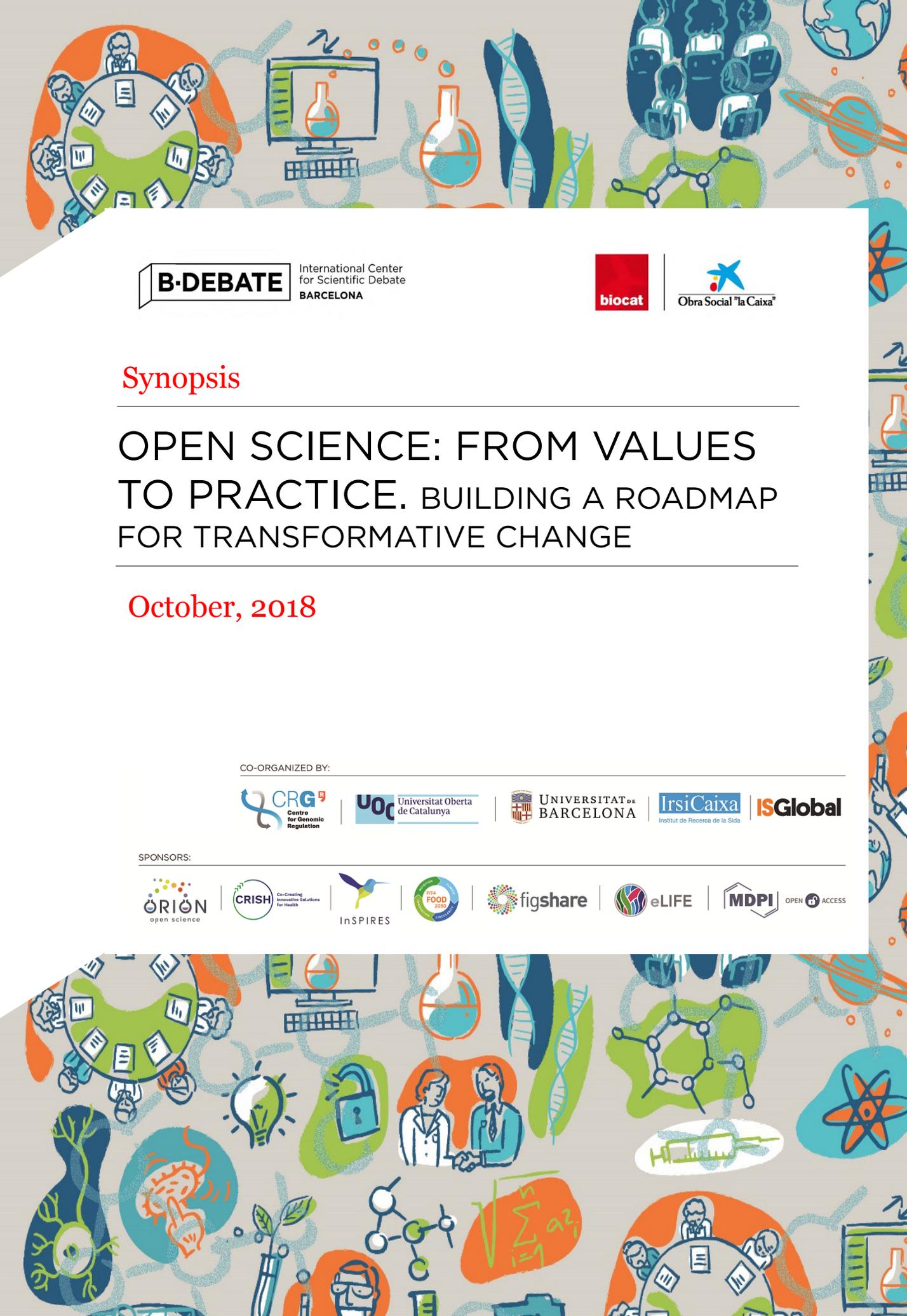
OPEN SCIENCE: FROM VALUES TO PRACTICE. BUILDING A ROADMAP FOR TRANSFORMATIVE CHANGE

October, 2018

CO-ORGANIZED BY:



SPONSORS:



OPEN SCIENCE: A PATH TO MAKE IT REAL

Science is an extremely powerful tool to advance knowledge and wellbeing, but it is not without problems. There is significant and varied criticism of current scientific practices: having to pay for access to most publications, reproducibility issues, an assessment system that is not sufficiently based on bibliographic indicators, and the scarce influence the **general society** has on decision-making and path-setting, among others.

In response to these issues, the concept of open science has taken shape. This work method emphasizes collaboration, transparency and dialog with society. Nevertheless, despite its advances, there's still a long road ahead for it to become commonplace.

In order to deal with some of these problems and, above all, come up with solutions and draw up a roadmap to accelerate the advance of open science, several top international experts met at the B-Debate session '[Open science: from values to practice. Building a roadmap for transformative change](#)', an initiative of [Biocat](#) and the "[la Caixa](#)" Foundation to promote scientific debate. This session was organized jointly by the [Center for Genomic Regulation](#) (CRG), [Universitat Oberta de Catalunya](#) (UOC), [IrsiCaixa AIDS Research Institute](#) and [Barcelona Institute for Global Health](#) (ISGlobal).

CONCLUSIONS

- 80% of all scientific publications are **still behind a 'pay wall'**. We must be more firmly committed to an open-access model, and change the way negotiations with publishers are handled.
- Reproducibility is an issue in scientific work, as **many studies cannot be reproduced**. It is important to improve data production and communication methods to limit their importance.
- Indicators in general, and bibliographic indicators specifically, shouldn't be the sole basis of strategic decisions in science. **We need new ways to measure and assess quality and to award funding.**
- **General society is practically excluded from decision-making processes in science.** Citizen science projects and a firm commitment to responsible research and innovation should be implemented to bridge this gap.

1. OPEN SCIENCE, AN ANSWER TO MANY PROBLEMS IN SCIENCE

There is no single official definition of open science. It includes, clearly, **open access** (the ability to access and read scientific publications without having to pay for them, accepting that scientific knowledge is a universal right), but also encompasses much more: a **much more transparent code of ethics** on how research is shared and judged; overhauling criteria on **what should be highlighted and valued**; **more openness toward society** so that the people can share their interests and participate in the process.

"Science today has many problems," summed up Frank Miedema, dean at University Medical Center Utrecht, in the Netherlands. There's the **issue of reproducibility**: "Of the 53 most revolutionary papers on cancer, only six (11%) could be reproduced with the same results." Or the mechanism through which scientists build their reputation, which can be summed up as '**publish or perish**' and implies that "quality and relevance are less important than quantity, which prioritizes low-risk, short-term research." There's even a problem with the processes used to judge the work, known as peer review, which for Miedema involves "judging and sentencing years of work in just 15 minutes." And, to make it worse, it is often not done by the head researcher, but by "a postdoc or even PhD student, because there's just no time."

Plus, "**biomedical research is highly self-referential**," says Miedema. "In general, what really matters is publications, not whether you are truly serving the patients: society is excluded from the credibility cycle in science." So, open science refers to and takes into account the audience being addressed: "society in general or just science colleagues?"

"Imagine a leukemia patient who has been treated with everything available to us: chemotherapy, bone-marrow transplant... In the end, we send them home, possibly with 30% of their energy and a severe effect on their libido. When the patient complains, we say it isn't important: yes, okay, but the tumor is gone. To which they reply: fine, but I'm still here," explained Miedema. "**We have to take patients into account in order to address their needs.**"

With this background, the Head of Open Science Policy for the European Commission René von Schomberg presented **some of the initiatives the European Union (EU)**

is promoting to foster open science. These include launching an open-access publishing platform and requiring any research that receives European funds to publish openly. However, assuming the agenda should be holistic, it also includes aspects of Responsible Research Innovation, which takes into account the interests of society, as well as studying and introducing new metrics, new ways of assessing science beyond a paper's citations and the impact factor of the journals where it is published.

Miedema wondered whether scientists are looking for "**a cure or a career.**" Open science should help make both things possible. Assuming there is a problem, we have to talk about the hurdles and possible solutions.

2. ABOUT OPEN ACCESS, ETHICS AND REPRODUCIBILITY IN SCIENCE

Open access

15 years have gone by since the **Berlin Declaration** on Open Access to Knowledge in the Sciences and Humanities. The progress is clear, and more than 600 European institutions have already signed it. Nevertheless, 80% of all scientific publications are still behind a 'pay wall'. On a global level, counting all subscriptions, "**European institutions pay €3,800 per article, on average, just to be able to read it,**" explained Colleen Campbell, who leads outreach for the [Open Access 2020](#) Initiative. However, "**publishing an open-access article, which everyone can read free of charge, costs an average of €2,000.**"

On top of the very limited open-access publication, Campbell revealed that "**organizations' subscriptions to journals is a very opaque process.** Institutions never know what the rest pay, which decreases pressure on publishers." Therefore, "there is no real competition on the market, which makes it more difficult for there to be a transformative change." In any case, "we can't continue supporting a subscription-based system," she said. "We need to encourage agreements that change the landscape."

One of these movements is being promoted by the Health Research Board (HRB) in Ireland, which has implemented and [open-access platform](#) where its researchers can publish their results directly. As the head of the board, Patricia Clarke, explained: it means shifting the traditional view, as the papers only take "**seven days to become**

available and the peer-review process is done in public afterwards." The platform itself [recognizes](#) that its publications **lack impact factor**, but they explained that "a growing number of institutions firmly support a move away from journal-based metrics. We believe that it is the intrinsic value of the research that matters, not where it is published. We hope that the HRB's open research helps change the focus of scientific publication towards practices that incentivize, recognize and reward good research."

Portugal is also on this path. As explained Secretary of State for Science and Innovation Maria Fernanda Rollo, a [national Open Science policy](#) is already being implemented, changing assessment policies and recognizing that this goes beyond open access and should bridge the gap between scientific knowledge and society.

Ethics and reproducibility

Are we facing a [reproducibility crisis](#)? Are most scientific studies biased and tainted by the overriding need to publish? Scientists at Amgen could only [reproduce 11% of 53 landmark basic studies on cancer](#). Others, at Bayer, only managed to do so for [one fourth of the papers on 67 drugs being researched](#).

For Ian Sullivan, coordinator of the Center for Open Science in Richmond, United States, the '**crisis narrative**' has its advantages, as it can act as "a powerful switch for debate and encourage us to find solutions." However, it also has its dangers, like focusing too much on the actions or actors that aren't working or promoting a vision of science based on what is called 'alternative facts', conspiracy theories and '**fake news**'. Sullivan proposes moving quickly into a '**narrative of opportunity**', which seeks out solutions without losing sight of the goals achieved. As part of the former, open science is an attractive promise: greater transparency in research that puts the emphasis more on value and cooperation than just competition. To promote this, **Sullivan does not think everyone in the world has to become an activist. He advocates for altruistic egotism, for "contributing selfish motivations for practices that have the desired collective benefits."**

Itziar de Lecuona, a member of the [Bioethics and Law](#) Observatory at the University of Barcelona, disagrees with that approach: "**We should move away from principles and towards acts, not vice versa,**" she says. Plus, she was critical of the "ideals that look good on a PowerPoint," because then "you come back down to earth and see the huge gap between how things are and how they should be." In fact, "many of the open-science guidelines have already been law for decades, but little progress has been made."

On the other hand, "**much is made of the relationship between science and society, but people in general know nothing about how the scientific world works.** Open science is positive, but this world is a savage fight subject to market rules. There are many issues to resolve on top of the problem of open science."

3. FROM INDICATORS TO FUNDING, INCLUDING SOCIETY

The main way science (and a scientific career) is judged today is with bibliographic indicators. Some of the sacred metrics are the **impact factor** of journals in which the papers are published (which has to do with the number of times previous articles have been cited) and the author's **H index** (also based on the number of times their research is referenced in journals).

Nevertheless, these seem clearly insufficient. And criticism of their indiscriminate use is only growing.

"**These metrics measure anything but what we want to measure. They certainly don't determine the quality of the science,**" said von Schomberg. For Ismael Ràfols, researcher at Ingenio (Instituto de Gestión de la Innovación y el Conocimiento), "indicators shouldn't be the basis of evaluating science. They should be at the bottom of the list of criteria, not at the top." Not even the new models proposed, such as social media indicators (**Altmetrics**) that assess the number of times articles are downloaded, mentioned or shared online or on social media, are sufficiently robust. "They're interesting to explore the context and audience for the articles, but they aren't general indicators."

Ràfols advocates for shifting focus away from production and towards processes to share knowledge, assuming there are **no universal indicators** and that they must fit the context of the research and its communication. "Science is like a biosphere with different ecosystems. If we choose one indicator, we may be encouraging just one of them. This is why we should focus on those that encourage diversity without compromising production."

The classic indicators are also one of the pillars of **assessing projects and assigning funding**. This process concerns not only funding agencies also scientists themselves, and is strongly criticized by Johan Bollen, professor at the Indiana University, United States. "It takes a lot of time and money to draft proposals that will mostly be rejected,"

he said (up to one fourth of the total of a European program may be spent on preparing applications, [according to Bollen](#)). Plus, "**assessments can't predict productivity and they are particularly unfair to young people, women and those with more innovative projects.**"

Bollen has developed a radical proposal: a sort of (scientific) universal basic income. This idea would give each researcher, simply for being one, a fixed amount each year. In the United States, dividing the total investment by the number of head researchers would mean each one would get a base of \$250,000, according to Bollen. After that, each one could donate a percentage to another research group anonymously. So, the scientists themselves redistribute the funding and no one goes without.

With certain [adjustments and corrections](#) to prevent bias, **this would have many advantages, according to Bollen.** It would allow scientists to devote all of the hours that currently go into drafting grant proposals to research. It would foster **innovation**, as all researchers would have a basic income and this would allow them to take on projects with greater risk. It would promote **more open science**, because groups would see the direct advantages of expanding their network of collaborations and raising awareness of their work for others to assess (and fund) it. It would prevent lines of research from being decided by small assessment panels and it would **open up distribution of resources** to the whole network of scientists.

However, he does recognize this would limit society's participation in the decision-making process.

About RRI (Responsible Research Innovation) and citizen science

Open-innovation proposals for some time now have used a model called the '[quadruple helix](#)', which advocates for joint participation from four different stakeholders: public administrations, academia, industry and society. The final group should be increasingly involved, both in some research processes and in the decision-making process.

One of the ways to bridge this gap is through what are called '**Labs**', where users are directly involved in the creation and innovation process. "**It's the new meme.**

Everything that used to be net now wants to be lab," joked Artur Serra, deputy director of [i2cat](#) and vice-president of the European Network of Living Labs. Serra

presented some of the initiatives being promoted in Catalonia, like the [BiblioLab](#), [Ciència Ciutadana en Acció](#), BCN Lab and the [Barcelona Citizen Science Office](#).

In addition to co-creation processes, **many citizen science initiatives have to do with public health research**, specifically for emergency situations. And they not only bring science to society, they have a direct effect on it. "Open science in real time saves lives," stressed von Schomberg. "Many of the achievements in terms of Ebola and Zika wouldn't have been possible if the research had been focused competitively. But these mechanisms should be expanded to many other arenas."

The concept of **RRI** is increasingly popular, but Marion Dreyer, deputy scientific director at DIALOGIK in Stuttgart, regrets that there has not been a firmer commitment to this in Europe. Despite the push for open science, "**European programs don't have a specific framework or budget for it.**" And, according to René von Schomberg, "open science is a necessary condition for responsible innovation, but it is not enough on its own."

Issues with access to publications, reproducibility, assessment and funding methods, true utility, and the role of citizens in the processes and results; open science must try to give specific alternatives and solutions to the problems facing science today. To influence this, B-Debate participants met in breakout sessions focused on each of these topics.

Their conclusions and recommendations will be published soon with the firm commitment to promoting this in Catalonia, Spain and Europe.