

# A report on the public meeting 'Society and Synthetic Cells'



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# 1 Society and Synthetic cells

On May 12<sup>th</sup>, the Rathenau Instituut, together with Radboud University, organised a public meeting on Society and Synthetic Cells. This was the final meeting in a series of four meetings, in which fourteen international experts discussed the societal aspects that are related to the development of the synthetic cell. Because it was the final meeting, a broader group of stakeholders was invited to participate.

## 1.1 The Future Panel on synthetic life

Building a Synthetic Cell (BaSyC) is the name of a large research programme of six Dutch research institutes. Since 2017, these institutes have been working on developing an artificial cell that is alive and can reproduce independently. The BaSyC programme concerns techno-scientific research that aims to gain more insight into the origin of life.

The work within BaSyC is divided into seven work packages. One of these revolves around the philosophical and ethical aspects of developing a synthetic cell and the public debate about it. Part of this is the Future Panel on synthetic life, which the Rathenau Instituut and Radboud University set up to create agenda starting point for future political, academic, and public debate on the synthetic cell.

The past two years, the Future Panel on Synthetic Life has come together on multiple occasions to discuss the social challenges and dilemmas in a future society which masters synthetic cell technology, and to identify the conditions under which the construction of a synthetic cell can be considered beneficial for society. These discussions resulted in a position paper, which can be found on the Rathenau Instituut website.

## 1.2 Kickstarting the academic, political, and public debate on the synthetic cell

To make sure the discussion does not end with the Future Panel, the Rathenau Instituut and Radboud University organised an online public meeting to kick start the academic, political, and public debate on the synthetic cell. During this meeting,

the Future Panel presented their position paper and invited participants to join the discussion about society and synthetic cells.

In addition to the members of the Future Panel, we invited a group of participants that might help continue the discussion that the Future Panel started. Appendix 1 contains a list of the participants. All participants were experts on or had experience in working within or with the political domain, the academic domain, or the public domain.

The meeting was divided into three parts. The first part introduced the Future Panel, explained the process of organising the panel meetings over the past two years and presented dilemmas and recommendations as formulated by the Future Panel.

Three panel members introduced themselves and shared their view on the, according to them, most interesting dilemma from the panel meetings:

1. How to combine different vocabularies, perspectives, socio-cultural and time horizons in a meaningful way? – Presented by panel members Georg Tremmel and Gido Ruivenkamp.
2. How to practice synthetic cell research as a dialogue with nature rather than as an appropriation and instrumentalisation of the living cell? – Presented by panel member Cécile van der Vlugt.

The second part of the meeting was focused on kick starting the academic, political, and societal debate on synthetic cells. Participants split up into smaller groups to discuss one of the four recommendations:

1. Ensure that the synthetic cell contributes to a fair and sustainable future.
2. Organise participation of civil society in synthetic cell research.
3. Foster a socially responsive academic ecosystem.
4. Design social governance experiments aimed at renewing the regulatory.

Each discussion was moderated by a panel member or a member of the project team.

## 2 From competing to collaborating

The different discussions show an overarching desire to move from competitive to collaborative systems. The necessary steps that the participants mentioned in order to reach this goal are mainly focused on making sure everyone can take part in the discussion on the synthetic cell. This can be done by creating a shared and accessible language, constructing clear and agreed upon definitions of key concepts, focusing on the benefits for society as a whole instead of individual benefits/risks, empowering researchers with resources and skills needed to transcend disciplines and interact with society. Furthermore, to give direction to the developments of the synthetic cell, we need a clear vision from our government on where we want to be as a society in the future .

Below we summarise the discussions by stating what participants think are the key challenges in relation to the respective recommendation and what should be done to address these challenges.

### 2.1 Recommendation 1: ensure that the synthetic cell contributes to a fair and sustainable future

#### 2.1.1 What are the key challenges?

- How different people and different countries define sustainability, fairness, and justice presents a challenge to bringing this recommendation into practice. For the discussion, it is important to agree upon the definition of sustainability, fairness, and justice.
- The theoretical level at which the BaSyC-project still stands makes it difficult to bring fairness and sustainability into practice, but it also presents an opportunity to think about these questions before it is too late. Thinking upfront about the possible applications of new technologies could help develop a technology in a sustainable direction.
- Can a bio-based society also be a fair or sustainable society? The technology to produce synthetic cells is already unevenly distributed across the globe. So perhaps synthetic cell research and development is already unfair and/or unsustainable. It is not just about the synthetic cells themselves, but also about the technology required to produce them.

- There is a possibility that only a small group of organisations/companies will 'own' the future synthetic cells market. This creates questions of sovereignty and may limit societal and/or political influence. Reflecting on the digital transition, the worries about ownership have increased. Should the owners be private actors, governments, or perhaps 'all of us'?

### **2.1.2 What needs to be done?**

- There should be a circular and sustainable 'synthetic cell factory'. This requires arrangements at the highest political level, based on public values, instead of a focus on creating wealth. Institutions that currently focus on capitalistic markets may need to be redesigned to be more oriented towards public values. This may be done through governments setting requirements for the application of technologies.
- Governments need to formulate broader, interdepartmental visions of the society of the future, instead of each department creating their own vision and not collaborating with each other.
- A systems change towards a more public-values-based society, may require an overhaul of the current intellectual property systems. Current systems of intellectual property motivate innovation for personal profit, or on the level of organisations.
- Research on synthetic cells should be open science. Open science does not stop with sharing knowledge, but should also make sure that others have sufficient skills to be able to use and build upon that knowledge. For example; pharmaceuticals should be available to everyone, but because pharmaceutical companies are private companies, this is not always the case.
- Maybe we could learn from the cultivated meat market. This market is also still in an experimental stage and faces some of the same challenges around public perception and sustainability.
- Sustainability and fairness should not only be about avoiding bad outcomes but also about setting positive goals. Innovation is also a matter of unexpected outcomes, and so there should be room for experimentation.
- Narratives could play an important role in stimulating imagination and innovation, and thinking about sustainability and fairness. Artists can play an important role in developing these narratives.
- Misbehaviour should be controlled, perhaps through clear rules (laws, red.), in which case governments should be responsible for synthetic cell technology. Perhaps there should be a balance between regulation of synthetic cell development, and providing researchers and developers a certain degree of freedom with regards to their research.

## **2.2 Recommendation 2: organise participation of civil society in synthetic cell research**

### **2.2.1 What are the key challenges?**

- Because we are at a very early stage in the research process, we do not know how to talk about the synthetic cell and its development. We need to have a narrative in order to be able to talk about the future of the synthetic cell.
- The discussion about the synthetic cell is not having a fresh start. The whole past debate of GMO is influencing the debate of synthetic cell.
- What a fair and sustainable future is may differ for people.
- Natural scientists do not have the knowledge, time and tools to engage with the broader public. Is this the right task for natural scientists?
- Can society participate in the research into and form an opinion on the building of the synthetic cell? Is this too complicated? Can society and research reach consensus? What if they can't?
- What do we do about misinformation and disinformation?

### **2.2.2 What needs to be done?**

- We should communicate about the synthetic cell research in a simple and inclusive way so that that citizens can really participate and think along with the research. Moreover, we should provide sufficient information in different formats so that it appeals to different target audiences. The Rathenau Instituut was mentioned as a good institute to organise the communication on the synthetic cell and dialogue with society.
- We should define what we mean with terms such as 'sustainability' or 'the synthetic cell' to make the narrative more concrete.
- There should be incentives for individual researchers so that they have the time and money to play a part in the interaction with society. On an institutional level, arrangements should be made to bring the public and researchers together.
- We should bring together different stakeholders and experts from different areas in order to work towards a fair and sustainable future with the synthetic cell. We should discuss a strategy on how to move forward as a collective. Otherwise, it is most likely not effective.
- We should organise different moments of reflection during the process to anticipate ethical or societal issues.



## **2.3 Recommendation 3: foster a socially responsive academic ecosystem**

### **2.3.1 What are the key challenges?**

- We need to have discussions between people with many different backgrounds. How do we create a vocabulary that suits the everyone?
- How do we change the dominant narrative that technology brings progress? Because of this narrative people always only hear the big stories.
- How can we organise an academic culture in which societal interaction is acknowledged as a necessary aspect of doing science? How can we convince researchers of the importance of societal participation? How do we make sure natural scientists are open to the collaboration with social scientists? Sometimes, natural scientists have fears on collaborating with social scientists. For example that there is less money for their technical research when social scientists are involved.
- How can the government facilitate the collaboration between different disciplines? How do we build mechanisms that both social and natural scientists can use?
- How do we prevent that transdisciplinary collaboration or societal participation does not just become another checkbox but is initiated from a feeling of responsibility?

### **2.3.2 What needs to be done?**

- We should organise closer collaboration between university and basic and applied research.
- Researchers need to be empowered by teaching them the skills they need to collaborate with other disciplines or organise public participation. For example, they should get training in talking to the public about their research or how to write academic papers in simple language.
- Journals should also become part of the change. Scientists are judged based on their publications. But there is a lack of journals publishing on interaction between science and society. Furthermore, journals are based on disciplines and not on interaction between disciplines.
- We should organise citizen panels. Citizens can provide new ideas and perspectives, also when they are not fully up to date. There should be a financial reward for citizens so they can take participating more seriously.
- We should innovate funding programmes to make sure there is enough time and resources to organise transdisciplinary research.

- Science is a competitive ecosystem. This should change to a collaborative ecosystem.

## **2.4 Recommendation 4: design social governance experiments aimed at renewing the regulatory landscape for new biotechnologies, including the synthetic cell**

### **2.4.1 What are the key challenges?**

- At the moment, regulation is outdated and not futureproof because it is only based on environmental risks. How can we introduce other aspects, like ethics and societal issues, to the regulatory framework?
- Bringing in a social aspect to the research on the synthetic cell is important, but do the recommendations also work in an international landscape (outside of Europe)? What are the goals of these governance experiments, how can they contribute in shaping regulation, and what does this look like in an international context as opposed to the European context?
- 'Societal desirability' is a difficult concept. Assessing desirability is very different from assessing risks. What does societal desirability mean? Can we come up with criteria to assess societal desirability? What does societal desirability look like in a regulatory setting? What kind of technologies do we need to assess it? What kind of robustness?
- Responsibility is an important issue. Who is responsible for assessing whether or not a new technology it is going to be a benefit or risk?

### **2.4.2 What needs to be done?**

- We should talk about whether we as a society want the synthetic cell or not, and why. On top of that, we should not restrict these conversations to just the synthetic cell. The synthetic cell is the dot on the horizon that guides the research that you do, which has different aims and stages, some of which will never end up being a synthetic cell but could answer other fundamental questions or lead to practical applications.

- We should assemble a committee consisting of stakeholders and specialists from different backgrounds that should work towards updating the rules and regulations in relation to the development of the synthetic cell.
- To bring the discussion a step further we should organise a closed environment which enables people, companies, and regulators to exchange their views and ideas on the development of the synthetic cell. This would facilitate an open discussion without repercussion and allow stakeholders to get a first impression on what the development actually entails and think about the benefits and risks of the development.
- We should stimulate political decision making. It seems like political decision making has been avoided the past few years. Without political decisions and only input from science or societal assessment the process does not move forward.
- We should look at the benefits for society as a whole instead of in terms of individual benefits/risks. Are we collaborating or competing? We have to think on a more societal and/or global level.
- We should learn from the Norwegian model, which is used to adjust regulations and authorise biotechnology applications. An important question in this model is whether the technology benefits society. But we should also make sure that creating such a system does not hijack the regulatory process for years to come due to disagreement on what we think is a benefit, sustainability, fair, etc.

## 3 This is only the beginning

The meeting ended with a quick reflection on the discussion in the break-out groups and a final question to all participants: 'How we are going to make sure that the discussion on the synthetic cell does not end with this final meeting of the Future Panel?' A few answers to this question were presented. First of all, designer Mies Loogman shared her experience with developing the podcast series called Recreates (Herschept in Dutch) together with the Rathenau Instituut and organising a public debate at the Dutch Design week in November 2021 about the synthetic cell. Jelmer Coenradij informed everyone about the new Synthetic Biology Association of the Netherlands that was recently brought into life and is looking for new members. Hub Zwart explained that he will be setting up a follow-up project of the Future Panel together with the Rathenau Instituut. And finally, Marileen Dogterom, President of the Royal Netherlands Academy of Arts and Sciences (KNAW), a member of the Future Panel, and head of BaSyC reflected on the value of the Future Panel for the BaSyC consortium, mentioning that this is not the end, but just the beginning of the dialogue we need to have on society and synthetic cells.

### 3.1 Links and contacts from the meeting

You can download the position paper by the Future Panel here:

<https://www.rathenau.nl/en/democratic-information-society/society-and-synthetic-cells>

If you would like to stay up to date on our work at the Rathenau Instituut or the BaSyC programme, keep an eye on these websites:

- <https://www.rathenau.nl/en>
- <https://www.basyc.nl/>

If you would like to learn more about the Synthetic Biology Association of the Netherlands you can visit <https://www.synbionl.com/>, send an email to [synbionl@gmail.com](mailto:synbionl@gmail.com) or contact Jelmer Coenradij directly at: [j.coenradij@rug.nl](mailto:j.coenradij@rug.nl).

And if you are interested in listening to the podcast series Herschept (or Recreates in English) you can find all four episodes here:

<https://app.springcast.fm/podcast/herschept>

The podcast is in Dutch but you can find all episodes with English subtitles on YouTube:

- Episode 1: [https://www.youtube.com/watch?v=1s\\_Dhnwbzso](https://www.youtube.com/watch?v=1s_Dhnwbzso)
- Episode 2: <https://www.youtube.com/watch?v=jN6MjZiTMX8>
- Episode 3: <https://www.youtube.com/watch?v=GxWRj4wRT1k>
- Episode 4: <https://www.youtube.com/watch?v=be7gsylGZ-s>

# Appendix 1: Participant list

## Guests

- Prof. dr. Arnold Driessen - Professor in Molecular Microbiology at the University of Groningen (PI BaSyC)
- Prof. dr. Gijsje Koenderink - Professor in the Bionanoscience Department of the TU Delft (PI BaSyC)
- Prof. dr. John van der Oost - Professor of microbiology at Wageningen University & Research (PI BaSyC)
- Mareike Berger - PhD Student at AMOLF
- India Hook-Barnard - Executive Director of the Engineering Biology Research Consortium (EBRC).
- Becky Mackelprang - Associate Director for Security Programmes at Engineering Biology Research Consortium (EBRC).
- Dr. Ruth Mampuy - Member of WRR's scientific staff
- Carolien Roesink – Employer at the GMO office (National Institute for Public Health and the Environment)
- Jaco Westra - Strategic advisor at the Centre for Safety of Substances and Products (National Institute for Public Health and the Environment)
- Cameron Fox - WEF Global Future Council on Synthetic Biology
- Makiko Matsuo - Project Associate Professor at the Graduate School of Public Policy, the University of Tokyo
- Julia Rijssenbeek - PhD candidate Ethics of Technology Gravitation programme Ethics of Socially Disruptive Technologies at Wageningen University
- Heleen van Rooijen - Communications Officer BaSyC
- Joanne Chauveau - Communication Advisor SynCellEU
- Jelmer Coenradij - PhD student at the University of Groningen and member of the Executive board of SynBioNL
- Darshak Bhatt - PhD candidate at the University of Groningen and the University of Sao Paulo and member of the Executive board of SynBioNL
- Laurens Landeweerd - Lecturer and researcher at Radboud University
- Aleksandra Stelmach - Post-doctoral fellow at Exeter
- Tessa Lange - Ministry of Infrastructure and Water Management Task field Safety biotechnology & Task field Pesticides and chemical substances
- Dr. ir. Jasper Deuten - Coordinator at Rathenau Instituut on innovation (research and innovation programmes and research institutes)
- Robin Bergman - Researcher at The Netherlands Study Centre for Technology Trends

- Marcel van Bergen - BioRisk Professional at Radboudumc and Radboud University
- Mies Loogman – Designer at Enlightens

## **Members of the Future Panel**

- Noelle Aarts (chair) - professor Socio-Ecological Interactions and director of the Institute for Science in Society (ISIS) at Radboud University in Nijmegen
- Marileen Dogterom – President of the Royal Netherlands Academy of Arts and Sciences (KNAW) and professor bionanoscience at the TU Delft and Medical Delta professor at Leiden University
- Philip Macnaghten - Professor in the Knowledge, Technology and Innovation (KTI) group at Wageningen University
- Steen Rasmussen - professor in physics and center director, works on creating minimal life from nonliving materials, as well as on how new technologies change what it means to be human
- Georg Tremmel - background in Media Art and Bioinformatics, and currently pursuing a PhD in Artistic Research at the University of Applied Arts in Vienna
- Cécile van der Vlugt - senior risk assessor at the National Institute for Public Health and the Environment (RIVM)

## **Project team & support**

- Kyra Delsing – Rathenau Instituut
- Rinie van Est – Rathenau Instituut
- Hub Zwart– Radboud University
- Bettina Graupe – Radboud University
- Gido van Rooijen – Rathenau Instituut
- Annet Beukema – Rathenau Instituut
- Juul Gerritsen – Rathenau Instituut

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