Using Short Films for Public Engagement with Synthetic Biology

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Abstract

Synthetic biology is an emerging techno-scientific field, aiming to contribute to the future bioeconomy. With the advancement of the research in this field, many societal, ethical and environmental questions and issues arise. In this article we present the results of an engagement experiment which took place during the 2nd European Technology Assessment Conference in Berlin in February 2015. The discussion of 25 participants which aimed at the societal implications of synthetic biology was triggered by several short film presentations. We claim that the role of cultural products, in this case the BIO·FICTION films, is an important instrument for public engagement with synthetic biology. The fictional portrayal of science can offer opportunities for critical reflection about emerging technologies and their societal ramifications. We conclude that the use of thematically relevant films as stimulus for a lively debate on emerging technologies is a promising and appealing approach.

Introduction

Synthetic biology is an emerging field of research that comprises knowledge, approaches and methods of biotechnology, engineering and related disciplines with the overarching aim to create organisms with novel characteristics. According to SCENIHR (2014), “synthetic biology is the application of science, technology and engineering to facilitate and accelerate the design, manufacture and/or modification of genetic materials in living organisms”. Potential applications of synthetic biology can contribute to a new bioeconomy, to the medical sector and may provide solutions to environmental challenges. With the advancement of research in this field, many questions and issues, both already familiar and new ones, arise. These issues concern, for example, ethical implications associated with the creation of novel living organisms, legal aspects of biosecurity as well as the fair distribution of possible benefits from the use of the new technology (see e.g. Schmidt et al. 2009). In order to engage a wider audience in a debate on such issues, novel attractive approaches have to be found. Therefore we set out to experiment with a new session format to be used for this purpose.

The results presented here are based on a session which took place during the 2nd European Technology Assessment Conference (PACITA) in Berlin on 26 February 2015. Several films (see Table 28) were shown to participants and then discussed in small groups. The session focused not only on the societal implications of synthetic biology. It also dealt with the role of cultural products, such as films, in science engagement and the opportunities for critical reflection on emerging technologies and their implications that the fictional portrayal of science can offer.

The films were originally screened during the BIO·FICTION Science Art Film Festival[1] which took place in October 2014 in Vienna, Austria. The aim of the festival was not only to engage scientists, social scientists, biohackers, artists and filmmakers in a discourse on synthetic biology, but also to address ambiguities and paradox aspects of the field itself by offering an unconventional programme. During the PACITA session some of these aspects were also addressed using films to stimulate a lively interaction between the participants.

Cultural Products and Narratives in Public Engagement on Science and Technology

The questions of how to and why engage a broader public in decision making about technological developments are very challenging in STI governance (Miller and Bennet 2008, p. 599). In some cases, issues for deliberation can be very complex, "intimidating or uninteresting" (Long and Ostman 2014, p. 62) for lay public and an ordinary citizen. In this context, film and fiction can be more appealing:

"Why should the public be engaged in deliberations about technological choices? It is not always clear how technological choices may impact the things people care most deeply about. (...) Science fiction, by virtue of the centrality of narrative and myth – the very quality most despised by the technical realists, and yet crucial to effective public communication – can help overcome this barrier and engage people's deep-seated, cultural sensibilities about what is significant and important in life" (Miller and Bennet 2008, p. 601).

Films can offer a good ground for reflections and discussions about wider ethical and societal implications, the current state and the future developments of emerging technology, and give the broader public an opportunity to engage in complex issues without the necessity "to present or defend their own opinions, at least initially, increasing their confidence and comfort" (Long and Ostman 2014, p. 62). Another important contribution of films and cultural products in general is that they provide a possibility to engage in a discussion about long-term technological developments, serving as a sort of scenarios (Schwarz 2015, p. 511). In the discourse about synthetic biology it is becoming especially relevant, as the current discussion focused more on the potential and possibilities of this emerging technology (Schmidt et al. 2013, p. 3).

Problematization and Frames

One way to analyze the perception of synthetic biology is to utilize Foucault's notion of problematization and the theory of media frames (Bogner and Torgersen 2014). Biotechnology in general has been predominantly discussed within three different modes of

problematization, namely risk, ethics and economy. The three different modes are connected with different key questions, forms of policy advice, modes of participation and different regimes of legitimisation of decisions regarding the technology. With the interdisciplinary character of synthetic biology, new fields of influence enter the stage. The genealogy of its problematization is not only connected to biotechnology, but comparators with IT and nanotechnology gain momentum (Torgersen and Schmidt, 2013). Another possible way of looking at synthetic biology is that of the DIY biology, or "biohacker" community, that demands a renegotiation of power in the access to scientific knowledge in addition to cultivating a certain "coolness" factor in the context of the new emerging technology. Schmidt et al (2013) systematically analyzed the contributions to the 2011 Bio:fiction film festival in Vienna[2] which already showed movies around the topic of synthetic biology. The authors showed that synthetic biology was not only depicted within the frame of conflict that was associated with biotechnology, but also compared with IT and nanotechnology, associated with a "gadget" and "progress" frame respectively. This set of problematization regimes, frames and comparators, however, is not limited to the few mentioned above and the dynamic development of synthetic biology could also create new perspectives for a debate on novel technosciences.

The films of the second Bio:fiction festival in 2014 also refer to different modes of problematization. Our engagement experiment on the one hand utilizes these different regimes as a stimulus for a lively debate, on the other hand the outcome of the discussion can show if the categories established so far also show up in the groups' associations concerning the films or if anything new – a new form of problematization – enters the stage.

Method Description

The session "Interactive BIO·FICTION Film Lounge" took place during the 2nd European Technology Assessment Conference in February 2015. The conference attracted specialists and professionals engaged in topics like technology assessment, public science and technology participation as well as citizen science. So the aim behind the organization of a session during this conference was to attract participants interested in the field of public engagement. Any registered participant of the conference could attend the session. Approximately 25 people did this, among them were junior and senior researchers, social scientists and PhD students. Some of the participants were familiar with the field of synthetic biology, to some of them it was new.

Session Format

Firstly, we presented the aim and the session plan to the participants. After this short introduction to the session, the selected films were screened. Then the participants were divided into three groups. Participants elected the hosts of each table to present the results of the group work at the end of the session. Each group received the task to discuss films with regard to the following questions:

- Which issues are raised in the film?
- How are these issues connected to the field of SynBio?
- What are your associations with/impressions on the issues depicted in the film?

Group discussions were divided into three rounds during which each group discussed and compared two different films, answered the questions mentioned above and debated. Each round lasted approximately 12 minutes. When a facilitator gave a signal, the groups, apart from the table host, rotated around the room to the next table and discussed the next two films. After every group had discussed every movie, each host of the tables presented the results of the group discussions. It is important to note that several flip chart papers were prepared at each table with the names of the films on each paper. Groups had to write down the results of their discussions. At the end of the group work, each poster contained the results of three rounds of discussion of each group. In total, the session lasted approximately 1.5 hours.

Selection of Films

From a wide range of 60 different films shown during the BIO·FICTION Film Festival,[3] six films were chosen for the PACITA session. Film descriptions are presented in Table 28, which also summarizes the way in which films were presented to the participants for the discussion session.

	Description of Films	
1	Film 1: Reinventing the Dodo (Steven van Eekelen / 2013 / length 03:08 min) This highly entertaining animation explores what could happen if the Dodo were to be resurrected.	Film 2: BioFlaneur (Aleks Cicha / 2014 / length 02:20 min) This short film speculates about a future where invisible biological data of spaces and humans is uncovered.
2	Film 3: Bioluminiscent Streetlamps (Steven van Eekelen / 2013 / length 02:22 min) This animation paints a picture of how a future light-emitting tree that could serve as a sustainable alternative for street lamps could look like.	Film 4: Exploring Indonesia (Ari Dwijayanti / 2013 / length 02:50 min) The vast development of synthetic biology brings a large number of innovative applications, and Indonesia, located in the most biologically diverse region on the planet, is well placed to explore the possibilities.
3	Film 5: Copy and Clone (Louis Rigaud / 2010 / length 03:15 min) “Copy and Clone” displays the effects of biotechnologies on animal food industries through the window of a computer.	Film 6: Quanticare (Amy Congdon, Jenny Lee, Ann-Kristin Abel / 2012 / length 02:23 min) The film takes a look at an imagined future healthcare company and the role of synthetic biology, which will revolutionize and advance healthcare.

Table 28: Description of films

The selected films all showed a clear relation to the field of synthetic biology and raised different societal issues while still being short in time (about 3 minutes). Films were selected due to different modes of problematizing synthetic biology (see above), although the main idea behind the selection was the pairing of more positive with more negative representations, so that each group/table had a pro and con pair to discuss. However, the more critical films included some ambiguities as regards the general attitude towards synthetic biology and nevertheless were closer to the risk and ethics mode compared with

the “positive” films in column two that rather reflected the economy mode and even the new category of “coolness” (see also Bogner and Torgersen 2014).

Results

The following section presents the results of the discussions which took place during the session. Table 29 summarizes the group discussions of different aspects of the films and the answers to the questions mentioned above.

Film	Issues	Relation to SynBio	Impressions
Reinventing the Dodo	• Nature as static and imperfect • Biodiversity, de-extinction, responsibility, human hubris	• Reconstructing organisms, genetic manipulation	• Biological reductionism. Reconstruction of the spirit and behaviour, impossible, responsibility for the creation -> Frankenstein tragedy •- Realistic? Is a synbio creature really so dependent? / not more dynamic, adaptable? • Nihilism • Moral norms can change • Nature ≠? Artificial creature • Value of nature • Cute, fictional topic
BioFlaneur	• Privacy, Panopticum (you can’t hide), DNA trace • Info overload	• There is no link?	• Loss of autonomy • Identity stealing • Knowing someone by DNA traces
Bioluminescent Streetlamps	• Lack of regulation + impossibility to control • Precautionary principle • We should challenge/address the users of the technology and maybe not the technology itself	• Limited technology: season bound, can’t turn it off	• Unfulfilled expectations • User creativity • Poetry/melancholic images • Acceptance based on emotions • Positive aspect, at the same time raises concerns why not working
Exploring Indonesia	• Not exploring, but exploiting -> unlimited possibilities • Simplistic symbols, depth of technology • “Start-up optimism”, marketing	• One-sided technology	• Serious or parody?
Copy and Clone	• Nature-human relation • Industrialized food production, antibiotics • Industrial cloning • Vulnerable/instable system (self-enforcing) • Narrow focus on economic efficiency	• Many issues present already • Digitization • Copyright on organisms/life forms (IP rights, access) • Big Business, capitalism	• Animal Welfare • Sad • Detachment from the “real world” • Trial+error • Game • Technophobic • Regulation?
Quanticare	• Privacy • Genetic code: your health? • Personalized healthcare • Old issue? • Now not the doctor, but technology • Individual scanning • Drug targeting • For whom will it work? • Access to data?	• Digitalization • New? • Your DNA = you? • Big biodata • Big Business, capitalism	• Cool • Personal identity • Control • Simplistic technocratic view • Aesthetic interactional relevance for broader public/ tattoo community -> aesthetic avant-gardism • Access to the treatment? • Regulation?

Table 29: Transcription of the results of brainstorming and group discussions of films

Issues raised in the films and participants' impressions

Participants could identify a wide range of issues handled in the films. Regarding the quantity of reactions, the three more critical films showed more response in the discussion, with the exception of "Quanticare". This might be due to the fact that the relation between "BioFlaneur" and synthetic biology was not recognized and "Exploring Indonesia" was seen as too simplistic.

With respect to the problematization of synthetic biology, most of the comments fit into one of the three categories discussed by Bogner and Torgersen. In addition, there was also a focus on applications which belongs to the economy frame but implicitly touches the mode of ethics as well.

"Reinventing the Dodo", "BioFlaneur" and to some extent "Copy and Clone" as well as "Quanticare" were discussed under the umbrella of the ethics mode. Human responsibility, hubris, the relation between the artificial and the natural as well as privacy and distribution issues were addressed.

"Bioluminiscent Streetlights" was framed in the "risk" mode of problematization and associated with a lack of regulation, the loss of control and the precaution principle.

The issue of economic impact was mainly addressed when discussing "Quanticare". This film with its positive representation of possible medical applications nevertheless earned many critical comments from the participants with respect to who will profit from such a technology and who will have access to the respective data.

The participants especially reacted to emotional aspects of the films such as the "cute" Dodo, the ambiguous comment in "Bioluminescent Streetlamps" and the over-positive stories of "Exploring Indonesia" and "Quanticare".

The general attitude towards synthetic biology in the discussion rounds can also be regarded as mainly critical because in addition to the issues raised by the critical films, negative associations were also found for the more neutral or positive clips.

This analysis of the material shall exemplify the practical use of the films as stimulus material and one possible categorisation of the issues. However, it is limited to the single event and the limited number of participants. It nevertheless illustrates the possibilities for applying the method to a larger and more diverse audience.

Films in public participation on STI issues

After discussing the screened films, the debate was taken to a more general level. The advantages and disadvantages of using films and this format of the session, its potential to contribute to reflections on the implications of synthetic biology and how it can be transferred to other environments and other contexts were discussed. First of all, it was pointed out that the topics handled in the selected films were relatively specific and more appropriate for someone who is already familiar with the subject and that it would be

difficult to engage a broader public with these topics. However, the format of the session could serve as a good entry point to open up a discussion and to reflect about developments in the field of synthetic biology, as it stimulates thinking and an exchange of different points of view. The films were appealing, as they represented visual information, which was easier to "digest" than long pieces of text. Several participants who were not familiar with the field of synthetic biology pointed out their difficulties to understand what the films were about, but during the group discussion, they were informed on the issues represented in the films by other members of the group. Thus, it is necessary to consider giving a short introduction on the field before showing the films. It is also important to put the films into context for a broader public, as one of the participants noted: "because if one of these clips would be a huge success and have billions of views on YouTube, on the one hand it would of course be amazing, but on the other hand, that would be a kind of, maybe a dominant thing as well in thinking of what synthetic biology might mean and that might be too narrow."

In other words, while films like these are considered to be great stimulus material for a broad discussion of the societal ramifications of synthetic biology, they are not supposed to completely replace other, more factual, sources of information.

Conclusions

The aim of the session was to use a selection of films, shown during the BIO·FICTION Film Festival, to stimulate a discussion and the reflection on the societal issues regarding synthetic biology. This paper is based on the results of the session and discussed how films can be applied to engage a broader public in questions regarding scientific and technological developments. This session was an attempt to experiment with public engagement formats in synthetic biology. In general, there was a positive feedback from participants for using the films in public engagement on science and technology development issues, as they represent an easy and appealing entry point to the topic. The number of societal issues mentioned and discussed is relatively similar to the issues discussed among social scientists, which means the films evoke a broad and encompassing reflection on the technology, in relatively short time. The films seem to work best for those who have at least a little bit of knowledge about synthetic biology. For someone unfamiliar with the field these films could be difficult to understand, which should be considered if the format is applied in activities aimed at a broader public. We conclude that the use of films can be very appealing for broader audiences.

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Footnotes:

1) See: www.bio-fiction.com/2014
2) See: http://bio-fiction.com/en
3) For more information about all 60 films, see: http://bio-fiction.com/2014/#call-for-submission
4) See: www.synenergene.eu

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Footnotes:

1) http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94867/lbna27252enn.pdf

Afterword: Technology Assessment As Political Myth, p. 403.

Footnotes:

1) This paper summarizes a talk given at PACITA: The Second European Technology Assessment Conference, February 2015, in Berlin, Germany. The talk and paper draw upon previously published work; the section on "basic research" draws on Pielke (2013) and also work in progress, while the section on the green revolution draws on an ongoing collaboration with Björn Ola-Linnér.

2) Gunnell, John. 1968. "Social Science and Political Reality: The Problem of Explanation." Social Research 35: 159-201.

3) http://www.jstor.org/stable/448911?seq=1#page_scan_tab_contents

4) http://www.economist.com/blogs/democracyinamerica/2011/07/bin-laden-vaccine

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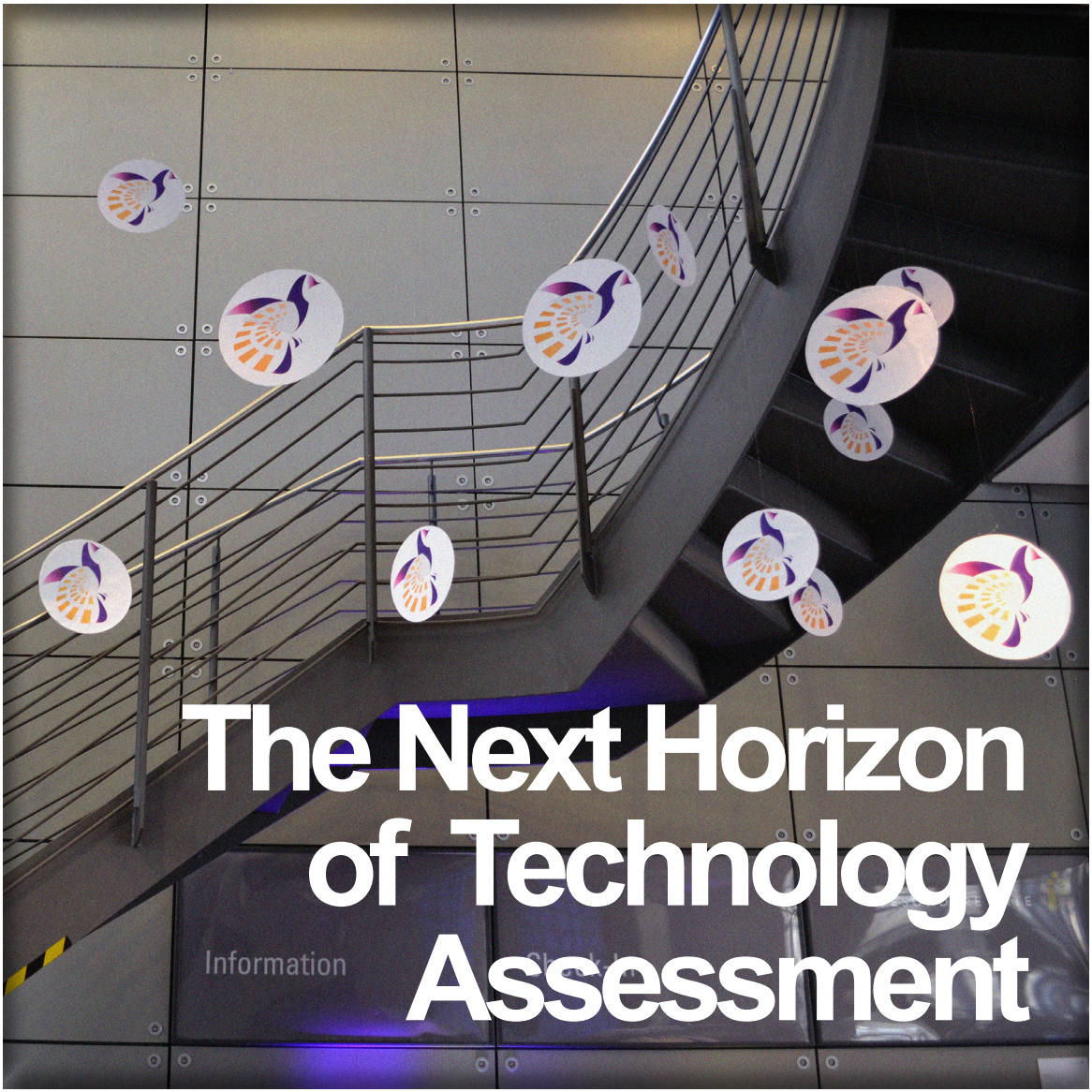

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