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Article

Building Possible Worlds: A Speculation Based Framework to Reflect on Images of the Future

Nele Fischer[1,*], Wenzel Mehnert[2,*]

[1]*Technische Universität Berlin, Berlin Ethics Lab, Germany*
[2]*University of the Arts, Berlin, Germany*

Abstract

Images of the future are representations of possible worlds different to ours. We access these worlds through written stories, plans, scenarios, statistics, trends, and many more. Oftentimes, those images only implicitly describe the world's context but still guide current actions and decisions. Thus, we lack the exploratory and reflective space for their deliberate discussion.
In this paper, we present a framework to explore and reflect own, current images of the future. The framework is based on the process of speculative worldbuilding with the aim to create a 'thick description' of a possible world to (self)reflect on the present assumptions and to understand and reframe today's actions and decisions.

Keywords

Critical Futures Studies, New and Emerging Science and Technologies, Sociotechnical Imaginaries, Speculative Fiction, Technology Assessment, Worldbuilding

Introduction

Speculation enables us to undertake thought experiments of living in possible worlds different from the actual world we inhabit. Once we 'enter' those other worlds, we explore not only its otherness but more importantly our relation to our own actual world.

'Futures' are such possible worlds: While we imagine how the actual world could or should (not) become, we are inventing images of the future that each constitutes a deviant world. Especially new and emerging science and technologies (NEST) are surrounded by those images picturing game changing technologies, insinuating they would fundamentally alter the world as we know it. However, often those images are rather abstract, lacking context and thus only implicitly hint at the possible world's deviations.

Speculation enables us to deliberately build the world implied and thus makes it accessible for exploration and reflection. This process, known as worldbuilding, is like a sandbox for "thought experiments or prototyp[ing] increasingly detailed interactions (...) and to explore emerging science and technology" (von Stackelberg & McDowell, 2015, p. 32). This raises the questions: What can we learn about futures through such a speculative worldbuilding endeavor and what kind of knowledge is created in such a process?

As Whitehead states, "Imagination is never very free" (Whitehead, 1978, p. 132) as it always proceeds from particular actualities and their accompanying possibilities which emerge from the actual world and our relation to it (Halewood, 2017, p. 54). To rephrase: Everything to speculate with is already a disposition of the social reality of the speculator – including empirical facts as well as cultural shared meanings and fictions. Therefore, speculation does not create any knowledge about a future present but instead creates knowledge about our currently shared assumptions, traces current discourses and uncovers the social imaginaries of the present.[1] Speculating about a possible world enables us to reflect upon how we currently *imagine* the world might become. By speculating, we can trace bigger cultural categories in an ethnographic sense: "Analysis, then, is sorting out the structures of

* *Corresponding author*.
E-mail addresses: nele.fischer@online.de (N. Fischer), wenzel.mehnert@udk-berlin.de (W. Mehnert).

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signification [...] and determining their social ground and import" (Geertz, 1973, p. 9).

Speculative Worldbuilding enables us to explore potential implications of an emerging technology and creates a contextualized image of the future. It thus creates enriched material for hermeneutical approaches to understand the implicit, underlying assumptions and to critically reflect upon the everyday images of the futures we hold and live by. In contrast to the design of narration based SF-media (cf. von Stackelberg & McDowell, 2015) or the design of preferable futures (cf. Zaidi, 2019), we aim on using worldbuilding as a participatory workshop method to create a possible world for the purpose of reflecting on the participants' implicit assumptions of the future. By that, we borrow a method to create storyworlds from SF-writers and reuse it as ethnographic tool, creating artefacts as a means for joint (self)reflection. Accordingly, within this paper we are less concerned with neither creating SF nor the diffusion or perception of images of the future (or SF in this regard).

The framework presented here enables the creation of artefacts for reflecting own assumptions on the future, thus opening up spaces for actions and decision making. First, we will present more in depth the theoretical backbones of this framework, both in regard to futures as well as worldbuilding (section 2). In the following, we will describe the framework (section 3) and illustrate it with a case (section 4).

Theoretical Backbone

In this section, we introduce the theoretical premises of our framework, thereby connecting worldbuilding to Critical Futures Studies (CFS) and both to debates in Technology Assessment (TA) and Science and Technology Studies (STS). Various fields, disciplines and practices have influenced this theoretical backbone and our following references to the original concepts and surrounding discussions are necessarily abridged. We can only hint towards the massive amount of research and practical experience our ideas are built upon, inviting further research on connecting those fields.

In the following, we will firstly discuss our understanding of 'the future' as present images of the future shaping current actions and decisions. Building on that, we show how enriching the context implied in such images through worldbuilding is supporting their reflection, analysis and reconstruction - and thereby enhancing our opportunities to critically and deliberately work with futures.

How Images of the Future Shape Current Social Reality

Present futures instead of future presents

In debates on 'the future', e.g. those surrounding new and emerging science and technologies (NEST), 'the future' is understood from (at least) two different angles (Jouvenel, 1967; Grunwald, 2009; Brown, Rappert, & Webster, 2000, p. 3):

- the future understood as *future present*: Here, 'the future' refers to a specific state of affairs later than now, a *future present* that is a point in time yet to (be)come. While it is consequently not yet empirically existing, discussions about its likelihood or (im)possibility assess its potential of realization.
- 'the future' as *present futures* or *images of the future*: Images of the future are *present* descriptions of states-later-than-now that are embedded in current discourses, based on imaginaries and are effectively shaping today's actions and decisions by attributing meaning to the present. They manifest in, amongst others, trend-extrapolations, scenarios, plans, pop-cultural media artefacts or hopes and fears. As those images of the future are part of the *current* social reality, they become empirically observable. Understanding 'the future' as *present future* allows to focus on those current depictions, in contrast to assessing their potential of becoming a *future present* as implied in the first notion.

Both notions are intrinsically linked: The not existing and inherently uncertain future presents (i.e. states later than now) are the content depicted in now existing and now *effective* present futures. Still, they should be analytically separated due to their different implications for any Futures Studies endeavor: Understanding 'the future' as state-yet-to-become - no matter how implicitly - triggers thoughts on predictability, on likelihoods and possibilities. Understanding 'the future' as part of the current social reality, as we do in this paper, triggers trying to understand the impacts those images have on current actions and decisions and enables to shape a future present by own images.

Present futures shaping the present

Images of the future effectively influence not only what might become a future present but current social realities as well: They act as drivers for actions and decision making. The images of the future surrounding us may be more or less explicit, might converge or diverge in terms of the future presents implied or desired, they may complement, compete or ignore each other. And of course, they are changing over time. But despite their diversity, those images are not arbitrary. Images of the future are part of our social reality embedded in intersubjectively shared, socially and culturally prefigured meanings. From this perspective, images of the future are closely linked to Jasanoff and Kim's (2015) concept of sociotechnical imaginaries, that is "collectively held and performed visions of desirable futures" (or of resistance against the undesirable) that are "animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015, p. 19). As parts of different discourses or imaginaries, images of the future form important cultural resources, that create goals and define actions to attain or prevent them – and that accordingly reflect power structures in their processes of creation, diffusion, perception and normalization.

In short, images of the future attribute meaning to the present. Or as Whitehead puts it more radically: "Cut away the future and the present collapses" (Whitehead, 1967, p. 191). (cf. Beckert, 2016, p. 2; Brown, Rappert & Webster, 2000, p. 5; Ferrari & Lösch, 2017; Fuller & Loogma, 2009; Grunwald, 2014a, 2019; Jasanoff & Kim, 2009; Polak, 1973; Schneider & Lösch, 2019; Slaughter, 2002).

Images of the future actively shape not only how new technologies can be governed but also the pathways for how they find their way into society, e.g. in form of potential use cases or perceived risks. The case of nanotechnology has been intensively studied in this regard (Burri, 2015; Grunwald, 2014b, 2018; Nordmann, 2014; Selin, 2007): A dispersed range of different technologies loosely related to something small is receiving a common meaning through the abstract category "nanotechnology". Images of what nanotechnology could or could not do, its implications, risks, hopes etc., arise and define the perception of the technology and consequently related actions today, impacting governmental decisions, research agendas and societal debates. Even more so, as images of the future related to NEST often entail a promise of hyperdisruptivity. Being understood as definitively changing the world as we know it, they create an urgency for current decisions and actions – often already including an implicit normative direction.

The dynamics among (contested) futures also reflect social power structures, e.g. the ability to normalize or emphasize social issues within a society. Images of the futures are formed by actors utilizing differing resources to convince others of '"what the future will bring"' (Brown, Rappert & Webster, 2000, p. 4), thus shaping the different discourses and the negotiation of futures. Although the creation, diffusion, perceptions and normalization of images of the future is closely related to our topic, this paper focuses on creating and analyzing images of the future as 'snapshots' of current, action and decision shaping assumptions of a group.

Why Reflecting On Images of the Future Is Enhanced Through 'Thick' Descriptions of Possible Worlds

Approaches to analyzing images of the future

Analyzing images of the future in order to grasp present futures as driving forces is a crucial part of Critical Futures Studies (CFS). CFS analyses, deconstructs and reconstructs images of the future, examining their discursive power structures as well as underlying assumptions and narratives in order to create alternative futures (Gaisbauer & Sedmak, 2014; Godhe & Goode, 2018; Inayatullah, 2004; Milojević & Inayatullah, 2015; Sardar, 1993).

Next to CFS, analyzing images of the future has gained momentum in various disciplines working on the intersection of society, policy and technology. Their analysis is promoted as NEST take the Collingridge-Dilemma to the extreme: "When change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult, and time-consuming" (Collingridge, 1981, p.11). Not only is little knowledge available regarding the social, economic or environmental implications of the technologies (not to speak of hard facts), but the technologies themselves are existing only through the images of the future. In the light of unpredictable technological implications and little or no available knowledge, what offers the demanded support for decision making and political steering is a deliberate debate on desirability based on the reflection of the images of the future. ((Grunwald, 2018, 2019; Jasanoff & Kim, 2009; Lösch & Schneider, 2016; Selin, 2007) On Vision

Assessment: (Ferrari & Lösch, 2017; Grin & Grunwald, 2000; Schneider & Lösch, 2019)).

What those approaches have in common, is a focus on the images of the future themselves and their current discursive power. Reconstructing the sociotechnical imaginaries and discourses surrounding them aims at *understanding* how the present reality receives meaning from the imagined futures, how present decision making processes and actions are (explicitly or implicitly) shaped by those meanings and, how dominant power relationships are inscripted in artefacts, technical dispositives, practices and discourses. Those approaches promise to open up opportunities for deliberate debates and shaping of future presents through understanding images of futures.

A need to create 'thick' descriptions of the possible worlds depicted by images of the future

In the context of NEST, there are many images of the future fueling the ongoing debates. While this offers rich material for approaches focusing on reconstructing the imaginaries and discourses, the single images often are a mere description of the technology. They lack depictions of a technology's social embeddedness. Thus, there is too little substance for deliberately debating those futures (especially in terms of desirability) although those images still have the power to shape actions and decisions. This is especially problematic in contexts where NEST is developed, as these developments are (implicitly) guided by those images while often lacking reflection on the respective implications.

What is needed then are 'thick descriptions' of futures, to borrow a term from Geertz (1973, p. 5). As an account of a "microscopic" part of culture (Geertz, 1973, p. 21), a thick image of a future would describe the technology as part of a sociotechnical system. It would include cultural contexts, descriptions of potential events and their conditions evolving around a technology, and depict it shaping and being shaped by values, rituals or routines and open for reinterpretation, non-usage and appropriation.

By creating such thick descriptions, the aim is not to develop 'better' predictions of future presents. Here, we side with Nordmann (2014, p. 89) in emphasizing the problematic stance of anticipating future presents:

> This imagined future is a different world, inhabited not only by different technologies but inhabited by different people, too: by the time the envisioned new technologies have insinuated themselves into the fabric of society, this will be a society of new people in that they will have integrated these new technologies with their system of values.

As Nordmann suggests, we propose to "change the wording in this paragraph ever so slightly, and once instead of 'this imagined future is a different world' we would simply say 'a different world is imagined here'" (2014, p. 90).

We understand images of the future as different or possible worlds and contemporary artefacts without a predictive ambition. Instead, the depiction of a different world enables us to understand the underlying assumptions that prefigure our imagination of how 'the future' might become, how 'future' is constructed today and what this tells us about current societies. In contrast to discussing the realization-potential of any future present depicted or using them for ideating new technologies, we consider those possible worlds as meaningful accounts that reflect current social realities. They offer hermeneutic material which in turn can be investigated to uncover the implicit assumptions and eventually opening them up for deliberate debate of our current societies. Therefore, we propose to a) creating a dense and detailed image of the future that allows to explore the world implied and b) to use this material for further reflection.

Thick descriptions of possible worlds through speculation and worldbuilding

The mutual connection between fiction and images of the future has been explored from different perspectives. (cf. Bina, Mateus, Pereira, & Caffa, 2017; Johnson, 2011; Li, 2013; Miles, 1993; von Stackelberg & McDowell, 2015; Steinmüller, 2017; Thacker, 2001; Zaidi, 2019).

In the context of this paper, we build on the process of worldbuilding and the concept of storyworlds respectively as described in the literature on and practice of creating Speculative Fictions (SF). The genre is intriguing as it does not try to imitate the actual world – the one that we inhabit – but instead extrapolates, changes, rethinks or (re)invents unique alternatives in the form of possible worlds (Oziewicz, 2017, p. 1)[2]. However, we are not aiming at creating SF, but rather applying this kind of speculation to create artefacts for further (self)reflection within a group.

Possible worlds

Ryan (2001, p. 91) defines a possible world as a non-contradictory "connected set of objects and individuals; habitable environment; reasonably intelligible totality for external observers; field of activity for its members". Exploring such a possible world and its relationship towards the actual world we inhabit is at the core of SF. According to Ryan (2012), inventing a possible world simultaneously involves using the actual world as a mental model and deliberately playing with differences to the actual world of varying degrees.

In the context of images of the future, the spectrum of attachment between such a possible world and the actual world is a very specific one: As these possible worlds describe 'the future' of the actual world, a connection to the actual world is suggested through the linearity of time and the inherent promise of becoming a *future present.* Therefore, these highly overlapping possible worlds show us an estranged form of our actual world. Through the effects of cognitive estrangement (Herman, 2013; Suvin, 1972), we are able to imagine and immerse in (deliberately created) differences, but also to reflect on their meanings and on those aspects that are left unchanged.

For a possible world to be perceived, it must be accessible from the actual world, e.g. through narrations and accompanying formats such as appendices or maps, but also through images, sound, or other artefacts. Speaking with Ryan (2001, p. 91), they all constitute "a window on something that exists outside of language and extends in time and space well beyond the window frame." In our context, those access-points are crucial: Every image of the future is such a window to a possible world. However, lacking a thick description, the crucial elements constituting the possible world are only implied, their interplay being mostly hidden and thus obscured to the immersion as well as to the critical reflection and discussion.

Worldbuilding and storyworlds

From the perspective of narratology, the tangible outline of a possible world is known as storyworld. It constitutes and holds the narration while hiding in the mundane everyday situations that all fictional characters encounter throughout the story. Therefore, 'world' does not only refer to geographical or spatial categories but covers "everything that is experienced by the characters" (Wolf, 2012, p. 25).

A storyworld can be created through a process called *worldbuilding*, which means to set up assets (e.g. objects, inhabitants, places, laws, values, and more) and to create a consistent structure of relationships between them. The results are captured in *Story Bibles* or *Writers' Guides*, which are handed to a team of writers to ensure consistency within the created stories and to the canon.[3]

Considering storyworlds next to plot structures and character arcs is a relatively young endeavor, introduced by Ryan (1991) as well as Herman (2009). It accounts for the process of worldbuilding as creative practice on its own and acknowledges the storyworlds *beyond* the stories as pieces of art (cf. Roine, 2016; Wolf, 2012).

Next to theoretical reflections, worldbuilding is widely discussed among practitioners from different fields and contexts. Examples here are writers' handbooks like "Storyworld First" (Williamson, 2014), the – in contrast to the academic literature – beautifully illustrated "Wonderbook" (Vandermeer, 2013), or the "Kobolds guide to Worldbuilding" (Silverstein, 2012), as well as online communities like Tale Foundry (2018) or *worldanvil.com, a* wiki-like service to organize storyworlds (Forbes & Havlids, n.d.).

Within Futures Studies, worldbuilding has been discussed by von Stackelberg and McDowell (2015), and more recently by McDowell (2019), focusing on the elements of storytelling, and Zaidi (2019), connecting it with experiential foresight and transition design. The authors refer to the creative power of worldbuilding to foster ideation or transition design processes.

Towards A Worldbuilding Based Framework for Reflecting Images of the Future

Building on the theory above, we now present a worldbuilding based framework for reflecting images of the future. The overview of the proposed phases is as follows:

- The *starting point are images of the future*, e.g. surrounding NEST, and especially those lacking context. We find them in journal articles, TED-talks, news reports, as well as (own) project visions and others. The few elements given by them are the entry point to the worldbuilding phase.
- *worldbuilding:* This step is separated into three phases (that might overlap each other) and builds upon what Wolf describes as "Invention, Completeness, and Creation" (2012, p. 33). In this step, thick descriptions are

created as the interconnectedness of the storyworld is layed out. The writing of short fictions – so called Narrative Probes – can support this step to define the systemic structures.

- *reflection:* The possible worlds created are reflected in two directions, namely in terms of evaluating the future present depicted as well as - more importantly - reflecting the underlying assumptions, narratives etc. that prefigure the worldbuilding endeavor, our ability to think of possibilities.
- Based on the reflections, *iteration* starts and invites to reconstruct alternative possible worlds, playing with the elements and their relationships. Such iterations resonate with CFS's approach of deconstructing and reconstructing alternative futures as well as with a hermeneutic circle of understanding.

In the following, we will describe the worldbuilding and the reflection parts of the framework more in detail. This descriptive overview is followed by a case that both, portraits the prototype preceding this conceptual description and serves to illustrate the framework in action.

Practice of Worldbuilding Based On Wolf (2012)

Invention

The worldbuilding starts with 'invention', that is defining the degree to which the storyworld deviates from the actual world by creating the assets of the storyworld (Wolf, 2012, p. 34). Wolf separates between four realms where those deviations originate (2012, p. 35): (1) The *nominal realm* is on the level of language and refers to renaming already familiar elements (e.g. an actual city like Berlin becomes *New-Berlin* and thus already implies a new concept). (2) The *cultural realm* consists of all things made by humans like technologies, new objects or artefacts but also includes inhabitants and a set of customs, religions, institutions, companies and many more. (3) The *natural realm* includes the landscape and places (like underground regions, forbidden zones, and more). (4) The deepest level is the *ontological realm* which consists of new laws (e.g. physical laws or social laws that build upon different socially shared values).

Completeness

Within the second phase, 'completeness', the setting of the storyworld is defined. Here, the before mentioned elements are completed as their context gets enriched. Wolf (2012, p. 42) points out that "the completeness of a world is what makes it seem as though it extends far beyond the story, hinting at infrastructures, ecological systems, and societies and cultures whose existence is implied but not directly described or clearly shown".

Every asset created in the step before needs to be contextualized through a set of questions like: What values do people or entities carry? What capabilities do new technologies have? How are new objects used and how can you access them? And so on. Those questions are just exemplifying the idea of the second phase. Obviously, every category of assets needs its own set of questions.

Creation

The last step, 'creation', determines the relationships between the assets. Once the worldbuilding process developed enough details and inner structure, it develops a logic of its own and even its authors have to obey to the rules that result from it (Wolf, 2012, p. 53). The inner coherence of the storyworld 'automatically' fills in the parts of the world that have not been created by the author before. Wolf (2012, p. 51) frames this step as "filling the gaps." However, it's impossible to fill in all the gaps. In those cases, the relationship to the actual world becomes relevant:

> Where the world's own logic does not dictate specific answers, gaps are usually filled with [actual world's] defaults; in other words, unless we are told otherwise, we expect the laws of physics in a [possible world] to be the same as those of the [actual world], and expect that the [possible world's] social, political, or economic structures will operate in a similar fashion as those that exist (or used to exist) in the [actual world]. (Wolf, 2012, p. 54)

Reflecting and iterating possible worlds

The worldbuilding process allows to create images of the future as 'thick descriptions', that allow for both, discussing desirability and reflecting on own assumptions. In this sense, the authors of the created storyworld re-perceive their creation through an ethnographic lens as cultural artefact that allows interpretation, discussion and reflection. Doing so invites the diverse range of analytical approaches from TA, STS or CFS (as described in 2.2) to be applied. Importantly, such analysis can be both, a participatory endeavor of self-reflection of those who took part in the worldbuilding as well as a more scholarly undertaking of analyzing the participants' material. We focus on the first, inviting self-reflection especially in but not limited to contexts of technology development.

Reflecting desirability

The future presented (as potential future present) can be discussed in terms of desirabilities. This builds on the immersive experience in the created worlds, as NEST are depicted in sociotechnical, ecological, cultural, etc. (inter)relationships. We can ask whether we would like to live in such a world, what aspects are (not) desirable and what this would imply for current actions and decisions. Such an evaluation refers back to Nordmann's (2014, p. 89) claim cited above, who proposes assessing desirabilities instead of anticipation. Also, this type of reflection is strongly connected to approaches from speculative design or experiential foresight (Candy & Dunagan, 2017; Dunne & Raby, 2013; Zaidi, 2019).

Reflecting current world views and assumptions

Reflections can shed a light on current imaginaries, discourses or, generally speaking, assumptions about the actual world. This is especially promising as worldbuilding is both, an artefact of the present worldview as well as a deliberate attempt to stretch it. Through cognitive estrangement, exploring the possible world creates a distance to naturalized assumptions of our actual world. But however different, this world is still based on the perception of the current world. Worldbuilding involves filling gaps following the 'default' assumptions of the actual world that we consider 'natural' and leave unquestioned. Looking at differences and overlaps between the possible and the actual world as well as building on the created distance as reflexive space allows to analyze what is, for example, considered changeable or stable. Approaches from CFS offer a range of opportunities to deconstruct and reconstruct such implicit worldviews and further research could enrich this toolbox to investigate assumptions.

Iterating the world

Based on the two routes of reflection described above, the worldbuilding process can be repeated and iterated, allowing to play with alternative possible worlds. As any image of the future is only intermediary and subject to changes over time, this is a play with different 'snapshots' of present futures, inviting active changes. We understand not only the speculation process itself as grounded in discourses and imaginaries, but the same counts for the analysis and reflection. Creation and reflection form a circle: It is about imagining the possible worlds within images of the future and simultaneously reflecting the newly created images of the future to learn about own assumptions and to make worldviews explicit.

Consequently, during the whole process of speculation and reflection, there is a need for humble expectations in terms of exploring one's own line of thought. Neither speculation nor reflection or interpretation is completely free but always situated within the sociocultural context and – especially the speculations about NEST – based on the sociotechnical imaginaries of the one to speculate and reflect. However, explicitly building on the biases as part of the construction of a storyworld offers a promising access to reflect at least some of them.

The Framework Applied: A Case Study

The following case is a prototype of the above described framework that was created for a seminar at the Berlin University of the Arts together with a colleague, Tom Kolombe, and funded by the Studium Generale at the UdK. This prototype was developed over the course of three months in 2018/19 with sixteen intrinsically motivated students from the UdK and the Technical University Berlin. While we present this prototype to illustrate the phases of the framework, a modified (shorter) version of this approach can be integrated in technology development

contexts to re-think actions and decisions related to the own project.

Researching thin images of the future

At the beginning of the project the students researched images of futures within three self-selected fields of NEST: Artificial Intelligence, Future of Medicine and Smart Cities. The images discovered mostly lacked context while shaping current political and public discourses on dealing with NEST.

Setting the Foundation of the World

Based on the images of the future, we developed possible implications and social changes using the "Futures Wheel" (cf. Bengston, 2015; Glenn, 1972). Starting with questions like "What if there was a device that could gen-edit everyone on demand?" the students speculated on four directly related changes (1st order implications). These became the starting point for the 2nd order implications, which again became the starting for the 3rd order implications. All implications were then mapped out to create the timeline of the storyworld.

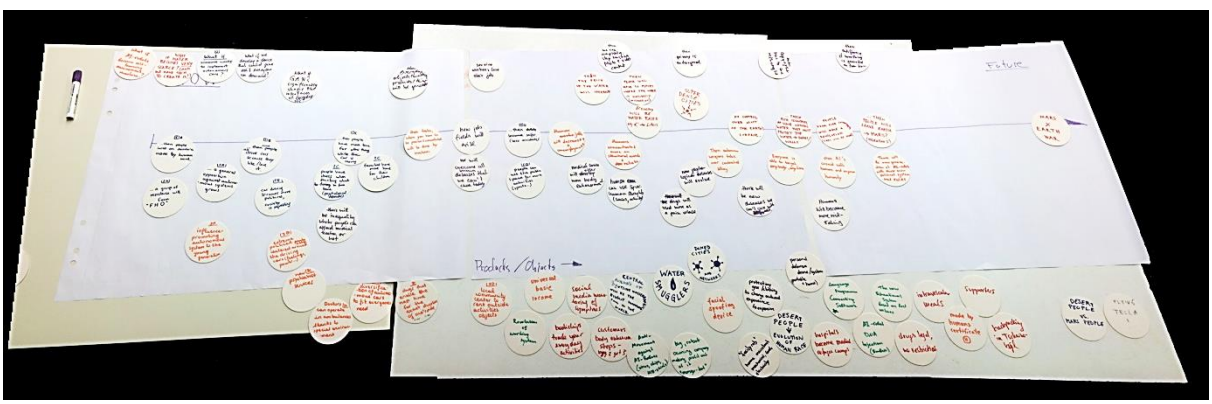

Fig. 1: The timeline of our storyworld (Kolombe & Mehnert, 2019)

The created results were merged and transformed through *Narrative Probes*, flash-fiction like narrations (cf. Hazuka, Thomas, & Thomas, 1992) that probe into the sketched out world and bring forth narrative artefacts. In our context we used Narrative Proves to create fictional historic events of our possible world (e.g.: a political event, a product announcement, a scientific breakthrough). The created events already included references to persons inhabiting the world, technologies including their potentials and limits, companies creating those technologies, and many more. Those details constituted the basic elements of our storyworld, which corresponds to the *Invention* process in the above-mentioned worldbuilding approach.

Defining structures

For the *Completeness* phase, we extracted all the elements described in the step before and started to enrich their context. We defined five elemental categories – objects, timeline, inhabitants, places and laws & rules – and developed special worksheets with specific questions for each category. At this point we made sure, that the consistency within our world was given. We discussed the relationships between the elements within the group to create a collective idea of what appeared to be a plausible development. To keep the overview of the created ideas, we mapped the results on a wall and used strings to display the relations of the elements within the storyworld. Additionally, we used worldanvil.com to organize the storyworld.

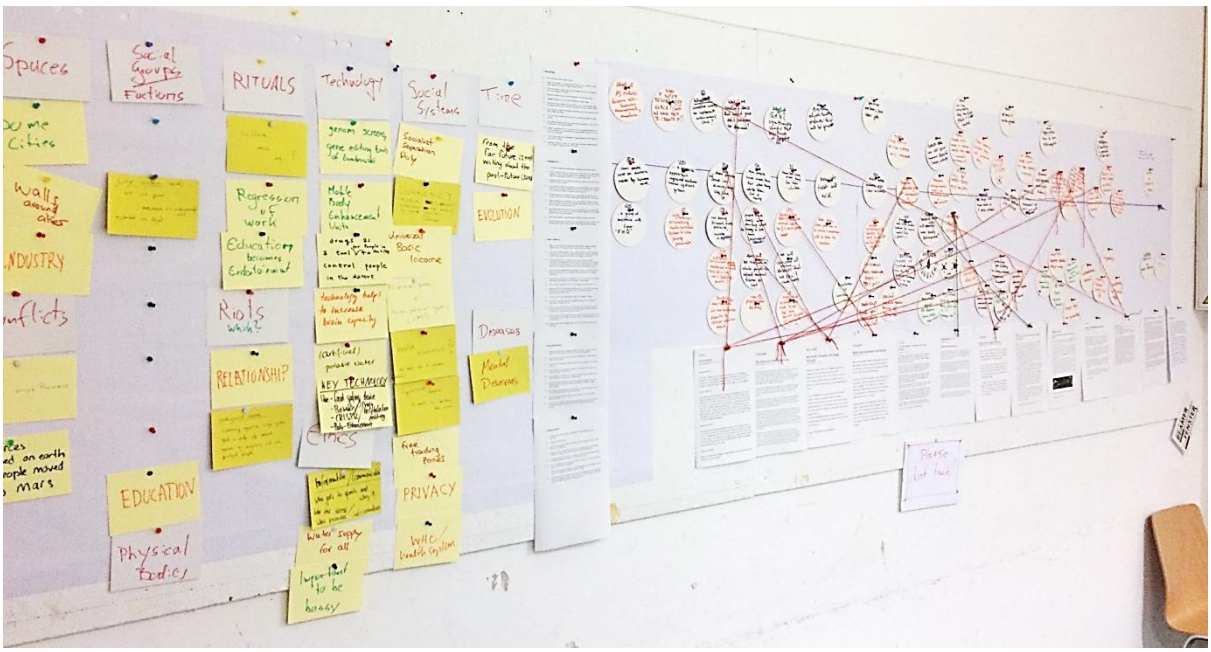

Fig. 2: The mapped out storyworld (Kolombe & Mehnert, 2019)

Diving into the world

Until then we were creating and observing the storyworld from a meta-perspective. To dive deeper we used classical means of storytelling. We developed potential characters inhabiting the space, sketched out their arcs, defined their personal wants and needs, and set the equilibrium (their everyday life and routines). Within this step, the participants explored the world through the eyes of their characters and by that reflected upon the desirability of the possible world. During the writing process, we discussed presented assumptions, talked about dystopic and utopic potentials and how technologies need to be actively shaped to help or hinder societal development.

At this point, the group also decided to submit to the rules and logic of the storyworld and used them as constraints for their own writing process. Once all stories were written, a team of three students formed that was going through the stories to ensure the overall consistency with the defined world.

The resulting storyworld is a collectively created thick image of the future that contains the related, culturally shared biases of each participant. Step by step, this exploration led through scoping out implications, embedding them in mutual connections and finally immersing into the possible world. Thus, the speculative process of worldbuilding combined an analysis of current trends, a creative immersion into a possible future and fostered discussions about how to shape the world we live in.

Short description of the storyworld

The following description offers a peak into the storyworld. For a detailed view, please take a look in our glossary and the publication.[4]

Our storyworld is set in the year 2050 and due to natural catastrophes most of the world is deserted and abandoned. There are a few gated communities, so called *Dome Cities*, providing a covered, artificial ecosystem to protect its inhabitants from the harsh outside conditions. People living in the cities have access to several new technologies. People living outside these communities are forced to scavenge the world surrounding the Domes in order to survive. To raise their chances of survival, many individuals gathered in different communities that are either placed in fixed colonies or moving through the world nomadically. To survive in the hostile environment, the *Desert People* need certain body enhancements, which are only available within the Dome Cities. Conflicts and trade relations emerged, the latter manifested in a marketplace called *Inferris*, where people trade goods from raids inside the Dome.

Reflecting the created world

The short stories themselves, as well as all the artefacts of the storyworld created during the process offered plenty of material for a subsequent reflection. For example, it is interesting to look at the group's decisions and discussions, figuring out what kind of assumptions were never questioned (and thus strongly bound to a shared understanding of the actual world) or those that raised strong discussions.

Also, examining the overlap of possible and actual world allowed reflection on taken-for-granted-assumptions. To give fragmentary examples: The premise of climate change induced water scarcity constituted a deliberate difference to the actual world. However, the landscape imagined was modelled according to stereotypical images of deserts but not depicting a deserted Europe. Furthermore, it was 'naturally' assumed that resource scarcity would lead to social conflicts (not, for example to intensified collaboration). Solutions were imagined to be provided via technology, sold by private companies, thus reproducing current economic structures even within a quite post-catastrophic world and ignoring non-technology based solutions.

In a similar vein, combining AI with the consequences of no paid labor and a universal basic income, were understood as explicit deviance. This deliberate decision was accompanied by implicit assumptions such as: without work, people do not see sense in life. A solution to this was predominantly seen in escaping to spaces outside the Dome to help those in need.

Already with those fragments above, the potential for deliberate discussion becomes obvious: Having made those assumptions explicit, we may look for other social strategies when confronted with scarcity or ask how to deal with questions regarding sense and purpose not connected to work.

Moreover, this approach invites further analysis and reflection from a sociotechnical perspective. It can be complemented with analyzing the current discourses and imaginaries, looking at how they influence the created storyworlds or how those storyworlds in turn might impact the discourses, how they might diffuse into society and how they might be perceived.

Conclusion

Within this paper, we presented a speculation based framework to explore and reflect on images of the future. The framework is based on the premise that images of the future are artefacts that describe how a future present might be(come) and thus present a possible world. Our focus was not on assessing their potential to be realized, but on understanding what such images tell us about our current social reality. We understand images of the future as possible worlds that can be a) explored in order to discuss desirability and b) analyzed and reflected upon to examine the underlying assumptions of the present and complement analysis of current discourses and imaginaries.

In order to do so, creating 'thick descriptions' of the possible world is needed. The process of worldbuilding allows to explore and enrich the implied possible world, as implications of e.g. a specific technology are embedded in an imagined social reality, interrelated causes and impacts, behaviors and changes, etc.

Speculation is grounded in current observations and present social reality while simultaneously enabling the imaginination and immersion in differences through cognitive estrangement. This allows to combine the creation of images of the future and their analysis in a focused and reflexive manner. Examining the overlaps and differences between the possible and the actual world (and their reasons), offers plenty material for further reflection. Here, we propose to build on existing and emerging approaches from CFS, STS and TA.

Using this framework enhances debates in contexts where 'the future' is discussed as especially uncertain and within a clash of strongly diverging claims, as with NEST. As images of the future form driving forces for present decisions and actions, this framework can support reflecting on (own) future oriented work and its potential implications, e.g. when applied with and by technology developers or researchers.

With this framework we want to emphasize on worldbuilding as a (participatory) research method for the following reasons:

Firstly, because worldbuilding 're-opens' thinking about the future: It opens up a space of possibilities that allows to question the status quo and think about how the world could or should be. In a workshop setting, participants are enabled to create images of the future that lay beyond the often externally imposed images coming from e.g. private companies, political parties or mass media. Through reflecting upon desirabilities, the participants gain a different understanding of 'the future', in the sense, that future is an open space that is (and can be) shaped by social actors

instead of being predetermined.

Secondly, using this framework promotes the creation of tangible artefacts as empirically accessible material for further analysis. Although the facilitation of such a workshop of course influences the process, the creation of assets and how those elements are interlinked with each other emerges from the group, that is from the individual as well as shared biases and assumptions. In turn, the created artefacts pose entry points for their reflection. This approach encourages the use of speculation about possible worlds in e.g. in TA, STS or CFS to gain a better understanding about culturally shared imaginaries and the constitutive process of creating meaning. Speculation thus becomes an important tool to address global challenges as it allows to understand, reflect and reframe today's actions and decisions.

However, several questions remain for further research and application of the framework: For one, the framework's adaptation and scaling up and down to fit different contexts is an ongoing experiment of ours, especially with regard to contexts of technology development where the (self)reflection is supposed to directly feed back into ongoing development work.

With regard to the application, it would also be interesting to take a closer look at the complex group dynamics and interactions and their influence on the creation and reflection of storyworlds. A related question concerns the impacts and potentials of working with more heterogeneous/homogeneous groups.

Moreover, further research is needed to understand how the created storyworlds act as interface between current discourses, the particpants/authors and a potential, dispersed audience. How do the storyworlds and created images of the future relate to current discourses and imaginaries, how do those impact the group? How might the created storyworlds be perceived by a different audience or how would they diffuse into a project team, an organization or society?

As our own research and the development of this method will continue, we sincerely hope that this approach to applied speculation will inspire others to work with the concept of worldbuilding. If so, we are more than happy to hear from your results and strongly welcome an exchange of experiences.

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Notes

1- Regarding the grounding of speculation within the (social) reality: cp. Diprose "Hence, speculative thinking cannot escape some kind of contact with the material world it is said to bypass." (2017, p. 40) or Suvin "I don't see how anyone could imagine anything that another person hadn't dreamed before." (1972, p. 96)

2- SF also has a tradition of using reframing to comment on the actual world, either to satirize and hint at actual shortcomings or to create models and perspectives for desired changes (Miles, 1993, p. 317; Oziewicz, 2017, p. 10). It also primes the audience for questioning predominant worldviews and voices alternative views which "can move the world" (Oziewicz, 2017, p. 10) in the direction towards gender and ethnic equality. Representative examples are Feminist Science-Fiction (see works by authors like Atwood and Le Guin) or Afro- and Ethno-Futurism. See here the publication "Dark Matter: A Century of Speculative Fiction from the African Diaspora" (Thomas, 2000) which was the first to recognize the rich tradition of SF by authors of color.

3- Examples here are Writers Guides for Roddenberry's *Star Trek TNG*, Abrams' & Damon's *Lost* or Moore's *Battlestar Galactica*. The most famous example of a Story Bible is Tolkien's *Silmarillion* about the fictional world *Arda*, the world in which Middle-earth appears. It does not only contain a list of names, listing 788 entries for characters, places, titles and terms used in the book but also serves as the backstory for Tolkien's other works *Lord of the Rings* and *The Hobbit* (cf. Wolf, 2012, p. 50).

4- For the glossary we used the website worldanvil: https://www.worldanvil.com/w/what-desert-smells-like-tomkolombe

The publication "What Desert smells like" (Kolombe & Mehnert, 2019) is available on request.

- List of Abbreviations

CFS: Critical Futures Studies
NEST: New and Emerging Science and Technology
SF: Speculative Fiction
STS: Science and Technology Studies
TA: Technology Assessment

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