

# (Techno-)Utopias and the Question of Natural Boundaries

Georg Jochum

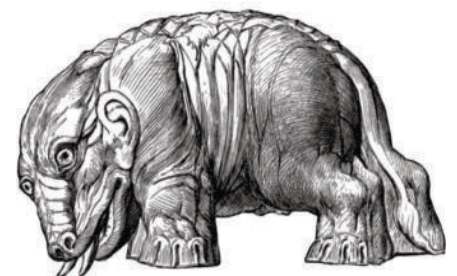
## Abstract

Two key issues are currently dominating the discourse on the future: On the one hand, technological and especially digital transformation, on the other hand the socioecological transformation towards sustainable development, which takes into account ecological boundaries. Both topics are becoming increasingly linked, but there is no consensus on the direction of the upcoming socio-eco-technological transformation.

As stated in the article, the controversies and the different concepts are influenced by the utopian traditions of modernity. In particular, the technical utopia 'Nova Atlantis' by Bacon, and the paradigmatic social utopia 'Utopia' by More are crucial. The hegemonic technology-oriented sustainability concepts are in the tradition of Bacon. Since they continue modern expansionism, they are inadequate to solve the ecological crisis. Approaches in the tradition of social utopia may be more likely to solve the crisis, as they include more comprehensive socio-eco-technical imaginaries of a sustainable future.

**Keywords:** Sociotechnical Imaginaries, Utopias, Planetary Boundaries, Sustainable Development

**Georg Jochum** studied Sociology, Philosophy and Psychology at the Ludwig-Maximilians-University of Munich. Since 2011 research fellow at the chair for sociology of science, Technical University Munich. The interaction between the social-ecological transformation of the world of work and the digitization of work is at the centre of his current research. **E-Mail:** [g.jochum@tum.de](mailto:g.jochum@tum.de)



## 1. Introduction

Currently, two central themes can be identified in the public and political discourses about the future: On the one hand, discussions about the opportunities and risks of new technologies and, in particular, the social consequences of digital technologies. On the other hand, debates about the ecological crisis and the idea of a transformation towards a sustainable society. Technological developments are now widely discussed in the social sciences and, among other things, the concept of “sociotechnical imaginaries” (Jasanoff/Kim 2015, 9) is used to examine the importance of technological visions for politically controlled innovation processes.

With regard to ecological transformation, the concept of sustainable development has long been at the centre of the debate on the significance of “Leitbilder” (guiding principles; Giesel 2007, 69). In addition, research on utopias, which has long focused on *political* utopias (Saage 2006), is beginning a discussion on the relation between utopias and sustainability (Harlow et al. 2013; Wendt 2018). However, so far there has been a lack of reflection on the interaction between technological and ecological visions of the future. This is astonishing, as the two strands are currently increasingly being combined in strategies. A significant example is the programme of the new EU Commission, whose “European Green Deal” (European Commission 2019) closely links digital innovations and the transition to sustainability. We can therefore speak of a growing importance of *socio-eco-technical imaginaries*.

This connection between *techno-futures* and *eco-futures* should not only in view of the current development become the subject of social science analysis, an inseparable nexus can also be found in the historical origins of the projects of modernity. They have always been driven by utopias, which had already included imaginations of technically mediated social relations to nature. Especially Francis Bacon announced in his utopia “Nova Atlantis” (1969; first 1627) an “enlarging of the bounds of Human Empire” (Bacon 1969, 398) through the technical mastery of nature. The spiritual ancestor of the modern industrial society calls, under the maxim “plus ultra (further beyond)” (Bacon 1987, 48), for an orientation of human knowledge toward technology with the aim of expanding technical power. He thus represents the beginning of the “TechnoScientific Utopias of Modernity” (Yar 2014). And the ecological crisis and thus the current unsustainability of development was also partly caused by this utopia of techno-scientific domination of nature.

However, these origins of modern futuring are largely unconsidered in current analyses. For example, in their discussion of “sociotechnical imaginaries” Jasanoff and Kim go only back to the writings of Machiavelli (2015, 9), the utopia “Nova Atlantis” remains unmentioned. In general, it can be stated that in the analysis of the “Dreamscapes of Modernity” (ibid.) is given too little consideration to the meaning of the “utopian imagination” (Bloch 1995a, 195), i.e. the influence of social and technological utopias on the constitution of the project of modernity. This disregarding is problematic, both if you want to understand current technological visions, as well as sustainability-related imaginations, because they are also inspired by the utopian traditions of modernity: „Sustainable development(s) [...] origins wind their way back through [...] the modernism founded on Bacon and Descartes [...] and classical utopias such as Republic and New Atlantis, which expressed

themes of social justice, environmental stewardship and economic growth.” (Harlow et al. 2013, 1)

The intention of this article is to reconstruct these utopian traditions in order a) to enable a better understanding of the roots of the current social-ecological crisis and b) to show how utopias shape current discourses on social, technological and ecological futures.

This applies in particular to the way natural boundaries are dealt with, i.e. how natural constraints and borders and ecological thresholds are perceived and processed, whether they are viewed as expandable frontiers and borderlines, that can be crossed, or as non-negotiable limits. Currently the development of digital technologies has contributed to imaginations of technological futures that promise a new level of transgression of natural boundaries. At the same time according to the idea of sustainable development, a socio-ecological transformation is required towards a society that takes ecological “planetary boundaries” (Rockström et al. 2009a) into account. In eco-centric concepts of sustainability, exceeding these boundaries is seen as risky and associated with catastrophic consequences. Some of the profound conflicts concerning the discussion about the right path of the socio-ecological-technological transformation towards sustainable techno-futures are induced as a result of this different ideas of how to deal with natural boundaries.

In the following, the historical origins of the various utopian traditions and the associated attitudes towards boundaries are presented first. Afterwards, I will analyse concepts of sociotechnical futures which are in continuity with Bacon’s technical utopia. As will be argued below, these concepts are incapable of coping with the ecological crisis because they do not challenge the modern techno-scientific expansionism. Hence, it is necessary to develop socio-eco-technical imaginaries that additionally incorporate the alternative traditions of utopias – especially the social utopia of Thomas More – and which involve a turning away from the idea of expansion of domination over nature and the growth orientation of modernity.

## **2. From the limiting ‘Non Plus Ultra’ to the expansive ‘Plus Ultra’**

The expansionism of western civilization as well as the utopian imaginations have their central origin in the early modern period and are a consequence of the lifting of restrictions on space, which were considered to be unsurpassable in antiquity and the Middle Ages.

This transition from a limited world to a spatially and temporally open world will be illustrated in the following by the change in meaning of a symbol that was previously well known, the so-called Pillars of Hercules, the opening of which also stimulated the invention of spatio-temporal utopias.

The striking peaks of the Rock of Gibraltar (Latin: Calpe) on the European side and Mount Jebel Musa (Latin: Mons Abila) on the African side near the Strait of Gibraltar marked in ancient times the transition between the navigable Mediterranean Sea and the vast Atlantic Ocean. They had been seen as “Pillars of Hercules, which that hero and God [Hercules] set up as far-famed witnesses of the furthest limit of voyaging” (Pindar 1930, lines 3.19-22). Located at the westernmost end of the ancient world, these pillars were the

central symbol for the spatial boundaries of the world of humanity and a warning against the hubris of man (see Jochum 2017, 57 f.). The humans were bound to the island of the earth – the foray into the surrounding ocean was forbidden. Also in the Middle Ages, Dante (1265-1321) wrote in his *Divine Comedy* about the “strait pass, where Hercules ordained the boundaries not to be overstepped by man” (original: *più oltre non se metta*) (Dante 1998, C. 26; lines 106-108). In defiance of this command, Dante’s curious Odysseus ventures beyond this threshold. However, for his sinful curiosity he has been punished with the sinking of his ship and is condemned to Dante’s hell. For Dante, as for all medieval people, the pillars represented a clear boundary. Therefore, on many medieval maps, the pillars are depicted as a symbol of the limitation of the navigable realm and as the western end of the world.

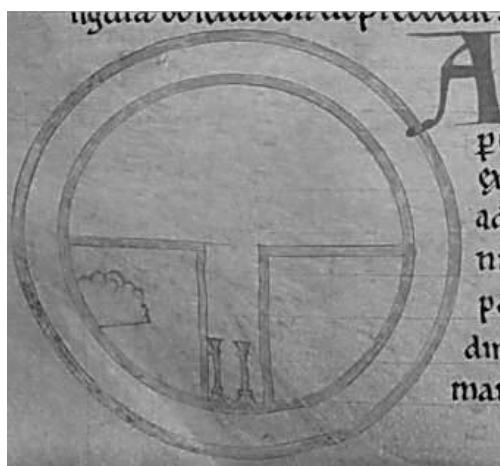


Figure 1: World map of 12th century with the limiting pillars of Heracles at the western end of the world (MS Digby MS 83, f. 15v)

The realization of Columbus’ journey and the subsequent voyages of other navigators of the early modern times, however, made clear that this demarcation is obsolete. The border crossing did not lead to sunken ships but to the Americas and other alleged *New Worlds*. As a result of this process, the meaning of the pillars of Heracles was reversed: They were no longer associated with a fearful *Non Plus Ultra*, but with a heroic *Plus Ultra*. The Emperor Charles V., ruler of the Holy Roman Empire of the German Nation and Spain, chose this *Plus Ultra* as his slogan. His motto, which is still included in the coat of arms of Spain, can be regarded as “the authoritative European word of modern times” (Sloterdijk 2010, 7). The motto not only referred to the expansion of imperial power and knowledge, but also promised further border crossings and new discoveries: “The pillars now stood not on the boundaries of the known, but at the entrance to the still-to-be-known.” (Pagden 2002, 269)

The opening of the western border also led to the emergence of utopian imaginations in the sense of a “plus ultra that utopian consciousness lives” (Bloch 1971, 132). This shows the work *Utopia* (1516[1995]) by Thomas More, which marks the beginning of the utopian discourse of modernity. Here the English humanist designs a society, located on an imaginary island near the *New World*, which is freed from social ills. More was inspired by the reports of Amerigo Vespucci about his four American journeys, in which the way of life of the indigene tribe of the Tupi is described as a return to the

golden age: “They have no personal possessions, but everything belongs to the community [omnia communia sunt]. [...] They live according to nature [Vivunt secundum naturam].” (Vespucci 2014, 117; Latin insert of the author)

In the work of More, the navigator Hythlodæus, who allegedly accompanied Vespucci to Brazil, tells about Utopia: The idea that everything was held in common (omnia communia sunt) applied to the tribal communism of the Tupis. As this was as well a central component of Plato’s politeia (Plato 2000, 464b), Hythlodæus (respectively More) unites the vision of the ancient philosopher with the accounts of the newly discovered world:

What if I were to tell them about the scheme that Plato imagines in his republic, or that which the Utopians actually practise in theirs? However superior these may be (and without question they are), they would still seem outlandish here because the rule is private ownership of property, while there all things are held in common. (More 1995, 50)

Thereby Morus created the paradigmatic social utopia of modernity. A hundred years later, Francis Bacon wrote the central competing vision of a socio-technical utopia. The English scientist adopted in his work the symbolism of successful border crossing but transformed its meaning. The Pillars of Heracles are shown on the Spanish navigation manual “Regimiento de navegación” (1606) by Garcia de Céspedes. The motto “Hispanum Imperium clausit utroque polo” (The Spanish Empire ranges from pole to pole) makes clear that the nautical knowledge was also associated with a claim on the part of the Spanish empire to power over the entire globe (see Figure 2). This became the model for the title page of the “Novum Organum” (Bacon 1620), but now with a changed and expanded meaning, since it was associated with the expansion of the technoscientific ‘imperial’ power of mankind over nature.



Figure 2: Frontispiece of the “Regimiento de Navegación” of Garcia de Céspedes (1606)

Figure 3: Frontispiece of the “Novum Organon” by Francis Bacon (1620)



For Bacon, crossing the Heraclian frontier and opening up the globe became a paradigm for scientific and technological progress:

And therefore these times may justly bear in their word [...] plus ultra in precedence of the ancient non ultra [...] in respect of the many memorable voyages [...] about the globe of the earth. And this proficiencie in navigation and discoveries may plant also an expectation of the further proficiencie and augmentation of all sciences. (Bacon 1987, 48)

The plus-ultra-symbolism can be considered as constitutive for the self-understanding of modern occidental culture: “The modern age’s initial passage beyond the Pillars of Hercules. [...] The beginning of the modern age turned out to be a repeatable, or at least an imitable, paradigm.” (Blumenberg 1985, 440) With the motto *Plus Ultra*, border crossing, progress, modernization and innovation become a duty for modern man (see Jochum 2017).

This New World beyond the Pillars of Hercules was concretized by Bacon in the Utopia “Nova Atlantis” (Bacon 1969; first 1627). For Bacon, the central goal of crossing the old boundaries of knowledge was the expansion of power over nature. “The End of our Foundation is the knowledge of Causes, and secret motions of things; and the enlarging of the bounds of Human Empire, to the effecting of all things possible.” (Bacon 1969, 398) It can be assumed that “Bacon might have had the Spanish empire in mind when he wrote his New Atlantis” (Cañizares-Esguerra 2006, 19). The project of the expansion of the Spanish Empire was replaced by the *vision of expanding the Human Empire* by the expansion of technoscientific power over nature. Bacon writes in the *Novum Organon*: “Human knowledge and human power meet in one; for where the cause is not known the effect cannot be produced. Nature to be commanded must be obeyed; and that which in contemplation is as the cause is in operation as the rule.” (Bacon 1863, 67)

Francis Bacon is the ancestor of current technosciences (Kastenhofer/Schmidt 2011, 134). Bacon’s writings can be considered as the central socio-technical imaginary of modernity.<sup>[1]</sup> It can also be added that the dark side of the modern world and, in particular, the ecological crisis have their origins here as well: “Bacon well understood the scientific temper which was to come after him. [...] Knowledge, which is power, knows no limits, either in its enslavement of creation or in its deference to worldly masters.” (Horkheimer/Adorno 2002, 2)

Bacon’s books and imaginations became influential in England and throughout the western world. He was clearly venerated by the members of the London Royal Society, founded in 1660, as their spiritual ancestor. Against critics, the Baconian Project was defended by Joseph Glanvill (1636-1680), a member of the Royal Society, in the book *Plus Ultra – or the Progress and advancement of knowledge since the days of Aristotle* (1668). The combination of the slogan Plus Ultra with the concept of progress in the title of the book shows, that the motto was no longer only associated with a spatial border-crossing, but explicitly with an opening of time in the sense of a belief in techno-scientific progress.

[1] Descartes is of course to be mentioned as the second ancestor of the techno-scientific programme. With his demand to make people “masters and possessors of nature” (Descartes 1980, 78) by researching the laws of nature, he ties in with the Baconian project and supplements it with methodological and philosophical reflections: “Bacon explored the social and political implications in more detail, but Descartes founded the epistemology and metaphysics of what has come to be known as the modern project.” (Rich 1994, 205).

Especially in the USA, the Baconian utopia was very powerful. Bacon was involved in the process of Anglo-Saxon colonization of the New World from the beginning. He wrote his *Nova Atlantis* also to develop a vision for the future of the English colonies (Jowitt 2002, 131). Moreover, he provided an ideology that legitimized the colonization itself. European civilization, by virtue of its ability to acquire the techno-scientific control of nature, here seems to be superior to the inferior Native American: “Only consider what a difference there is between the life of men in the most civilized province of Europe, and in the wildest and most barbarous districts of the New India [...] And this difference comes [...] from arts.” (Bacon 1860, 114) Technoscientific knowledge thus became a central reference point for the construction of a “colonial difference” (Mignolo 2002).

The first settlers often had *Nova Atlantis* in her kit in addition to the Bible. One founding father of the USA, Benjamin Franklin, was inspired by the English thinker in his ideas concerning the American future: “Franklin was keenly aware of the much broader horizon of modernity within which he depicted his American experience. In particular, he was aware of that horizon as defined by its architect, Bacon: the scientific and technological conquest of nature.” (Weinberger 2005, 255)

In the United States, the idea of the “Manifest Destiny” of the USA and a “Myth of the Frontier” (Slotkin 1992), respectively a “Myth of the West” (Schulte Nordholt 1995) emerged from the combination of the Christian-Puritan religion, Baconian plus-ultra utopia, and the settlers’ “frontiers experience” (Turner 1962, 205). These myths repeatedly legitimized the colonization of new spaces and natures: The borders of the Western Human Empire are to be expanded by the technoscientific mastering of nature.

### **3. Green futures: Between respecting and transgressing boundaries**

Especially the conquest of outer space was legitimized again and again with reference to the myth of the west. For example, the National Commission on Space wrote in the report “Pioneering the Space Frontier”:

Five centuries after Columbus opened access to ‘The New World’ we can initiate the settlement of worlds beyond our planet of birth. The promise of virgin lands and the opportunity to live in freedom brought our ancestors to the shores of North America. Now space technology has freed humankind to move outward from Earth as a species destined to expand to other worlds. (quoted after McCurdy 2011, 157)

The plus-ultra project of Power Expansion is expanding beyond Earth’s borders. At the same time, these journeys into space had a paradoxical consequence: The vulnerability and uniqueness of planet Earth became clear, as US President Carter pointed out: “We saw our own world as a single delicate globe of swirling blue and white, green, brown. [...] It is very beautiful, but it is also very fragile. And it is the special responsibility of the human race to preserve it.” (quoted after *ibid.*, 302) This new view of the earth had a decis-

ive influence on the establishment of an ecological awareness. The image of the earth made by the Apollo 17 moon mission became an “icon of our time” (ibid., 300). The ‘success’ of the report “The Limits to Growth” (Meadows et al. 1972) would have been unthinkable without this visualization of the Earth. This perception of ecological boundaries also led to the call for a transition to sustainable development.

The thesis of limits of growth has been relativized by many. However, in recent years the concept of the *Planetary Boundaries* (Rockström et al. 2009a) has emerged, which has contributed to a renewal of the debate about limits to growth. These planetary boundaries are similar to the medieval maps with their message of a Non Plus Ultra (see Figure 1). The article Planetary Boundaries states: “Transgressing one or more planetary boundaries may be deleterious or even catastrophic due to the risk of crossing thresholds that will trigger non-linear, abrupt environmental change within continental to planetary-scale systems.” (ibid., 32)

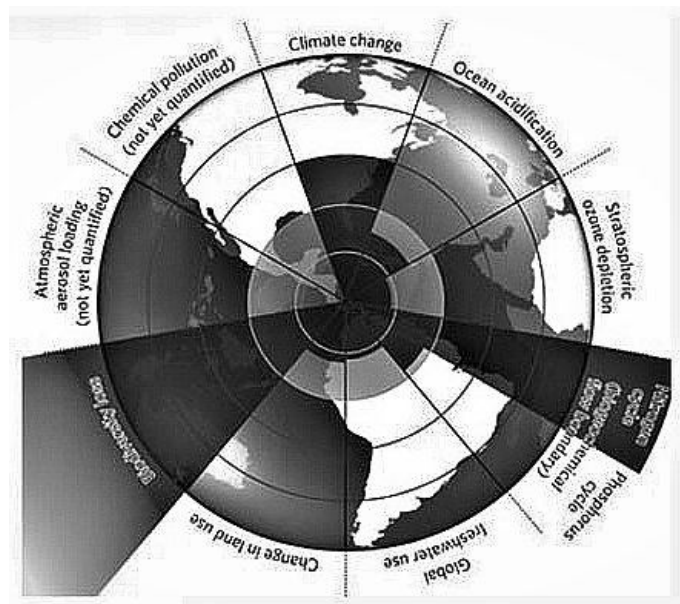


Figure 4: Representation of the “Planetary Boundaries” (Rockström et al. 2009b, 472)

A fundamental paradigm shift seems to be taking place: The departure from Bacon’s socio-technical imagination of an endless expansion of the Human Empire has begun. The development of a green, sustainable future that accepts the limits of human power has now become the task. Latour interprets in “Facing Gaia” (2017) the new situation under the conditions of climate change:

While humans of the modern species could be defined as those who always emancipated themselves from the constraints of the past, who were always trying to pass through the impassable Pillars of Hercules, conversely, the Earthbound have to explore the question of their limits. Whereas the Humans had ‘Plus ultra’ as their motto, the Earthbound have no motto but ‘Plus Intra’. (ibid., 290)



The climate agreement from November 2015 and the related formulation of the target “to limit the temperature increase to 1.5°C above pre-industrial levels” (UN 2015, 2) is an indication of the crossing of an epochal threshold. The plus-ultra project of the expansion of the Human Empire has encountered ecological limits and seems to be coming to an end.

However, a realistic look makes clear that this simple thesis must be relativized. Many, e.g. US President Donald Trump, are denying the relevance of climate change and environmental issues in general. Trump announced, furthermore, in his *NASA space policy directive*, with reference to the old plus-ultra myths, a new expansionism:

After braving the vast unknown and discovering the new world, our forefathers did not only merely sail home [...]. They stayed, they explored, they built, they guided, and through that pioneering spirit, they imagined all of the possibilities that few dared to dream. Today, the same spirit beckons us to begin new journeys of exploration and discovery. (Trump 2017)

In this way, he still promotes the project of the expansion of the Human Empire. This attitude is not an exception, but rather part of a renaissance of an expansive techno-utopism in the USA in recent years. In particular, the prophets of technological posthumanism promise a world without borders and a liberation from all natural, and especially biological, bonds. This is, for example, recognizable in Ray Kurzweil’s work “The Singularity is Near” (2005). An overcoming of all natural limits is promised: The basis is an “exponential growth of the capacity of information technology” (ibid., 9) that will lead to singularity and “a world that is still human but that transcends our biological roots” (ibid.).

#### 4. The ecological modernization of the Human Empire

This optimism implies that the ecological crisis is not linked to a fundamental revision of the progress project. All apparent natural limits and the ecological crises seem to be surmountable by technological innovations. In this sense Kurzweil promised the solution of all energy problems due to the improved efficiency of solar technologies (Solar Power World 2016). The new posthumanist and postbiologist utopias are an essential element of the “Californian Ideology” (Barbrook/Cameron 1996) and they are also influencing the activities of IT companies in Silicon Valley like Google.[2] Common opinion among these companies is that the ecological crisis, engendered by technological culture, can ultimately be solved by new technological innovations, especially by digital technologies.

The influence of the Californian ideology is also evident in the concepts Elon Musk promotes.[3] With his company Tesla he promises to contribute to a fundamental change in energy usage. Solar energy and electromobility are central elements of his “plan to save the world” (Forbes 2015). On this basis, the warning about limits *to growth* can be answered with the message of *green growth*. The current hype regarding the transition to electromobil-

[2] It is therefore not surprising that Kurzweil was hired by Google as a director in 2012, primarily to work on the development of AI (Cadwalladr 2014).

[3] It should be noted that, unlike the posthumanists, Musk takes a more sceptical stance towards artificial intelligence. He is member and one of the main sponsors of the “Future of Life Institute”, which discusses also the social risks of AI (Future of life institute 2015).

ity makes clear that this technology-centred solution for the climate crisis is becoming a key socio-technical imagination.

By linking cyberutopism with technology-centred sustainability concepts, ‘smart technologies’ have become established in recent years as the central vision of the hegemonic sustainability discourse. In Germany, as well, the technology utopia of a “Smartopia” (Politische Ökologie 2018) is becoming increasingly impactful. The changes currently being discussed under the term “Industry 4.0” are interpreted as an opportunity for the transformation of sustainability as a whole. The Federal Ministry of Economics, for example, argues: “Digitalisation [...] will make the German economy more sustainable, as it makes a significant contribution to resource conservation and energy efficiency.” (BMWi 2015, 5)

Also, the new EU Commission’s agenda for a “European Green Deal” (European Commission 2019) relies largely on technical innovations. For the “transition to climate neutrality”, a “deployment of innovative technologies and infrastructure, such as smart grids, hydrogen networks or carbon capture, storage and utilization” is considered necessary (ibid., 6). The programme is quite ambitious, but the vision for the future remains within the framework of a technical-progress project and green economic growth, while more fundamental changes in social structures are not considered necessary. In general, it can be stated that we are not witnessing an “end of the Baconian age” (Böhme 1993), but rather its green reconfiguration and an ecological modernization of the Human Empire: The dominating sociotechnical imaginaries of the present promise to solve the problem of sustainability through further technical innovations, growth, and a Green New Deal. Although an exit from fossil fuel use is being sought, a departure from the dynamics of growth and the acceleration of fossil modernity is nevertheless not taking place. Problems related to the digital revolution, e.g. the need for raw materials, which are often mined under ecologically and socially problematic conditions, are mostly being ignored. Likewise, rebound effects associated with capitalist growth dynamic are also being disregarded.

It can be critically questioned whether these technical solutions are sufficient to overcome the ecological crisis, given that they continue the expansive dynamics of modernity. They problematize neither the imperial-colonial logic of modernity (see Mignolo 2002; Quijano 2000; Spivak 1988) nor the capitalistic logic of economic growth nor the technoscientific coloniality of the Baconian project – rather they radicalize the three aspects of the plus-ultra programme of modernity. The negative dialectic of modern mastery of nature, which has been described by Critical Theory (Horkheimer/Adorno, 2002), has reached a new level. As representatives of the idea of the post-growth society rightly argue, in view of the ecological planetary boundary, it is necessary to turn away from the logics of growth that characterize modernity (D’Alisa et al. 2014). A real transition to a sustainable future must therefore go hand in hand with a departure from the expansive plus-ultra motto and with this, too, a departure from the dogma of the extension of power over nature.

## 5. New socio-ecological imaginaries

This requires socio-technical imaginaries that are fundamentally different from hegemonic imaginations – and an understanding of the origins of the utopias and imaginations of modernity can be helpful in furthering their development. As has been mentioned in this article, the ecological crisis has an essential historical origin in the socio-technical utopia of Bacon, which was linked to the promise of growing material welfare. The natural limits of this promise of increasing private prosperity are currently becoming apparent. Therefore, it is time to reflect on the older utopia of More, which can be regarded as a socio-technical imagination of its own: an improvement of human life is conjured up by a social technology that overcomes the capitalist egoism and allows for a society in which everything is owned commonly and the goods are shared.

Faced with the current socio-ecological crisis, social utopias in the tradition of More are regaining importance. This crisis shows the destructive consequences of a capitalist, growth-oriented economy. We are not experiencing a “Tragedy of the Commons” (Hardin 1968) but rather a “Tragedy of the Commodity” (Longo et al. 2015). Against this background, new visions of “commoning” are being discussed, especially in the post-growth discourse, as ways of a socio-ecological transformation (Helfrich/Bollier 2014). De Angelis describes in “Omnia Sunt Communia” (2017) a “Transformation to Postcapitalism” by strengthening the Commons.

Also, from a feminist perspective, the focus of the capitalist market economy on so-called productive wage labour and the associated devaluing of the productivity of nature and care work – often performed by women – is criticized.<sup>[4]</sup> Visions are designed for a “community economy” (Gibson-Graham 2006) or a “precautionary economy”, in which the category of “(re)productivity” (Biesecker/Hofmeister 2010) is at the centre and in which non-commodified activities are upgraded.

As was the case for the Utopia of More, non-European societies are serving as the inspiration for the development of community-oriented social forms. In recent years, the idea of “Buen Vivir [as] Creating a Utopia” (Acosta 2009), which is based on the indigenous life models of Suma Kawsay (Quechua) or Suma Qamaña (Aymara), is gaining importance in Latin America and is also being received in Europe. Unlike the individualistic idea of the good life in occidental culture, the vision of the “Buenos Convivires (modes of good coexistence)” (see Acosta/Brand 2018, 122) includes at its core good coexistence with nature. In contrast to the techno-and anthropocentric thinking of the West, the concept is based on bio-centric thinking. Based on this reference to life, another form of technical imagination becomes relevant, as it is related to the concept of “convivial technology” (Illich 1973; Vetter 2018). The goal is not the further expansion of power over nature, but techniques for an ecological degrowth society that will allow for a “co-productivity” (Vetter 2018, 1782) with nature: “The ideal of convivial technologies is clear an ecological cycle.” (ibid.) The aim is the embedding of technology in nature. The convivial technologies are intended to support the transition to a degrowth society and are therefore also conceptualized as “degrowth technologies” which are characterized by the dimensions “relatedness, adaptability, accessibility, bio-interaction and appropriateness” (ibid., 1779).

[4] The colonial expansion of the Occident, the project of modern technoscientific control of nature and the devaluation and subordinate appropriation of the unpaid work of women can be seen as a coherent process (see Mies et al. 1988).

## 6. Final considerations

As outlined in the article, the majority of concepts for sustainable futures are in the tradition of Baconian technoscientific utopia. It has been argued that these concepts are incapable of coping with the ecological crisis because they do not challenge the capitalist and technoscientific expansionism. More transformative potential for a transition to sustainability can be found in the utopias of a degrowth society and an orientation towards the commons. Nevertheless, it should be added that such a dichotomization between hegemonic techno-centric concepts and socio-ecological alternatives is simplified because there are also concepts in between. Furthermore, one can ask to what extent the recourse to social models related to small communities and with premodern structures, such as the *Buen Vivir*, or to the ecological-movement visions of the 1970s, are sufficient for future drafts for the 21st century. These socio-ecological visions are associated with the risk of the romanticisation of pre-industrial societies. The emancipatory achievements that also were connected with modernity are neglected.

A technological modernization of these utopias seems therefore to be necessary. Digital technologies could be the basis for this if their use is not restricted to increasing resource efficiency and smart forms of production, as in the sustainability visions outlined above. Digital technologies are basically cybernetic control technologies (Jochum/Schaupp 2019) and the development of these “steering forces” (ibid., 331) thus makes new forms of regulation of society and natural relations beyond the market economy possible. Already today, successful examples of ‘digital commons’, ‘commons-based peer production’ and ‘platform cooperativism’ can be identified (Scholz 2016). Social utopias in the tradition of More and technical utopias in the tradition of Baconian thought do not necessarily have to be regarded as incompatible opposites. A synthesis can be seen in Srnicek’s and Williams’ post-capitalist, left-Baconian utopia “Inventing the Future” (2015). However, they pay too little attention to natural and ecological limits.

What is needed today is therefore the development of imaginaries which affirm the development of technical productive forces and at the same time take natural boundaries, necessities, and productivities into account. An orientation for this futuring can be the utopia of the “technology of alliance”, which Bloch describes with these words:

The more a technology of alliance in particular were to become possible [...] mediated with the coproductivity of nature, the more certainly the creative forces of a frozen nature will be released again. Nature is no bygone, but the building site which has not yet been cleared at all, the building material which does not yet adequately exist at all for the human house which does not yet adequately exist at all. The ability of the problematic natural subject to help to create this house is in fact the objective utopian correlate of the humane utopian imagination, a concrete imagination. (1995b, 690)

The climate crisis and the drastic decline of biodiversity show clearly that the (co-)productivity of nature is fundamentally endangered. Only socio-eco-

technological imaginaries, which consider the preservation of this productivity, can point a way to a sustainable future.

The basis of this utopia is an “ecological materialism” which “understands that the dialectic of productive forces and production relations is surrounded and supported by an elementary dialectic of earth and man” (Schmidt 1993, XII). These considerations may sound abstract and seem to have little to do with concrete political actions. Today, however, ecological crises such as climate change and the mass extinction of species are being more acutely perceived and discussed in public. Movements such as Fridays for Future and Extinction Rebellion are also calling for more far-reaching political action. The development of apparently unrealistic socio-eco-technological imaginations is therefore today becoming an act of “Envisioning Real Utopias” (Wright 2010) in a twofold sense: In view of the development of the productive forces as well as the growing ecological awareness in the public, they are realizable – and they are perhaps the only realistic perspective on how the unsustainable, destructive tendencies of the current capitalist, expansionist society can be stopped and thereby the survival of humanity can be guaranteed.

## References

- Acosta, A. (2009) Das BuenVivir. Die Schaffung einer Utopie. In: *Juridikum* 2009 (4): 209-213.
- Acosta, A.; Brand, U. (2018) *Radikale Alternativen. Warum man den Kapitalismus nur mit vereinten Kräften überwinden kann*. München: oekom Verlag.
- D’Alisa, G.; Demaria, F.; Kallis, G. (eds.) (2014) *Degrowth. A vocabular for a new era*. London: Routledge.
- Bacon, F. (1863) *Novum Organum, Part I, Aphorism III*. Boston: Taggard & Thompson.
- Bacon, F. (1969) New Atlantis. In: *Works of Francis Bacon Volume 5*. Boston: Brown and Taggard.
- Bacon, F. (1987) *Of the advancement and proficience of learning*. Alburgh: Archival Facs. Ltd.
- Barbrook, R.; Cameron, A. (1996) The Californian Ideology. In: *Science as Culture* 6 (1): 44-72.
- Biesecker, A.; Hofmeister, S. (2010) Focus: (Re)Productivity. Sustainable relations both between society and nature and between the genders. in: *Eco-logical Economics*, 69 (8): 1703-1711.
- Bloch, E. (1971) *Tübinger Einleitung in die Philosophie I*. Frankfurt am Main: Suhrkamp.
- Bloch, E. (1995a) *The principle of hope. Vol. 1*. Cambridge, Massachusetts: MIT Press.
- Bloch, E. (1995b) *The principle of hope. Vol. 2*. Cambridge, Massachusetts: MIT Press.
- Blumenberg, H. (1985) *The Legitimacy of the Modern Age*. Massachusetts: MIT Press.



- BMWi (Bundesministerium für Wirtschaft und Energie) (2015) *Industrie 4.0 und Digitale Wirtschaft Impulse für Wachstum, Beschäftigung und Innovation*. Berlin: BMWi.
- Böhme, G. (1993) *Am Ende des Baconschen Zeitalters. Studien zur Wissenschaftsentwicklung*. Frankfurt am Main: Suhrkamp.
- Cadwalladr, C. (2014) Are the robots about to rise? Google's new director of engineering thinks so... . <https://www.theguardian.com/technology/2014/feb/22/robots-google-ray-kurzweil-terminator-singularity-artificial-intelligence> (22/3/2020).
- Cañizares -Esguerra, J. (2006) *Nature, empire, and nation. Explorations of the history of science in the Iberian world*. Stanford, Calif: Stanford University Press.
- Dante, A. (1998) *Divine Comedy. The Inferno*. Hertfordshire: Wordsworth Edition.
- Digby Ms 83 (12th century) *Digby Ms 83 (S.C. 1684) Hyginus, Recensio interpolata*. Oxford: Bodleian Library. <https://www.thesaxlproject.com/assets/Uploads/Hyginus-Oxford-Digby-83-pics-on-page.pdf> (20/3/2020).
- De Angelis, M. (2017) *Omnia Sunt Communia: On the Commons and the Transformation to Postcapitalism*. London: ZET Books.
- Descartes, René (1980) *Discourse on Method*. Indianapolis: Hackett.
- European Commission (2019) *The European Green Deal*. Brussel. [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf) (15/1/2020).
- Forbes (2015) *Elon Musk Has A Plan to Save The World*. <https://www.forbes.com/sites/ericmack/%202015/12/15/elon-musk-has-a-plan-to-save-the-world/> (23/9/2019).
- Future of life institute (2015) *An Open Letter - Research Priorities for Robust and Beneficial Artificial Intelligence*. <https://futureoflife.org/ai-open-letter/> (15/1/2020).
- Glanvill, J. (1668) *Plus ultra: or, The progress and advancement of knowledge since the days of Aristotle*. London: James Collins.
- Gibson-Graham, J. K. (2006) *A Postcapitalist Politics*. Minneapolis: University of Minnesota Press.
- Giesel, K. D. (2007) *Leitbilder in den Sozialwissenschaften. Begriffe, Theorien und Forschungskonzepte*. Wiesbaden: VS Verlag.
- Hardin, G. (1968) The Tragedy of the Commons. In: *Science* 162 (3859): 1243-1248.
- Harlow, J.; Golub, A.; Allenby, B. (2013) A Review of Utopian Themes in Sustainable Development Discourse. In: *Sustainable Development* 21 (4): 270-280.
- Helfrich, S.; Bollier, D. (2014) Commons. In: D'Alisa, G.; Demaria, F.; Kallis, G. (eds.) *Degrowth. A vocabulary for a new era*. London: Routledge.
- Horkheimer, M.; Adorno, T.W. (2002) *Dialectic of Enlightenment*. Stanford, Calif: Stanford University Press.
- Illich, I. (1973) *Tools for Conviviality*. London: Calder & Boyars.
- Jasanoff, S.; Kim, S. H. (2015) *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago; London: University of Chicago Press.
- Jochum, G. (2017) *Plus Ultra oder die Erfindung der Moderne. Zur Entgrenzung der okzidentalen Welt*. Bielefeld: Transcript.
- Jochum, G.; Schaupp, S. (2019) Die Steuerungswende. Zur Möglichkeit einer demokratischen digitalen Wirtschaftsplanung. In: Butollo, F.; Nuss, S. (eds.) *Marx und die Roboter. Vernetzte Produktion, Künstliche Intelligenz und lebendige Arbeit*. Berlin: Dietz.

- Jowitt, C. (2002) Books will speak plain? Colonialism, Jewishness and politics in Bacon's New Atlantis. In: Bronwen, P. (ed.), *Francis Bacon's "New Atlantis". New interdisciplinary essays*. Manchester: Manchester University Press.
- Kastenhofer, K.; Schmidt, J. C. (2011) Technoscienza est Potentia? In: *Poiesis Prax* 8 (2-3): 125-149.
- Kurzweil, R. (2005) *The singularity is near. When humans transcend biology*. New York: Viking.
- Latour, Bruno (2017) *Facing Gaia: Eight Lectures on the New Climatic Regime*. New Jersey: John Wiley & Sons.
- Longo, S.; Clausen, R. Clark, B. (2015) *The Tragedy of the Commodity: Oceans, Fisheries and Aquaculture*. New Brunswick: Rutgers University Press.
- Meadows, D. L.; Meadows, D.; Randers J.; Behrens, W. (eds.) (1972) *The Limits to Growth*. New York: Universe Books.
- McCurdy, H. E. (2011) *Space and the American Imagination*. Baltimore: Johns Hopkins University Press.
- Mies, M.; Bennholdt-Thomsen, V.; von Werlhof, C. (1988) *Women: The Last Colony*. London: Zed Books.
- Mignolo, W. D. (2002) The Geopolitics of Knowledge and the Colonial Difference. *South Atlantic Quarterly* 101 (1): 57–96.
- More, T. (1995) *Utopia: Latin Text and English Translation*. Cambridge: Cambridge UP.
- Pagden, A. (2002) Plus Ultra: America and the Changing European Notions of Time and Space. In: Marino, J.A. (ed.) *Early modern history and the social sciences. Testing the limits of Braudel's Mediterranean*. Kirkville: Truman State University Press.
- Pindar (1930) *Pindar's Odes of victory : the Nemean and Isthmia*. Oxford: Basil Blackwel.
- Politische Ökologie (2018) Smartopia – Geht Digitalisierung auch nachhaltig? *Politische Ökologie Band 155*. München: oekom Verlag.
- Quijano, A. (2000) Coloniality of power, eurocentrism, and Latin America. In: *Nepantla: Views from South* 1 (3): 533-580.
- Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F.S.; Lambin, E.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.; Nykvist, B.; De Wit, C.A.; Hughes, T.; van der Leeuw, S.; Rodhe, H.; Sörlin, S.; Snyder, P.K.; Costanza, R.; Svedin, U.; Falkenmark, M.; Karlberg, L.; Corell, R.W.; Fabry, V.J.; Hansen, J.; Walker, B.; Liverman, D.; Richardson, K.; Crutzen, P.; Foley, J. (2009a) Planetary Boundaries: Exploring the Safe Operating Space for Humanity. In: *Ecology and Society* 14 (2): Art 32. <http://www.ecologyandsociety.org/vol14/iss2/art32/>
- Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F.S.; Lambin, E.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.; Nykvist, B.; De Wit, C.A.; Hughes, T.; van der Leeuw, S.; Rodhe, H.; Sörlin, S.; Snyder, P.K.; Costanza, R.; Svedin, U.; Falkenmark, M.; Karlberg, L.; Corell, R.W.; Fabry, V.J.; Hansen, J.; Walker, B.H.; Liverman, D.; Richardson, K.; Crutzen, C.; Foley J.A. (2009b) A safe operating space for humanity. In: *Nature* 461: 472-475.
- Rich, Bruce (1994) *Mortgaging the Earth: World Bank, Environmental Impoverishment and the crisis of development*. London: Earthscan.
- Saage, Richard (2006) Socio-political Utopianism and the Demands of the 21st Century. In: *Spaces of Utopia: An Electronic Journal* 2006 (2): 150-164.
- Schmidt, A. (1993) *Der Begriff der Natur in der Lehre von Marx*. Hamburg: Europäische Verlagsanstalt.

- Scholz, T. (2016) *Platform Cooperativism. Challenging the Corporate Sharing Economy*. New York: Rosa Luxemburg Stiftung.
- Schulte Nordholt, J.W. (1995) *The myth of the West. America as the last empire*. Grand Rapids, Michigan: Eerdmans.
- Sloterdijk, P. (2010) Das Zeug zur Macht. In: Sloterdijk, P; Voelker, S. (eds.) *Der Welt über die Straße helfen*. München: Wilhelm Fink.
- Slotkin, R. (1992) *The Gunfighter Nation: The Myth of the Frontier in Twentieth-Century America*. New York: Atheneum.
- Solar Power World (2016) *Futurist Ray Kurzweil predicts solar industry dominance in 12 years*. <https://www.solarpowerworldonline.com/2016/03/futurist-ray-kurzweil-predicts-solar-industry-dominance-12-> (23/9/2019).
- Spivak, G. C. (1988) *In other worlds. Essays in cultural politics*. New York: Routledge.
- Srnicek, N.; Williams, A. (2015) *Inventing the Future: Postcapitalism and a World Without Work*. London: Verso.
- Trump, D. (2017) *Remarks by president Trump and vice president Pence at signing ceremony for space policy directive*. Washington: Office of the Press Secretary. <https://spacepolicyonline.com/news/text-of-remarks-at-signing-of-trump-space-policy-directive-1-and-list-of-attendees/> (20/3/2020).
- UN (United Nations) (2015) *Adoption of the Paris Agreement*. FCCC/CP/2015/L.9/Rev.1. United Nations.
- Vespucci, A. (2014) *Neue Welt/Mundus Novus. Und die vier Seefahrten*. Wiesbaden: Erdmann.
- Vetter, A. (2018) The Matrix of Convivial Technology – Assessing technologies for degrowth. In: *Journal of Cleaner Production* 197 (2): 1778-1786.
- Weinberger, J. (2005) *Benjamin Franklin unmasked. On the unity of his moral, religious, and political thought*. Lawrence: University Press of Kansas.
- Wendt, B. (2018) *Nachhaltigkeit als Utopie. Zur Zukunft der sozial-ökologischen Bewegung*. Frankfurt/New York: Campus.
- Wright, E. O. (2010) *Envisioning Real Utopias*. London: Verso.
- Yar, M. (2014) *The Cultural Imaginary of the Internet. Virtual Utopias and Dystopias*. Basingstoke: Palgrave Macmillan.