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The Logic of Digital Utopianism

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Abstract With the Internet's integration into mainstream society, online technologies have become a significant economic factor and a central aspect of everyday life. Thus, it is not surprising that news providers and social scientists regularly offer media-induced visions of a nearby future and that these horizons of expectation are continually expanding. This is true not only for the Web as a traditional media technology but also for 3D printing, which has freed modern media utopianism from its stigma of immateriality. Our article explores the fundamental semantic structures and simplification patterns of popular media utopias and unfolds the thesis that their resounding success is based on their instantaneous connectivity and compatibility to societal discourses in a broad variety of cultural, political, or economic contexts. Further, it addresses the social functions of utopian concepts in the digital realm.

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Introduction

In the course of digitalization, technological utopias are having a new heyday, somewhat comparable to the era of the 1960s and 1970s, in which self-assured optimistic planning converged with futuristic imaginaries, a union that ended with a growing awareness of technological risks and contingency following the nuclear disaster at Chernobyl. Hence, newer technological utopias refrain from fixed notions of the future or ambitions of controlling society as a whole and pursue a rhetoric of potentiality—a potentiality already present in current technological designs, possibly to be released in a yet to be arranged future. Such expectations find their genuine expression in visions that treat new technologies as enablers or vehicles for an improvement of human life (e.g., human enhancement, nanobiotechnology). They focus on the transformation of the material environment of human existence or human nature itself. Contrary to traditional social utopias, which wed social criticism and alternative conceptions of society, in the scheme of technological utopianism society exists merely as background noise.

However, the utopian discourse of today can no longer be reduced to a polarity of technologically oblivious *social utopias* versus socially oblivious *technological utopias*. In the internet age, exceedingly popular *media utopias* combine—at first sight free of any ideology—expectations of technological potential and far-reaching ideas of social transformation overlaid with a shimmering revolutionary vocabulary in a novel and particular way. And given the seemingly ever more rapid cycles of information technology innovations in the field of digital

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media since the late 1990s, the need for evangelists and prophets appears to be inexhaustible. The media technologies thereby addressed are changing, yet, the visionary semantics remain remarkably stable.

In this article, we reframe popular visions associated with new media technologies as *typical forms of utopian communication*: Based on two case studies, we discuss widespread expectations focusing on the dissolution of producer and consumer roles and demonstrate that with the case of 3D printing, already existing anticipations surrounding the Web 2.0—as well as prior novel media technologies such as videotex systems, cable television or small-format film cameras—are being updated. Subsequently, we identify the shared semantical logics of these expectations and suggest that the continued success of media-utopian ideas is closely linked to their complexity-reducing architecture, to their ease of integration into a number of area-specific and fundamental societal discourses, and to their instantaneous connectivity and compatibility with a broad variety of social references. In conclusion, we discuss the social functions of utopian concepts in the digital realm and assume that media utopias should not be read as predictions for future developments, but viewed as narratives that offer orientation on uncertainties and conflicts shaping current societal communication.[1]

Web 2.0 and 3D Printing: Two Case Studies

A central point of reference for recent utopian narratives in digital modernity is the social figure of the "prosumer" [2]: As "prosumers", media and technology users are expected to override the established boundaries of the production and consumption sphere as well as associated role descriptions and serve as a counterweight to the increasing centralization of production and the dominance of a few companies in many sectors of the global economy. And as widely reflected in socio-scientific literature (e.g., [3], [4]), the utopias built up around Web 2.0 and 3D printing likewise strive to convince their audience that new technologies will transform us into a "prosumer society," ([5], p. 17) characterized by a *democratization* of political decision-making processes, a

decentralization of production and distribution of material and immaterial goods, as well as an *emancipation* of consumers, media users and citizens.

By holding out the prospect of a dedifferentiated era of the prosumer, they orient themselves directly on "social reality" and thus become something more than mere media utopias: As long as the "reality" being addressed only existed in the world of media itself, media utopias were presumed to change only superficial aspects of society—the contents of our displays and video screens—but not the "real world" in all its materiality. In the case of the World Wide Web, this interpretation was promoted by early Internet utopians themselves, who defined the "cyberspace" as a separate realm, detached from any capitalistic constraints and political power structures [6]. Media utopias today, however, no longer focus on the idea of a cyber-space as a progressive niche, but instead foresee a technology-induced transformation of society as a whole. Indeed, the Web has become not only a significant economic factor but also a central aspect of everyday life or the "lifeworld" of average citizens in the sense of Edmund Husserl [7 p. 127] and Alfred Schütz [8]. Thus, it is not surprising that news providers, as well as social scientists, regularly offer media-induced visions of a nearby future and that these horizons of expectation are constantly expanding. This is true for the *Web 2.0* as a traditional media technology, but also for *3D printing*, which has freed modern media utopianism from its stigma of immateriality (e.g., [9], [10]). Accordingly, in the eyes of current media visionaries, the digital future of the "prosumer society" is to be materialized by 3D printers and their socio-technological ecosystems [11].

Web 2.0

By the mid-2000s, the term "Web 2.0" [12] quickly became a synonym for a second wave of Internet optimism (after the initial "dot-com hype" of the 1990s). Without the least amount of consideration being given to empirical evidence, ever newer slogans were called out as shorthand points of reference: Dan Gillmor, for instance, proclaimed that "Grassroots journalists are dismantling Big Media's monopoly on the news, transforming it from a lecture to a conversation" [13]; other expectations ranged from an ubiquitous "empowerment" of media users ([5], p. 25) or a "wisdom of the crowd" [14] to a novel form of "commons-based peer production" as voluntary "collaboration among

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[1] This article partly resumes, expands, and elaborates our lines of arguments on digital media utopianism initially introduced in [1]. We wish to thank the reviewers for their very helpful comments and suggestions, which led to significant improvements in the final outcome.

large groups of individuals [...] without relying on either market pricing or managerial hierarchies to coordinate their common enterprise"—presumably being superior to established forms of economic coordination in the long term ([15], p. 394).

The underlying notion of the "prosumer," initially proposed by Marshall McLuhan in the 1960s and then refined by Alvin Toffler in the early 1980s ([16], p. 349; [2]), was first applied to the Web 2.0 by Kevin Kelly, founder of the *Wired Magazine*. Kelly characterized the Web 2.0 as the "most surprising event on the planet" and accused the experts of his time of underestimating the disruptive force of online technologies. He predicted that the typical consumer by 2015 would be a relic of the past: "[...] in the near future, everyone alive will (on average) write a song, author a book, make a video, craft a weblog, and code a program. [...] What happens when everyone is uploading far more than they download? [...] Who will be a consumer? No one. [...] The producers are the audience, the act of making is the act of watching, and every link is both a point of departure and a destination" ([17], p. 4). By the end of the 2000s, Kelly's prediction was part of the standard repertoire of socio-logical discourse [11].

After a few years, however, it became apparent that society's adoption of the Web is proceeding in a less distinct manner and that the sheer technical possibilities, with the exception of well-considered ideal cases such as *Wikipedia*—although the free encyclopedia, too, tends to re-enact established hierarchies by drawing on expert knowledge [18]—have yet to lead to fundamental shifts in societal roles. Instead, the basic infrastructures of the Web are shaped to a much lesser extent than expected by the users than by a small number of multinational tech-nology corporations which supply the central communi-cation platforms and services on the Internet. These corporations have the financial means necessary to invest in research and development continuously, regularly pro-vide novel services to users, and thus significantly influ-ence their online experience ([19], p. 7; [20]). Even so, Kelly's article "We are the Web" was a significant point of reference in sociological debates that at times have even culminated in proclamations of an entirely new age: "the age of the prosumer" ([5], p. 19, 31).

Associated with these beliefs are notions of a declin-ing influence of the mass media in cross-societal com-munication, an idea already expressed in the early days of the Internet by authors such as Clay Shirky [21]. And although the potentials and risks of participative forms of journalism had initially been discussed already in the 1970s, the further hype surrounding the Web 2.0 has again boosted the belief, that the dominance of the mass media in news distribution would soon be a hallmark of the past—a belief which intermittently became a down-right social science truism (see e.g., [22]; [23]): "The network allows all citizens to change their relationship to the public sphere. They no longer need be consumers and passive spectators. They can become creators and prima-ry subjects" ([24], p. 272). And, in fact, the technological and economic barriers for content production and dis-semination have never been this low in media history, user-generated content is increasingly finding its way into mass media coverage as well as an increasing num-ber of semi-professional news platforms have emerged that aim to complement mass media reporting. In addi-tion, several waves of emotionally charged outrage on the Web were shown to have had significant influence on political or business decisions ([25], [26]).
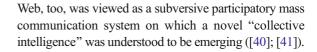
At the same time, however, empirical studies show that the number of Internet users seeking to participate in the Web from a deeper political or cultural angle is small; that social networking services are used primarily for entertainment and distraction purposes; that only a few user-generated offers can maintain a wider audience over a longer period of time; and that the content of established media brands plays a key role in the social web as well ([27], [28]). Yet, these conflicting empirical findings and research results as well as critical observers such as Jürgen Habermas, noting the uncertain conse-quences of fragmented audiences for the political public sphere, and Otfried Jarren, who pointed out the pivotal role of professional mass media as intermediate systems in societal communication [29], were widely ignored in the initial discourse on the "Web 2.0" or else understood as backward-looking [30].

The basic premise behind these narratives—the dis-solution of well-established social roles—ultimately led to an acceptance of the idea of a technologically driven democratization of the production and distribution of media goods: The theory of the "long tail," first advo-cated by *Wired* editor-in-chief Chris Anderson in 2004 [31], which postulates a loss of relevance for traditional mass markets, has experienced a widespread populariza-tion in recent years; but even with respect to the young mobile app store phenomenon, growing evidence sug-gests that the talk of a new "power of the niche" is hardly justified: In recent years, roughly half of the revenue in Apple's US app store was earned by two dozen firms,

while two-thirds of the developers were earning, on average, less than 500 US-Dollars per app and month. In the end, very few of the suppliers profit from the mobile "gold rush for developers"—and these are largely the platform providers themselves: "Whether it is gold in the Yukon, websites in the 1990s, or app developers today, larger amounts of revenue will go to those who enable development than to those who are doing the development." [32] However, the reflex to reproach the dominant Internet corporations for their infrastructural hegemony points in the wrong direction. This is because the operation of mostly free of charge usable services is costly as well; the survival in the rapidly changing market for information technologies requires continual investments in research and development and, last but not least, Google and Apple, or Facebook and Twitter, are for-profit companies that must, for reasons of self-preservation, remain true to that mandate ([33]; [34]).[2]

Altogether, the visions presented led to a flood of journalistic articles and sociological papers holding out the prospect of a technology-driven decentralization, democratization, and equalization of society. These future horizons correspond to a fundamental utopia that has long been a fixture of social sciences and associated with almost every new medium of communication since Bertolt Brecht's "radio theory" in 1932 [37]: the hope for a technologically mediated implementation of the ideals of enlightenment as inscribed by Immanuel Kant into the canon of western culture. Thus, the electronic media of the late 1960s (e.g., tape recorders, *Super 8* cameras) were already supposed to promote a decentralization of content production and a democratization of society; in the 1980s, videocassette systems, interactive videotex, and cable television were believed to initiate an increasing independence from mass media broadcasters and to become the keystones of a future communications' system that would challenge or dissolve a hierarchically structured society ([38]; [39]); and the early World Wide

Web, too, was viewed as a subversive participatory mass communication system on which a novel "collective intelligence" was understood to be emerging ([40]; [41]).

3D Printing

Even so, in the eyes of their critics, the visions surrounding the "Web 2.0" remain concepts that only scratch the "surface" of society. The products that Kevin Kelly wrote about (videos, weblogs, songs, software) remain digital and thus seemingly immaterial media goods. The branding of the digital as an expression of immaterial superficiality, however, appears increasingly anachronistic in a society being pervaded through ever-increasing digitization [42]. The current gradual transformation of the Web into an omnipresent Internet of things and services is flanked by visions that bestow the utopian hopes of Web 2.0 upon the production of material goods.

In this regard, the utopias surrounding 3D printing as "desktop manufacturing"—personalized fabrication by users at home or the office—hold a particularly trenchant position. These expectations and hopes are not merely visions of a future in which the prosumers of the information age seize for themselves the reigns of digital value creation, but rather visions of a future in which the dissemination of affordable and easy-to-use 3D printers leads to a decentralization and democratization of the entire realm of industrial manufacturing and a "re-negotiation of established producer and consumer roles" as consumers become increasingly integrated in the value creation process and the entire supply chain [43, p. 11].

"3D printing" is the colloquial term for a special type of computer-aided manufacturing. Functionally, 3D printing consists in the production of an object on the basis of a three-dimensional digital model by means of built-up layers and without the use of additional machine tools. These technologies exist since several decades, so as such, there is nothing new about additive production. Nevertheless, the novel term "3D printing" places additive production in the same genealogical line as Gutenberg's printing press. Thus, along with its part in the narrative of social emancipation brought about by the letterpress, the term evokes the image of an inexpensive machine that not only transforms the home into an office but also turns its users into potential manufacturers.

In 2004, the British engineer Adrian Boyer initiated the open-source development project *RepRap* (Replicating Rapid-Prototyper) with the goal of producing 3D printers assembled mostly from parts that could

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[2] From a historical perspective, the situation that basic communication infrastructures are operated and driven by private sector providers is not an exclusive phenomenon of our time. The invention of the metal movable-type printing press, for instance, was driven by Johannes Gutenberg and his investor due to tangible economic interests; and from the mid-fifteenth century on, it was able to spread rapidly primarily in light of its high sales potential along the European trade routes [35]. However, the novelty of digital modernity is the hegemony of a very few multinational companies as the operators of the key infrastructures of communication and information retrieval on a global scale that can hardly be counteracted by means of national government regulations. Indeed, such a level of power concentration was never reached in previous phases of media consolidation [36].

be generated by 3D printers itself. His manifest "Wealth without Money" [44] characterizes such technologies as the next stage in the greater process of decentralized industrialization, which will again transfer the means of production to the people: If each of us had a 3D printer on his desktop by which we could produce many objects of everyday life by ourselves, the need to purchase industrial products would lessen. With this vision, Boyer set in motion a thoroughly impressive development process that contributed to the dissemination of 3D printers for private use. A further source of the 3D printing hype can be found at the *Massachusetts Institute of Technology*. There arose, in 2005, the idea of so-called *FabLabs*, which as "shared machine shops" [45] would offer anyone, regardless of age, gender, origin, or status, the possibility of actively participating in innovation and production processes by means of 3D printing and other technologies of digital fabrication [46].

The foremost popularizer of the idea of decentralized production regime certainly was once again Chris Anderson. He refers to 3D printers as elements of a "next industrial revolution" ([47]; see [48]): In the course of this "revolution", the elevated position of professional organizations and large-scale factories as traditional sites of innovation and production is to be diminished and replaced by an economy of "makers," who collaboratively generate new product ideas that can be materialized anywhere.

Sociological authors such as Jeremy Rifkin [4], as well as leading news journals such as *The Economist* [10], have picked up on this idea of a new industrial revolution. The material-saving production approach of 3D printing and the reduction in transport costs associated with a decentralization of production and diffusion mean that this technological transformation should at the same time lead to an ecological transformation: "If we were to put all the disparate pieces of the 3D printing culture together what we begin to see is a powerful new narrative arising that could change the way civilization is organizing the twenty-first century." ([4], p. 98) In these revolutionary futures, which played a decisive role in the development and popularization of 3D printing as "desktop manufacturing", the technology is envisioned as a means to transform bits into atoms and to connect the digital media sphere with material production. The 3D printer is characterized as a technology that—like the 2D printer—will soon become an object of everyday use.

Much as with the visions surrounding Web 2.0, future concepts of 3D printing can be seen as the renaissance of utopian beliefs and ideas that were first articulated decades ago but lacked a technological foundation that provided them with sufficient plausibility. Visions of a collaborative economy—based on the interplay of local production and global networks exchanging knowledge—carry a flow of convergent concepts initially shaped the California counterculture of the 1960s and 1970s. *The Whole Earth Catalog*, published from 1968 until 1972, rapidly becoming "a nexus of radical environmentalism, appropriate technology research, alternative lifestyle information, and communitarian anarchism" ([49], p. 383) and, consisting of an almost endless assortment of products with do-it-yourself (DIY) orientation (from tools and supplies to books and instructional courses), readily expresses the appropriate interpretive pattern: From the earliest days of the DIY movement, the amateur was firmly established as a social figure standing in sharp contrast to the world of formal organizations and market-economic forces [50]. But even as the popularity of DIY as a cultural pattern has continued to grow since the 1970s (not least due to the marketing efforts of the manufacturers of the tools and hardware stores), the breakthrough impulse that its early proponents hoped for has not yet occurred [51].

Today, the 3D printer and the Internet are brought into play as being the technological tools that could elevate the amateur to a new, socially transformative level. Together, they are meant to exploit possibilities that had indeed been conceived but were not yet viable mainstream. Today, a 3D printer can be picked up in an electronics market for a few hundred euros or US dollars. Printable 3D models can be produced on the computer, with a scanner or via app and smartphone camera—and informed users are able to download hundreds of thousands of print-ready digital blueprints. It is in their digital interconnectivity that 3D printers appear to be the utopian machines that could materially pave the way to the "prosumer society." This case, however, also shows that empirically observable innovation dynamics cannot be understood straightly as stages in the realization of visionary ideas.

Boyer has by no means anticipated the actual developmental path followed by 3D printers. Open-source 3D printers continue to play a pioneering role in the dissemination of additive-digital production technologies, but commercial companies such as *MakerBot Industries* have meanwhile outgrown their open-source origins and are producing "closed-source" 3D printers as a fully assembled products [45]. Moreover, in 2013, *MakerBot* was
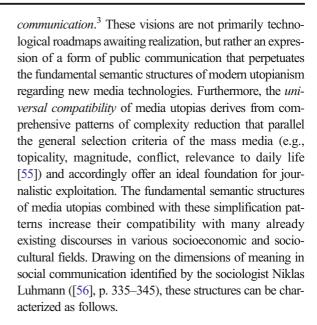
purchased by *Stratasys Ltd.*, a commercial manufacturer serving the professional additive production business, thus allowing them to tap into the DIY market commercially. The hopes for decentralization are in turn now giving way to fears of a future centralization and commodification. Accordingly, Anderson's "next industrial revolution," in which an emancipation of the prosumer in the area of production is set to merge the utopias of Web 2.0 with the material world, has not yet happened. *Fablabs* have established themselves in several countries, and transnational networks are being developed, but they are still a long way away from replacing established production models. Instead, digital production technologies are being integrated into the existing industrial regime: Manufacturers are embedding digital technologies in their factories and production lines, including additive production technologies way beyond the molten plastic process of inexpensive desktop 3D printers. Now that the hype of 3D printing has reached its peak, the realization of a "prosumer society" once more seems to be no more than a distant prospect: "Despite the marketing clangor of the 'maker movement,' shared machine shops are currently 'fringe phenomena' since they play a minor role in the production of wealth, knowledge, political consensus, and the social organization of life." ([52], p. 1)

The Logic of Digital Media Utopias

Without any doubt, new media technologies have a significant impact on social life as they transform the ways we interact and communicate as well as the ways the society is organized. However, albeit current transformations are characterized less by substitution and resolution than by differentiation and complementarity, the widely acclaimed books and articles on the "new media" of an era (e.g., the early World Wide Web [2], the so-called "Web 2.0" [5, 13], or presently 3D printing [1, 48])—literally never focus on incremental or gradual change, but promise fundamental media revolutions that supposedly will shake the very foundations of society. The fact that prior expectations, in their radicalism, were not empirically fulfilled scarcely matters to the prevailing revolutionary rhetoric of the day. Thus, it is safe to assume that the "Web 2.0" and 3D printing will not be the last media technologies which will be linked to far-reaching hopes for decentralization, democratization, and emancipation.

In this respect, the utopias associated with new media technologies can be recast as *typical forms of utopian communication*.[3] These visions are not primarily technological roadmaps awaiting realization, but rather an expression of a form of public communication that perpetuates the fundamental semantic structures of modern utopianism regarding new media technologies. Furthermore, the *universal compatibility* of media utopias derives from comprehensive patterns of complexity reduction that parallel the general selection criteria of the mass media (e.g., topicality, magnitude, conflict, relevance to daily life [55]) and accordingly offer an ideal foundation for journalistic exploitation. The fundamental semantic structures of media utopias combined with these simplification patterns increase their compatibility with many already existing discourses in various socioeconomic and sociocultural fields. Drawing on the dimensions of meaning in social communication identified by the sociologist Niklas Luhmann ([56], p. 335–345), these structures can be characterized as follows.

Factual Dimension

Utopias consider a given situation in the light of possible alternatives; as a result, observed reality first is subjected to an explicit or implicit critique and secondly depicted as contingent and modifiable. Each respective reality is compared to an envisioned alternative viewed as being an improvement on the status quo.[4] In this construction process of an alternate future, radical transformation potentials of a new media technology are derived from ideal cases and thereafter instantaneously carried over to a number of adjacent contexts. Thus, they are becoming isolated from their frame of reference and conventionalized into a universal alternative. In the case of the "Web 2.0", the open encyclopedia *Wikipedia*, for instance, may have proven itself to be (a more or less) perfect field of application for

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[3] Our concept of media utopias as forms of utopian communication is related to other concepts in technology assessment and science and technology studies, first and foremost Armin Grunwald's concept of visionary "techno-futures." These futures are "decades away, and exhibit revolutionary features in terms of technology and of culture, human behavior, and individual and social issues" ([53], p. 285). At least all far-ranging techno-utopias are visionary techno-futures. It is, however, an empirical question, if all techno-futures share the narrative patterns that we reconstructed in our research. This can also be said regarding the concept of "socio-technical imaginaries" [54], which is primarily used to make sense of national innovation politics.

[4] This definition is in alignment with the semantic origin of the utopian concept—the "Utopia" of the humanist Thomas More [57]: His book (first published in 1516) combines a radical critique of the current social order with the construction of a radical alternative of social interaction.

user-centered knowledge production; however, its concept cannot be straightforwardly transferred to other areas such as the production of daily news (e.g., recall the downfall of *WikiNews*). In the case of desktop *3D printing*, machines with currently very limited technological capabilities become prototypes of a next industrial revolution and a decentralized and personalized regime of production, serving as starting point for far-reaching utopian visions criticizing the status quo of industrial mass production.

Temporal Dimension

The distinction between criticized present and a visionary alternative is then transferred to the temporal difference between past and future, with the present being represented as a transitional turning point in which existing structures can be overcome in order to realize the alternative possibilities of the future. Contemporary visions are thereby decoupled from past experiences with and expectations on legacy technologies. The empirical disenchantment of previous media utopias is simply forgotten, or (by asserting a temporal difference) traced back to difficulties in the past that have since been overcome. Thus, in the early years of the "*Web 2.0*" discourse, one finds very few references to similar predictions in the initial days of the World Wide Web—or their failure is blamed on the technical limitations of the "Web 1.0" (see e.g., [24]; [5]). And in a similar manner, *3D printers* combined with digital platforms which enable the global sharing of blueprints were formatted into revolutionary instruments that might unlock the possibilities of an era of "personal fabrication" [46], while previous utopian discourses on do-it-yourself technologies were either ignored or conceived as predecessors which placed their hopes in immature technologies [58].

Social Dimension

In their appeal for the realization of future possibilities, utopians and visionary proponents of an emerging media technology position themselves as public intellectuals, which claim to possess valuable insights for the future. Society is divided into agents of socio-technical change on the one hand, and the rest of society on the other—explicitly or implicitly (through its practices) legitimizing the status quo. The behavior and preferences of the early users of new media technologies are regularly extended to entire social milieus, or even the population at large, without any regard for the unique social backgrounds of these "early adopters" [59]. In the debate on the so-called "*Web 2.0*", broad

distinctions between older "digital immigrants" and younger "digital natives," with presumably greatly expanded media expertise, and the self-characterizations of some bloggers as the vanguard of a future majority both run along this line. In the case of *3D printing*, technology journalists and public academics popularized the technology and positioned themselves as visionary speakers of a new participatory age of production and innovation—if only society is ready to embrace the novel technological options. In the staging of a "maker culture" of 3D printing enthusiasts, every citizen is equally addressed as a potential maker [60].

As a result, the fundamental semantic structures and simplification patterns inherent in popular media utopias (Tab. 1) give rise to highly distinctive (and thus, for the involved corporations: ideally marketable) narratives of a nearby future whose origins are already inherent in our present. Though, in contrast to purely social utopias, media utopias assume that behavioral changes or a new political order are not sufficient to bring about social change. Instead, new media technologies are viewed as instruments for bringing about the presumed transition, and in this respect, the online technologies are apparently well-suited to meet the expectations of the society as a whole as well as in all its parts. The respective technologies intended for the changes, each characterized as a catalyst, often serve merely as a stepping stone to universal future hopes arising in the course of criticism of current conditions. And obviously, media utopias vice versa can also be turned upside down and converted into dystopias, e.g. regarding an increased medialization, automatization, and informatization of society, which highlights the inherent ambivalence of technologies and their societal repercussions: In the case of 3D printing, fears of blueprint piracy and do-it-yourself weapons are accompanying visions of distributed production and emancipation [61]; in the debates on the "Web 2.0", the narratives of democratization and decentralization were countered by warnings of mass surveillance, information overload and "digital Maoism" ([62]).

The utopias surrounding the Web 2.0 and 3D printing, which regularly derive from professional "visioneers",[5]

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[5] Dedicated visioneers are often directly based in the San Francisco Bay area or other centers of technological innovation: "Visioneering means developing a broad and comprehensive vision for how the future might be radically changed by technology, doing research and engineering to advance this vision, and promoting one's ideas to the public and policy makers in the hopes of generating attention and perhaps even realization." [63 p. 13.] In this context, Martin Sand stresses the importance "to study the intentions of visioneers, their alternatives, and the effects of their actions thoroughly to find out whether they are responsible." [64, p. 84]

Table 1 Semantics of (digital) media utopianism

Dimension of meaning	Utopian semantics	Simplification patterns
Factual	Reality/alternative	Decontextualization
Temporal	Past/future	Decoupling and forgetting
Social	Public/utopians	Overgeneralization (early user ➔ general public)

share the same fundamental semantic logics and simplification patterns and thus excel in an instant connectivity and compatibility to a broad variety of societal discourses. In this spirit, media utopias are the heirs to classic social utopias. As *streamlined and easily graspable reference points* among early users, they facilitate differentiation from other social groups, contribute to the motivation and coordination of the mostly young and well-educated early users and participants, moderate communication with their accompanying need for approval or disapproval and supply a readily utilized basis for legitimization in decision-making processes (e.g., in political or economic contexts, see [65], [66]). Social sciences, in many cases, also gratefully make use of media-utopian ideas, as references to popular visions and narratives evidently not only lead to an easier acquisition of research funds; they also offer the opportunity of revitalizing long-cherished normative ideals—for example, the hope for a cross-societal democratization or the dissolution of social power asymmetries.

In this process of mutually reinforced expectations—in the cases of "Web 2.0" and 3D printing based on a combination of journalistic and scholarly assessments, the fascination of individual early adaptors, and the deliberately far-reaching visions of technology evangelists—any empirical facts that might speak against the widespread adoption of new technologies or for the retention of established modes of media usage recede into the background. Opposing the dissolution of the allocation of roles between consumers and producers, is, for instance, the principle scarcity of cognitive and temporal resources: Laypersons have neither the expertise nor the time necessary to deliver the same quality of work as professionals are able to on a continual basis, not least because their resources are limited by demands from other areas of life (e.g., work, family) and their legitimate need for leisure time. The belief that social change might be induced solely by means of new technological possibilities is thus still a (at best well-concealed) fallacy that is founded on technological determinism.

Functions of Digital Media Utopias

That said, it is precisely this generalization and decontextualization, on the other hand, that yields the discourse-shaping force of popular media utopias and might reveal new socio-technological lines of development. Media utopias thus can be regarded as *productive types of communication*: They serve to guide innovation, to direct a particular technology into a new context or to start an unconventional path of development. They generate attention for technological potentials, provoke the need for follow-up communication, channel the discourse in a particular direction—and for this reason, they are constantly being reformulated. The suggestion of a difference, i.e., a technologically induced expansion of future horizons, and its initial validation on the basis of ideal cases seems to be sufficient "to proceed without overall analysis and [...] to focus on what is new (or what is considered to be so) as substitute for the essential" ([56], p. 314). In this manner, media utopias substantially contribute to our daily coping with contingencies and uncertainties. In these utopias (or dystopias), business corporations may see a confirmation of their current course or derive from them an urgent need for reorganization; early adopters can align their preferences on them and thus flag themselves as "enlightened" or "innovative"; science can claim the need for further research; politicians can call for societal reorientation; and mass media providers, after every reverberation of a radical future expectation, can mount a series of successive coverage.

In the media vision's outlined, technology is assigned a prominent role as it promises control over space and matter. Through technology, society conceives itself as the creator of its own future. In this context, Gilbert Simondon's positioning of a technological artifact or system as an "open object" [67] is instructive: The concept of the open object refers to network-like technological devices designed for perpetual connectivity, extension, and modification. The openness of such objects is expedited by the separation of hardware and software—a

characteristic of the personal computer, the smartphone, and other mobile devices as well as increasingly finding application in industrial production. In the course of digitalization, we are being inundated with open technical objects and their interfaces. They are the material force for technological utopias becoming media utopias: Rather than a single innovation being positioned as a lever for world change, we find entire socio-technological ensembles. Thus, the heart of media utopias is the conception of *new interfaces between technology and society*.

The media utopias surrounding the Web 2.0 and 3D printing apparently hold out the prospect of a technologically mediated decentralization and democratization of societal relations and an emancipation of previously passive media users and consumers. In their radicalism, they are distinguished by a semantic architecture that is oriented on the expectation logic of the general utopian discourse of modernity; in contrast to classic social utopias, however, their point of departure for hoped-for transitions is not the social order itself. Rather, new communication and information technologies are regarded as "media" (in a literal sense) for a presumed turning point. With this in mind, much can be learned from these interfaces between technology and society. Appealing future constructions with a potential to exceed their particular contexts are characterized by an architecture that allows for connections to diverse societal expectations. The supposed "neutrality" of technology supports the conformability of techno-centric visions to already existing social narratives. Thus, the utopias outlined here are able to tap into preexisting hopes for (political) democratization, (individual) emancipation, (socioeconomic) decentralization, and (environmental) transformation.

Through their radical yet open-ended technologically mediated expectations, which typically imply a dissolution of producer and consumer roles in journalistic, cultural, political, and economic contexts, media utopias immediately provoke a sense of dismay that requires a prompt response in almost all areas of society. They create an impression of a further media revolution that supposedly will lead to a disruptive overriding of existing socio-technological configurations. In the intended user milieus and functional contexts, these narratives offer in turn highly simplified points of reference that can serve as a basis of legitimization in individual, collective and corporative decision-making processes as well as they enhance the internal cohesiveness of the respective fields. Media utopian visions function

as drivers in (always open-ended) innovation processes, but they also provide orientation—less about the future, but rather about the uncertainties, problems, and conflicts shaping current communication.

In light of this, the plain comparison of utopia versus reality appears foreshortened. Utopian narratives can undoubtedly shape communication processes—and thus the "realities" of our society. They are a key element of digital modernity and serve as core media of societal self-understanding as "the future does not let itself be de-futurized" ([68], p. 181). In other words: *That* the (digital) society of the future will be different from present-day is self-evident—thus the increased need for guidance and orientation. But *how* this being different will specifically look, naturally remains unclear in its present. Therefore, open-minded speculation about societal disruptions or utopian narratives directed toward specific media technologies might be illuminating, even when popular media utopias draw—contingent on the respective interests of their creators (e.g., self-marketing, business acumen, political justification)—one-sided forms of representation. To go beyond the analytic capacities of genuine utopian discourses, however, a socio-structural contextualization and an understanding of long-term social transformation processes become indispensable.

The "prosumers" in media utopias, for instance, can be sociologically described as holders of "secondary performance roles" in functional contexts, selectively rendering contributions and services that were previously reserved for specific professions or members of professional organizations [69]. Active users of the social web differ clearly from passive consumers as they selectively perform journalistic research, curation, and structuring tasks. At the same time, they also differ from professional journalists as holders of primary performance roles since they do not necessarily follow established journalistic conventions, for example concerning the universality of topics or periodicity. Very often, they also work without being embedded into any organizational framework and are motivated primarily by short-term incentives and personal interests. However, it is thanks to these same characteristics that amateur journalists are at times able to draw the public attention to subjects that otherwise would not have been covered by mass media reporting. For functional systems such as the mass media, this informalization yields significant enhancement

options [70], e.g., through the inclusion of user-generated content in professional news services. Thus, new technologies contribute to a considerable differentiation of the spectrum between recipient and producer roles, but they do not fundamentally resolve the dichotomy of professional providers and consumers [19].

In turn, utopian narratives on 3D printing (as well as on crowdsourcing) shift responsibility for innovation and production from industrial producers to consumers since the rhetoric of individual emancipation through ownership of the novel means of production also implies an integration of citizens and media users into an expanded innovation regime. As technologically equipped "makers", citizens are expected to contribute to innovative products and sustainable solutions by their collaborative use of 3D printing—and this core expectation, which shapes accompanying sociocultural, socioeconomic, and sociopolitical processes, ultimately results in an increasing responsibilization of individual citizens and users for (co-) production, invention, and innovation [69]. In that vein, media utopias also contribute to a discursive redistribution of societal responsibilities—that is to say: who is made accountable for the invention and application of novel technologies as well as their consequences, and who may claim responsibility to speak and act in the "name" of the future.

Concluding Remarks

We defined technological utopias as alternative constructions of reality that are projected into the future, addressing a public alleged to be trapped in a mindset that views the status quo as being without alternative. They decontextualize and overgeneralize context-specific experiences with new technologies and disconnect them from complex and often disappointing innovation processes of the past. At least implicitly, utopias are always—similar to dystopias—a form of critique of contemporary society. Utopias are thus "present futures" [71] and insofar like a rainbow, which sometimes seems to be just around the next corner but is impossible to reach. Their power does not depend on the realization of an imagined prospective alternative to the status quo, but on their performativity in the present.

With respect to digital media utopias, it is, therefore, less the mediated image of the future that is instructive, but rather the area of social reality being emphasized as in need for change. The media utopias outlined here ("Web 2.0" and 3D printing) suggest that the present differentiation of producer and consumer roles is not based on a law of nature; rather, it is a particular structure of the modern, functionally differentiated society. They reveal points of departure for alternative lines of development already being tested by fringe actors in niches uncoupled from stable societal regimes or mainstream markets, presumably waiting for a window of opportunity for cross-societal diffusion and adoption [72]. The utopian exuberance of mass media-compatible visions can lead to models of socio-technological innovation that translate revolutionary futures into pragmatic realities.

The demand for such real-world experiments clearly exists: Utopias are invariably, as Ruth Levitas puts it, a "socially constructed response to an equally constructed gap between the needs and wants generated by a particular society and the satisfactions available to and distributed by it" [73 p. 182]. With this in mind, digital media utopias, which excel in an instantaneous connectivity and compatibility to a broad variety of discourses, point to a mismatch or contradiction between the empirically experienced passivity of media recipients, consumers as well as technology users and an ubiquitous notion of modern times: the ideal conception, that individuals can, should, and wish to be active participants in the shaping of their own society. However, even partly achieving this core utopia of digital modernity depends not merely on technological possibilities but on genuine and therefore very complex and versatile social negotiation processes and institutional dynamics.

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