Social media as innovation

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Abstract:
Social media are changing contemporary practices of communication, information, and participation. They continue the tradition of "Web 2.0"—a set of interconnected changes in software architecture, business models, and guiding principles that transformed online communication in the early 2000s. Two fundamental innovations characterize the current form of social media: first, a communication architecture based on personalization and the convergence of conversation and publication; second, a business model grounded in the comprehensive datafication of user activities. Both aspects contribute to a profound transformation of the public sphere—making it more open to diverse and alternative voices, but also more vulnerable to extremist communication and disinformation. The unprecedented economic power of a few dominant platforms in shaping these structures poses a threat to democratic models and ideals of public communication. Far from the utopian discourses of the participatory web, social media give rise instead to paradoxes, conflicts, and contradictions that complicate the establishment and further development of these media innovations.

1. Introduction

Social media have become a cornerstone of online communication. Platforms such as Facebook, Instagram, WhatsApp, YouTube, TikTok, or X (formerly Twitter), as well as Wikipedia and the blogosphere, rank among the most widely used internet services. In addition, numerous other platforms address specific language communities or thematic niches. While covering a broad spectrum of functionalities, social media share two core characteristics (Schmidt 2018; Taddicken and Schmidt 2022): They lower the barriers for individuals to share various types of information, and they facilitate the establishment and maintenance of social relationships. These expanded possibilities, however, come with a significant drawback: dominant platforms collect, store, and utilize user data on an unprecedented scale, often with limited oversight and regulation.

Unsurprisingly, social media are at the center of a broad public debate. The companies behind these services and platforms often promise that their products or business models will solve social problems and contribute to a better world. For example, Meta, the parent company of Facebook, Instagram, and WhatsApp, claims to give "people the power to build community and bring the world closer together" (Meta 2024). YouTube declares: "Our mission is to give everyone a voice and show them the world" (YouTube 2024). These statements represent contemporary variants of "digital utopianism" (Turner 2006)—a way of thinking that emerged in the 1960s and 1970s, blending Californian counterculture with hacker and inventor cultures, and still shaping Silicon Valley today. Opposing these promises are critical—and sometimes dystopian—narratives that associate social media with the fragmentation of the public sphere, the rise of uncontrollable technological power, or the erosion of expert knowledge (Keen 2007; Morozov 2014; Zuboff 2019).

This article examines the innovative character of social media from the perspective of communication sociology. It starts (in section 2) with a review of the concept of "Web 2.0," the context within which social media emerged and developed. It then discusses in greater detail two areas in which social media can be considered innovative: first, their dominant communication architecture, understood as the interwoven organizational principles for structuring and disseminating information (section 3); and, second, their dominant economic paradigm, which is based on the comprehensive datafication and algorithmization of users for granularly targeted advertising (section 4). The article concludes with a critical discussion of these developments (section 5).

2. Social media as a continuation of Web 2.0

What we now call "social media" stands in the tradition of "Web 2.0." The key text that introduced and elaborated on this concept is an essay by publisher and publicist Tim O'Reilly (2005), which significantly shaped discourse about the Internet in the second half of the 2000s. The suffix "2.0" suggests a leap from "Web 1.0" to a more advanced level of functionality—a leap O'Reilly associated with three interconnected areas of innovation. First, he identified *changes in the way software is provided and developed: a shift from software-as-a-product, purchased and installed locally, to software-as-a-service*, provided online. This change allows users to access and use applications directly through a web browser. A well-known example is Google Docs, which offers word processing and spreadsheets as an alternative to locally installed programs like Microsoft Office or Open Office. This shift also transformed software development itself: while software-as-a-product

follows a model of discrete versions and releases, software-as-a-service evolves continuously. Under this new paradigm, software systems are never considered complete but exist in a state of "perpetual beta," characterized by constant modification, adaptation, and improvement during ongoing operation.

According to O'Reilly, a second area in which Web 2.0 differs significantly from earlier phases of the Internet lies in its business models and forms of value creation. Central to this shift is the monetization of user-generated content (Wunsch-Vincent and Vickery 2007)—that is, content of all kinds created outside of professional organizations, typically without commercial intent, but now turned into a source of profit. In addition, Anderson (2006) popularized the "long tail" concept. Since the costs of storing and distributing digitizable goods—such as music tracks or videos—are close to zero, online platforms can profitably serve niche markets and highly specific user interests. In this model, economic success no longer depends solely on "blockbusters," but can also be built on specialized, small-scale content

Building on these technical and economic principles, Web 2.0 is also shaped by certain ideals—above all, *networking and participation*. The guiding principle of networking is reflected in Web 2.0's emphasis on combining and connecting data to a far greater extent than in earlier phases of the Internet. This not only facilitates the exchange of all kinds of content but also supports the maintenance and expansion of social connections between people. From the mid-2000s onward, network platforms embodied this ideal—initially through services like MySpace, Friendster, and Orkut (all now discontinued), and later through Facebook and Twitter. At the same time, like blogs, YouTube, or Wikipedia, they also reflected the ideal of participation: they promised new possibilities for individual engagement and became key examples of the so-called "participatory web" (Blank and Reisdorf 2012).

The distinction between "Web 1.0" and a "Web 2.0" shaped debates about the development of the Internet for many years. However, the underlying assumption of a fundamental, disruptive, or even revolutionary shift in technological development has faced criticism from the outset. Critics pointed out that this perspective overlooked many aspects suggesting incremental progress and continuities—both in the technical foundations of the Internet and in the practices of online communication (Schmidt 2011; Meikle and Young 2012).

Almost twenty years after O'Reilly's essay, many of the principles he identified have become firmly established—to the point of seeming almost unremarkable—or have been

overtaken by subsequent developments in digital technology. Consider, for instance, the rapid rise of mobile communication and its associated "app ecosystems," or the enormous advances in machine learning and so-called "artificial intelligence." Accordingly, over the course of the 2010s, the label "Web 2.0" gradually lost its significance and was largely replaced by a broader, more encompassing term: "social media."

3. The communicative architecture of social media

A key innovation of social media lies in their communicative architecture—that is, the specific interplay of software functionalities, shared rules and expectations, and the social structures and figurations that shape users' practices (cf. in detail, Schmidt 2011). Section 3.1 identifies three core principles that characterize the current architecture of platforms such as Facebook, Instagram, Snapchat, Twitter/X, and YouTube. Contrary to their self-portrayal as neutral intermediaries between users, these platforms exert considerable influence over users' activities and communication. As a result, they play an active role in shaping the social consequences of social media, some of which are briefly examined in section 3.2.

3.1 Principles of the communicative architecture of social media

The first of three key principles characterizing the communicative architecture of social media is the *simultaneous unbundling and rebundling of information*. Social media draws on information from diverse sources and provides channels for disseminating content of all kinds. Individual status updates, videos, images, and other contributions circulate as *microcontent*—that is, as discrete, often small units that can be individually commented on, evaluated, referenced, and "shared." While the original context of such microcontent, for example, a journalistic website whose article is shared on Facebook or the account from which a post originates, is not entirely lost, it typically becomes less visible in the rebundling process enabled by social media.

This is because social media do not present content in the form of traditional journalistic products with fixed temporal rhythms (such as the *broadcast* or *issue*), nor as editorially curated *online portals*. Instead, they organize content in the form of instantly generated and continuously updated *feeds* or *streams*. Content selection and ordering are not subject to editorial oversight but are largely shaped by algorithmic filtering—for example, through chronological sorting or by prioritizing content from a user's network of contacts. Although the exact criteria and parameters for algorithmic filtering and recommendation are continually adjusted and remain opaque to outside observers, they are closely aligned with platforms'

business models, which generally aim to maximize user engagement and time spent on the platform (van Dijck et al. 2018).

Closely connected to this “algorithmic media production and consumption” (Napoli 2014) is the second structuring principle of social media: *personalization of information*. Personalization can result from deliberate choices made by users, for example, by following specific accounts on Mastodon, accepting a friend request on Facebook, or adding someone on Instagram. These actions are often part of relationship management, driven by considerations of maintaining or expanding one’s social connections. At the same time, making social contacts explicit on a platform automatically expands the set of information sources available to a user, gradually creating a personalized, individually unique repertoire of content over time.

In contrast, a second facet of personalization operates largely in the background. Many platforms deploy algorithmic recommendation and filtering systems that draw on user behavior, as well as metadata about users and their social networks, to determine which content is shown or hidden (for an introduction to how such recommendation systems work, see Guy 2022). The principles of personalization and the rebundling of information lie at the heart of the business models of many social media platforms (see section 4).

Finally, the third structuring principle is the *convergence of conversation and publication*. For a long time, these two modes of communication were tied to different types of media: journalistic publication took place in print and broadcast media, while conversation, in the sense of dialogue and interaction, primarily occurred face-to-face or via interpersonal media such as the telephone or letters. Social media, however, afford both modes on the same technical basis. They make follow-up communication to journalistic content visible through comments and conversational references, or explicit ratings (such as “likes” or “thumbs up”), which previously required switching communication channels (e.g., writing a letter to the editor) and remained largely invisible to the broader audience of the original content. Moreover, social media also facilitate the recommendation and forwarding of content within one’s contact network, enabling the rapid and potentially viral spread of posts, images, or videos.

3.2 Consequences of the communicative architecture of social media

The three principles of social media mentioned outlined not only shape interpersonal and group communication but also fundamentally transform the structure of public communication. This becomes particularly evident in two respects: first, in the emergence of

new forms of the public sphere; and second, in the potential distortions of a diverse and deliberative public sphere.

As social media lower the barriers to distributing content and enable users to build personalized information repertoires, they foster the emergence of "personal publics" (Schmidt 2011, pp. 107-133; see also Lüders 2008 on "personal media"). These publics follow different selection and presentation logics to professional journalistic communication or to the persuasive marketing and PR strategies of companies and political actors. In personal publics, content is selected primarily based on personal relevance rather than journalistic news values, and it is typically directed toward an audience of social contacts rather than the dispersed and anonymous mass audiences addressed by traditional media. The focus is often on users' identity and relationship management—that is, presenting their interests, experiences, and opinions. In turn, this facilitates follow-up communication through comments, likes, and other forms of interaction, allowing users to reinforce their social embeddedness and maintain existing relationships.

While the emergence of personal public spheres can be seen as a positive development—offering increased opportunities for participation and greater informational diversity—other consequences of social media carry far more negative connotations. Early concerns were shaped by metaphors of fragmentation and polarization, such as the "filter bubble" (Pariser 2011) and the "echo chamber" (Sunstein 2009), both of which continue to inform current debates. From the mid-2010s onward, these concerns were increasingly accompanied by warnings about the rise of disinformation, with popular terms like "fake news" and "alternative facts" (Kumkar 2022) gaining traction. While these two strands of critique are often linked in public discourse, they rest on different assumptions about how social media operate and differ considerably in terms of empirical support.

The concepts of the "filter bubble" and the "echo chamber" both rest on the assumption that algorithmic filtering and recommendation mechanisms amplify certain psychological patterns of information behavior—such as "selective exposure" or the avoidance of cognitive dissonance (cf. Festinger 1957; Knobloch-Westerwick 2015) as well as the tendency toward social homophily (McPherson et al. 2001), in potentially problematic ways. If personalization algorithms on social media prioritize content originating from users' personal networks or content similar to what they have engaged with in the past, this may lead people to gradually lose exposure to diverse topics and perspectives. Instead, their views may become increasingly reinforced through interaction with like-minded others, thereby contributing to societal fragmentation. Empirical research has shown that social media indeed offer spaces in

which groups can shield their worldviews or ideologies from contradictory information and are thus more vulnerable to politically motivated propaganda or misinformation, particularly when it aligns with their existing beliefs (e.g., Mahl et al. 2023 on conspiracy theories; Knüpfer et al. 2023 on politically extreme groups).

However, most social media users continue to encounter opposing opinions and information (cf. Flaxman et al. 2016; Dubois and Blank 2018; Scharkow et al. 2020). Moreover, in Germany, only a small segment of the population primarily or exclusively relies on social media for information on socially relevant topics (Behre et al. 2024). This does not mean that social media cannot contribute to processes of social polarization. Yet, they appear to do so in ways that differ from the scenarios implied by the concepts of filter bubbles and echo chambers, which assume isolated and internally homogeneous spaces (Bruns 2019). Instead, social media platforms seem to foster polarization by increasing the likelihood of users encountering strongly opposing views, often more frequently and more directly than in other social or media environments (Ludwig and Müller 2022; Törnberg 2022).

The spread of disinformation—that is, information that is knowingly false and communicated with the intent to mislead—should be analytically separated from fragmentation and polarization, even though it can be both an integral element of and a driver within these processes. Social media mechanisms play a central role in facilitating the spread of disinformation in several ways:

1. Social media platforms do not exercise editorial control prior to publication, making it easy for individuals or organizations with specific interests to circulate misleading information.
2. The reach of disinformation is amplified through a combination of user-driven and algorithmic dynamics. People forward disinformation within their networks, while automated accounts ("social bots") artificially boost its visibility within the networked public spheres of social media.
3. Recommendation algorithms tend to prioritize content that generates high levels of engagement and follow-up communication, keeping users on the platform longer and increasing advertising revenue. Emotional, controversial, provocative, or exaggerated content often performs particularly well and is rewarded with greater visibility (Diaz-Ruiz 2023). While not all content of this nature qualifies as disinformation, these characteristics are typical of most disinformation.

Disinformation can contribute to the consolidation of group identities by reinforcing people's views on social developments or political movements through false information or

content taken out of context. In this way, it fuels the dynamics of polarization described above. Populist actors often deploy disinformation strategically to intensify emotional confrontation along lines of an "us versus them" divide, rather than engaging in rational debate on factual issues. Moreover, it is now well-documented that Russia uses coordinated disinformation campaigns to destabilize democratic societies (Hameleers 2023).

This is especially problematic because disinformation undermines truthful communication—an essential cornerstone of democratic opinion formation and decision-making. Over the medium and long term, the persistent circulation of disinformation may also erode trust in the public sphere and its epistemic authorities, such as journalism or evidence-based science.

4. The (media) economy of social media

The communicative architecture of social media described above not only changes the structure of public communication but also contributes to a specific (media) economic transformation, which Helmond (2015) described as the "platformization of the web." This transformation can only be understood against the backdrop of the historical development of the Internet, and of the World Wide Web in particular (Gillies and Cailliau 2000; Winston 1998). The basic principles of internet communication that are still valid today—namely the exchange of data packets between networked computers using unique IP addresses via paths that are not defined in advance—were developed as early as the 1950s and 1960s at academic and military research institutions in the USA and Western Europe. Building on this basic technological principle, various communication services, such as e-mail and newsgroups, were introduced in the 1970s and 1980s. The development of the World Wide Web, conceived by Tim Berners-Lee at CERN in Geneva in the early 1990s, was particularly influential. It combined a specific markup language (HTML) for displaying texts and other content with hyperlinks—that is, the possibility of inserting clickable links to other documents into a web page.

All of these innovations originated in universities or research institutions. The Internet was initially a state-sponsored, non-commercial information and communication tool, primarily intended for military and academic use. However, by the end of the 1980s, the first commercial access and service providers (such as CompuServe and America Online) were licensed in the USA, where the Internet was most widespread. As part of its "Information Superhighway" initiative, the Clinton-Gore administration privatized the underlying infrastructure. In 1995, responsibility for the "backbones," i.e., the most powerful data

connections that held the Internet together nationwide, was transferred from the National Science Foundation to the private telecommunications companies Sprint, Ameritech, and Pacific Bell.

In the years that followed, the Internet expanded beyond academic circles into other areas of business and everyday life. Ideas (and sometimes myths) about the Internet's economic and social potential, on the one hand, and investments—particularly venture capital—on the other, mutually reinforced each other, fueling the first "dot-com boom." Companies no longer needed to generate an immediate operating profit but merely had to credibly promise future profitability (Kühl 2003). The "new economy" bubble burst at the beginning of 2000. Yet some of its central mechanisms persisted, especially the dominance of a dynamic, disruptive start-up culture combined with a strong reliance on venture capital. The "Web 2.0" label subsequently presented a positive and optimistic model for developing products, platforms, and business ideas (Stugr 2010).

However, the past two decades have also produced an unprecedented degree of technical and economic concentration: a small number of large companies—Alphabet (Google), Meta (Facebook), Amazon, Microsoft, and Apple—have emerged as the central players in today's Internet. They organize, control, and largely monopolize access to communication services, information, and knowledge (Dolata and Schrape 2022; see also Tilo Grenz and Stefan Kirchner on Platform Innovations, in this volume). These companies occupy key positions in the global "platform society" (van Dijck et al. 2018), in which value creation, the allocation of social resources, and opportunities for participation (i.e., power) are essentially tied to the authority to control information and data flows. But how exactly does this connection between control over data and value creation manifest itself—particularly in the case of social media platforms (as opposed to Amazon or Google)? In other words, what is the (media) economic innovation that characterizes platforms such as Facebook, YouTube, TikTok, or Instagram?

What these platforms have in common is that they record and transform every user activity, such as publishing, commenting, searching, rating, or recommending content, along with information about users' relationship networks (the so-called "social graph") and movement patterns, into comprehensive data profiles. These profiles are not publicly visible but are controlled exclusively by the platforms' owners. Their economic success—Meta, for example, generated profits of $39 billion in 2023 from its platforms, Facebook, Instagram, WhatsApp, and others (Meta Investor Relations 2024)—relies on this large-scale process of "datafication" (Mejias und Couldry 2019) in three key respects.

First, this data is essential for personalizing information and communication environments (see above), thereby making the platform more attractive to users and increasing their engagement and loyalty. Second, datafied users can be addressed more specifically as target audiences for advertising, enabling platforms to sell their attention at higher prices. Third, the collected data serves as a crucial resource for training machine learning systems (such as generative AI), where user interactions and shared content are analyzed to extract patterns for algorithmically generated recommendations and content.

The companies behind social media pursue two main strategies to build these extensive databases: On the one hand, they acquire other platforms to access their user bases and associated data. On the other hand, they design their platforms in ways that incentivize users to continuously create, share, and interact with content. Facebook's "Like button" is a prominent example of this kind of technological innovation, as it simultaneously provides functionality for users and creates economic value for the platform operator.

From a user perspective, the Like button primarily serves as a low threshold tool for interacting with other users' posts (Sumner et al. 2017). It allows users to respond to communicated content—a response which, depending on the context, may for example signal approval ("like" in the narrow sense), express condolences, or simply acknowledge the post. Liking, therefore, is always a social practice—a way of expressing identity and cultivating relationships.

At the same time, however, the "Like button" functions as a central hub for tracking user activity—both on Facebook itself and across all other websites that have integrated the feature. For Gerlitz and Helmond (2013), this interweaving of user practices and data collection constitutes the core of the "like economy," in which "the social is of particular economic value, as user interactions are instantly transformed into comparable forms of data and presented to other users in a way that generates more traffic and engagement. Furthermore, the increasing presence of Facebook features on the web contributes to generating connections between websites beyond the traditional hyperlink" (ibid., p. 1349).

5. Paradoxes and dynamics of social media

Social media technologies have significantly shaped communication since the 2010s. They fuel narratives and social debates about the Internet as an innovative and disruptive technology—both in positive and negative ways. They stand in the tradition of Web 2.0, but also build on earlier information and communication technologies (Schrape 2012). From the

perspective of communication sociology, two interrelated innovations make social media particularly momentous.

First, they are based on a specific communicative architecture with central principles (the unbundling and rebundling of content of all kinds, the personalization of information environments, and the convergence of conversation and publication) which transform the fabric of the public sphere. Second, they follow a business model grounded in the datafication of as many aspects of users and their actions as possible, in order to segment them as precisely as possible for advertisers.

The consequences of these innovations are not limited to social media in the narrower sense but extend into other areas of society, where practices and social structures are evolving alongside the rise of social media. Journalism provides a striking example: the convergence of conversation and publication makes users' follow-up communications on news stories and reporting visible both to their contacts and to journalists themselves. This visibility requires new editorial routines—not only for selecting and preparing content for distribution via social media but also for moderating user contributions and integrating them into journalistic work. These routines are particularly evident in emerging editorial roles such as the "social media manager" or the "community manager," which became increasingly professionalized during the 2010s (Bakker 2014). At the same time, the journalistic self-image is being reshaped by audience participation, influencing aspects such as the willingness to engage in debates with readers or to increase transparency in editorial decisions. Consequently, social media play a central role in redefining the relationship between journalists and their audience (Loosen 2023).

Another area where the impact of social media is starkly apparent is in the realm of social movements and broader democratic engagement. The information dissemination mechanisms of social media enable the bundling of attention from many previously unconnected individuals, often through tools such as hashtags (Rambukkana 2015) or subcultural memes (Shifman 2014). This dynamic can give rise to social formations such as "crowds" or "swarms," which coalesce around a shared issue but lack independent, stable coordination structures or collective decision-making capacities (Dolata 2017).

Nevertheless, social media can influence political decisions in at least two significant ways. First, they make the activities of these formations visible and quantifiable, often through metrics such as follower counts or likes. These indicators can reflect dissatisfaction or criticism or gauge the popularity of a cause. Second, social media can foster mobilization and political engagement by facilitating the dissemination of calls to action, such as organizing

demonstrations or promoting petitions. In this regard, social media enable social participation through “connective action” (Bennett and Segerberg 2012).

The transformations in fields such as journalism, political engagement, and everyday interactions are not without friction; they harbor paradoxes. For example, social media provide tools and communication spaces that help individuals navigate contemporary societies characterized by “networked individualism” (Rainie and Wellman 2012) and information overload. While they promise (and often deliver) opportunities for individualized identity management and networking (Kneidinger-Müller 2022), they also standardize and commodify these individual expressions and relationships in a process of continuous and encompassing “datafication” (Hepp 2020) of identities, events, and life courses: “The more one interacts with digital systems, the more the course of one’s personal and social life becomes dependent on algorithmic operations and choices” (Burrell and Fourcade 2021, p. 227).

Another paradox of social media lies in their promise to offer users extensive opportunities to participate in everyday and popular culture, as well as in political processes. However, users cannot participate in the fundamental decisions regarding the design and regulation of the platforms themselves. Instead, they are reduced to the role of customers for platforms like Facebook, YouTube, etc., a role they accept when agreeing to the general terms and conditions upon registering an account. Choices are further restricted by the limited availability of alternatives to the dominant platforms, and generally, transferring one’s profile and contact information to another platform is not feasible. The dominant position of a few social media platforms is not solely due to their innovative functionalities and affordances, but also to network effects and lock-in mechanisms (Kolo 2022), which reinforce the tendency toward monopoly.

We can safely assume that new social media platforms and apps will become popular in the coming years, while the current leading systems will continue to adapt and expand their functionalities. However, a truly disruptive innovation in social media that offers an alternative to the data-driven business model has yet to emerge. For instance, the decentralized and non-commercial approach of the “Fediverse,” which connects many different social media applications and servers through shared technical protocols for data exchange, has appealed to certain user groups who migrated from the microblogging service Twitter after its acquisition by Elon Musk, choosing platforms like Mastodon. Nevertheless, the Fediverse largely remains a niche phenomenon. While the recognition of social media as crucial infrastructures of a digital public sphere has occasionally sparked calls for public

funding of alternatives (Dobusch 2024), a serious political initiative at the European level has yet to materialize.

Progress has been evident in the systematic regulation of social media, particularly in response to the public debate over hidden influence on elections in Europe (Brexit) and North America (the 2017 US presidential election), as well as the scandal involving the consulting firm Cambridge Analytica. A series of laws and legal frameworks have been established to regulate social media platforms. In Germany, for example, the "State Media Treaty" underwent a significant amendment in 2020. This amendment marked the first inclusion of digital platforms (referred to as "intermediaries") within the media regulation system, imposing obligations aimed at ensuring transparency and diversity.

At the European level, the General Data Protection Regulation (GDPR) has regulated the protection of natural persons concerning the processing of personal data and the free movement of such data on the Internet since 2018. Additionally, the Digital Services Act (DSA), which came into force in 2024, extends regulation to all digital intermediary services beyond social media, including app stores and e-commerce platforms. Under the DSA, these platforms must implement effective and transparent complaint procedures. Furthermore, they will no longer be permitted to provide algorithmically personalized recommendations based on sensitive personal data, such as political beliefs or sexual orientation. However, the long-term impact of these regulations on social media platforms in the years to come remains to be seen.

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