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FULL PAPER

"Bridging Technologies" – Conceptualizing technological objects as interfaces between journalism and audience

„Brückentechnologien" – Technologische Objekte als Schnittstellen zwischen Journalismus und Publikum

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Abstract: Technologies have always been an important element of the production, distribution and consumption of media content. In the past years, the 'materiality' of media communication regained the attention of media scholars. This "re-discovery of media" (Zillien 2008) is accompanied by empirical research, for instance, on the implementation of technologies in newsrooms, but also on the adoption of new media technologies by recipients. Because existing theoretical models of the journalism-audience-relationship rarely include the 'mediating' channels (technological objects), we still face a conceptual gap regarding the role of technologies between media producers (journalists) and users (audience). Since we cannot fully understand the journalism-audience-relationship without reflecting the role of technological objects and infrastructures, a more inclusive framework is needed. To establish such a holistic view, the concept of technologies as 'intermediaries' or 'interfaces' is introduced. I argue that these 'bridging technologies' and their intermediating functions provide a helpful starting point to analyze how the journalism-audience-relationship is not only structured and shaped by cognitive, normative or cultural aspects and practices, but also by the affordances of media technologies. The proposed conceptual framework seeks to guide and inspire innovative empirical research, as well as to encourage a critical reflection of technological intermediaries.

Keywords: Journalism-audience-relationship, digital intermediaries, artifacts, media technologies, materiality

Zusammenfassung: Schon immer waren Technologien zentral für die Produktion, Distribution und Rezeption von Medieninhalten. Die Medienforschung der vergangenen Jahre rückt diese materiale Ebene bzw. Materialität von Medienkommunikation wieder verstärkt in den Fokus. Diese „Wieder-Entdeckung der Medien" (Zillien 2008) spiegelt sich etwa in empirischen Studien zur Technik-Implementierung in Nachrichtenredaktionen oder der Aneignung neuer (Medien-)Technologien auf Seiten der Rezipienten. Da bisherige theoretische Modelle zur Journalismus-Publikum-Beziehung diese vermittelnden Kanäle (technologische Objekte) kaum oder gar nicht berücksichtigen, besteht nach wie vor eine konzeptuelle Lücke bezüglich der Funktion von Technologien als Elemente zwischen Produzenten (Journalisten) und Nutzern (Publikum). Um diese Beziehung umfassender untersuchen und verstehen zu können, gilt es, Modelle zu entwickeln, die technologische Objekte und Infra-

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strukturen explizit einbeziehen. Grundlegend für ein solches Modell ist hier ein Verständnis von Technologien als ‚Intermediäre' oder ‚Interfaces' (Schnittstellen). Diese ‚Brückentechnologien' und ihre vermittelnden Funktionen bieten einen möglichen Ausgangspunkt, um nicht nur die kognitiven, normativen oder kulturellen Aspekte zu untersuchen, die für die Beziehung zwischen Journalismus und Publikum prägend sind. Sondern auch, inwieweit diese komplexen und dynamischen Beziehungen von den zugrunde liegenden Medientechnologien strukturiert werden. Das hier vorgeschlagene Modell versteht sich nicht nur als potenzieller Startpunkt für empirische Ansätze, es soll auch zu einer kritischen Reflexion der Rolle technologischer Intermediäre anregen.

Schlagwörter: Journalismus-Publikum-Beziehung, digitale Intermediäre, Artefakte, Medientechnologien, Materialität

1. Introduction

Almost fifteen years ago, Pavlik (2000, p. 229) postulated that technological change affects not only the way journalists do their job, the nature of news content, or the structure and organization of the newsroom and the news industry, but also the nature of the relationships between news organizations, journalists and their many publics. Today, many authors would surely agree that the digital age represents a "profound recontextualisation of media production, distribution and consumption" (Dubber, 2013, p. 33), and that our contemporary media environments seem to be "not just structured symbolically by omnipresent [ubiquitous] and pervasive media – . . . [they are] also arranged through the technological infrastructures in our lives" (Deuze, 2012, p. 8). With the increasing implementation of technological tools, such as social media plug-ins on news websites, the diffusion of mobile news apps or new ways to aggregate audience activities, we witness a renewed scholarly interest in technological devices, services or interfaces, as well as a growing awareness for the material dimension and infrastructures of media communication, "as these shape whatever information is sent or received in fundamental ways" (Deuze, 2012, p. 24). However, despite this (re-)discovery of media (Zillien, 2008) in media and communication research, there still exists a conceptual gap regarding the role of technologies in the relationship between journalists and their audience(s). Referring back to Pavlik's dimensions of technological change, this article particularly focuses on the fourth dimension of the 'nature' of the journalism-audience-relationship, and how it is structured and shaped by technological objects.

First, I will discuss selected empirical approaches on the role of technologies in practices of media production and consumption, as well as theoretical takes on the relation between journalism and audience (section 2). In that context, I will also introduce my understanding of the notion of 'technological objects' (section 3). One of this article's main goals is to establish an enhanced understanding of the constitutive elements in the journalism-audience-relationship under the conditions of contemporary media environments. To that end, the role of media technologies as 'intermediaries' and/or 'interfaces' between journalists and their audience as well as the intermediating functions of these technological objects will be discussed (section 4). Finally, a conceptual framework is introduced that

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not only comprises practices as well as communicative, cognitive, cultural and normative aspects related to the adoption of technological objects, but also the affordances and intermediating functions of these objects (section 5). Overall, the article seeks to spark ideas for innovative empirical research and critical reflections about the role of technologies in the journalism-audience-relationship.

2. Interconnections between journalism, audience and technology

As has been introduced above, the past years saw an increasing scholarly interest in the influence of technological innovations on practices of media production, distribution and consumption. The following section discusses different approaches in journalism studies and audience/user research from a practice, actor and a feature/tool-oriented perspective. Additionally, I will look at different theoretical conceptualizations of the journalism-audience-relationship and to what extent they refer to the role of technologies.

2.1 Approaches in journalism studies

In the field of journalism research, we find a range of empirical studies examining the role of (media) technologies and tools in the production of journalistic content and the ways in which technological change affects the gathering, presentation, dissemination and general substance of information. Domingo (2008), for instance, points to the importance of the materiality of news work: Professional culture does not exist in a vacuum, but is recreated and renegotiated in every production task, in the design of content management software, in staff decisions et cetera. Moreover, empirical research has shown that a networked media environment and the implementation of innovations in the newsroom not only affect daily *practices* and *journalistic routines* but also *journalistic roles, norms and self-conceptions* – i.e. the idea that professional journalists are the ones who determine what the public should hear and read about the world (Deuze 2009) – as well as *newsroom cultures*.

Many studies conclude that journalists defend their professional values, but are much more hesitant to assign users' proactive roles or employ models of active audience involvement in the process of creating journalistic content. This rather traditional understanding of news work is closely related to a reliance on existing norms and practices as symptoms of a certain newsroom ethos and processes of *boundary work*, i.e. struggles over textual authority, control and quality of content (Singer, 2010; Heinonen, 2011; Hermida, 2011; Thurman, 2011). Spyridou and others, for instance, conclude that professional culture (skills, ideas and practices) as well as knowledge gaps and resistances weaken the potential impact of technology towards innovation and audience-orientation to some extent (Spyridou, Matsiola, Veglis, Kalliris, & Dimoulas, 2013).

Other studies address the changing *work styles* of journalists, assuming that technology as an amplifier of change affects journalistic work and confronts them with a need to master these technologies in service of established goals, strategies and relationships (Deuze, 2009). This 'pressure' to adopt also leads to the emer-

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gence of *new journalistic roles*, e.g. technical specialists, and new conceptions of journalistic work (Nielsen, 2012). Ananny and Crawford, for instance, analyzed how news app designers "understand their work in relation to journalism as a profession and process, and how they see themselves as like or unlike others" (Ananny & Crawford, 2014, p. 1) in the field of networked news production. In this context, research has shown that different philosophies within the newsroom can create tensions between "traditionalists" and "convergers" (Robinson, 2010). However, these tensions regarding the adoption of technological innovations are not new: In his analysis of discourses among media practitioners over the past decades, Powers (2012) found that 'technologically specific' forms of journalistic work have been discussed as exemplars of continuity, as threats to be subordinated, and/or as possibilities of journalistic reinvention. These discursive positions not only reflect the resistances, contradicting positions as well as the willingness of journalists to rethink or renegotiate their professional culture in light of current technological changes. They also illustrate that the "history of journalism is tied to the evolution of technology" (Primo & Zago, 2014, p. 3), which is why we should look at technological infrastructures to further our understanding of the conditions behind changing practices of media production. The same is true for changing practices of media consumption and the ways in which the audience makes use of (media) technologies.

2.2 Audience and user research

From an audience – and/or user – perspective, the body of research examining the role of (media) technologies for communicative practices appears much more fragmented and diverse than in the field of journalism studies, because it derives from various disciplines and research fields, e.g. audience research, cultural studies or computer science. Broadly speaking, the approaches relevant for my discussion here examine the ways in which audience members and/or users create meaning through their interaction with the content of media technologies, how they play an active role in the material configuration of artifacts, and how this artifactual dimension enables and constraints certain communication practices (Siles & Boczkowski, 2012). Here, one key research area focuses on practices, circumstances and contexts related to the *adoption and appropriation of media (technologies)*: The domestication approach, for instance, looks at how (technological) media objects are embedded into the household and in people's everyday life. It reconstructs different stages of a circular adoption process, including the purchase, placing/objectification, integration and routinization as well as potential modification of these objects (Silverstone & Haddon, 1996). These processes result in certain social, physical and technological arrangements or repertoires of media with distinct and dynamic life cycles – an evolving living media world within the domestic environment of the household which is closely connected to the audience's everyday life (Deuze, 2012, p. 43). In the context of changing media environments, particularly in regards to the diffusion of mobile communication technologies, new approaches to media adoption have been developed. The model of mobile phone appropriation, for example, looks at how object-oriented

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and functional factors (expectations, norms and evaluations) influence the actual use of mobile devices (Wirth, von Pape, & Karnowski, 2008).

While these approaches more or less focus on individual use, adoption and integration of media technologies into people's everyday live, another important dimension of media appropriation concerns the processes of discursive familiarization and production of collective meaning at a social level. Here, the *social representations* approach might prove helpful. According to this approach, changes in the material and the symbolic world are related to existing social representations in social life, media or elsewhere in society (Höijer, 2011). As an integral part of shared knowledge, these representations allow members of a community to develop attitudes and assign meanings to communication and social action connected with novelties, e.g. in situations when communities are pushed to cope with new information and communication technologies (Sarrica, 2010). New meanings, for example of technologies, emerge, develop and change in ongoing and dynamic communicative processes of meaning-making and structuring of representations – e.g. by naming, antinomies, metaphors – that help to make the unfamiliar familiar, to relate novelties to previous knowledge (anchoring), and to substitute the inaccessible real object with a tangible representation (objectification; Gal & Berente, 2008; Höijer, 2011). These collective discursive processes are shaped by numerous contexts such as shared experiences, traditions, identities, as well as historical and socio-cultural backgrounds of the respective group or community (Gal & Berente, 2008; Sarrica, 2010).

Another body of empirical studies in the field of audience/user research looks at how certain *characteristics of media* and *psychological/motivational aspects* affect the use of and (active) engagement with (media) technologies: for example, studies examining how certain cognitive aspects and attitudes, such as the perceived usefulness or ease of use, influence the acceptance and intention to adopt new technologies (King & He, 2006); or how different dimensions of technical literacy, such as perceived competence and skills, are related to the users' motivations to create online content (Correa, 2010). Furthermore, many audience studies focus on the concept of *interactivity* – understood as a threshold of "the (technical) characteristics of media services, the characteristics of a communication process, and the users' perception" (Leiner & Quiring, 2008, p. 128) – and how (characteristics of) interactive features influence patterns of media consumption. Here, studies found that, for instance, different design choices of personalized information systems have an impact on the processing and reception of news (Beam, 2013) or that certain socio-demographic characteristics and attitudes of users predict the use of interactive functions of news websites (Chung, 2008). In their study on interactive features of online newspapers, Boczkowski and Mitchelstein (2012, p. 13) also found that news consumers use these features in very different ways due to contextual matters. While they point to the "changing and diverse relationships between interactive media features and the social practices afforded by those features", they also admit that the dynamics between technological capabilities, practices of use, and broader social circumstances are still not fully understood.

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Altogether, these different approaches inform about the conditions and processes related to the adoption and use of (media) technologies of individuals and/or groups as well as how the meaning of new technologies is negotiated in society through collective communicative processes. Moreover, they point to the role of (creative) user agency in practices of media consumption and how these practices of use are shaped by the users' characteristics (including motivations, norms, resources, skills, and attitudes), technological capabilities and broader social circumstances.

2.3 Features & Tools

In addition to these actor- and/or practice-oriented research approaches we also find a range of studies – mostly content analyses of online news sites – looking at interactive or participatory features and how they allegedly influence the journalism-audience-relationship, for example by mediating interactions. Among others, the analysed dimensions comprise:

- the *level of participation* the features allow and what assigned *user role* (as consumers, 'prosumers' or producers) or user activities they represent, e.g. consuming, influencing/manipulating and passing/distributing content (Jönsson & Örnebring, 2011; Himelboim & McCreery, 2012);
- the *degree of involvement* of the user these features afford (Milioni, Vadratsikas, & Papa, 2012);
- their *restrictiveness* (need for registration, degree of journalistic control over user-generated content) and how it might influence the willingness to contribute (Weber, 2012);
- forms of *interactivity* promoted through various features, i.e. medium/human-medium/human-human interactivity (Chung, 2008);
- different forms of *customization* (Spyridou & Veglis, 2008) features and (implicit or explicit) features for *personalization* (Thurman, 2011);
- different types of *transparency* enabled by these features due to a shift in what is visible on the "journalistic front stage" (Karlsson, 2011); and
- different *stages of the news making process* these features refer to, i.e. access/observation, selection/filtering, processing/editing, distribution and interpretation (Hermida, 2011).

Overall, most empirical studies mentioned above focus on either journalism *or* users of media (technologies) *or* specific media features. According to Ross (2014, pp. 157-161), this essential divide is prevalent in different traditions of media research and derives from the ontological distinction or 'structured break' between the social identities of producers and the social spaces and experiences associated with the everyday life of consumers. Nevertheless, we should keep in mind that media technologies in journalism are "shaped by professional and organizational protocols, as well as by the way people outside the newsroom use them and think about them" (Hermida, 2011, p. 30). Thus, we need to develop inclusive conceptual frameworks, which help us to overcome this gap of perspectives and to analyze how the journalism-audience-relationship is structured by technology.

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2.4 Theoretical takes on the journalism-audience-relationship – and technology?

While comprehensive theoretical clarifications of the relation between journalism and audience still appear to be lacking (Syvertsen, 2004), the journalism-audience-relationship represents a core interest of media and communication studies in different research traditions. Some examples are: the *dynamic-transactional approach* (Wünsch, Früh, & Gehrau, 2008), representing media effects research; the concept of *audience inclusion* in journalism, an approach deriving from systems theory (Loosen & Schmidt, 2012); or critical perspectives on the production and appropriation of media content in the field of *cultural studies* (Renger, 2004). Most of these approaches focus on *cognitive*, e.g. images, expectations, or *normative* aspects, e.g. functions of journalism, role of the audience, and how they relate to *practices* of content production and reception, such as the flow and symmetry of communication. Although some theoretical conceptualizations of the journalism-audience-relationship already include an artifactual dimension, such as the 'technical infrastructures' in Hall's encoding/decoding model (Krotz, 2009, p. 216), the functions and material aspects of (media) technologies play only a marginal role or are simply not an integrative part of most of these models at all.

In the past years, however, we see different attempts to discuss and examine the relations between journalism and audience from a more 'material' or 'artifactual' perspective. Interestingly, many of them adapt ideas from other disciplines, such as organizational research or science and technology studies. Fortunati and Sarrica (2010), for instance, refer to the *socio-technical approach* by describing journalism as a sociotechnical system that is characterized by various power relations, confrontations and negotiations between editors, audiences and journalists. In their analysis, they conclude that the professional fabric of journalism is restructured due to an interaction between technological advances and societal changes. In their view these processes also affect journalism's relation to its audience, because users are increasingly enabled to act in various roles "of consumers, producers, designers, and stakeholders" (Fortunati & Sarrica, 2010, p. 251). Larsson (2012) uses a different meta-theoretical perspective by applying Giddens' *structuration theory* in regard to interactive features on news websites. In his analysis of various empirical studies, he found that the "agents involved in the journalistic context, be they journalists or readers, tend to reproduce established structures" of 'audiencehood' rather than a structure of 'prosumerism' (Larsson, 2012, p. 260). He concludes that further research on agency, such as situated use, facilities, norms and interpretive schemes, and its relation to structures, such as rules and norms instantiated in use, might help us to better understand the (non-) use of interactive features.

Another approach recently adopted in media research is *actor-network-theory* (ANT), which stresses the role of (technological) objects or artefacts, i.e. non-humans, as 'actants' and active participants. Following this premise, several studies analyzed how different media and their (material) characteristics are important actors in a process of changing work practices, and how – vice versa – the news production network determines the way in which new technologies are embedded within newsrooms (Plesner, 2009; Schmitz Weiss & Domingo, 2010; Primo &

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Zago, 2014). An important contribution of ANT is its sensitivity for 'moments of translation' where different actors negotiate their roles, attributes and goals to reach a specific outcome. This interplay among different networks – actors and their relationships – can lead to a (re-)production of new orders, hierarchies etc., which might be disrupted due to resistances or novel actors that contest existing hierarchies and power relations (Spyridou et al., 2013, p. 79). Additionally, ANT provides a helpful differentiation regarding technological artefacts that supports our understanding of technological objects as relevant intermediating elements in the journalism-audience-relationship (see section 4): On the one hand we have intermediaries, i.e. entities of minor importance in networks or "carriers that can be used to enhance" certain routines and practices. Mediators, on the other hand, influence the meaning they are supposed to carry (Primo & Zago, 2014, p. 6). Moreover, the approach raises our awareness "about the fundamental force of media in shaping the social fabric and what we can say about it" (Deuze, 2012, p. 39; see section 3).

Overall, there is a need to address the blind spots in the literature by taking the dynamic interplay between human actors and technological objects more fully into account. As Lewis and Westerlund (2014, p. 3) postulate, we face the opportunity for developing a *sociotechnical emphasis* in our conceptions of the journalism-audience-relationship without assuming that technology itself is 'changing' the production, distribution and consumption of media in a somewhat deterministic sense. On the contrary, bringing technologies to the fore might help us to "reveal nuances in the relationships among human actors" and nonhuman elements "that cross-mediate their interplay" (Lewis & Westerlund, 2014, p. 3). But before I take a closer look at these intermediating functions of technological objects in the journalism-audience-relationship (section 4), we need to discuss what these objects are.

3. (The layers of) Media technologies and objects

Discussions revolving around media technologies and materiality have a long-standing tradition in various disciplines and research fields such as philosophy, sociology or cultural studies. In media studies they were mainly driven by theorists like McLuhan or Kittler. With the rise of digital media communication, these discussions regained scholarly attention and led to the emergence of new research fields, such as media archaeology or critical software studies. Although the notion 'technology' itself appears to be a rather fluid signifier, the definitions from various disciplines commonly refer to specific *material tools/devices* (e.g. machines, instruments) and their "assemblages" or "functional ensembles" (*material systems*), as well as *social* and *cultural dimensions*, such as knowledge or resources (Carpentier, 2011, p. 287-288). At the social level, this refers to the discursive and hegemonic dimension of technologies as meaningful objects, i.e. dominant or consensual ways of how to use a specific technology the 'right' way, which are continually negotiated in discursive processes (see section 2.2). Moreover, (media) technologies are related to "a variety of norms, rules and regulations that mediate their production and consumption" (Carpentier, 2011, p. 268).

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Many approaches on the emergence of technological innovations and their adoption face some criticism for being either technological- or social-deterministic. On the one hand, technological-deterministic perspectives (such as the 'Diffusion of Innovation' approach) have been criticized for their tendency to overlook the degree to which the adoption of media artifacts is tied to their social construction, and for overexposing the internal research and development (R&D) processes of the invention of new technologies, which are then made accessible to the public and set the conditions for social change and progress. Social-deterministic perspectives, such as the 'Social Shaping of Technology' approach, on the other hand, were accused of largely neglecting the extent to which the development of artifacts is linked to their planned and actual diffusion, and their perspective on technologies as 'by-products' of social processes and changes that are determined otherwise (Boczkowski, 2004, Hepp, 2012). Despite their shortcomings, these approaches inform about multiple actors and social groups such as engineers, users or designers, power relations as well as institutional, economic and cultural factors, i.e. socio-political environmental factors, that shape the development and adoption of (media) technologies (Hepp, 2012; Dubber, 2013). These ongoing processes of a "mutual shaping" unfold in certain historical contexts and are characterized by the simultaneous pursuit of interdependent technological and social transformations (Boczkowski, 2004, p. 263), such as perceived needs, social and political pressures. Moreover, all aspects and elements of the design, material development, distribution, usage and adoption of media technologies are subject to social production, i.e. they are "shaped by the actions, ideas, biases and beliefs of the people involved in the entire process, from design to actual implementation" (Deuze, 2012, p. 46).[1]

While keeping this in mind, let us come back to our question of what technological objects – and *media* technologies in particular – are. Broadly speaking, media technologies enable, structure or amplify communication between people. We use them for various purposes such as expression, information, influence or entertainment (Deuze, 2012). Media technologies afford the communication of meaning, i.e. they "are to varying degrees technologies of representation and communication, registration and distribution . . . arranged to enable their users to communicate through a variety of languages" (Carpentier, 2011, p. 270). Media technologies range from speech and writing (*techniques* of communication) to electronic media such as the Internet (the *technological basis* of mediated communication). These different technological elements form specific 'assemblages' and relationships with intersecting and heterogeneous social and historical contingencies – a media technology "is always rather a 'bundle' of various techniques than the homogeneity of a certain apparatus" (Hepp, 2012, p. 17). These arrangements are not merely mechanical, but also *organizational*: the arrangements of

1 In this context, Deuze (2012, p. 46) points out that technological change and development does not follow a linear trajectory: "The people involved often develop machines (or parts thereof) independent of each other; cultural appropriation of technologies flows from unintended events and uses; not a single standard or protocol for communication is ever permanent or inevitable; and dead media live on embedded in updated devices and evolved practices."

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large-scale, vertically structured mainstream media, for instance, differ from the small-scale, horizontally structured media arrangements of alternative or community media. Moreover, these arrangements point to *cultural dimensions,* such as "production cultures" related to certain technologies (Carpentier, 2011, pp. 270-271), i.e. media arrangements and infrastructures incorporate more than the artifacts and devices (hardware/software) we use to communicate and share information (content) – they also include "the activities and practices in which people engage to communicate . . ., and the social arrangements or organizational forms that develop around those devices and practices" (Lievrouw & Livingstone, 2004, cited in Deuze, 2012, pp. 40-41).

One important question is how these different technological objects structure our practices and – vice versa – how our everyday actions influence the nature and shape of these objects. In this context, Hepp (2012, p. 17) states that media "as such only become concrete in communicative action; however, they offer a certain 'potentiality of action' . . . which can be called the 'moulding force' of the media". Accordingly, media technologies have a certain material structure, which does not completely determine the usage, but that has a structuring effect on our actions, because it opens or restricts certain options of usage and therefore exerts certain pressures on the way we communicate (Zillien, 2008). Allen (2004), for instance, points to the importance of the ideologies behind interactive design elements on news websites that define the direction of interaction. Hence, while we as users of (media) technologies have agency, we are not completely autonomous of these 'forces', i.e. the properties, biases, inherent attributes or "rules that stipulate what is possible, what behaviors are to be encouraged . . . and what actions are not compatible with the space . . .. In other words, the media we create have 'affordances'" (Dubber, 2013, p. 34) that represent opportunities for action and shape and structure what is possible within a certain technological media environment. While some of these affordances are directly perceivable, others are "hidden" or misperceived by the users, i.e. the perception of affordances differs between users due to characteristics such as age, experience etc. (Zillien, 2008, pp. 167-168). In this context, research also suggests that people are "passionately appropriating the hardware and software of media in ways not necessarily intended by their designers and manufacturers" (Deuze, 2012, p. 18). Since users often ignore, alter or work around inscribed technological properties – due to error (lack of understanding, misperceptions) or intent (sabotage, invention) – and use technological objects in unintended ways, new forms of usage emerge through the practical use of objects in everyday life (Zillien, 2008). This also underlines that media technologies are not simply "something that 'happens to' and transforms our communication . . . [, but that we are] in a position to make decisions about the ways in which we use and express ourselves through these media" (Dubber, 2013, p. 34). This suggests that we should not only consider the affordances and material qualities (form, design, functions) as well as the decisions over the purpose, anticipated target group or 'ideal user' of technological objects and infrastructures "to understand what is possible and what not within that environment" (Dubber, 2013, p. 34), but also the ways in which people actively shape and appropriate media technologies (Siles & Boczkowski, 2012).

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Overall, a 'denaturalization' of technological (media) objects seems to be more important but also more complicated than ever due to their "seamlessness"; that is humans "and their communication technologies have become integrated more tightly" (Plesner, 2009, p. 624) in the course of a rapid development in practices and articulations towards these objects. Sometimes, it "seems as if media artifacts advance more rapidly than our everyday practices and social arrangements can keep up with. This . . . confronts people with increasingly complex and swiftly liquefying technologies for which we have to come up with new languages, habits and routines" (Deuze, 2012, p. 48). Since media systems are best understood as being in continuous flux, the moments when these environments change give us "the opportunity to examine . . . the nature and character" of their affordances (Dubber, 2013, pp. 34-35), as well as the "relationships between what media are (*artifacts*), what people do with media (*activities*) and how it fits into their everyday lives (*arrangements*)" (Deuze, 2012, pp. 47-48; italics added).

Due to their opacity – unlike physical media, most digital technologies do no longer demonstrate processes –, omnipresence and disappearance from our direct awareness (Deuze, 2012, p. 42), we have "little intuitive sense" (Braun, 2013, p. 3) regarding the functional components of digital media. In many cases, the interior of (digital) media technologies remains an obscure and indeterminate 'black box'. "We know what goes into them (ideas, values, actions and experiences), and we can witness the impact of what comes out of the boxes – but we generally have no idea about what goes on inside" (Deuze, 2012, p. 44). This might explain why the role of technologies for communicative practices is still not fully understood. And while we as media researchers do not have to understand every technical detail of the infrastructures of media communication, there is a certain need to 'unbox' these technologies with the help of sociological terms and/or empirical tool kits of social researchers.

Table 1: Layers and components of media technologies

Layer	Components
Infrastructure: logistics (transport)	Cable-, satellite-, telephone-, computer-, protocol- and server networks
Instruments: Hardware (sending/receiving)	Sending and receiving devices, e.g. radio, TV, computers, mobile devices
Interfaces: Software/Code (Input-Throughput-Output)	Programs, algorithms, browser, APIs, graphical user interfaces, data bases and protocols

One starting point would be to identify and analyze the different layers and components of media technologies, which play a role in the production, distribution and reception of media content. As shown in table 1, the *layers* refer to different *functional groups* of technological objects (*components*), e.g. hardware devices that serve the purpose of transmission and reception, or different logistical infra-

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structures transporting information.[2] These components, e.g. cable or server networks, mostly run at the 'backend', but many interactions between media producers and consumers take place on the 'frontend' and are mediated by interfaces, i.e. software or code. In the following section, I will focus on this group of technological interfaces – the layer of input-throughput-output – such as browser-based services, smartphone applications or web statistic programs, and their intermediating functions.

4. 'Bridging Technologies': Media Technologies & their intermediating functions

Before we discuss the role of technological objects and the intermediating functions they afford as 'bridging' elements in the journalism-audience-relationship, we need to set out an analytical reference. Here, the concepts of *intermediaries as actors* and *intermediation as a process* are helpful. The notion "intermediary" originates from the financial and trading sector. In general, an intermediary – or 'go-between' – can be understood as a third party that offers intermediation services between two trading parties, e.g. producer and consumer; it typically offers some added value to the transaction that may not be possible by direct trading.[3] It is useful to differentiate between intermediaries as (a set of) *actors* with certain *functions* and *purposes,* and intermediation as a *process*. In his analysis of innovation systems, Howells (2006) identifies emerging sets of intermediating *actors* that perform various tasks within innovation processes, among them firms, bridgers, brokers, information intermediaries (associated with information exchange) or superstructure organizations. In the realm of the Internet, we find different "cybermediaries" (Sarkar, Butler, & Steinfield, 1995) – specific actors or services, e.g. search engines, publishers, forums, fan clubs or user groups – or "digital intermediaries", e.g. content-platforms or social networks (Braun & Gillespie, 2011). By looking at *intermediation as a process*, we can identify different intermediating functions offered, enabled or fulfilled by these intermediaries such as foresight and diagnostics, scanning, aggregating and processing of information, knowledge (re-)combination, 'gatekeeping' and/or brokering, validation and regulation, or the matching and integration of consumer and producer needs (Sarkar et al., 1995; Howells, 2006). Howells points out that a growing number of (human) actors, physical artefacts and concepts, e.g. statements and texts, are involved in these processes, which also play an "'animateur' role of creating new possibilities and dynamisms" (Howells, 2006, p. 726) – together they form complex systems or networks of intermediation.

Against this backdrop, media technologies can be conceptualized as (a set or ensemble of) intermediating 'actors' – artifacts and/or other third parties, e.g. technology providers – which offer, enable or fulfill different intermediating functions. As 'bridging technologies', they mediate, shape, stimulate and facilitate different interactions between journalists and their audience.

2 Other characteristics of media technologies comprise their scale and reach, their 'materiality' (digital, physical, procedural), or the persistence, precision and speed of transmission.

3 See: http://en.wikipedia.org/wiki/Intermediary (accessed on October 5, 2014).

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Table 2: Examples for intermediating functions of software (input-throughput-output layer)

Intermediaries	Intermediating Functions	Some examples
Search engines & aggregators	Searching, selecting, aggregation, "gatekeeping"	*Google News, Rivva, reddit, netvibes*
Bookmarking services	Information processing, distribution	*Mr. Wong, Delicious*
Social network sites	observation, investigation, distribution/ content passing, consumption, follow-up communication, "shared spaces" for opinion exchange and interpretation	*Twitter, Facebook, Google+, Pinterest (and plugins on media websites)*
Content platforms	observation, investigation, distribution/ content passing, consumption, follow-up communication	*YouTube, Vimeo, flickr, Bambuser*
Web analytics	Observation (customer information) and surveillance, aggregation & presentation	*Google Analytics, Omniture Site Catalyst, Rankings („most …")*
Crowdsourcing-Tools	investigation, examination, presentation, processing & combination of knowledge and resources, collaboration	*Spot.us, emphas.is, Open Platform Guardian, storify, ProPublica*
Uploading Tools	investigation, observation, combination of knowledge	*20min.ch, BILD Leser-Reporter, Die ZEIT Leserartikel*
Mobile News Apps	Distribution, consumption, observation (user statistics), presentation	*Push messages, Updates, breaking news*
Subscription services	Personalization, consumption	*RSS-Feeds, newsletters*
On-Demand platforms	Distribution, consumption, observation (user statistics)	*BBC iPlayer, Catch Up TV, IPTV, VOD*

Table 2 shows different examples of software/interface intermediaries (input-throughput-output layer) and their intermediating functions that reflect the intermediation processes discussed above as well as different stages of the news-making process (section 2.3). Instead of merely aggregating news sources or helping users to find news resources on the web, e.g. via Google News, these software interfaces comprise a broad range of intermediating functions. Some of these interfaces, such as mobile apps or social networking platforms, appear to be hybrid intermediaries that provide more functions than others. Taking this as a starting point, we can examine the role of 'bridging technologies' in the practices of the production, distribution and consumption of media content.

Broadly speaking, in journalism they afford new ways of *producing stories*, e.g. via crowd-sourcing, audience material/user-generated content or data-driven storytelling, as well as new ways of content *distribution*, e.g. via social media plugins or search engines. Additionally, specific technological tools provide new possibilities to *monitor, aggregate and quantify the audience* as well as to integrate audience activities in the journalistic product (Wehner, 2010). On the audience side, these 'bridging technologies' enable users to actively generate content with regard

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to journalistic products and add something, e.g. in comment sections on news websites. Certain technological tools afford new practices of *distribution*, e.g. recommending or sharing activities, as well as *engagement* with media content, e.g. in form of follow-up communication or mutual orientation processes among audience members; in the realm of digital media, users can easily remediate – in form of mash-ups, remixes, memes – and re-distribute journalistic content via content platforms like YouTube. Other tools allow users to examine the quality of journalism. The website Churnalism.org, for instance, allows users to compare press releases with UK press articles and BBC content to identify the amount of 'churnalism', i.e. news articles closely based on original press releases. Additionally, the introduction of interactive features and/or personalization tools on news websites as well as mobile devices and apps amplifies and enhances the practices and contexts of media *consumption*.

One strength of the proposed perspective is that it allows us to bring together the different empirical insights of journalism and audience research regarding certain technological artifacts and interfaces, e.g. recommendation, sharing and social bookmarking features on news websites. From the audience perspective, these tools open up new practices such as social navigation, resulting in media repertoires that are influenced by previous media activities of others, as well as by new forms of algorithmic data processing (Lünich, Rössler, & Hautzer, 2012, p. 245). Rankings like "most emailed/recommended" are interpreted as a means to bring awareness to content that the audience might otherwise reject or dismiss. In consequence, these rankings might lessen the ability of media institutions to shape their public's opinion about the relative importance of specific articles (Thorson, 2008, pp. 485-486). And indeed, as Singer (2013, p. 1) postulates, facilitated by technology and enabled by online news editors, users are *secondary gatekeepers* of the content published on media websites. In a two-step gatekeeping process of 'editorial' decisions and selective dissemination, they upgrade or downgrade the visibility of content for a secondary audience.

From the journalists' perspective, the introduction of new tools and programs to track and monitor these activities represents an important shift in the journalist-audience relationship, because the process of deciding what is news is increasingly influenced by quantitative audience measurement techniques. While journalists often reject certain aspects of audience participation, they become more aware of and increasingly reliant on information about audience preferences in form of quantitative feedback (metrics, tracking data), which also affects the way media producers think about their audiences, in a rhetoric of active, empowered, generative audiences (Anderson, 2011; Lee, Lewis, & Powers, 2012). Although such data forms the basis for more evidence-based news reporting decisions, research also reveals certain gaps in the news preferences of editors and audiences, as well as contrary attitudes regarding the ways in which journalists react to server data, e.g. resistances against certain market pressures. Overall, MacGregor (2007, p. 280) concludes that "social and organizational context rather than technology alone shape the way . . . professionals react to their new tool."

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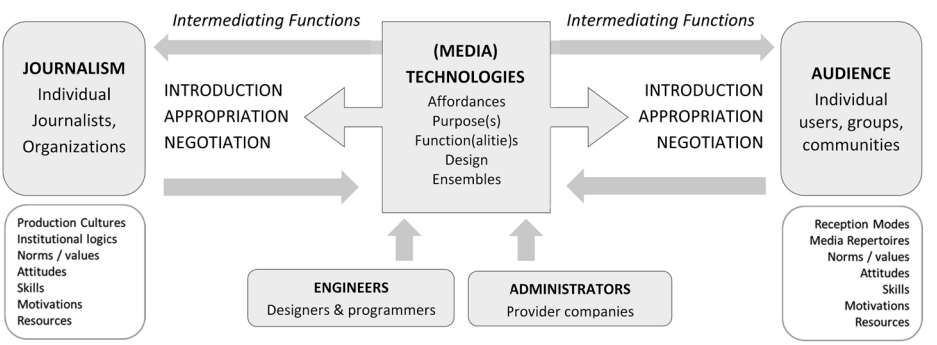
5. Proposing a conceptual framework

Considering all the aspects in the previous chapters, it is insufficient to merely describe technological objects as transmitters of interactions between journalists and their audience. As Lewis and Westerlund (2014) point out, we face the scholarly need for inclusive conceptual frameworks that accommodate and account for the interconnections among the different elements that structure the relation between journalists, audiences and 'bridging' technologies (artifacts, devices). To this end, the proposed conceptual framework (figure 1) comprises different human and non-human actors, their characteristics and/or functions as well as their interactions. To account for the procedural dynamics and intertwined activities that constitute the practices of media production and reception through different media technologies, the framework also includes the three stages of introduction, appropriation and negotiation of technological objects. These ideal stages reflect the circularity of these processes and help to reconstruct what happens when (time) and where (space) in regard of "the activities and practices in which people engage to communicate or share information, and the social arrangements or organizational forms that develop around those devices and practices" (Lievrouw & Livingstone, 2004, cited in Deuze, 2012, pp. 40-41).

The process starts with the *introduction* of a new technological artefact, e.g. a specific feature, service or device, either implemented by a media organization itself, or by different intermediaries, for example providing companies such as Facebook (*administrators*). Additionally, the implementation also comprises prior planning stages, e.g. in R&D departments, in which the objects, their purposes, ideal users and uses are imagined, designed and programmed. In this stage, the work, values and ideas of technical experts, programmers and designers (*engineers*) also play an important role, because they shape to a great extent the (hidden) affordances, form and functionalities, as well as the practices the technological object enables and/or constraints, i.e. its intermediating functions. Thus, we should keep in mind that technologies are social constructs that are "shaped by the actions, ideas, biases and beliefs of the people involved in the entire process, from design to actual implementation" (Deuze, 2012, p. 46).

Figure 1: Formations and processes shaping the interplay between journalism, audience and media technologies – a conceptual framework



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After the introduction, the phase of *appropriation* on both, the side of the journalists and the audience members, begins. As set out above, this includes the incorporation of the new technological artifact – and its intermediating functions – in existing practices, media arrangements and repertoires. However, new technologies do not only enable a different or more efficient way to execute former practices, they also alter existing practices or require new ones (Zillien, 2008). Therefore, journalists might be forced to develop new practices, skills and routines to accomplish new technology-related tasks (Deuze, 2009), and the same is true for audience members. Moreover, the appropriation phase comprises dynamic communicative processes of meaning-making and familiarization that help individuals (journalists, users) and groups (news organizations, user communities) to relate novelties to previous knowledge, and to substitute the inaccessible real object with a tangible representation. However, we should keep in mind that while the adoption is subsequent to certain social pressures, this does not necessarily mean that new media technologies, "once part of people's everyday lives, are used in the way they were originally intended to be by those who design or market them" (Deuze, 2012, p. 46). Therefore, we should also take into account the various contextual aspects that play a role in the appropriation of technological objects, including historical and socio-cultural backgrounds, shared experiences, traditions, and identities of the involved communities, e.g. newsroom cultures, as well as the characteristics (motivations, norms, resources, skills, and attitudes) of individuals.

The processes of appropriation are closely intertwined with the *negotiation* stage, i.e. the continuous debates over the meaning and concepts behind a technological novelty that not only take place within and across media organizations, but also between journalists and audience members, through mutual observation and feedback. Sometimes even external actors, such as providers of intermediating technologies, are involved in these discursive processes that can lead to a conversion, modification or adjustment of the respective artifact. Regarding the role of technological objects in the journalism-audience-relationship, the negotiation stage offers interesting analytical 'moments' that allow us to identify conflicts, resistances and irritations, but also emerging norms, rules and changing power relations accompanying the appropriation of artifacts. Particularly these points of contention and controversy "are among the most telling moments in the study of culture . . . [because] the norms, assumptions, and expectations of various actors in a social system become uniquely visible when they are breached" (Braun, 2013, p. 3). One example for these negotiation processes are the ongoing debates revolving around comment sections on online news sites that not only reveal different positions of users and journalists regarding anonymity and civility (Reader, 2012), but also different "philosophies" and expectations towards the role of comment sections and their active users:

> "For reporters, these people reached the level of 'sources' and 'fact-checkers'. For readers, these spaces were the chance to 'talk back' and change the direction of journalist-initiated dialogue. Both groups wanted a commenting policy that established and maintained their own textual authority" (Robinson, 2010, pp. 140-141).

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While journalists are nowadays accustomed to a much greater audience presence in newsrooms via web analytics, comment areas etc. (Heinonen, 2011), certain degrees of audience participation enabled through new technological tools appear to be incompatible with existing norms and mutual expectations of journalists and audience members (Heise, Loosen, Reimer, & Schmidt, 2014).

Overall, the negotiations revolving around the introduction and appropriation of media artifacts shed light on ongoing processes of a "mutual shaping" (Boczkowski, 2004) between technological objects and those who use and develop them, as well as the simultaneous pursuit of interdependent technological and social transformations. I hope that the proposed conceptual framework provides a helpful starting point to analyze these processes and the interplay of the involved (human and non-human) actors from a more holistic perspective.

Example: Comments on Facebook fan pages

The following section illustrates some of these conceptual ideas with an example for the impact of small-scale critical moments: the reorganization of the comment function on Facebook, an example of how gradual changes of the technological pursuit of communication lead to confusion and irritations for both, journalists and user. But first, let us take a look at Facebook as a digital intermediary. Particularly for media organizations, the practical value and attractiveness of the social networking platform derives from its broad variety of intermediating functions (see table 2). For example, the service facilitates new forms of content distribution via sharing or recommendation plugins. These tools not only help media organisations to reach their audience where it prefers to be, but can also increase the traffic that goes back to news sites. Facebook also provides new tools to observe and to generate data about users that might become an integral part of the journalistic product, e.g. in form of automated rankings of user activities. Moreover, Facebook lets media organizations outsource certain processes coupled with hosting the public discourse, true to the motto: "let the production of news be handled by the news professionals, and let . . . Facebook handle the community management" (Braun & Gillespie, 2011, p. 395).

Since November 2012, the service gradually changed the structure and logics of comment sections on fan pages with over 10 000 fans, meaning that comments under postings are no longer shown in chronological order but are weighted according to their "relevance". These changes were officially announced in March 2013 by Vadim Lavrusik, manager of Facebook's Journalist Program. The new comment features, which allow users to reply directly to comments and start conversation threads, were "designed to improve conversations" as well as to make it easier for media organizations and journalists

> "to interact directly with individual readers and keep relevant conversations connected. . . . [T]he most active and engaging conversations among your readers will be surfaced at the top of your posts ensuring that people who visit your Page [sic] will see the best conversations."[4]

4 See: https://www.facebook.com/notes/facebook-journalists/improving-conversations-on-facebook-with-replies/578890718789613 (accessed on November 19, 2014).

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Technically, this relevance induced re-ordering of comments is based on a set of algorithmic definitions of: "positive feedback" (likes, replies), "connections" (comments by 'friends' appear on top) and "negative feedback" (number of spam reports in a thread, involvement of frequent spammers). As a result, the conversation display on the Facebook fan page of a media organisation differs for each visitor. Compared to encompassing changes of the Facebook user interface in the past, such as the implementation of the News Feed, these structural changes only seem to have had a minor impact. Nevertheless, they caused some conflicts on the journalists' as well as on the users' side, for which Juliane Leopold, social media editor at ZEIT Online, found an interesting metaphor:

> "Imagine that you are a baker. You are just preparing to begin your daily baking routine like you always do, which is known to produce the best bread in town, when you suddenly notice that someone messed with your oven, changed your type of flour to a different type . . . as well as your yeast, which had been switched for baking soda. To add to that, your colleague now assumes you're getting crazy, because of what *he* sees of the bakery still looks like the place you both have been working in for ages. Your customers, on the other hand, accuse you of having added strange extra ingredients, because for them, your product – the best bread in town – now looks and tastes very different from what you used to bake for them." (Leopold, 2013, italics added, translation from German original)

After the rather unexpected implementation of the new comment features by Facebook (*introduction stage*), Leopold faced several problems: not only did she as a social media editor struggle with the need for new discussion moderation practices. The fan page users also accused her and her colleagues of deleting their comments because they could not find them on top of the comment threads as usual. This irritation, caused by Facebook as powerful mediator, disrupted the relation between journalists and users and urged social media editors to explain the new comment logic to avoid further conflicts. According to the conceptual framework, the adjustment of the new comment logics to former moderation and/or comment practices as well as the familiarization and struggle over its meaning on both sides can be interpreted as part of the appropriation and negotiation stages. Here, it would be interesting to reconstruct the communicative processes related to the introduction of the new features and how they reflect the different backgrounds, shared experiences and identities of the involved groups, i.e. journalists and fan page users/commentators.

In my view, this example illustrates how the interaction between media organizations and their audience is being (re-)shaped and sometimes disrupted by subtle changes of the interface – in this case, the algorithmically determined order of discussions on Facebook fan pages. Above that, it also highlights that Facebook's position as provider and 'engineer' of an intermediating infrastructure – the fan page interface – is far from neutral. First, the framing of the new comment structure as an "improvement" designed to upgrade "the best conversations" reveals Facebook's vision of how the network should be used – a vision in which "a useful individual is one who participates, communicates and interacts" (Bucher, 2012, p. 1175). Secondly, it points to the algorithms' power to determine which

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content is visible or not, and to the fact that the underlying programming decisions might differ from the expectations of users and journalists. This also poses important questions about the increasing role of digital intermediaries as powerful third parties in the journalism-audience-relationship: What, for instance, are the consequences for media organizations regarding the control over their distribution channels? As Leopold (2013) admits, her employer *ZEIT Online* does not own the metaphorical 'bakery' which is Facebook; thus, the medium remains a 'guest' at the bakery and is bound to the rules of the host. In light of an increasingly close entanglement of journalism and so called metajournalistic services (Braun & Gillespie, 2011, p. 395), we also need to critically assess the dependency of media organizations on these services and their intermediating functions. Such functions reach from the circulation and discovery of content, e.g. via Google News, to providing the environment for public dialogue, e.g. on social networking platforms.[5]

6. Some final remarks

While it seems to be clear that the ramifications of technological change are forcing media scholars and practitioners alike to rethink the manifold relations between journalism and audience, we still lack the theoretical frameworks and empirical tools to tackle these urgent questions. In my view, a conceptualization of media technologies as intermediating structures provides an analytical starting point and might help to establish a more balanced view on both, journalists and their audience(s). Such a shift of perspective is much needed, not only in terms of overcoming the producer-audience-binary or social-/technological determinisms: For example, a recent study (Borger, van Hoof, Costera Meijer, & Sanders, 2013, p. 130) argues that the understanding of participatory journalism is dominated by the perspectives of journalists due to a strong focus on the production culture of professional journalism. Thus, the conditions on the part of the audience need a more central position in journalism studies.

What is more, many open questions remain with regard to the role of technologies in the journalism-audience-relationship, e.g. concerning the irritations and conflicts evoked by the introduction of technological intermediaries. As Nielsen (2012, p. 961) points out, innovative tools are "not off-the-shelf, plug-and-play gadgets seamlessly adopted by existing organizations". Their implementation does not follow an inherent technical logic, but is accompanied by socio-communicative processes of appropriation and negotiation on and between both sides. It would be interesting to identify (potential) barriers for the adoption and acceptance of technologies, such as incompatibilities with existing professional norms,

5 On German news websites, for instance, we witness a certain *standardization* process. Whereas in 2012, many pages offered multiple options for sharing and bookmarking, one year later most websites narrowed down these sharing options to the 'Big Three', Facebook, Twitter, Google+. Eventually, the providers of journalistic content are becoming a relevant part of what Gerlitz and Helmond (2013, p. 1362) call the "Like economy": an alternative fabric of the web, in which social interaction is instantly metrified and creates specific relations between the social, the traceable and the marketable.

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routines, or social identities. Moreover, we should ask if and how technological objects and their affordances are (re-)shaping the role of the audience as consumers, as producers, as active citizens or as interactive "players" (Jönsson & Örnebring, 2011; Syvertsen, 2004): What does the implementation of specific features – plus their design and functionalities – tell us about the intentions, willingness and ability of journalism/journalists to empower and invite their audiences to participate? And if these participatory features are primarily designed to generate revenue for the media organizations rather than attracting feedback or to reach audiences on several platforms (Enli, 2008) – what is their added value?

Furthermore, media research should pay attention at how software architecture and algorithms such as Google PageRank, which are designed to make things visible in a specific way due to cultural assumptions about relevance and importance (Bucher, 2012), are shaping the users' practices and experiences by determining what they encounter online. Currently, a much debated issue is the role of algorithms as substitutes for certain journalistic functions, i.e. the filtering, prioritization and weighting of information, or the role of the structure and 'ideology' behind news alerts and search engines. Referring to our conceptualization of intermediaries as actors, we should also critically examine the role of big influential actors like Google or Facebook and the increasing dependency of media organizations on the intermediating functions of these metajournalistic services, e.g. to distribute content or to attract younger target groups. These administrators are powerful mediators, in an ANT sense, because they not only shape, but also influence the meaning they are supposed to carry, which creates certain tensions and challenges longstanding power dynamics.

In this context, another crucial question is how we deal with the complexity and opacity of the inner workings of technological artifacts that often remain 'black boxes', particularly in digital media environments. How much do we actually need to know about the technological basis to examine their role in the journalism-audience relationship? Here, I want to conclude with Bucher (2012, p. 1177) that it is not necessarily important "to know every technical detail of how a system works, but to be able to understand some of the logics or principles of their functioning in order to critically engage with the ways in which systems work on a theoretical level."

While it is important to account for the historical contexts and (dis-)continuities along which current developments unfold, we should also scrutinize their novelty. It might be helpful to consult older studies and theories stemming from earlier times with similar critical moments of disruption through technological innovation, such as during the first phases of the computerization of newsrooms in the 1970s and 1980s (Weischenberg, 1982). Moreover, the disciplinary borders of media and communication research should be made more permeable: as the recent theoretical adaptations and 'translations' in journalism studies have shown, we might greatly benefit from insights, ideas and conceptual inspirations from other disciplines such as science and technology studies or computer science.

To conclude, this article's goal was to discuss the role of technologies and their affordances in the journalism-audience-relationship. To this end, I introduced a perspective on technologies as 'intermediaries', 'interfaces' or 'bridges' and exam-

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ined their numerous intermediating functions in practices of media production, distribution and consumption. Finally, the article proposed a conceptual framework that might help researchers to analyze the interconnections among media producers, recipients and technological objects from a more holistic, critical perspective. If nothing else, this work wants to encourage media scholars to pursue the "(re-)discovery of media" (Zillien 2008) and to develop innovative empirical methods that might help us to draw a more comprehensive picture of the ongoing technological and social transformations, the historical continuities and changes of media technologies and the ways in which they are (re-)shaping the relationship between journalists and their audiences.

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