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Technological innovation and convergent journalism. Case study on the transformation process of Bavaria's public broadcasting service

Innovación tecnológica y periodismo convergente. Estudio de caso sobre el proceso de transformación del servicio de radiodifusión pública de Baviera (Alemania)

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Abstract

As a consequence of technological innovations and their social utilisation, media organisations and newsrooms are undergoing a fundamental transformation process. This article analyses the interrelations between technological innovations and the challenges of convergent journalism. Studies conducted on newsroom convergence to date set out from one-sided influences: They investigated the extent to which technical innovations determine the newsrooms, or whether journalistic structures and long-range trends are so strong as to largely obstruct the adoption of new technologies in journalism. Therefore technology — especially in studies carried out on newsroom convergence — is considered as an influencing factor on somehow resisting or non-resisting newsrooms. We broaden the scope of this investigation by considering that any such influence might not come exclusively from technology, but that impulses can come also from innovative newsrooms: technological gaps, wishes and obstacles are identified from the journalist's viewpoint and brought to the attention of the developers of newsroom technologies — on the basis of empirical research findings from a case study of Bavaria's public broadcasting service, Bayerischer Rundfunk (BR). With its 5.000 employees, BR is one of Germany's largest media organisations. It is undergoing a fundamental and

Resumen

Como consecuencia de las innovaciones tecnológicas y su uso social, los medios y las redacciones están afrontando un proceso clave de transformación. Este artículo analiza las interrelaciones entre las innovaciones tecnológicas y los retos para el periodismo convergente. Los estudios realizados sobre la convergencia de redacciones hasta la fecha indican una serie de influencias y analizan hasta qué punto las innovaciones tecnológicas influyen en las redacciones o si las estructuras periodísticas y las tendencias a largo plazo pueden obstaculizar la adopción de nuevas tecnologías en el periodismo. Por tanto, la tecnología, -en especial en aquellos estudios sobre la convergencia de redacciones- se considera un factor determinante en la resistencia o la falta de resistencia al cambio en las redacciones. En nuestra investigación ampliamos esta perspectiva al considerar que este tipo de influencias puede no surgir exclusivamente de la tecnología, sino que también puede surgir por la implantación de la innovación en las redacciones; en nuestro trabajo se identifican las brechas tecnológicas, las aspiraciones y los obstáculos que afrontan los periodistas y que plantean los desarrolladores de tecnología en las redacciones, mediante el estudio del caso de la emisora de radiotelevisión

long-term convergence process. A variety of gaps, problems and wishes came to light from 25 in-depth interviews with journalists working on innovative projects. For example, criticism is expressed of complicated, partly unknown or non-existent networking of cross-media production systems. There is a desire for the increased use of consumer devices like smartphones in professional news production. There exists a creative potential for innovative solutions, but these are not comprehensively evaluated. To date, there has been no systematic implementation of the findings of innovative media projects in everyday journalistic practice.

Keywords

Journalism and Technology; Newsroom Technology; Newsroom Convergence; Innovations in Newsrooms; Transformation of Public Broadcasting Services; Bavaria; Germany

pública de Bavaria, Bayerischer Rundfunk (BR). Con sus 5.000 empleados, BR es una de las empresas mediáticas más grandes de Alemania, que afronta un proceso de convergencia a largo plazo. Las entrevistas realizadas a 25 profesionales de dicha emisora que trabajan en proyectos innovadores revelan una serie de problemas e inquietudes sobre el uso de la tecnología; el artículo ofrece un enfoque que hasta ahora no se ha dado en el análisis de la innovación en la práctica periodística.

Palabras clave

Periodismo y tecnología; tecnología y redacción periodística; convergencia en las redacciones periodísticas; innovación en las redacciones periodísticas; transformación servicios radiotelevisión pública; Baviera; Alemania

1. Research context and research questions

Media organisations and journalistic newsrooms are undergoing a fundamental transformation process. Workflows, processes as well as working methods, roles and competencies of the actors change when newsrooms no longer work for a single medium – such as TV or radio – but instead utilise all channels, including the digital channels, to serve and interact with the public (Kaltenbrunner & Meier, 2013; García-Avilés, Meier & Kaltenbrunner, 2016; Hofstetter & Schönhagen, 2016; Meier, 2016). This article analyses the interactions between technological innovations and the challenges of newsroom convergence. The results are presented of a sub-study carried out within the scope of a project supported by the Bavarian Research Foundation that was conducted throughout 2015 and 2016 by the interdisciplinary research group "Rundfunk 2025" – a team of researchers specialising in the areas of journalism and technology¹.

Few role models exist for cooperation in the areas of journalistic and technological research in the digital era. We took as a guideline the EU "Social Sensor" project in which the journalistic requirements of new tools for the use of social media were investigated and that computer scientists took as a basis on which to develop software that is in turn evaluated in social use (Schiffes et al., 2014). Our overall project aimed at a similar objective for broadcasting technology: In an initial step, the journalistic research identified technological wishes, gaps or obstacles for innovative cross-media quality journalism in convergent media environments; in a next step, an interdisciplinary "gap analysis" was carried out. This set out to systematically identify the gaps between existing and desired technology and served finally as the basis for technological research aimed at developing suitable concepts for system architectures and giving industry development impulses. In this article we confine our remarks to the sub-study focusing on journalism research.

The study was conducted within the theoretical framework of research on newsroom convergence: As a consequence of digitisation, economic pressure and the change in media utilisation, the legacy media feel themselves compelled to integrate all new digital communication channels and platforms into the newsroom – e.g.: websites; social networks; audio and video streaming; on-demand media offers for smart TVs, mobile devices such as smartphones and tablets; phenomena such as "second screen", etc. (García-Avilés, Meier & Kaltenbrunner, 2016).

Up to now, the transition of newspaper newsrooms in the digital era has been well analysed – also in international comparison (e. g. García-Avilés, Kaltenbrunner & Meier, 2014; Hofstetter & Schönhagen, 2014, 2016; Lischka, 2015). But to date there is little scientifically-founded knowledge on the complex transformation processes at large public broadcasting organisations. In Germany, the recently published dissertation of Rautenberg (2016) provides a retrospective description of the introduction of cross-media structures at Radio Bremen from 2007 to 2011; it shows that, after the move into a new building designed from the beginning for cross-media, convergent working practices, the newsroom personnel continued to work primarily for a single medium and the process of restructuring and newsroom transformation took years to realise. In other countries also and in an international comparison, only a small number of research reports

is available (see e.g. studies in Belgium and Spain: Van den Bulck & Tambuyzer, 2013; Micó, Masip & Domingo, 2013; and in particular the comparison of five “mid-sized European public corporations” by Larrondo, Domingo, Erdal, Masip & Van den Bulck, 2014). Something that all these studies have in common is that, although technological innovations are always considered as a convergence factor, they are never the focal point of the analysis and therefore can only be examined superficially. Our study sets out to close this research gap on the interrelations between technological innovations and newsroom convergence.

But even beyond this, there is in general a need for research into the interrelations between technological innovations and (convergent) journalism: Studies carried out to date question the degree to which technological innovations determine the newsrooms or whether journalistic structures and long-range trends – such as norms, habits, economic constraints, etc. – are so strong as to largely obstruct the adoption of new technologies in journalism (Ashuri & Frenkel, 2015, 4). Therefore technology – especially in studies on newsroom convergence – is seen as an influencing factor on somehow resisting or non-resisting newsrooms. “Journalism has always been shaped by technology” (Pavlik, 2000, 229) sums this up perfectly and provides a highly accurate interpretation of centuries of journalistic history (see also Ornebring, 2010; Witschge, 2012). Or it is investigated “how technologies of news production are in fact socially and culturally shaped and embedded within corporate and professional contexts and practices” (Cottle & Ashton, 1999, 22). We broaden the scope of this investigation by considering that any such influence might not come exclusively from technology – but that impulses can come also from innovative newsrooms: technological gaps, wishes and obstacles are identified from the journalist’s viewpoint and brought to the attention of the developers of newsroom technologies.

Accordingly, the central focus of our research was to establish whether the persons responsible in the newsroom for innovative media projects have specific technological wishes, and whether technological gaps or technological obstacles exist for future cross-media quality journalism. This central investigation was based on four research questions:

- How do workflows and processes, roles and competencies change?
- What are the demands of newsrooms on new, virtualised production methods and vice versa, and how can this new technology support and optimise journalistic work practices?
- What utilisation options, expectations, needs and infrastructures are emerging among the general public and how can these be catered to both technologically and socially in the work of the newsroom?
- How does all this effect journalistic quality?

2. Challenges of the transformation processes of public broadcasting services

In a first step, based on these research questions, the challenges of the complex transformation processes at large public broadcasting services were displayed systematically in a four-dimensional diagram (see Fig. 1). All these dimensions were incorporated into our empirical study – in the form of key categories for the qualitative analysis. The diagram can be read and interpreted both from left to right and vice versa, as there are no one-sided interdependencies or linear time sequences, rather always mutually-dependent interactions. For practical purposes, we will start from the left:

(1) Internet and digitisation bring new technological infrastructures for the *public*, thus changing media use habits. An example is the smartphone as a central hub for daily time- and location-independent media utilisation; it heightens the desire for a personal, individual, dialogue-oriented, networked and open contact; it is much closer to the individual, both emotionally and personally, than all other media devices to date – and it does away with the rigid programming of linear broadcast TV and radio services. In particular, the smartphone stands for an alternative to the classical TV news as the “family viewing at the end of the day” (Ashuri & Frenkel, 2015, 14).

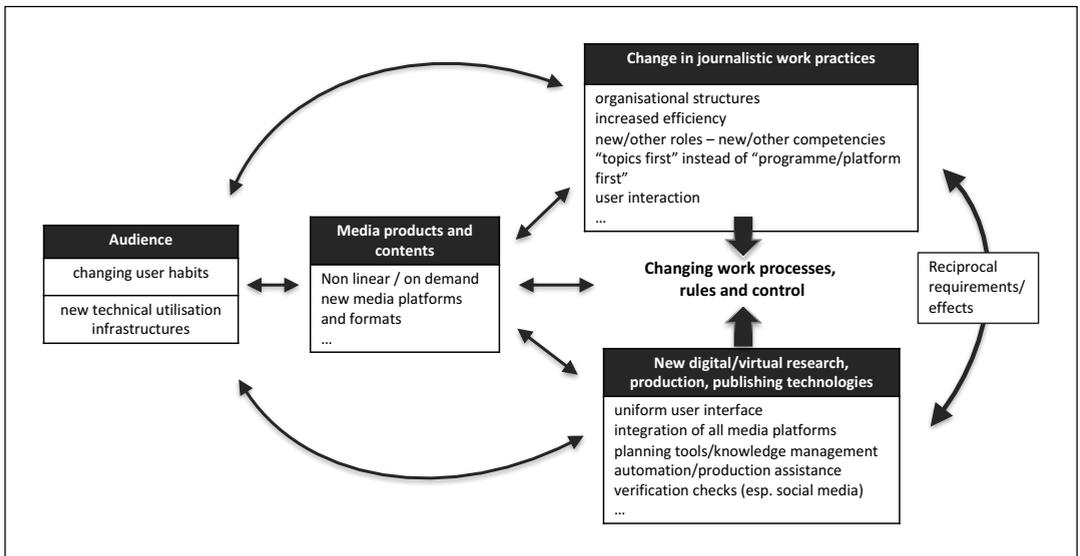
(2) Accordingly, the use of *media products and contents* is either freed-up from rigid schedules or at best the media organisations offer them right from the start on an on-demand basis in order to optimise their utilisation and ensure that they find their way on to the new user devices (see e.g. the new apps offered by the public broadcasting services that allow not only to receive programme streams like the first-generation broadcast apps). Moreover, new media platforms are continually appearing on the scene, e.g. in the social media sector, where new digital formats are being developed.

(3) Topic-orientation, as opposed to the classical news desk and broadcasting (section, platform and beat oriented) structure, is playing an increasingly important role in *newsroom organisation and journalistic*

working methods (Meier 2002, 2007; Grubenmann, 2016). As a first step in integrated newsrooms the (platform and beat) resources of the classical media are combined in a topic-oriented way with a cross-beat and cross-platform perspective of current and complex issues, and are used also for digital platforms. In a second step, the aim is to subordinate the old production logistics of the "legacy media" to the new production logistics of the digital media (see García-Avilés et al., 2016; Meier, 2016). In this case, however, it frequently occurs that the "old media" do not willingly surrender their dominance, especially if, for example, former TV or radio section heads are appointed cross-media team leaders, although they regard the digital platforms as merely an extension of the "old media". Despite all obstacles, new roles emerge, such as the multimedia coordinator, or new organisational units, e.g. an update centre with newsdesk for current news in all sections or programmes – or entirely new teams are established such as software and platform development. In such a case, in view of the economic pressure in today's media industry, attention is always paid to increasing efficiency: in the final instance, fewer or at most exactly the same number of personnel should operate an increasing number of platforms.

(4) The *digital research, production and publishing technology* should integrate all media platforms with uniform, simple-to-operate user interfaces – such is the vision of convergent newsrooms. Other examples of technological wishes in complex newsroom environments are comprehensive tools for planning and knowledge management or for carrying out verification checks in social media (e.g. Quinn, 2002; Schifferes et al., 2014). The transformation process of the last years have already replaced analog by all-digital, file-based production infrastructures; it is currently continuing with the introduction of purely IT-based infrastructures and an emerging trend towards cloud-based concepts (infrastructure virtualisation). In addition, there is the growing availability of extremely powerful mobile devices that allow the new production methods.

Figure 1: Challenges of the transformation processes at public broadcasting services



Source: own graphic of the "Rundfunk 2025" research group.

3. Methods and research tools

A qualitative approach in the form of a case study was chosen with a view to resolving the central research question, i.e. whether the persons responsible in the newsroom for innovative media projects have specific technological wishes, and whether technological gaps or technological obstacles exist for future cross-media quality journalism. Case studies are a valid tool for analysing a complex phenomenon in its own context, which is why they have proved highly successful, especially for the analysis of both newsroom convergence (Yin, 2003; García-Avilés, Kaltenbrunner & Meier, 2014; Erdal, 2011; Infotendencias Group, 2012) as well as technological influences on journalistic work (Cottle & Ashton, 1999).

The object of the investigation was Bavaria's public broadcasting service, Bayerischer Rundfunk (BR), which is especially suitable for such a research project as its nearly 5.000 permanent and freelance employees are undergoing a fundamental and long-term transformation process launched by BR director Ulrich

Wilhelm under the title "BR hoch 3" (Spanner-Ulmer, 2014; Gottlieb, 2015). A core aim of this project is to install a networked working approach transcending the traditional media boundaries of TV, radio and the Internet, with topic-related instead of programme-related work practices. The structural changes are new newsroom buildings planned as convergent "updating and current news centres" to accommodate 70 staff in Nuremberg and several hundred staff in Munich-Freimann. In addition, the Bavarian public broadcasting service has made a name for itself recently with its digital innovations (e.g. the "BR24" app, "Linus" storytelling tool as well as various transmedia projects), realised to a large degree with the input of "In-House Innovation Labs" (see Boyles, 2015, for further details concerning "In-House Innovation Labs" in media organisations).

Guided expert interviews were conducted with 25 BR employees. The selected interview participants were permanent or freelance staff working in management or non-management positions, who at the time of the interviews in 2015 – and this was decisive – were already participating in innovative projects (in TV/radio/online, e.g. Treffpunkt Trimedialität, PULS, 24 h Jerusalem, Digitale Garage, Landauer-Projekt etc.) or due to become involved in the coming months. They were researched, appointed by the project partners, but also recruited in a "snowball" system, i.e. approached on the advice of already interviewed experts.

The research tool was based on a broad approach. In a first step, it was attempted to establish precisely what the interviewees understand by innovations in journalism, what technology they apply in their projects and where problems and obstacles exist in this connection, or what their wishes are in relation to technology respectively. Moreover, the guidelines – in accordance with the objective of the overall project – also included asking the experts about their visions. In summary, this means that various levels were incorporated and questions were put concerning both actual tools and systems for research, production and distribution tasks, as well as content and technological visions for integrating the audience. A brief summary of the central results of the research project is given in the following.

4. Results

A qualitative analysis of the contents of the interviews identified a wide range of technological wishes, gaps or obstacles for future cross-media quality journalism. Due to this, it was necessary to first transcribe in full and anonymise the interviews stored on audio files. After that, the Word files were read into the MAXQDA data analysis solution. In accordance with the research questions, a rough code system was produced with the categories "Technological problems", "Technology wishes", "Definition of innovation", "Actual projects" and "Position at the Bayerischer Rundfunk". The coding of the interviews sentence by sentence, segment by segment respectively, led to a gradual expansion of the code system. A total of 944 individual codes was assigned.

In the following, the central analysed categories are summarised and enhanced with illustrating statements from the interviews².

4.1. Innovations in journalism and visions

The interviewed employees of the Bavarian public broadcasting service reveal a high degree of consistency in relation to their ideas for and definitions of innovations in journalism. There is broad consensus that predictions can be given only for a very limited period. As a basic principle, the focus is put on "new approaches", as opposed to a mere "improvement" of a journalistic product:

"An innovation should take a genuinely new approach, confront new challenges. And for us is a challenge to the degree that innovation cannot be regarded solely from the technological point of view; programme-related innovation is equally concerned, and in part also process organisation, i.e. it is equally essential to improve the workflows as well as the purely technological developments." (I16_11)

Most of the interviewees emphasise that it is by no means exclusively programme-related developments that should be taken into account, but that it is vital also to consider structural changes. In general, many of those interviewed are of the opinion that there continues to be an insufficient culture of innovation at BR. Despite this, they do indeed take into account the seeds of innovation that in their opinion exist and that represent the beginning of the gradual expansion of the comprehensive change process at BR. They also point out that many employees (both journalists as well as technical staff) take a sceptical view of the restructuring measures and changes to their personal job profile. One consequence of this would be to handicap the implementation of journalistic innovations throughout the operation. Naturally, this refers to

the fears and insecurities normally involved in every transformation process (García-Avilés, 2012). The evolution of the change process is a future task and challenge facing the Bavarian public broadcasting service. This applies equally to the equipping with and operating of technical installations for which the personnel have not yet been trained:

"Major gaps exist in regard to technological competence. Especially among the generation who did not grow up in a technologically-oriented era and who also do not make much use of technology in their private lives. Naturally, I will only learn to fully utilise multimodal devices if I regularly use them myself." (I5_45)

"What we need in any case are standardised formats that work also with equipment other than our own. A freelancer will never see why he should work with a slow BR laptop running an ancient editing program when he himself has an ultra high-speed Mac equipped with the latest final-cut features." (I9_47)

When asked about their personal visions concerning innovative journalism, the answers of the professionals interviewed revealed a high level of consensus on the aspect of focus on "individualised media use", where the media "very closely serve the user's personal needs":

"My vision is one in which public broadcasting services as we know them today will cease to exist. Perhaps there will still be an on-demand programme, though one that would not be supplied by the broadcast station; instead it would be compiled based on my personal profile and needs, i.e. material that I like." (I0_86)

Such opinions are generally closely connected with a positive expectation of the operation and use of social media platforms:

"Social media today continue to be treated as an afterthought. Social media is not just Facebook, but all social channels, e.g. also WhatsApp. This means that they are becoming increasingly intimate, like a family chat. If we succeed in entering this intimate domain, the living room of our users and fans, I believe we will have achieved a lot. It is important to bear in mind that each channel has its own rules. I must know these rules and work with them. That does not cost money, only knowledge." (I6_40)

"Social media are an integral element. They are tremendously important for us, as gone are the times when we could expect people to come automatically to us and seek out the BR. We must go to where the people are." (I10_29)

At the same time, interview participants emphasise that social media by themselves are not the key to success. Rather it is essential that they should be linked with the other channels:

"It is important to seek anchoring points. In our case, in relation to social media it is important to utilise the TV channel. If we produce a Web Special and say 'Hey, we have a Web Special' – no one will pay any attention. We must simply use the channels we have in order to achieve a wider reach." (I19_57)

Another aspect that emerges repeatedly in the interviews is the problem that in reality social media channels are usually "fed" as a side-line, even though this is not possible (if it is meant to be successful):

"Therefore in principle it is ok, it is on a solid basis, we are attracting growing numbers of followers, more 'likes', also good discussions on Facebook. But basically, in order to really put it on a firm footing, we would need someone to do this full-time." (I21_44)

In addition to the growing importance of social media channels, those interviewed highlight the uniqueness and strength of the Bavarian public broadcasting service that is in a position, by means of both innovative as well as proven quality journalistic products, to build up a type of "knowledge database":

"Innovative journalism is the preparation and management of the knowledge database that we generate. On a platform that for me, as a customer, is simple to use and for which I need not be a specialist, neither for the device, operating system nor for a specific application." (I17_54)

In this connection, it is also predicted that there will be an increasing desire for orientation among the users, involving a type of media "lean-back function" in relation to a programme allowing maximum individual utilisation:

"With regard to journalistic contents and preparation, I believe that having the courage to be understandable will bring the greatest praise from the public. I think that we should dare to word,

illustrate and treat things even more clearly, simply and understandably. There is a growing desire for orientation. This is something we should duly act on and position ourselves clearly." (I3_36/37)

Apart from the content levels, the interviewees see and wish an increasing shift towards digitisation at production level. For example, one of them answered the question concerning their version of a "public broadcasting service 2025" as follows:

"We can go on air immediately. We no longer need a TV service. We no longer need an infrastructure. If a bomb explodes, we can take out our smartphones and transmit via the Periscope live stream app – and if we are on site when something important happens, then some two, three, or four hundred persons will also be following events live." (I0_121)

Overall, those questioned expressed two concrete wishes in relation to a visionary development of public broadcasting services: Firstly, the desire to be "as close as possible" to events, to be able to inform users in real time, and take innovative approaches using mobile devices permitting this in an uncomplicated way. Secondly, accompanying this is the wish for independence from cumbersome and complicated production steps. This once again highlights the major challenges facing the Bavarian public broadcasting service, BR, and its transformation process. Unheeded initially in the development of visions is the aspect of what implications this has at the level of safety measures or for the technical staff as regards planning guidelines, or also that at least in a transitional period they would have to support very many systems in parallel:

"My technological vision for production is to pop everything into the cloud." (I9_85)

"You can use your phone to produce photos and video sequences that you could broadcast immediately on TV. Though now the material is not prime quality, but if you film a moving event that has news value you can naturally broadcast it right away. And we have missed out on this, i.e. the consumerisation of IT, by which I also mean film, TV, and audio production." (I10_69)

4.2. Problems with technology and wishes for their resolution

Although the professionals interviewed work firstly for different media (TV, radio, online) and secondly occupy different positions (mainly journalistic, or mainly managing/organising positions respectively), the answers in relation to "technical problems with technology" were very uniform. The problems occurring particularly in connection with concrete innovative projects were experienced also in everyday journalistic practice and can be well summarised. In connection with old (accustomed), though also new technology, problems emerged especially with interfaces and transmission channels. The interviewees pointed out problems (in part massive) with: 1. making omnipresent consumer technology (example: filming with the iPhone) manageable for regular newsroom requirements, and 2. feeding material produced using consumer technology into the BR systems.

The BR systems are compatible only to a limited degree with standard technical devices, particularly of the type suitable for everyday use. The following statement shows that two worlds collide here, namely IT whose priority is security and the work of the journalist who requires fast, and above all uncomplicated means of transmission:

"It begins with IT. The IT people say that we have very restrictive access mechanisms, and everyone must provide identification five times. If I'm out in the field working as a journalist and a train derailed, I do a brief interview that I must get to the broadcasting studio within minutes, so that I have no time for such things. Then we must consider taking a different approach and perhaps not going first into the network, rather for example to a safe cloud where access is fast." (I0_49)

A central problem are so-called "metadata" that must be delivered together with the raw material. The metadata provide information about the supplied data itself and must in part be input several times:

"It is the technical people who want metadata to be supplied. From the technical point of view, I can appreciate this, but it is also necessary to consider that everyone is used to Facebook or Twitter. All I must do there is upload a video and right away it will be at its destination. In our case, you must first fill out ten lines of metadata, even though it is only unedited material that is being transmitted." (I21_58/60)

The interviewees did not dispute that some solutions already exist today, e.g. for enabling the use of videos produced on mobile phones, though not everyone is aware of these solutions. However, many see as a problem the "multiple steps" that continue to be necessary, or the complicated implementation, as the following statements show:

"We still do not have a process similar to what we know from other apps; select the video, press transmit and my mobile does the rest. However, that is not everything. For example, how do I get the audio track from the video recording to our radio colleagues working here at the broadcasting house? We can do all this, we have already solutions for everything. But as I see it, very many steps continue to be necessary. We need it faster and simpler." (I21_62)

"Many of the solutions have been developed by technicians for technicians. Accordingly, they are mostly overly complex, though that need not be so. A technician loves it if he has 20 buttons and slide controls on his display, but we are dealing here with journalists, not technicians, and they don't need all that, don't understand it and are put off by it." (I0_13)

Interview participants unanimously expressed the opinion that, especially in today's journalism, technology must not be difficult to use. It was criticised that existing standard technology is complicated to use. Especially in this area, where the priority is fast, up-to-the-minute on-site reporting, the quality of video and audio recordings is of less importance than in a documentary film. The persons interviewed made reference to these "journalistic highlights and flagship productions" that are naturally expected from a public broadcasting service and that must be offered. But they make a clear distinction between these journalistic productions and everyday journalism:

"For up-to-the minute reporting, I do not by a long stretch require the technology that I would need, for example, to produce a documentary. Therefore using an Avid media production system for breaking news reporting would be the equivalent of taking a bus to go one hundred metres to the nearest kiosk. It is simply not suitable. For this reason we need a simple-to-use editing system that journalists can operate. My son does it here on my Apple device." (I18_46)

Another problem, one that in the opinion of the interviewees occurs very frequently, is a poor/inadequate Internet connection in the field, resulting in contents being transmitted at a very slow speed. The general demands of the interview participants in relation to usable technology can be summed up as speed, simplicity (in the sense of consumer technology, or possibly also private devices respectively) and mobility (fast Internet connection, cloud solution). Furthermore, several participants point out that although technical tools are in part available, process elements are absent, elements that ensure the flow of one production step into the next (preferably automatically). There are, however, several contradictions involved here, including some of a technical nature. Automated production steps, among other things, require the input of the aforementioned "metadata", therefore information relating to the fed material, i.e. a production step apparently quite unpopular among journalists which, according to the interviewees, costs a lot of time or is awkward to carry out, e.g. on the display of a mobile phone.

Another identifiable wish is for a cross-media production system into which journalists from all media areas can input and access these contents. Synergistic effects are seen here on many levels (e.g. in relation to research results, experts lists, but also as an information/communication instrument) and consequently cost reductions. This involves a change in the workflows, so that the establishment of such a programme planning tool is not equivalent to an "imposed" process. Instead, interconnected convergent processes are created:

"We need common, new convergent processes, from the initial idea up to the finished programme. The solution here is not the programme planning tool, rather: How do we change our workflows? Which technological tool will support us in this?" (I16_59/61)

"What we lack is a common 'ingestion' for unedited material from outside. I see the problem every time when one of our reporters is tasked with working for various types of media. We even have an app for uploading, which is a great thing, but you still have to check every time in advance where the material is going to go." (I21_54)

"We must talk about exactly such needs at BR: Which structures must we find, which workflows? Here at the Bavarian public broadcasting service web series or apps are usually rush jobs. Everyone says 'great, cool!', and then it is over again. We are pondering how to integrate workflow and knowledge managers into our operation, and thus have a type of flying team to bring the newsroom up to speed digitally." (I22_33)

The interview participants did not doubt that BR is already working in a highly innovative way, e.g. in a cross-media manner and with new storytelling elements, etc. They address two problems in relation to these innovative projects: Firstly, a poor information and communication culture, and secondly, an absent or poor evaluation of work steps, or solutions respectively, that were created to resolve technical difficulties. This is all the more remarkable as it was especially the journalists and staff who were asked who are/were involved in such projects. Nevertheless they frequently expressed dissatisfaction with how the findings from

this work are treated. Implementation of these experiences in everyday journalistic practices – also in the everyday activities of persons who have not yet participated in such projects – either does not occur at all, or only to a small degree:

"An interesting aspect is that, after the project was completed, it vanished into a drawer and the insights that had been gained were simply forgotten. I had a foreboding of this while we were carrying it out. Outdated technology continued to be used for similar tasks. That is a regular occurrence in my experience. No one looks to see what is already available for such jobs, what others have perhaps already developed, though frequently this is due also to an absence of proper documentation. As a result, it is back to base one, i.e. the wheel is reinvented every time." (I14_40)

"You only find out something by chance. One time a colleague from ZDF (the second German public TV broadcasting programme) told me that they produced a complete live transmission using the iPhone. Then when I tell this in a working group I hear a technician say: 'We have already tested all that. It is not fit to broadcast.' At such moments I think: seemingly everyone here does his own thing, tests things out, but the results are not made known." (I2_39)

Frequent reference was made also to another structural problem: legal uncertainties in relation to the use of consumer technology, though also the (multiple) use of content, use of webcams and similar devices. A desire was expressed also for a clear reduction in bureaucratic obstacles. Interview participants regard this as a major problem in their everyday journalistic work and to an even greater extent in relation to the development of journalistic innovations:

"I am a little jealous of our colleagues working at the Swiss TV public broadcasting service or also at the German NDR and ZDF public TV programmes who produce, edit and add sound to complete features using the iPhone. For us, that is considered to be the downfall of TV." (I2_19)

"More than 1.000 persons working at BR have Dropbox access for private use. And if I am familiar with it, and make use of it, I upload my images to Dropbox. And then I can say in the newsroom: Look, you have access. I can give him authorisation etc. so that he can retrieve the image from Dropbox. He doesn't need a 4Media app, nor 35 settings, the whole thing is done rapidly. The product is on the market, it works, and is tried and tested." (I11_94)

"We want to be the innovative nucleus, and that means taking different approaches than the normal 'doing'. Too many obstacles continue to exist that sometimes get in our way, be they buying or safety regulations, etc. It does not mean that these departments are not cooperative, but they have their rules and they stick to them." (I7_41)

5. Summary and outlook

Previous studies usually regarded technology as a one-sided influencing factor on journalism: "Technological determinism is common among journalists when reflecting on changes in their profession; several studies show that journalists ascribe great power and independent agency to technology." (Ornebring, 2010, 57). Journalists "feel trapped by technology" (Witschge, 2012, 99). Our study showed the serious concerns of journalists about the use and efficiency of digital technology, but also the potentials of powerful new digital tools, and brought the technological wishes of innovative journalists to the attention of developers of newsroom technology. The research results reveal a broad range of visions among broadcast journalists in regard to innovative technology. The subject and questions of the study gave rise overall to a high level of interest among BR employees. The extensive and detailed interviews highlighted many problems and wishes in relation to technology, and overall, despite the heterogeneity of the random samples, there was a high degree of homogeneity in the answers.

Table 1 shows a summary of the problems identified with existing technology in comparison with the related requirements and wishes of the interviewees. For many of the journalists, it is less a matter of specific, minor problems with individual technological tools or working devices, but instead higher-level structural and legal problems, or uncertainties as regards to technology and related innovations in journalistic work.

Table 1: Summarised: Technological problems, requirements and wishes.

Problems with existing technology	Requirements and wishes
<ul style="list-style-type: none"> • Complicated, often unknown and in part absence of systems networking, esp. cross-media 	<ul style="list-style-type: none"> • Simple operability
<ul style="list-style-type: none"> • Absence (or not yet implemented) concept for flexible workflow design possibilities 	<ul style="list-style-type: none"> • Utilisation of latest software and hardware
<ul style="list-style-type: none"> • Lack of (workflow) automation for realising cross- system or cross-divisional processes 	<ul style="list-style-type: none"> • More highly automated processes
<ul style="list-style-type: none"> • Insufficient support of AV formats 	<ul style="list-style-type: none"> • Multi-media studios
<ul style="list-style-type: none"> • Problems with or limits on the use of mobile devices in production 	<ul style="list-style-type: none"> • Comprehensive support of AV formats (esp. also consumer formats)
<ul style="list-style-type: none"> • Absence of safety concept allowing use of consumer equipment and services 	<ul style="list-style-type: none"> • Central content pool and collaboration tool
<ul style="list-style-type: none"> • Insufficient integration of social media in research, production and delivery 	<ul style="list-style-type: none"> • Integration of social media
<ul style="list-style-type: none"> • Poor evaluation of solutions to date 	<ul style="list-style-type: none"> • Improve communication (internal) and corporate culture by technical support

Source: "Rundfunk 2025" research group.

It becomes apparent that a lot of challenges which the BR has to face exist on different levels (see also chapter 1.1). On the one hand, on an organisational level, the internal communication needs to be improved, essentially to inform the employees about the things, which can not be changed, such as external structures (e.g. law). These build an inflexible frame, which they have to accept and within they are free to be creative, try new tools and create new products. This can be also valid for internal BR-specific rules, for example according to quality, after they are checked due to their "road capability" and if they are up-to-date. With regard to the changing media use habits and devices, the priorities developed like the journalists pointed out (for example Smartphone/speed vs. high image quality). Besides quality, security is an outstanding point: Journalists often feel handicapped in their creativity by the safety measures, whereas it is the technicians' priority to protect the system. One possible solution, which emerged in the interdisciplinary "Rundfunk 2025" research group, are clouds, which contain all the software and tools that journalists need to produce virtually. This would reduce the interfaces and thereby at the same time the gateways for malware/security problems.

Besides that, also the communication about the things which can be changed, or which others already tried to improve respectively, should be communicated more directly. Therefore it is useful to have a "knowledge management" to deliver data as well as experts to inform about projects that have already been conducted, and to make accessible evaluation results, in order to avoid failures such as have already been experienced. The journalists confirmed the positive impacts of new "roles", for example of "human interfaces" who develop and push the internal exchange. But they showed where resources are not applied correctly in accordance with current needs (for example due to Social Media).

On the other hand, on an individual level, one of the huge – and in large extent individual – tasks of the journalists will be to open up for new forms of journalism and to see it as a common performance of the whole BR with common aims – as opposed to a one-man-show. One of the major tasks of the technicians will be to smooth out the aforementioned problems, which can be solved, and to simplify "the backend" for the journalists as well as "the frontend" for the users. It must be their aim to reach recipients and make it easy for them to use and enjoy journalism content. They need to find solutions to help the journalists to concentrate on content, for example by automated processes or tools which they know from their consumer-technical devices.

Below the line, the BR faces the higher-ranked task to provide the structures, to enable the technical and journalist players to develop the necessary competencies of the present age, which also need to be implemented in the corporate culture.

The interviews carried out in this project among employees of the Bavarian public broadcasting service on the basis of a set of categories can be applied in principle also to other media operations. In addition, it is equally suitable for use in an international comparison. It would also be conceivable to repeat the survey after the imminent construction and structural changes at the BR in order to evaluate whether they managed to achieve the (desired) success and support innovative journalistic working methods – therefore

whether the wishes have been fulfilled, problems diminished and gaps filled. Or whether new technical visions will then emerge. Because at the moment the physical separation within the BR organisation prevents the improvement of workflows and processes as well as the close cooperation between the technicians and journalists, aspects that will become even more important in the future.

6. References

- [1] Ashuri, T., & Frenkel, A. (2015). Online/offscreen: On changing technology and practices in television journalism. *Convergence*, online first, 1-18. <http://dx.doi.org/10.1177/1354856515577776>.
- [2] Boyles, J. L. (2015). The isolation of innovation. Restructuring the digital newsroom through intrapreneurship. *Digital Journalism*, online first. doi: <http://dx.doi.org/10.1080/21670811.2015.1022193>.
- [3] Cottle, S., & Ashton, M. (1999). From BBC Newsroom to BBC Newscentre: On Changing Technology and Journalist Practices. *Convergence*, 5 (3), 22-43.
- [4] Erdal, Ivar J. (2011). Coming to Terms with Convergence Journalism: Cross-media as a Theoretical and Analytical Concept. *Convergence*, 17 (2), 213-223. <http://dx.doi.org/10.1177/1354856510397109>.
- [5] García-Avilés, J. A. (2012). Innovation Management in Crossmedia Production: Leading Change in the Newsroom. In *Crossmedia Innovations: Texts, Markets, Institutions*, edited by I. Ibrus and C. A. Scolari, Frankfurt: Peter Lang, 259-276.
- [6] García-Avilés, J. A., Kaltenbrunner, A., & Meier, K. (2014). Media convergence revisited: lessons learned on newsroom integration in Austria, Germany and Spain. *Journalism Practice*, 8 (5), 573-584. <http://dx.doi.org/10.1080/17512786.2014.885678>.
- [7] García-Avilés, J. A., Meier, K., & Kaltenbrunner, A. (2016): Converged Media Content: Reshaping the "Legacy" of Legacy Media in the Online Scenario. In *The Routledge Companion to Digital Journalism Studies*, edited by B. Franklin and S. Eldridge II, London/New York: Routledge, forthcoming.
- [8] Gottlieb, S. (2015). "Trimedial heißt: Niemand ist mehr eine Insel". Interview mit M. Goblirsch und M. Anger. *BJV report*, (4), 10-13.
- [9] Grubenmann, S. (2016). Matrix Organisation. *Journalism Practice*, online first. doi: [10.1080/17512786.2016.1140588](http://dx.doi.org/10.1080/17512786.2016.1140588).
- [10] Hofstetter, B., & Schönhagen, P. (2014). Wandel redaktioneller Strukturen und journalistischen Handelns. In: *SCM*, 3 (2), 228-252.
- [11] Hofstetter, B., & Schönhagen, P. (2016). When Creative Potentials are Being Undermined By Commercial Imperatives. Change and resistance in six cases of newsroom reorganisation. *Digital Journalism*, online first. doi: <http://dx.doi.org/10.1080/21670811.2016.1155966>.
- [12] Infotendencias Group (2012). Media Convergence. In *The Handbook of Global Online Journalism* edited by E.Siapera and A. Veglis, Malden, MA: Wiley- Blackwell, 21-38.
- [13] Kaltenbrunner, A., & Meier, K. (2013). Convergent Journalism – Newsrooms, Routines, Job Profiles and Training. In *Media and Convergence Management* edited by S. Diehl and M. Karmasin, Berlin/Heidelberg: Springer, 285-298.
- [14] Larrondo, A., Domingo, D., Erdal, I. J., Masip, P., & Van den Bulck, H. (2014). Opportunities and Limitations of Newsroom Convergence. *Journalism Studies*, online first. <http://dx.doi.org/10.1080/1461670X.2014.977611>.
- [15] Lischka, J. A. (2015). How structural multi-platform newsroom features and innovative values alter journalistic cross-channel and crosssectional working procedures. *Journal of Media Business Studies*, 12 (1), 7-28. <http://dx.doi.org/10.1080/16522354.2015.1027114>.
- [16] Meier, K. (2002). Ressort, Sparte, Team. Wahrnehmungsstrukturen und Redaktionsorganisation im Zeitungsjournalismus. Konstanz: UVK.
- [17] Meier, K. (2007). Innovations in Central European Newsrooms. *Journalism Practice*, 1 (1), 4-19. <http://dx.doi.org/10.1080/17512780601078803>.
- [18] Meier, K. (2016). Crossmedialität. In *Journalismusforschung. Stand und Perspektiven*, edited by K. Meier and C. Neuberger (second edition). Baden-Baden: Nomos, forthcoming.

- [19] Micó, J. L., Masip, P., & Domingo, D. (2013). To wish impossible things: Convergence as a process of diffusion of innovations in an actor-network. *The International Communication Gazette*, 75 (1), 118–137. <http://dx.doi.org/10.1177/1748048512461765>.
- [20] Ornebring, Henrik (2010). Technology and journalism-as-labour: Historical perspectives. *Journalism*, 11(1), 57–74.
- [21] Pavlik, J. (2000). The Impact of Technology on Journalism. *Journalism Studies*, 1 (2), 229-237.
- [22] Quinn, S. (2002). Knowledge Management in the Digital Newsroom. Amsterdam et al.: Focal.
- [23] Rautenberg, K. (2016). *Medienwandel durch Crossmedia*. Konstanz: UVK.
- [24] Schifferes, S., Newman, N., Thurman, N., Corney, D., Göker, A., & Martin, C. (2014). Identifying and verifying news through social media. Developing a user-centred tool for professional journalists. *Digital Journalism*, 2 (3), 406-418. <http://dx.doi.org/10.1080/21670811.2014.892747>.
- [25] Spanner-Ulmer, B. (2014). Transformation und Management: Wie lässt sich ein etabliertes Medienunternehmen in die crossmediale Welt führen? *Medienwirtschaft*, 4, 45-46.
- [26] Van den Bulck, H., & Tambuyzer, S. (2013). Collisions of convergence: Flemish news workers' and management's perceptions of the impact of PSB newsroom integration on journalistic practices and identities. *The International Communication Gazette*, 75 (1), 54–75. <http://dx.doi.org/10.1177/1748048512461762>.
- [27] Witschge, Tamara (2012). The 'tyranny' of technology. In *Changing Journalism*, edited by P. Lee-Wright, A. Phillips and T. Witschge, London/News York: Routledge, 99-114.
- [28] Yin, R.K. (2003). *Case Study Research. Design and Methods*, 3. ed. Thousand Oaks et al.: Sage.

Notas

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