Algorithms and Public Service Media

Jannick Kirk Sørensen & Jonathon Hutchinson

Abstract

Algorithms increasingly shape the flow of information in societies. Recently, public service media organisations have begun to develop algorithmic recommender systems and automated systems in their internet services, which makes sense given their importance as mediators of information. In the emerging era of big data and growing personalisation, this makes sense strategically and can have instrumental importance for networked societies. This chapter draws on relevant development projects in European and Australian public service media organisations. In relation to the core principles of public service media, five challenges in operationalising automated rule-based systems are identified: 1) balancing popularity and distinctiveness, 2) diversity of exposure to programming, 3) transparency of the logic underlying recommendations, 4) user sovereignty and, 5) the issue of dependence on or independence from commercial intermediaries. The chapter examines a new set of conditions that affect provision public service provision in societies that feature growing use and reliance on networked media.

Keywords: computer ethics, universalism, content diversity, transparency, chat-bots, recommender systems, personalisation

Introduction

This chapter is about decision-making algorithms in public service media (PSM). An algorithm is a set of typically non-transparent rules for selecting and recommending media content. Algorithmic media are a constituent feature of networked communication platforms. Our interest is focused on implications for PSM. We begin with an overview of computer ethics because the essential issues are normative concerns. We prioritise the importance and complications of editorial work in the networked society context. We argue that algorithms do not solve problems caused by editorial bias, but can be effective when used alongside human judgment. The chapter is important for deliberating on PSM policy design because algorithmic media are increasingly ubiq-

uitous and arguably fundamental to the media networks that underpin a networked society as such.

The business models for Facebook, Google, Netflix and Amazon depend on the continual development of proprietary algorithms that automate content selection options presented to each user as a personalised set of recommendations based on presumed or actual interest, as indicated by previous online activity using a platform. An algorithm consists of two components: "a logic component, which specifies the knowledge to be used in solving problems, and a control component, which determines the problem-solving strategies by means of which that knowledge is used" (Kowalski 1979: 424).

The development of algorithms in PSM is congruent with this general trend in networked media, but raises difficult ethical questions related to a shift in agency from individual decision-making to the influence of automated systems (see Dworkin 1988; Brey 2005). This shift encourages reformulating the heritage understanding of 'audiences' as 'users', which in principle reflects the de-prioritisation of consumption per se. A popular example used in the field of computer ethics is self-driven automobiles that shift the locus of decision-making from the driver to sophisticated software (Goodall 2014; Lin 2016). Causality and result are both hidden in the 'black box' of an on-board computer that utilises algorithms to make driving 'decisions' (Brey 2005). In this instance, the key question is about who is responsible for what does and doesn't happen during vehicle operation – the driver, who isn't actually a driver in this context, or the software? Or even the programmer/coder of the software? Or, perhaps, the owner of the network grid that enables systemic communication as the vehicle navigates in the driving environment?

The practical problem demonstrated in the example is an asymmetric distribution of agency because automated systems make 'decisions' that can be based on flawed normative or behavioural assumptions (Vedder 1999). At worst, there is no possibility to override the automated decision. That is why algorithmic recommendations are sensitive matters and should be explained to users (Tintarev & Masthoff 2015). But explaining and understanding recommendation systems requires deep technical knowledge as the results are produced by a series of complex and often counter-intuitive calculations (Koren et al. 2009). Furthermore, recommendations are often the result of more than one algorithm applied in the online and offline processing of consumer behaviour data (Armatriain & Basilico 2015); Netflix is a commonly used example. The asymmetrical relation this creates between users and media content providers is especially problematic for PSM due to its public complexion and its social responsibility obligations. It is therefore a central focus of our discussion.

A second issue of particular relevance to the public complexion of PSM was recently underscored by Danaher (2016) as a threat he characterised as 'algocracy' that is rooted in the opacity of algorithmic decision-making. This applies to the ownership and commercialised use of a continually expanding volume of personal information that is collected and integrated as 'big data' for the strategic and commercial interests

of network media firms. Over the past 20 years, a large literature base has developed about privacy problems related to this threat (e.g. Moor 1997; Thompson 2001; Zarsky 2005). Danaher emphasises the inaccessibility of algorithms due to the complexity of parameters and processing that make algorithmic decision-making incomprehensible to most people. In addition to general problems related to opacity and privacy invasion, when algorithms are used by PSM organisations a third and specific threat arises. The lack of transparency and inherent system complexity can threaten PSM legitimacy, and should therefore be a core concern for public sector organisations in the application of automated systems.

Algorithms can be quite useful because they generate personalised recommendations as the result of sophisticated computations based on expressed personal interests. How this works is partly known and partly concealed. The general filtering principles used by Google, Facebook, Amazon and Netflix are published (Page et al. 1998; Linden et al. 2003; Ali & van Stam 2004; Amatriain & Basilico 2015), but the configuration, implementation and datasets are proprietary (Machill & Beiler 2007; Hallinan & Striphas 2016). As Sunstein (2007) observed, personalised systems are useful to optimise media exposure but can bias an individual's exposure to sources and facilitate 'filter bubbles' (Pariser 2011). Research has confirmed this problem (see Bozdag 2013). Further, researchers have found that the different filtering principles used by Google, Facebook and Twitter produce divergent rankings, even when using the same dataset (Birkbak & Carlsen 2016).

In short, algorithms are instrumental for determining what information and which sources are found, how easily and quickly, and with what prioritisation. The trade-offs are of central concern to the character and quality of public life in a networked society. That said, we do not imply that recommendations per se are new. Broadcasting has long used scheduling strategies, previews (or trailers) and marketing for that purpose. But the presentation of content selection options in broadcasting is more transparent (although not totally) and not as precisely targeted to individuals based on a personal history of behaviour. Moreover, the traditional broadcast mode of content dissemination has not produced the growing body of detailed data that is now owned and can only be analysed by the firm that controls the platform and uses this information manly to achieve its own self-interested objectives.

In the networked media environment, incorrect assumptions about user interests often reveal flaws in algorithmic designs. A familiar example is the case of a 'straight' TiVo user who received recommendations for gay-related films. He attempted to correct the false assumptions by deliberately choosing war-related films, but then began receiving recommendations for films about Nazis and the Third Reich (Zaslow 2002). So, although potentially useful and even beneficial in many cases, the quality of recommendations is a function of the quality of the algorithm's design, which is always based on a set of assumptions that can be flawed in practice. This is personalisation gone awry, so to say.

Recommendations are based on how user needs have been modelled in the software. Collaborative filtering is a core feature of algorithms and is based on mathematical formulas (Shardanand & Maes 1995; Linden et al. 2003). Accuracy is obviously important, but problematic to achieve and also not in itself sufficient to guarantee a good user experience (McNee et al. 2006). Serendipity is the ultimate goal, which happens when a user experiences the system 'as if it read my mind' (Ricci et al. 2015). Achieving this depends on modelling user preferences to recommend content that achieves a challenging balance between predictability and novelty (Castells et al. 2015). Most algorithms are commercial systems that combine a diverse set of methods to weight results on the basis of sophisticated and usually hidden data analyses.

Today, PSM organisations are increasingly involved with algorithms in two ways. First, their content is subject to the same recommendation system dynamics as all other kinds of content that is searchable online. This can't be avoided by any content making company and must be managed as well as possible by techniques involving metadata and search optimisation. Second, an increasing number of PSM organisations are developing their own algorithmic recommender systems with the goal of enhancing the findability and exposure of their content, and to improve interactive services and personalisation. This makes sense given the importance of algorithms in the media environment overall, but in doing this PSM faces challenges that can be categorised in five dimensions that we explain in detail towards the end of the chapter. To demonstrate particular issues that PSM currently faces with algorithms, we present a case study from Australia where the ABC is developing an automated news service called 'ChatBot'. We then explore several highly current issues in the European context.

ABC ChatBot

The Australian Broadcasting Corporation has developed an automated service that relies on an algorithmic design which seeks to avoid the 'black box' software problem by 1) co-creating technology with their 'audience' and 2) constructing stories using third party platforms (especially Facebook). The ABC ChatBot is our case study for operationalising issues that are pertinent to the development of algorithms in PSM with its distinctive ethos that prioritises transparency.

ABC Chatbot is an automated news service that operates on the Facebook Messenger platform to deliver news items directly to a user through mobile phone notification. The items are typically a mixture of three articles: one key news item, an article on something less socially pressing but relatively important, and one lifestyle article. The user interacts with the Chatbot through short messages, which send automated responses. The project demonstrates the role of automation and recommendation in the development of news and journalism in PSM, which have long been a focal feature of their services for the public.

The ABC is widely respected for a heritage of success in balancing journalism with broad appeal, quality educational content, and facilitating public debate on issues that matter for all Australian citizens. With the launch of ChatBot, the ABC has opened discussion about issues related to media diversity and authenticity in news production and distribution, thereby tangling with contemporary concerns about fragmented niche audiences that desire specialised news and media content (Jakubowicz 2007; McClean 2011), algorithms and authenticity (Ford et al. 2016), and PSM datafication (Hutchinson 2017). In developing ChatBot, the problems of keenest concern hinge on the risk of disrupting ABC's position as a reputable news organisation and undermining perceptions of the reliability of ABC journalism. The ChatBot initiative is part of a complex, on-going transition at the ABC – from a traditional PSB organisation to a mature PSM enterprise that is fully aligned with general media trends in the development of a digitally networked society. But the initiative poses thorny challenges and may threaten the legitimacy of the enterprise as a public service organisation.

Chatbots are becoming prolific online. Facebook launched theirs in late 2016 as a way for customers to interface with businesses and organisations in ways that are perceived as being more human and therefore presumably meaningful. The primary purpose for Facebook is to encourage higher commercial sales, which isn't very pertinent to a PSM organisation that is not supposed to be involved with product sales and has a mission to educate, inform and entertain audiences. Thus, one faces the immediate problem of establishing the legitimacy of the chat bot in this context, which is one focus of debate in Australia.

Chatbots utilise artificial intelligence algorithms which determine their impact. A pertinent challenge for PSM is their capacity and limitations for engaging citizens on public issues because what a chat bot deems important may not necessarily be significant to the public interest. The importance of getting automation right is evident in the recent derailing of Microsoft's foray into artificial intelligence (AI) with its multiplatform bot called 'Tay'. In designing a bot to operate across Twitter, Kik and GroupMe platforms, Tay was supposed to learn through interacting with users in conversations with them. The software was designed to mimic assumptions the coders made about an average 19-year old American female. Users were encouraged to tell her to "repeat after me", followed by the syntax the user would like the bot to learn. Within 24 hours, Tay had mutated from a caring bot ("humans are super cool") into a Nazi ("Hitler was right; I hate Jews"). Microsoft decommissioned the bot.

This example indicates both the potential for bots and important dangers in designing algorithms. Automated algorithms can be programmed to function in specific patterns, but if the assumptions are incorrect or the information is misleading, all subsequent interactions with the bot can compound an escalating dysfunctionality.

The ABC has been engaged with automation development since 2012, especially recommendation systems based on AI algorithms. Multiple iterations of 'Your iView' and 'My Radio' have been based on various ways of data tracking, for example using cookies or beacons (small coded tracking programmes that provide the audience with

a selection of suggestions for content they might find interesting based on previous viewing or listening choices). Functionality depends on a blend of datafication, user profiling and assistance in problem-solving in deciding what to watch in an environment of abundant choice. Recalling Kowalski's (1979) definition at the start of this chapter, one problem for PSM is that crafting an effective algorithm requires tightening control over choice options.

The ABC first experimented with AI during the 2016 Australian election when it launched a Twitter bot (@abcnewsbot) to help Australians ask questions about the election as it unfolded. The bot was programmed to know the basic information about the election, each candidate and party, and attuned to live election results. At the completion of this experiment, generally considered a success, the ABC launched the ChatBot application on Facebook Messenger as the news team's focal experiment with AI in social media. The aforementioned problem of the need for deep technical understanding is relevant because only specialists understand the ChatBot's code and can evaluate the journalistic quality of outcomes. This disjunction is the context for a complicated struggle between regulation, content production and software coding.

The ABC ChatBot relies on a typical approach to coding that sees software as being in a continual beta state. This approach is useful for capturing user reactions and gleaning information from user behaviours that is continually integrated with developmental tweaks and reformulations. A PSM user will ideally engage with the ChatBot as a 'trusted' media source, which suggests they will perceive it differently from their commercial counterparts because of the source. This is important to the ABC because, "one of the key characteristics of our foray into messaging is the interaction with the audience that it allows […]. [T]he natural behaviour in a messaging app is to reply to messages. This offers the prospect of us 'harvesting' reactions to news stories which we can then incorporate into our coverage" (Watts 2016: n.p.). Of particular interest is the way news stories are delivered to users, and how they are prompted to interact with the ChatBot, as illustrated in Figure 1.

Interacting with the ChatBot is rather mundane and similar to scrolling through a web-based article as the user scans for information that is personally relevant. But there are difficulties in conversing with participants who respond to a conversational remark or question that depends on understanding syntax. This is illustrated in Figure 2.

It is difficult to predict the outcome of algorithmic recommendation and AI interaction at an individual level because although these systems are dynamic they are bounded by syntax. A lot that is important for their use is opaque to ordinary users and, in practice, continually emergent (Danaher 2016; Hallinan & Striphas 2016). Algorithmic recommendations represent a shift of control to software programmers and data curators who configure and adjust the algorithms. Control over media content exposure is relocated from human news editors to a mathematical logic that is predictable because it follows rules, and yet also unpredictable due to complex conditions. Each recommendation is calculated and weighted by features that are dynamic and managed by algorithms in a situation that is paradoxical because these systems are
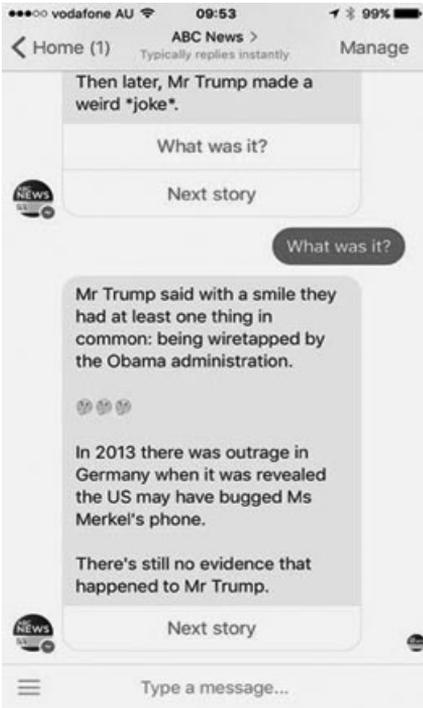
Figure 1. User interaction with the ABC ChatBot
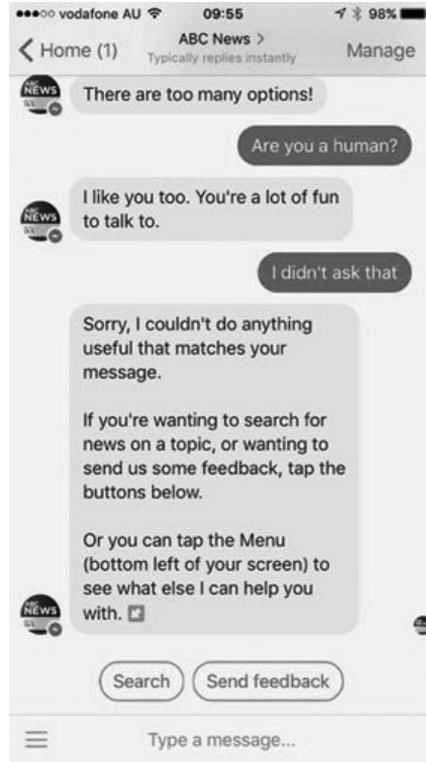
Figure 2. ChatBot having difficulty responding to syntax

entirely rule-bound but produce an emergent complexity that is difficult for humans to understand – much less predict.

These AI systems require PSM organisations to translate editorial values and policies into software code. Given contemporary debate over core values and appropriate editorial policies for PSM, the additional complication is considerable. PSM programming policies typically suggest that it is important to expand an audience's areas of interests and knowledge through discovery. This begs the question as to how well that can be accomplished by algorithmic recommendations, and whether this should be enforced by the rule-based code? Moreover, which features of an algorithmic recommendation system used by a PSM organisation can demonstrate a necessary distinctiveness in programming and services? An algorithm could be specifically designed to promote personalised content with high public value in general terms, but then it would not necessarily be keyed to the expressed interests of individual users. Moreover, this reopens the sticky question about PSB paternalism in the PSM context, as well as forcing a 'PSM diversity diet' (Sørensen & Schmidt 2016). Should a PSM recommendation system be a tool for the user-citizen to protect and manage

her or his media diet in today's attention economy, or mainly a tool for the PSM to optimise exposure to content, or a tool mainly to promote enlightenment? If all three, then with what prioritisation and how to do all of that in ways that satisfy the interest in personalisation?

The ABC ChatBot can be understood as a mechanism of 'soft control' that enables AI in the coded algorithm to 'learn' to address PSM values, specifically those related to transparency, dependability and trustworthiness. This learning process can assist firms and audiences in maintaining the relevance of public media content in a networked society by demonstrating both persistent and emergent values in the practice of public service beyond broadcast transmission. Through a consultative process with users as participants, the ABC is addressing transparency in a range of issues that include un-biased recommendations, diversity of content produced and offered, privacy concerns, and revealing how the AI works. But the ABC has decided to build their bot on the Facebook Messenger platform, which makes sense economically and given popular use, but limits their development capacity for public service per se. We next consider the potential and problems in PSM development of algorithmic recommender systems as understood by PSM managers involved with this work. The chapter reports original empirical findings in research conducted by one of the authors.

EBU members' recommender systems

In many interactive services, users deal with algorithmic recommendations, but for public service media webpages, this has been rare until recently. However, among EBU members, there is growing interest, as indicated in conferences for its Big Data Initiative (EBU 2016a, 2017). These conferences explore the potential for PSM content promotion and production planning on the basis of analysing large amounts of data about media consumption collected from PSM web services. Mining this data may help editors reach users more efficiently via algorithmic recommendation systems, and more closely observe and quickly identify shifting trends in user interests in real-time. There are challenges under discussion that have been elaborated in a series of interviews with PSM big data practitioners from DR (Denmark), ZDF (Germany), RTBF (Belgium) and BR (Germany)[1], as well as PSM project leaders, data analysts, programmers and managers from the BBC (UK), ERR (Estonia), RAI, (Italy), RTÉ (Ireland), RTS (Switzerland) and YLE (Finland).[2]

The interviewees see the use of 'big data' algorithmic recommendations as strategi-cally important for the survival of PSM organisations in an increasingly networked media system. Failing to analyse user behaviours and present personalised recom-mendations would sacrifice needed insights about user preferences, and lower ef-ficiency in the exposure of PSM content compared with other content providers. The algorithmic recommendation system is considered vital for presenting PSM content in contemporary media platforms.

There are concerns. On the editorial level, a key concern has to do with feeding filter bubbles, as noted earlier. PSM's obligation to provide unbiased and fair programming lead many to worry that an algorithm which optimises recommendations based on specific (and assumed) user interests could violate general PSM programming policy that is premised on legal mandates as well as ethical priorities. This is a looming question as PSM organisations grapple with practical questions involved with doing big data analyses and building recommender systems, which are complex and require particular technical skills for software development. This may be an overwhelming challenge for a PSM organisation simply to develop and maintain on its own. Although this approach would accumulate knowledge within the organisation and ensure full control of the collected user data, getting it done is costly and time-consuming.

Pursuing a swift launch is preferred by some PSM firms, as in Denmark. DR thinks it is necessary to keep pace with the rapid development of media systems of pivotal importance among other providers. Other PSM firms do not see an immediate need and prefer a longer time-horizon for the introduction of recommender systems. A third group already has recommender systems, including the BBC (UK), NRK (Norway), RAIplay (Italy), RPT (Portugal), YLE (Finland) and ZDF (Germany).

The pace of technological development is fast and a lot of PSM content is not that different from what is provided by commercial media. Thus, one option is to use a commercial recommender system 'off the shelf'. Deciding whether to use a ready-made recommender service or build their own revolves around questions of control. The use of external software may create a strategic vulnerability. One interviewee expressed the view that controlling the recommendation system software and user data may become as important as control of radio transmitters was for many PSM operators earlier. Whether the implementation of recommender systems actually implies loss of control, independence or integrity for these organisations is an important focus for future research as recommender systems are developed.

The choice of a technological solution raises fundamental questions for PSM organisations. Within the EBU, a group of PSM organisations have joined forces to develop a PSM-oriented recommender system called the "PEACH" project[3], which combines classic recommender algorithms (content-based filtering to find similar content and collaborative filtering to find similar users) with a novel mechanism to recommend diverse content.[4] This can be seen as a first attempt to implement PSM-specific editorial values in an algorithm, as discussed by Sørensen and Schmidt (2016). Still, Helberger's question (2015) about intervention at the end-user level to ensure unbiased exposure and equal chances for media content exposure remains unaddressed at the operational/technical level. The question is whether PSM's particular obligations to provide unbiased programming requires the development of a new approach to algorithmic recommendation, or if existing recommendation principles, derived from practice in e-commerce and online shopping are sufficient? In short, the extent to which PSM praxis fits with a commercial media recommender system is unclear.

The introduction of algorithms implies a shift within PSM organisations. The automated, rule-based exposure of content on webpages and apps challenges traditional editorial practice. Also, the traditional metric of broadcasting reach is challenged by big data systems that offer (commercial) media organisations real-time analytics, precise user segmentation, and behaviour prediction. Traditional ways of planning and evaluating programme and service success will be challenged by insights that detailed analyses of PSM consumer habits can offer. The classical Reithian idea of not only giving people what they want but also introducing them to unfamiliar content will be challenged by reliance on algorithms. Again, PSM organisations must seek another approach to the interpretation of what amounts to consumer data due to the requirement of distinctiveness for PSM content.

The new technologies also require a difficult transfer of knowledge within PSM organisations. Data analysts and computer programmers (developers) now perform tasks that are key determinants for exposure to PSM content. Success is no longer only about making and scheduling programmes. This knowledge is difficult to communicate to journalists and editors, who typically don't engage in these development projects. This can weaken the organisation strategically and, on a practical level, create problems caused by failing to include or correctly mark the metadata that is essential for findability. Deep understanding of how a system recommends content is shared among a small group of experts, returning us to the question of 'opaqueness' raised by Danaher (2016). Ultimately, this points to the need for a future re-conceptualisation of PSM editorial work as a public data curating service.

Challenges in algorithmic development for public service media

We distil our understanding of crucially important challenges involved in algorithmic development for PSM in five dimensions. Each contextualises key questions that will need to be addressed.

1. Reach and distinctiveness

Nissen (2006) underscored a persistent tension in PSM is between maximising reach and maintaining distinctiveness. Does algorithmic recommendation challenge this balance? As PSM organisations implement algorithms, discussion about this tension will likely re-emerge. The point of recommending is to maximise potential reach for PSM content, but employing algorithms requires standardising the nature of content and may dilute distinctions that are essential for PSM content to have uniqueness. A related question is whether traditional understandings of reach and distinctiveness can be consistent across broadcast and online content dissemination? Further, what will be the primary point of reference – broadcasting for society as a whole or serv-

ing individual consumption preferences? If the latter, which seems more likely as networked media platforms grow and broadcast spectrum is challenged, this can put the heritage emphasis on collective social service for publics at risk (Helberger 2012). Commercial recommendation systems are designed to satisfy individual user needs as indicated by patterns of personal use. Current algorithms do not accommodate the distinctiveness of PSM content as a parameter. Using the same recommender principles that are common in commercial media may also trigger market failure criticisms, leading to complicated and costly 'public value tests' (PVTs).

2. Provision of diversity

As noted by Burri (2015) and Helberger (2015), PSM organisations have a particular obligation to reflect and promote diversity. Traditionally, this has been addressed in production and programming. As access to users' attention is now increasingly controlled by online intermediaries such as Facebook and Google, ensuring diversity becomes more difficult. Currently, no automated system reflects the editorial understanding of diversity that is vital to PSM as such (Sørensen & Schmidt 2016). In the broadcasting context, editors are able to ensure diverse perspectives and contents for viewers, but this is not the case in online media where recommendation systems pattern the presentation of options based on algorithms. Further research will be needed to map differences between mathematically calculated diversity (automated) and diversity as produced manually in the creation and programming of content. But the key question is how to guarantee diversity, and of which types and for all groups, if recommendation systems are based on principles that aim to optimise personalised consumption?

3. Transparency

PSB organisations have been accused of paternalistic attitudes (Tracey 1998). Paternalism can be understood as the 'gate-keeping' function whereby content is selected and curated for dissemination of knowledge (Scannell 2005). Algorithmic recommender systems risk a renewal of perceptions that PSM is paternalistic (Brey 2005; Spiekermann & Pallas 2006). Following Tintarev and Masthoff (2015), it is therefore important to inform users about why particular content is being recommended, and how the recommendation happens, although this is a difficult task given the technical complexity. Another aspect of transparency in relation to algorithmic recommendation involves PSM management and auditing. The digital delivery of content combined with user login requirements open opportunities for detailed reporting on consumption patterns. Will performance goals and key performance indicators for PSM organisations be linked to particular segments or user types? Will they be related to narrow policy goals? A consequence of this would be that the 'universalist mission' of PSM is severly at risk.

4. User sovereignty and the attention economy

Concern that users suffer from information overload (Eppler & Mengis 2004) is a familiar argument for developing recommendation systems. In reality, the objective is to optimise exposure to particular content. Recommendation systems may help users manage their attention economy focus (Goldhaber 1997, 2006; Mitchell 2005), but there are conflicting interests that these systems do not resolve. Algorithms make it possible to enforce some PSM programming policies (e.g. broadcasting a minimum percentage of national music), but the persistent tension between agenda-setting and user-agency, or between paternalism and popularity, are actually intensified. The reach-distinctiveness problem treated earlier now takes on a techno-paternalistic dimension (Spiekermann & Pallas 2006). This raises the question of how algorithmic recommendation systems affect the balance between agenda setting as a positive aspect and paternalism as a problematic aspect?

5. Dependency

Editorial independence is a core value in public service broadcasting (UNESCO 2001). But today the distribution of and exposure to media content increasingly relies on social network intermediaries that use recommendation algorithms. This creates a dilemma for PSM organisations which are not-for-profit organisations but inherently participants in a commercial media ecology (Leurdijk 2007). As Sørensen and van den Bulck (forthcoming) demonstrate, the use of external third-party web services for media content delivery, media recommendation, audience behaviour measurement, and sale of advertisement, makes PSM organisations increasingly integrated in and dependent on the global business ecology of web services (Lindskow 2016). While this makes sense from an operational perspective, such a practice may challenge the trustworthiness of PSM organisations in seeming overly concerned about competitive success and maximising reach. This raises questions about the ways in which PSM organisations are becoming increasingly dependent on commercial software providers with proprietary interests, third-party providers that are not mandated to provide public service per se, and social networks outside their control. Dependency is not necessarily a bad thing, but how will PSM manage the downside of this perceived vulnerability?

Conclusion

The introduction of algorithms in PSM directs attention to the unique value of human editorial work. Developing algorithmic systems requires crafting exact descriptions and unambiguous valuations of media content. This renders them more predictable within the boundaries of their formulaic constructions, and possibly less biased when compared with human recommenders. But this also makes them inherently

less thoughtful and largely unconcerned with ethical dilemmas – both of which go to the very heart of public service and are as important in networked communications as in mass media.

With refinements based on use and results, algorithms could be tweaked to deliver a transparent, relevant and diverse personal PSM diet to each user. But for reasons we have discussed, it is so far uncertain if this is actually the best way forward for PSM development? It makes sense from a technological perspective focused on aligning PSM with general conditions that characterise the networked society as a mediated environment, but this will open PSM to potential legitimacy problems with regard to enacting several of its core values. It also inherently means that PSM would be engaged with and dependent on global social media firms in which intermedia relations are highly asymmetrical.

Moreover, this area of development puts PSM organisations squarely in the crosshairs of those who argue against their engagement in innovative development. Complaints about destabilising media markets, unfair competition, and subsidised innovation are likely to be heard in the near future as algorithmic development continues. Further, PSM will be under pressure to ensure that their algorithmic systems demonstrate public value, adhere to heritage values, are properly distanced from commercial and vested self-interests, and maintain editorial independence. All of that is possible, but obviously complicated in technical, operational and political terms.

One should remember, however, that the public service ethos and characteristic PSM's core values are not rigid or universally defined. Different PSM organisations have emphasised different elements and aspects, in different political frameworks, under varying conditions over time. That is evident in variations of public service contracts and regulatory texts over time and from country to country, and in the instruments of oversight that exist in some but not all countries. The introduction of algorithmic systems will force PSM to express its values and goals as measurable key performance indicators, which could be useful and perhaps even necessary. But this could also create existential threats to the institution by undermining the core principles and values that are essential for legitimacy.

In the end, the key question is whether algorithms will be developed to embody a localised public service media ethos or become another problematic development in their reliance on commercial systems. Can the values and interpretations of PSM values, and the ethos overall, be handled appropriately in developing algorithmic designs? Can PSM values even be expressed in the mathematical language of coding logic? Or are they a human-contingent praxis that cannot be formalised in algorithms? Can coding and design practice address the complicated concerns of the need to give voice to minority groups, address marginalised concerns, and ensure that publics are informed about all crucial issues of pressing public interest? All of that remains to be seen and the answers are likely to be complicated and uneven. The issues treated in this chapter are essential because public service media are already important nodes in networked media systems with instrumental importance for building networked societies.

Notes

1. DR: Project leader Jacob Faarvang (three interviews: December 2016, February 2017, June 2017). ZDF: Project leader Andreas Grün (interview: March 2017). RTBF: project leader Pierre-Nicolas Schwab (informal conversation: February 2017). BR: (the PEACH recommender system project) lead programmer Veronika Eickhoff (interview: June 2017)

2. Conversations have been conducted in the context of a workshop and a conference organised by the EBU 'Big Data Initiative' (EBU 2016a, 2017).

3. 'PEACH' – 'Personalisation for Each', is developed by Bayerische Rundfunk (BR) and Radio Télévision Suisse (Switzerland), and supported by the EBU (http://peach.ebu.io/team/about/ visited July, 10 2017). Currently it is implemented by BR, RTS and RTP. At the PEACH home page, a larger group of PSMs, including BBC (R&D), YLE, RAI, RTVE, VRT and TVP are being acknowledged for their support and help to the PEACH project.

4. cf.: https://ebu.io/organizations/blog/58/17/2017/04/27/the-role-of-diversity-in-recommender-systems-for-public-broadcasters (accessed 2017-09-26)

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