

Intelligent Technologies Shaping Business Models for Journalistic Content Provision: A Concept Matrix

Full Paper

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Abstract

There has been much discussion about how intelligent technologies shape journalistic content provision. Common buzz words are data-driven and automated journalism. To address this issue, we conduct on a two-phase, systemic literature review in order to develop an integrated Concept Matrix (Webster & Watson 2002) on how intelligent technologies - here natural language generation, predictive intelligence algorithms, and latent semantic indexing - shape the business models of journalistic content provision. We offer insights regarding 'roles of' intelligent technologies and how they drive for' business models as we find that they, will make the difference also in journalism as in many other already or soon digital industries.

Keywords

Intelligent technologies, business model, automated content, automated journalism, computational journalism, concept matrix.

Introduction

We distinguish two traditional revenue models for monetizing journalistic content: the free indirect (attention-based) model (Bakker 2012) to attract traffic and monetize this traffic via advertising revenue (Johar et al. 2012), and the direct payment based models charging consumers per piece or for subscriptions (Chipp & Chakravorty 2016). Recent technological changes not only alter the mode and structures of news provision (Picard 2014, Ferrucci et al. 2017), but also challenge both revenue models, breaking down industry barriers and creating new opportunities (Weill & Woerner 2015; Lewis 2015; Graefe et al. 2016; Chipp & Chakravorty 2016). The vast volume and the variety of digital information produced as 'user-generated-content' aggravates charging directly for access to media services like news articles (Oestreicher-Singer & Zalmanson 2013). Automated journalism based on Artificial Intelligence (AI) and machine learning is likely to disrupt news writing in the years to come (Latar 2015). Automatically created content will relate to stories that otherwise could not be covered because of lacks in funding (van Dalen 2012). As intelligent technologies will assume tasks which used "to require human brain power" (Loebbecke & Picot 2015:152), computers may "write more than 90 percent of news by 2025" (Hammond after Graefe et al. 2016:4). A better understanding of the roles and the drivers of intelligent technologies in the context of monetizing journalistic content is needed. Here, this paper makes a contribution by developing and discussing a focused literature-based concept matrix on how intelligent technologies shape business models for journalistic content provision.

Terms and Concepts

Developing a concept matrix regarding the impact of intelligent technologies on business models of journalistic content provision, i.e., on creating journalistic information items and providing them to customers, we build on the following definitions and terms:

Intelligent Technologies. We build on the Oxford Dictionary which defines intelligence as an ability to acquire and apply knowledge and skills and technology as the application of scientific knowledge for practical purposes (Oxford Dictionary 2017). Hence, we define intelligent technologies as applications that are able to acquire and apply both knowledge and skills¹ to perform tasks and functions that would formerly have required human intervention (see also Autor et al. 2003; Hammond 2015). The literature refers to 'intelligent technologies' for example as Artificial Intelligence (Latar & Nordfors 2009; Kurzweil 2012; Brynjolfsson & McAfee 2014; Napoli 2014; Latar 2015), Algorithms (Coddington 2015) and Big Data Analytics (Hammond 2015; Loebbecke & Picot 2015). Considering our context of journalistic content provision, we distinguish Natural Language Generation (NLG), Predictive Intelligence Algorithms (PIA), and Latent Semantic Indexing (LSI), which drive increasingly popular applications in news provision such as (chat)bots.

Natural Language Generation (NLG) describes a system of algorithms that is capable of conflating representative data from different databases and identifying patterns and correlations from that in order to produce comprehensible texts in English or other human languages (Bauer et al. 2015). An NLG system maps data from some input to an output text (Reiter & Dale 1997) and enables automatically creating data-based news (Haarmann & Sikorski 2015). Applying NLG increases speed, scale, and volume of content provision through real-time analytics of databases (Graefe 2016; Mueller et al. 2016). It allows for automatically producing content through data mining according to a reader's location and activities, and hence for delivering the right content to the right person at the right time (Graefe 2016), leads to improved consistency (Graefe 2016), and allows journalists to focus more on activities that presume creativity or lateral thinking (Autor et al. 2003; Clerwall 2014; Hammond 2015). Considering the quality of automated content, van Dalen (2012) and Graefe et al. (2016) show that the quality of computer-written news is competitive with that of human journalists' for routine tasks. Media outlets such as Forbes, Los Angeles Times or The New York Times have partially adopted NLG-based systems for their news websites (Graefe 2016).

Predictive Intelligence Algorithms (PIA) enable for the extraction of information from large data sets and varieties of data structures (Shumueli & Koppius 2011; Martens & Provost 2014). They use statistical models and machine learning techniques to identify relationships and patterns as well as likelihoods of future outcomes to create empirical predictions (Upendran et al. 2016). PIA have come more to the fore as big data and smart devices open new opportunities for collecting fine grained, location-specific, context-aware, and highly personalized content (Shmueli & Koppius 2011). Using PIA, news outlets can not only observe customer behavior and build profiles of customer preferences regarding prospective product offers (Martens et al. 2016), but also better predict user preferences and personalize recommendations (Chen et al. 2012), thereby support attention-based business models such as mass advertising (Carlson 2015).

Latent Semantic Indexing (LSI) has entered the literature in the early 1990s for the first time (Deerwester et al. 1990). Recently, it gained attention with respect to information retrieval (Koukal et al. 2014) and recommendation provisions (Liang et al. 2016). It allows for analyzing semantic relationships between a set of documents and embedded terms by identifying and comparing the underlying meaning or concepts behind the words instead of keywords (Sidorova et al. 2008). Thus, it models relationships among documents based on their constituent words and subsequently the relationships between words based on their occurrence in documents (Evangelopoulos et al. 2012). By using fewer dimensions for representation than there are unique words, LSI induces similarities among terms that are useful in solving the information retrieval problems (Dumais 2004).

Business Model. Lacking a common business model definition (Chesbrough 2006; Zott & Amit 2008; Casadeus-Masanell & Ricart 2010; Zott et al. 2011), scholars have used the term with regard to e-business types, value creation or value capture by firms, and how technology innovation works (Zott et al. 2011), architecture (Timmers 1998), blueprint and building plan (Osterwalder et al. 2005), or framework and construct (Yun et al. 2015). In the technology and innovation management field, a business model is mainly seen as "a mechanism that connects a firm's (innovative) technology to customer needs and/or to other firm resources (e.g., technologies)" (Zott et al. 2011:1034). In this paper, we define business models

¹ Beyond the strict application of two Oxford Dictionary definitions that technologies have skills to perform functions, we also agree with the broader notion that technologies have or apply 'functions'.

as mediating constructs between technology and economic value that capture the core business logic of any firm – here: journalistic content providers (Loebbecke & Picot 2015; Yun et al. 2015). We distinguish three business models² for journalistic content provision which benefit from deploying the above 'intelligent technologies' in publishing houses, namely (1) offering Low-Cost Content, (2) offering Personalized Content, and an (3) offering Enhanced Consumer-Experience.

Offering Low-Cost Content. While content providers increasingly face commercial pressure to produce cheaper content and lower distribution costs (Berman et al. 2007; Johar et al. 2012; Franklin 2014), they appreciate digital goods with their enormous economies of scale (Brynjolfsson & McAfee 2014). Those allow them to reduce average cost in information markets is to increase sales volume (Shapiro & Varian 1999) because their production needs are reduced to basically one unit (Loebbecke & Picot 2015).

Offering Personalized Content. Monetizing personalized content requires knowing something about one's customers (Shapiro & Varian 1999; Weill & Woerner 2015). Intelligent technologies help constructing consumers' personal identities by tracking their online activities. Journalistic content providers can anticipate consumers' interest-shifts (Berman et al. 2007) and adjust their information goods to consumers' preferences and social trends (Latar & Nordfors 2009; Lewis & Westlund 2015). Further, intelligent technologies enable differential – perhaps even personalized – pricing (Shapiro & Varian 1999).

Offering Enhanced Consumer-Experience. As consumers' willingness to pay for media content increases with the level of engagement (Oestreicher-Singer & Zalmanson 2013), content providers integrate interaction strategies based on contextual and personal parameters such as cognition, emotions and behavior into their business models (Latar & Nordfors 2009; Chipp & Chakravorty 2016), hence focus on enhancing consumer experiences instead of attention-based business models.

Research Methodology

As "concepts determine the organizing framework of a [literature] review" (Webster & Watson 2002:16), we followed a concept-driven approach as we performed a two-phase, systematic literature review (for different approaches to literature reviews, see for instance Rowe (2014) or Paré et al. (2016).

Phase 1: Identifying Papers for the Concept Matrix. To gather a holistic view on the topic of intelligent technologies impacting business models of journalistic content provision, we first conducted a preliminary literature overview searching on Google for 'content provision', 'business model content provision', 'intelligent technologies', 'intelligent technologies content provision', 'artificial intelligence media industry', and 'big data media industry' without restricting the time-period. Finding mostly articles which focused on intelligent technologies shaping business models of news outlets, we identified the keywords 'Computational Journalism', 'Automated Journalism' and 'Robot Journalism' as relevant. We then performed a systematic search for those keywords on ACM Digital Library, AISWorld, EBSCO, IEEEExplore, ProQuest, ScienceDirect, and Web of Science within title, abstract, keywords, and full-text. This resulted in 149 papers including 20 duplicates. The 129 papers (Appendix A - dropped due to page limitation) mainly appeared in journalism outlets such as 'Journalism Practice' and 'Digital Journalism'. We did not exclude any publication outlet as "a complete review covers relevant literature on the topic and is not confined to (...) one set of journals" (Webster & Watson 2002:15). Subsequently, we followed a multi-step filtering process (Afzal et al. 2009). To enhance validity and reliability, two researchers analyzed each title and abstract for intelligent technologies shaping business models of journalistic content provision (Alavi & Carlson 1991). Thereby, we eliminated 85 of 129 articles. Second, we analyzed the full text of the remaining 44 papers (see Appendix A - dropped due to page limitation). Again, two researchers independently assessed whether a paper links any intelligent technology to shaping business models of news outlets. We found 12 core articles. As we were more interested in covering the literature on the topic than in counting and categorizing papers, we then took those 12 core articles and for each searched both backward "by reviewing the citations for the articles identified (...) to determine prior articles" (Webster & Watson 2002:16) and forward "to identify papers citing the key articles identified in the previous steps" (Webster & Watson 2002:16). We found another 7 papers (Appendix B - dropped due

² The reader may prefer to conceptualize these non-disjoint 'business models' as strategies or technological features, which in turn contribute to or enable business models.

to page limitations, but all integrated in the references). At the end, we had a final set of 19 papers for developing concept matrix.

Phase 2: Developing the Concept Matrix. Following Webster and Watson (2002:17), who recommend to "develop a logical approach to grouping and presenting the key concepts you have uncovered" and to "synthesize the literature by discussing each identified concept" afterwards, in a team of two researchers, we read all 19 papers to identify the 'roles of' and 'drivers for' business models as key concepts. The role of a business model lies in "unlocking the value potential embedded in new technologies and converting it into market outcomes" (Zott et al. 2011:1032). For our concept matrix, we found 'Reduction of Production Costs', 'Gains in Efficiency', 'Potential for Differential Pricing' and 'Generation of Competitive Advantage' as such roles. Drivers for business models are potential sources of value creation, so that "the Internet is a principal driver of the surge of interest in business models" (Zott et al. 2011:1025). We found 'Automated Content' and 'Data-Mining' as drivers. We then added "a further dimension (...) to handle the unit of analysis" (Webster & Watson 2002:17) and introduced the key concept 'Journalistic Content Provider's Business Models based on Intelligent Technologies' with the three models 'Offering Low-Cost Content as Business Model', 'Offering Personalized Content as Business Model' and 'Offering Enhanced Consumer-Experience as Business Model'. Subsequently, we studied in detail the selected 19 papers in detail regarding their insights on roles, drivers and business models.

Literature-Based Concept Matrix

Only 2 of the 19 papers were published prior to 2012; this suggests a growing research interest in linking intelligent technologies to business models of journalistic content provision. 90% of the studies were published in journals, 10% as working paper or in conference proceedings. 11 studies were theoretical and 8 studies were empirical. Considering the research methods applied in the empirical studies, 6 were case studies and 2 surveys. In the following, we offer the main insights gained from the selected papers regarding roles, drivers, and business models – the integrated Concept Matrix has been removed from the text due to the given page limit; it is available upon request.

Roles of Intelligent Technologies for Journalistic Content Provision

Of 19 papers, 13 investigate the role of intelligent technologies for journalistic content provision – 8 papers support Reducing Production Costs and Gaining Efficiency and 4 the Potential for Differential Pricing and generally Generating Competitive Advantage (see Table 1 at the end of the subsection).

Reducing Production Costs. The adoption of NLG helps journalistic content providers to produce numerous articles with virtually no variable costs (van Dalen 2012; Graefe 2016) in light of declining revenues and audiences (Flew et al. 2012). Providing automated content promises lower labor costs and thus overall operational costs (Franklin 2014; Carlson 2015; Latar 2015). Human professionals can be reallocated to investigative reporting without "wasting resources on stories that a robot could write just as well" (Lewis & Westlund 2015:458). However, the adoption of automated content raises issues of "low-pay and no-pay journalism where content is no longer King" (Franklin 2014:484).

Gaining Efficiency. Intelligent technologies can improve the quality and speed of media content (here: news) delivery (Flew et al. 2012; van Dalen 2012). NLG "enables scale and offers a competitive advantage for the business in producing content more efficiently" (Diakopoulos & Koliska 2016:5). Efficiency gains result from "automation, creation of data silos, the construction of AI algorithms that can data-mine new facts and social trends, write the stories, and automatically target the content to the appropriate consumers in the relevant context of media consumption" (Latar 2015:74). NLG and the use of data allows for achieving more observation at less cost (Flew et al. 2012, Kshetri 2014; Lewis & Westlund 2015). LSI enables media companies to derive insights from various data sets more effectively and efficiently (Flew et al. 2012). For example, Liang et al. (2016) developed a system called 'KVASIR' that can be integrated on top of LSI allowing consumers and media companies to achieve millisecond query speed for a 14 million document repository.

Enabling Differential Pricing. Data mining activities foster the use of differential pricing and thus give consumers a choice while allowing the provider to gain consumer insights (Berman et al. 2011). Providers can personalize content at different prices by adopting an 'advanced price discrimination

strategy', which prices within the affordability range and "thus overcomes the inefficiencies associated with deadweight losses" (Couldry & Turow 2014; Kshetri 2014). Selling gathered data sets to marketers (while adhering to privacy laws) offers additional revenue opportunities (Couldry & Turow 2014). Data about consumers' preferences can be used to tailor pricing and product offerings and thereby increase consumer welfare and firms' profits (Kshetri 2014). A higher willingness-to-pay for premium services typically results from active consumers taking advantage of an array of technical features (Oestreicher-Singer & Zalmanson 2013).

Generation of Competitive Advantage. Technologies like NLG offer a competitive advantage from more efficient journalistic content production (Diakopoulos & Koliska 2016). PIA and LSI improve data mining activities and thus the opportunity to automatically send personalized content to respective consumers based on their digital profiles means (Latar 2015). With automated content and real-time data mining of media consumers as emerging key competences, data mining systems have become a key source of competitive advantage (Kshetri 2014). Strategic thinking with respect to lower switching costs for consumers contributes to sustaining such competitive advantages based on deploying intelligent technologies (Oestreicher-Singer & Zalmanson 2013).

Source		Roles			
Author	Outlet	Reducing Production Costs	Gaining Efficiency	Potential for Differential Pricing	Generating Competitive Advantage
Berman/Battino/Feldman '11	Strategy & Leadership	-	-	x	-
Carlson '15	Digital Journalism	x	x	-	-
Couldry/Turow '14	Int. Journal of Communication	-	-	x	-
Diakopoulos/Koliska '16	Digital Journalism	-	x	-	x
Evans/van Damme '16	Journal of Media Management	-	-	-	x
Flew/Spurgeon/Daniel '12	Journalism Practice	x	x	-	-
Franklin '14	Journalism Studies	x	-	-	-
Kshetri '14	Telecommunications Policy	x	x	x	x
Latar '15	Springer Book Series	x	x	-	x
Lewis/Westlund '14	Digital Journalism	x	x	-	-
Napoli '13	McGannon Working Paper	x	x	-	-
Oestreicher-Singer/Zalmanson '13	MIS Quarterly	-	-	x	-
van Dalen '12	Journalism Practice	x	x	-	-
		8	8	4	4

Table 1. References on Roles of Intelligent Technologies in Business Models for Journalistic Content Provision

Intelligent Technologies as Drivers for Journalistic Content Provision

16 papers analyze intelligent technologies as drivers of journalistic content provision – 11 investigate automated content and also 11 data mining to shape business models (see Table 2 at the end of the subsection).

Automated Content has become a normalized component of the news experience; consumers can barely differentiate between automated and human content (Clerwall 2014; Carlson 2015; Graefe et al. 2016). Any "narrativization of data through sophisticated artificial intelligence programs" (Carlson 2015) allows for mass production of interchangeable content. As driver for scale and optimization (Diakopoulos & Koliska 2016) automated content, especially 'Robotic Journalism', vastly expands business opportunities around news (Carlson 2015; Latar 2015). Intelligent technologies assume decisions which content to produce and how to produce it and they contribute to data gathering and information retrieval (Flew et al. 2012; Napoli 2014; Latar 2015). Delegating the creation of superficial content like breaking

news to intelligent technologies, reduces labor resources and improves the news quality by decreasing the time spent gathering and processing information from diverse sources (Flew et al. 2012). Stories which lack funding can be produced automatically (van Dalen 2012); journalists can focus high-quality content supported by intelligent technologies that provide datasets as a "robust and factual basis for investigative reporting" (Flew et al. 2012). PIA may supplement automatically produced content with NLG, thus "providing a significant advantage in the competition for consumer attention and dollars" (Latar 2015:74). Automated content can personalize multiple versions of the same story for individual audience members (Carlson 2015) to enhance the interaction and engagement with consumers.

Data Mining allows drawing the secrets from massive amounts of data – gathered as source material for journalistic storytelling guiding content production (Gillespie 2012; Napoli 2014) and collected on audiences for business purposes (Lewis & Westlund 2015). Marketers use consumer tracking technology to news providers to better understand customers' changing needs and requirements (Latar & Nordfors 2009) and target advertising messages (Couldry & Turow 2014; Ombelet et al. 2016). Mining personal data allows delivering higher value to customers by lowering prices and other means (Kshetri 2014). Consumers are willing to share personal information in exchange for more news content if "the perceived benefits of signing up [i.e., sharing personal data] are higher than the perceived costs" (Evens & van Damme 2016).

Author	Driver	Source	
		Reducing Production Costs	Gaining Efficiency
Bakker '12	Journalism Practice	x	-
Carlson '15	Digital Journalism	x	x
Chipp/Chakravorty '16	Journal of Product & Brand Mgmt	-	x
Couldry/Turow '14	Int Journal of Communication	-	x
Diakopoulos/Koliska '16	Digital Journalism	x	-
Evens/van Damme '16	Journal of Media Management	-	x
Flew/Spurgeon/Daniel '12	Journalism Practice	x	-
Franklin '14	Journalism Studies	x	-
Gillespie '14	MIT Press	-	x
Kshetri '14	Telecommunications Policy	-	x
Latar '15	Springer Book Series	x	x
Latar/Nordfors '09	Innovation Journalism	x	x
Lewis/Westlund '14	Digital Journalism	x	-
Napoli '13	McGannon Working Paper	-	x
Napoli '14	Communication Theory	x	x
Ombelet/Kuczerawy '16	WWW Conference	x	x
van Dalen '12	Journalism Practice	x	-
		11	11

Table 2. References on Intelligent Technologies as Drivers of Business Models for Journalistic Content Provision

Journalistic Content Providers' Business Models

18 papers point to intelligent technologies shaping business models for journalistic news providers – 9 refer to offering Low-Cost Content, 13 to offering Personalized Content, and 6 to offering Enhancing Consumer Experience (see Table 3 at the end of the subsection).

Offering **Low-Cost Content**. News providers must substantially lower current costs to fund growth and maintain competitive advantage (Berman et al. 2011). Hence they promote low-cost or even free content production as business models (Bakker 2012). They build on lowering operational costs, especially labor cost (Latar 2015; Lewis & Westlund 2015) as intelligent technologies take on non-routine cognitive tasks (Autor et al. 2003; Oestreicher-Singer & Zalmanson 2013; Loebbecke & Krcmar 2014; Graefe et al. 2016) while professionals are reallocated to tasks typically assigned to humans. Using NLG enhances their productivity by creating and distributing many articles causing basically only fixed costs for the first unit (van Dalen 2012).

Offering **Personalized Content**. News providers benefit from advanced data mining and an "ever-expanding supply of data on audiences' media consumption patterns and preferences" (Napoli 2014). They adjust content to these preferences (Couldry & Turow 2014; Lewis & Westlund 2015; Chipp & Chakravorty 2016) and target consumers in the relevant context (Latar 2015) and offer marketers to instantly attain and tailor advertising messages to consumers predicted to buy respective products or services, thereby fostering overall demand (Gillespie 2012; Loebbecke & Picot 2015; Evens & van Damme 2016). When offering multiple customized versions of the same story to individual audience, they can take advantage of differential pricing (Kshetri 2014; Carlson 2015; Chipp & Chakravorty 2016). However, they may also face the challenge of "unpleasant, creepy and frightening experiences for consumers" (Kshetri 2014:1139) with respect to highly customized news based on predicted preferences.

Offering **Enhancing Consumer-Experience**. LSI, but also NLG and PIA, enable business models based on consumer-experience and interaction rendering them an enabler of experiences rather than a mere provider of content (Oestreicher-Singer & Zalmanson 2013). Building a news-world experience requires combining automated content by natural language generation with a new way of consuming it [personalized content by predictive intelligence algorithms] and new tools to make the experience easy (Berman et al. 2011; Flew et al. 2012; Lewis & Westlund 2015; Evens & van Damme 2016). Intelligent technologies offer a range of possibilities for news providers rethinking their business models and seeking innovative ways to enhance the consumer experience (Latar & Nordfors 2009; Flew et al. 2012; Evens & van Damme 2016; Chipp & Chakravorty 2016). News providers should not ask themselves how to make users pay more, but rather how to achieve higher participation (Oestreicher-Singer & Zalmanson 2013). Consumers' search cost impact participation; "if a user's total level of benefit is lower than the cost of finding the right content, he or she is likely to discontinue use of the news outlets" (Oestreicher-Singer & Zalmanson 2013:596).

Author	Source	Business Model: Offering		
		Low-Cost Content	Personalized Content	Consumer Experience
Bakker '12	Journalism Practice	x	-	-
Berman/Battino/ Feldman '11	Strategy & Leadership	-	x	x
Carlson '15	Digital Journalism	x	x	-
Chipp/Chakravorty '16	Journal of Product & Brand Mgmt	-	x	x
Couldry/Turow '14	Int Journal of Communication	-	x	-
Evens/van Damme '16	Journal of Media Management	-	x	x
Flew/Spurgeon/Daniel '12	Journalism Practice	x	-	-
Franklin '14	Journalism Studies	x	-	-
Gillespie '12	MIT Press	-	x	-
Kshetrie '14	Telecommunications Policy	-	x	-
Latar '15	Springer Book Series	x	x	-
Latar/Nordfors '09	Innovation Journalism	x	x	x
Lewis/Westlund '15	Digital Journalism	x	x	-
Napoli '13	McGannon Working Paper	-	x	-
Napoli '14	Communication Theory	-	-	x
Oestreicher-Singer/Zalmanson '13	MIS Quarterly	-	-	x
Ombelet/Kuczerawy '16	WWW Conference	x	x	x
van Daken '12	Journalism Practice	x	-	-
		9	13	6

Table 3. References on Business Models for Journalistic News Provision based on Intelligent Technologies

Discussion and Outlook

From developing our concept matrix, we would like to raise four discussion points:

- Intelligent technologies, here NLG, PIA and LSI, indeed shape the business models of journalistic content provision. Using intelligent technologies will eventually break down industry barriers (Evens & van Damme 2016) as predicted by Shirky (2008). Also in journalism, advanced data analytics will make

the difference. Companies that figure out how to combine domain expertise with data science will be at an advantage (McAfee & Brynjolfsson 2012).

- Intelligent technologies will replace well educated labor performing cognitive tasks – likely without user notice as news writing gives room to become standardized by intelligent technologies whereas automated content is also competitive with standard news (Hammond 2015). Different from Autor et al. (2003) who sees less educated labor at risk first, the trend towards automated content points to substitutive effects of machines replacing labor in the cognitive field of journalism (Flew et al 2012; Franklin 2014; Napoli 2014; Carlson 2015; Latar 2015; Lewis & Westlund 2015).
- Intelligent technologies entering journalistic content provision support user generated mass production of interchangeable content (Carlson 2015): Such so-called 'mass amateurization' (Shirky 2008) will replace professional production by organizations.
- Properly maintained property rights artificially increase the sales price (Lessig 1999; Brynjolfsson & Saunders 2010), they strengthen the monopoly power of the respective right holder (Helpman 1993). The diffusion of intelligent technologies causes an erosion of property rights as competitors and users can copy any information goods cheaply (Shapiro & Varian 1999) and puts any direct payment based revenue model of information goods at risk (Loebbecke 1999). Indirect, advertising-based revenue models will gain ground; traditional providers of journalistic content will enrich their offerings via customized content and interactive features (Lewis & Usher 2013; Oestreicher-Singer & Zalmanson 2013) – until ad-blocking technologies will cause the next industry upheaval.

With developing our concept matrix, we hope to start a broader debate in the IS community about the industry- or domain specific impact of intelligent technologies on business models in, at least formerly, cognitive and perhaps even creative industries (Caves 2002; Knee et al. 2009) such as journalism. Obviously, it is less about rolling out technologies than about understanding how these technologies might create business value (Mueller et al. 2016).

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