Drivers of Professional-AI Collaboration: Case Study Analyses of the German News Media Industry

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Abstract

Artificial intelligence (AI) is increasingly becoming part of many processes in the news media industry. It is seen as highly relevant for speeding up workflows and content personalisation. At the same time, the introduction of AI is having a strong impact on workflows, trust, roles and responsibilities of the professional newsworkers, who are consequently often reluctant to collaborate with the new, intelligent technology. These case study analyses investigate with an HMC (human-machine communication) lens how to create conditions for supporting and improving professional-AI collaboration. Besides identifying relevant drivers, existing overlaps of human-machine collaboration theory and other theoretical fields as well as practical measures for management and AI providers to promote professional-AI collaboration in the newsroom will be uncovered. The results highlight (1) comprehensibility of the AI, (2) the AI's benefits and (3) knowledge sharing as most important drivers. The study introduces furthermore concrete indications for future research.

Keywords: professional-AI collaboration; human-AI collaboration; artificial intelligence; AI; human-machine communication; HMC; news media; case study

Introduction

Nowadays, artificial intelligence (AI) technologies, such as ChatGPT, is experiencing high popularity and trust crises in many application fields and value chains in our society and

economy. Predictive AI for consumer behaviour, virtual assistants, and personalisation increasingly influence the user experience. This development is especially relevant and controversial for the news media industry, since journalism also performs fundamental functions in politics and society. Established media organisations, such as the Associated Press, the New York Times or Microsoft already use or even build up their own intelligent systems for content processing (Bandy & Diakopoulos, 2019; Graefe & Bohlken, 2020; Waterson, 2020). Newsrooms are preparing for the fourth major wave of journalism (after online, mobile and social media) to use big data with the help of AI (Goni & Tabassum, 2020). Moreover, a survey conducted by the University of Oxford among 246 media leaders from 52 countries shows that over 80% rely on AI for delivering more personalised experience and production efficiency (Newman, 2022). It is therefore perceived as a highly relevant development for the industry.

On the other hand, the role of professionals is shifting immensely with the adoption of AI in the news (Lewis, Guzman, et al., 2019; Lewis, Sanders, et al., 2019; Schapals & Porlezza, 2020). AI is able to perform increasingly more communicative tasks, including Natural Language Generation (NLG), social bots, virtual agents, or content-processing technology, while processes and professional responsibilities transform successively (A. Guzman, 2020). Consequently, they are often not willing to work with new intelligent technologies. In addition, during the COVID-19 pandemic, home-office, hygiene concepts and rapid integration of new technologies have complicated the intra- and inter-organisational collaboration. Intelligent automation solutions became more attractive to react to challenging work conditions. Classical team collaboration experiences a shift to a distant, technology-mediated collaboration. The questions arise how to react responsibly to these developments, how to ensure that professionals

collaborate productively with AI-enabled technology, and how to enhance technology-driven collaboration conditions.

Despite the visibly increasing importance of this topic, there are still disproportionately large knowledge gaps. Prior studies predominantly concentrate on interactions between AI and customers (Gómez-Zará & Diakopoulos, 2020; Lutz & Tamó-Larrieux, 2020; McEwen et al., 2020). Other research addresses consumers' perception of AI and similarities between journalists' and machines' output and performance (Clerwall, 2014; Graefe et al., 2018). However, research on professional-AI collaboration in the media organisation has been neglected so far. Therefore, this study finds its contribution in investigating human-AI collaboration in the professional context, exemplified in the German news media industry. Of particular importance are the drivers, which can support and improve professional-AI collaboration, since they form an important basis, both theoretically and practically, for understanding human-machine collaboration in the newsroom and for maintaining journalistic quality in the era of AI. This work follows the research question:

RQ: Which drivers can be identified to enhance professional-AI collaboration?

In this collective case study of four major newsrooms in Germany, team collaboration schemes are contrasted to the logics of professional-AI collaboration. The term *AI* describes a technology here, which can be trained and can learn to display or simulate human behaviour (Graßl et al., 2022; Janiesch et al., 2021; Russell & Norvig, 2021). Besides approaching professional-AI collaboration and its drivers, the results can directly contribute to expand logics in human-machine collaboration theory and about possibilities for management and AI providers to promote professional-AI collaboration in news media organisations.

Background

As theoretical embedding to this study, the Human-Machine-Communication (HMC) approach is chosen – an emerging, socio-technical approach challenging the assumption that humans are communicators and machines are exclusively mediators (Lewis, Guzman, et al., 2019). Nowadays, AI increasingly takes over communicative tasks and performs interactive roles in news media organisations (e.g. Natural Language Generation, social/virtual bots, automated content-processing) (A. L. Guzman, 2019; Schapals & Porlezza, 2020). The incorporating HMC approach is theoretically very adequate to apply, as it considers the intelligence or impact of the machine in the value creation process (A. L. Guzman, 2019). However, there is a need for further theoretical development, especially at the interplay between human and technical logics in the professional-AI collaboration. So far, studies prioritize *traditional* communication with users (audience-oriented), such as news bots interacting on Twitter (Gómez-Zará & Diakopoulos, 2020), communicative eye-tracking technology interacting with physically impaired users (McEwen et al., 2020) or social robots interacting with Amazon users (Lutz & Tamó-Larrieux, 2020). Apart from this, there are still large gaps in knowledge at the professional-organisational level. This study approaches this gap from the collaboration direction. Prior management research provides empirical evidence that a high level of collaboration significantly enhance the quality of an organisation's performance (Banker et al., 2006; Boughzala & de Vreede, 2012, 2015; Jordan et al., 2002). Collaboration is recognized as one of the most critical ingredients for organisational value creation (Bolton et al., 2018; Boughzala & de Vreede, 2015; Wognum & Faber, 2002). Sowa et al. (2021) distinguishes four stages of professional-AI collaboration (competing or working separately, supplementing, interdependent working and hybrid working) and highlights the need for AI-related research to focus not on full automation in the future, but

rather on collaborative approaches where professionals and AI work closely together (Sowa et al., 2021).

Methodology

This study employs a collective case study methodology (Stake, 1995; Yin, 2014), a branch of the multiple case study analysis with emphasis on cross-case similarities and differences (Lai, 2017; Yin, 2014). This method is very suitable for theory development, since it specifies gaps and compares one contemporary issue across different scenarios within a real-life context (Lai, 2017; Ridder, 2017). *Diverse* cases are chosen to contrast different collaborative conditions systematically with an HMC lens (Gerring, 2009; Yin, 2014). Additionally, cases from Germany are selected to start with one particular news media market. This study is one of the first to examine HMC (1) in the professional newsroom setting, (2) from a collaboration perspective and (3) for the German news media market.

Lacking human-machine collaboration models in media management research, established collaboration maturity models from general management studies were screened for their applicability and suitability in the journalistic context of this case study (e.g. Collaboration Maturity Model (Col-MM), Collaboration Maturity Grid (CMG), Quality Management Maturity Grid (QMMG), Collaboration Model for Urban Planning (CUPM), Computer-Mediated Communication Interactivity Model (CMC)). Ten criteria were selected, which are represented in multiple established collaboration maturity models to form a study framework (Table 1). These criteria are sufficiently generic to be applied to different types of settings and assess collaboration holistically.

Table 1: Collaboration Criteria

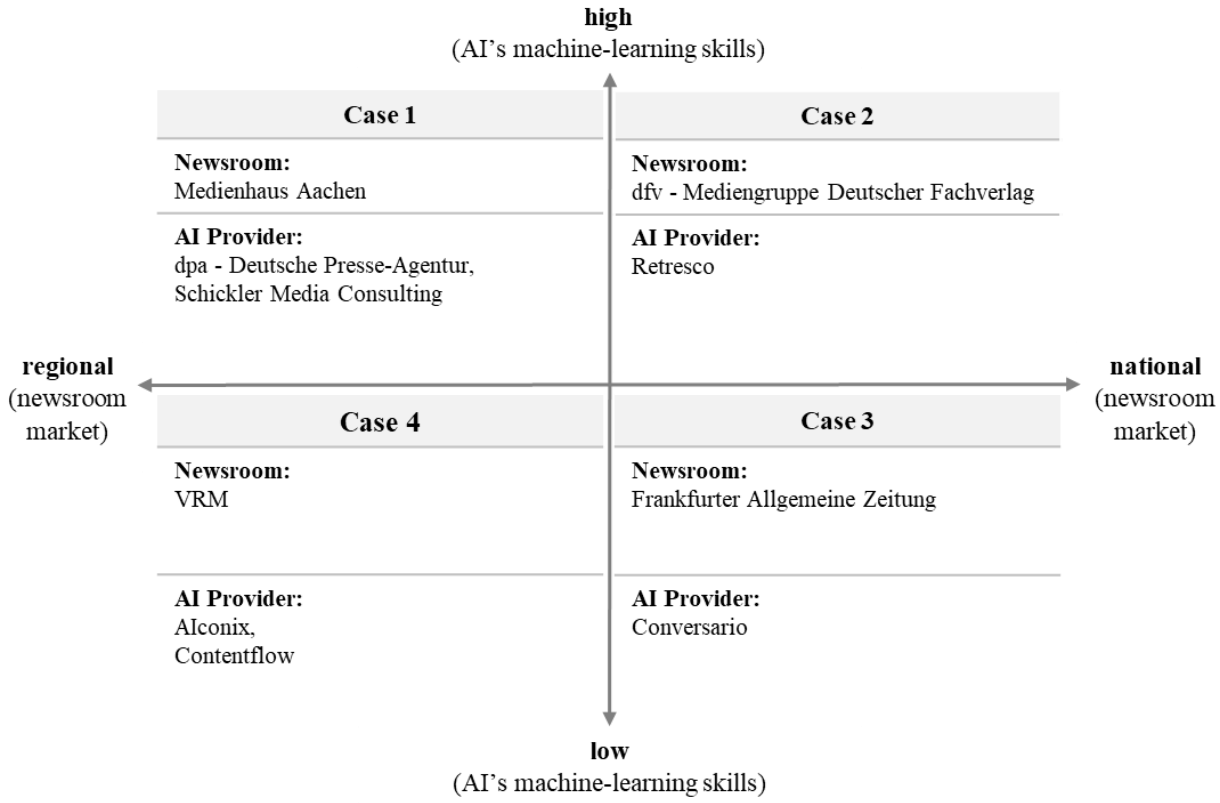
Dimension	Criteria	Collaboration approaches	Operationalisation	Scale	References *(among others)*
Collaboration characteristics	Working mode	Col-MM, QMMG, CMG	Responsibilities of the AI/human, daily work dependencies	1. Distribution + low interdependence, 2. Distribution + high interdependence, 3. Synergy + low interdependence, 4. Synergy + high interdependence	(Boughzala & de Vreede, 2012, 2015; Crosby, 1979; Fraser et al., 2003)
	Interaction intensity	Col-MM, CMC, computer-mediated group interactivity	Professional-AI intersections, AI's intervention in value creation	1. No interaction, 2. Weak interactions, 3. Non-regular strong interactions, 4. Regular strong interactions	(Boughzala & de Vreede, 2012, 2015; A. Guzman, 2020; Weick et al., 2005; Westerman et al., 2020)
	Formalisation	Col-MM, CMG, relations in unified modelling language	Degree of standardization/ predefinition in human-AI interaction	1. Not at all, 2. Structured, 3. Formalised, 4. Standardized	(Boughzala & de Vreede, 2012, 2015; Fraser et al., 2003; Wognum & Faber, 2002)
	Commitment	Col-MM, knowledge management strategy	Professionals' reactions to AI implementation, pleasure to work with AI	1. Less committed + passive, 2. Committed passive, 3. Committed + active, 4. Highly committed + active	(Boughzala & de Vreede, 2012, 2015; Kolfschoten & de Vreede, 2009; Westerman et al., 2020)
	Collaboration depth	Col-MM, CMG, collaboration infrastructures in virtual organisations	Degree of perceived human-AI collaboration	1. Communication, 2. Coordination, 3. Cooperation, 4. Coproduction	(Boughzala & de Vreede, 2015; Fraser et al., 2003; A. Guzman, 2020; Kolfschoten & de Vreede, 2009)
Collaboration management	Decision making	Col-MM, CUPM, human-machine collaboration in managerial decision making	Responsibility sharing, role of AI, controlling of AI decisions	1. Randomly (human or AI), 2. Reactive (human or AI), 3. Proactive (human+AI), 4. Collective (human+AI)	(Boughzala & de Vreede, 2012, 2015; Haesevoets et al., 2021; Meza et al., 2021; Weick et al., 2005)
	Management style	Col-MM, future of work approach, QMMG, CMG	Management approach, effects on the collaboration	1. Chaos, 2. Emergence, 3. Planning, 4. Integrated culture	(Boughzala & de Vreede, 2012, 2015; Crosby, 1979; Fraser et al., 2003)
	Leadership endorsement	Col-MM, leadership effectiveness in virtual teams	Involvement of managers in AI implementation	1. Apathy, 2. Interest, 3. Approval, 4. Active support	(Boughzala & de Vreede, 2012, 2015; Wognum & Faber, 2002)

Information/ knowledge integration	Knowledge sharing, strategic learning	Col-MM, theory of knowledge reuse	Handling with new knowledge, recordings	1. Not at all, 2. Individually memorized, 3. Managed sharing, 4. Collective intelligence	(Boughzala & de Vreede, 2015; A. L. Guzman, 2019; Kolfschoten & de Vreede, 2009)
	Information access	Col-MM, CUPM, human-AI collaboration workflows, information theory	Type/no. of accesses to information for professionals	1. None, 2. One simple entry point, 3. Several entry points, 4. Active supported multiple access	(Boughzala & de Vreede, 2015; A. L. Guzman, 2019; Meza et al., 2021; Segal et al., 2022; Weick et al., 2005)

For *diverse* cases, it is mandatory that central, influencing variables vary to cover the full diversity of cases on the market (Gläser & Laudel, 2010; Patton, 2015), typically one referring to the studied setting (news media organisation) and one to the studied subject (AI) (Ridder, 2017). Here, the newsroom market (regional vs. national) and the AI's machine-learning skills (high vs. low) are chosen as varying variables. The newsroom market highly influences strategic value creation decisions, including collaboration decisions, while the technological skills of the AI has been shown to influence the decision-making process in human-machine collaboration (Cook, 2021; Meza et al., 2021).

In addition, it is essential to include consistent, intervening variables across all cases to ensure comparability and meaningful theoretical explanation and induction (Gerring, 2009; Gläser & Laudel, 2010). The constant, intervening variables of the case selection are: (1) The AI is used for news text-generating and -processing and (2) the AI is currently in use in the newsroom. This is based on the fact that the AI need to be able to perform similar core tasks than the newsworker (text-generating and -processing) and to examine recent and current collaboration experiences.

Figure 1: Case Positioning



In collaboration with major German AI providers and their customer bases, four cases were purposively selected meeting the aforementioned requirements (German Press Agency, General Newspaper Frankfurt, German Special Interest Publishing Group and Publishing Group Rhine-Main) (Figure 1). For each case, semi-structured interviews were conducted with the experts who manage the AI, always both from the newsroom and the provider perspective. On the newsroom side, it might be the AI project manager, head of content, head of digital or the managing digital editor. On the provider side, it might be the CEO, AI developer or digital officer. Interviews were conducted with 15 experts in total, lasting between 45 and 60 minutes (Table 2).

Table 2: Interview Sampling

Case	Participants	Organisation	Role
1	Chief Digital Officer (P1)	German Press Agency	AI Provider
	Head of Performing Content (P2)	German Press Agency	AI Provider
	Head of Digital Development (P3)	Mediahouse Aachen	Newsroom
	Head of Digital Content (P4)	Mediahouse Aachen	Newsroom
	Partner & AI Co-Provider (P5)	Schickler AI Consulting	AI Provider
2	AI Project Manager (P6)	German Special Interest Publishing	Newsroom
	Chief Editor Digital Media Development (P7)	German Special Interest Publishing	Newsroom
	Chief Executive Officer (P8)	Retresco AI	AI Provider
3	Managing Editor (P9)	General Newspaper Frankfurt	Newsroom
	Head of Social Media (P10)	General Newspaper Frankfurt	Newsroom
	Chief Executive Officer (P11)	conversario AI	AI Provider
4	Deputy Head of Content Development (P12)	Publishing Group Rhine-Main	Newsroom
	Chief Executive Officer (P13)	Aiconix	AI Provider
	Chief Executive Officer (P14)	contentflow	IT Provider
	Chief Operating Officer (P15)	contentflow	IT Provider

The interview guideline consisted of three sections: the first covered the case description, the second the collaboration criteria (collaboration conditions) and the third the drivers and potentials for the future (Pauli et al., 2020). For intercoder reliability and coding consistency, one researcher coded the interview transcripts line-by-line (Pauli et al., 2020) with the software MAXQDA and a directive, qualitative content analysis approach (starting with theory) according to Hsieh & Shannon (2005). To develop an empirically grounded framework, thematic coding by Braun & Clarke (2006) was used – an iterative coding process to identify themes from extensive qualitative data. Additionally, AI training materials, online articles and strategic concepts about the AI project were screened. Interview transcripts and secondary materials were analysed until thematic and content-related saturation was reached. The dataset consisted of 576 text pages with 837 coded text parts, structured in 26 coding themes.

Results and Discussion

Professional-AI Collaboration Conditions

The results indicate very diverse collaboration conditions across the cases. The cases of the German Press Agency & Mediahouse Aachen (case 1) and the General Newspaper Frankfurt (case 3) score high in many collaboration criteria, in contrast to the cases of the German Special Interest Publishing Group (case 2) and the Publishing Group Rhine-Main (case 4). In the more collaborative cases (case 1 and 3), professionals use the AI daily to get recommendations for upcoming content decisions. As interview participant P11 claimed: *"The AI can say: 'I'm uncertain if this is good or bad. Dear human, take another look at it'."* In the less collaborative cases (case 2 and 4), the AI project is only occasionally driven and not strategically managed. Consequently, knowledge sharing, information access and the commitment of the collaborators are not transparently structured or pronounced. Furthermore, in case 2 and 4, the collaboration is not as deep or intense as in the other cases: Most of the AI processes operate automatically in the background and rarely cross the path of the professional newsworker. Therefore, the AI has only little impact on the internal work routines. The collaboration can be classified here in the stage *working separately* (stage 1 of 4), while the more collaborative cases 1 and 3 rather fall under *interdependent working* (stage 3 of 4) (Sowa et al., 2021).

Regarding the decision-making in the professional-AI collaboration, every interviewee explained that the final decision-maker remains the professional newsworker: *"The AI does not decide itself. We get the data from the AI, get what we need, and then work with it." (P5)* Interviewees perceive it as very relevant that humans are always in charge and can monitor or change all activities of the AI. Furthermore, the AI is not perceived as a collaboration partner, which confirms the findings by Graßl et al. (2022). Regardless how intelligent the AI is, it

consistently assumes a subordinate role as technical assistance, in which the assistant service is reciprocal with the professional newsworker.

Drivers of Professional-AI Collaboration

When asking the interviewees which factors they perceive as relevant to drive the collaboration between the AI and the professional newsworker, three key drivers were explicitly thematised across the board:

(1) comprehensibility of the AI tool,

(2) clear benefit of the AI, and

(3) knowledge sharing.

Several interviewees acknowledged comprehensibility in each of the four cases. This entails a reduction of complexity in the working processes with the AI: *"There is one key that is absolutely critical to success, and that is complexity reduction." (P1)* According to the interviews, newsworker-AI collaboration works best if each professional is able to utilize the technology easily and comprehend the success KPIs. Comprehensibility is also seen as being highly relevant for building trust in the machine. *"Trust and understanding of how things work is an important point. It is also important to keep this inhibition threshold as low as possible, so that editors also dare to try something new. It's all interrelated." (P6)*

Moreover, interviewees from three cases (case 1, 2 and 4) particularly expressed the driving force of a clearly perceived benefit of the AI, which is often associated with work relief. The willingness to work with the AI grows notably if the professionals perceive it as helpful to solve real problems. In this course, the continuous explanation of the AI's benefit is emphasised: *"That is an important driving factor. You can't just put an AI in the newsroom and implement it*

and say, "This is here now and that's it," but you have to manage it very closely and explain it again and again and again. So that everyone understands why it is important." (P4)

It highlights the relevance of a close accompaniment of the implementation process with continuous explanation of the AI tool and its benefits. Furthermore, it is claimed as important that the AI can perform data analyses on a very deep level, which can then be translated into concrete, tangible recommendations for action.

As a third key driver for collaborating with the AI, knowledge sharing was stressed by several interviewees from two cases (case 1 and 2). The exchange of learnings, also not successful results, need to be shared transparently to enhance collaboration, both within a team and between departments, organisations and also between newsworkers and AI. As P2 claimed:

> *"First of all, opening the door [...] creates trust among all members. Secondly, you can look and realise: Oh, maybe we need that too. Maybe we also need this role. After all, you influence each other. This information is an enrichment."*

Case 1 represents a prime example here, as the AI project was initiated with the core objective that each participating newsroom shares new insights on digital content strategies with all member companies transparently. Several knowledge exchange platforms are provided for this reason. Case 1 is overall the one with the highest score in the collaboration criteria.

In addition, further drivers were extracted from the material appearing several times in single cases:

- Adaptability of the AI tool and the associated fast integration in current software
- Reliability through constant functioning
- Involving newsworkers at eye level and taking topics/concerns seriously
- Active management support of the AI project setting a clear direction

Besides that, factors like courage, a general interest in AI, a show-off of examples and use cases and close monitoring of the implementation process can serve as helpful factors as well.

Additionally, in the cases, it is striking that the AI is sometimes only hardly visible for the professionals, since it operates mainly in the background (case 2 and 4). This also seems to have an impact on the professional-AI collaboration, according to the interviews. We therefore hypothesize that professional-AI collaboration is influenced by measures enlarging the AI's visibility.

Conclusion and Implications for Theory and Practice

The empirical findings allow several conclusions to be drawn: First, it stands to reason that professional-AI collaboration have high potential to improve value creation and the news organisation's outcome. It is already well known from existing management theory that collaboration is recognized as one of the most critical ingredients for organisational value creation (Bolton et al., 2018; Boughzala & de Vreede, 2015; Wognum & Faber, 2002), which can be supported by these case study findings. Second, collaboration manifests itself through conscious and frequent usage, strategic management of the collaboration process, internal knowledge sharing, easy access to information and the commitment of the collaborators. Third, the comprehensibility of the AI, its perceived benefits and a high degree of knowledge sharing serve as key drivers, which need to be tested quantitatively in future research. Moreover, it became clear in the interviews that drivers for professional-AI collaboration identified in the interviews (comprehensibility, benefit, knowledge sharing) are going largely hand in hand with drivers for technology acceptance:

"The tool should cause as little additional work as possible, preferably none at all. If an editorial team has to fill in 5 additional fields for an article they are writing under time pressure, the system will not catch on." (P7)

"It must be very easy for the editors to understand why something is happening, so that it is accepted in their daily work." (P4)

When the professional newsworkers accept the AI as part of the newsroom, they are willing to collaborate with it. This is an interesting finding, since it underlines the large overlaps in technology acceptance research and human-AI interaction research (e.g. the benefits of the AI are comparable with technology acceptance drivers such as perceived usefulness (TAM3) or performance expectancy (UTAUT2)). Therefore, human-machine interaction and the HMC approach, especially regarding professional-AI collaboration, can highly profit from technology acceptance theory and research.

Moreover, the findings show that if the collaboration works well within the team and/or across newsrooms (depends on the project), it also supports the newsworker-AI collaboration, if the AI is accepted in the newsroom. This is particularly visible in the driver knowledge sharing, when interviewees mainly emphasised the information transparency across colleagues, with respect to professional-AI collaboration. Knowledge is usually shared among humans, however, it is perceived as relevant factor to enhance the collaborative conditions between professionals and AI. Knowledge sharing as criterion itself was taken from team collaboration theory (Col-MM), which illustrates that these two theoretical fields also seem to have a lot in common.

Having a deeper look on the interplay between human and technical logics in the professional-AI collaboration, prior studies could already identify commitment and frequent communication as drivers for classical collaboration (Dodgson, 2018; Littler et al., 1995). In the

cases here, commitment of collaborators, frequent usage, knowledge sharing and information access are manifesting professional-AI collaboration, which gives reason to hypothesize that these constructs are interrelated. The visibility of the AI is missing in existing theory and need to be empirically tested for its effect. Since HMC still lacks in evidence regarding concrete empirical relationships or causal logics among constructs, we suggest using these insights as a starting point for further professional-AI collaboration research through an HMC lens.

Regarding concrete measures and practical implications, managers and practitioners can actively promote the knowledge sharing among the collaborators and the AI's visibility and comprehensibility. This includes institutionalized exchange platforms, iterative explanation processes about the functioning and the benefit of the AI, increased fun factor in usage (commitment), and the involvement of all collaborators in the continuous improvement process. As seen in the cases, these factors can provide real performance potential in the resource-intensive, challenging market.

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