Design Thinking for Journalism in the Age of AI*

Towards an Innovation Process for Responsible AI Applications

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ABSTRACT

Artificial Intelligence (AI) technologies offer opportunities for news organizations to become more efficient. At the same time, the adoption of AI in journalism raises concerns, including whether such efficiency-driven AI applications will endanger the democratic function of news organizations. In this paper, we present a Design Thinking (DT) process that draws on co-creation with journalists, aims to balance efficiency and quality standards, and prototypes a responsible AI application for journalism. We conceptualized the DT process based on interdisciplinary literature and tested it in a project with journalism students from a leading German journalism school.

CCS CONCEPTS

• General and references → Cross-computing tools and techniques → Design

KEYWORDS

Artificial Intelligence, Efficiency, Quality, Journalism, Design Thinking

1 Introduction

The use of Artificial Intelligence (AI) for scalable products has increased along with the growth in computing power and data availability. This also applies in journalism, where AI has been described as "an umbrella term for a range of technologies" [9:1914] that draw on rule-based systems and machine learning. In part due to the economic challenges they face, 68 percent of the news organizations investigated by Beckett [6:32] have started to adopt AI to make journalists' work more efficient, and 20 percent name AI as a tool to improve their business models. News organizations have explored the potential of AI throughout all stages of the news value chain [10,35], e.g., to monitor events, check facts, create content, recommend news, and optimize paywalls.

*Design Thinking for Journalism in the Age of AI

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At the same time, however, the adoption of AI in journalism raises concerns, including whether such efficiency-driven AI applications will endanger the democratic function of news organizations [5,13], which involves securing "the quality of public discourse" [16:193]. For instance, Dörr, Köberer and Haim [12] argue for more accountability and transparency regarding the AI-based production of journalistic content. Regarding the personalized distribution of journalistic content, Helberger, Karppinen, and Makhortykh [16] state that AI applications should present users with content diversity to prevent the formation of possible filter bubbles. Accordingly, AI applications in journalism should not only be responsible for increasing the efficiency of news organizations but also adhere to journalistic quality standards. However, while the implementation of efficiency and quality standards may lead to trade-offs [34], research and best practice guidelines on how news organizations can balance efficiency and quality standards and, thereby, develop responsible AI applications, remain scarce (e.g., [4,15,21,27,31].

Moreover, technology providers without dedicated journalistic roots are increasingly shaping how AI is used in journalism [28]. Due to this external dependency, we argue that there is an urgent need for more user-centric approaches that involve journalists in the co-creation of AI applications [2,11,19,30]. Methodologically, we argue that Design Thinking (DT) offers such an approach. After all, DT allows for a human-centric perspective on complex problems [3] and helps organizations with their innovation processes [26], not least in the realm of AI-driven innovation [33].

Against this background, we present a DT process (Fig. 1) that draws on co-creation with journalists and aims to balance efficiency and quality standards during the innovation of AI applications in news organizations. We conceptualized the DT process based on literature from computer science, journalism studies, and DT. We tested it in a project with journalism students (overall: N = 15) from a leading German journalism school between December 2022 and February 2023. More specifically, this project aimed to develop a low-fidelity prototype of a responsible AI application for local journalism. After all, a significant challenge facing journalism today lies in the collapse of local news provision [32] with potentially severe consequences for local communities and, more broadly for democratic societies [22].

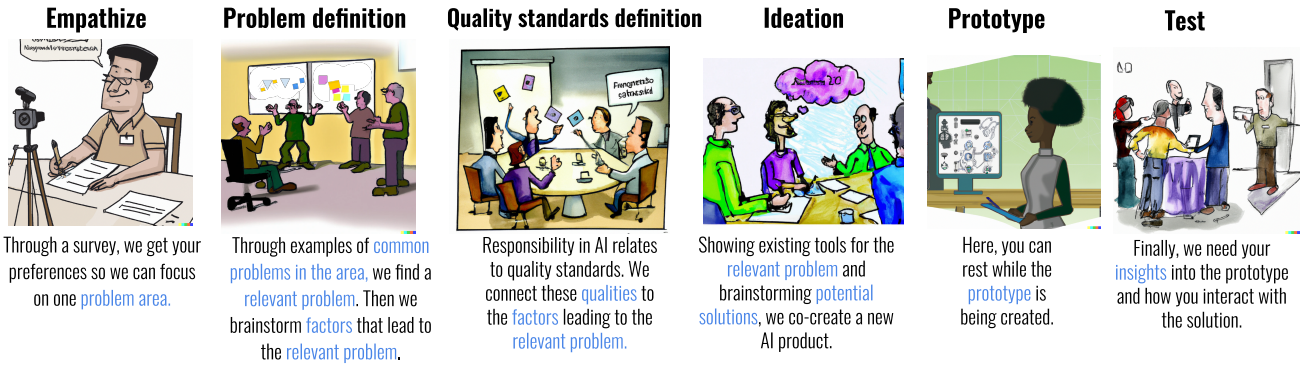

Figure 1. DT process to design a responsible AI application in journalism (images produced with DALL-E).

The rest of this paper is structured as follows: section 2 summarizes the DT process we developed and assessed; section 3 presents related work and compares it with our DT process; section 4 presents conclusions.

2 DT process for responsible AI

Our innovation process for responsible AI (Fig. 1) draws on the widely applied DT approach developed by the Stanford Design School [20:313]. To adapt this approach to our journalistic use case, we incorporated software engineering techniques, particularly from requirements engineering (RE), that aim to identify user needs not only from a functional but also from a qualitative point of view, i.e., quality standards should be amalgamated into the software production [25].

Furthermore, RE techniques also bring necessary trade-offs—which often show up when implementing quality standards [8]—to light early in the design process. For instance, the implementation of more transparency may result in less privacy. Early detection of this trade-off would allow mitigation, such as implementing stricter privacy regulations in other parts of the proposed software.

In the next sections, we present the DT steps in more detail.

2.1 Empathize

For the first DT step, "empathize", an online survey was conducted to identify the most relevant problem area along the news value chain in local journalism. Participants were asked to identify activities where economic pressure, time constraints, and/or the need to meet specific quality standards affect local journalists the most. Based on this survey (provided upon request), ***time constraints regarding video creation*** were identified as the most relevant problem area. All but one of the subsequent DT steps—i.e., "problem definition", "quality standards definition", "ideation", and "test"—were conducted via in-person workshops to facilitate collaboration and co-creation among the participants. The DT prototyping step was, however, undertaken by the authors without the involvement of the participants, as the participants had only limited expertise regarding existing AI applications.

2.2 Problem definition

The goal of this workshop (n = 14 participants) was to obtain meaningful and actionable problem statements regarding time constraints during video creation. For that purpose, problem example cards were created to speed up the acquisition or recall of knowledge (Fig. 2). Participants were asked to define the core problem in two steps. First, they were asked to select the three most relevant problems presented from the example cards and to suggest further problems themselves (left part in Fig. 3). Second, based on this selection, they were asked to define the core problem. As Fig. 3 shows, ***time constraints regarding editing and assembling video footage into a finished product*** were identified as the core problem.

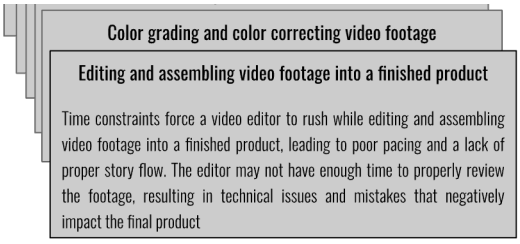

Figure 2. Cards with examples related to video creation.

Next, participants were asked to specify factors that lead to this core problem. For that purpose, the triangle technique [18] was applied. It visualizes the problem definition through a triangular center, the core problems on the left, and the factors leading to the core problems on the right (Fig. 3).

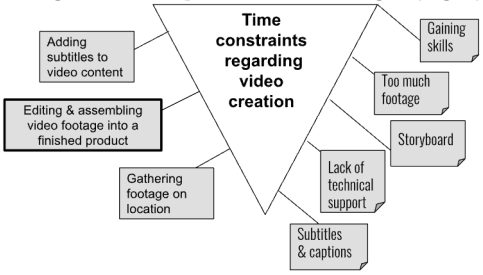

Figure 3. Triangle technique for defining the problem.

2.3 Quality standards definition

The goal of the next workshop (n = 10 participants) was to identify relevant journalistic quality standards for editing and assembling video footage into a finished product. To facilitate a discussion regarding possible trade-offs, quality standards were assigned to possible functionalities of the AI application.

Quality: Care	Factors:
Research is an indispensable instrument of journalistic due diligence. The publication of specific information must be carefully checked for accuracy in light of existing circumstances. Its sense must not be distorted or falsified by editing, title, or picture captions.	Storytelling Subtitles and captions

Figure 4. Quality standards cards related to problem factors.

For that purpose, cards were created where quality standards were linked to problem factors (Fig. 4). The quality standards were determined based on the Code of the German Press Council as well as literature on journalistic quality.

With the back of the cards indicating only the quality standards and using the Non-Functional Requirements framework [8], participants were instructed to model corresponding relationships. Fig. 5 shows an example of such a model. A "+" indicates a positive contribution relationship between quality standards, while a "–" indicates a negative contribution or conflict.

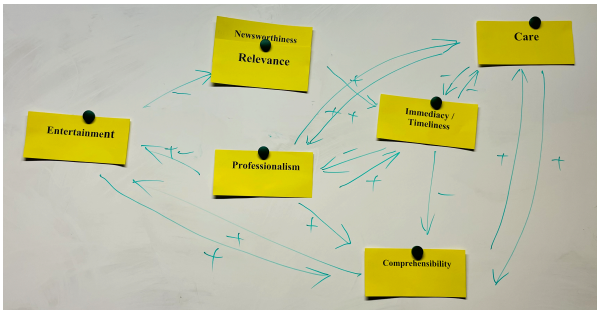

Figure 5. Modeling trade-offs between quality standards

2.4 Ideation

The goal of this workshop (n = 13 participants) was to co-create the core idea of the prototype. For that purpose, participants were presented with existing AI applications for video creation, which facilitated the ideation of an innovative AI application. Subsequently, using resources from earlier workshops (e.g., problem factors, here conceptualized as functionalities, and quality standards), participants were asked to prepare a logical sequence of how the AI application would address the problem identified. More specifically, a timeline was created indicating which functionalities and which corresponding quality standards were necessary at which point in the ideated AI application (Fig. 6).

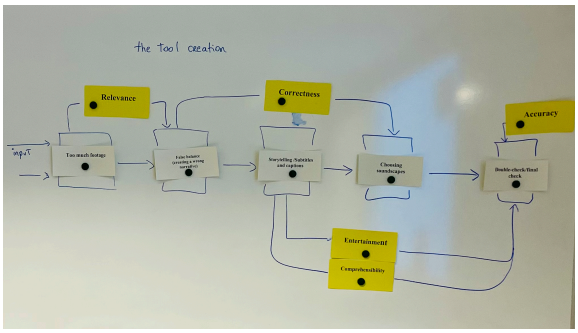

Figure 6. Technique for ideating the prototype.

2.5 Prototype

The DT process facilitated the prototyping of the AI application in different ways [37]. First, the problem factors were transformed into functionalities of the AI application. Second, the logical order of features was given by the participants to help define the inputs and outputs that are required by the envisioned AI application. Third, functionalities were mapped to quality standards to support the selection of corresponding technologies.

From these contributions, the authors compiled a low-fidelity prototype using mock-up and sketching techniques for each of the proposed functions. Fig. 7 shows the resulting prototype for the footage selection function. Prototypes for all functions of the AI application are available in GitHub and Zenodo [37].

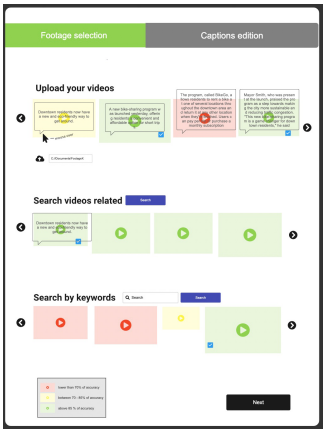

Figure 7. Prototype of the feature "footage selection".

2.6 Test

The goal of the last workshop was to determine whether the developed prototype met the participants' requirements. The workshop consisted of two steps. First, participants were asked to assess the prototype regarding its functionalities and quality standards. Second, participants suggested changes to the prototype to tailor it even further to the originally defined core problem (Fig. 8). Based on this feedback, the prototype was refined. The testing was iterated twice, once in-person during the workshop (n = 9 participants), and once digitally via a shared online document (n = 7 participants).

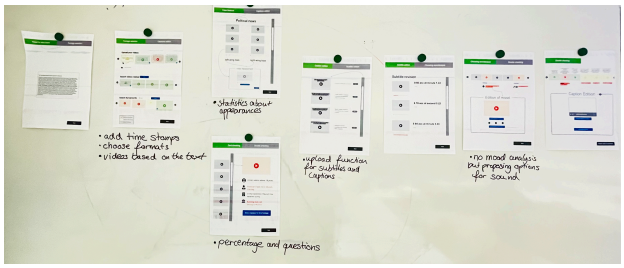

Figure 8. Testing the prototype using the whiteboard

3 Embedding into related work

Halskov and Lundqvist [14] have used domain and technology inspiration cards to accelerate knowledge gathering and simplify DT workshops. This practice has been also applied by AI developers such as Nexocode [23]. In our DT process, we used cards not only to speed up the process but also to facilitate collaboration and co-creation among participants during the workshops. Sinders and Ahmad [29] applied a DT approach that moves from general to more specific questions, thereby adding more complexity in each subsequent workshop. Our DT process applied a similar approach, as we first identified a broad problem and then worked through the complexity by gradually breaking the problem down. In addition, we implemented the bottom-up approach of DT during the definition of quality standards, i.e., by using the Non-Functional Requirements framework [8].

Furthermore, Tang [30] has used DT to collect as many ideas as possible without considering feasibility or rationality. We agree with the author that free brainstorming may facilitate creativity. However, we argue that particularly during the prototyping step of the DT process the consideration of feasibility is necessary to facilitate the implementation (i.e., coding) of the prototype. Feasibility can be increased by organizing (i.e., rationalizing) the corresponding functionalities and quality standards.

Finally, especially in computer science, DT approaches have focused on solutions to *agilize* DT with the goal of increasing its effectiveness and efficiency. For instance, regarding the preparation of a DT process, Parizi et al. [24] propose using a recommendation system that optimizes the selection of techniques that are used during each step of the DT process. Moreover, Ahmed et al. [1] propose a Lean Design Thinking Methodology (LDTM), which is a data-driven approach to support problem discovery. Both approaches can improve the DT process. For instance, our selection of techniques was restricted by the duration of the workshops (the workshops consisted of two sprints of 20 to 30 minutes each). A recommendation system could facilitate the selection of techniques that are simple and yet optimize results. A data-driven approach, in turn, could be used in addition to an empathizing workshop (or survey) to extend the problem discovery.

4 Conclusions

While AI technologies offer opportunities for news organizations to become more efficient, the adoption of AI in journalism raises concerns, namely whether such efficiency-driven AI applications will endanger the democratic function of journalism. Accordingly, we argue that AI applications in journalism should be responsible so that they not only increase the efficiency of news organizations but also adhere to journalistic quality standards.

Therefore, in this paper, we present a DT process that draws on co-creation with journalists and balances efficiency and quality standards with the goal of innovating responsible AI applications in journalism. We developed the DT process based on interdisciplinary literature and assessed it based on a project with journalism students (overall: N = 15) from a leading German journalism school. In sum, the project developed a low-fidelity prototype of a responsible AI application that aims to solve a core problem in local journalism, namely **time constraints regarding editing and assembling video footage into a finished product**. With its specific functionalities, the developed prototype aims to increase efficiency and thereby mitigate time constraints. At the same time, it incorporates journalistic quality standards.

Journalists are increasingly involved in the co-creation of AI applications [2,11,14,19,29,30], however, contrary to our DT process, these co-creation approaches have not applied specific techniques to accommodate quality standards. i.e., the so-called Non-Functional Requirements that software engineering has been investigating for more than 20 years. As presented in this paper, these requirements are, however, relevant for developing responsible AI applications, i.e., AI applications that increase journalistic efficiency and adhere to journalistic quality standards.

Finally, DT has been criticized because it may restrict creativity due to its formally structured process [17,36]. Accordingly, in the future, further techniques could be incorporated into DT. For instance, Dimitrakopoulou and Lewis [11] suggest merging DT with techniques that facilitate more reflective listening processes to improve the empathizing step of the DT process. After all, this step is particularly important to engage the participants with DT. This is corroborated by Chaplin [7]. Halskov and Lundqvist [14] emphasize the importance of using diverse prototyping: For example, sketches on a whiteboard, digital 3D models, or scenarios, which can be used to further define the design space., i.e. to find a problem space. Kolko [17], in turn, proposes the use of lateral thinking, which involves examining a situation from different, also unexpected, perspectives.

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