AI should embody our values: Investigating journalistic values to inform AI technology design

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In the current climate of shrinking newsrooms and revenues, journalists face increasing pressures exerted by the industry's for-profit focus and the expectation of intensified output. While AI-enabled journalism has great potential to help alleviate journalists' pressures, it might also disrupt journalistic norms and, at worst, interfere with their duty to inform the public. For AI systems to be as useful as possible, designers should understand journalists' professional values and incorporate them into their designs. We report findings from interviews with journalists to understand their perceptions of how professional values that are important to them (such as truth, impartiality and originality) might be supported and/or undermined by AI technologies. Based on these findings, we provide design insight and guidelines for incorporating values into the design of AI systems. We argue HCI design can achieve the strongest possible value alignment by moving beyond merely supporting important values, to truly embodying them.

CCS Human-centered computing → Empirical studies in HCI.

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1 INTRODUCTION

Today's journalists are immensely challenged by market pressure, and as a result, journalism is facing an economic, professional and confidence crisis [49]. It faces an economic crisis as the traditional advertising-based business model is no longer viable and there are increasing commercial pressures on newsrooms [49]. A 2020 survey of digital media leaders noted "widespread disquiet" (p.9) about the economic pressure on journalists worldwide [48]. A 2016 survey of UK journalists found 78 per cent felt increased pressure for commercial success and 86 per cent thought there was less time available to research news stories, highlighting that while pressure for accelerated output does not necessarily imply quality reduction, the situation "must be kept under close scrutiny" [66]. Journalism faces a professional crisis as resource cutbacks often require journalists to deliver stories in extremely short timeframes. Thus, many stories are almost entirely replicated from press releases or wire services without question, thus lacking in depth and impartiality [10,42]. Journalism also faces a confidence crisis as cutbacks make it hard to maintain public trust at a crucial time, where over half of UK adults now get their news from social media rather than news outlets [50] and where mis/disinformation is rife (partly as a consequence of the shift to social media news consumption) [48].

With advancements in natural language processing (NLP) and machine learning (ML), journalism is rapidly turning to AI technologies to help alleviate some of its pressures. Some newsrooms have already introduced systems that automatically produce content. For example, in the UK, the Press Association and Urbes Media are leading the RADAR project [53], which is creating data-driven news stories and distributing them to thousands of local newspapers. In the US, Associated Press has produced more than

3,700 stories using algorithms [20]. Scholars have also created AI systems for newsrooms, supporting investigative research through data analysis and visualisation [9,11,65], automatic story generation based on newsworthiness [41] and story-related creativity [43,44] . Newsrooms are cautiously optimistic about the potential of AI and plan to step up its use to drive more effective content distribution and achieve time and cost efficiencies [5,48].

While AI technologies might unburden journalists from at least some of these increased pressures, concern has been raised they might compromise professional journalistic values such as transparency, accountability and responsibility [3,21,24]. However, little research has examined how journalistic values can inform the design of interactive systems for journalists and, to our knowledge, no previous studies have aimed to understand the potential impact of AI technologies on the professional values journalists consider important. Journalism might particularly benefit from a value-oriented approach to AI design as it is a strongly value-based profession, firmly guided by professional values and codes of conduct [60].

Understanding journalistic values has been highlighted as particularly important when making journalism automation decisions. Diakopoulos [20] explicitly incorporates values into his definition of algorithmic journalism; “information and knowledge production with, by, and about algorithms that embraces journalistic values” (p.27). Others have specifically called for embedding journalists’ professional values into AI technologies [5] and have suggested this might be achieved through the use of Value Sensitive Design (VSD) [20,25]. VSD is an approach to designing technology that involves eliciting, understanding and designing based on the human values and value conflicts held by stakeholders [31,32]. There have also been calls outside journalism to design AI systems that align with human values [22,27,55]. However, value alignment (ensuring AI technologies are well-aligned with human values [56]) is notoriously difficult to achieve [22]. A better understanding of how AI technologies might support and/or undermine important user values may result in stronger value alignment and, in turn, more useful AI tools.

Inspired by VSD, this research aimed to identify important journalistic values in news story creation and understand how these values might be supported and/or undermined by AI technologies. It sought to address 3 research questions: [RQ1]: What professional journalistic values are important in the context of news story creation and how are they practiced?; [RQ2]: How might AI systems support and/or undermine those values? and [RQ3]: What are implications for the design of AI technologies for journalists? This research contributes an enriched understanding of the professional journalistic values important for the design of algorithmic journalism technologies, assisting designers in creating useful AI technologies that embody these values.

In the rest of this paper, we first explain and justify our interview approach, then present findings on the journalistic values discussed by interviewees, how they are practiced and how they might be supported and/or undermined by AI technologies. Next we discuss the implications of our findings for the design of AI systems for journalists. Finally, we discuss limitations to our study and potential for future related research.

2 RELATED WORK

Below we present an overview of previous work on journalistic values and the ethical challenges of algorithmic journalism. We also survey existing AI systems in the context of news production.

2.1 Journalistic values

Journalistic values are at the core of journalism practice, shaping not only journalists' news production practices but also their perception of journalism's role in society [69]. Many of these values reflect this perceived societal function. For example serving the public interest relates to a perceived 'watchdog' role, where journalists believe holding the powerful to account is for the good of society [15,68]. Journalistic values are thus central to journalistic professionalism, particularly for ensuring 'good journalism' practice.

Journalism's central tenet is truth [62]. The importance of doggedly pursing the truth and conveying it clearly and openly in outputs is often ingrained throughout journalists' education. While some values differ across cultures, [36], truth has been found to be consistent worldwide [40]. Besides truth, journalists also value other related notions such as transparency, credibility and trust and other groups of related concepts such as acting in the public interest, accountability and impartiality [35,36,57] However, there is no single set of 'most important' journalistic values; they not only differ across cultures, but also across organisations; unlike some other professions, journalists continuously re-interpret and re-define their professional ideology and connected values according to the organisation in which they work, as "journalists generally depend on their organisation to give them access to the public they claim to serve" [63]. Sometimes, however, journalists' individual values clash with the general orientation of the news organisation [46]. Values are particularly relevant at times of technological change; AI systems may not only challenge journalists' perceptions of their role, but also the societal function of journalism as a whole [13].

As there is much existing scholarly work on professional values in journalism, including work that highlights important values [35,57,60], we did not try to identify what values are important in the context of story creation for its own stake. Instead, this was a steppingstone for understanding how these values may be supported and/or undermined by AI technologies and associated implications for design. This is the first study to examine the potential impact of AI technologies on a variety of important journalistic values.

2.2 Ethical challenges of algorithmic journalism

While AI systems could make news production more efficient, ideally while upholding journalists' values, they also present ethical challenges, including those related to transparency, accountability and responsibility. AI systems have been criticised as opaque 'black boxes,' impeding system transparency and potentially having a knock-on impact on journalistic transparency [21]. Some AI algorithms make decisions that are inherently difficult (if not impossible) to explain. Even when some degree of explanation is possible, journalists often lack the necessary knowledge and skills to interpret the explanation [3]. This makes achieving system transparency difficult and means journalists cannot hold algorithmic systems accountable for their decisions, as the decision-making processes remain unknown. It has been suggested AI news production technologies should consider transparency and accountability as primary norms [21].

However, this is easier said than implemented. Existing research has identified factors that might be made transparent about news production algorithms (e.g. data collection assumptions, explicitly embedded rules) [21]. What remains is to determine how best to do so. While this is a hard question, a value-oriented AI design may help answer it - by encouraging a developer mind shift towards supporting transparency over performance [22].

Another ethical challenge relates to responsibility. In AI systems, the responsibility traditionally held by journalists is now distributed across other actors, such as designers and data providers [25]. This poses questions about how ethical standards in journalism should be framed. How best to achieve this 'hybridisation' of news production, where AI systems and human journalists collaborate to create news that upholds journalistic values [20], is an empirical question. However, it has been argued that a value-oriented approach to AI design can ensure journalists maintain sufficient agency in hybridised systems [20].

2.3 Existing algorithmic systems for journalists

Recently, there has been increased interest in AI news systems within HCI and in Computer Science more broadly. Most work has focused on understanding, designing or evaluating AI systems for news readers. For example, understanding readers' perceptions of an automated news generation system [51], measuring bias in news media [16,29], predicting the success of stories before publication [38] and designing to showcase news provenance (where news content has been modified and re-published over time) [28]. However, little work has focused on journalist-facing systems and, to our knowledge, no previous work has sought to elicit requirements for, design or evaluate AI systems for journalists from a human values perspective.

The few existing AI systems for journalists have been designed to support story creation in various ways. One way is through visualisation and interrogation of large structured datasets. For example, Broussard's [11] Story Discovery Engine was designed based on the author's extensive experience a reporter. It leveraged both human and machine 'intelligence' by monitoring and visualising large public datasets to facilitate the discovery of potentially impactful news stories. Similarly Stray et al. designed Overview [9], a visual document mining system, which supported journalists in searching, reading, annotating and summarising large document collections and Workbench (https://workbenchdata.com), an integrated workspace for data journalists that supports semi-automated data scraping, visualisation, cleaning, filtering and analysis.

Also supporting story creation, but through automatic news generation not visualisation, Leppänen et al. [41] developed a system that identified potentially newsworthy events from a structured dataset. It then used natural language generation to auto-generate stories based on the events. The system was designed based on a formal model of 'newsworthiness,' comprising measures of topicality, outlierness, interestingness, and personalisation. However, no explanation is provided of the relationship between these measures and newsworthiness. Therefore, it remains unclear whether and how journalistic values informed the design. Also, Thurman et al. [67] evaluated a commercial AI system for generating stories from structured data with journalists. Findings highlighted both benefits (e.g. increased speed and reduced cost) and constraints (e.g. the lack of a 'human angle' in generated stories) of story auto-generation systems and suggested certain journalistic skills cannot be easily automated, such as 'news judgement,' 'curiosity' and 'scepticism.' This evaluation did not, however, explicitly probe

the relationship between journalists' values and the technology.

INJECT [43,44] supported story creation through creative idea generation by using machine learning and NLP to extract terms from a partially-written story. It then used the extracted terms to search news sources for existing stories to inspire the in-progress story. Journalists could select to search sources classified under several categories, such as quantifiable (for quantified information associated with the story), casual (for information about events) and people.

Although a user-centred approach was followed and journalists involved throughout the design, the approach did not involve explicitly incorporating journalists' values. By involving journalists in the design process (or being designed by a journalist, as [11]), these existing systems implicitly incorporate journalistic values. However none, even the system by Leppänen et al. [41], were designed expressly to do so. A value-oriented approach to understanding requirements for, designing and evaluating AI systems can help ensure systems are 'in sync' with important user values. Although an HCI study examined how journalism students incorporated journalistic values into the design of journalism technologies [23], these were not AI technologies and participants were not asked to unpack the notion of 'journalistic values,' so the findings do not address how they incorporated specific values into their designs.

3 METHOD

Inspired by Value Sensitive Design (VSD) [31,47], we conducted 11 semi-structured interviews with journalists to identify the professional values they considered important and to understand how these values might be supported and/or undermined in AI systems. In this section, we first describe the prompts we designed to guide our interviews. Then, we detail our recruitment, interview and data analysis approaches.

3.1 Designing interview prompts

In VSD, envisioning cards [33] are often used as prompts to generate, imagine and discuss implications of future technologies around values [30,32,39]. Inspired by VSD, we created two card decks as prompts for evoking discussion: value cards containing journalistic values and AI cards to orient the conversation on values around a set of potential AI systems for journalism. Like envisioning cards, the value cards served as reflective tools to evoke discussion around values. But while envisioning cards evoke value-oriented discussion around the (re)design of a new system, our cards aimed to probe such discussion about AI systems in general, without informing the design of a specific system.

3.1.1 Value cards. To identify key professional values held by journalists, we extracted values shared across codes of conduct of two prominent news agencies; Reuters [54] and Associated Press [4] and an acclaimed book on the elements of good journalism [40]. As journalistic values differ across cultures [40], we chose these sources as all represented an Anglo-American journalism context. We distilled 16 values, each presented in plain text on a separate card. These were: accountability, anonymity, attribution, credibility, humility, impartiality, independence, integrity, loyalty, originality, privacy, public interest, transparency, trust, truth and veracity. The cards were used as prompts, so journalists could focus on unpacking rather than recalling values. Rather than try to create an exhaustive list, we asked journalists to add important values they thought were missing.

3.1.2 AI cards. As well as value cards, we created AI cards as prompts to assist interviewees in exploring the potential impact of AI systems on journalistic practice. We wanted the discussion on values to be grounded in a broad range of realistic examples based on the current capabilities of AI technologies. AI systems are notoriously opaque, making them difficult to understand and explain independent of examples [12]. The AI cards were created based on findings from a pilot, conducted with 5 journalism students. While pilot interviewees engaged positively with the value cards, they struggled to discuss values in relation to AI systems, as these systems are currently rare to find in newsrooms. The AI cards were designed in response. The AI cards were inspired by existing algorithmic journalism tools [11,20,43,44,65] (see section 2.3).

The four AI cards were: 1) Creativity Booster for finding innovative story angles using a database of previously published stories; 2) Newsworthiness Detector for suggesting newsworthy topics found on social media; 3) Auto-visualizer for automatically generating data visualizations and infographics, and 4) Narrative Generator for identifying trends and patterns in data and transforming these into stories. Each card included a short description of the technology, its capabilities and how the technology might support the identification and creation of original and/or insightful stories (see Figure 1). The cards were created in consultation with an Artificial Intelligence expert to ensure the fictional systems were technically feasible. We decided not to describe existing systems (e.g. INJECT [44]) as we wanted to focus the discussion on the values potentially impacted by a range of different types of AI systems rather than on the value-related impact of specific systems or functionality. Thus, the cards acted as open-ended rough sketches of realistic types of AI system.

Fig. 1. AI cards used to spur discussion around a range of specific AI technologies for journalism.

3.2 Interviews with journalists

The semi-structured interviews aimed to understand the role key journalistic values (depicted in the value cards) play in the context of news story creation and how AI technologies (including but not restricted to those described in the AI cards) might support or undermine those values. By framing the AI technology discussion around journalists' professional values, human values were brought into the foreground.

3.2.1 Participants. 11 journalists with an average of 5.6 years of newsroom experience were interviewed. All were UK- based and thus assumed to subscribe to Anglo-American journalistic codes of conduct and associated values. Recruitment activities included a social media ad reposted by a national journalism organisation, in-person recruitment at journalism conferences and snowball sampling through journalists in our professional network. We selected journalists who had published at least one news story in the past 6 months. Our sample included freelancers and private and public news organisation employees, of various roles (Reporters, Data Journalists and a Technology Journalist) and with publishing experience across various mediums (newspaper, online, magazine, TV). This broad sample encompassed a variety of work practices with potential for AI support. As this was an exploratory study, the sample was necessarily small. As journalists consistently described similar values across roles, mediums and stories, we reached data saturation with this limited sample size.

3.2.2 Data collection. The semi-structured interviews lasted around an hour and were conducted at journalists' workplaces or public spaces. Informed consent was obtained and the research approved by the appropriate ethics committee. To protect anonymity, we purposefully reveal only selected details of the stories interviewees chose to discuss. Interviews were audio recorded and notes taken. The interviews were in three parts: 1) story-sharing, 2) value elicitation, and 3) discussion of the potential AI impact on values. In the story-sharing part, interviewees shared one of their news stories they considered important. Similar to [58,59], we used stories as props to discuss work practices and values that might be impacted by AI, in a contextualised way. In the value elicitation part, interviewees were shown the value card deck and asked to select several (around 4-5) values that were important in the creation of their chosen story. Journalists could also add their own values on blank cards. They were then asked to explain how each of their selected values was reflected in their chosen news story, helping us understand how values were practiced in their work. Finally, in the AI impact part, the journalists were shown the AI cards and received an explanation of the AI system represented in each card. We asked the journalists to consider what journalistic values might be supported and/or undermined by each type of AI system depicted, either based on the card's description, or their knowledge or prior use of similar systems. We asked them to discuss the potential professional, technical or even emotional impacts. We also asked them to discuss how each AI system might support or undermine the values elicited rather than how each value might be supported or undermined by AI technologies. This was to avoid overly constraining the interviews by requiring journalists to provide a (potentially artificial) balanced view. The AI cards, combined with the value cards, helped ground and concretise the discussions, allowing interviewees to focus firmly on values while reflecting on how a broad range of AI technologies might support or undermine those values.

3.2.3 Data analysis. The interviews were transcribed, then analysed using Braun and Clarke's Thematic Analysis approach [8,14]. Coding was done in a systematic, iterative fashion using NVivo. An Excel spreadsheet was created for making sense of the complex interrelationships between values and between values and themes. The analysis was mostly inductive, but with deductive elements; we explored the latent meaning of the data, guided by theoretical concepts associated with key journalistic values. First, we sorted the values selected by the journalists into 3 groups of inter-related values: 1) transparency, trust, truth and credibility, 2) accountability, impartiality and public interest and 3) originality. We created these groups based on conceptual similarities and differences from the journalists' explanations of which values were important for story creation. These groups organically aligned to desirable characteristics of news stories that emerged from the data, namely that a good story should 1) convey the truth, 2) serve its audience and 3) provide an original perspective. This resulted in a set of 3 value-focused themes; 1) transparency, credibility and trust as indicators of truth, 2) serving audiences through acting in the public interest, accountability and impartiality and 3) originality is key to ensuring a story provides a new perspective. We also created a set of subthemes below each theme.

4 FINDINGS

The journalists chose a diverse range of stories which varied in format (including long-form features, daily news articles, and investigative pieces), publication medium (e.g. newspaper, magazine, TV, online) and topic. Topics ranged from investigating the mortality rate of care leavers to examining technological solutions for drug abuse. Of the 16 value cards, only 2 were not selected by anyone (privacy and independence). Of the

remaining 14 values, 8 were selected by at least 2 journalists. Our findings focus on these 8. In order of times selected, these are: truth (selected by 9/11 journalists), originality (selected by 8), public interest (7), credibility (5), trust (4), impartiality (3), accountability (3) and transparency (2). Only two new value cards were created; 'flair' by Anthony (pseudonyms are used throughout) and 'good read' by Jeremy, both described as a sophisticated writing style. While we used selection frequency to decide which values to report (those chosen by 2+ journalists), we regard this as only a rough indication of the importance of a particular value; qualitative findings most prevalent in the data are not always the most important, and vice versa [8,14].

The journalists' discussion of values highlighted a duality; all values may be either supported or undermined by AI systems, depending on the type of story they are creating, how exactly the system works and journalists' perceptions of the likely impact of the system on their story creation workflow. We now present findings related to the 8 most selected values by discussing the 3 value-focused themes that incorporate those values; transparency, credibility and trust as indicators of truth, serving audiences through acting in the public interest, accountability and impartiality and originality is key to ensuring a story provides a new perspective, and related subthemes. For each subtheme, we present findings on how AI tools might support or undermine relevant journalistic values, with responses contextualised by referring to the AI cards where appropriate.

4.1 Transparency, credibility and trust as indicators of truth

Journalists considered truth a fundamental journalistic value. David stated "truth has to come first and foremost." In his opinion, "there's no point in doing any story if it's not true." The journalistic aim to convey truth differentiates news stories, which should be based on facts, from other types of story (such as fiction) [59,62]. However, journalists acknowledged that truth-seeking often presents a value tension between fact and fiction, especially in long-form features, where journalists tend to adopt creative storytelling techniques, requiring them to "navigate this [truth] boundary quite carefully" (Anthony).

Transparency, credibility and trust served as indicators of truth and were often discussed in relation to truth. Transparency held two different meanings for journalists. One was journalists should disclose their methods and sources. The other that they should uncover 'hidden' information for reader benefit. These two meanings linked transparency to both engendering trust and seeking truth. Credibility referred to the audience's perception of the accuracy and truthfulness of the story, as journalists "need to convey the truth in order to be credible" (Neil). As such, credibility is paramount for some journalism types (e.g. investigative). Truth was considered a necessary but not sufficient condition for credibility, as credibility also involves reputation and public perception. Greg considered perceived credibility essential to achieve his goal of persuading authorities "to affect social change." He sought to demonstrate credibility through the use of accurate data and reliable human sources to create impact. He interwove data and patient interviews using "clear and easy to understand" writing to earn his audience's trust. Tim highlighted the importance of trust-building, as "the moment you break that trust with the reader is when they start thinking what you publish is fake."

4.1.1 Verification for truth seeking and earning perceived credibility/trust. All journalists worked meticulously to convey truth in their stories and used systematic verification approaches to enhance perceived credibility and trust. Approaches differed across roles; for data journalists, verification often involved cleaning and processing data, and cross-

checking results across different sources. For investigative journalists, verification involved checking information obtained during reporting to verify if human sources provided genuine information. Tim admitted “often there’s no way of knowing for sure”, so he collected lawful evidence and met with additional sources for cross-checking. Sometimes ‘truth-seeking’ verification was done in real-time; David worked live data reporting for UK elections, where the online story was constantly updated as the election results came in. Efforts to ensure data accuracy were divided between both humans and computers by using automatic checking to flag anomalies, then notifying a human to verify.

Journalists made every effort to enhance the perceived credibility of their stories and earn readers’ trust. Gina explained it was important to present carefully-selected case studies on her story on toxic workplaces to gain trust. Tim also mentioned the importance of quoting credible sources; “if you feature someone in a story that turns out not to be a credible source, the public aren’t going to trust you.” Sometimes, credibility stemmed from selecting prominent or high-profile sources. Other times, it involved conducting rigorous background checks and verifying the truthfulness of sources’ comments. Greg said credibility can also be demonstrated by writing transparently; by being “as open as possible with your method and your sourcing, within reason.”

4.1.2 Can AI technologies help seek the truth? The journalists raised the potential for all values, including transparency, credibility, trust and truth, to be either supported or undermined by AI technologies. They thought AI could support these values by facilitating highly-procedural fact checking tasks at scale and by providing trust and transparency about AI usage. They thought AI could undermine these values because AI may not be as expert as human journalists, might potentially propagate mis/disinformation and may not produce trustworthy content.

AI can facilitate highly-procedural fact checking tasks at scale (+). Emma thought AI could support truth-seeking by facilitating binary fact checking at scale (to establish if a fact is true or false). She thought, as she had step-by-step manual verification strategies, “you can teach a machine how to fact check.” Some journalists thought AI systems could be better than humans in establishing truth, due to inherent human biases; Emma stated systems “would be able to identify the truth better than a subjective human”, while Neil thought “AI would be more black and white and more transparent.” Similarly, Michael thought AI could support journalists in truth-seeking for tasks that do not require complete accuracy, citing an example of a sexual misconduct investigation of doctors in a big city, where AI was used to triage thousands of doctor’s records, reducing them to a manageable volume for journalists to examine.

Providing trust and transparency about AI usage (+). Trust and transparency are journalistic values that are also important when it comes to being open about when AI has been used to generate stories. For example, David and his team are experimenting with an AI system similar to the Narrative Generator. In his opinion, it is crucial to be transparent that the story had “a sort of AI input to it.” However, he stated he was unsure if doing so would “necessarily aid transparency in it and of itself.” This suggests a redefinition of this value might be required with wider adoption of AI systems. David also stressed the importance of these AI systems being trustworthy for journalists, as delegating this key aspect of journalism is not easy to do; “it’s important you can trust that it’s going to be doing the right things. It can be quite difficult for journalists to hand over their story efforts and let AI do the rest of it.”

AI can propagate mis/disinformation (–). Tim and Dominic were concerned that if an AI system used inaccurate datasets, it could result in propagating mis- or dis-information – phenomena that rival journalistic truth and undermine credibility and trust. For this reason, they expressed caution over systems such as the Newsworthiness Detector. Tim said he would take such systems "with a pinch of salt" as even if they could effectively detect trending topics on social media, whether the information within each post is true would still need to be verified by a human.

AI may not be as expert as human journalists (–). Another concern raised was AI's lack of ability to fully understand the context of news events – as while it may be trained to develop and apply relevant subject-specific knowledge, its expertise may not match that of a human journalist. Thus, some journalists thought AI could support truth-seeking, credibility or trust by identifying patterns, but only journalists had the 'right' expertise to meaningfully interpret those patterns. For example, referring to the Auto Visualizer, Tim stated "you could looking at crime stats and the AI could pick out and say oh look there's a massive rise in hate crime in Swansea." He highlighted that, while this would be useful, humans needed to make the final decision on whether to pursue leads or incorporate data in their story. Similarly, Michael argued that even if AI is accurate "90 per cent of the time," that is "not good enough" for journalists. In his view, "the biggest problem with using AI in journalism is we've got to be able to check it. How do we know it is true?" Michael explained he uses his subject knowledge to recognise patterns in data and determine if anything "does not make sense." He mentioned that for one of his stories, an external data processing company erroneously provided a figure of 50,000 instead of 500. The AI system did not spot the error; he manually detected it. Thus, the patterns identified by the system were "patterns of the mistake." It was also important for Michael to check what data sources were included (and excluded), as "it's about what's not there, as well as what's there, both have to be checked. It's like false positives versus false negatives."

AI may not produce trustworthy content (–) . Interviewees expressed doubts over the quality of news content generated by AI systems. David considered it crucial for journalists to be able to scrutinise outputs of AI systems, especially given the "temptation to think that because something, a news line or an analysis, has been algorithmically produced that is more truthful, more trustworthy." He reflected that while "every human being has biases" that might undermine promoting credibility and trust, AI was unlikely to address them and might even compound them through the risk of developer bias. He stated "someone still has to build the AI...the bias can still come in there." Neil thought AI would generate less trustworthy content as humans were likely to have "more conscience than an AI." He noted common sense is a difficult concept for AI systems to learn, therefore "even though people are subjective, they are more trustworthy than a machine." Michael was concerned quality of content could be compromised when created at scale; he could not "imagine it being as high quality as what humans produce."

4.2 Serving audiences through acting in the public interest, accountability and impartiality

Journalists discussed the values of acting in the public interest, accountability and impartiality in the context of serving their audiences. They described holding public entities accountable for their actions, remaining as impartial as possible in their reporting and acting for the common good of society, as key journalistic duties. These values also serve a democratic function and have been recognised as important in democratic

societies [18,35]. As public interest is difficult to delineate [37], journalists were guided by their newsroom's ethos. Likewise while impartiality often involved providing balance, it was also influenced by organisational norms.

Public interest was discussed by most journalists, although they held different views on what it constitutes. Tim highlighted this as an ongoing debate at his newsroom, stating "some [colleagues] would say it's in our public interest to know what the royal family are up to." Greg had a clear view of public interest as making a difference to people's lives. For him, "celebrity journalism might be interesting to the public, but it doesn't help anybody." From this perspective, what the public are interested in and what is in the public interest are distinct. However, other journalists considered these overlapping; that there is "a crossover of public interest and what interests the public" (Gina), and this is necessary overlap as "good journalism has both elements" (Greg). Journalists often mentioned public interest in conjunction with accountability, defining it as holding public bodies, and journalists themselves responsible for their actions. In line with his stringent views on public interest, Greg strived for accountability; acting as an "internal watchdog" by constantly questioning not only authorities, but also his own decision making, as "otherwise you undermine the point of journalism."

Impartiality depended on the topic and angle of the story, and the type of media organisation they work for (for-profit vs. public-owned). The importance they placed on impartiality also depended on these factors. On the one hand, Neil considered impartiality highly important, as it meant "not conveying too much of one side over the other," to provide "an unbiased view." On the other hand, for Tim impartiality was not always a priority and could be "tricky", as "there are some issues where you probably shouldn't be impartial. For example, climate change." However, Tim's previous newsroom considered impartiality essential.

4.2.1 Can AI technologies act as a force for public good? Some journalists thought accountability, impartiality and public interest might be supported by AI technologies, by leveraging AI to identify and help create balanced stories for the common good of society that, where appropriate, hold public bodies to account. Others were not convinced AI technologies could make impartial judgements, or adequately determine public interest without human assistance. Likewise, while some journalists thought AI might help journalists reflect on the impartiality of their stories, others were concerned AI data bias could result in pseudo-impartiality and stories not truly in the public interest.

AI may help journalists reflect on their own inherent biases (+). Jamie was excited about a future where AI can help journalists "pause for thought" to reflect on their biases. He stated journalists often "struggle" with impartiality because it is "not a realistic norm," due to inherent biases in individuals and news organisations. While Jamie and his team already seek impartiality through a peer-review process and through sub-editor checks for stories, he noted these practices still involve "relying on someone else's instinct." For him, the problem with these practices is "if you both have similar thought processes, and you're both leaning quite heavily on one direction on the article, does that ever get flagged up? And then you're just supporting a status quo in an echo chamber." Jamie likened using AI for detecting impartiality to an "automated review process" that may be more impartial than the human equivalent.

AI may generate useful suggestions for public interest stories (+). Greg thought public interest and accountability could be supported by AI systems such as the Creativity Booster; he thought "there is nothing wrong using a sort of AI program to actually throw up suggestions" for stories. In particular, he recognised potential for automating part of his work for achieving public interest - parsing websites for previous acclaimed investigations to inspire public interest stories. Greg thought AI could help him search "across borders" by surfacing public interest stories he was not previously aware of from other countries. He considered this a valuable use of AI as long as it is "ultimately up to the journalist to provide the stories." Similarly, Jeremy and Michael thought AI could help local newsrooms, which often have limited resources, to generate impactful data-driven stories on public interest and accountability.

AI data sources may be biased (–). The Newsworthiness Detector raised concerns that the data used in such systems could undermine public interest, accountability and impartiality. Greg stated that "often the people that need to be spoken for don't have a voice." Therefore, journalists must often "go find them," by relying on human rather than technical skills. Reflecting on this AI card, Greg thought using social media as input data for AI systems would "not be very useful in terms of actually deciding what is newsworthy", as he regarded social media as "skewed" and therefore unsuitable for supporting accountable journalism in the public interest.

Dominic questioned whether impartiality could be supported by AI technology. He voiced concern about whether the Narrative Generator could "present an impartial way of telling a story" and thought it would depend on what stories were used to train the machine learning algorithm; "it would depend on what you fill the AI with as it learns." Similarly, Neil asked "is it ever going to be impartial? Because it depends on the data that's fed in by certain individuals." However, he also recognised humans have "unconscious bias" and therefore, in certain situations, AI technology could help them be more impartial. He considered AI technology to be double-edged, stating "I think there are two sides to that as well, ironically."

AI lacks human reasoning ability (–). Emma also questioned whether AI technologies could support public interest and accountability as she thought these values could only be achieved though "human reasoning" - requiring holistic, context-sensitive judgement as well as sensibility to "nuances." In her opinion, public interest and accountability are not "black and white" or "binary," as "what is public interest today might not be tomorrow." For Emma, this temporal instability meant human reasoning was required to determine whether a story is likely to be of public interest at the current time. For similar reasons, Jeremy thought AI technology would "always need a human editor directing it", by telling the system exactly what to look out for when striving to support public interest and accountability. He therefore concluded that "AI could ever be at the front of the news production process."

4.3 Originality is key to ensuring a story provides a new perspective

Originality was identified as an important value by journalists, not just for them, but also their but readers and organisations. Tim characterised the readers' perspective as "no one wants to read something that's been done a few months ago by different news of sorts," while Neil highlighted organisations are "committed to create new stories." This commitment to originality is equally important for journalists themselves. Jamie, for example, had no doubt about its importance, stating "why write what I've already touched on?"

4.3.1 Journalists' practices for creating original stories. Journalists reported measuring the originality of their stories by benchmarking against previous related stories. Therefore, they often sought stories previously published by their own organisations and, especially, by their competitors. They kept monitoring competitors' coverage over the entire course of story creation "so if anybody else wrote something similar, I would know about it while I was working on it" (Michael). Paradoxically, originality was achieved by using existing stories as inspiration or a starting point, before 'moving beyond' what has been previously written. Neil explained "you try to differentiate yourself from others, but you also try to use some of the good things from other pieces of work to incorporate into your own." The journalists reported a variety of ways for achieving originality in news story creation:

> (1) Being the first to report on a topic: The most original story is "the exclusive... the story nobody else has. The first person to report something. That's what journalism's about" (Jeremy).
> (2)Finding a new story angle on an existing topic: Addressing an existing topic from a fresh, unique angle. Jamie made his mobile journalism story original by featuring a renowned expert, while Gina reported on an already-unfolded incident in an original way by providing tips for readers in a similar situation.
> (3) Producing unique content to differentiate the story from others: David integrated interactive features into his election-related stories to differentiate his stories from those published by other news outlets.
> (4) Applying unique skills: Using highly specialised skills such as engaging storytelling skills in long-form feature journalism or novel visualisations based on advanced data analysis in data journalism.

4.3.2 Can AI technologies create creativity? Some journalists thought AI technologies could support originality by offering a 'helping hand' for finding unreported topics, fresh angles and ideas for unique content or approaches. This might spark ideas they might not have otherwise had, or spark faster than without technology. Other journalists warned AI systems might undermine human creativity by devaluing passion and human hunches and may even constrain their thinking.

AI may help generate original ideas and stories (+). The potential for AI technologies to spark new story ideas, especially to identify unreported, 'under the radar' stories and new angles on existing stories, excited some journalists. For example, Neil was curious to "see what ideas come out of a machine as opposed to a person." Several journalists highlighted the time and effort-saving potential of AI-aided idea generation. For example, David thought AI might automate some of the manual work required to generate original ideas, such as to "look at previous ideas and bring them together. It could save time." Similarly, Tim stated he finds "idea generation really, really hard" and welcomed any AI technology that could save intellectual effort. David thought AI could be "a really powerful tool for making hundreds of thousands of stories that wouldn't have been possible without it." He specifically mentioned the potential value of AI technologies for delivering data-driven public interest journalism to local newsrooms at scale, citing an existing tool, RADAR [53] as a successful example.

AI may constrain journalists" thinking (–). While some journalists were excited that AI technology might augment their thinking, Anthony was concerned it might constrain his thinking, stating AI systems are "probably an enemy of originality." He was specifically concerned about the Newsworthiness Detector, stating that this type of tool could

undermine originality as "if people are talking about it, it is probably already newsworthy and therefore not going to be that original." Similarly, David warned originality might be at risk if journalists get "stuck thinking about the ideas that tools create, rather than thinking about them as a basepoint, something to move beyond."

AI cannot emulate journalists' passion and hunches (–). Some journalists were concerned AI might undermine originality through deskilling and discouragement. As Jamie stated, "while [an AI system] could cut through the market and understand what your competitors are talking about," it is "open to abuse." For example, unethical news outlets might try to 'game the algorithm.' Jamie noted AI systems could identify topics that are "statistically proven to be underreported," but this would not guarantee they were interesting, newsworthy topics. To him, originality "comes from something you're passionate about as a journalist, like a story that you really want to write about." Jamie noted his story ideas often came from keeping "one eye on the market and one eye on what everyone else is doing" and using a "hunch" nurtured throughout his career. Therefore, he was concerned AI cannot emulate journalists' passion and hunches, as he thought true originality can only be detected by a dedicated human eye.

4.4 Summary of findings

We have discussed how key journalistic values are practiced by journalists and how they might be supported or undermined by AI technologies. Consistent with research on journalism practices, we found these values supported journalists in achieving the broad aims of conveying the truth [62], serving their audiences [18,35] and providing an original perspective [19]. The values of transparency, credibility and trust served as indicators of truth, while journalists served their audience through the values of acting in the public interest, accountability and impartiality. Originality was key to ensuring a story provides a new perspective.

The discussion of the potential impacts of AI on these values highlighted a duality; all may be either supported or undermined by AI systems, On the one hand, journalists suggested AI might support key journalistic values, for example seeking truth by facilitating highly-procedural fact-checking tasks at scale, impartiality by helping journalists reflect on their own inherent biases and originality by helping them generate new story ideas. On the other hand, journalists were concerned AI might undermine those same values – for example truth by propagating mis/disinformation, impartiality by imposing data bias and originality by constraining rather than augmenting journalists' thinking. This highlights the need for responsible, value-oriented AI design that helps ensure future AI systems support rather than undermine important journalistic values.

5 DISCUSSION

In the face of an economic, resource, and confidence crisis [49], AI has been suggested as a potential means of supporting journalism by automating aspects of investigative work, [11,65], facilitating large-scale data processing [9,41,64] and even augmenting journalists' creativity [43,44]. Journalistic values are at the core of the profession, shaping not only the role of journalism in society and journalism approaches [36], but also technology adoption [7]. The key contribution of this research is a rich, empirical understanding of journalists' perceptions of how AI technologies may support and/or undermine important professional values.

While existing research has examined the potential impact of AI technologies on human values in general (e.g. [22,27]), this is the first study to examine the potential impact of AI on the professional values journalists deem important. This is particularly important and timely; while in democratic societies the media plays a vital role in creating, moulding and reflecting public opinion [61], the industry is facing tremendous strain [49]. It its thus essential AI technologies fulfil as much of their promise as possible to ease some of the pressure faced by journalists. In this section we reflect on the design implications of our findings to provide guidance that advances the discussion on AI value alignment [56]. We argue that while it is certainly desirable to create AI systems that respect key journalistic values, designers should move beyond supporting values by embodying them through design. A strong knowledge of what professional values are important in a field and why, and how they are practiced, can aid progression from value alignment to value embodiment.

5.1 Journalistic values and how they are practiced

The value cards selected by interviewees included truth, trust, transparency, accountability, public interest, accountability, impartiality and originality. These are consistent with those highlighted as important in Journalism Studies [62]. Truth was selected by all but 2 interviewees, affirming its importance as a defining value for the field. However, how these values were contextualised and practiced differed at both the individual and organisational levels; there was no single way of understanding each value. For example, and consistent with previous findings, there was a diversity of practices around verifying the accuracy of information [52, 53]; data-led stories utilised different verification practices for seeking truth than investigative stories. This supports previous findings that journalistic values are highly contextual and culture-dependant [35] and is consistent with Shoemaker [60], who found journalistic values were influenced by journalists' personal beliefs and the ethos of media organisations.

Research on the ethics of AI has also noted values can mean different things to different people [34]. Thus, AI designers must decide whether to adopt a minimalist or maximalist approach to value alignment. While a maximalist approach might involve designing for a unified set of 'journalism-wide' values, our findings suggest this approach may gloss over important subtleties and nuances; an approach that assumes journalists subscribe to a common set of values (and have a common understanding of them) risks designing AI technologies that are insensitive to the local journalism context in which they will be embedded. In contrast, a minimalist approach may involve designing based on locally-held (e.g. within a single news organisation) values and, potentially, more nuanced conceptualisations of them. While this may restrict the usefulness of a system developed based on these values for other organisations, it may help ensure usefulness within the narrow organisational context in which it was designed. This form of tailoring AI to local journalism contexts may convince AI-sceptic journalists, which many are [5], that AI technologies really do share their values.

The journalists we interviewed also highlighted the strongly overlapping nature of the boundaries of many of the values (for example truth, credibility, trust and transparency). This suggests that rather than design solely based on a piecemeal understanding of the importance of individual values, designers of AI systems should consider them holistically, as a value ecosystem. This can be achieved by striving to understand how these values complement, inter-link and feed one another. Considering journalistic values as an ecosystem is particularly pertinent as, together, they are what might constitute 'good journalism.' Designers should support value ecosystems while

simultaneously respecting individual values. To achieve this effectively will require empirical research focused on 'value discovery,' [17] to accommodate different meanings and practices and understand the inter-relationships between values. An empirical approach is preferable to following established codes of conduct, as these might fit organisations, but clash with individuals [46].

5.2 How AI might support and undermine key journalistic values

Historically, journalism has weathered technological disruptions, most recently with well-documented challenges related to the rise of online news [2,45] and social media [6,7]. Although these innovations have fundamentally changed news production, their influence has strengthened journalistic values by encouraging journalists to hold themselves to even higher standards [26,69]. In other words, these disruptions have reshaped work boundaries and practices, but reinforced the importance of journalistic values. Our findings highlight how AI might (continue to) disrupt news work and suggest that rather than 'de-value' values, the proliferation of AI technologies is likely to place them in even greater focus. What remains to be determined is to what extent, and how exactly, it will re-negotiate and re-define journalism's boundaries and values.

The journalists' discussion of the potential impact of AI on their values highlighted a duality; all were thought to have the potential to be either supported or undermined by AI systems. While this is perhaps unsurprising given the controversial nature of AI, it is important to note that evidence of this duality emerged organically; it was not 'forced' by asking journalists to discuss how each value could be supported or undermined by AI technologies. This duality is therefore something designers should carefully consider by weighing up how their assumptions, design approaches and algorithms are likely to impact on key journalistic values. For example, how can they ensure their approach to automatic fact-checking is accurate enough to avoid unwittingly propagating mis/disinformation, thereby supporting rather than undermining truth? Does the system work on the assumption that fact-checking is objective and procedural, or it is subjective and there is a 'grey area' of what counts as mis/disinformation and what does not? Or a mix of these? The former assumption might result in a more automated, system-led approach to verification. The latter a less automated, user-led approach. How can they ensure their approach to story idea generation augments rather than constrains journalists' thinking? Does the system provide content with the aim of sparking original new story ideas, or attempt to provide ideas directly? Does the generation algorithm aim to concretely determine originality, or flag potentially original story ideas without claiming they are unique? Does the interface convey these decisions by explaining the nature and scope of the algorithm, or leave this to the user to infer? A value-oriented approach may raise more questions than it answers, but it is only by reflecting on a breadth of questions such as these that designers can make responsible value-sensitive design decisions. In line with the NordiCHI 2020 theme, 'shaping experiences, shaping society,' we must demand ethical reasoning by the shapers of our society. This includes AI designers, systems and the organisations in which they are embedded.

Given the overlapping nature of many of the journalistic values identified, designers may also have to make design trade-offs based on which values are most important to support. For example, by encouraging journalists to reflect on their own biases (supporting impartiality), journalists might re-consider whether a story they published really was for the common good of society (undermining public interest). Similarly, the duality highlighted by journalists means it is possible an individual value might be either supported or undermined by a single AI system, through the incorporation or integration

of ‘incompatible’ assumptions, approaches or algorithms. For example, impartiality might be supported through bias-checking but undermined by being underpinned by biased training models. AI designers thus need to remain sensitive to ‘value tensions,’ which feature prominently in VSD methods [47], and ensure systems they design actually support the individual values they aim to support while, holistically, supporting the broader value ecosystem.

A key principle for designing AI technologies that are well-aligned to human values is value alignment [56]. Aligning AI with a community’s moral beliefs (which many of journalists’ professional values encapsulate) can mitigate for the possibility of the system having malicious goals or exhibiting malicious behaviour [34]. Aligning AI technologies to users’ values rather than their intentions, preferences or interests can provide broad constraints to the design space, serving as guiding principles rather than prescriptive guidelines [34]. This is important if there is no single set of professional values applicable to all, as with journalism.

Alignment might be forged by linking values to formal system requirements [22]. But this may be insufficient to create truly useful AI systems. Instead, we suggest designer learn to ‘live by’ journalistic values, to shape their design values. This extends beyond traditional user-centred design, as values become embodied into technology design not because users are involved in the process, but because they are part of the design ethos. For example, truth and impartiality can be translated into a design commitment to select trustworthy data sources for training models. By incorporating journalistic values in the design ethos, designers should share responsibility and accountability over the input provided of AI systems into news production [25]. Design values should serve human values rather than the other way around. For example, in an automated news story, algorithmic transparency could serve journalistic impartiality by explaining how the algorithm decided what sources to include to maintain balanced coverage. By ‘baking in’ professional values into HCI design rather than only linking them to requirements, AI systems can go beyond merely respecting them.

5.3 Value-specific design guidelines for journalism AI technologies

In addition to highlighting the principle of AI designers ‘living’ users’ values and AI systems embodying them, we propose three high-level design guidelines by synthesising our findings.

5.3.1 Supporting truth-seeking through AI scrutability. Truth was of paramount importance for most journalists and was linked by them to values such as trust, credibility and transparency. Several of the journalists feared automating truth-seeking, citing risks of losing authority or propagating mis/disinformation. This suggests that fully automating tasks such as verification may not be desirable, as the values of truth, accountability and credibility could be significantly challenged.

Our findings suggest the value ecosystem around truth could be supported by providing users with the opportunity to scrutinise AI outputs and decision-making rationale. Scrutability is a central concept in human-centred AI research [1], and could open up design spaces for tackling the black-box challenge, where algorithmic systems may undermine the journalistic values of transparency and accountability by not providing users with sufficient understanding of the inner workings of the system [3,21]. Supporting scrutiny is preferable to trying to create a ‘truth machine’ as anything less than 100 per cent accuracy could ruin a journalist or organisation’s reputation. One way of supporting

scrutiny is to allow journalists to review alternative outputs and make the final decision (e.g. on whether or not to flag a story as mis/disinformation).

5.3.2 Supporting impartiality assessment with AI-facilitated sub-editing. Some journalists thought AI could support them in writing balanced stories by identifying stories that lacked it. In this vein, AI could act as an 'external' subeditor, reviewing stories before publication and assessing if they provide a balanced view. AI models have been trialled for this purpose, flagging hyper partisan (or one-sided) news stories based on the text [16,29,52]. However, journalists' have had little involvement in the design of these systems, as their input on detecting bias is often limited to manually annotating content [52]. Like some journalists, we question the implications of automating bias detection without full consideration of the values behind it. We suggest journalists should be more involved in fine-tuning editorial criteria for flagging non-impartial stories and designers should embrace journalistic value ecologies around impartiality. Responsibility for impartiality should not fall solely on journalists, but also be distributed across designers and data providers, who should adhere to the codes of conduct and ethical standards of journalism [25]. This is important as impartiality is a complex value, often confounded with others such as objectivity, neutrality, balance and even transparency - which can be considered a "substitute for (the impossibility of) impartiality" [57]. To support journalistic accountability, AI designers should be open about the 'incompleteness' of data and make explicit what information is used to train models and make decisions. They should also explain the role of AI as sub-editor, letting the user know what sources were used and how to flag a story as unbalanced.

5.3.3 Generating original story ideas with AI-facilitated discoverability. Generating ideas can be challenging. While some journalists were curious about what ideas a computer might generate, others feared AI could constrain their thinking by encouraging them to reuse story arguments or would lack the 'human eye' necessary for identifying story opportunities. Like Maiden et al [44], we found original stories were often built on previous ones, as journalists often strove to find a fresh perspective on an existing story. To support originality, AI systems should engage with its paradoxical nature, where existing stories are used as inspiration. For example, AI could use previous stories to produce visualisations depicting the connections (or disconnections) between existing stories. Moreover, these systems could spark novel ideas by highlighting opposing perspectives or news provenance [28]. This can provide inspiration for original stories, allowing journalists to use their hunches to explore potentially newsworthy leads.

5.4 Limitations and future work

First, the exploratory nature of our study necessitated a relatively small sample size. Therefore, we are cautious not to over-claim the generalisability of our findings. In particular, we do not claim the values discussed by our journalists are important to all journalists worldwide. Indeed, our findings are unlikely to be generalisable to non-democratic media systems, as values differ in different media systems and cultures [35,36]. However, as our findings were consistent across journalists from a variety of organisations, roles and publication types, this suggests their relevance beyond our specific sample. A survey might supplement our research with more generalisable findings. For example, it might help quantify which values journalists think are most likely to be supported or undermined by AI and provide a broader range of examples of how.

Second, inspired by VSD, we used value and AI cards as simple yet powerful tools for grounding discussions around specific values and AI technologies. Although we told interviewees they could discuss values and systems not included on these cards, few did; the cards may have therefore constrained the discussion to an extent. However, there is no evidence the cards affected the validity of the study, as some journalists discussed related values in the context of overlapping values (e.g. accuracy when discussing truth) and some extended the discussion of AI technologies to systems they were familiar with. Although the AI cards outlined only 4 potential uses of AI in journalism where many more are possible, they allowed discussion of concrete applications of AI for those who had not used these technologies directly (most of our interviewees).

Finally, while we focused on values of individual journalists, future work might examine values shared across media organisations, involving a broader range of stakeholders, such as editors and AI system designers. It may also examine AI-related value tensions specifically, with the aim of better understanding how to resolve those tensions or investigate how best to achieve value alignment or embodiment in a journalism AI context.

6 CONCLUSION

We investigated the professional values journalists considered important in the context of news story creation, how they are practiced and how AI systems might support and/or undermine them. We highlighted a duality where all values could be either supported or undermined by AI systems. For example, journalists thought AI systems might support them in encouraging credibility and trust by facilitating procedural fact checking tasks at scale but risked undermining these values by producing untrustworthy content or propagating mis/disinformation. They thought AI might support them in recognising and reflecting on their own inherent biases to remain impartial, but risked data bias itself. They also thought AI might support generating original story ideas by augmenting their creativity, but at the same time risked constraining their thinking.

While existing research has examined professional values in journalism practice and the potential impact of AI technologies on human values in general, this is the first empirical study to examine this potential impact on the values journalists consider important. Understanding the potential impact of AI technologies on values can 1) help ensure these technologies are designed in synergy with user values, based on a deep appreciation of them and 2) encourage the design of AI systems that go beyond respecting values; designers of AI systems should strive to ‘live by’ rather than just understand user values and ‘bake them in’ rather than ‘link them in’ to their designs. By doing so, AI systems can go beyond merely respecting values by truly embodying them.

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