Values as Problems, Principles, and Tensions in Sociotechnical System Design for Journalism

Sachita Nishal
Northwestern University
Evanston, USA
nishal@u.northwestern.edu

Nicholas Diakopoulos
Northwestern University
Evanston, USA
nad@northwestern.edu

Abstract

Through a systematic review of design contributions in journalism, this work examines how domain-specific values shape sociotechnical systems for newswork. We illustrate the different ways in which values define design problems and act as guiding principles for solutions. For instance, the value "accountability" functions as both a design problem (how to support journalists in accountability reporting) and as a guiding principle (features to ensure that systems remain accountable to users). Our analysis reveals how ten domain values shape design choices, and how these values can support or conflict with each other in practice. Building on these findings, we then discuss how designers might position their work in relation to stakeholders: journalists, the public, and technology providers. Each of these relationships presents unique value tensions for designers to consider and balance. In this way, our work provides practical guidance for creating systems that better serve newswork, helps designers reflect on how their choices impact different stakeholders, and contributes to critical computing discourses on where values require adjudication or deeper attention.

CCS Concepts

• **General and reference** → **Surveys and overviews**; • **Human-centered computing** → **Interaction design process and methods**; **Collaborative and social computing**.

Keywords

journalism, value-sensitive design, systematic review, news production, sociotechnical systems

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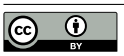
1 Introduction

Modern newswork—the gathering, production, and dissemination of news—occurs within complex sociotechnical systems where technology and journalistic practices are deeply intertwined. Various computational artifacts and systems support professionals like journalists and editors in their work: surfacing newsworthy social media posts [106], exploring datasets [94], improving real-time coverage [113], and more. Yet the design of these tools is not merely a technical endeavor. Rather, it is fundamentally shaped by journalistic values that serve dual roles: defining the problems that designed artifacts and systems aim to address, while simultaneously acting as principles that guide solution approaches. As a result, design contributions in this field come to reflect (and reflect on or challenge) its domain values through the framing of problems, development of artifacts, and evaluation of the outcomes.

With an eye towards supporting design for journalism—an important institution for informing society and buttressing democratic decision making—this work undertakes a systematic review and analysis of design contributions in this field. We focus on how domain-specific values manifest in these design contributions. Our review adheres to the PRISMA framework for systematic literature reviews [120], focusing specifically on design contributions targeted at professional news gathering and production. We analyze four types of design contributions in journalism as proposed by Aitamurto et al. [1]: context-specific design requirements, designed tools and practices, design research methods, and human-centered evaluation approaches. Values are identified through an inductive, thematic analysis of design contributions, e.g., in descriptions of design goals and requirements, user study findings, and suggested implications for design. While previous systematic reviews have covered different aspects of newswork tools and practices—from historicizing computational approaches [25, 33, 76], to charting out theory and methods of digital journalism studies [135, 152], to studying specific actors and infrastructures [36, 79, 142]—a systematic analysis of design contributions through the lens of domain values offers an opportunity to identify how different values shape existing systems, where tensions arise between competing values, and what gaps exist in current approaches to supporting core journalistic values in design.

This investigation is particularly timely given today's "burgeoning ecosystem" of digital tools for journalism [144], where newsworkers are testing and contesting new technologies like generative AI (e.g., [57, 130, 165]). For designers, understanding how different values shape and constrain design choices can help ensure that new technological projects serve journalism's core functions: acting in the public interest, holding power accountable, and fostering informed democratic discourse [99]. Equally important is to identify where values are underrepresented or where their interpretations could be expanded, enabling designers to imagine new possibilities for sociotechnical systems for journalism. By providing a snapshot of how values manifest in design contributions, this work can also provide a launchpad for critical discourses around domain values in



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design, e.g., through the lens of value dilution over time [69], as "design criterion" to evaluate new artifacts [64], as axes for trade-offs in case studies of designed artifacts [23], and so on.

Our analysis reveals how different values like accountability serve both as design problems (e.g., supporting accountability reporting) and as solution approaches (e.g., ensuring algorithmic systems are accountable to audiences). We analyze ten different values from this perspective, describing how each of these impact design choices, and subsequently present tensions or trade-offs with other values. While these findings explore how values shape design, the discussion explores how designers might more intentionally support or reshape domain values through designing with/for particular stakeholders. The relationships surrounding design work for the domain—to journalists themselves, to the public they serve, and to technology providers—inherently involve power dynamics and value tensions that designers must navigate. For instance, maximizing audience engagement could conflict with journalistic autonomy. We chart out implications for design and future research directions oriented toward exploring these relationships and tensions.

This work aligns with Value Sensitive Design's (VSD) understanding that values and technology shape each other interactively [65], and shows how this occurs for sociotechnical systems of professional news gathering and production. In doing so, it offers three key contributions: First, it suggests practical guidance for designers aiming to engage in value-sensitive design of artifacts and systems in this domain. Second, it advances critical computing discourse by revealing both how values trade-off, and where opportunities exist to expand current interpretations of journalistic values in design. Third, by examining how design can be oriented toward different stakeholders, e.g., journalistic autonomy, audience news comprehension, platform engagement, we help designers reflect on their own positioning and its implications.

2 Methods

Our systematic review aims to identify studies based on Aitamurto et al.'s [1] framework of design contributions in journalism: identification of design requirements, adoption of design research methods, design of tools and practices, and human-centered evaluation. This framework aligns with Wobbrock and Kientz's [168] HCI research typology, supporting our analytical approach.

Design contributions can focus on different stages of professional newswork (gathering, production, dissemination) and specific tasks within these stages (news discovery, collaboration, writing, editing). Given that prior reviews have often focused on specific stages like news dissemination [8, 55, 119], we scope our review to design contributions supporting professional news gathering and production. These crucial early phases directly impact the core news product—the story—and are deeply intertwined in practice [140].

Professional journalists, editors, and technologists also collaborate with sources, citizen journalists, audiences, and peers [9, 56], impacting topic selection [101], workflows [87], and editorial priorities [26]. Therefore, we include studies examining such interactions in our corpus, provided they illuminate how these actors influence the design of sociotechnical systems. Also, while our corpus primarily contains design contributions for written news, with fewer studies on broadcast or audio news, many of our findings about values generalize across formats. Though specific features (like video editing) may be under-represented in our dataset, the values shaping news discovery, verification, or data visualization remain relevant regardless of medium.

In summary, we examine empirical design contributions to sociotechnical systems for professional news gathering and production, considering professional actors as well as their interactions with others in the ecosystem. This scope allows us to examine how values shape the design of artifacts and systems for newswork, while acknowledging the collaboration inherent to it. To identify and synthesize relevant design contributions, we followed PRISMA guidelines [120]. The process involved four phases: identification, screening, eligibility evaluation, and inclusion for analysis (Figure 1).

2.1 Keyword Search

We relied on the ACM Digital Library and the Scopus database to identify articles. The former provided us with relevant articles from the computing literature, and has been used in prior reviews in HCI [22, 153]. The Scopus database indexes articles from wider databases of interest, beyond computing, and included prominent sources such as IEEE Xplore, Taylor and Francis (Journalism Studies, Digital Journalism journals), etc.

We piloted keyword searches using terms related to journalism, design, and empirical research methods (e.g., "news", "journalism", "design", "computational journalism", "automated journalism", "study", "artifact"). These searches sometimes surfaced articles only marginally related to journalism, or lacking an empirical component. Searches also showed that while design-oriented contributions span multiple disciplines like journalism studies, HCI, and political communication, they do not always share the same terminology or methodological approaches [76]. And so our search strategy evolved to capture interdisciplinary terminology while minimizing false positives.

We filtered to include only English language, peer-reviewed articles that were conference papers, journal papers, or book chapters. Figure 2 shows the boolean string that was used to search both databases. This final search query was run on August 9, 2023. It uncovered 142 articles from the ACM Digital Library, and 1015 articles from the Scopus database, leading to a total of 1157 records. We supplemented this with 359 additional records from reverse citations of key texts [27, 44] and the International Symposium on Online Journalism—not indexed by major databases but known to us. After removing duplicates, 1406 articles remained for screening.

2.2 Screening and Eligibility Evaluation

We conducted screening in two stages following PRISMA guidelines. Based on the scope of the review, the first author developed exclusion criteria through iterative coding of 50 random records and discussion with the second author. Following this, articles were imported into specialized screening software[1], and the following final set of exclusion criteria were applied:

- **EC1** *Tangential references*: Papers with only tangential references to journalism without actual engagement (e.g. studies

[1]Rayyan, available at https://rayyan.ai/

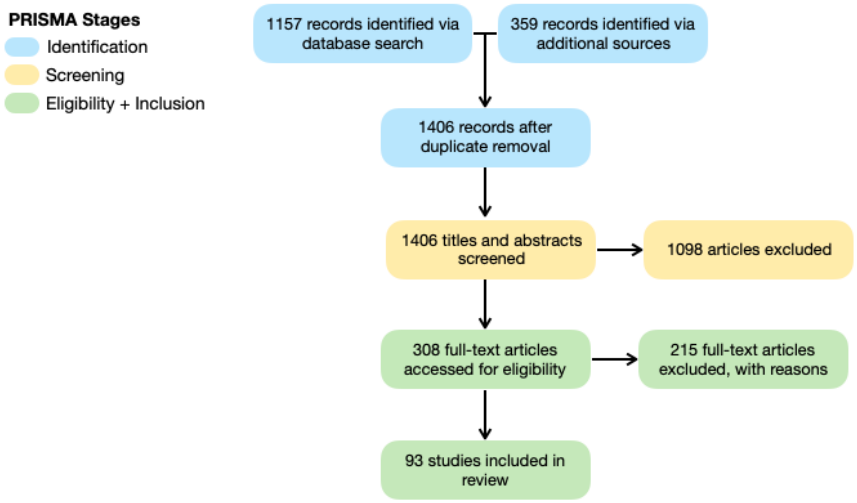

Figure 1: PRISMA flowchart documenting the systematic review from the identification stage to analysis.

TITLE, ABSTRACT OR KEYWORDS	journalis* **OR** news*
	AND
TITLE, ABSTRACT OR KEYWORDS	study **OR** analys* **OR** analyz* **OR** experiment* **OR** interview* **OR** demo* **OR** system* **OR** artefact* **OR** artifact* **OR** tool* **OR** interface* **OR** design* **OR** prototype* **OR** case-stud* **OR** evaluat* **OR** ethnograph* **OR** deploy*
	AND
ALL FIELDS	"computational journalism" **OR** "automated journalism" **OR** "computer-assisted reporting"

Figure 2: Search query for the ACM Digital Library and the Scopus database. An asterisk (*) indicates a wild-card character. Both British and American versions of spellings are included where necessary.

about collecting social media data [163], or the impact of fake news on brand management [60])

- **EC2** *Non-empirical work*: Reviews [7, 78], research methods contributions (e.g., coding methodologies [174]), opinion articles
- **EC3** *Outside scope*: Work outside professional news gathering or production (e.g., ad targetting [12], news dissemination chatbots [88])
- **EC4** *Technical only*: Pure technical contributions without design elements (e.g., algorithmic techniques and optimization [170, 173])
- **EC5** *No design contributions*: Papers without explicit design contributions based on Aitamurto et al. [1] (e.g., business model case studies [52], newswork with technical artifacts without outlining any explicit implications for design [109])

For title and abstract screening, the first author reviewed articles against these criteria. Ambiguous cases, particularly those unclear about design contributions, advanced to full-text screening. This process excluded 1098 articles, leaving 308 for full-text review.

In full-text screening, articles were evaluated against the same criteria. Seven articles were inaccessible despite contacting authors, nine were duplicates, and seven were non-English. Most articles excluded due to full-text screening met criterion **EC5**, as they described how newsworkers, managers, or audiences engaged with different types of computational artifacts and systems, but did not explicitly suggest choices or implications for the design of sociotechnical systems. After excluding 215 articles during full-text screening, 93 articles remained for analysis.

At this point, we concluded our data identification and screening process. While we could have engaged in further reverse citation searching from this corpus of 93 articles, we believed they spanned a diverse range of design contributions that could lead to fruitful analysis. The full list of articles is available as supplementary material.

2.3 Analysis and Coding Procedure

For the full set of included articles, we first recorded the type of design contributions that each made (design requirements, design, evaluation, or design methods), the goal of newswork (news gathering, news production, multiple), and the intended stakeholders for a given design contribution (reporters, sources, so on). This was intended to support qualitative descriptions of how values take the form of design problems, or are addressed for particular stakeholders.

The first author then adopted an inductive approach to reflexive thematic analysis [19] to uncover stakeholder values relevant to the design of sociotechnical artifacts and systems. We analyzed all types of design contributions (n=93). Any descriptions of users' (e.g., in design requirements, design goals, user study responses),

that were either uncovered, implemented, or recommended in a study were thematically coded.

Following the first round of coding, 36 themes emerged for stakeholder values. Since these themes were found to be overlapping and at differing levels of abstractions within each set, two rounds of axial coding were conducted for this set of themes as well. This process was shaped by conversations among the authors and external feedback. Finally, ten themes pertaining to domain values were identified.

3 Findings: Values in Sociotechnical Systems for Newswork

Drawing on recent work [95], we approach values as "guiding principles of what people consider important in life" [24] that fundamentally shape design contributions. Values here serve dual roles: they help identify what constitutes a problem (e.g., lack of transparency is only problematic because transparency is valued), and they guide solution approaches (e.g., making algorithmic decisions explainable because transparency matters). These values manifest across the design process: from problem framing and requirements gathering to feature decisions and system evaluation.

The values we identify span three, overlapping categories: canonical journalistic values (e.g., objectivity, accuracy), values intensified by the use of technical artifacts (e.g., data privacy, inclusivity), and values tied to labor conditions (e.g., efficiency in time-sensitive news production). For each value, we examine how it translates into specific design problems and guides solutions, for instance, how "independence" manifests both as a design problem (e.g., designing tools that enhance journalistic autonomy) and specific features (e.g., news recommendation tools that defer to journalists' judgment).

We also recognize the interconnected and often competing nature of these values. Both value-sensitive design (VSD) and journalistic practice acknowledge that values often exist in tension with each other, requiring ongoing negotiation and trade-offs in both design and practice [40, 65]. Through this negotiation, journalism constantly shifts and changes: our review captures these tensions at this moment in time.

Thus, when analyzing each value, we detail: (1) how it orients specific design problems in newswork, (2) what features and design choices have been developed to reflect it, and (3) how it conflicts with or reinforces other values in practice. This mapping between values, problems, and features can help identify where current artifacts and systems fall short and where new design opportunities exist to support journalism. Table 1 summarizes these values and their trade-offs in brief.

3.1 Independence

Independence, or the ability to act without influence from "extra-journalistic forces" [40], is a key journalistic value shaping design in newswork. As with other values in our analysis, independence serves dual roles: defining problems (loss of autonomy through algorithmic influence, or power imbalances in human collaborations) and guiding solutions (preserving human judgment in automated systems, redistributing control in collaborative tools). While independence is a canonical journalistic value, the increasing use of algorithmic systems—from automated news gathering, to generative AI-based brainstorming, to story generation [138, 147]—has intensified its importance in design.

For algorithmic tools, systems that consistently defer to journalists' professional judgment are suggested rather than automating decisions entirely. This manifests across different types of tools: news gathering systems that allow journalists to select newsworthy *leads*[2] from varied options, rather than making outright recommendations [15, 48, 85], readership dashboards that incorporate journalists' input during design so as to inform rather than dictate editorial decisions [141], and text or video creation tools that enable thorough inspection and modification of algorithmic outputs [90, 123, 156]. Supporting these tools through broader sociotechnical approaches like comprehensive documentation [148, 167], editorial guidelines for tool usage [74, 150], and expert-led AI literacy initiatives [35, 89] can help journalists make informed decisions about technology use.

In supporting tool-mediated collaborations with stakeholders like citizen reporters and sources, design features must navigate inherent power imbalances between newsrooms and these contributors. While newsrooms traditionally have held most of the power in these relationships, newer artifacts and systems aim to redistribute some control. For crowdsourced reporting, mobile apps that offer granular privacy controls can let citizen reporters manage their availability and engagement with newsrooms [162]. Similarly, frameworks for working with sources to build stories emphasize creative and joyful conversations [50], even if they are difficult to organize. Rather than creating tools that simply maximize information flow or efficiency, these approaches aim to balance newsroom needs with contributors' independence, allowing volunteer contributors to resist potential pressure from newsroom agendas or platform incentives.

Independence frequently exists in tension with other journalistic values and practical constraints. The drive for autonomy underlying independence can conflict with transparency needs, as Bhuiyan et al. [16] reveal in their study of how journalists negotiate between independent decision-making and audience demands for transparency about editorial choices. Similarly, McGregor et al. [111] show how prioritizing reporter autonomy in technology choices can lead to using less secure communication tools, creating tension with privacy requirements. Perhaps most challengingly, independence can be unknowingly compromised. de Haan et al. [35] demonstrate how journalists unwittingly cede autonomy through subtle influences of AI-based tools on their news gathering routines. These tensions suggest that preserving journalistic independence requires not just specific features, but thoughtful design approaches that make algorithmic influences visible and help journalists understand how tools shape their work practices.

3.2 Accuracy

Accuracy, or commitment to delivering credible and factual information, represents a canonical journalistic value that takes on heightened importance when newsworkers rely on computational tools. As a value, accuracy defines a host of problems (unreliable

[2] A lead is a potential story idea to be vetted and pursued.

Table 1: A summary of values that are found to shape sociotechnical system design for professional newswork.

Value	Description	Trade-offs
VN1. Independence	Enable the ability to act without influence from other people, tools, or algorithms.	Reporters' needs for independence in work can trade-off with organizational efficiency, and with the independence of volunteer contributors they collaborate with.
VN2. Accuracy	Enable delivering accurate and credible information to audiences and collaborators.	Can limit inclusivity of sourcing practices, and trade-off against algorithm-afforded efficiency.
VN3. Objectivity	Enable rigorous, open-minded reporting methods that mitigate bias. Support objectivity through collaborative and co-designed news reporting.	May trade-off with the efficiency afforded by large-scale algorithms, depending on audience or journalist beliefs about bias.
VN4. Comprehensive Coverage	Expand the range and diversity of news stories, supporting bias mitigation and accuracy. Entails attention to inclusivity practices in sourcing news.	Requires more resources which could affect efficiency; also challenges verification work, and journalistic independence.
VN5. Transparency and Accountability	Extend to readers to highlight accuracy, objectivity, and coverage for both algorithmic and non-algorithmic practices. Required among newswork collaborators. Can be supported by outcomes such as investigative stories.	Readers' transparency needs may conflict with reporters' needs for autonomy.
VN6. Creative Gratification	Support the exercise of creativity for people involved in news gathering and production. Entails supporting journalistic independence and autonomy.	May trade-off with efficiency, but also lead to more inclusive newswork and support accountability reporting.
VN7. Efficiency	Reduce the strain of time and resource limitations on reporters by improving the efficiency of their use.	May clash with reporters' independence, objectivity, accuracy, and creative gratification.
VN8. Inclusivity	Practices and tools addressing differences in newsworkers' backgrounds, interests, skills, and contexts, as well as the needs of their audiences. Shapes design processes and entails attention to policies surrounding use of designed systems.	Could support comprehensive coverage, trade-off with individual journalists' creative autonomy, and require more resources and time than are considered efficient.
VN9. Privacy	Maintain the privacy of user data sourced and transmitted via technical artifacts. Entails users' autonomy over their own data.	Could conflict with transparency during and after newswork.
VN10. Newsworthiness	Support for evaluating newsworthiness via editorially interesting factors that determine the salience of potential news stories. May be leveraged to provide transparency.	May affect the inclusivity or accuracy of news coverage if prioritizing certain types of news values.

computational data sources, risks of AI-generated errors and misinformation, challenges in demonstrating verification) while guiding solution approaches (verification features, transparency mechanisms).

These design problems manifest across a range of tasks in newswork. In news gathering, journalists need tools that surface accurate leads when processing large structured or unstructured data sources like social media streams [84], sensor data [121], or drone footage [125]. For fact-checking, computational tools must reliably identify check-worthy claims while providing evidence to enable rapid human verification [83, 118]. The rise of black-box AI systems introduces additional challenges around offering model transparency to journalists and editors, preventing system errors, and ensuring appropriate usage based on the stakes of reporting [97, 159]. Spotting and fixing errors in large-scale datasets is another issue for data journalists [93, 94]. Within automated content generation, accuracy presents a paradox: while automation might reduce mechanical errors in time-pressured newsrooms, it can also make verification more challenging through potential information overload [156]. The stakes of verification in human-AI workflows vary by genre of

news story—from recipes to political reports—though news organizations maintain baseline standards of accountability [154].

Design features addressing these challenges reflect journalism's distinct needs. For news gathering, interfaces are suggested to display credibility indicators like institutional affiliations and past contributions of human sources [68], helping journalists quickly assess information reliability [45]. In crowdsourcing contexts in particular, task selection features can help citizen journalists assess their own capability to provide accurate coverage, while enabling newsrooms to gather multiple verified perspectives [162]. Interfaces for data wrangling can support data verification through typical features for quick visualizations and spot checks for efficiency [94], but must also encourage traditional modes of journalistic inquiry like examining the data closely instead of simply working at an aggregate level [110]. Enabling version control and workflow documentation for data wrangling is also important given journalists' use of heterogeneous tools and diverse data sources [94]. For automated content generation—from story brainstorming to publishable headlines [49, 154]—designers can expose causal explanations of outputs (e.g., showing source sentences that informed AI-generated headlines) to support human verification, while acknowledging that expert oversight remains crucial for detecting subtle inaccuracies [156]. In presenting news stories to audiences, systems can be designed to support audiences' verification of data and process through interactive visualizations [6] and layered transparency disclosures [16].

Accuracy also brushes up against other values. For instance, an emphasis on accuracy can conflict with inclusivity when reporters rely heavily on verified but familiar sources during news gathering [68], while efforts to demonstrate accuracy through transparency disclosures can risk audience cognitive overload [47]. In both cases, striving for trustworthy information surfaces value tensions that extend beyond the newsroom and into the broader sociotechnical system.

3.3 Objectivity

Objectivity emerges as a complex and contested value in journalistic sociotechnical systems, interweaving with other professional values like independence, comprehensive coverage, and transparency. While traditionally framed as professional detachment or neutrality, contemporary interpretations favor "open-minded independent rigorous inquiry" emphasizing the self-aware and critical application of methods towards producing new knowledge [99] over simplistic notions of value-neutrality [40]. As such, journalists and editors are encouraged to exercise their conscience in the interest of freeing their work from bias to the extent possible, and offering transparency so audiences can judge the results of this process [99]. Once again, this evolution becomes particularly salient in the context of algorithmic supports for newswork.

As a design problem, objectivity manifests in multiple interpretations across the news production pipeline. News discovery tools that employ black-box algorithms to rank and classify content (e.g., Random Forest models for scientific papers [128], or semantic embeddings for user-generated content [167]) raise concerns about algorithmic bias from reporters. Designers attempt to address this through some degree of user control over algorithmic outputs [10, 167] and transparency around how these tools work and generate outputs [128].

The integration of algorithms in news production reveals competing interpretations of objectivity. Some systems explicitly encode bias preferences, as in Nack et al.'s [123] video-editing system where users specify the desired sentiment to influence clip selection from an archive. Other journalists perceive algorithms as enhancing objectivity, believing they "present facts and figures as they are" [156]. Critics challenge these "mythologies of algorithmic objectivity" [90], noting how automated tools can rapidly amplify organizational biases if used at scale [156].

Audience perceptions further complicate this landscape. Readers view automatically-generated content differently across genres: finding templated sports news more "objective" but "dull" [131], and appreciating automation for structured, data-driven stories that require less subjective interpretation [73]. However, even factual stories (e.g., sports scores, market numbers) can perpetuate dataset biases, and quite latently at that, prompting calls for algorithmic transparency across different beats [73].

The evolution of objectivity toward transparency and reflection manifests distinctly in HCI and design. Similar to HCI's shift from neutral tools to value-sensitive design approaches, a new generation of journalism technologies suggest moving toward supporting transparent, reflective practice. This manifests in systems that defer final judgments to journalists' expertise, echoing earlier findings about preserving independence in algorithmic systems. Tools aiming to support journalistic reflection on broader norms and values in their work [10, 89] also represent early steps toward this goal, though this requires careful collaboration between reporters and designers to define appropriate editorial criteria for feedback [97].

A notable gap exists around collaborative features for negotiating or measuring different notions of objectivity in newsrooms. While some studies identify transparency cues that could support in communicating objectivity to audiences [16, 47], few other contributions support newsrooms in collectively defining or evaluating such standards. This gap is particularly notable as newsrooms are now confronted with technologies like word embeddings and generative AI, whose latent biases may be harder to detect or mitigate.

3.4 Comprehensive Coverage

The mandate for comprehensive coverage in journalism serves a fundamental "cartographic" function [99]: journalists must create comprehensive, proportional representations of reality that enable citizens to navigate society. As a design problem in the domain, this manifests as challenges of story selection, resource allocation, diversifying sourcing, and adapting to evolving audience needs. Limitations of time, space, budget, and attention make perfectly comprehensive coverage impossible. The inherently subjective nature of coverage decisions adds another layer of complexity—journalists must critically evaluate which stories truly matter amid hype cycles and competing priorities. As a guiding principle, comprehensive coverage demands that the news represent diverse cultural experiences and perspectives over the longer-term [40].

This value manifests most prominently in sociotechnical systems supporting news gathering and sourcing. Journalists require

tools that move beyond "single, isolated data streams" [156], accessing diverse sources from social media [39, 84] to forums [167] and physical sensor data [121]. More sophisticated implementations link contextually-related datasets, serving multiple values simultaneously: comprehensive coverage through different sources, accuracy through cross-referencing, and automation that augments reporters' work instead of threatening independence (e.g., [61]). These systems work best when tailored for specific contexts: Wikidata integration for newsworthy events [67], news archives linked to political press releases [138], and aggregated voting records for legislative coverage [85]. Systems like Birnbaum et al.'s [17] browser extensions automatically retrieve contextual information (e.g., relevant quotes from public figures, statistics from civic agencies) to even support audiences in getting the fuller picture around a news story they're reading.

The principle has also evolved to view audiences as "co-creators" of meaning [6], spurring innovations in journalist-source interactions through collaborative platforms [32], audience interactions in live broadcasts [143], frameworks for eliciting lived experiences [50], as well as in story presentation via the use of interactive formats rather than static ones [6]. Design methods can even support newsworkers in understanding audiences better [126]. In terms of news discovery, crowdsourcing tools have evolved from allowing newsrooms to send out directed assignments to citizen reporters [92, 98, 160, 162] to collecting large-scale user-generated content or perceptions that then inform editorial decisions [48, 105, 128, 133, 157].

These sociotechnical solutions create new value tensions. Tools surfacing wide-ranging data complicate verification practices [110, 147]. Suggested approaches to resolve this range from automated credibility scores [59] to detailed data analysis tools [110], all requiring transparency to build trust among journalists, their audiences, and their sources [147]. Similarly, data-driven agenda-setting (e.g., crowdsourcing pipelines, audience readership data) can potentially challenge journalistic independence. While such data can help ensure coverage includes topics audiences care about and brings in diverse viewpoints, systems should present these inputs alongside other editorial considerations. Moreover, involving reporters in crafting such systems or determining the organizational policies that guide their use is also important [141].

3.5 Transparency and Accountability

Transparency and accountability represent interrelated values that shape both how newsrooms operate and how they serve the public interest. As design problems, these values manifest in three key challenges: (1) making algorithmic and human editorial processes visible to audiences without overwhelming them, (2) creating clarity around collaborative news production processes, and (3) supporting investigative journalism's mandate to hold powerful actors accountable. While transparency has traditionally focused on editorial decisions, the integration of computational tools has intensified the need for clear communication about how algorithms influence newswork [47].

Design features supporting these values span multiple contexts. For audience-facing transparency, systems incorporate carefully designed disclosure mechanisms that explain both algorithmic and human editorial processes, e.g., sourcing practices, story selection mechanisms [16, 146]. These features must balance comprehensiveness with accessibility—making complex processes understandable without oversimplifying them [47]. In collaborative contexts, platforms like WikiTribune implement discussion forums that document story development processes [132], while crowdsourcing systems can provide contributors with real-time updates about how their work is used [92]. For investigative journalism, specialized tools support accountability reporting through features like political ad data auditing [114], government document analysis [48], civic dataset exploration [20], and sense-making tools over large databases [18, 21, 38, 136]. These tools need to be complemented by training programs and collaboration features that help journalists, particularly in the Global South where resources for reporting may be relatively constrained, develop digital investigation skills [100].

As seen prior, transparency frequently reinforces other journalistic principles while occasionally creating tensions. Transparency about editorial and algorithmic processes supports accuracy and objectivity by allowing audiences to evaluate news production methods [147, 154]. Similarly, transparent collaborative platforms can advance inclusivity goals within news production by allowing everyone involved to understand the process and their own contributions within it [132]. Petre [137] describes Chartbeat, a social media analytics platform for journalists that is intentionally designed to obfuscate managerial control, perform deference to journalistic values, and create habit-forming experiences. The intentional lack of transparency in the tool's design (and who that design serves) ultimately strips journalists of autonomy over their work, values, and time.

We also observe that the drive for transparency can conflict with efficiency, for instance, when detailed process documentation creates additional work for journalists. Moreover, as newsrooms integrate more complex computational tools, striking the right balance between comprehensive transparency and audience comprehension becomes increasingly challenging [47]. This suggests that while transparency and accountability remain fundamental to journalism's public service mission, their implementation requires careful consideration of both technical capabilities and human factors.

3.6 Creative Gratification

Unlike traditional journalistic values like objectivity or accuracy, creativity has more recently been recognized as fundamental to journalism. Deuze [41] argues that journalism is "distinctly and intrinsically creative," throughout the news production cycle—from story ideation and research to production and audience engagement—making it increasingly crucial to consider in sociotechnical system design.

As a design problem, creativity presents unique challenges in newswork. First, automation technologies, while promising efficiency gains, can inadvertently constrain creative expression. This manifests in reporters' frustration with semi-automated, template-based writing systems [156] and metrics-driven editorial decisions [141]. Second, maintaining creative fulfillment becomes crucial for professional satisfaction and retention, particularly as newsrooms

integrate more automated tools [147]. Third, designers must balance opportunities for exercising creativity, with other practical constraints like time pressure and resource limitations [72].

Design features supporting creativity take various forms across the news production. Some systems explicitly preserve space for human creativity by establishing clear boundaries between automated and human-driven tasks [154]—particularly distinguishing between rule-based tasks suitable for automation and interpretive work requiring human creativity. Other approaches enhance creative processes without technical intervention, such as novel design thinking-based approaches for source interviews [50] and game-like mechanisms for collaborative story generation [72]. In fact, attempts to support creativity through automation can also backfire—as seen in Dierickx's [49] study where a template writing tool intended to free journalists for more creative work instead created new burdens for error corrections.

Creativity's relationship with other journalistic values reveals both alignments and tensions. Making room for human creativity could support accountability work by enabling reporters to question the status quo while NLP-based tools draft shorter, structured stories [154], and support inclusivity by making different collaborators in newswork (e.g., sources, journalists, editors) feel more valued and agentic [50, 72]. However, creative approaches must be balanced against efficiency demands [90] and core journalistic responsibilities. As seen in Section 3.3, audiences can perceive this tension, finding automated content more "objective" but less engaging [131], suggesting that creativity plays a crucial role in audience engagement even as it sometimes conflicts with traditional journalistic values.

While some creativity support tools exist in journalism—particularly for brainstorming story ideas from leads [62, 108, 138]—these represent only a narrow slice of journalism's creative needs. This gap is particularly notable given journalism's unique constraints of balancing creative expression with factual accuracy, time pressure, and public service obligations. Going beyond the initial ideation phase, researchers can study how creativity emerges in deployed workflows (like *The Verge*'s new hybrid publishing system [145]) and reshapes reporter collaborations or even audience relationships.

Certain genres of news (e.g., features and long-form writing) and occupational conditions (e.g., freelancers who continually pitch stories to outlets) may especially benefit from expanded creativity support. News-specific solutions could help reporters and editors collectively develop fresh approaches while maintaining editorial standards. This represents a significant opportunity for HCI researchers to reimagine creativity support across journalism's full workflow, particularly for these certain contexts and user groups.

3.7 Efficiency

Efficiency is a critical value in newswork given the profession's orientation toward timeliness of stories (e.g., breaking news, story exclusives), but is further entrenched by accelerating news cycles and diminishing revenue streams. Unlike traditional journalistic values that guide editorial decisions, efficiency acts as an operational constraint that shapes how other values can be realized in practice. As a design problem, efficiency manifests in three key challenges: (1) supporting rapid turnaround in response to market pressures [4], (2) enabling complex, collaborative work like data journalism under tight resource constraints [37, 150], and (3) balancing the adoption of new tools against training time and learning curves [74].

Design features geared toward improving the efficiency of newsworkers and their processes span multiple approaches. For immediate news production needs, semi-automated systems support quick story generation for structured content like sports and finance [73, 156], while real-time fact-checking tools help verify claims during breaking news coverage [83]. For specialized beats, platforms can be designed to facilitate rapid connections between reporters and sources [151], while interoperable data portals and standardized workflow documentation practices help data journalists work and collaborate more efficiently [37, 94]. Some systems explicitly incorporate efficiency-oriented features like context-specific newsworthiness criteria to help reporters quickly identify relevant information [48]. For the more structured news genres, end-to-end automation systems can free journalists from pressure to break stories first [67, 106], a nd instead focus their creative energies elsewhere.

However, the pursuit of efficiency creates complex value tensions in newswork. While automation promises time savings, it can paradoxically increase workload through oversight requirements and error correction needs [49, 90]. Resource constraints can compromise transparency when newsrooms opt for free tools with limited capabilities [171]. Most critically, pressure for quick turnaround can conflict with accuracy, independence, and objectivity [134, 147]. These tensions suggest that while efficiency remains crucial for journalism's sustainability, its pursuit must be carefully balanced against journalism's core principles. A key gap in current research is understanding how to design systems that genuinely save time without creating hidden costs or compromising essential journalistic values—particularly in resource-constrained newsrooms where the pressure for efficiency is highest.

3.8 Inclusivity

Building on journalism's shift toward pluralistic interpretations of objectivity (discussed in Section 3.3), inclusivity emerges as a crucial consideration in sociotechnical system design. Attending to inclusivity as a design challenge entails : (1) supporting diverse perspectives in newswork through both staffing and sourcing, (2) designing systems that accommodate varied technical capabilities and beat expertise among journalists [128, 134], and (3) addressing systemic barriers to participation, particularly in resource-constrained contexts [100].

Design features supporting inclusivity need to enable diverse participation in news production while ensuring systems themselves are accessible to varied users. For newsroom participation, designers increasingly recognize that different beats require specialized support—from data wrangling interfaces for sports journalism [66] to platforms bridging reporters with scientific sources [151]. These beat-specific tools also need to evolve alongside changing news formats online that spur deeper collaborations between journalists and technical specialists [51, 150]. Supporting these collaborations requires both technical features (like privacy controls and feedback mechanisms in citizen journalism apps [98, 161]) and

organizational approaches (such as experimenting with flat team structures in the newsroom [139]). System accessibility for users with limited technical know-how manifests through features like layered data exploration interfaces accommodating different levels of data expertise [146] and specialized training programs [148]. These accessibility considerations become particularly crucial in Global South newsrooms, where systems must address both resource constraints and linguistic diversity through features like language-specific fact-checking tools [80] and contextualized training infrastructures [116].

The commitment to inclusivity has also shaped design processes themselves, with many studies suggesting participatory design approaches [141, 146, 154], especially in combination with slow, intentional introduction of tools into reporters' workflows [75]. These collaborative methods can help clarify user responsibilities and needs [154] while building trust in algorithmic system outputs [167]. However, these can also be resource-intensive approaches, and have primarily been studied in Northern or Western European newsrooms [75, 154], highlighting disparities in access to collaborative design processes. The case of *La Nación* in Argentina illustrates both the potential and limitations of participatory approaches—while journalists were initially involved in designing a technical artifact that measured audience response metrics for published stories, subsequent modifications without their input negatively impacted their creative satisfaction and feelings of job security [141].

The pursuit of inclusivity both reinforces and complicates other journalistic values. While diverse perspectives enhance comprehensive coverage, they can create tensions around traditional notions of independence, especially when participants in collaborative newswork come from different professional cultures [139]. New story formats may be more accessible to audiences but require additional training [148] and can conflict with efficiency goals. Collaborations between professionals having different skillsets require careful bridging of skill gaps to build trust [150]. As Dierickx reminds us, even participatory approaches cannot guarantee tool adoption—acceptance ultimately depends on how innovations align with newsroom practices and journalists' own perceived benefits and risks [49]. Technical features alone do not ensure inclusivity; instead, designers must continually engage newsroom stakeholders in the process of reshaping sociotechnical systems for their work.

3.9 Privacy

While privacy has always been crucial to protecting sources in journalism, computational systems for communication and data storage in newsrooms present tangible challenges: (1) protecting sensitive data across complex digital workflows within the newsroom [111], (2) balancing privacy with new forms of data collection like sensors and location tracking [121], and (3) managing risks in collaborative news production with citizen journalists and other contributors [162].

Design features supporting privacy must address both data protection and user autonomy. For data protection, systems implement encryption for communication, secure storage for documents, and anonymization for social media analysis [67]. Supporting user agency requires granular privacy controls—like in citizen journalism apps where volunteer contributors control their location data and availability to newsrooms for reporting assignments [161]. Within newsrooms, features can include role-based access and audit trails for sensitive data analyses [147].

The need for privacy creates some interesting tensions with other values in newswork. While privacy protections can support journalists' independence by shielding their work from external pressures, they can conflict with audiences' transparency needs, for instance in context of protecting source confidentiality [16]. A drive toward resource efficiency with cheaper or closed-source tools may also threaten data privacy and transparency (e.g.,[111, 171]). These tensions intensify as newsrooms adopt sophisticated data collection tools that could compromise privacy in pursuit of innovative storytelling, e.g., from physical sensors out in the world [121]. Future research must develop privacy-preserving approaches that maintain computational benefits while protecting participants in news production.

3.10 Newsworthiness

Unlike broader journalistic values, newsworthiness represents specific operational criteria, i.e. *news values*—relevance, timeliness, impact, and so on [81]—that guide daily editorial decisions. These heuristics now shape the design of computational tools and the policies guiding their use across the news production pipeline. Crucially, newsworthiness is not simply a fixed set of news values applied mechanically to potential stories, nor an inherent property of events themselves. Rather, it emerges through ongoing interpretation and negotiation, as reporters reconcile their professional interests and routines with organizational priorities and perceived audience needs [103].

Design features addressing newsworthiness span different beats and content types. For news discovery, systems offer specialized support for investigative [146], political [138], and science reporting [128], computationally analyzing structured and unstructured data points or items like user comments [43], policy documents [48], and civic datasets [102] to identify what merits a user's attention. Crucially, they preserve reporter autonomy through configurable indicators—ranging from textual cues [138] and ratings [48] to rankings [128] and visualizations [3] of potentially newsworthy items that journalists and editors can then review. In automated systems, these criteria guide both content selection and generation [77, 106]. Much like suggestions for tools that enable reflections of reporters' own perspectives and biases (3.3), one could also envision tools that support reporters in reflecting on the newsworthiness of their own published stories, or their preferred heuristics for identifying it.

Supporting newsworthiness assessment may trade-off with with other values in newswork. While computational tools can enhance efficient, comprehensive coverage by surfacing leads and enabling newsworthiness evaluation over them, they risk compromising independence if reporters overly rely on automated recommendations. Similarly, explaining journalists' newsworthiness criteria to audiences can support transparency but requires careful design to avoid overwhelming readers [16]. While personalization of suggested newsworthy leads may support creative expression for reporters

along topics and themes they care about, this also risks creating feedback loops that only amplify certain perspectives or newsworthiness criteria [45, 48]. The technical landscape for news discovery is also currently in flux: social platforms restrict APIs previously used for news discovery, while generative AI introduces new system capabilities and verification challenges. These shifts require designers to rethink sociotechnical system design for identifying and establishing newsworthiness.

4 Discussion

Journalism studies has a long history of theorizing about the profession's values and role toward society, as understood by its practitioners [40, 70, 99]. Value-sensitive design (VSD) in HCI in turn presents a family of approaches to support such domain-specific values and stakeholder interests in the design of technology [63]. Our findings have focused on the ways in which design contributions in the domain approach journalistic values as design problems and guiding principles, addressing them through specific features in designed artifacts and systems that in turn present value trade-offs or gaps.

Drawing from our findings, below we present a synthesis articulating three key relationships that designers must navigate in their work, and how designed technologies for the domain might address values differently based on the stakeholder in question. We first offer design implications for how tools can center and support *journalists*' professional practice, drawing on exemplars from our findings to support designers who want to shape sociotechnical tools that are aligned with the domain. The success of journalistic endeavors is also predicated on their ability to serve the public interest and so we then also explore how designers can better orient their work to what the *public* needs, especially to participate in democratic society. Finally, we examine how designers' engagement with *technology providers* and platforms might influence the exercise and tensions of domain values. By examining these relationships, we aim to help designers reflect on how their choices can support or reshape journalistic values in practice. We outline implications for design and future research oriented toward more thoughtfully navigating these tensions.

4.1 Implications for Design

Our analysis reveals several key implications for the design of journalistic tools in an era of increasing algorithmic and AI integration into newswork. Below, we summarize these implications, accompanied by exemplars from our corpus for designers interested in exploring specific manifestations. As the material technologies of journalism continue to evolve, we believe these principles can guide future design work in this space.

The primary challenge emerging from our findings is the need to thoughtfully configure *automation* in newswork. As algorithmic systems become more sophisticated, particularly with the emergence of generative AI [13, 46], the emphasis must continue to remain on augmenting rather than replacing human judgment. This manifests in the need for robust oversight mechanisms that allow journalists to control and verify algorithmic outputs [45, 83, 146] while preserving their editorial autonomy. Such semi-automated systems can automate time-consuming or highly technical activities, allowing reporters to focus on more creative aspects of news production [73, 154, 156]. However, we also observe instances where these systems create additional workloads for verification and rectification of automatically generated text [49], creating opportunities for designers to consider the ergonomics of semi-automated newswork.

System *transparency* and *explainability* emerge as core design considerations, though they present significant technical challenges with black-boxed algorithms [47, 110]. Recent requirements gathering work scoped to domain and task-specific needs for algorithmic transparency may offer guidance to designers in this domain [104]. While complete algorithmic transparency may not always be feasible, especially with complex AI systems, designers can focus on providing task-specific explanations that journalists can understand and act upon [85, 129, 159]. Preliminary requirements gathering studies to understand journalists', sources', and readers' specific requirements for AI explanations would be valuable, as seen in other contexts [54, 96]. Algorithmic tools that support the accountability function of the news, also seen in more recent work [127, 158] also continue to remain avenues for designers to explore this ideal more broadly, and may be especially useful for resource-constrained local newsrooms.

Infrastructure integration, often overlooked in system design, is also key. Tools must integrate with existing workflows [66, 136] while maintaining *sustainability* in terms of maintenance, training, and resource requirements. Prior studies of newsrooms and their technological infrastructure tend to focus especially on European or American newsrooms, and/or often from a managerial perspective [29, 172]. Addressing infrastructure integration in resource-constrained environments [156] and the Global South [100] requires more emphasis. Developing *literacy* around design interventions also plays a vital role [35, 74, 148]. Such literacy initiatives can help both reporters and designers evaluate whether situations call for high-tech solutions or whether simpler approaches or policy changes might better serve their needs.

These findings underscore that successful design requires a nuanced understanding of both technical possibilities and journalistic values. As newsrooms continue integrating new technologies, designers must remain flexible and adaptive, ensuring tools enhance rather than compromise journalism's fundamental principles. Future work could focus particularly on evaluating the long-term impacts of these systems on journalistic practice and values, an aspect of design evaluation that remains severely under-explored in our reviewed corpus.

Longer-term studies can reveal how novel technical artifacts integrate into the routines and workflows of newswork (or not), especially as the novelty itself wears off. These approaches can also capture how the commitment of technical artifacts to the values they aim to embody can change over time [69]. Longer-term deployments and studies in this domain are contingent on successful academia-media partnerships, which, despite their value, face significant obstacles. Such partnerships require effective collaboration, credibility and commitment on both sides, and appropriate data, engineering, and design resources. Academic incentive structures do not always easily align with industry timelines, intended contributions, methods adopted, and so on [28]. Limited information infrastructures and fewer training opportunities also create

additional barriers to sustaining long-term research initiatives in contexts like the Global South [100, 116].

4.2 Missing Public Service Orientation

Deuze [40] condenses prior work from journalism studies into five ideal-typical values of news practitioners: public service, objectivity, autonomy, immediacy, and ethics. Similarly, Kovach and Rosensteil [99] identify journalism's obligation toward values such as democracy, truth, public service, verification, independence, and fostering public forums. Our analysis reveals a complex picture: while many professional values like objectivity, verification, and immediacy are operationalized as design problems or guiding principles in the reviewed work, an orientation toward goals of *public service* and *community dialogue* remain only partially addressed.

While accurate, unbiased, and transparent reporting might implicitly serve public interests, the field of journalism studies distinguishes public service as an explicit commitment where journalists engage with audiences as citizens rather than consumers. This approach aims to foster civic deliberation and informed opinion formation beyond simply reporting facts [82]. In practice, public service journalism differs markedly from market-oriented approaches—which primarily respond to audience preferences—in its coverage priorities and social impacts. Prior work shows market-driven news organizations provide less international reporting and hard news, while countries dominated by this model exhibit wider knowledge gaps between socioeconomic groups than those with public service ecosystems [31].

Some dimensions of public service do find sociotechnical support in the literature that we reviewed. Tools for accountability reporting and investigative journalism demonstrate how technology can serve the public interest, enabling journalists to analyze large datasets and build out news stories (e.g., [114, 136]). Fact-checking systems work to augment journalists in issuing corrections on matters of civic importance, such as political debates (e.g., [83, 118]). Systems for moderating comments in news forums and using them as leads show attempts at fostering public dialogue (e.g., [112, 167]).

However, these implementations are limited in scope. While VSD emphasizes values like autonomy and usability [64], these are typically conceptualized at the individual level in our corpus—focusing on a journalist's control over tools, or a reader's preference for transparency disclosures. The enabling of shared decision-making that brings community voices into newswork itself finds less support [40]. We also recognize that the pursuit of public service journalism faces significant challenges in today's media environment, including economic pressures, fragmented audiences, and the tension between democratic ideals and commercial sustainability [82]. And so as the mainstream media faces declining relevance and the public's information-seeking habits become more social [86, 124], the stakes are heightened for creating meaningful spaces for dialogue, and reflecting the values of the public and society which the journalistic mission ultimately serves. A bridge between artifacts designed to foster healthy civic participation (e.g., [11, 107]) and those for newswork is necessary. And how might we design such systems to support shared decision-making between journalists and communities rather than just individual autonomy? What would comment moderation systems look like if designed primarily to facilitate dialogue rather than content filtering? How can we create interfaces that encourage thoughtful engagement with news rather than passive consumption? More broadly, how does a given normative model of democracy emphasized by journalists or organizations in a given context (say, procedural or participatory democracy) [155] distinguish and guide design efforts?

This also connects to what Annany [5] identifies as the public's fundamental "right to hear" for democratic self-governance—not just receiving important information, but having time to encounter different perspectives, reflect on them, and develop considered responses. Our findings reveal how current systems often work against these needs. While efficiency-oriented features like automated story generation aim to give journalists more time, they also normalize instant publication as the default rhythm of the news. Annany [5] further argues that social media platforms have redefined how quickly news should move, dictating the pace of coverage through technical choices like push notifications, instant feed refreshes, and so on. This creates a compounding effect: newsrooms adopt efficiency tools to keep pace with platform-driven news cycles, yet these same platforms introduce new temporal demands.

Recent work suggests audiences want news outlets to place less emphasis on constant updates and more support for understanding different perspectives [124]. In fact this work also shows that audiences have an appetite for varied news temporalities, from instant breaking news on short-form video or micro-blogging platforms, to longer-form email newsletters and podcasts [124]. This presents a host of exciting directions for future HCI research: How might we create systems that support multiple rhythms of public engagement with the news? How do interface patterns like infinite scroll and algorithmic feeds affect engagement with long-term issues? When newsrooms automate coverage—like ESPN's AI-generated stories for "under-served" sports leagues [91]—what nuance are we trading for scale and speed? As newsrooms explore generative AI tools, it will also be vital for designers to resist the temptation to simply use them to further accelerate newswork[3] and instead consider how such technologies might support more thoughtful temporal rhythms that serve community dialogue and the public's right to hear. Designers must consider how values manifest not only between newsworkers and technology, but also between newsworkers and the communities that they support.

4.3 Technical Infrastructure and Value Trade-offs

New corporate actors increasingly shape how journalism is practiced, through their technical infrastructure. Certain industry interventions aim to support specific values—newsworthiness, accountability, efficiency—in reporters' work. Meta's CrowdTangle supported identification of "immediately" relevant leads [115], Google's ClaimReview enabled interoperability between fact-checking websites [71], and initiatives like DataCommons can help reporters find and aggregate large-scale datasets [34]. What makes these initiatives effective is their ability to leverage large-scale data pipelines and sophisticated design to operationalize journalistic values like coverage and accuracy. However, their development often bypasses

[3] Some tales of caution: [42, 53, 117]

the participatory approaches known in HCI—where journalists and communities would be active participants in design decisions rather than just end users. This creates tensions not just with values like transparency and inclusivity, but with a broader commitment to democracy itself. The recent, sudden disbanding of CrowdTangle [2] exemplifies the risks of dependence on closed-source technical infrastructure: when newsrooms aren't meaningfully involved in infrastructure design, their established workflows can be disrupted by distant corporate decisions.

This influence also raises deeper questions about how technical infrastructure might reframe journalistic values into market considerations [30]. In this vein, some studies in our corpus explicitly questioned why reporters use potentially biased search tools instead of specialized journalistic ones [35], or how free-to-use but black-boxed visualization tools affect journalistic creativity [171]. The fact that technological dependence impacts the value-orientation of journalists' work raises important questions for future research: How might we design systems that make their value trade-offs more explicit to newsrooms? How can we create sustainable alternatives to proprietary infrastructure at a low-cost, or support newsrooms in designing their own? How do we better document open-source tools to make them accessible to not only newsroom engineers, but even journalists with limited code expertise? The same structural conditions—resource scarcity in newsrooms, market pressures to attract investment, gaps in technical expertise—that create these dependencies also constrain newsrooms' ability to address them through in-house experimentation and artifact development. Building academia-newsroom collaborations, supports for cross-organizational collaborations among newsrooms, and open-sourced research outputs may offer some leverage against these conditions. For the community of researchers in HCI, this would mean rethinking how we structure and navigate our collaborations with news practitioners to prioritize sustained engagement and knowledge sharing, over technological quick fixes [28].

While our review intentionally focused on systems supporting news production rather than distribution, we also recognize that distribution represents another area where corporate technical infrastructure significantly impacts journalism. Establishing this boundary was methodologically necessary for our review, as distribution systems involve a much broader set of stakeholders both within and beyond the newsroom, including audience editors, comment moderators, platform companies, audience analytics firms, and diverse publics. However, as audiences increasingly get their news through social media platforms [166], future research could adopt our value-centric approach to examine how these distribution technologies embody, challenge, or reshape journalistic values across this expanded ecosystem.

The rise of generative AI further complicates this landscape; it finds use across all types of media modalities such as for drafting news articles, working with unstructured datasets, transcribing interviews, creating graphics, and editing video [46]. While OpenAI's investments in local newsrooms [58] promise to support under-resourced communities, the technology of generative AI is also often opaque in its workings, produces unreliable content at scale, reduces journalists' autonomy, and creates lock-in effects that keep newsrooms tied to certain companies or their tools [149]: it amplifies concerns around values like independence, accuracy, and transparency that this review has surfaced. Publishers also turn to AI companies especially due to the cost effectiveness of working with them compared to developing tools in-house, which exemplifies the tensions presented by efficiency against other domain values [149], which we saw with other tools in our study as well. This is not to say that generative AI cannot support newswork for the better, which we know it holds potential to do [14, 46], but that designers have a responsibility to understand how this technology presents certain trade-offs; where journalists and audiences may want to set boundaries during use (e.g., [122, 164], and how design processes and features can better adjudicate these factors. Key questions emerge: How might we design generative AI systems that augment rather than automate journalistic judgment? What design patterns can encourage reporters to be more reflective and attentive to potential errors or biases? How can we ensure AI tools support rather than supplant community relationships in local newsrooms? For what newsroom tasks or contexts is the implication not-to-design with generative AI? Attending to these questions would require the HCI community to extend a critical eye: rather than treat generative AI tools as neutral interventions, we need approaches that surface their embedded politics and trace how they reconfigure stakeholders' practice and entrenched power dynamics (e.g., [169]).

5 Conclusion

In this article, we undertook a systematic literature review to study design contributions and identify how journalistic values shape and integrate into sociotechnical systems for professional news gathering and production. The set of values we identified in the literature not only highlight which problems need attention but also guide implementation and design features. As we elaborate in our findings and discussion, these values can both support and compete with each other, offering fodder for navigating how to support the domain through sociotechnical design. One limitation is that our analysis only covers literature published through August 2023. We believe that while the field continues to evolve, particularly with recent advances in generative AI, the value tensions and design considerations identified in our review remain relevant to emerging work in HCI and journalism.

More concretely, our findings can support designers in making tactical decisions about building tools and developing policies (e.g., building technical literacy around new generative AI interventions) that better support values and adjudicate their trade-offs. The values framework we articulate can also facilitate designer-stakeholder communication by providing a vocabulary for stakeholder priorities, and potentially serve as evaluation criteria for future design contributions. For researchers, value trade-offs and gaps provide opportunities to re-imagine how interpretations of these values can expand or shift, especially as the material technologies of journalism evolve (e.g., with generative AI, social platforms).

As journalism evolves, so will stakeholders' values, contexts, and design requirements. We contribute insights into how designers might navigate domain values and stakeholder relationships to thoughtfully participate in these shifts. Our discussion synthesizes our analysis towards specific design implications for journalistic tools (e.g., human oversight of automation, transparency), broader

orientation toward public service (e.g., journalist-audience collaboration, democratic or community information needs), and technology platform impacts on domain values (e.g., reduced transparency in proprietary tools). While designers ultimately choose whom their work is oriented toward, our results and findings can support them in reflecting on that choice.

Our review has specific limitations. We primarily address professional news gathering and production, not volunteer efforts situated within volunteer communities (although we do include volunteer-professional collaborations). Excluding news dissemination limits our insight into design requirements for audiences, audience editors, and related actors. While we speak to multiple news formats where data enables us to (video, broadcast, etc.), our sample predominantly offers insights around text and digital news. Future work could incorporate these dimensions and others, such as organizational scale or geographical location.

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