Would You Slack That? The Impact of Security and Privacy on Cooperative Newsroom Work

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Journalistic work is increasingly conducted using cooperative technologies. But while journalists need security and privacy just like professionals in sectors like health and education, constrained finances and missing legal requirements cause journalists to rely mostly on third-party platforms for their professional communications. In this study, we analyze how journalists manage professional collaborations across myriad tasks and contexts, with a focus on how their security and privacy concerns may shape these behaviors. We find that journalists' relatively open information-sharing practices may reflect the strength of their informal intra-organizational networks, rather than their organizational commitment per se. Moreover, while journalists—like many workers—manage their security and privacy concerns by avoiding sensitive communications via certain channels, the physical shrinking newsrooms of is reducing opportunities for the face-to-face communications journalists rely on for secure, private, professional exchange. Journalists' self-censorship on collaborative platforms therefore warrants particular attention given journalism's essential role in the public sphere.

CCS Concepts: • **Security and privacy** → **Human and societal aspects of security and privacy**; • **Human-centered computing** → Collaborative and social computing;

Additional Key Words and Phrases: Security; Privacy; Journalism; Collaboration; Information-Sharing

1 INTRODUCTION

The number of people touched by collaborative technologies continues to increase the world over, as social, civic, and professional life transforms in both spatial and temporal arrangement. At the Global Leadership summit held in London in 2014, 34% of business leaders surveyed said more than half of their company's full-time workforce would work remotely by 2020 [85]. As of 2017, 43% of working Americans spend at least some portion of their time working remotely—an all-time high [17].

The field of journalism is no exception. Over the past fifteen years, the professional journalism industry has undergone a paradigm shift, wrought largely by the adoption of cooperative technologies both inside and outside the newsroom. The resulting changes have affected every aspect of news production and consumption, generating both individual works of scholarship [e.g. 5, 30, 37, 82], and entirely new scholarly publications [e.g. 31]. High-profile events related to

security and privacy issues that affect journalistic work [e.g. 46, 57] have also begun generating scholarship of their own [59, 60].

Journalists are hardly alone in needing to protect their professional information and communications. Yet unlike other professions in which workers have significant autonomy and handle potentially sensitive data—such as medicine, education and law—journalistic organizations' security and privacy practices are not governed by specific legal frameworks (e.g. HIPPA, FERPA). Moreover, journalistic organizations typically lack the financial resources to create custom software for their purposes [19]. Thus, while many organizations deploy security guidelines for information management [88], journalistic organizations typically lack these frameworks [60].

One result is that journalists principally rely on third-party, consumer-oriented collaboration platforms and open APIs to conduct most of their work [4, 77]. Given that the business models of such platforms often depend on advertising and data-collection about users, however, they naturally present security and privacy concerns for journalists—for both competitive and ethical reasons [59]. Yet prior research has found journalists are *not* especially heavy users of security and privacy technologies [61]. While these tools' poor usability [e.g. 3, 76, 92] may be one obstacle to their adoption, substantial prior work in CSCW indicates that individuals use a variety of adaptive behaviors when collaborative technologies do not meet their needs. These include workarounds, rule-breaking, and resilience strategies [15, 47]—all of which are also deployed with privacy and security solutions in particular [52, 63].

Through a grounded analysis [16, 33] of semi-structured interviews with 12 full-time newsroom journalists, this paper contributes a view on how organizationally-affiliated journalists make collaboration and information-sharing decisions during news gathering and production, with specific attention to the impact of their privacy and security concerns on these choices. By anchoring our study design in a robust combination of collaboration and information-management frameworks [10, 54], our work identifies (1) specific strategies deployed by journalists in managing collaborative work processes in the modern newsroom, (2) how security and privacy concerns factor into these approaches, and (3) the potential consequences of these choices for the ongoing role of news-gathering in the public interest.

Our core research questions can be summarized as:

RQ1:*What factors influence journalists' decisions about which collaboration and communication tools to use to accomplish a given cooperative work task?*

RQ2: *To what extent, if any, do concerns about security and privacy play into these platform choices?*

RQ3: *What are the implications of these choices in an increasingly collaborative, distributed journalistic environment?*

Our findings indicate that journalists use certain communication methods in unexpected ways. In their work, for example, journalists view email less as a means of communication than as a way to "memorialize" information. They are also surprisingly open in their sharing information within their organization, despite maintaining serious concerns about competitiveness and professional boundaries.

We also find that journalists appreciate the insecurities of many collaboration platforms and avoid using them to share sensitive information. At the same time, we observe this may interact with an increasingly dispersed news production environment to reduce the free flow of information inside news organizations. In restricting their communications due to security and privacy concerns, journalists' adaptive behaviors—intended to protect their colleagues and sources—may be inadvertently threatening the quality of journalistic output. Given the consequential role of journalism in developing an informed citizenry—a key component of a free democracy [75]—these impediments represent a critical threat to democratic societies.

2   BACKGROUND AND RELATED WORK

News production comprises a highly diverse set of activities, norms and behaviors, including collaboration within teams whose members may be divided by time, physical distance and primary job responsibility. Moreover, disruptions in the technologies and economics of news production, distribution, and consumption in the past 20 years have significantly changed the way that journalists and newsrooms operate. Given the wide range of industries are also embracing distributed work [43], increasing their reliance on third-party and open-source computing products [6], and becoming more acutely aware of security and privacy risks [70], studying journalists' experiences of these challenges is an opportunity to shed light on cooperation issues that may also be applicable to other domains.

Falling revenues and a rise in networked communication technologies have resulted in newsrooms that are both shrinking physically and being structurally reorganized [e.g. 5, 30, 82, 83]. Likewise, new publishing tools and platforms are transforming the processes of reporting [e.g. 26, 27], publishing [e.g. 12, 89] and evaluating [e.g. 18] news production.

While these technologies have massively extended the reach of news organizations and reduced dependence on expensive, geographically-bound, print-oriented infrastructures, the explosion of channels for communicating with both colleagues and sources has made journalists and their work vulnerable in new ways. Just as the ability to report on global events has been revolutionized by social media platforms like Twitter [e.g. 42, 86], both the Sony hack [39] and the recent Gawker lawsuit [55], have illustrated how the use of networked communications can work against media organizations. Moreover, even before Edward Snowden's disclosures about the National Security Agency's metadata collection programs [53], the Department of Justice had used broad subpoenas to obtain the telephone records of Associated Press reporters in connection with a leak investigation [44].

Despite these events, most professional journalists have yet to adopt secure communication tools [61]. Yet while there has been some scholarship on privacy and security issues in journalists' communications with sources [e.g. 59, 60], little has been done to examine the impact of journalists' security and privacy concerns in their communication and collaboration with colleagues.

The CSCW community has long recognized that groupware adoption is influenced by social, cognitive, and structural elements, in addition to technical effectiveness [62, 65]. Theoretically, these mechanisms are articulated in Rogers' Diffusion of Technology (DOT) framework [71] and the Technology Acceptance Model [22], which frame the interacting social and technical cues that help describe the "tool ecology" that affects a particular technology's rate of adoption within a given community of practice [34]. Security and privacy technologies are as subject to these influences as other types of cooperative technologies, as illustrated in previous CSCW work [e.g. 21, 56, 63, 66, 87, 90].

Prior work indicates that news organizations are generally reluctant to impose explicit communication technologies or policies on journalists [60]. While organizations in other fields deploy technologies to their members (e.g. [41, 65]), journalists are expected to adopt new technologies through self-directed "upskilling" [25]. The result is a "liquid" workflow and communication culture [23, 24] that is simultaneously institutional and entrepreneurial. While supporting journalists' highly individualized work practices reflects the value the profession places on autonomy [60], it also reduces the "translucence" of journalists' work processes and constrains shared learning [29].

Weak institutional support around cooperative technology selection and adoption, moreover, also pushes journalists towards reliance on free or low-cost consumer platforms, despite the security and privacy challenges they present. Thus, while journalists are not unique in their need for secure

and private communications, they must often individually negotiate the "channel scatter" that pervades modern workplace communications [62].

While the very phenomenon of "channel scatter" [62] illustrates the *almost* interchangeable nature of many cooperative technologies, their particular security and privacy profiles are often both specific and non-overlapping [2]. In this sense, security and privacy considerations comprise an orthogonal dimension of concern in communication platform selection–a dimension that is dominated by abstract, temporally distant, and socially contingent conditions [48, 93]. Incorporating these considerations into the selection of collaboration technologies therefore requires dynamically negotiating a range of concerns, including: maintaining the boundary between self and others, maintaining the boundary of information disclosure (i.e. what is publicly broadcast and what is protected), and maintaining an awareness of the temporality of decision-making [67].

In this vein, our work seeks to examine how journalists accomplish a variety of communication and cooperation tasks, while negotiating competing boundaries, information disclosure norms, and information management needs. Given the challenges inherent in integrating security and privacy concerns into communication choices, we seek to examine the ways in which these concerns influence journalists' communication decisions, and how those decisions affect journalists' work more broadly.

3 METHODOLOGY

3.1 Interview Design

Our goal in this work is to explore the collaboration and information-sharing practices of journalists during news gathering and production, with specific attention to the impact of their privacy and security concerns on these choices.

Given the diverse tasks that comprise journalistic work, we sought to conceptually anchor our investigation in order to better capture the influences on journalists' professional communication choices. Reviewing Grudin's model of organizational person-machine ecosystems [35], and Johansens's model of the time-space matrix of collaborative work [45] led us in turn to Lee and Paine's Model of Coordinated Action (MoCA) [54]. MoCA itself leverages substantial prior literature to propose seven dimensions that help frame: "a more sophisticated understanding of collaborative work . . . [to include] whole systems or aggregates of tools and systems" [54]. In this research, we draw on the researchers' prior experience in journalism to identify the five dimensions of the MoCA framework relevant to the journalistic context.

In addition to being highly cooperative, contemporary journalistic work often requires journalists to concurrently handle very recent, breaking-news issues [72], while *also* developing longer-term investigative or beat-driven projects (like election coverage) that can have a timeline of months or years.

To accommodate the impact of these temporal shifts, we join other scholars [e.g. 68] in extending the MoCA framework. Because temporality varies highly across journalistic projects and is key in both security- and privacy-related decision-making [67], we look to Barreau and Nardi's model of Personal Information Management (PIM)—specifically their taxonomy of three kinds of electronic information: ephemeral, working and archived [10].

We express our refined MoCAxPIM framework in the following matrix which integrates both activity-based (MoCA) and time-based (PIM) work-project attributes:

Using this matrix as a guide, we then designed a set of scenarios reflecting common newsroom tasks, based on one of the researcher's extensive prior experience in professional journalism. By using this descriptive framework to design our interview scenarios as outlined in Table 2, we sought

to ensure a robust and representative portrait of the ways in which participants made cooperative information management decisions in their professional lives.

A growing body of research has documented the mismatch between users' stated privacy preferences or concerns and their actual behaviors [7, 81]. Although participants were aware of the overall security and privacy focus of the study, we avoided explicitly asking them about privacy and security issues in the majority of the scenarios, in order to obtain as comprehensive a view as possible of their actual collaboration practices. To better draw out how security and privacy concerns might be *implicitly* affecting these choices, however, the latter portion of the interviews included specific prompts about participants' security and privacy concerns around specific communication tools. The selection of tools reviewed–which focused on email, chat and text-messaging services, collaborative document storage and editing platforms, and face-to-face communications–was based in part on one of the researcher's prior experience in and around professional newsrooms. This interview structure allowed us to make reasonable inferences about the relevance of privacy and security considerations in some instances where it was not directly articulated during a given participant's scenario description.

3.2 Participants

We conducted interviews at six different media institutions around the New York City metro area by recruiting participants through our existing professional networks. To help ensure a sufficiently diverse and representative sample of journalistic work practices, the media organizations selected included broadcast outlets as well as larger, primarily print-oriented "legacy media" organizations, and smaller, digital-only "new media" institutions. Firms ranged in size from several dozen to several thousand employees, with some focused principally on U.S. news, while others were global in scope. Though our participants were in this way intentionally diverse, they are all bound together by their work activities [51] as journalists, with their primary job responsibilities centering on the reporting, editing and publishing of original news stories.

All of our participants were full-time employees of their organizations. Seven were women and five were men, and they ranged in age from 25 to 60. Eleven of the interviews were conducted at participants' place of work and one took place over the phone between March and May of 2016. Interviews ranged in length from 45 to 90 minutes, with an average length of approximately one hour.

MoCA x PIM	Ephemeral	Working	Archival
Synchronicity	sync	sync	sync
	async	async	async
Location	near	near	near
	distant	distant	distant
Community	self	self	self
	others	others	others
Permanence	daily	daily	daily
	ongoing	ongoing	ongoing
Scale	1-to-1	1-to-1	1-to-1
	1-to-many	1-to-many	1-to-many

Table 1. A combined MoCAxPIM matrix for classifying communication situations

Scenario Characteristics	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Synchronicity	sync	sync, async	sync, async	async	sync, async	async
Location	near, distant	near	distant	near, distant	near, distant	near, distant
Community	self, others	self, others	self, others	self	self, others	self, others
Permanence	daily	daily	ongoing	archival	ongoing	ongoing
Scale	1-to-many	1-to-1	1-to-1	1-to-1	1-to-many	1-to-1
Knowledge type	ephemeral, working	ephemeral	working	archival	working	working

Table 2. A summary of interview questions, mapped onto our MoCA x PIM framework

The study protocol was IRB approved prior to our contact with any participants, and all of our participants consented to audio recording of the interview. Audio recordings and their resulting transcriptions were encrypted both in transit and at rest.

We reached theoretical saturation at participant 12. At this point no new information with which we could develop our theory or further build our codebook emerged from our interviews [33]. The resulting sample size is consistent with both widely held standards of qualitative research [38] and with qualitative research published in the CHI [13] community.

3.3 Analysis

After transcribing our audio interviews, two researchers iteratively reviewed and coded the results using a grounded theory approach [33]. After labeling responses to identify all communication methods mentioned by participants in response to our scenarios, we aggregated these responses into the MoCA x PIM matrix in order to build a unified, high-level overview of the responses. We then supplemented the results from the first part of the interview with participants' responses to the platform-specific questions. In particular, our coding process sought to identify instances in which participants' responses indicated behavioral adaptation related to security or privacy concerns.

4 RESULTS

Our findings from this work fall into two main areas: general patterns of tool use emerging from participants' scenario responses, and security and privacy concerns and behaviors revealed by their responses to questions about specific communication methods.

In analyzing participants' responses to our example scenarios we sought to identify what factors influence journalists' methods of communicating with colleagues. In particular, we use participants' responses to platform-specific questions about privacy and security to illuminate the role these concerns may play in their communication choices. In this section, we briefly describe each scenario and summarize the relevant portions of participants' responses. The complete interview script is available in Appendix A.

Scenario Number	Scenario 1a	Scenario 1b	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Email	7	6	4	7	1	10	2
Phone	4	-	4	8	-	3	8
Slack/chat	6	3	4	3	-	1	-
Shared storage	-	10	-	-	8	1	-
F2F	7	-	2	-	-	2	3
Other	-	-	1	1	8	8	-

Table 3. Participants' use of communication/collaboration technologies, by scenario

4.1 Scenario 1: Instigating and managing short-term projects

In Scenario 1 we asked participants to describe how they would handle the process of a) pulling other team-members onto a same-day project and b) how they would go about sharing the documents necessary for the project.

In part (a), nearly all participants reported that they would use multiple channels of communication to get their team members "up to speed." In analyzing their responses, it became clear that this process involved at least two distinct tasks, each of which was associated with a particular modality of communication: *synchronous* communication methods were preferred for formulating plans and sharing ideas, while *asynchronous* methods were largely preferred for sharing documents and progress updates. As one participant described it:

> We would start by bringing everyone together and divvying up tasks. And then all communication would take place on Slack. (N7)

Participants particularly noted the spontaneity and free-flowing nature of real-time communication, especially in contrast with email. As another participant put it:

> If people send an email it's really cumbersome to write a thoughtful response ... [In-person meetings are] more efficient, you probably get more ideas out of that because there is an exchange. (N5)

At the same time, email often played an important role in the providing an initial project overview, as described by another participant:

> I'd probably send a mass email, and then start discussing it in Slack or in person depending on where we are. If we're all in the same office then obviously I'd prefer to just turn to people and talk to them. I'd just grab them. (N8)

In part (b), 10 out of 12 participants indicated that they would use some type of collaborative, centralized groupware (such as Google Docs, DropBox or DocumentCloud[1]) to share research materials, with email as a secondary option. Interestingly, 75% of participants (N=9) indicated that they would *not* restrict access to these documents within their organization.

4.2 Scenario 2: Rapid response

In Scenario 2, participants' responses highlighted how the demands imposed by a very short deadline broadly superseded individual preferences about communication method. This scenario

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[1]DocumentCloud is a platform for hosting, annotating and publishing documents. It was designed for—and is largely restricted to—the journalistic community. Although DocumentCloud is open-source, a hosted version is available through Investigative Reporters and Editors (IRE).

asked journalists how they would go about confirming the accuracy of a quote previously obtained by a colleague within 30 minutes, if that colleague worked on another floor of the same building. In this case, participants took a "whatever works" approach, as indicated by the near even spread of responses across email, chat and telephone communications and illustrated by their responses. As one participant put it:

> I would probably G-chat someone that I knew sat next to her, and ask if she's there. Also I would call her as well - so land line or desk line - then cell phone. Then I'd probably G-chat a colleague who I know sits in the area to ask if they know where she is. (N5)

4.3   Scenario 3: Remote coordination

In this scenario, we asked participants to describe how they would reach out to a colleague in a remote office, if they needed to obtain background information about a story in that colleague's domain. In this circumstance, roughly 75% of participants reported that they would use *both* email and telephone communication. Once again, we found that email was cited as a preferred method of introducing themselves and/or following up on a telephone conversation, which was identified as the principal means of exchange. As one participant noted:

> I think my initial point would be an email to introduce myself and then say, you know, "This is what I'm working on - I have a couple questions. When's a good time to talk?" And then try to get them on the phone. (N8)

Although most participants did not mention security issues explicitly, one participant did note:

> More complex and more sensitive information would probably be discussed over the phone. (N12)

4.4   Scenario 4: Accessing old work

In order to understand how journalists archive and retrieve their own previously gathered information, we asked participants how they would access their records for potential use in a current story, as well as how they generally organize such material.

In this scenario, two-thirds of participants (N=8) mentioned some form of cloud-based backup service (e.g. Google Docs, DropBox, EverNote) for managing long-term information, with many of them describing detailed mechanisms for archiving and indexing these materials—often using time and, occasionally, topic or organization to categorize the data.

Notably, however, 5 out of 12 participants explicitly mentioned paper notes as a long-term storage method. Informed by our later discussions of face-to-face meetings, however, the explanation for this result becomes clearer: 75% of participants (N=9) indicated that paper was their primary means of taking notes in face-to-face meetings.

For others, however, creating—and keeping—notes took on an explicit security dimension. As one participant put it:

> I keep notes, but I don't keep them around. And that's partly a security issue. The lawyer at my old, old paper said that we should always be consistent...either keep everything, or else keep nothing. But choose one or the other. (N7)

4.5   Scenario 5: Organizational influence

Scenario 5 focused on uncovering what–if any–organizational requirements and norms influenced journalists' communication decisions. Participants were asked how they would go about transferring work material and continuing work on a story with (former) colleagues after a hypothetical breakup of their current newsroom. In this situation, participants indicated that they would rely on a mix of

Platform usage, security concerns and desired features	Email	Slack	Chat	Google Docs	Text/SMS
Use regularly?	12	9	9	10	5
Security/privacy concerns?	9	5	5	5	2
Security/privacy "dream feature"	2	2	1	1	-

Table 4. A summary of platform usage and security/privacy considerations

personal email (N=10), social media (N=3), and telephone or face-to-face communications (N=2). Almost all (N=11) participants had the personal contact information of their colleagues.

In these responses, we noted that when participants imagined no longer being co-located with their colleagues, email gained importance as a communication method. Moreover, of the 7 participants who described regularly using Slack professionally, 5 volunteered that their communications with colleagues would be mostly the same *except* for Slack. We note that for many of our participants, Slack was the *only* cooperative platform that they had first been exposed to via their organization.

4.6 Scenario 6: Security and privacy considerations under scrutiny

In our sixth scenario, we sought to assess participants' concern with and strategies for communicating securely with a party outside their organization. Participants were asked how they would reach out to an existing source whose professional email account and office visitor logs were under scrutiny. While only 16% (N=2) participants suggested that they might have previously established encrypted channels of communication, nearly all of them (N=11) said they would rely on telephone or face-to-face communications in such a circumstance.

> If it's a really sensitive thing like that where...their emails are being reviewed and I didn't want it to come up that they spoke to me, I'd probably try to get them on the phone if possible. Because even in some states, if you're conducting official business on your personal email account... [law enforcement] could get that. (N8)

4.7 Platform-specific privacy and security concerns

The latter half of our interviews consisted of detailed discussions about any tools participants used regularly for work among the following: email, Slack, chat services, Google Docs, face-to-face communications and text messaging. Participants were also invited to add any other platforms they used regularly, which included Skype (N=5) and Trello (N=1). We note, however, that platforms beyond even these were mentioned by some participants in their scenario responses, suggesting that even when prompted, participants' self-reported platform use may not have been exhaustive.

As outlined in the Table 4, roughly half of our participants reported privacy and security concerns about their communication platforms, with a full two-thirds (N=9) indicating privacy and security concerns about email correspondence. Illustrating the tensions between security and privacy and other work demands [2], however, relatively few of our participants specified privacy and/or security as a "dream feature" for a given platform.

Our results in this respect echo earlier work on the privacy and security habits of journalists [61], but offer substantial detail about journalists' specific attitudes and coping mechanisms around these issues. Specifically, we found that our participants were likely to downplay security and privacy concerns by focusing on the strategies they used to avoid or minimize perceived risks, rather than articulating their concerns directly. For example:

> I don't really work a lot with hyper-sensitive stuff, and if I did I probably wouldn't Slack about it. (N10)

In some cases, however, this "strategy" amounted to implicit self-censorship, as some participants articulated mistrust of virtually all available cooperative technologies:

> I assume everything is discoverable: text messages, voicemail, all of it—especially version code. Its intent can be part of a libel case. You think very carefully about what you name the variables in our code. No snarky comments or anything like that. You just have to be aware. It's all recorded; there's no privacy. (N3)

As the quote above illustrates, even the tools of *producing* journalism–such as the code that is increasingly[2] used to perform data analysis or drive a online graphics–suggests that an awareness of security and privacy concerns pervades journalists' behaviors throughout the reporting and publication process.

Moreover, many participants were both aware of and explicit about their self-censoring behaviors on various platforms:

> I don't put things into emails that I don't want to be public—I mean, in life in general. Like, even bullshitting with friends, there are lots of good jokes that I don't make on email, just because every time somebody gets into trouble for email I think, "Didn't they know?" (N6)

> I'm a fairly neutered version of myself on Slack. (N11)

At the same time, the few participants who reported regular use of some type of encrypted communication channel (N=3), did attribute their lack of privacy and security concerns on those channels (such as chat, for example) to their accepted security properties. As one participant reflected, on instant-messaging:

> I use iMessage, so that's all encrypted end-to-end, and then my phone is encrypted. I guess individual text messages someone could conceivably see who I'm texting. (N8)

Thus, while secure collaboration platforms are not the norm among journalists, our results suggest that journalists have a a relatively accurate—and fairly nuanced—understanding of both security and privacy threat vectors. For example, another participant contrasted their concerns about a Google account being compromised via legal means (e.g. a subpoena) rather than technical means (e.g. "hackers"):

> I know that Google has its own privacy concerns, but in terms of a bad actor that is not Google getting ahold of [emails], I don't worry about it that much. (N1)

Nonetheless, *all* of our participants (N=12) reported using face-to-face conversation as a means of avoiding a written record for privacy and/or security reasons at one time or another. As one participant replied when asked about this strategy: "It just happened today" (N6).

While these kinds of adaptive responses to missing functionality are not unusual among users of cooperative technologies [15, 47], we believe these strategies are particularly problematic in the context of contemporary journalism, as we discuss further below.

5 DISCUSSION

The desire to foster the type of creative, unfettered communication afforded by physical co-location through technology has been a core concern of CSCW since its very inception [e.g. 11]. Yet the challenge of identifying and clarifying the goal(s) of a particular cooperative system [e.g. 51, 73, 74]

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[2]Given the variety of job titles in which journalists may use code, one way to estimate the relevance of coding to journalism is via attendance at the annual computer-assisted reporting conference, which has more than doubled in the past 5 years[78].

is complicated by the diverse communication systems that are available in many professional contexts [e.g. 49, 50, 62]. Journalism is no exception.

In this study, we sought first to develop a representative portrait of collaborative work processes within journalistic organizations by using our MoCA x PIM framework to craft scenarios addressing the many physical and temporal dimensions of journalistic work. To deepen our understanding of how the features and affordances of individual technologies might influence these collaboration decisions, participants were also interviewed in detail about their preferences and patterns of use around common collaboration platforms, with particular attention to any privacy and security concerns they engendered.

Though few participants explicitly mentioned security and privacy concerns in the more generalized workflow scenarios, the majority of them articulated distinct security and privacy concerns about the platforms they described using *in* those scenarios. Thus, our results suggest that privacy and security issues constitute a pervasive—if not definitive—influence on our participants' reasoning about communication decisions.

5.1   Task Features' Impact on Privacy and Security choices

By allowing us to categorize journalists' complex tasks in a generalizable way, our combined MoCA x PIM framework allowed us to tease out the extent to which journalists' security and privacy choices might be stable within a particular task dimension—or affected by interaction with other dimensions.

For example, we found that *synchronous* communications were highly preferred by our participants for the discussion of abstract and/or sensitive topics, irrespective of task timeframe or the number of communication parters. In exploring participants' *asynchronous* sharing habits, meanwhile, we found clear indications about their communities of practice, as, for example, few distinguished between sharing documents with a single colleague (1-to-1) and their entire organization (1-to-many).

In this, our results suggest that our modified MoCAxPIM framework offers a valuable lens for classifying and interpreting various types of cooperative journalistic work, and may be useful to other scholars studying journalism and related disciplines.

5.2   Unique Challenges in Journalistic Cooperation

5.2.1   Competitive Collaboration. The simultaneously institutional and entrepreneurial nature of journalism [23–25] requires journalists be both collaborative and competitive in their protection of information, meaning that nearly every information-sharing decision involves a level of security and privacy reasoning. While this type of "adversarial collaboration" [19] has also been observed in the legal field, we note that, unlike lawyers, journalists must negotiate these decisions in a fluid, fast-paced and largely unregulated work environment.

For our participants, the balance between collaboration and competition was mediated, in part, by their position in the interaction (i.e. whether they were requesting or sharing material)—a distinction that was partially embodied in *their selected modality for the exchange*. Thus, while participants tended to select synchronous communications—which were broadly preferred for complex and/or "sensitive" exchanges (see Scenario 3)—when "crossing into" another reporter's territory, they were very comfortable providing colleagues with asynchronous access to their own sources documents (see Scenario 1).

For example, one participant described the multiple stages of requesting information from another reporter:

> My initial point would be an email to introduce myself...and then try to get them on the phone. (N8)

By contrast, the same participant described openly sharing documents on a breaking story:

> I'll just share [the documents] with everybody all at once and have everybody get in there and start reading it. (N8)

In sociology, workers are often viewed as struggling to assert "jurisdictions" that they can "defend from interlopers" [1]. Surprisingly, however, for our participants these boundaries were strict in one direction and porous in the other: they were recognized when reaching out to a colleague, but minimized when sharing their own documents.

Though prior work suggests that open knowledge-sharing practices are reflective of organizational commitment [84], we note that journalists must often "upskill" their technical competencies with little help or investment from their organizations [25]. This suggests journalists' cooperative information-sharing practices may reflect the strength of their informal intraorganizational networks [69], rather than their *organizational* commitment, per se.

Indeed, our participants clearly distinguished among platforms' appropriateness for highly-valued social interactions. As one participant put it:

> [Chat] clearly helps solve the bullshitting problem...the barrier to entry for [chatting] someone is lower than calling or emailing, that's the point. (N6)

Similarly, when digitally-mediated conversations failed—for security/privacy reasons *or* interpersonal ones—face-to-face communications were an essential option:

> Sometimes it's about making sure that you're not miscommunicating, 'cause tone and meaning can often be really hard to read in email. Oftentimes to defuse situations, that can be a phone call, and if it doesn't work you go up [to the person's desk]. (N11)

Thus, while all of our participants clearly identified the importance of face-to-face communications for managing security and privacy concerns (see Results), the success of journalists' simultaneously collaborative and competitive work depends on unfettered social communications as well. As one participant put it:

> We had a person who was working out in [another state], and it was much harder than I thought...I value [speaking in person] more highly than I did. (N6)

5.2.2 Generation vs. Memorialization. One consistent theme that emerged from our conversations was a distinction between *generative* work (e.g. brainstorming, planning, strategizing and meaning-making) and *memorialization* activities (such as presenting and preserving evidence of a discussion or decision).

When the nature of the task was generative, our participants indicated a clear preference for relatively *synchronous* communication methods, whether these were face-to-face discussions, telephone calls or, at minimum, chat-based exchanges. As one participant put it:

> The reason it would be a telephone conversation is because...we need to brainstorm a bit more. So it just needs to be a more open conversation. (N12)

In contrast to prior work that has identified email as mechanism to "discuss" material [28], we found that journalists typically viewed email as a strategic mechanism for the *memorialization* of tasks, activities and outcomes. This seemed to emerge in part from unique features of the journalistic process, including its sometimes extended time-frames and self-directed nature. As our participants described it:

> The great thing about emails, particularly on investigative projects, is it memorializes your thoughts to some degree. (N4)

> I've also used email to prove there is a record of my contact. In my work, I've found
> that to be more helpful. (N5)

These findings suggest that in the workplace, email correspondence is not actually viewed by many journalists as a genuine mechanism for idea exchange. Rather, journalists' professional use of email accounts is more closely aligned with the type of *articulation* work established by Strauss [79] and Gerson and Star [32], Muller et al. [62], Schmidt and Bannon [74].

5.3 Privacy and Security Considerations in Cooperative Work

The range of activities and timeframes involved in journalism present particular challenges for cooperative work, especially given the "collaboratively competitive" nature of the field. Still, many of the behaviors we observed in this study are likely shared by workers in other distributed environments.

5.3.1 Platform-Switching. In this study, many participants who expressed platform-specific privacy and security concerns suggested they would address these shortcomings by switching to a different communication channel—a type of adaptive behavior has been previously identified around collaborative technologies in general [8, 58], and privacy and security technologies in particular [e.g. 14, 67]. Yet our participants described using this strategy not just for journalism-specific tasks (such as protecting secret documents or sources), but for handling more general workplace issues, such as unionization discussions, or when sharing personally-identifiable information:

> When I have to give my credit card to someone, or my social security number, I call
> them. There are more laws that protect me from being wiretapped than [protect] my
> metadata. (N11)

In other words, participants' privacy and security concerns about many collaborative platforms meant that when they needed security or privacy functionality, *they simply took those interactions elsewhere.* For the most part, this meant a transition to face-to-face communication: all 12 participants indicated that they had at some point used face-to-face communications to avoid generating a written record, whether out of security concerns, privacy concerns, or both.

5.3.2 Deletion. In addition to the greater nuance afforded by synchronous communications, our participants' interest in their privacy and security properties seems clearly linked to the reduced cognitive load of ephemerality: once a verbal conversation is over, access to its contents no longer needs to be actively managed.

With asynchronous communications, however, multiple participants described deletion patterns designed to preserve the privacy and/or security of their exchanges. As one participant put it:

> I do delete messages [on Slack] sometimes, when I'm saying things about colleagues
> that I probably shouldn't be saying in digital forums. (N9)

Similarly, one participant's "dream feature" for Google Docs was a notification option for documents that had *not* been accessed for a certain period, as a way to facilitate efficient deletion.

5.4 Recommendations and Future Work

While the unique nature of journalistic work produces distinct security and privacy concerns and behaviors, many journalists' methods of dealing with these concerns–from self-censorship to platform-switching and deletion–have been observed in other communities and populations. For example, both younger and older adults self-censor on Facebook [20]. Thus, we believe that communication platforms that substantially address the cooperative needs of journalists–including their security and privacy concerns–will serve a number of communities.

5.4.1   Build on Existing Systems and Standards. Workers across fields experience the opportunity-costs of adopting new technologies [36], though journalists overstretched by shrinking resources and expanding job responsibilities may feel them more acutely. Thus, we note that while many of our participants valued the integrated features of platforms like Slack, others expressed concerns about adopting new communication systems too early, out of concern for both their efficacy (including security) and longevity. As one participant put it:

> That's why I stick with Google, because it's a big company that's probably not going to go bankrupt anytime soon. There's so many tools that have died, and stopped being maintained. (N11)

Or put another way:

> As a reporter, the last thing you want to be is the bleeding edge... you need secure things that are going to be applied. (N3)

Thus, creating tools that expand the security and privacy properties of existing services (such as email or chat systems) are particularly promising, as they offer desired functionality while also degrading gracefully. Among our participants' dream features, for example, were web- and mobile-based GPG solutions for email, as well as more selective syncing for services like DropBox.

Existing systems with secure defaults and genuine ephemerality (such as OTR and iMessage chats) were both valued and trusted by participants who used them, and prior work [e.g. 94] indicates that highly usable systems with automatic deletion and expiration options help encourage a richer, more playful type of digitally-mediated interaction. While platforms like Google Docs have begun offering some of these features (such as sharing expiration [80]), we note that in a professional context such decisions cannot always efficiently be made in advance. Exploring various forms ephemerality may therefore be a promising area for future research.

5.5   Limitations

We faced several limitations in our analysis. First, our sample population was drawn from the New York metro area, and is therefore unlikely to be representative of journalists working in less-urban areas of the U.S., or journalists in other countries who operate in substantially different political and legal contexts. However, journalists' need for protected communications is evident globally: a 2008 survey of journalists in 56 nations found that in Western Europe alone, journalists had been detained by their governments, subjected to raids on editorial premises, and experienced seizures of documents and computer hard-drives, specifically in the nations of Belgium, Denmark, France, Germany, Italy, Switzerland, the Netherlands, and Britain [40].

We faced another limitation in the selective employment status of our interview participants; as all were full-time employees of news organizations, our analysis does not include the cooperative-work management strategies of freelance or part-time workers. We surmise that the behaviors we observed around competitive collaboration, email memorialization, adaptive platform-switching, deletion and self-censorship may be impacted by one's work status, so further research on the concerns of such workers would be valuable, especially given the global rise of contingent work [9].

6   CONCLUSION

Given the shrinking physical size of newsrooms and the corresponding increase in distributed news production [83, 95]—as well as the increase in genuine privacy and security threats to journalism—there is a greater need than ever for cooperative technologies that support not just the creative and social richness of in-person communication [64], but the natural security and privacy it affords. At the moment, we note that journalists—like many others—may suffer from the *resignation* around

privacy and security issues that has been documented more broadly [81, 91]. As one participant said:

> We're being tracked in a million different ways. And the amount of effort that it would take for me to circumnavigate that would just make it a full-time job. (N7)

Such resignation and self-censorship, exacerbated by the shrinking physical spaces available for journalists to cooperate in person [83], threatens to substantially reduce the robustness and quality of journalistic work, particularly when it involves sensitive, complex or potentially dangerous information. Given the crucial role that journalism plays in speaking truth to power and providing independent information to the public, these are compromises that democratic societies can ill afford. Thus, understanding the pressures on journalistic workflows–and designing private, secure collaboration tools that can help relieve those pressures–is, arguably, more important than every before.

7 ACKNOWLEDGEMENTS

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8 APPENDIX: SURVEY INSTRUMENT

8.1 Scenarios

The purpose of the study is to understand how journalists collaborate and share information internally, whether that's via email, telephone, chat or simply getting up and walking across the room. Our interest is in learning about how journalists currently manage their communications and other information to inform the design of new tools so that they can be more useful for journalists. To help with this, we'll provide you with some short sample scenarios, where we'll ask how you would communicate or save the information in question. In the second part, we'll ask you a series of questions about how you use particular tools.

(1) You're working on a story about a political candidate in a statewide race, and you uncover documents related to a campaign-finance scandal. You need to quickly bring in additional help to analyze the documents and track down corroborating sources before another outlet uncovers the story. What steps would you take to get others on the team up to speed?

   (a) What of your existing material (files/notes/contacts/drafts) would you share with the new team members?

   (b) How do you share it?

   (c) Would you segment access to different parts of the material by role? Or simply give everyone access to all of your files on the work?

   (d) How would you establish and manage communications for this new team? How would you check in on the status of team members' work, and how would you make sure you're up-to-date on all important developments?

      (i) Would you central pointperson to receive all communications?

      (ii) do you appoint several subteams or partnerships?

      (iii) or do you set up a flat group structure allowing communication between all parties?

   (e) Would you set up this communication workflow yourself, or would you ask an admin or supervisor do so?

   (f) How would you make sure that everyone on the team can get in touch with each other as needed?

(2) You're working on a one-day story about a new police initiative, and you need to file in 30 minutes. One of the quotes for the story was provided by another reporter who got comment from a community leader earlier in the day. She works two floors below you. How would you get in touch with her to check the quote?

(3) You're working the healthcare beat when you discover that the executive of a company in your state has a personal connection to a regulator in another state, where the company has just gotten a sweetheart government contract.

   (a) Scenario 3a: Your organization has a bureau there, with its own healthcare reporter, whom you've worked with before on national stories.

      (i) How would you get in touch with them?

    (ii) What kind of information would you ask them for, and how would you ask them to share it?

    (iii) Would you suggest continuing to develop the story together, or simply ask them for whatever information they had and then pursue it on your own?

    (iv) In either case, how would you keep them updated about the story's progress/status?

  (b) Scenario 3b: Your organization doesn't have a presence in the second state.

    (i) Would you reach out to reporters other organizations to get perspective? What types of reporters would you try to contact first others on healthcare? Or a regulation beat?

(4) Several years ago you covered the campaign of a candidate who's now running for national office, including an in-depth personal profile of the candidate her family. Your editor has now asked that you do weekly blog posts about the candidate's current campaign, incorporating background context.

  (a) How would access your old notes, interview materials & stories in preparation for the start of the series?

  (b) Would you reorganize, move or reindex your materials from the last campaign in order to make them more easily accessible for the new series? If so, how would you do so? Via keyword, date, topic, material type?

  (c) In general, is there a difference in the way you manage your materials for a longterm investigative story versus and ongoing series?

(5) Your publication is bought out by a larger competitor, and your newsroom is disbanded. However, there was one story you and your team were working on that you now want to pitch to another organization.

  (a) How would you backup/move your notes off of any company-owned systems?

  (b) How would you contact your old teammates to see if they want to be involved in the story?

  (c) Are there different ways you would communicate/coordinate with your former team members, now that you are no longer subject to the rules of your old organization?

(6) Your team is working on a routine story about a public official, when a source tells your teammate that the visitor logs from their office were requested by the police, and all of their emails are under review. You have contacts in the same office, and want to secure your communications with them.

  (a) What tools would you use?

  (b) Wow would you coordinate the shift?

  (c) How would you share files that need to stay secure?

8.2 Platforms

Now we'd like to ask you about how you use particular communication tools and technologies that you may or may not use in your work. For each tool, we'll ask you for some details about how, when, and with whom you tend to use it. If you don't use that particular technology (or don't use it much) just let us know and we'll move on to the next one.

Slack

(1) How did you hear about/start using Slack?

(2) How long have you been using it?

(3) Do you have multiple Slack channels for different groups or projects?

  (a) Who is part of each of these channels?

(4) Do you have any security or privacy concerns about using Slack?

(5) How do you use the @ mechanism?

(a) Do you use it to notify others of questions or material that they need to review? What's the expected response time?

(b) Do others use it to notify you of new material? How quickly do you review/respond?

(6) Do you use the desktop notifier?

(7) Do you use the phone app?

(8) How do you look up handles/contact info for Slack?

(9) If you could create your dream feature, what would it be?

(10) Do you use other services with Slack (e.g. DropBox, Drive). Can you give an example of use?

Email

(1) Does org manage its own email servers? If not, what service provider do you use?

(2) Do you usually include a greeting/signoff on your emails?

(3) How do you look up email addresses/contact info?

(4) Do you have an email app on your phone?

(5) Do you get desktop notifications for your email?

(6) Do you ever use your personal email for work?

(7) Do you have any particular strategies for managing workrelated email (e.g. labels, filters, archiving, downloading, deletion, marking read/unread)?

(a) If archive/download/delete, at what point in the conversation/process?

(8) Do you have any security or privacy concerns about sending email?

(9) Do you use or have you ever tried any secure email technologies?

(10) What would be your email dream feature?

Phone

(1) What type of phone do you have?

(2) Do you use your phone for both work & personal use?

(3) Work issued/paid?

(4) Do you store your personal and work contacts in the same address book? Is it on your device on your (Apple/Google) cloud account?

(5) Do your colleagues ever call you on your mobile phone? Would you call them?

(6) Do you have a passcode on your device? Is it encrypted?

(7) Do you have any security or privacy concerns related to using your phone for work?

(8) Do you have any work-related apps on your phone (e.g. Drive, Slack &c)? Do you have notifications from those apps enabled?

(9) What would be your dream app/feature for your phone?

Chat

(1) What chat program(s) do you use? Computer? Phone?

(2) How long have you been using them?

(3) How do you manage your chat contacts? On your computer? Phone?

(4) Do you have open chats ongoing throughout the day? Do you ever use group chats? Who with?

(5) Do you have any security or privacy concerns about using chat for certain communications?

(6) Do you have desktop and/or phone notifications enabled?

(7) What is one thing you wish your chat program(s) did that they don't currently do?

Google Docs

(1) Organizational account?

(2) Do you use your personal Google account for sharing documents with colleagues? With yourself?

(3) How do you manage contacts for sharing documents?

(4) How do you manage/send sharing notifications (via "send & share"? Separate email with link?)

(5) Do you ever use the chat/comment functionality? Do you receive email notifications of new comments?

(6) Do you use Drive to share general file types (e.g. Excel, Word &c) or do you convert these to Drive files?

   (a) If you use/convert to Drive files, how much of the time are you working directly online?

(7) How do manage permissions and sharing of files or folders with:

   (a) other reporters?

   (b) copyeditors?

(8) Do you have any security or privacy concerns about using Google Docs for your work? Are there certain kinds of information you don't share or store there?

(9) What's one feature you wish Google Docs had that it doesn't?

F2F

(1) How often do you use face-to-face conversation to communicate with

   (a) others on your team?

   (b) others in your office/bureau?

(2) Do you ever choose facetoface communications to avoid a written record?

(3) If you need to take notes during a F2F meeting, how do you do it?

(4) How do you archive and/or share these notes?

Text/SMS

(1) How do you manage SMS contacts?

(2) Do you ever text with colleagues? Example?

(3) Do you have any security or privacy concerns about using texting for work purposes?

(4) How quickly do you tend to respond to text? How quickly to expect others to respond?

(5) What features do you wish SMS (or your texting app) had that it doesn't?