

Brokering Contested Technologies: Stabilizing and Governing Algorithmic Management

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March 23, 2026

Ethics Statement: This research received approval from the University of Illinois at Urbana-Champaign Office for Protection of Research Subjects IRB24-0911 and Michigan State University Office of Regulatory Affairs Human Research Protection Program IRB STUDY00006671.

Conflicts: The authors declare no conflicts of interest.

Acknowledgements: The research upon which this paper is based is part of a multi-year effort aimed at evaluating the impact of technology on hospitality work. We are grateful for financial support from the National Science Foundation (award numbers 2128954, 2128836, 2128902, 2128938). We thank members of our interdisciplinary team: Jodi Forlizzi and Sarah Fox at the Human-Computer Interaction Institute, Carnegie Mellon University; Betsy Stringam, School of Hotel, Restaurant, and Tourism Management, New Mexico University; and Deborah Figart and Ellen Mutari, Economics, Stockton University. We especially thank Ben Begleiter, UNITE HERE, for his efforts in securing access to data and his contributions to the research process. We thank Claudia Robles and Baoluo Wang (UIUC); Dasom Jang and Kelly Manzo (MSU); and Ezra Awumey and Hunter Akridge (CMU) for their assistance with various parts of our data collection.

We thank the following participants of conferences and seminars, who, in addition to our research team, provided feedback on early versions of this paper: Labor and Employment Relations Association Annual Meeting; European Group on Organization Studies Colloquium, especially Alessandro Niccolò Tirapani (Tilburg University), Marcus Helfen (University of Labour), and Andreas Pekarek (University of Melbourne); Academy of Management Annual Meeting; Future of Work Research Showcase, Center for Social and Behavioral Sciences, University of Illinois at Urbana-Champaign; and the Centre for Industrial Relations and Human Resources Research Seminar, University of Toronto.

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Abstract

Algorithmic technologies are widely portrayed as contested, yet they continue to diffuse and persist throughout organizations. This raises a central question: how are contested technologies sustained over time? Drawing on a qualitative study of algorithmic management (AM) in unionized hotel housekeeping, this paper shows that union leaders play a critical brokerage role in mediating workers' experiences with algorithmic systems. We identify two distinct brokerage practices that emerge in response to gaps—or frictions that require intervention—workers encounter under AM. When gaps stem from skills, training, or infrastructural limitations, leaders engage in stabilizing work, absorbing disruptions and enabling continued use through teaching, troubleshooting, and improvisation. When such gaps are persistent, or when they raise questions of authority, however, leaders shift to governing work, strategically translating workers' experiences into collective claims and negotiating adjustments to algorithmic governance. These findings shift attention in research on algorithmic management from individual adaptation to the collective and political processes through which contested technologies are made workable. More broadly, the paper extends brokerage theory by showing that in contested technological environments, brokerage may take on representative—not only integrative—forms that vary depending on the coordination problem at hand.

INTRODUCTION

Algorithmic management (AM)—systems which digitally substitute for or augment the allocation, coordination and evaluation of work—is often portrayed as a deeply contested technology. Existing scholarship shows that workers often perceive algorithmic systems as opaque instruments of surveillance and control that narrow worker discretion, deepen information asymmetries, and undermine autonomy and well-being (Curchod et al., 2020; Jarrahi et al., 2021; Kellogg, Valentine, and Christin, 2020; Parent-Rocheleau and Parker, 2022; Shapiro, 2018). These concerns stem, in part, from the comprehensive, instantaneous, and “black box” nature of such technologies (Kellogg et al., 2020: 370), which can foster distrust in algorithmic decision-making (Mahmud et al., 2022; Lee, 2018). In contrast, organizations and their managers are often seen as benefiting from AM through efficiency gains, improved decision-making and expanded managerial capacity to coordinate complex processes and workflows (Liu, Brynjolfsson, and Dowlatabadi, 2021; Rosenblat, 2018).

Despite these tensions, AM continues to diffuse beyond digital platforms into traditional organizational settings such as retail, healthcare, and manufacturing (Wood, 2021). In these settings, AM typically augments rather than replaces managerial authority, shaping how work is allocated, coordinated and evaluated (Benlian et al., 2022; Mahmud et al., 2022; Parent-Rocheleau and Parker, 2022; Wood, 2021). This raises a central question: How do technologies that are subject to contestation become normalized and sustained within organizations?

Research on platform work suggests that AM persists even when workers actively contest it. Individual acts of gaming, adaptation, and resistance are incorporated into algorithmic systems, allowing contestation to coexist with organizational imperatives of efficiency (Cameron, 2024; Möhlmann, Salge, and Marabelli, 2023). However, compared to platform work,

where organizational structures are relatively thin, AM in traditional organizations is integrated into contexts shaped by hierarchy, power asymmetries, and pre-existing rules, routines, and relationships (Jarrahi et al., 2021). As a result, implementation is not purely technical: Instead, AM is integrated through actors who interpret, translate, and adapt them to existing contexts (e.g., Waardenburg et al., 2022; Gal, Jensen, and Stein, 2020; Kellogg et al., 2020; Henke, Levine, and McInerney, 2018). Such social mediation—often conceptualized in terms of brokerage—becomes particularly consequential when technologies are contested or ambiguous.

This makes contexts where institutionalized mechanisms of worker representation that use AM theoretically rich and useful sites for understanding how contested technologies become mediated in hierarchical contexts. In unionized settings, workers' interests are represented through mechanisms such as union leaders, or rank-and-file workers who represent their coworkers in union matters. Through their representative activity, leaders occupy a unique, intermediary position between workers and management. Leaders therefore have the capacity to influence contested technologies such as AM, shaping whether they are disrupted or adopted.

The current study draws on extensive qualitative fieldwork of AM in unionized hotel housekeeping to unpack how leaders act as brokers of algorithmic technologies. In hospitality, AM introduces gaps, or tensions over both control and operations, which serve as the basis for potential contestation. These gaps emerge at the interface between system design and implementation, managerial authority, and frontline workers' experiences. Gaps cannot be addressed by technology, managers or workers alone, thereby necessitating intervention. We show that union leaders respond to AM's gaps through two distinct forms of brokerage: coordination brokerage that makes AM workable in everyday situations, which we conceptualize

as *stabilizing work*, and representative brokerage that elevates workers' concerns and reshapes algorithmic governance, conceptualized as *governing work*.

When gaps emerge from issues such as faulty infrastructure or lack of training—examples of operational gaps—leaders engage in stabilizing work, or internal coordination brokerage with coworkers: they teach, troubleshoot, improvise, and diffuse practical knowledge of AM. Through these practices, leaders absorb, repair or circumvent AM gaps, resulting in stabilized algorithmic coordination. While stabilizing work makes AM workable, it also serves a buffering function, protecting workers' interests without directly elevating gaps to management. Leaders shift to representative brokerage, however, when gaps are either authority-based—born out of misalignment between algorithmic direction and workers' discretion—or when operational gaps are persistent and widespread. This type of brokerage is captured by governing work. Leaders aggregate workers' experiences, carry them across the labor-management boundary, and escalate them through formal authority or institutional channels when needed. Brokerage in algorithmic systems thus evolves from coordination brokerage to representative brokerage as leaders elevate everyday struggles into issues that must be addressed as matters of governance.

The contributions of this study are three-fold. First, we contribute to brokerage theory, showing that, in contested technological environments, brokerage practices are both coordinative and representative. These different practices address different kinds of coordination problems, relying on specific relational and technical behaviors to do so. Second, we contribute to research on algorithmic management in traditional organizations, moving beyond accounts centered on workers' individual adaptation strategies when such technologies are contested to show how breakdowns in algorithmic coordination are instead socially mediated. Third, we contribute to

studies of technology and work relying on a practice-based approach, which emphasizes how technologies are enacted through ongoing interpretation and negotiation by organizational actors.

LITERATURE

Algorithmic management as a contested technology

Algorithmic management is defined as “large scale collection and use of data on a platform to develop and improve learning algorithms that carry out coordination and control functions traditionally performed by managers” (Möhlmann et al., 2021:2001; see also Jarrahi et al 2021; Lee et al, 2015). Whereas in gig platforms AM systems replace core managerial functions (e.g., Cameron, 2024), in settings outside of platforms they are typically designed to complement managerial judgment, assisting managers in decisions related to task allocation, scheduling, work flows, and evaluation (Benlian et al., 2022; Mahmud et al., 2022, Parent-Rocheleau and Parker, 2022; Wood, 2021).

As with other technologies, the introduction of AM means that managers and employees must adapt workflows and decision-making processes, develop new routines, and learn new tasks (Bailey, Leonardi, and Chong, 2010; Leonardi and Bailey, 2008; Shestakofsky, 2017). Yet scholars argue that AM is distinct from other technologies in its opacity, instantaneous and interactive character, and its data-driven authority (Kellogg et al., 2020; Haber and Carmeli, 2023), which together create uncertainty for organizations.

These characteristics of AM make it susceptible to varied interpretations that affect how it is enacted. Heiland (2025), for instance, shows algorithms’ opacity leads workers to construct inaccurate interpretations of AM based on their own assumptions, experiences, and peer interactions; this, in turn, motivates self-disciplinary behaviors at work. Such interpretations

reflect shared cognitive structures, or technological frames, that emerge from assumptions and expectations of social actors regarding technology (Orlikowski and Gash, 1994).

Because technologies are socially embedded within organizations, interpretations also reflect differences in positions and interests (Klein and Kleinman, 2002; Pinch and Bijker, 1984), which can further complicate how technology is enacted (Orlikowski and Gash, 1994; Davidson 2002). Existing hierarchies, regimes of control, and power dynamics sharply define how organizational actors—such as employees and managers—interpret AM (Jarrahi et al., 2021). Under these conditions, AM-induced uncertainty may be experienced unevenly. Managers, who work with algorithmic systems, and employees, who receive algorithm-augmented managerial directives, encounter AM from varying positions with different interests.

To illustrate, scholarship on AM suggests that workers share widespread suspicion and skepticism of such technologies. AM is depicted as an instrument of surveillance and control, with its ability to direct, evaluate, and discipline workers (Kellogg et al., 2020). AM's lack of transparency and its erosion of workers' control are argued to negatively impact workers' autonomy, well-being and workload (see, e.g., Jarrahi et al., 2021; Parent-Rochelleau and Parker, 2022), in part because of power and information asymmetries (e.g., Curchod, Gerardo, Cohen, and Neysen 2020; Shapiro 2018). Workers respond through repertoires of accommodation and resistance, including gaming (Cameron, 2024; Cameron and Rahman, 2022), anticipatory compliance (Heiland, 2025; Bucher, Schou, and Waldkirch, 2021), and data manipulation (Cheon and Erickson, 2025), in effort to obtain favorable algorithmic evaluations and avoid algorithmic scrutiny or punishment.

These accounts contrast markedly from organizational and managerial perspectives, which consider AM systems as tools of enhancement, extending an organization's capacity to

make timely, data-informed decisions and coordinate complex workflows (Kellogg et al., 2020; Meijerink and Bondarouk, 2023). Scholars suggest that AM can generate value for middle and frontline managers by automating routine administrative tasks and improving efficiency in labor allocation (Van Oort, 2019; Wood, 2021). Managers increasingly rely on AM's data capabilities to inform performance and promotion decisions (e.g., Mateescu and Nguyen, 2019; Vallas, Johnston, and Mommadova, 2022; Gal et al. 2020). These benefits accrue even as managers grapple with interpreting opaque outputs, addressing worker concerns, and reconciling algorithmic recommendations with workplace realities (Jarrahi et al., 2021; Cui, Tan, and Shi, 2024; Vieira and Junte, 2025).

This dual portrayal produces a tension: if workers experience AM as opaque and controlling, and if interpretations of technologies diverge across organizational hierarchies, how do such technologies become normalized and sustained within organizations?

One explanation emphasizes workers' individual adaptation. Workers participate in, and therefore stabilize, algorithmic systems through their responses—gaming, anticipatory compliance or accommodation—to AM. Even workers' acts of manipulation, representing “deviance” from prescribed behaviors, are argued to ultimately align their actions with managerial interests (Cameron, 2024). In this view, technological embeddedness is an outcome of individual adaptation and can occur even as managers' and workers' interpretations of technology remain misaligned.

A second explanation shifts attention from individual adaptation to social mediation, calling attention to the social, collective processes through which contested technologies become sustained. Emerging research suggests this occurs through actors that translate algorithmic outputs, diffuse knowledge, and foster acceptance of AM systems among different groups (e.g.,

Gal et al., 2020; Kellogg et al., 2020; Henke et al., 2018). AM stabilization is thus relational, emerging from the integration and negotiation of interpretations and interests across different groups. For example, algorithmic brokers interpret and spread technical knowledge of AM and its outputs among organizational members who use it (Waardenburg et al., 2022). Managers play similar roles (Leavitt, Barnes, and Shapiro, 2025). For instance, in their study of Spanish retail fulfillment centers, Vieira and Junte (2025) show that middle managers act as algorithmic brokers who interpret algorithmic output, and selectively override it, when algorithmic recommendations clash with company priorities.

Yet this emerging account is largely management-centered; it presumes that managerial agendas—and the ways in which technology supports them—are legitimate and undertheorizes how workers' interpretations and interests are incorporated or suppressed in mediation processes. We therefore lack an account of how contested algorithmic systems are embedded in contexts where not only by power asymmetries but also worker representation is salient. In such instances, when interpretations diverge and uncertainty presents itself, stabilization depends on boundary-spanning actors who can articulate competing interests and negotiate adjustments across hierarchical divides.

Brokering in a contested domain

To theorize this form of mediation, we turn to brokerage theory. Brokerage refers to enacted behaviors through which actors—brokers—facilitate interaction and influence across groups by translating information, reframing meanings, and articulating interests (Kwon et al., 2020; Halevy, Halali, and Zlatev, 2019; Obstfeld, Borgatti, and Davis, 2014; Kellogg, 2014). Rather than simply occupying a structural position, brokers enact influence by actively mediating boundaries. They bring groups together to foster shared understandings and new, joint practices

through connecting strategies that reframe perspectives, translate meaning and ideas, and articulate groups' interests. Through buffering, they exert influence by leaving groups disconnected and perspectives unchanged (Hargadon, 2002; Obstfeld et al., 2014, Kellogg, 2014; Carlile, 2004). Brokers draw on both sets of strategies selectively, depending on the task or process at hand (Kellogg, 2014; Lingo and O'Mahony, 2010).

Brokerage theory highlights the role of brokers in facilitating coordination across groups (Obstfeld et al., 2014; Halevy et al., 2019). Coordination helps actors navigate complex, uncertain tasks when knowledge is unevenly distributed, especially when they are dependent on one another to meet their goals (Carlile, 2004). In this sense, brokers stabilize work processes without necessarily altering underlying authority relations, namely by integrating different actors' knowledge or practices. Existing applications of brokerage theory to technological adoption have long emphasized this coordination and integrative role, revealing how brokers translate knowledge and foster shared understandings to facilitate technological use (e.g., Barley, 1996). In regard to AM, for instance, Waardenburg et al. (2022) theorize intelligence officers in a police organization as algorithmic brokers who interpret, translate, and make actionable opaque algorithmic outputs of a predictive policing software for local station managers.

However, when technological systems generate contestation and are embedded in hierarchical contexts marked by divergent interests and power asymmetry, brokerage cannot be understood solely in coordinative or integrative terms. Rather, brokerage becomes political: Brokers not only influence groups but also promote and protect the interests of those they represent (Burt, 2004; Boari and Riboldazzi, 2014). Representative brokerage, in which brokers act on behalf of a constituency to promote and protect its interests in interactions with another group (Gould and Fernandez, 1989), captures this idea. The outcomes of representative

brokerage thus include securing resources such as commitment and support (Marrone, 2010), protecting a group's interests with strategies like gatekeeping (Lingo and O'Mahony, 2010), and representing less advantaged stakeholders to secure changes in policy (e.g., Williams, 2002).

Often, representative brokers' agendas and influence are facilitated by their embeddedness within groups, especially those characterized by dense, close ties where coordination and mobilized action are more likely (Obstfeld, 2005; Obstfeld et al., 2014). This is because familiarity with the group's interpretations and practices enhances brokers' trustworthiness and credibility (Tortoriello and Krackhardt, 2010; Fleming and Waguespack, 2007). At the same time, representative brokers must also be recognized as legitimate by the group they seek to influence (Grosser et al., 2019; see also Boari and Riboldazzi, 2014). In hierarchical contexts marked by sharp divisions in group status, this dual legitimacy is difficult to achieve (Currie and White, 2012). Actors must maintain credibility among those they represent and secure recognition from more powerful counterparts. Understanding how such representative brokerage unfolds is therefore central to explaining the social mediation of contested technologies in such contexts.

Union leaders and brokerage

Representative brokerage is especially salient in unionized workplaces, where workers' interests are institutionally organized and formal representation structures coexist with managerial authority. In these settings, union leaders—rank-and-file workers who are elected or appointed to their positions, often as shop stewards¹—are explicitly authorized to represent workers' concerns. They thus occupy a distinct brokerage position: they are embedded in worker communities while recognized as legitimate intermediaries by management.

¹ Stewards are union leaders who have formal representative roles in grievance proceedings, typically outlined in a collective bargaining agreement.

Crucially, union leaders do not just transmit information across boundaries; their brokerage is representative. They administer and enforce collective bargaining agreements, translating formal rules into everyday protections through communication and problem solving (Pilemalm, Hallberg and Timpka, 2001). They relay concerns to management and seek redress, when necessary, relying on extensive knowledge of rules, procedures, and rights to do so. In many unions, including the one we study—they also organize and mobilize coworkers to sustain union power at the level of the workplace (Peetz and Pocock, 2009). In all these practices, leaders must establish reputations and relationships with labor and management, navigating diverse goals, interests, and perceptions and strategically aligning them when necessary (Levesque and Murray, 2013).

In unionized workplaces, technologies like AM introduce new decision-making and workflow coordination practices that existing collective bargaining agreements only partially anticipate, since employers typically retain authority over technological adoption (Kochan, Liebman and von Weitershausen, 2018). AM thus creates gaps between formal protections outlined in agreements and algorithmically mediated workflows, resulting in indeterminate spaces in which diverging interpretations and interests among organizational actors can emerge. Stabilizing AM under such conditions requires more than individual adaptation; it depends on actors who can represent worker interests and negotiate implementation across hierarchical boundaries with management. We turn to union leaders to unpack this question: How do they broker interests of labor and management under AM, and what does this mean for how AM is contested or sustained?

RESEARCH SETTING AND METHODS

Research setting

We selected unionized hotel housekeeping as a strategic research site to study how AM is socially mediated through representative brokerage. Our research in this area, which began in 2021, revealed observable gaps between workers' and managers' experiences with AM, allowing us to examine how union leaders respond. Our analysis focuses on GRAs represented by North America's largest hospitality union, primarily employed in full-service urban and resort hotels (e.g., convention, airport, casino, and resort properties). These are characterized by labor-intensive operations that cater to upper-midscale business and leisure travelers. Our study thus constitutes a specific case of algorithmic management in unionized hospitality, with multiple workplace sites and local unions serving as contexts in which AM is embedded.

In hotel housekeeping departments, AM optimizes room flows so that clean, vacant rooms can be released efficiently to incoming guests. AM systems are configured by management, which sets workflow dimensions such as limits on the number and types of rooms, and number of floors, that a GRA can cover per shift, which in unionized workplaces are negotiated by the union and management. These are integrated with real-time inputs including room status (e.g., checkouts versus stayovers) and guest preferences. These inputs guide managers' allocation of rooms to GRAs' "boards", or list of assigned rooms to service, based on required cleaning labor, the latter of which is typically measured in points or credits.

GRAs receive their assignments on hand-held mobile devices, such as iPhones, which replace paper printouts they receive under "manual" or "paper" systems without AM. They interact throughout their shift with their devices, inputting guests' requests, marking when they

start and finish a room, and submitting work orders to other departments, making AM a system that also centralizes coordination and collaboration.

In hotel housekeeping, the objective of AM is to bring greater efficiency to decision-making regarding workflow, which must be continuously adjusted. Housekeeping is a highly dynamic environment, shaped by unpredictable guest behavior. For example, a GRA may encounter several “do not disturb” (DND) placards left on doors by guests in the morning, delaying start of service. A preferred guest may arrive ahead of check-in, prompting supervisors to “rush” a room for priority cleaning. Rooms that guests leave especially dirty require extra time to clean. AM streamlines how such contingencies are accounted for, enabling managers to make informed, real-time adjustments across GRAs in a department. Updates are instantly communicated to GRAs via their devices, reducing the need for supervisors to relay changes through direct, face-to-face communication.

For these reasons, managers generally view AM favorably and as efficiency-enhancing. GRAs similarly value expanded access to information, ease of coordination with other departments, and greater protection afforded by documentation of their work and visibility of their physical location. Yet, as we describe below, AM systems are also characterized by tensions that emerge from gaps between how the system is envisioned to work and its reality in practice—gaps that are only partially governed by bargaining agreements and that require active intervention to resolve.

Within this context, union leaders occupy a structurally central position (Figure 1). They are embedded within GRA networks and regularly interact with supervisors (sometimes referred to as clerks) and managers. Their work routines bring them into contact with other departments on the property and their union local position makes them the point of contact with union staff.

Aside from training they might receive from a vendor when AM is implemented, they have limited access to technical experts, making representative—rather than technical integration—strategies most salient.

[Insert Figure 1 here]

Taken together, this setting allows us to examine how AM integration unfolds within a traditional organization that includes formal management authority and collective worker representation. The established union leadership structure enables observation of workplace-level representatives engaging with managerial and technological systems in their everyday work.

Data collection

Our data were collected as part of a multi-year, interdisciplinary research project examining AM technologies in hospitality. Multiple sources of field data, collected from 2021-2024, inform our understanding of AM in this setting and are the basis of our conceptualization of its gaps. These include workshops, semi-structured interviews, focus groups, participant observation, and participatory prototyping sessions with over 100 GRAs. Although our research focuses on the experience of workers, we also conducted background site visits and interviews with hotel property managers, corporate officers, and a technology vendor, allowing us to contextualize workers' experiences. These activities are summarized in Table 1. Together, these data provide a rich understanding of how AM is experienced in everyday housekeeping work.

[Insert Table 1 here]

As we engaged with early-stage data, an emerging theme took shape: We observed that union leaders, despite having no formally defined role in relation to AM, were the primary source of assistance for GRAs and the main channel for raising AM-related problems with management. We therefore undertook a focused qualitative study of union leaders with the aim

of understanding how they mediate AM in their workplaces. Because our study examines how union leaders mediate gaps as experienced by workers, we center the perspectives of GRAs in our data collection and analysis.

Our primary data consists of 41 semi-structured interviews with GRAs who are union leaders, including some stewards, undertaken from August 2022 until January 2024. We purposefully sampled individuals who both use AM and occupy representative roles, consistent with theoretical sampling (Glaser and Strauss, 1967; Corbin and Strauss, 2008). Many of our respondents used a single system we refer to as UpKeep, an AM application that, according to its vendor, has leading market share. UpKeep reflects core features of AM systems in hospitality—algorithmic allocation, real-time updating, and digital workflow coordination—making it representative of AM use in the industry. Participants were identified through collaboration with the union via direct communication with union locals. In our recruitment efforts, we emphasized voluntary participation independent of union membership. We sought variation by geography and employers, recruiting respondents from 35 properties and 14 union locals across the country.

Six pilot interviews were undertaken from August-September 2022 by all authors and a small team of research assistants. Expert consultants from our team—researchers who were not directly involved in data collection—consulted on our protocol. Interviews were conducted in pairs; part of our analysis at this stage stemmed from observations on how well the protocol served our data collection purposes. Structured pair and full team debriefs allowed us to reflect on emerging themes and amend the protocol (Majid et al., 2017; Malmqvist et al., 2019).

The remaining 35 interviews were undertaken individually by the authors from August-January 2024. The interviews were accompanied by a short questionnaire asking respondents for demographic, employment, and union background information. Interviews were recorded,

transcribed, and translated into English when necessary. We reached theoretical saturation during a later phase of interviews (Glaser and Strauss, 1967), when additional sampling did not generate substantially new dimensions of leaders' practices. Respondents had substantial industry and job tenure (around 17 and 14 years, respectively), but relatively recent exposure to AM systems (typically five years or less). The sample is predominantly female, racially and ethnically diverse, and immigrants who spoke English as a second language (see Table 2).

[Insert Table 2 here]

Data analysis

We analyzed our data through an iterative, inductive process aimed at developing theory grounded in participants' accounts and observed practices (Strauss and Corbin, 1998; Charmaz, 2006). Our analysis unfolded in multiple stages.

First, we began with open coding, identifying descriptive codes closely tied to participants' experience and language (Charmaz, 2006). These codes captured practices and interpretations related to GRAs' routines and their use of AM. Examples include *encountering disruption, playing with my board, traveling, sequencing, and feeling controlled*. At the same time, our initial coding revealed a wide range of practices that characterized leaders' roles in relation to AM. These include *demonstrating UpKeep, troubleshooting UpKeep, doing [UpKeep] tasks for others, encouraging reporting, huddling*. Where appropriate, we grouped codes into descriptive categories that reflected emerging themes. For instance, inductive codes such as *reassuring and guiding* and *addressing fears* were grouped into a category named "relational practices with GRAs." *Demonstrating UpKeep* and *peer troubleshooting* were among those labeled as "making AM workable". All authors contributed to code development,

maintained analytic memos, and met regularly to refine and align interpretations. The first two authors reviewed all coding of leader data.

Next, the first two authors began examining relationships between categories, and iterating between coding and literature, to identify broader patterns and emerging theoretical constructs (Charmaz, 2006). To facilitate our conceptualization of boundary-spanning gaps, we wrote detailed memos describing the daily routine of a typical GRA. Because participants frequently compared algorithmic and manual systems, we wrote parallel memos reconstructing workflows under each condition, focusing on decision-making and coordination, interactions, workflow, and cleaning tasks. This allowed us to differentiate between GRAs' perceptions and experiences with AM and those that apply to housekeeping work more generally. It also made visible gaps that emerge in relation to core functions of AM and other dimensions less closely tied to algorithmic direction but that were still experienced as part of the overall technological system. Our conceptualization of gaps emerged from this analysis.

At this stage, with our leader data, we used guiding questions such as "What strategies do leaders use? Who is involved? What are they trying to accomplish?" to help us define relationships between and characterize practices. We observed and categorized practices labeled "coordination with GRAs" and others that involved "coordination with management". We identified relationships of these categories with other codes, unearthing, for example, the linkage between peer-to-peer practices with descriptive codes such as *relational practices with GRAs*. We also began to identify a model of how and when "coordination with management" took place through its relationship with practices like *huddling*. After identifying these linkages inductively and differentiating between peer and boundary-spanning practices, we engaged with the

brokerage literature to assess conceptual alignment and divergence, iterating, for example, on how our identified practices mapped on to concepts such as buffering and connecting.

The final stage of our analysis involved returning to relationships among these dimensions, aggregating among them, and developing an understanding of how they fit together. At this stage, we engaged in interpretation with guiding questions such as, “What do these different categories of practice achieve?” and, “How do leaders evaluate when to use one over the other?”, ultimately leading to our conceptualization of stabilizing and governing work. We again turned to the literature on brokerage to guide our abstraction. We iterated between reviewing literature, analyzing our data, and drawing and revising models to capture relationships of these practices to the scope and type of gaps we observed.

FINDINGS

As with other complex technical systems, AM generates persistent gaps between its designed logic and what unfolds in implementation and use, which in unionized settings are only partially addressed through work rules—such as limits on the numbers and types of rooms that can be cleaned in a shift negotiated by labor and management. In the sections that follow, we examine how these gaps become sites of potential contestation among workers and intervention by union leaders. We then show how leaders respond through strategies we conceptualize as peer-to-peer *stabilization work* and boundary-spanning *governing work*, which stabilize and negotiate AM gaps. Through these strategies, leaders reshape algorithmic coordination and governance in their workplaces. Figure 2 provides a guiding illustration.

[Figure 2 here]

Boundary problems: Gaps in the technical system

In hotel housekeeping, AM's gaps take the form of recurring breakdowns in coordination between algorithmic allocation and situated labor practices. We conceptualize these as coordination problems that emerge at the interface between system design, managerial control, and frontline work. While some gaps can be absorbed locally through workers' adaptation and peer coordination, others point to deeper questions about who controls the organization and pacing of work, underscoring how the gaps we identify are also sites of potential contestation. Table 3 juxtaposes worker-identified experiences with efficiency-oriented rationales embedded in system design and surfaced in our research, highlighting the tensions they produce.²

[Insert Table 3 here]

Sequencing: Gaps of control, system logic, and embodied labor. Sequencing in housekeeping refers to determining the order in which rooms are cleaned during a shift. The associated gap reflects a tension between operational efficiency embedded in the system's allocation logic and GRAs' embodied experience of work and control over their workflow.

Under manual systems, GRAs have latitude, within some constraints, to determine their sequences. To do so, they draw on knowledge of a hotel's physical space and embodied experience of cleaning tasks (Valenzuela-Bustos et al., 2024). When GRAs control sequencing it allows them to calibrate their physical labor and pace across a shift. As one GRA explained, "I have to do my sequence, one checkout, one occupied, and another checkout. And that way I don't get tired..." [Interview_41].

AM, in contrast, generates fixed room sequences—sometimes one or a few at a time—that workers typically cannot modify. GRAs frequently describe being sent across hallways or between floors in sequences that deviate from the spatial logic they would otherwise construct.

² Detailed data tables for each dimension of the gaps identified here can be found in the Appendix.

Extra travel, and pushing heavy carts across thick carpets, intensifies fatigue and the sense that they are “fighting against the clock” to complete their assignments [FocusGroup2]. “It just doesn't give you space to rest your body” [Workshop1_5], stated one GRA.

These experiences become grounds for questioning the legitimacy of the system's logic, as workers contrast algorithmic sequencing with their own embodied understanding of work organization. As one GRA questioned, “...if the system is so smart, why doesn't it give us the rooms in an efficient order?” [Interview_6].

Relatedly, many workers describe AM as a mechanism of technological and managerial control. As one GRA explained, “You need to be in our shoes to understand how hard it is to follow the device. The device is the technology, it's like a robot...I'm a human being.” [Interview_32]. A second described:

So with the paper [referring to a manual system], you have everything on your own. You are the one who decides, ‘I'm going to start with checkout, then I can finish with the occupied rooms’... But with that device...it is the management who are trying to say, ‘Go to this room first’...So it's like the management takes control, using your device. [Interview_31]

Because sequencing is embedded in the logic of AM systems and enforced through managerial oversight, these tensions cannot be resolved through workers' individual adjustments alone. Instead, they raise broader questions about who controls the flow and pace of work.

Centralization of coordination and perceptions of surveillance. A second gap emerges from the centralization of coordination and related perceptions of surveillance. One dimension of coordination pertains to managers' shuffling of room assignments and workflows to account for guest contingencies. GRAs describe these real-time adjustments as managers “playing with” or “manipulating” their boards. Many contrast AM with manual systems in which supervisors walked floors and engaged in direct dialogue over these changes, enabling mutual adjustment.

These experiences reflect competing expectations about where coordination authority should reside:

And before when we had the sheet of paper, they [supervisors] had to physically come and look for you to tell you like, ‘Hey, they gave you another room.’ But now it's automatic, it's on your board. I mean, it kind of gets you mad sometimes because it's like, ‘Okay, stop playing with my board. You already gave me these rooms, why are you changing them?’ [Interview_3]

GRAs also describe coordination failures resulting from their limited capacity to incorporate their own knowledge into centralized functions of AM. They often cannot independently correct discrepancies they encounter, such as revising the status of a room marked as vacant on their device but still occupied by guests. This sometimes leads to poor service. For instance, one GRA described an instance when her regular guests were dissatisfied with their room, as it had not been arranged according to their preferences during a week when she was away. She explained that she could not record these preferences in UpKeep: “All this knowledge, I’m carrying it with me” [Interview_9].

Because centralization is made possible by extensive data tracking, many GRAs also perceive surveillance to be an issue, even if they do not directly experience monitoring by managers using UpKeep. GRAs are nonetheless aware that managers can track when they start and finish rooms, how much time they spend cleaning, and the amount of time that lapses after receiving a special request or work order. This contributes to perceptions of surveillance and diminished autonomy, especially in instances when management reveals that they do in fact monitor work progress with AM:

We have to go in one room. We need to click it [the room in UpKeep], because if we don’t update, the management is gonna get mad, and then they can write you up. ‘How come you don’t follow [the order]?’ or something like that. Because they keep checking what room the lady finishes...I think they are just trying to keep track. It’s not really comfortable being watched. [Interview 15]

Because workers often lack immediate opportunity to negotiate changes to workflow and correct discrepancies, and input information into AM, they must escalate these issues to supervisors when they arise. Coordination failures therefore emerge at the boundary between system design, frontline knowledge, and managerial authority. Managers' discretion over how they use AM's data tracking to monitor workers and work progress underscores, in a different way, how centralization yields boundary-spanning problems.

Operational gaps: Skills and infrastructure. Our data also surfaced breakdowns that are less closely tied to algorithmic direction but still experienced as part of the overall technological system. For example, AM's configurability allows the application to be tailored to individual properties. GRAs report difficulty navigating complex interfaces and long dropdown lists—a problem frequently associated with work orders, where a single room feature, such as a lampshade, may have multiple orders routing to different departments. These struggles are often amplified by barriers with language and digital skills needed to use UpKeep efficiently:

When we were hired, we were not required to understand [English]. It's a hassle, because [the list of work orders] is at least, I think, 300 items. Sometimes we need a thing translated from Chinese to English, and how we can find [the] UpKeep [work order] number?...Sometimes we are not good at spelling, so we need to find it [by scrolling] from the top to the bottom. It's hard for us. [Interview_CityA_9]

These challenges are compounded by limited training and uneven access to reliable devices and internet connectivity—a common issue across numerous respondents' workplaces—further constraining workers' ability to make their experiences legible within the system. Unlike sequencing or centralized coordination, which represent gaps of authority and control, breakdowns stemming from skills, training, and infrastructure are largely operational. While some may require managerial action—for example, when faulty Wi-Fi results in workflow

coordination failures—others can be resolved more informally, potentially avoiding changes to the system itself.

In sum, because these gaps reveal misalignments among managerial authority, worker discretion, and technological design, they cannot be resolved through workers' individual adaptation alone. Instead, they become ongoing sites of negotiation and mediation across these boundaries, where competing visions of coordination are worked out in practice. Some gaps, such as skills, training, and infrastructure, represent operational breakdowns that can be absorbed locally, as we illustrate below. Others, however, center on questions of authority and control, requiring leaders to articulate workers' concerns and negotiate adjustments with management.

Seeing and responding to AM system gaps

The gaps created by algorithmic management become especially visible through union leaders. Situated at the intersection of worker networks and management, leaders occupy a vantage point from which coordination problems become visible: Workers frequently approach them first when problems arise, positioning leaders as intermediaries through which individual experiences are consolidated into shared patterns and articulated as collective concerns.

This capacity is grounded in the relational and institutional foundations of leaders' brokerage roles. Leaders maintain close ties with coworkers, who they describe in familial terms. As one leader explained, "I like to help people. I don't like to see unfair things...It's not only a fight for something for me, right?...I love my coworkers because being there for so long, I consider them my family" [Interview_5]. Trust derived from these relationships, combined with authority that comes from their role, positions leaders as central nodes in workplace networks, where workers routinely bring forward questions, frustrations, and technical problems. As one leader illustrated:

I'm the one that everybody approaches. If they have an issue, they'll come and talk to me. If they need to go talk to management, they'll come and talk to me....I believe it's the trust. The trust that, you know, 'If Cecilia [referring to herself] goes [to management], they'll listen to her, because she's part of the union.' [Interview_3]

Leaders' embeddedness across domains further strengthens this role. Many leaders we spoke with described how managers sought to bring them into organizational decisions and processes, for example by tasking them to liaise with workers in preparation for changes such as AM. Their capacity to see both the positions of labor and management enhances their credibility. One leader recalled coworkers telling her, 'We liked how you spoke. You put yourself in the place of both sides. And not just what was convenient for us all, but...what's convenient for the hotel' [Interview_27]. Another stated, "I'm always there to give good ideas and to help both sides" [Interview_5].

This capacity to interpret both managerial perspectives and workers' experiences strengthens leaders' credibility as intermediaries who can translate concerns across organizational boundaries. Leaders' perspectives on technology fall in line with this capacity. Rather than framing AM as something to resist outright, they approach it pragmatically. "If we wanna fight to remove this [UpKeep], it's not going to happen, it's just the reality of it" [Interview_3], one leader explained. Union framing reinforces this orientation: "We have a meeting with the union. They say, ladies this [UpKeep] is something we cannot stop..." [Interview_32]. Because these technologies are perceived as durable yet uncertain, leaders treat them as objects of negotiation rather than rejection.

Within this structural and relational context, leaders become the primary sites through which the effects of AM become visible in practice. For instance, many leaders describe how AM generates fear and uncertainty. "At first, we did not want to use it [UpKeep]," explained one leader. "Some of the housekeepers, they are scared of applications." She later elaborated:

You got seniors, you know older people, [who are] not really computer savvy or phone savvy. They're so intimidated and scared to death. They come to me like, 'Alicia, what we gonna do? I don't know how to use this. I don't know what we gonna do.'
[Interview_34]

Such interactions position leaders as witnesses to these gaps, which, in turn, activates leaders' justice-oriented understanding of their role in the workplace. Many describe becoming leaders after witnessing coworkers' fear, silence, or marginalization. One leader explained that she "decided to take the position because sometimes you have a lot of problems at work, and there are people who are afraid to speak" [Interview_27], while another described becoming a "voice" for coworkers she perceived to be "pushed aside by management" because of language [Interview_3]. Others framed their leadership as a moral obligation: "I took on the responsibility because there was no one else to help...I felt that I hadn't done anything in my life to help my colleagues" [Interview_39]. These motivations are linked to leaders' sense of justice: "I like to help, and especially when people are old...I hate injustice. I don't know if that's the correct word and that's why I'm involved with the union" [Interview_32].

Taken together, these dimensions—deep ties, reputational credibility, and technological pragmatism—position leaders to intervene in workers' experiences of AM gaps.

Leaders' responses: Stabilizing and governing work

Leaders respond to these boundary problems through two distinct forms of brokerage. When gaps stem from skills, training, or infrastructure, leaders engage in *stabilizing work*. Through stabilizing work, leaders absorb, repair, and bypass AM's operational gaps by teaching, troubleshooting, and improvising with AM. These practices make AM workable in everyday routines, coordinating responses to breakdowns and protecting workers' interests without elevating issues to management. When gaps point to broader questions of authority, discretion, or control via system design, however, leaders shift to *governing work*, strategically escalating

workers' experiences to management and negotiating adjustments to algorithmic coordination. In brokerage terms, this constitutes representative brokerage, through which leaders render workers' experiences legible as tractable problems to be negotiated across the labor–management boundary.

Stabilizing work: Peer-to-peer practices that absorb, repair and bypass AM gaps.

Stabilizing work consists of peer-to-peer practices through which leaders address coordination problems—and potential for contestation—locally rather than elevating them to management. Leaders intervene to absorb, fix, or bypass AM's gaps associated with operational problems such as skills, training, and infrastructure, thereby containing disruption. In doing so, they also temper frustration and prevent gaps from escalating into open contestation over the system. Stabilization work takes three primary forms—teaching, troubleshooting, and improvising—that are enabled by leaders' attention to relational dimensions of technological adoption and their development of technical competence. Table 4 provides additional illustrations.

[Insert Table 4 here]

Teaching and troubleshooting. Leaders frequently describe teaching coworkers through hands-on demonstration, instructing them in how to perform basic functions in UpKeep. These practices address gaps in workers' skills and training. To illustrate:

There's a lot of input to do, which for some of my coworkers, it's not so familiar. And then they forget. Then they will come to me and say, Ava, what do I need to do? So I'll help them and show them how to do it. You know, it takes time. [Interview_41]

Leaders deploy similar practices in response to infrastructure breakdowns. They guide coworkers step-by-step through troubleshooting when Wi-Fi fails or devices do not load assignments (e.g., “You have to close everything that is open and then you have to go to the Wi-

Fi, turn off the Wi-Fi...” [Interview_24]). These practices serve a protective function: they address gaps in training and skills while sustaining workflow amid infrastructural instability. In doing so, they mitigate breakdowns that could otherwise trigger perceptions of worker incompetence or managerial intervention.

To enact these practices, leaders must themselves develop technological competence. Many describe proactively learning UpKeep so that they can support others. “I’m not the UpKeep expert,” said one respondent, laughing. “But I am a fast learner, so I take it very well when they trained me on that. I see the struggle of my coworkers so I’m there for them” [Interview_25]. Another reflected, “I’m teaching them and teaching myself too at the same time. Cause you gotta figure it out and you don’t want nobody lost at the same time” [Interview_9]. A third underscores the relational dimension of her role and how technical competence is central to fulfilling it:

Interviewer: When it comes to issues of technology, what makes a good union leader?

Respondent: To be able to kind of pick it up first and learn it so you are able to help them [other GRAs] with it...If you help somebody, they’re gonna be grateful for what you do for them. [Interview_3]

Leaders often take on extra work to acquire skills, relying on networks of GRAs and supervisors to decipher AM. To illustrate:

They [management] only explained it [UpKeep] for a week, and then we helped each other. A more knowledgeable colleague came to assist. I would go and say, ‘Look what came up here.’ She would say ‘Here...’ So, I started figuring out what she could do. [Interview_40]

Sometimes they [inspectors] come to the room to verify [our cleaning] and we do it [in UpKeep] together... Sometimes when they finish, I’ll check the phone like, ‘What did you do? How did do I do that? How do I do it next time?’ So I always ask because I don’t want to, you know...I don’t want to look like I don’t know what I’m doing. [...] It’s because I ask, not because they come to teach us. [Interview_22]

Teaching and troubleshooting also reinforce leaders' credibility and strengthen ties. Leaders pair these practices with relational practices that include reassurance, guidance, and solidaristic support for workers struggling with AM. As one leader explained, "It was intimidating...but I honestly just told the girls, 'Well, make a mistake. That's how we're gonna learn.'" [Interview_3]. Through these interactions, leaders normalize systems gaps so that breakdowns are framed as shared problems rather than individual failures. This framing reduces workers' concerns about surveillance and repercussions. To illustrate:

Everybody, every single housekeeper, especially the new people say 'What's wrong with this phone?' I say, 'Well, look, I have the same issue like you. So close to the phone, go to the clerk and ask her, 'What's the next room?' or 'What happened?'...So I explain to everybody, 'Nothing's new, everything's the same. Don't get mad. It happens to everybody.' [Interview_2]

And she [my coworker] says, look, they gave me this phone and I don't know how to use it. So I start telling her what little I can do. I tell her, 'Look, don't get frustrated. If they [management] see that you haven't punched in any room, they will come, and they will start explaining to you again.' [Interview_40]

Importantly, leaders do not act solely as individual helpers. They also cultivate collective capacity by diffusing knowledge throughout housekeeping networks, often invoking the principle of "each one teach one" [Interview_19]. This collective capacity-building is deliberate and embedded within leaders' positions:

I'm shop steward on the property. So all the shop stewards from housekeeping, for a month, we were on the floor with older GRAs, helping, you know, teaching in case they don't understand the icons. So that's how we learn. Because we help. That's what it is. [Interview_32]

Another respondent illustrated how she directs diffusion of teaching and troubleshooting:

Sometimes they [coworkers] come to me or my sister, because my sister works here. I teach my sister, and I told her, 'Hey, somebody come and ask you for help with the device, help her. You need to recognize [that] we have the same issues every single day'. [Interview_2]

Through these peer learning networks, leaders circulate technical knowledge informally, allowing workers to collectively adapt to persistent operational gaps of AM.

Improvising. When leaders do not have time to teach or troubleshoot, they turn to shortcuts. As one leader explained:

Yes, I'll show her and sometimes, depending on if I'm in a hurry, I do it for her. It's quicker. But if I'm not, I'll tell her how to do it so she can learn" [Interview_22].

These shortcuts—performing tasks in UpKeep on behalf of others—reflect leaders' role in improvisation, or workarounds that allow GRAs to bypass AM's gaps. Specifically, these practices reflect patchwork (Fox et al., 2023), or quick fixes that bypass AM breakdowns, such as Wi-Fi instability, without addressing the underlying causes of gaps. Much of this improvisation remains invisible to management. For instance, workers photograph their boards on personal phones, copy assignments onto paper, or memorize room lists as backups in case of Wi-Fi failure or depleted device batteries. They also rely on alternative technologies—such as guest-room landlines or translation apps—to communicate issues they cannot record in UpKeep.

Leaders frequently become the informal channel through which patchwork is enacted. They not only diffuse improvisation practices—for instance by advising others to copy lists from their devices to paper—but also update boards, input information, and perform basic functions for others. Other leaders describe marking rooms as cleaned in coworkers' devices or logging into their own devices with coworkers' credentials to input required updates. To illustrate:

I tell her to lend me her phone and try to help her. And if not, what I do is, I close my phone. And if my phone is working, I close it and tell her to open it with her password. And from there, I punch in the room numbers. That's what we do. [Interview_39]

Leaders view these practices as protective, particularly for workers who face barriers to using UpKeep because of skills and language:

She [my coworker] knows how to read. The room numbers are printed on the paper, and she marks if it's "vacant clean" or "stay over". But if she needs something to be written, she comes to me so that I can do it because she cannot write. [Interview_7]

Some other coworkers, they come to me because they don't understand English and the app is in English. So they ask me, 'How do I say this in English?' So, I help them to do it. [Interview_22]

Through these practices, leaders become central to informal problem-solving networks that sustain the use of AM. As one explained, "They're always coming to me. Can you create an UpKeep [referring to a work order] for me? Can you request this for me?" [Interview_3]. Their teaching, troubleshooting, and improvisation contain the inefficiencies, infrastructural failures and skill disparities generated by AM, resolving or bypassing operational issues without raising them to management. Leaders thus make AM workable in everyday routines.

Stabilizing work as brokerage practice. In brokerage terms, these practices have two objectives. First, they represent coordination brokerage: they transmit and diffuse practices that allow work to proceed despite fragmented information or misaligned practices. In our setting, union leaders perform this role within housekeeping networks, helping coworkers interpret system outputs, troubleshoot devices, and bypass infrastructural failures while transforming meaning (e.g., addressing fear while normalizing problems) associated with AM breakdowns. Moreover, they coordinate the spread of these practices throughout their departments. Second, stabilizing work is also buffering as it absorbs disruptions while preserving structural separation between workers and managers. Through both dimensions, leaders stabilize AM's frictions, transforming persistent sources of struggle into manageable, everyday challenges. By doing so, they cultivate credibility and authority as trusted intermediaries.

At the same time, stabilizing work does not eliminate underlying gaps. Leaders recognize that gaps persist despite repeated peer troubleshooting or improvisation. Escalation—and

contestation—becomes more likely when problems affect multiple workers, recur despite local fixes, or implicate managerial authority or system design. When these limitations become apparent, leaders shift from stabilizing work to elevating workers’ experiences to management. They move from coordination within their own networks to representative brokerage across the labor–management boundary.

Governing work: Boundary-spanning practices that surface and negotiate gaps

Representative brokerage occurs through *governing work*. Leaders first construct governance issues by gathering information about workers’ experiences, interpreting AM’s gaps, and surfacing recurring problems to render them legible to management. They then represent workers by carrying these concerns across the labor–management boundary, advocating for workers and negotiating remedies with supervisors. If these efforts prove insufficient, leaders escalate concerns through formal authority channels or by invoking institutional rules. Through these practices, leaders transform local coordination problems into governance issues. Table 5 provides illustrations.

[Table 5 here]

Constructing governance issues. Although coordination breakdowns originate in workers’ day-to-day experiences with algorithmic systems, these problems do not automatically become governance issues. Rather, leaders identify and elevate problems to make them governable. They continuously gather information about coworkers’ experience with AM. One respondent described, “I walk through the halls...I talk to the girls sometimes, and they tell me, ‘Hey, I lost the signal...’ [Interview_37]. Another described routinely asking coworkers, “‘How’s everybody doing?’ or ‘What’s going on?’” [Interview_34]. Leaders also observe how GRAs navigate the system during their workday, describing how they see coworkers taking

pictures of their boards with personal phones during morning meetings. Others described “huddles” in which workers discuss recurring issues during lunch breaks in pre-shift meetings.

Leaders translate such information into governance issues by aggregating experiences and elevating them to management. They notify supervisors when problems, such as Wi-Fi failures or depleted device batteries, arise and engage in joint sensemaking when technological features, such as icons in UpKeep’s interface, are unclear. As one GRA noted, “Sometimes they [managers] don’t even know. And they’re really guessing with us” [Interview_22]. In these moments, leaders interpret system features alongside managers, producing workable knowledge about AM.

Leaders also encourage workers to surface issues directly, reinforcing that problems are collective rather than individual. One leader mentioned how, if coworkers came to her with issues with UpKeep, she says, “You know what I tell ‘em, ‘Call your supervisor, go on the little message board, let the supervisor know” [Interview_9]. Another urged GRAs struggling with room assignment changes to report them:

And if you don't let them know, because it's [UpKeep] just gonna keep spitting them [rooms] out, you gotta call down there. And a lot of ladies be crying,’ Mami, I can't go to lunch...I got too many credits’. [I say] ‘Call down there right now.’ [Respondent 11]

Leaders sometimes encourage collective voice, advising hesitant coworkers to approach management together so they “don’t feel intimidated” which “always seems to make them more empowered” [Interview_11]. Through these practices, leaders transform dispersed worker experiences of coordination breakdowns into collective governance issues that management can recognize and address.

Representing workers. Once issues are surfaced, leaders carry them across the labor–management boundary through advocacy aimed at securing case-specific remedies. They often

begin with their own experiences of AM's gaps, turning to supervisors when problems exceed what they can address themselves. As one respondent explained, "I use my own phone to call the inspector [to figure out UpKeep]. I always talk to them" [Interview_15]. They negotiate changes for coworkers as well, bringing their coworkers' experiences with gaps to management to trigger immediate fixes or repairs.

Representation frequently centers on operational gaps—coordination breakdowns stemming from skills, training, and infrastructural limitations—that, as they become widespread and persistent, leaders consolidate and communicate upward:

We had the work order ticket that we needed to do, and then we couldn't find it on the UpKeep list... They [my coworkers] are saying that the Spanish is so different, it's not the same. So they hesitate to do it. So we go down to the office and we let them know about the Spanish translation. [Interview_41]

In the process of doing so, they articulate collective problems with coordination breakdowns (e.g., poor translation of technological features) but also their consequences for workers' ability to perform their jobs (e.g., hesitancy in generating work orders), thus translating gaps into operational germs that have implications for workflow management.

Representation also intensifies when such gaps persist despite stabilization work. One leader described how GRAs relied on personal phones to use UpKeep due to poor technological infrastructure and the limits of workarounds such as paper. Given this, she shifted from stabilizing work (e.g., suggesting paper) to governing work, elevating the issue to management and eventually securing agreement that infrastructural upgrades were needed:

They [my coworkers] are asking me, 'Oh, I don't wanna use my phone. What am I going to do?' 'Oh, just ask them [supervisors]. They'll give you a paper for your task.' But that way it's harder because they cannot communicate [with management]... That's why there was a time that I told the general manager that, if possible, I don't wanna use my personal phone. Because by the time in the afternoon, if it runs out of battery, I cannot call my family. [Interview_30]

While representation often addresses operational gaps, leaders' brokerage role becomes particularly salient in gaps involving authority and control, such as sequencing and reallocation of workflows, both for themselves and for others. To illustrate:

[Interviewer] So what happens if you get [assignment changes] on UpKeep [in]the middle of your shift? [Respondent] I call the manager 'cause you know, it's not easy...Let's say I'm on building nine and they want me to go to building five, that's a lot of work that I have to do. And at that time, the carts are not ready, everybody used them, so they're gonna be empty...You have to let them [management] know everything. Because sometimes they don't realize, and sometimes you tell them and they change it. [Interview_22]

They [my coworkers] usually come talk to me and then I'll address it with Status [referring to the department's coordinator]. They'll be like, 'Well, I didn't make any changes, it was management.' And then I was like, 'Transfer me to management.' 'Is there a reason why you moved her board around?'...They kind of blame each other: 'Oh no, it wasn't me, it was the lead.' And I'll be like, 'Well, can you fix her board? She was already working on that [room].' [Interview_3]

In these instances, representation is not simply about fixing or absorbing breakdowns, but about governing how work is organized and controlled. Leaders question managerial decisions and seek to restore continuity in workflow. Whereas teaching, troubleshooting, and improvisation absorb gaps internally, representation governs how gaps cross organizational boundaries and become negotiated. In brokerage theory, these practices remain oriented around buffering in that seek remedy for gaps while also shielding workers from potential repercussions.

Just as leaders build credibility with workers through stabilization work, they must also cultivate credibility for governing work, in particular with managers. Their effectiveness depends on not being seen as simply raising grievances but as knowledgeable and reasonable intermediaries. Thus, leaders actively manage how and when they surface concerns. Their role in identifying and translating AM gaps helps establish credibility by demonstrating practical knowledge of workers' experiences and pragmatic engagement with AM. Encouraging others to

surface issues directly reinforces this, namely by emphasizing that concerns are widespread rather than individual complaints. As one leader explained,

“You can’t go fight for them if they don’t want to fight with you. At the end of the day, they’ll [management] ask you what’s going on, and if she [another GRA] says everything is fine, you’re the one who will get in trouble” [Interview_37].

At the same time, leaders are careful not to jeopardize their relationships with supervisors by appearing to escalate indiscriminately. One respondent explained:

Some of them [management] is easy [to talk to], but some of them are harder. I'm keep[ing] the distance. If I need to go [talk to them], I go, otherwise I'm not [going to] keep going, keep going and then bother them. And then [they say], ‘Oh, Priya, every time, come and complain, complain, complain.’ No. [Interview_13]

Governing work therefore includes not only surfacing and negotiating AM-related gaps, but also managing the relational conditions under which worker concerns can be heard. These strategies unfold within a context of uneven managerial responses, which shape both the possibilities and limits of representation. Leaders describe, for example, how some managers use their discretion to soften AM’s rough edges, messaging GRAs about room changes or using paper workarounds when systems are unreliable. Others, however, use AM more heavily-handedly, monitoring GRAs’ work progress remotely or threatening discipline for delayed updates. Representation therefore unfolds in a context where leaders must navigate gaps and managers’ varied responses to them, making their relational work central to governing strategies.

At times, managers can constrain representation by “punting,” or deflecting responsibility for AM problems to corporate decisions, technological constraints, or their own lack of authority. Respondents describe managers' stating that the system is “unchangeable” [Interview_8]; that AM is “controlled by corporate” [Interview_24]; or “that’s the system,” implying that “they don’t have control over those issues” [Interview_21]. By inserting distance from system breakdowns,

such responses stall leaders' efforts and limit the effectiveness of representation. When this occurs, leaders' governing work shifts direction: they escalate through formal authority channels.

Collective escalation and rule enforcement. Escalation represents a distinct form of governing work that extends beyond representation by mobilizing institutional authority to address AM gaps collectively. Through escalation, leaders activate formal structures—such as formal meetings, union processes, or contractual rules—to intervene in coordination breakdowns. Escalation marks a shift from negotiating within managerial discretion to invoking structures that constrain it.

Escalation decisions are deliberate and strategic. Leaders consult with one another about when and how to raise concerns through formal channels, collectively assessing the scope of problems and clarifying how they should be articulated to management. To illustrate:

I'm a housekeeper. She's the houseperson. So me and her would really talk and then she would go to the other shop steward that's a houseperson and tell him, and then we would meet in the cafeteria and talk. And then because my houseperson, she's on the e-board [executive board of the union], she would go back and let them know and then they would pull us back in, like, okay, this is what it is, this is the concern. All right. We gotta figure a way, how to get with management. [Interview_9]

We usually just talk to each other and be like, 'Should we bring it up to management?' And then if it's just one person having an issue, then we'll probably go and help them. But if it's majority, then that's when we'll request a meeting with management. [Interview_3]

This collective deliberation allows leaders to calibrate escalation, ensuring that issues brought to management reflect shared concerns. By building such decisions on collective input (e.g., "When a decision is going to be made, we hold a meeting and take a day to make sure we all agree..." [Interview_27]), leaders protect their own representative credibility.

Workers' escalation practices progress through levels of authority when AM's gaps are not addressed. They move from localized representation, for instance, to collective meetings with

management where their experiences are discussed. As with representation strategies, escalation is used when operational gaps are persistent and widespread:

In fact, some time ago, about three years, two and a half, three years ago, we had a meeting where the managers sat down. And this was a topic that I brought up. We talked about how the internet was failing a lot. So, the discussion took place. [Interview_37]

Escalation also is used when gaps require intervention in questions of authority:

We invited leaders, housekeeping, HR, management, manager of housekeeping [to a meeting]...the same issue came every day. They [GRAs] use the device but they don't have control of the device. You can get [room number] 345, for example, on your device. As soon as you get 345, you don't see 345, they add 347 for you. They're getting mad. It's like stop messing up with my device. I need all my board to be completed in the morning. So we asked the manager...you have to respect the housekeeping. That means you have your plan in the morning before starting giving rooms to ladies, assigning rooms...[Interview_31]

Leaders also bring union representatives into interactions with management, especially when confronted with punting. As one leader explained, “We go to the manager, right? But when the manager says, ‘I can’t do anything,’ that’s when we talk to the union” [Interview_38]. Other leaders raise issues in regular meetings organized between the union and employers, discussing items such as better Wi-Fi connectivity or the desire to self-sequence.

Leaders also escalate by invoking rules in collective bargaining agreements, effectively holding up AM gaps against rules, negotiated by the union and management, to seek redress:

I know the rules. So if I have three floors, I clean only seven rooms. Some of my coworkers that are new or they don't know the rules, they [managers] take advantage of them. Well, in UpKeep, they can keep adding rooms on your UpKeep, on the device...According to them, they couldn't see if you already traveled three floors.³ If you don't bring it up to them, they won't know. I said, ‘How is that possible? You are facing your computer, you'll see that I already traveled three floors and then you keep giving me more rooms.’ [Interview_24]

³ Collective bargaining agreements typically limit the number of floors a GRA can be assigned to in one shift; if the limit is exceeded, credit, point, or room reductions in their daily assignments result.

In some cases, leaders and their unions have secured written agreements that aim to curb room assignment changes and to allow GRAs to effectively self-sequence their boards using workarounds that entail manipulation (e.g., pressing “return later” or “do not disturb” on successive rooms in their list until they arrive at the one they want to clean). While some respondents report using manipulation and two mention sharing how to manipulate with coworkers, many described manipulation as being discouraged, risking managerial scrutiny. As one GRA stated, “I understand it [manipulation] is not good because we have to follow the rules even if we don't like or agree with them... We could get reprimanded if we don't follow the rules. [Interview_21]. Another explained,

You cannot say, ‘No, I'm going to put it on hold and work on the adjacent room instead.’.... You will have a problem with the manager because you are not following the instructions. And that aspect is not yet mentioned in the contract. It is already at the discretion of the manager. [Interview_20].

In cases where agreements regarding manipulation are reached, union leaders have negotiated the right to manipulate UpKeep, without repercussions, into formally binding language, reasserting their control over sequencing decisions. In these instances, they enact a highly consequential form of governing work, where rules governing AM's use change in accordance with workers' interests.

Governing work as brokerage practice. In brokerage terms, leaders' governing work is representative, aimed at promoting and protecting the interests of workers that they represent. Whereas stabilizing work maintains AM viability through local repair and coordination to keep AM workable, governing work focuses on negotiating how AM is used by inserting workers' interests into managerial decision-making about algorithmic systems.

Leaders turn to governing work when coordination problems exceed the limits of local repair, particularly when issues become widespread, persist despite troubleshooting, or require

managerial authority to resolve. Under these conditions, they aggregate and interpret workers' concerns and translate them into collective claims that are elevated across labor-management boundaries structured by power asymmetries. Escalation becomes necessary when the limitations of informal, shop-floor representation become apparent.

To maintain legitimacy with managers while advocating for workers, leaders demonstrate a willingness to work with AM rather than rejecting it—for example, by discouraging manipulation of the system—and by collectively calibrating when and how to escalate. At the same time, governing work is not limited to buffering the labor-management boundary. Leaders also engage in connecting practices by facilitating the interaction of each party, for example by encouraging workers to surface issues, approach management collectively, or participate in formal meetings. This repertoire of practices shows how representative brokerage, while rooted in union leaders' institutional role, becomes reoriented toward the governance of technologies.

DISCUSSION

This study shows how union leaders in hospitality both adapt and extend their representative roles in response to tensions at the intersection of technological systems, managerial authority, and frontline worker experiences under algorithmic management. We argue that these tensions are not resolved through technological design, management intervention, or frontline workers' adaptations alone. Instead, they require ongoing social mediation. Union leaders leverage their intermediary position to broker between workers, managers, and technological systems.

Specifically, we identify two distinct forms of brokerage work: *stabilizing work*, through which they stabilize algorithmic coordination among workers by making AM workable, and *governing work*, through which they make workers' experiences with technologies tractable and

negotiable via strategic escalation with management. While leaders use stabilizing work to absorb, fix, or bypass operational gaps on their own, they shift to governing work when operational gaps become widespread and persistent or when they are concerned primarily with questions of managerial and technical control. Through these coordinative and representational processes, leaders reshape algorithmic coordination and governance in ways that both privilege workers' interests while also preserving managerial commitments to AM adoption.

Theoretical contributions

This study makes three primary theoretical contributions.

Contribution to brokerage theory. First, we contribute to brokerage theory by showing that brokerage in contested technological environments cannot be understood solely as knowledge translation and integration (e.g., Waardenburg et al., 2022). Rather, we show that brokerage in these contexts is inherently political, making brokerage not only coordinative but also representative. This is especially the case in contexts where brokers are accountable to worker communities. Our research thus builds on other efforts that aim to understand how brokerage enables less powerful actors to promote their interests (e.g., Currie and White, 2012)

Our findings extend brokerage theory by specifying how different forms of brokerage practices emerge from similar positions and contexts. Prior research shows that different kinds of brokerage processes may address different kinds of coordination problems, and that relational work that stabilizes relationships is often required so that coordination becomes possible. For example, Lingo and O'Mahony (2010) show that music producers who broker creative work shift between competing brokerage practices depending on the type of ambiguity they encounter at various stages of song production. Kellogg (2014) similarly finds that different brokerage practices from lower-status workers in a healthcare setting vary in how successfully they support

the implementation of healthcare reform, namely by whether they align with higher-up professionals' authority and expertise.

Building on this insight, our research shows how brokerage may vary according to whether brokers are attempting to stabilize a technology operationally or govern authority over the technology across organizational hierarchies. Stabilizing work addresses immediate coordination breakdowns while maintaining workers' trust and preventing disruption, while governing work addresses recurring or authority-related tensions by translating issues into organizational problems. This highlights how brokers rely on different strategies to bridge across actors and stabilize the constituencies they represent so that representation is possible.

Our findings thus suggest a mechanism at play: that stabilizing work enables effective representation through governing work. Through stabilizing work, leaders build trust and credibility by helping workers navigate AM's gaps. This, in turn, serves as a foundation for elevating workers' experiences upward, to management. Moreover, each strategy is associated with different relational practices that stabilize relationships so that brokerage is possible.

Through stabilizing work, leaders build trust and credibility pertaining to AM—a domain around which rules, and leaders' roles, are unclear. They reconcile workers' tacit, embodied experiences of housekeeping work and frictions with AM, preventing disruptions that intensify uncertainty and time pressure. Leaders also engage in interpretive work, helping workers reframe AM as a source of fear into a manageable problem. They make these interpretations tangible by addressing workers' experiences through teaching, troubleshooting, and improvising. These practices manage potential frustration but also help leaders maintain legitimacy as competent and capable representatives.

Because stabilizing work is buffering, it achieves algorithmic coordination without risking managerial oversight or repercussions for failure to use systems like UpKeep effectively. By resolving breakdowns on their own, leaders reduce the need for managerial intervention while also accumulating knowledge about persistent and widespread problems. This allows them to later translate gaps to management, making workers' problems with AM governable.

With this foundation in place, leaders engage in governing work that is supported by distinct relational practices with management. They translate gaps into operational terms to make them legible. They turn workers' issues into evidenced problems by documenting them via recognized channels (e.g., through message boards on UpKeep). They demonstrate pragmatic awareness of managerial constraints with AM, recognizing, for example, that managers may not understand the technology fully or that they are unaware of how coordination problems unfold on the floor. These practices illustrate how leaders engage in role caretaking with multiple actors, carefully managing their own reputations to be effective intermediaries.

Leaders' engagement in role caretaking is particularly evident when considering their handling of manipulation. As practice, manipulation allows workers to regain control over decision-making via sequencing and thus their workflows, which enables them to calibrate physical labor. Manipulation is thus an individual adaptation that, if diffused, protects workers from narrowing spaces of discretion. Yet while some leaders described using manipulation practices themselves, and two mentioned diffusing it, others refrained from sharing such practices, concerned that doing so could undermine their credibility with management. This reflects the idea that brokerage positions are fragile (Halevy et al., 2019; Pawloski and Robey, 2004) and require careful calibration of reputation (Boari and Riboldazzi, 2014).

An additional theoretical insight on brokerage from our study concerns the role of technical skill in enabling brokerage processes as they relate to technology. Prior research shows that technical skills enable brokerage by enabling actors to translate across domains (Fleming and Waguespack, 2007). Our findings extend this insight by showing that technical skills are also a source of political legitimacy and necessary for stabilizing and governing work, making leaders' role in relation to AM qualitatively different from their broader representative roles.

Technical skills have a dual role in their brokerage practices. On one hand, skills enable leaders to diffuse teaching, workarounds, and improvisation. Indeed, leaders in our sample who did not engage deeply in stabilizing work often described their own limitations with UpKeep; they were aware of functionalities that were possible (e.g., communicating with supervisors) but confessed to being unable to perform them. In contexts where formal training is limited, leaders' ability to impart and diffuse technical knowledge through social relationships is crucial to building trust and influence. On the other hand, symbolically, technical competence also signals leaders' acceptance of AM rather than outright resistance. Leaders demonstrate this when they engage in collaborative sensemaking with managers or approach supervisors for help. This suggests that through skill-building, leaders maintain legitimacy by demonstrating commitment to AM while supporting instrumental and political dimensions of brokerage.

Contribution to research on AM in traditional organizations. Second, our study contributes to research on AM in traditional organizations. We move beyond accounts centered on individual worker adaptation—resistance, gaming, and the like—as a response to contested technologies, largely centered on platform work, to show how processes of social mediation can not only stabilize but also govern AM systems in organizations while ameliorating contestation. In line with work that conceptualizes algorithms as socially constructed through the interplay of

technological frames and everyday practices (Heiland, 2025), our analysis highlights how representative intermediaries actively shape this construction by channeling workers' experiences into organized action. This reframes contested technologies not simply as sites of struggle but as embedded within ongoing processes through which its use is negotiated.

Contribution to studies of technology and work. Third, we contribute to studies of technology and work by extending practice-oriented perspectives on technological change, which emphasizes technologies are enacted through ongoing, situated use, as organizational actors continuously interpret, improvise, and negotiate them (Orlikowski, 2000). Research on the social construction of technology has similarly argued these processes are deeply conditioned by structural factors such as organizational arrangements and institutional rules (Klein and Kleinman, 2002). Our findings build on these perspectives by showing how union leaders in our setting play a central role in these recurring processes by embedding structural concerns, such as authority and bargaining power, into social practices through which work is coordinated with AM. In this way, they participate in constituting “technology-in-practice” (Orlikowski, 2000: 411) that shape how algorithmic systems are sustained over time.

At the same time, our findings highlight an important tension in prior work on technological implementation. Although leaders' use of stabilizing work helps facilitate algorithmic coordination, it may also mask the true extent of gaps and prevent technological or managerial interventions that could otherwise fix them. This resonates with recent research showing that actors often absorb the burdens of imperfect technology implementation through workarounds that sustain performance while obscuring underlying dysfunctions (Beane, 2023). However, our findings extend this insight by showing that leaders do not simply buffer or absorb these tensions but shift brokerage strategies to ones that make intervention possible.

Practical implications

Our findings carry important implications for organizations implementing AM. Our study suggests that its successful integration depends on the organizational arrangements through which ongoing breakdowns are mediated and governed. In practice, this shifts attention from the design of algorithmic systems to the social infrastructure that surrounds them.

First, our findings point to the emergence—and necessity—of intermediary roles that mediate between algorithmic systems, workers, and management. This aligns with a growing body of research highlighting the need for new occupational roles and competencies to support the use of algorithmic technologies (e.g., Waardenburg et al., 2022; Gal et al., 2020; Kellogg et al., 2020; Henke et al., 2018), such as “algorithmic brokers” (Kellogg et al., 2020) or “knowledge brokers” (Waardenburg et al., 2022) that facilitate adoption by translating opaque algorithmic outputs and aligning practices between different parties. Our findings extend this view by showing that brokering work is not limited to knowledge diffusion or integration but also entails representing and negotiating workers’ interests when algorithmic systems generate persistent tensions. This suggests that organizations implementing AM should anticipate the need for such brokerage and consider how it is supported.

Second, our findings also highlight that building capacity to sustain AM requires rethinking training as an ongoing organizational process rather than a one-time intervention. Existing scholarship on new forms of work around algorithmic technologies often include the presence of technical experts who broker knowledge about the system—for example, vendors who elevate worker feedback (Myers, 2023) or internal specialists who interpret algorithmic outputs in collaboration with designers (Waardenburg et al., 2020). Yet, as AM diffuses into traditional organizational settings, such expertise is often limited or altogether absent. Even when

introduced as “off-the-shelf” solutions, these systems require substantial reconfiguration of routines, knowledge, and coordination practices to function effectively in context (Kellogg et al., 2020). In the absence of sustained access to technical experts, this burden shifts inward, falling on workers and intermediary actors who must collectively develop practices and skills to sustain the system. This suggests that organizations should invest in distributed and ongoing forms of learning, including equipping intermediaries to act as local trainers and troubleshooters, supporting peer learning networks, and preparing managers to engage with system limitations.

Third, our findings highlight the importance of participatory and interactive approaches to implementing algorithmic systems (Spektor et al., 2023). Many of the gaps we identify can neither be fully anticipated at rollout nor addressed through a single actor alone. Organizations should therefore create ongoing mechanisms through which workers’ experiences can be surfaced and incorporated into system adjustments. Such mechanisms may be particularly important in settings where formal representation is absent.

Limitations and Future Directions

This study has limitations that inform the interpretation of our findings and open avenues for future research. First, our empirical focus on unionized hotel housekeeping allows us to observe representative brokerage in a context where workers’ interests are formally recognized and leaders are institutional representatives of their coworkers. This arrangement may amplify the visibility and enactment of representative practices, including their extension into the mediation of algorithmic systems. In contexts where worker representation is absent or weaker, similar coordination breakdowns associated with AM may be addressed through different mechanisms, including managerial discretion, informal peer coordination, or individual adaptation. In our study, we are less able to specify whether and how such representation—and

the brokerage practices that follow from it—emerge when workers lack formal channels of collective voice. Future research should examine how AM becomes normalized and sustained in non-union settings and whether similar forms of brokerage arise.

Our reliance on data centered on workers’ and union leaders’ accounts further shapes the scope of our analysis. While this approach allows us to capture how AM gaps are experienced and mediated in practice, it provides limited insights into how these dynamics are interpreted and acted upon by other actors, such as managers and system designers. Although our data includes instances of managerial response, they do not allow for systematic comparison across labor and management. Future research that incorporates these perspectives could clarify how brokerage unfolds as a multi-sided process, and how competing interpretations of algorithmic systems are reconciled (or remain unresolved) across hierarchical positions.

Our findings are most likely to extend to organizational settings in which AM does not simply inform decisions—for example, hiring and screening algorithms and performance assessment analytics—but actively organizes how work is carried out in real time. In such contexts, the use of these systems is closely intertwined with everyday coordination, making technical breakdowns difficult to isolate or resolve at the level of individual workers. Future research may therefore parse out how brokerage practices vary depending on the nature and function of AM technologies (e.g., Parent-Rochelleau and Parker, 2022).

CONCLUSION

As algorithmic management continues to spread throughout traditional organizations in sectors like healthcare, retail, warehousing, and hospitality, attention to the social processes which sustain technological use, and how it accounts for experiences and interests of different stakeholders, is critical. This is especially the case when such technologies are grounds for

contestation. The current study details a novel set of brokerage practices, stabilizing work and governing work, through which frontline workers in union leadership positions both stabilize algorithmic coordination and negotiate algorithmic governance in their workplaces. Through these practices, leaders protect and promote workers interests as they relate to work under algorithmic management systems while also ameliorating potential for contestation. Attention to similar roles and practices can foster worker input into technological arrangements, particularly in hierarchical contexts where algorithmic technologies affect both day-to-day operational routines and broader questions of control at work.

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Table 1: Data sources

Data Category	Description	Research Task
<i>Background data: Revealing boundary-spanning gaps</i>		
Workshops and prototyping sessions (2021)	Three 1.5-hour workshop sessions (33 GRAs) and two 1-hour participatory prototyping sessions with a subset (5 GRAs)	Explore GRAs' everyday work experiences; identify broad areas for further inquiry; understand how GRAs experience AM design and configuration, and ideas for alternative design features
Site visit (2022)	One site visit to west coast city A: 5+ hours of recorded and transcribed audio and 20+ pages of fieldnotes (65 mini-interviews with GRAs, managers, IT professionals, etc.)	Develop contextual understanding of hotel operations; map out how AM is used on the ground; identify emerging patterns across roles and properties
Background interviews (2021-2024)	Informal interviews with corporate officers, hotel management, technology vendors, and union researchers	
Focus groups (2024)	One 1.5-hour focus group in a west coast city B (5 GRAs) One 2-hour focus group in a midwest city (7 GRAs)	Deepen understanding of routines, decision-making, and workload, informing parallel survey instrument development
<i>Primary data: In-depth, semi-structured interviews with union leaders</i>		
Interviews (2022-2023)	Semi-structured interviews; 40+ hours of recorded, translated, and transcribed audio (41 GRAs)	Conduct primary data collection aimed at directly addressing the research question of union leaders' role with technology

Table 2. Primary interview respondents

<i>Demographic Characteristics</i>	
Average age (years) ^a	47.6
Gender	(no.)
Female	38
Male	2
Race/ethnicity	
Latinx	20
Black or African-American	7
AAPI	10
White (non-Hispanic)	0
Unknown	3
Born outside of US ^b	30
First language other than English ^c	29
<i>Employment background</i>	
Average years in current job	14.4
Job title	(no.)
Guest room attendant/housekeeper	33
Houseman/runner	2
Clerk/supervisor	3
Other	2
Years since AM implementation	
Less than 2 years	8
2-5 years	12
6-9 years	4
10+ years	5
Unknown or unsure	11
<i>Unsure, but after I started working</i>	3
<i>Unsure, but before I started working</i>	3

^a Excludes four missing values

^b Includes Bangladesh, Cambodia, China, Democratic Republic of the Congo, Dominican Republic, Ecuador, El Salvador, India, Jamaica, Mexico, Nicaragua, Mexico, and the Philippines.

^c Languages include Tagalog, Ilocano, Spanish, Punjabi, Bengali, Gujarti, Cambodian, and Cantonese.

Table 3. Boundary problems: Gaps in the algorithmic management system

Worker-identified dimension	Corresponding managerial dimension	Tension to be overcome
<i>Sequencing: Gap between system logic, embodied labor, and control</i>		
Loss of control over sequencing	Enhanced efficiency through AM-augmented sequencing	GRAs perceive AM to be impractical and inefficient
Embodied experience	Operational efficiency	AM is associated with increased physical effort and temporal pressure
<i>Centralization of coordination and perceptions of surveillance</i>		
Frequent changes to workflow paired with narrowed channels of input	Centralization of control over adjustments	Narrowing channels through which to account for GRAs' input
		Perceptions of manipulation
Perception of surveillance	Managerial oversight	Pressure and discomfort
<i>Operational gaps: Skills and infrastructure</i>		
Clarity and transparency of technological features	Detailed, customizable technological configuration	Confusion, workarounds and extra coordination
Human capital and learning	System configuration and training	Skill-based challenges related to language, literacy and digital literacy. Heightened stress and underutilization of AM; feeling unsupported or unprepared
Uneven and unstable technical infrastructure	Digital coordination	Delays, interruptions, and coordination failures

Table 4. Stabilizing work: Peer-to-peer practices that fix, absorb or bypass gaps in the technical system

Practice	Description	Illustrations
Teaching via hands-on demonstration	Leaders diffuse skills through hands on demonstration or explanation	Interviewer: When someone comes to you and asks you for help, what would you typically do? Respondent: So you look in the app, it has an icon. So I hit that. It shows me different departments, like lighting, bathroom, and stuff like that. Let's say the safe is closed, so I click the safe and I put the order for someone to come and open the safe. Ok. And, and, and when I finished doing that, it sent me a number, like the order was made. So I know that it goes through. Interviewer: So you kind of go through the app with her and show her? [Respondent agrees] [Interview_22] There's a lot of input to do, which for some of my coworkers, it's not so familiar. And then they forget. Then they will come to me and say, Ava, what do I need to do? So I'll help them and show them how to do it. You know, it takes time. [Interview_41] I help the people. I help the lady. "Look, you gonna put this, this, this, this. See?" [Interview_2] As a trainer... I'm training housekeepers and there are younger generations now. It's still hard for them to use UpKeep. If they are working on their own, they still have to call me and ask, 'Oh, how am I gonna go in there [in UpKeep] and go like this, like this and like this?' You still have to guide them with the UpKeep. [Interview_30] So we'll just be on the floor and be like, oh, did you get how to create a[n] UpKeep [referencing a work order]? And I'll be like, yeah, let me show you. So I'll show them how to create a[n] UpKeep. You go here, you press here, you enter this, and then you send it. But there are ladies...not used to technology [Interview_3] One thing I can say in the casinos and for sure in housekeeping is 'each one teach one'. So even if we have to huddle around it [the device] at lunch or outside taking a smoke break or before we come in to clock in, over a cup of coffee, a tea...there's always questions, 'Well, did you know you can do this here? Did you know with this, it'll also show you this?' So, you know, networking as well. [Interview_19]

Peer troubleshooting	Leaders help GRAs troubleshoot faulty infrastructure or other technical problems	Some people didn't understand like, what goes after the [login code] and are like, why is it still circling? All right, this is what you do. You just go up out of it, just “x” up out of it. Let it refresh itself because maybe the system, the wifi hasn't connected to your server yet. Or you have to stand a certain way in a certain place in a hallway to get your wifi to hit. Or maybe the iPad is just bad, so now you gotta give it back. [Interview_9] They come and they come and ask for help and they will say I can't do anything on my device because it keep buffering. I can't see anything, she said. So I will have to explain to her how to do it. First of all, you have to close everything that is open and then you have to go to the wifi, turn off the wifi and turn back on the wifi. And then you have to wait till it gets connected to the wifi. Then you log in again, and then once you log in, it takes a while to bring up your station, the room numbers. [Interview_24]
Improvisation: Quick fixes or “patchwork”	Leaders’ enable informal peer support via workarounds that are quick fixes	They call me be Now do me one favor. I say, yes. Can you send this, uh, information to the, uh, facility department? So I was log out my HotSOS and then I put it her number in my device. And then I was send a message to the, uh, department, uh, facility department for her. [Interview_13] Yes, especially a lady named María, she doesn't handle the phone well. Many times, she rushes down to my floor and tells me, 'Carita, carita [a term of endearment], please, please, get me out of this application where I can't make a change to the room, and put it for me because I don't understand this anymore.'.. I tell her to lend me her phone and try to help her. And if not, what I do is, I close my phone. And if my phone is working, I close it and tell her to open it with her password. And from there, I punch in the room numbers. That's what we do. [Interview_39] Until now they're not used to technology. So it's a little difficult for them. So they're always coming to me. Can you create a hotspot for me? Can you request this for me? [Interview_3]

Table 5. Governing work: Boundary-spanning practices that surface and negotiate gaps

Practice	Description	Illustrations
<i>Constructing governance issues</i>		
Gathering information	Gathering information about gaps in technical systems, where GRAs are having problems, through individual and collective conversations, checking in, observation	Due to the signal issues, there are times when, let's assume a person thinks they've initiated a room. I've seen this because when I walk through the halls and, currently, my role involves collecting trash from the halls, I talk to the girls sometimes, and they tell me, "Hey, I lost the signal and everything." Sometimes they mark the room as initiated, as if they started cleaning it. However, when the signal drops, it turns out they didn't have it initiated. In other words, it wasn't marked as started. [Interview_37] In fact, they [temp workers] hardly come to me much. That's why sometimes I ask how things are going, and they start telling me, "Well, I'm having problems with the iPad or having Wi-Fi troubles," things like that. [Interview_37] A lot of people say, 'I don't like it [UpKeep].'... Well my sister and two ladies are, one day they told me, 'Oh, the device is not working. I'm gonna throw it away from the window' <laugh> because I'm behind and this is not working. I don't know which room is next.' [Interview_2] We usually have huddles, team member huddles every morning, and that's where we usually bring up the issues and then... that's where everybody just speaks on what's going on. If it's like majority of the people, then they'll stay behind and talk about it. [Interview_3]
Surfacing gaps to management: Joint sensemaking	Raising issues with management with the aim of making sense of AM	I know that every time that it's a checkout room, the room number would appear with a small, like a picture of a luggage on the side. But sometimes when it's an occupied room, it will show a green arrow on that. But then one day, it was a luggage and also a green arrow all together. I didn't know, I was like, 'Hey, what is this? Should I get into the room or what?' So I called one of the system managers, and she didn't even know what that meant. And so they called the front desk and said, 'What does this mean?' [Interview_6] Sometimes they use difficult words for us to write it. Let's say like for example...you wanna do an order for the fridge that is not working. You don't know how they write it there [in the search function that provides a shortcut for a dropdown list of work orders]. So you write fridge, this, that, and you cannot find how to put the order. 'Cause they have this specific word and if you don't put that word, you're not allowed to do it. So I have to pull the manager, how do I do this? And they're like, oh, let's try. Sometimes they don't even know. And they're really guessing with us." [Interview_22]

Surfacing gaps to management: Encouraging others	Directing others to surface problems and make them visible to management	And she [my coworker] says, look, they gave me this phone, and I don't know how to use it. So I start telling her what little I can do. I tell her, 'Look, don't get frustrated. If they [management] see that you haven't punched in any room, they will come, and they will start explaining to you again. Let them come because they themselves gave us these phones. That's what I also do.' [Interview_40] Message your supervisor off of there [UpKeep]. Let her know you can't punch your rooms because the device is not working. And with that, if the manager, I mean if the supervisor doesn't hit that person back within like an hour, hour and a half. Me, I would log myself outta my device and let them log in on my device so they can punch their rooms. I see. Then I would bring it to management attention. Like your supervisor is not answering the messages. [Interview_9]
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Representation

Self-representation	Representing own experiences of AM gaps and seeking remedy	So, what I do is, when I go for my lunch at 11:30, if the phone hasn't been working for me, I come back, and I'm not there anymore. I tell them, look, these are the ones who cleaned. Oh no, but you were marking it on the phone. What's, uh, no, but there was no internet. So why are you demanding that room from me? I haven't cleaned it because there was no internet. I didn't see it on the phone. So, that's what I do, I inform the supervisor. Look, these are the ones who cleaned. [Interview_40] So basically, for the small things like the bathrobe that we have to go through very complex steps...it's not like, one click, [one] function, then it's updated. We have to go through several steps and I've been talking with the manager to see whether we could implement an easier function for that. [Interview_16] I'll tell you that on UpKeep, every day I clean eight rooms, and I know I clean eight rooms – suites – but at the end of the day, sometimes the UpKeep, it will say, I only cleaned seven rooms. So I asked that to my director, 'How come it only says I only have seven room clean when in fact, I did eight rooms?' And they said, 'There's a glitch., I said, 'There's a glitch? I don't want later for you to tell me I don't have enough credits, when I did my credits. Because I want you to know that I cleaned eight rooms, not seven rooms.' Because, you know, when you don't have enough credits, they will write you up. [Interview_41]
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Representing others	Representing interests of coworkers to management, negotiating or advocating on behalf of others	So here we are in a situation where you are cleaning these rooms, you got to put all this stuff in UpKeep. It was just amazing to me, the way we're doing this. So I just, every now and then, when I get a little frustrated I go downstairs and ask funky questions like, "Why we don't have coordinators? I'm not understanding why you took the coordinators from us, knowing that every individual up there work in these rooms, is working on the clock and they working against time." [Interview_34] If there's like a big issue, then I usually walk down with the member and explain to management what's going on and for them to be able to fix it. So they usually call like IT, then like, can you fix it? Um, you know, it's not going to the Spanish language or, you know, whatever needs to be. [Interview_3] And if somebody's new, [if I'm not there, another steward and I] we'll call management ourselves on the phone. Like, 'Listen, this new girl, she just started. They gave her these rooms, she don't know what to do. Somebody didn't show her how to punch the rooms in [on the device] correctly. Can you have somebody go up and show her or send her with somebody to train her? [Interview_9]
<i>Collective deliberation</i>		
Collective deliberation	Consulting with other leaders about when and how to escalate issues to management or the union.	The management, when it comes to UpKeep, they always blame the corporate. So what we say, we as the shop stewards, then why don't you get together with the corporate? Or we can get together, you know...we need to be productive. [Interview_24] [Interviewer] And you are in constant communication with the people you work with? [Respondent] Yes. And when a decision is going to be made, we hold a meeting and take a day to make sure we all agree on a proposal or decision. [Interview_27] When there is a problem, we gather or discuss it among colleagues. We have to contact them [management] to come [talk with us]. So, they are accessible. They will inquire and ask what has happened. [Interview_38]
<i>Escalation</i>		
Escalating through formal authority channels		When there are moments where someone doesn't understand, or something seems complicated, we ask a manager to have a meeting where they can explain and listen to housekeeping questions about UpKeep, so we can better manage the application. [Interview_21] Sometimes we go to the boss, sometimes to the supervisor, and sometimes things get resolved. But sometimes, the supervisor doesn't have the authority. We go to the manager, right? But when the manager says, "I can't do anything," that's when we talk to the union.

	We talk to someone who represents us in the union, saying, "Look, this is happening. I talked to my supervisor, went to human resources, talked to my boss, and it's not working." That's when we call, "Hey." That's when they start addressing and finding solutions to the problems. [Interview_38] Majority of the time they like, oh, gimme a minute. I'm a little busy. I sure will. So I will wait for them because you have to fix it. So if you don't fix it, I'm getting on the phone with the union, I'm calling my rep like, Hey Michelle, listen, I got you on speaker. This is the problem. If it is like 10:30 and my girls still ain't upstairs doing their job, guess what? You gotta take some of the rooms away because now you're being a smart ass. Excuse my language. So yeah, now you're being in, now you gotta take, so if I don't start my rooms until 10 o'clock, you gotta take two of those rooms away. [Interview_9] But, uh, we, shop stewards, and the union, they're trying to get something about the UpKeep on paper....In writing. In writing, because a lot of things that are going on in UpKeep, you know, uh, not working according to the housekeeper. [Interview_24]
Enforcing rules	Yes, it is. Uh, we have the housekeeping language that when you travel three floors, okay. There's a room reduction. And on the, on the device, they were saying that if there is a rollaway in the room checkout and, and it says it recorded on the device, but I'm trying to find where it is because if you, if there's a three checkout rooms and every, on those three, there's rollaway in each room. They said that we will get credit for room reduction, but I don't see in the HotSOS that it listed roll away. So you show it to the floor manager, and that way you can get credit. [Interview_24] Some of them do listen [to our agreement on self-sequencing], but then on the following day, they keep doing the same thing...Okay, here we go again. They're not listening, you know, they listen to you and then after a day they go back the same thing. So you have to keep talking to them. It is like organizing people, workers every day. You have to remind them of something like that. But then, you know, I understand also because supervisors are being, if they don't do it, then the director of housekeeping will get them, which I understand that, you know. [Respondent 41]