# Part of the Conversation: Workforce Professionals' Perspectives on the Roles and Impacts of Workforce Technologies



CONNIE W. CHAU, Northwestern University, USA
KENNETH HOLSTEIN, Carnegie Mellon University, USA
MICHAEL MADAIO, Microsoft Research, USA

Amidst recent enthusiasm for data-driven technologies in workforce development, prior HCI research has explored job seekers' perspectives to inform the design of new technologies that could support their job search. However, in practice, the process of looking for work is often embedded in local workforce development ecosystems, where networks of organizations provide a range of services, from employment consulting, to resume workshops, to job skills training programs. Although prior CSCW work has explored the role of algorithms in social services, there has been little work investigating how algorithmic systems may shape workforce development professionals' interactions with clients and how they might be better designed to complement these professionals' work and responsibilities. To begin to address this gap, we conducted an interview study with five workforce development professionals in the US in both management and client-facing roles. Our findings contribute to research on how algorithmic systems are shaping workforce development, shedding light on the importance of the relationship building work that workforce professionals engage in with clients, the difficulty in maintaining boundaries in the face of resource and information challenges, and the ways that workforce development technologies are shaping the work of workforce development.

CCS Concepts: • **Human-centered computing → Empirical studies in HCI**.

Additional Key Words and Phrases: workforce development, service providers, public sector algorithms, workforce technology

**ACM Reference Format:**
Connie W. Chau, Kenneth Holstein, and Michael Madaio. 2022. Part of the Conversation: Workforce Professionals' Perspectives on the Roles and Impacts of Workforce Technologies. *PACM on Human-Computer Interaction* 6, CSCW2, Article 410 (November 2022), 22 pages. https://doi.org/10.1145/3555135

## 1 INTRODUCTION

As automation shapes and reconfigures the landscape of work [e.g., 15], there are increasing calls to invest in ways to help workers remain competitive [e.g., 4]. Today, these efforts often revolve around the use of data-driven approaches to support workforce development, often supported by large investments from technology companies [e.g., 35, 36]. The process of looking for work is increasingly mediated by digital tools, from searching for job listings, to finding skills training programs, to submitting applications to employers [32, 64]. This emphasis on workforce data analytics sits within a larger tradition in workforce development, exemplified in the 2014 Workforce

Authors' addresses: Connie W. Chau, conniechau2026@u.northwestern.edu, Northwestern University, 633 Clark St, Evanston, Illinois, USA; Kenneth Holstein, kjholste@andrew.cmu.edu, Carnegie Mellon University, 5000 Forbes Ave, Pittsburgh, Pennsylvania, USA; Michael Madaio, michael.madaio@gmail.com, Microsoft Research, New York City, New York, USA.


2573-0142/2022/11-ART410 $15.00
https://doi.org/10.1145/3555135

Innovation and Opportunity Act's call to develop data infrastructures to "enhance service delivery... and improve coordination" [68].

The CSCW and HCI communities have explored ways to design technologies to support job seekers, including identifying skills, leveraging social support networks, and developing career pathways [e.g., 18–23, 53, 54, 71]). As the use of data-driven algorithmic systems grows increasingly pervasive in social services and the public sector more broadly, research in CSCW and adjacent fields has explored how such technologies are impacting the work of frontline social service providers [e.g., 2, 3, 5, 6, 43, 47, 59]. However, these bodies of work have focused on what job seekers want from technology and, in public services more generally, how technology is shaping social service providers' interactions with clients. As such, given the increasingly ubiquitous role that algorithmic systems are playing in the larger workforce ecosystem [e.g., 32, 57, 63], it is critical to understand the perspectives of the workforce development professionals at public, private, and nonprofit workforce organizations, many of whom support people throughout the job search process or coordinate job skills training programs at the ecosystem level [25, 38].

As data-driven algorithmic systems are increasingly developed to match job seekers to job openings on the basis of their skills [e.g., 11, 51, 67]), and with much prior research in this space primarily focusing on the role that technology might play in supporting job seekers, we sought to understand how technology was shaping workforce development professionals' interactions with their clients,[1] as well as other actors and organizations in the local workforce ecosystem. As an initial step in this effort, we conducted semi-structured interviews with five workforce workforce development professionals from four workforce organizations of various types in a mid-sized city in the American Midwest. Specifically, we investigated the following research questions:

- RQ1: How do workforce development professionals support clients in accessing workforce development services?
- RQ2: How do workforce development professionals perceive the roles and impacts of technology in their work?

In contrast with much of the prior HCI work on technology in workforce development that has focused on designing technology to support the goals, needs, and challenges of job seekers—and prior CSCW research that has focused primarily on studying the use of technology by frontline social service providers—we sought the perspectives of a complementary stakeholder group in the workforce development ecosystem—workforce professionals comprised of both frontline service providers who interact with clients as well as management who coordinate the workforce services their organizations provide. In this paper, we identify insights about the relational work that workforce professionals engage in to understand their clients' needs, the systemic challenges they face in managing relational boundaries with their clients, and how workforce technologies are beginning to shape that relational work with clients and their coordination work with other actors and organizations in the local workforce ecosystem (e.g., employers and other workforce organizations). We close by discussing implications of our findings for the design of technologies that can support the work of workforce professionals.

[1] We use "clients" to broadly define the individuals who voluntarily seek and utilize workforce development-related services, which is inclusive of job seekers. Clients—as they are referred to by our participants—may not necessarily be job seekers, as they may have other goals such as job advancement, on-the-job training, or job support.

## 2 CONTEXT

### 2.1 The Workforce Development Landscape in the United States

Broadly, "workforce development" refers to the coordinated efforts of public and private sector policies, programs, and organizations to provide sustainable livelihoods for individuals [41]. Workforce development also differentiates itself from simply education or training with its overall goal of advancing economic development. As such, it is inclusive of a large range of services meant to mobilize and support potential members of the workforce in coordination with local employers. Workforce development often involves services such as job search assistance,[2] career counseling, job training or credential attainment, networking opportunities, resume help, mock interviews, among others. [8].

The current landscape of workforce development in the United States has been shaped by the Workforce Innovation Opportunity Act of 2014 (WIOA), which provides federal funding for workforce development activities in each state, requires states to create four-year plans to coordinate state and local programs to meet the needs of the workforce and employers, and promotes accountability and transparency of programs through data reporting and sharing with the public [29]. Under the WIOA, local workforce development organizations not only provide essential services to employers and individuals with oversight from state workforce development agencies, but also requires that states and their local workforce development organizations collect and report specific performance metrics [28] to receive support and funding.

Unlike its predecessor, the Workforce Investment Act of 1998 (WIA), the WIOA differentiates itself in two crucial ways—a focus on increasing coordination among federal workforce development and other related programs [8] and a data-driven approach to inform workforce development strategies. To guide workforce development strategies, the WIOA's official website provides resources for workforce development organizations, such as access to government databases and online reporting tools. In order to create a more coordinated workforce development system, WIOA establishes a centralized system of "one-stop" centers that provide a single location for individuals seeking employment and training services, in an effort to make the process of discovering and assessing resources more efficient [8]. This one-stop delivery model is reflected in the nation's American Job Centers[3] network where these public, government centers offer training referrals, career counseling, job listings, and similar employment-related services and are often the initial entry point into workforce development services.

*2.1.1 Workforce Development Ecosystem.* The activities of local workforce development systems can be grouped into 7 major functions: (1) provide employment services such as resume help, career counseling, job retention strategies, and reemployment services to explore, secure, and advance careers; (2) provide education and training including online learning, apprenticeship programs, and industry-recognized training to prepare and develop skills for employment; (3) offer supportive services such as access to government cash assistance, food assistance, or childcare fund programs; (4) support employers' human resources needs; (5) develop and coordinate workforce strategies and policies; (6) provide funding and resources to support the system; and (7) improve job quality and access [31]. The first four goals often pertain to services provided to individuals and local organizations, while the remaining three pertain more so to strategic goals for the local workforce development ecosystem as a whole.

[2]Note that although in the United States, people are generally required to be actively looking for a job to qualify for unemployment benefits, there is no legal obligation for them to seek services from workforce development organizations to support that search.

[3]https://www.careeronestop.org/localhelp/americanjobcenters/find-american-job-centers.aspx

Organizations within the local workforce development system generally belong to one or more of four major categories: (1) government and public sector; (2) nonprofits and collaborative entities; (3) employers, industry, and workforce representatives; and (4) education and training providers. *Government and the public sector* organizations include those that receive funding and oversight from federal, state, and county or city governments, including American Job Centers, workforce development boards (i.e., state or local boards that oversee WIOA funding to respond to the needs of the state or local workforce), public libraries, and public social service and economic development agencies. *Nonprofits and other collaborative entities* can include both public and private organizations, such as neighborhood or community employment centers, foundations or philanthropic organizations, or other organizations that act as intermediaries to facilitate collaboration in the local workforce development system. *Employers, industry, and workforce representatives* are small or large businesses that employ the available working population, business and trade associations, or industry organizations that represent workers in specific occupations or industry sectors (e.g., labor unions or staffing agencies). Finally, *education and training providers* include elementary and secondary (K-12) school districts, universities and vocational colleges, non-degree training providers (e.g., industry-acknowledged credentials but not formal degrees), and adult education providers (e.g., English language instruction)—although some other workforce development organizations may provide training services.

### 2.2 Workforce Development in the American Midwest

This research is situated in a mid-sized city (e.g., Detroit, Milwaukee) in the Midwestern region of the United States (e.g., Michigan, Ohio, Pennsylvania), an area that was once the home of the U.S.'s manufacturing, steel, and automobile industries. This region has since been known as the "Rust Belt" following the decline of these industries through a combination of many factors, including the increased transfer of manufacturing work overseas and the increasing automation of human labor in manufacturing [62], leading to a drastic increase in poverty rates in Rust Belt cities since 1970 [27].

Today, Rust Belt cities develop their workforce development strategies to respond to their unique histories and socioeconomic contexts, with some cities investing in industries other than manufacturing, such as education, energy, healthcare, and hospitality [33, 44, 45]. In many Rust Belt cities, workforce development boards often face a mismatch between the qualifications and skills of the workforce and the jobs available in the region, challenges exacerbated by gaps in public transportation to take employees without cars to the available jobs [14], and a fragmented workforce development system that results in duplication of similar efforts, a lack of centralized information about programs available, challenges to sharing best practices across organizations, and difficulty in reliably tracking performance of programs [16]. These challenges, while not exclusive to the Rust Belt, significantly exacerbate the issues faced by workforce development organizations and their clients in this region. In this complex ecosystem, it is thus critical to understand how the introduction of data-driven technologies may change workforce organizations' strategies and workforce professionals' work with clients.

## 3 RELATED WORK

### 3.1 Algorithms in Public Services

As data-driven algorithms enter into public service delivery, the human work of service providers and caseworkers remains a critical part of the process, albeit one that is increasingly mediated by algorithmic decision-systems [e.g., 59]. Data-driven algorithmic systems have been developed and deployed to inform decision-making in social services [30], public housing [37], and child welfare [10, 13, 60], among other social services domains (e.g., [3, 34, 43, 69]). Prior research in CHI and

CSCW has focused on how introducing information technology into social services impacts the relationship between caseworker and client across a variety of public services, including homeless services [17], social welfare services [10, 13, 40, 59], and employment consulting [25, 39]. Prior research has also emphasized the care work that service providers engage in to build, maintain, and repair relationships with clients mediated by sociotechnical infrastructures [5, 6, 17, 40], as well as the discretionary work that public service workers engage in to make such systems fit the reality of people's lives [2, 25, 55, 56, 59].

In their work on the role of information-communication technologies in homeless services, Le Dantec and Edwards identified challenges experienced by case managers working with homeless information systems, including how those systems impacted their interactions with clients [46] and the misalignment of homeless information systems with the particular needs of service providers at varying levels of scale (e.g., local, regional, national) [47]. Other work has explored the "coercive" role of data infrastructures in social services work [5], including the incentives and cultural forces that lead social services organizations to adopt "data-driven" policies and practices, which may impact frontline workers' human work with clients [6]. Verne et al. describe the "work to make the machine work" in automation of tax preparation services in Norway, as tax authorities coordinate resources to manage cases that the automated digital service providers are not able to handle [70], and in workforce services specifically, Dolata et al. describe the work that employment consultants undertake to mediate between macro-level workforce policies and the individual needs of their clients [25].

Alkhatib and Bernstein [2] has argued that there has been a shift from what Lipsky and others have referred to as street-level bureaucratic decision-making [49]—or case workers making decisions to enact policies—to what Alkhatib and Bernstein [2] refer to as street-level algorithms, where algorithms are used to enact policies that may shape people's experience at the margins. In order to make sense of how algorithmic decision systems are shaping public services, Saxena et al. [59] developed a framework that articulated the crucial role that human discretion and bureaucratic processes play in mediating how such algorithms are used in public services. Indeed, as Dolata et al. report for employment consultants, many job seekers feel that self-service job recommendation algorithms do not fit their unique situations, preferring face-to-face consultations with career service providers who can draw on their discretion to "fill the gaps" by mediating between macro-level policies, automated tools, and clients' lived experiences [25].

In social services, Holten Moeller et al.—describing the increasing datafication of social services work—highlight the client-caseworker interaction as a site for intervention, unpacking the relations of care on the part of the clients as well as the caseworkers in their work to contextualize the data about clients as part of a holistic understanding of clients' needs [39, 40], which Dolata et al. build on in their work on the "coping strategies" of employment consulting in making the system work for their clients [25]. In light of these coping strategies of employment consultants for integrating information technologies into their work practices, and in the context of data-driven algorithmic systems entering into a complex workforce development ecosystem, it is critical to understand the work that workforce professionals engage in with their clients, and how increased automation entering into the workforce development ecosystem may fundamentally shape the interactions between workforce development professionals and their clients.

### 3.2 Technology in Workforce Development

In contrast to the focus on frontline service providers' use of algorithms in the public sector more generally, in workforce development, many popular approaches rely on data-driven machine learning models to identify or extract skills in resumes and algorithmically match those to a set of skills extracted from job postings, in order to provide recommendations for job seekers. Some approaches focus on matching job seekers and job postings [11, 32, 48, 51, 67], while others focus

on matching job seekers and employers or recruiters [52, 61]. At a larger scale, other data-driven approaches have focused on modeling the labor market to predict local employment demand to support workforce development decision-making as well as to support job seekers [12, 72].

In contrast with these data-driven approaches, prior work in CHI and CSCW, among other venues, has adopted human-centered approaches to understanding the needs of job seekers for tools to support the job search process. Prior work has used contextual inquiries and interviews to understand the information-seeking processes and needs of low-SES job seekers [20], formerly incarcerated individuals [53], and low-resourced job seekers with limited access to internet [71]. Ogbonnaya-Ogburu et al. [53] found that job seekers often relied on social support from family and friends in their social network to identify job opportunities and use job search tools, and that digital literacy and access to digital technologies was a barrier for job seekers, particularly from under-resourced backgrounds. As part of this, they highlighted the crucial role that job seekers' family and friends, as well as others in the workforce ecosystem, played in supporting job seekers' access to workforce information, mirroring other work from HCI on digital intermediaries in supporting access to information on digital platforms [58] and on mediating social services as well [26].

Building on these qualitative studies, further research in this vein has developed and evaluated design concepts for employment application tools for formerly incarcerated individuals with limited digital literacy [54] and for economically under-resourced job seekers [22]. Dillahunt et al. [22] conducted an iterative design and speed-dating study to elicit job seekers' perspectives on ten different concepts for tools to support job seekers, including concepts for tools to support resume feedback, identifying job skills, interview practice, and social support for job search. Dillahunt and Lu [23] then conducted a more extensive evaluation of a prototype of one of the concepts in the speed-dating study, DreamGigs, to support job seekers in understanding the skills required to achieve their dream job, via a career pathway to develop the needed skills. In that work, Dillahunt and Lu [23] identified the importance of providing job seekers with information and access to resources to achieve their goals, the value of involving them in the design process, and discussed the value of empowering under-resourced job seekers as well as the structural barriers to doing so. However, the focus of this line of research was on the experiences of job seekers and their interactions with their personal networks, rather than on the roles of public sector workforce development organizations and the service providers and other professionals who work at those organizations.

However, in workforce development, the ecosystem of actors includes job seekers and employers, certainly, but also a complex mix of public and private "intermediaries" [42] that provide services directly to job seekers, including face-to-face job search and career services, as well as coordinating and delivering job skills training and certification programs. As data-driven algorithmic systems enter this complex milieu of workforce policies and professionals working at various levels of scale, designers of such systems must be aware of the needs of those workforce development professionals (including both frontline service providers as well as management) in addition to the needs and desires of job seekers (e.g., [20]). In this paper, we contribute the perspectives of such workforce professionals on the roles and impacts of workforce technologies on their work practices.

## 4 METHODS

### 4.1 Data Collection

In order to investigate our research questions about how workforce professionals support clients in accessing workforce development services (RQ1) and how they perceive the roles and impact of technology in their work (RQ2), we conducted seven semi-structured interview with five workforce

development professionals from four career and workforce development organizations in a mid-sized city in the American Midwest, from November 2019 to April 2020. Each interview lasted from 60-75 minutes, and all were conducted via phone or a video chat platform (e.g., Skype or Zoom). While we initially set out to understand how workforce development professionals supported job seekers in the job search process specifically, our interviews with our participants revealed the diverse range of people they served and their roles and responsibilities in the local workforce ecosystem. To address this, we broadened the scope of our original RQ1 from focusing on job-seekers to explore how workforce development professionals support their clients in accessing workforce-related services more broadly (e.g., skills training programs unrelated to a job search). We conducted four of the seven interviews prior to the onset of the COVID-19 pandemic. Then, from January to May 2020, we conducted follow-up interviews with two participants, and interviewed one new participant after the onset of the pandemic (P5). Prior to the COVID-19 pandemic, we asked participants about their interactions with clients, and about their experiences with workforce technologies, particularly as they fit into their work with clients and other workforce organizations, including challenges and what they might want from technology to support their work. After the onset of COVID-19, we asked participants about new (or newly exacerbated) challenges brought about by the pandemic and how they and their organization tried to resolve these challenges. However, the demands on participants' time from shifting their services to a remote delivery model during COVID-19 in 2020 made it difficult to continue to recruit participants and conduct interviews.

### 4.2 Participants

Our paper engages with individuals working in organizations that represent all four types of workforce organizations and involve themselves in all seven types of workforce development activities to some degree (see section 2 for more detail on those types of organizations and activities). This group of stakeholders includes local and state-wide workforce development organizations, career centers, non-profits, and training providers, broadly referred to in this paper as workforce development organizations [38, 42].

We recruited participants via a purposive sampling of workforce organizations, by emailing employees at local workforce development organizations in a medium-sized city in the American Midwest, along with snowball sampling from those participants. In an effort to understand both the broad variety of workforce services available in our context and the responsibilities and goals of workforce professionals at various levels, we recruited participants whose roles included working face-to-face with clients as part of frontline public services, as well as organizing and leading training programs and facilitating relationships between employers and workforce organizations at a system level, among other roles. This range of participant role and responsibilities enables us to not only evaluate experiences that affect frontline service providers, but provide nuance on more systemic challenges that professionals in managerial roles may shed light on. In the following paragraphs, we provide more detail on each participant; see Table 4.2 for an overview of the participants' roles and organizations.

P1 is the director of a career center at a local public library. Public libraries in the local workforce system offer pre-employment services such as resume help, mock interviews, computer classes, and host programs that connect people to potential employers. Local public libraries provide free and accessible resources (e.g., credential & standardized testing books, computers & printers, and stable internet access) and act as a liaison to more specialized or extensive services provided by other workforce development organizations in the region. P1 interfaces directly with community members (e.g., for resume help, mock interviews, and general career counseling), as well as coordinating their staff's responsibilities and shaping the library's broader strategy.

P2 is the chief operating officer of a local community employment center that specializes in supporting young adults with career readiness. The center itself provides a range of services including pre-employment services (e.g., resume help, mock interviews, workshops, etc.), job training, employment support (including providing transportation to employment opportunities), and additional post-employment training and services (e.g., on-the-job training). P2 primarily oversees the center (including planning and marketing events) and works with their employment specialists to generate reports for workforce agencies and funding organizations. As part of P2's role, they do not directly interact with clients.

P3 is an industry product manager at a local workforce development board that oversees local workforce development strategies, allocates both public and private funding, and explicitly works with industry leaders and employers to develop strategies to recruit and retain potential job seekers and employees. P3 partially leads the workforce board's efforts within the health and transportation industries. They actively connect employers with the public workforce development system (as well as funding organizations, training providers, and other service providers), coordinate groups of employers to help identify local workforce priorities and strategies across industries, and help workforce organizations and employers carry out these plans. P3 interacts primarily with employers and industry sector leaders, but they have recently run focus groups with job seekers prior to pivoting to employer-focused work.

P4 is a director at a state-wide re-employment and training service organization that is contracted by the WIOA's one-stop delivery network to oversee two local one-stop centers. These centers provide a range of pre-employment services, employment support, as well as job training (including online training and training scholarships). As they are WIOA-funded, the centers serve all targeted WIOA-targeted populations including veterans and dislocated workers, and as such, they are beholden to the WIOA's data reporting requirements. Not only does P4 regularly engage with other workforce development agencies and employers to coordinate programming and manages staff and administrators at the centers, P4 frequently interacts directly with clients in 1-on-1 meetings to provide a variety of services including career counseling, social service referrals, and resume help.

P5 is a director of adult programs on the same local workforce development board as P3. Most of P5's work involves investing in, contracting, and overseeing community-based organizations that offer workforce development-related services, specifically for adult clients. Some of this work also involves coordinating community-based organizations with each other in order to support referrals for clients to access specialized or additional support, such as social services. P5 does not directly interact with clients, but primarily with community-based organizations' leaders and management.

### 4.3 Data Analysis

After transcribing the interviews, we adopted an inductive thematic analysis approach to identify the most salient themes from our data, based on Braun and Clarke [9]. All authors coded the transcripts using an "open coding" process using the qualitative coding software Dedoose. These codes were lower-level, and include codes such as "Data-driven hiring systems miss out on the context behind the data." Then, through iterative rounds of discussion, we clustered the codes into a set of themes using a collaborative whiteboard software. Throughout this process, all authors discussed with each other to collaboratively merge similar codes when appropriate or split apart thematic categories into sub-themes, as needed, resolving disagreements through discussion to reach consensus. As part of this iterative sense-making process, we discussed the emerging themes with respect to our research questions and re-organized the themes in multiple passes, resulting in higher-level themes such as "Challenges to maintaining boundaries in empathy-driven work." In the next section, we discuss findings that emerged from this thematic analysis process.

| ID | Organization Type | Organization Function Areas | Role | Client-facing |
|---|---|---|---|---|
| P1 | Public library with employment services | (1) employment services | Director of career center | Yes |
| P2 | Community, nonprofit employment center | (1) employment services<br>(2) education & training<br>(3) supportive services | Chief Operating Officer | No |
| P3 | Local workforce development board | (1) employment services<br>(2) education & training<br>(4) employers' human resources needs<br>(5) workforce strategies and policies<br>(6) funding & resources to support system<br>(7) job quality and access | Industry Product Manager | In previous role |
| P4 | State-wide re-employment & training service center | (1) employment services<br>(2) education & training<br>(3) supportive services<br>(4) employers' human resources needs<br>(5) workforce strategies and policies | Director | Yes |
| P5 | Local workforce development board | (1) employment services<br>(2) education & training<br>(4) employers' human resources needs<br>(5) workforce strategies and policies<br>(6) funding & resources to support system<br>(7) job quality and access | Director of Adult Programs | No |

Table 1. Participants from various workforce development organizations within workforce and career development

## 5 FINDINGS

In this section, we highlight several key findings that we identify through our analysis of the interview data. In section 5.1, we identify how workforce professionals develop relationships with their clients to better understand their career goals and contexts of their lives to inform the workforce services their organizations provide to clients. In section 5.2, we discuss the challenges that workforce professionals face in managing boundaries in these relationships, in the face of systemic challenges (e.g., lack of resources, lack of coordination of services across multiple providers), challenges which have been exacerbated during COVID-19. Finally, in section 5.3, we discuss workforce professionals' perceptions of the roles that workforce technologies play in shaping their work practices, including their relational work with their clients and coordination work with other workforce organizations.

### 5.1 Developing relationships between workforce professionals and their clients

Our participants shared how establishing relationships with their clients allowed them to understand the contexts of their clients' lives, which they felt was especially important given the wide variety of backgrounds, experiences, and circumstances of clients who sought out their services. Participants in both management and frontline service provider roles revealed how relationships with clients enabled more honest conversations about clients' needs and goals, allowing them to make recommendations for workforce services or job opportunities based on those conversations, while also providing a foundation of trust that could potentially form the groundwork for a longer-term working relationship.

Our participants shared how people came to their organizations with an enormous variety of backgrounds, experiences, needs, and career goals. As a result, workforce professionals first needed

to understand their clients' unique situations in order to identify the types of support they might need. P2, the chief operating officer at a non-profit community employment center, shared how: "*We are seeing a lot of people but they all have very different needs and they're all coming for different reasons*" (P2). They went on to say:

> *"It's hard because everyone's situation is different so a lot of times the first meeting is figuring out what their background is, what their skills are, what their strengths are, what their weaknesses are, and try to fill in the gaps... It's not like we get into a situation and can have a scripted program*[4]*. It's just a case-by-case basis. You know, anyone can walk through the door at any time"* (P2)

Another participant, the director of the career center at a public library (who also worked directly with clients), remarked that the public library was the "first stop" for many people, and as such, clients would come to the library with a wide variety of needs for support, from concrete guidance about training programs, resume workshops, or career networking opportunities, as well as emotional support and encouragement (which we describe at more length in section 5.2). Because of the many kinds of services that exist in local workforce development ecosystems, participants described how they worked to build relationships with their clients to understand their needs and recommend the services that might best fit these needs—whether at their organization or other organizations in the ecosystem.

> *"Step 1 is really about building the relationship [... because] when you make someone feel valuable and you let them know that they are valuable to you, they will start opening up and they will basically tell you 'this is what I need help with'."* (P4)

Although P4 worked in a director-level role at a state-wide re-employment and retraining services center, they had frontline experience with building trust with clients by making them feel valued and heard so they would be more likely to share their needs and goals. Participants emphasized building rapport with their clients through these initial meetings and actively listening to them, creating an empathetic relationship that could later help them navigate potentially difficult and vulnerable conversations that arose throughout their clients' job search. Other participants also noted the value of having conversations with their clients early and often throughout the process to understand their needs and goals. However, they shared that it was not uncommon for clients to be unsure of their own goals or needs, prompting workforce professionals to draw upon the relationships they established to help their clients think through what they might need. P1 shared how their clients were often *"at a point of having no idea what they want [...and] having the conversation to pull out what they need or getting them to understand what they need"* (P1). They continued, stating that:

> *"if they don't have much experience it'll look more like talking to them about what they want to do, what kind of jobs they want to apply to, try to pull the experience out from them that they might not realize they have"* (P1)

For our participants, this process of guided self-reflection was critical in getting their clients to share the skills and experiences *"they might not realize they have"* by *"pull[ing] out what they need."* to inform workforce professionals' decision-making. In other cases, their clients' needs involved more than resume writing or job skill development, and instead included a need for transportation, child care, or other resources to help them attend and complete skills training programs or job interviews. Participants described how their conversations with clients helped them understand these needs as well:

[4]This lack of a "*scripted program*" for dealing with clients was at odds with commonly adopted approaches in workforce technologies to identify job seekers' skills from resumes and make recommendations for jobs or skills trainings (e.g., [32]).

> *"That's the biggest part of all these jobs. Listen to identify the specific opportunity. Sometimes an opportunity will present itself later on in terms of getting a job. But oftentimes there's a 'right now' opportunity, an opportunity that wasn't to sit down and get registered [...] Let me help provide them with some sort of things like clothes and comfort [...] so that they feel pride within themselves. Feel and look the part. Build themselves up. That's step one."* (P4)

Building relationships with clients through one-on-one conversations allowed workforce development professionals like P4 to *"listen to identify the specific opportunity"* to support their clients' needs for job training sessions or other services, as well as more immediate needs such as clothing, transportation to jobs or job training programs, or child-care during those training programs (or other aspects such scheduling of training sessions). For our participants, these needs were seen as critical elements to consider when providing more workforce-specific support, such as helping clients prepare their resumes to communicate their skills. P4's experience also highlights another dimension of the empathetic relationships with clients, where workforce professionals may draw on that relationship to raise concerns about clients' immediate "right now" needs, despite clients' own priorities for the job search. Other participants, such as P3, discussed how they tried to help local employers understand how these immediate needs posed barriers for job applicants:

> *"They have been unemployed for a while, maybe you'll require them to buy tools before they can work or a uniform and they don't have that so have you thought about these things? [...] What are the root causes of that? Because once you start having these conversations, you'll realize there's a pattern developing [...] For some [employers], it might be the time of the shift or lack of child care. For some others, it may be the cost of just starting the job: uniforms, tools, things like that. So then you start thinking of those issues and start putting together some ideas about how to solve them."* (P3)

Despite engaging primarily with employers, as opposed to frontline work with clients, P3 shared similar perspectives as other participants about the need for their organization to attend to people's immediate needs prior to helping them finding a job or attending a training program (and communicating those needs to local employers). This excerpt was taken from a broader explanation that P3 shared of the kinds of conversations they had with employers[5] in the region who came to their local workforce development organization to coordinate training programs as well as support with recruitment and employee retention. Crucially, P3 relied on frontline service providers in their organization who had established relationships with clients to identify their immediate needs and circumstances. Without frontline service providers establishing such relationships, P3 would not have had the information they needed to communicate those needs to employers and advocate on their clients' behalf for specific programs and resources such as transportation or childcare support when attending local job training programs.

Participants shared how they used what they learned about their clients' goals and needs to determine the next steps for their clients, and leveraged the relationships they or their colleagues built with the clients to deliver those recommendations in a way they would be receptive to. As P2 shared:

> *"Our employment specialist is pretty good at talking to people 1-on-1 and having them be realistic about their experience and education and what their expectations are and also*

[5] Although the role of employers in workforce development is out of the scope of this paper, P3's perspective suggests that workforce development professionals' engagement with employer stakeholders is another element of the workforce development ecosystem that bears consideration, as it may impact the types of training programs and services available in the region.

> *what the requirements of the training or the particular position is. So we try not to set anyone up for failure or give them some illusion.*" (P2)

Service providers shared how they needed to honestly discuss with each client which next steps are reasonable, actionable, and effective towards their career goals. Many of our participants mentioned the importance of supporting their clients' self-reflection, goal-setting, and management of expectations to help them plan a course of action for their immediate job search and broader, long-term career. P1 explained how *"there's sort of a false hope in what's going to be available for people in the region"* and *"what jobs are really available, what training is required, and perhaps the capacity of the average person to do some of the work"* (P1). They went on to mention specific industries that may have jobs available in their community, such as home health care, retail, and customer service, but that, in P1's perspective, *"people don't want to talk about it because it's not sexy. So I think that might [need to] be an honest conversation right there"* (P1). Workforce service providers thus needed to be able to communicate honestly with clients about the jobs that were available in the region and set realistic expectations about job requirements. Participants described leveraging their relationship with clients to be honest about the skills or training required for their desired career paths. Having these often-difficult conversations about skills and jobs may not have been possible without first establishing relationships with their clients.

### 5.2 Managing relational boundaries with clients, in the face of systemic challenges

In the previous section, we heard from participants about the crucial role that establishing relationships with clients played in helping them understand clients' needs, goals, and the larger context of their lives, in order to inform their recommendations for appropriate workforce services, their communication with clients about those recommendations, and their larger strategic planning about services their organizations provide. Our findings here shed additional insight into how workforce professionals manage those relationships with clients who access their services, given systemic challenges, including priorities for empathy-driven work (i.e., establishing honest relationships, building rapport with clients, and developing an emotional investment in their clients) that were in tension with resources to support that work, and information gaps in the local ecosystem that made it difficult to refer clients to other organizations.

Given the highly interpersonal, and often emotionally charged, nature of this relationship building work, participants noted that it was often challenging to maintain and manage healthy boundaries in their work. In part, participants shared that their organizations' strategies were driving this shift towards more relationship building, saying how *"public libraries are moving towards a strong social work, empathy-driven service agenda, which is good because a lot of our patrons need it"* (P1). Although this shift in strategy towards social and empathy-driven service was motivated by that participant's organizational agenda, they went on to describe feeling a personal desire to provide counseling and social support for their clients, beyond what their organization was asking for, despite lacking the training or organizational capacity to do so.

> *"At [another workforce development organization], they do full-on career counseling which is a little deeper than a resume review. So we should be clear: we're not counselors here. I get sucked into it a little bit but in general we try to get the full, holistic counseling over to organizations that are doing that and receiving funding for it. Because it's not the library's mission to be a counseling agency.*" (P1)

Despite this acknowledgment that their organization's mission did not encompass career counseling (although other local organizations did), this participant echoed the "responsibility creep" observed in other social and care-based professions [e.g., 24, 50, 66]. In the face of this responsibility creep, participants shared how they risked burning out by trying to take on too much for their

clients, as well as the balance they needed to strike between building caring relationships with clients and not burning themselves out. As P1 went on to say:

> *"Sometimes we have an issue where someone on our staff, they'll just work to save the person's life and they go way too far. You got to find a really careful balance of "you care" but you can only do so much before you burn yourself out entirely. You're not helping anyone by keeping them here for weeks and weeks and they don't make any progress."* (P1)

This desire to manage a balance of care with avoiding burnout was in tension with the relational approach to workforce development we discussed in section 5.1, in which service providers established relationships with clients to understand their needs and context and navigate difficult conversations about job and training program recommendations. Burnout amongst workforce development professionals was mentioned frequently by all our participants—both by frontline service providers who regularly interacted with clients, and by management who observed burnout in their staff. Although some organizations' priorities may have exacerbated the pressure that frontline service providers felt to take on this care work, in other cases participants described how their organizations refer clients to other local workforce organizations so that their clients can receive specialized services, as well as alleviate the responsibility creep on their own overextended staff and resources.

Indeed, some of our participants in management roles (i.e., who were had a role in shaping organizational strategies and priorities) shared how during the COVID-19 pandemic, they had intentionally shifted their organization towards a referral-based service model to avoid their staff needing to take on too many responsibilities by referring clients to other organizations nearby. For instance, P5 shared that their organization was implementing this shift by both expanding the services they offered and by *"connecting [their] contracted staff to community-based agencies so they can make referrals and they can get resources for people coming in the center who have a lot more needs than just the job search."* (P5). Echoing this, other participants emphasized that, given limited resources, they wanted to avoid becoming a "*one-stop shop*" (P2) (as described in section 2), saying:

> *"We don't have the staff, we don't have the financial ability to do that. I just want us to be the best at what we should be doing, instead of trying to do what everybody else is doing too... What comes along with that is seeing what other services [clients] might need. Which we probably don't provide so then we then refer them to these other services. "* (P2)

However, to do this referral to other local organizations effectively, many participants emphasized how they needed information about the programs and services offered by other workforce development organizations in their local context—information they (or indeed, anyone in their organization) often did not have. As one participant told us:

> *We just started reaching out to some of the other employment centers saying, 'hey can we meet, we just want to learn about what you guys are doing and we can talk about what we're doing and see where there might be some overlap'* (P2)

There was an implicit expectation that workforce professionals would coordinate their organizations' programs with other local workforce organizations, but for small local organizations, this was one more task for their staff to take on—one made even more challenging by redundancies in services offered by multiple workforce organizations in the ecosystem, with no clear information available about the quality or capacity of those programs. For this participant, and for others, they wanted to "*collaborate and partner more [...] due to being spread very thin*" (P2) across their programs, but often lacked the time available to "*try to piece-meal [information] together*" (P2) about what programs other organizations were offering, and when and where they were being held, making it

challenging for workforce professionals to understand the resources and programs available in their own local workforce ecosystem.

Given these information challenges within the local workforce ecosystem—challenges encountered by workforce professionals in both management and frontline roles, as well as people looking to access those services—clients of any given workforce organization may have expected the staff to provide more support than they were able to. With the requirements of reporting client satisfaction and outcomes to state-level WIOA boards, which directly impact financial and staffing resources (as described in section 2), workforce professionals may have felt systemic pressure to take on more responsibilities for their clients. Indeed, even after referring clients outward to other providers, there are no guarantees that the clients will be willing or able to make use of the other organization's services. All participants except one (P5) shared how challenging it can be to follow up with their clients to ensure that they follow through on a referral to another organization in the ecosystem (due to privacy requirements that restrict the data they are allowed to collect and retain about clients, and policies that limit their ability to contact clients until they return for additional services). As we discussed in section 5.1, people may have immediate needs and challenges that may be far outside the scope of what *any* workforce organization could support. These challenges often led to clients returning to frontline service providers after being referred elsewhere or after securing a job.

> *"We have return customers that you recognize they're probably not going to make it with what we can supply because they need mental health help. Or they're repeat customers who come back, they're gone for a while but then they come back and maybe they were working but then something happens, their mental health again."* (P1)

Burnout among workforce development professionals, especially among frontline service providers, is a consequence of a system where organizations ask fewer and fewer staff to take on more responsibilities to achieve better outcomes for their clients. Although the relational approach to workforce services discussed in section 5.1 allows workforce development professionals to understand their clients' needs, goals, and contexts, those approaches to relationship building may inadvertently lead to responsibility creep, as workers attempt to address issues beyond the scope of what they (or their organization) can reasonably provide support for. In such cases, frontline service providers may try to mitigate the potential for burnout by connecting their clients to the larger ecosystem of workforce services (and other social services) in the region. However, due to the lack of accessible information available about local workforce development ecosystems, workforce professionals may have information challenges in identifying the services available in the region and recommending those organizations to their clients.

### 5.3 Role of technology in shaping workforce professionals' work practices

Given the increasing role of algorithmic systems on every part of the workforce development ecosystem (from job search, to job skills training, to employment consulting, and more, as discussed in section 3.2), we explored workforce development professionals' perceptions of the roles and impacts of workforce technologies (broadly construed) on their work with their clients. Participants argued that workforce technologies are likely to be most valuable when they provide a starting point for human conversations, and they expressed wariness around attempts to automate away such conversations.

According to one participant, "*we're in a system where [employers'] applicant tracking system is what makes that decision [about whether an applicant will progress to the next step]*" (P4). Participants described how applicant tracking systems (ATSs) used by many employers in their region often rely on candidates being able to describe their skills and experiences in a way that is both legible to the ATS and attractive to employers using those tools. However, participants shared how that

process disproportionately impacts candidates who are less prepared to write their resumes in this algorithmically legible way without additional assistance, saying "*it's hard to do on the applicant tracking side because [the ATS] will only probably pull those folks who are a, quote-on-quote, "fit" in writing. And that might not always be your best candidate*" (P4). As we heard participants describe in section 5.1, people may not have the skills or knowledge to effectively represent their skills on their resumes, much less in ways that are legible to hiring algorithms [cf. 63]. As one participant described, "*You just need that opportunity for that applicant tracking system to [read] the right words*" (P4), but knowing what the 'right words' to choose is a task that participants felt they needed to assist their clients with, changing the way they approached those conversations and training programs.

Participants described the issues underlying challenges with resume writing as part of more fundamental issues many clients had with using technology more generally, saying, "*the biggest challenges are always going to be around technology. It's almost cliche but this region has an older population and a lot of people–we're talking about 50, 60+, we tend to have older customers–and a lot of times they've never touched a computer or they have just rudimentary computer skills*" (P1). In addition, participants described how, during COVID-19, many of their clients were newly unemployed and looking for work for the first time in years, and they were faced with the task of creating resumes in digital formats, which posed unique challenges (similar to that of formerly incarcerated individuals returning to the workforce [cf. 53, 54]).

Although workforce organizations provided resume writing workshops for clients, the scale of the demand, particularly during COVID-19, outstripped the capacity of their staff—in addition to needing to manage a transition to remote service delivery via phone or video (which many clients needed help setting up)—further contributing to the burnout described in section 5.2. All of these issues suggest that workforce technologies such as resume skill identification tools or applicant tracking systems configure new forms of labor from frontline service providers in their relationships with their clients as "*people might come [to us] with a better skill set than they're able to establish in their work records because they can't get through that technology piece to get to the next level*" (P1).

In spite of those issues, and faced with the reality of increasing use of algorithmic tools like resume skill identification and applicant tracking systems, workforce service providers nonetheless saw potential for such tools to be a part of the conversation with their clients. One participant discussed automated tools for skills assessment and job recommendation, used in other cities in their region, saying, "*I could see us using that with every person who comes in looking for a job. Just because you know, I want people to have goals but I want people to be realistic about what's appropriate for them right now*" (P2). The crucial element for this participant, and for others who described how they used similar tools, is that the tool was one part of a larger conversation between the service provider and the client: "*I think it would be a good way to start working with someone... complete this thing and that will at least help us start the conversation*" (P2). That is, for this participant and others, they saw workforce technologies fitting into the conversations that they used to build relationships with their clients (as in section 5.1)—but not replacing those conversations.

However, despite the potential of algorithmic tools for skills identification and job recommendation to support workforce professionals' conversations with clients, participants shared concerns about the risk that those tools might miss out on the rich context that frontline service providers are able to provide to their clients—and provide to local employers when coordinating job skills training programs. Participants felt that simply providing job recommendations on the basis of clients' skills alone may be insufficient to capture the factors that people actually consider when looking for job training programs and applying for jobs, such as distance to their home, opportunities for

affordable and accessible skills training programs, and timeliness of the application turnaround. One participant shared their experience using skills assessment tools:

> *"It goes beyond just the skills assessment because everyone can do a skills assessment... That is baseline. Anyone can do one of those. Where it becomes tricky is "well based on what I want to do, can you tell me who within a particular radius of where I live, can actually deliver this training and is it affordable?". If it's out of my price range, are there any resources that could cover that cost? Are there employers that are willing to invest in training employees or through programs like [Anonymized] or any provider in the community"?* (P3)

For this participant, skills assessment, while helpful as a starting point for conversations with clients, did not capture the other contextual factors that people consider when applying for jobs or job skills training programs. Another participant shared how "*those are conversations that happen between the client and the employment specialist*" (P2):

> *"And you might get this report back that says 'here are these programs you might be interested in' but then what? Or are you going to have any barriers to that? You might get a report that says "oh you know what, you might be really good for this job at Fedex" but okay, it might be all the way out in [City A] and you live in, I don't know, [City B], and you don't have a car and it's going to take you 4 buses and 3 hours to get there. So, there's still conversations that have to be had. People might be able to go through and answer the questions on their own, but when it comes to applying to things, it can be a much more intricate process."* (P2)

Workforce professionals describe how, as automated tools are introduced into the job training, search, and application process, they saw their own role as offering a human element to not only help people understand the context of the jobs landscape, but also to better emotionally support their clients through what might otherwise be a stressful process. Participants described how their relationships with clients afforded them insight into the nuances of their clients' lives and contexts that solely data-driven approaches might miss out on. As one participant describes:

> *"My feeling is that with any sort of system that's purely data-driven, it should be taken with a grain of salt because it can lack the human element which is something that's needed. You cannot quantify any one human being to a set of data points."* (P4)

Workforce professionals envision their role as providing a human element in the system, mediating between the ways that job opportunities and skills training programs are presented to people, as well as how people present themselves to these automated systems (e.g., for resume-based skill identification and skills-based job recommendations). One participant elaborated on exactly the parts of people's lives that might be missed out on by hiring algorithms:

> *"I saw something in them in terms of the human element to say, you know what, when you took these personality tests and things for the company, I don't know what state of mind you were in. You are a single mom, you have 4 kids. You took it at 8pm at night probably just after putting them to bed. The current job you have, you work your tail off. Your mind's doing this and you're like 'oh okay, [P4] told me and the HR department told me I have to complete this, I have 15 minutes.' You're already on edge because you have to repeat it again the next day. I can't put those things into a data point to say 'hey AI machine, factor this into the decision-making process'."* (P4)

In addition to providing this human element in helping their clients understand the jobs and training program landscape, and helping them navigate automated resume reading and applicant tracking tools, as well as other hiring algorithms, workforce professionals circumvent hiring

algorithms (such as ATSs), establishing personal relationships with employers to recommend candidates themselves, as P3 alluded to in section 5.1. One participant described how they drew on "*[their] own personal knowledge of the [eco]system*" (P4), saying: *"with the Businesses Services team, their job is to go and sell that to say 'okay forget your ATS for a hot second... This is just me; I'm building a relationship with you. I'm going to give you 5 strong candidates, give me a time you're open"'* (P4). They went on to describe this in terms of the "*human element*" they offer to companies working with ATSs, saying how they approach employers with the promise of "*help[ing] your company by adding an infusion of the human element when I present to you resumes*" (P4). Participants view their role in the workforce and job search ecosystem as "*someone that's going to be there as your advocate to really help that person to grow overall*" (P4). In this way, they see their role as a human complement to the automated tools that are being used in workforce development and hiring decisions, which they feel should be part of the conversation, not a replacement for that conversation.

## 6 DISCUSSION

### 6.1 Implications for technology to support workforce service providers

Existing research on the design of technologies for workforce development has often focused on directly supporting job seekers [e.g., 22, 23], designing technologies such as intelligent assistants that automate tasks currently performed by frontline workforce service providers [e.g., 1] or developing algorithms that automatically scrape skills from resumes and match those to skills in job postings [e.g., 11, 48, 51]. These visions for the future of workforce technologies are now instantiated in technologies widely used by recruiters and employers [e.g., 32, 36], as part of larger algorithmic assemblages in the hiring funnel [57, 63]. However, the focus on technologies for job seekers and employers that is represented in these visions overlooks the crucial roles that workforce professionals currently play in local workforce ecosystems [38, 42] (e.g., as employment consultants, job certification training providers, workforce training coordinators, etc).

In this paper, we contribute to prior research by providing an empirical account of the emerging role of technology in shaping the work of workforce professionals in both frontline and management roles (RQ2)—including their relational work with clients and their coordination work with other workforce organizations and employers in the local workforce ecosystem (RQ1). This paper contributes perspectives from workforce professionals who have dual roles as management and frontline workers, complementing prior HCI work on job seekers' experiences with technology in the job search process [e.g., 23, 54, 71]) and prior CSCW work on frontline social service providers' use of technology [e.g., 7, 39, 40]. These dual roles provide our participants with unique perspectives on how technology is shaping the work of workforce development at multiple scales and with multiple types of actors. In the rest of the discussion, we unpack implications of these perspectives on the design of technology to support the work of workforce professionals.

*6.1.1 Implications of workforce technologies for relational work with clients.* First, we found that although technologies that automatically identify skills from resumes have the potential to support frontline service providers' conversations with clients about appropriate jobs to apply to or skills training programs to enroll in, in their current form, such skill identification technologies [e.g., 32, 65] may instead compound existing inequities in workforce development. As our participants pointed out, their clients who had less experience in writing resumes, such as recently incarcerated adults [e.g., 54] or older adults who are on the job market for the first time, may find it difficult to write their resumes in a way that is legible to skill identification algorithms. In our findings, we identified the relational work that workforce professionals engage in: e.g., to help clients identify their skills in preparation for resume writing workshops. Such relational work is not typically considered in the design and use of existing skill identification algorithms.

In addition, we found that local employers' adoption of automated tools such as applicant tracking systems fundamentally shaped the relational work that workforce professionals engaged in during conversations with their clients. Although participants described the importance of incorporating awareness of the holistic context of their clients' lived experiences into conversations with clients and local employers, they felt applicant tracking systems and other automated workforce tools were leading to a homogenization of their clients' unique skills, career goals, and lived experiences. Exercising their discretion—a crucial element of algorithmic adoption in public services [55, 56, 59]—service providers went around the recommendations of the applicant tracking systems, leveraging their relationships with employers to provide more context about their clients' lived experiences than applicant tracking systems would be able to provide. However, as Karusala et al. pointed out in their work on data practices in homeless services provision [43], such advocacy work is difficult caring labor in its own right, and may place additional burdens on workforce professionals already at risk of burnout.

Indeed, as Saxena et al. [59] point out, this discretionary work is only one part of a larger system where such human judgment and bureaucratic processes interact with the capabilities of algorithmic systems to shape people's experiences and outcomes. Future workforce algorithms should be designed to specifically enable human discretion, taking into account how bureaucratic processes in the workforce ecosystem may shape how these tools are used by workforce professionals, such as requiring data reporting to the WIOA, or providing additional context to employers within ATSs.[6]

Building upon these findings, workforce technologies might instead be explicitly designed to support the relational work of frontline workforce service providers who provide a vital human touchpoint for their clients throughout the workforce ecosystem. As Saxena et al. [59] recommend, such technologies might frame the output as suggestions, with multidimensional measures, allowing workforce professionals to make informed recommendations rather than being presented with a single output (e.g., job recommendation, or set of skills extracted from a resume). Future approaches to workforce technologies might be designed to leverage and support this relationship building with clients, including ways to incorporate frontline service providers' knowledge of their clients' needs, desires, and constraints (e.g., transportation, childcare, etc) into recommendations for jobs, skills training programs, or other workforce services—factors not typically captured by existing workforce technologies. Or, more fundamentally, future approaches should carefully consider whether or not algorithms are truly appropriate for a given task and seek other, non-algorithmic approaches.

*6.1.2 Implications of workforce technologies for coordination of workforce services.* As our participants identified, and informed by Saxena et al. [59]'s focus on bureaucratic processes, there is a need for technologies that support ecosystemic approaches to workforce development, such as helping workforce professionals understand the landscape of workforce programs and services available in their local ecosystem (e.g., resume workshops, certification programs, skills training programs, and so on), in order to support referral strategies, program recommendations, and specialized assistance. In the absence of such information, workforce professionals may take on such information foraging work themselves or attempt to develop programs within their organization to cover for services not present in their context, potentially contributing to issues of over-extension, responsibility creep, and burnout. Designing workforce technologies to support information-sharing about the services provided by local workforce organizations may be one means towards what Dickinson et al. have referred to as an asset-based approach to community development [17], helping to connect

[6]Ideally, we would report more granular details about how bureaucratic processes impacted the use of workforce algorithms in our data; however, we do not have detailed data on participants' organizational policies for dealing with errors in system output, or the need for supervisor approval before engaging in this discretionary work, and other such processes.

community members with existing resources and assets in ways that strengthen existing community capacities and relationships. For instance, such technologies may support service providers by synthesizing information from various sources about the local workforce ecosystem (e.g., to support referrals to other providers, in a "hub-and-spoke" model [38], rather than a "one-stop shop"), potentially contributing to reducing burnout by supporting greater synergy between various workforce organizations in the local context.

### 6.2 Limitations

Future work should seek to include the perspectives of job seekers specifically around questions and concerns surfaced by participants in the current work: i.e., exploring how automated technologies are impacting *their* experiences with workforce development services and their relationships with frontline service providers. While this paper is intended to shed light on workforce development professionals' experiences, we encountered difficulties in recruiting and scheduling participants, in part due to scheduling challenges raised by the COVID-19 pandemic, and thus future work should incorporate perspectives from more workers in these and related roles. In addition, our work was situated in the context of the U.S. Midwest, a local context experiencing recent changes in the types of work in demand, and a national context with various historical trends [38] and recent policy changes [29] that have influenced both the workforce ecosystem and the adoption of data-driven algorithmic systems. Future work should thus investigate this topic in other geographic and cultural contexts, including exploring how the sociopolitical landscape of workforce development (e.g., workforce policies, data reporting requirements, unemployment benefit requirements for accessing workforce services, etc.) may shape the work of workforce professionals and the role of technology in that work. Finally, future research should include *in situ* ethnographic studies of frontline service providers' use of automated systems in the context of their work with clients, to refine our understanding of the ways these systems shape such work on the ground.

### 6.3 Conclusion

As algorithmic systems are increasingly introduced into the workforce development ecosystem, this paper sheds light on how such technologies may impact the work of workforce development professionals. While prior work in this space has focused primarily on job seekers' technology needs and the use of algorithms by frontline social service providers, we expand on prior work by focusing on the perspectives of workforce development professionals in both management and client-facing roles at workforce organizations. These uniquely dual-role perspectives allow us to provide an empirical account of how algorithmic systems are shaping the work of workforce development. In this paper, we identify the crucial role of relationship building in workforce development, and the risks of burnout of workforce professionals due to systemic challenges and the additional labor created by algorithmic systems. We also contribute insight into how workforce technologies are shaping the relational work that workforce professionals engage in with clients and their coordination work across workforce organizations. This work points to a future for workforce technologies that are designed to augment workforce professionals' relational and coordination work—to be a part of the workforce conversation.

## REFERENCES

[1] Bhavna Agrawal, Rong Liu, Ravi Kokku, Yi-Min Chee, Ashish Jagmohan, Satya Nitta, Michael Tan, and Sherry Sin. 2017. 4C: Continuous Cognitive Career Companions. In *International Conference on Artificial Intelligence in Education*. Springer, 623–629.

[2] Ali Alkhatib and Michael Bernstein. 2019. Street-level algorithms: A theory at the gaps between policy and decisions. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–13.

[3] Mariam Asad and Christopher A Le Dantec. 2019. "This Is Shared Work:" Negotiating Boundaries in a Social Service Intermediary Organization. *Media and Communication* 7, 3 (2019), 69–78.

[4] American Workforce Policy Advisory Board. 2020. Investing in American Workers to Expedite Economic Recovery: A CALL-TO-ACTION BY THE AMERICAN WORKFORCE POLICY ADVISORY BOARD. https://www.commerce.gov/sites/default/files/2020-05/AWPABCalltoActionFINAL051520.pdf. (Accessed on 01/15/2021).

[5] Chris Bopp, Lehn M. Benjamin, and Amy Voida. 2019. The coerciveness of the primary key: Infrastructure problems in human services work. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019). https://doi.org/10.1145/3359153

[6] Chris Bopp, Ellie Harmon, and Amy Voida. 2017. Disempowered by data: Nonprofits, social enterprises, and the consequences of data-driven work. *Conference on Human Factors in Computing Systems - Proceedings* 2017-May (2017), 3608–3619. https://doi.org/10.1145/3025453.3025694

[7] Nina Boulus-Rødje. 2018. In search for the perfect pathway: Supporting knowledge work of welfare workers. *Computer Supported Cooperative Work (CSCW)* 27, 3 (2018), 841–874.

[8] David H. Bradley. 2021. *The Workforce Innovation and Opportunity Act and the One-Stop Delivery System.* Technical Report. https://sgp.fas.org/crs/misc/R44252.pdf

[9] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative research in psychology* 3, 2 (2006), 77–101.

[10] Anna Brown, Alexandra Chouldechova, Emily Putnam-Hornstein, Andrew Tobin, and Rhema Vaithianathan. 2019. Toward algorithmic accountability in public services: A qualitative study of affected community perspectives on algorithmic decision-making in child welfare services. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–12.

[11] Sisay Adugna Chala. 2017. Bidirectional job matching through unsupervised feature learning. (2017).

[12] Stevie Chancellor and Scott Counts. 2018. Measuring Employment Demand Using Internet Search Data. *Chi* (2018).

[13] Alexandra Chouldechova, Diana Benavides-Prado, Oleksandr Fialko, and Rhema Vaithianathan. 2018. A case study of algorithm-assisted decision making in child maltreatment hotline screening decisions. In *Conference on Fairness, Accountability and Transparency*. PMLR, 134–148.

[14] Tammy Coxen, Jordan Falby, Jeannine La Prad, Taryn McFarlane, and Nicole Sherard-Freeman. 2016. *CSW Detroit Workforce System Mapping Project.* Technical Report. https://skilledwork.org/wp-content/uploads/2017/08/CSW-Mapping-Report-Full-White-Paper-Final.pdf

[15] HJJOEP David. 2015. Why are there still so many jobs? The history and future of workplace automation. *Journal of economic perspectives* 29, 3 (2015), 3–30.

[16] Victor Diaz and Bill Strickland. [n.d.]. *Imagining Allegheny County's Tomorrow.* Technical Report. https://alleghenycounty.us/county-executive/vision-team-report---workforce-development.aspx

[17] Jessa Dickinson, Mark Díaz, Christopher A. Le Dantec, and Sheena Erete. 2019. "The cavalry ain't coming in to save us". *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019), 1–21. https://doi.org/10.1145/3359225

[18] Tawanna R. Dillahunt. 2014. Fostering social capital in economically distressed communities. *Proceedings of the 32nd annual ACM conference on Human factors in computing systems - CHI '14* (2014), 531–540. https://doi.org/10.1145/2556288.2557123

[19] Tawanna R. Dillahunt, Nishan Bose, Suleman Diwan, and Asha Chen-Phang. 2016. Designing for Disadvantaged Job Seekers. *Proceedings of the 2016 ACM Conference on Designing Interactive Systems - DIS '16* (2016), 905–910. https://doi.org/10.1145/2901790.2901865

[20] Tawanna R Dillahunt, Nishan Bose, Suleman Diwan, and Asha Chen-Phang. 2016. Designing for disadvantaged job seekers: Insights from early investigations. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*. 905–910.

[21] Tawanna R Dillahunt and Joey Chiao-Yin Hsiao. 2020. Positive Feedback and Self-Reflection: Features to Support Self-Efficacy among Underrepresented Job Seekers. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.

[22] Tawanna R Dillahunt, Jason Lam, Alex Lu, and Earnest Wheeler. 2018. Designing future employment applications for underserved job seekers: a speed dating study. In *Proceedings of the 2018 Designing Interactive Systems Conference*. 33–44.

[23] Tawanna R Dillahunt and Alex Lu. 2019. DreamGigs: Designing a Tool to Empower Low-resource Job Seekers. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–14.

[24] Lisa Dodson and Rebekah M Zincavage. 2007. "It's like a family" caring labor, exploitation, and race in nursing homes. *Gender & Society* 21, 6 (2007), 905–928.

[25] Mateusz Dolata, Birgit Schenk, Jara Fuhrer, Alina Marti, and Gerhard Schwabe. 2020. When the System Does Not Fit: Coping Strategies of Employment Consultants. *Computer Supported Cooperative Work (CSCW)* 29, 6 (2020), 657–696.

[26] Lynn Dombrowski, Amy Voida, Gillian R Hayes, and Melissa Mazmanian. 2012. The labor practices of service mediation: a study of the work practices of food assistance outreach. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1977–1986.
[27] Stephen Eide. 2017. *RUST BELT CITIES AND THEIR BURDEN OF LEGACY COSTS*. Technical Report. https://media4.manhattan-institute.org/sites/default/files/R-SE-1017.pdf
[28] U.S. Employment and Training Administration. [n.d.]. WIOA Performance Indicators and Measures. https://www.dol.gov/agencies/eta/performance/performance-indicators
[29] U.S. Employment and Training Administration. 2014. Workforce innovation and opportunity act. https://www.dol.gov/agencies/eta/wioa
[30] Virginia Eubanks. 2018. *Automating inequality: How high-tech tools profile, police, and punish the poor*. St. Martin's Press.
[31] Lauren Eyster, Christin Durham, Michelle Van Noy, and Neil Damron. 2017. *Understanding Local Workforce Systems*. Technical Report. https://www.urban.org/research/publication/understanding-local-workforce-systems
[32] Freedman Consulting (Firm). 2017. Swiping right for the job: how tech is changing'matching'in the workforce. (2017).
[33] Timothy Fisher. 2012. An inside view of Detroit's rising tech scene. *Tech* (Aug 2012). https://www.deadlinedetroit.com/articles/1711/an_inside_view_of_detroit_s_rising_tech_scene#.VJNKPSdLdXI
[34] Asbjørn Ammitzbøll Flügge. 2020. Algorithmic Decision Making in Public Administration: A CSCW-Perspective. In *Companion of the 2020 ACM International Conference on Supporting Group Work*. 15–24.
[35] Maria Flynn. 2020. Google.org Supports JFF's Outcomes for Opportunity Initiative with $4 Million Grant. https://www.jff.org/what-we-do/impact-stories/awake/outcomes-opportunity/googleorg-supports-jff/. (Accessed on 08/15/2020).
[36] XPrize Foundation. 2020. Rapid Reskilling XPRIZE. https://www.xprize.org/prizes/rapidreskilling. (Accessed on 08/20/2020).
[37] Michele E Gilman. 2020. Poverty Lawgorithms: A Poverty Lawyer's Guide to Fighting Automated Decision-Making Harms on Low-Income Communities. *Data & Society* (2020).
[38] W Norton Grubb, Norena Badway, Denise Bell, Bernadette Chi, Chris King, Julie Herr, Heath Prince, Richard Kazis, Lisa Hicks, and Judith Combes Taylor. 1999. Toward Order from Chaos. State Efforts to Reform Workforce Development Systems. (1999).
[39] Naja Holten Møller, Irina Shklovski, and Thomas T Hildebrandt. 2020. Shifting concepts of value: Designing algorithmic decision-support systems for public services. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society*. 1–12.
[40] Naja L Holten Møller, Geraldine Fitzpatrick, and Christopher A Le Dantec. 2019. Assembling the Case: Citizens' Strategies for Exercising Authority and Personal Autonomy in Social Welfare. *Proceedings of the ACM on Human-Computer Interaction* 3, GROUP (2019), 1–21.
[41] Ronald L. Jacobs and Joshua D. Hawley. 2009. *The Emergence of 'Workforce Development': Definition, Conceptual Boundaries and Implications*. Springer Netherlands, Dordrecht, 2537–2552. https://doi.org/10.1007/978-1-4020-5281-1_167
[42] Janet O Javar and Stephen A Wandner. 2004. The use of service providers and brokers/consultants in employment and training programs. (2004).
[43] Naveena Karusala, Jennifer Wilson, Phebe Vayanos, and Eric Rice. 2019. The street-level realities of data practices in homeless services provision. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019). https://doi.org/10.1145/3359286
[44] Joshua Kim. 2021. 'The next shift': From manufacturing to meds (and eds): Inside higher ed. *Learning Innovation* (Aug 2021). https://www.insidehighered.com/blogs/learning-innovation/%E2%80%98-next-shift%E2%80%99-manufacturing-meds-and-eds
[45] Freeman Klopott. 2014. *Bloomberg.com* (Nov 2014). https://www.bloomberg.com/news/articles/2014-11-19/how-elon-musk-can-make-buffalo-known-for-more-than-wings
[46] Christopher A. Le Dantec and W. Keith Edwards. 2008. The View From the Trenches: Organization, Power, and Technology at Two Nonprofit Homeless Outreach Centers. *CSCW* 71, 9 (2008), 50–51.
[47] Christopher A Le Dantec and W Keith Edwards. 2010. Across boundaries of influence and accountability: The multiple scales of public sector information systems. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 113–122.
[48] Yiou Lin, Hang Lei, Prince Clement Addo, and Xiaoyu Li. 2016. Machine learned resume-job matching solution. *arXiv preprint arXiv:1607.07657* (2016).
[49] Michael Lipsky. 2010. *Street-level bureaucracy: Dilemmas of the individual in public service*. Russell Sage Foundation.
[50] Chris Lloyd, Robert King, and Lesley Chenoweth. 2002. Social work, stress and burnout: A review. *Journal of mental health* 11, 3 (2002), 255–265.

[51] Emmanuel Malherbe, Mario Cataldi, and Andrea Ballatore. 2015. Bringing order to the job market: Efficient job offer categorization in e-recruitment. In *Proceedings of the 38th International ACM SIGIR Conference on Research and Development in Information Retrieval*. 1101–1104.

[52] Rohit Muthyala, Sam Wood, Yi Jin, Yixing Qin, Hua Gao, and Amit Rai. 2017. Data-driven job search engine using skills and company attribute filters. In *2017 IEEE International Conference on Data Mining Workshops (ICDMW)*. IEEE, 199–206.

[53] Ihudiya Finda Ogbonnaya-Ogburu, Kentaro Toyama, and Tawanna Dillahunt. 2018. Returning Citizens' Job Search and Technology Use: Preliminary Findings. In *Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing*. 365–368.

[54] Ihudiya Finda Ogbonnaya-Ogburu, Kentaro Toyama, and Tawanna R Dillahunt. 2019. Towards an effective digital literacy intervention to assist returning citizens with job search. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–12.

[55] Anette CM Petersen, Lars Rune Christensen, Richard Harper, and Thomas Hildebrandt. 2021. " We Would Never Write That Down" Classifications of Unemployed and Data Challenges for AI. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW1 (2021), 1–26.

[56] Anette CM Petersen, Lars Rune Christensen, and Thomas T Hildebrandt. 2020. The role of discretion in the age of automation. *Computer Supported Cooperative Work (CSCW)* 29, 3 (2020), 303–333.

[57] Manish Raghavan, Solon Barocas, Jon Kleinberg, and Karen Levy. 2020. Mitigating bias in algorithmic hiring: Evaluating claims and practices. In *Proceedings of the 2020 conference on fairness, accountability, and transparency*. 469–481.

[58] Nithya Sambasivan, Ed Cutrell, Kentaro Toyama, and Bonnie Nardi. 2010. Intermediated technology use in developing communities. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2583–2592.

[59] Devansh Saxena, Karla Badillo-Urquiola, Pamela Wisniewski, and Shion Guha. 2021. A Framework of High-Stakes Algorithmic Decision-Making for the Public Sector Developed through a Case Study of Child-Welfare. *arXiv preprint arXiv:2107.03487* (2021).

[60] Devansh Saxena, Karla Badillo-Urquiola, Pamela J Wisniewski, and Shion Guha. 2020. A Human-Centered Review of Algorithms used within the US Child Welfare System. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–15.

[61] Thomas Schmitt, Philippe Caillou, and Michele Sebag. 2016. Matching jobs and resumes: a deep collaborative filtering task. In *GCAI 2016-2nd Global Conference on Artificial Intelligence*, Vol. 41.

[62] OTA International Security and Commerce. 1980. *Chapter 4. The Domestic Steel Industries Competitiveness Problems.* Congress, Office of Technology Assessment, 115–151.

[63] Mona Sloane, Emanuel Moss, and Rumman Chowdhury. 2021. A Silicon Valley Love Triangle: Hiring Algorithms, Pseudo-Science, and the Quest for Auditability. *arXiv preprint arXiv:2106.12403* (2021).

[64] Aaron Smith. 2015. Searching for work in the digital era. *Pew Research Center* 19 (2015).

[65] Hari Srinivasan. 2021. Introducing Skills Path, a New Way to Help Companies Hire. https://www.linkedin.com/business/talent/blog/product-tips/introducing-skills-path. (Accessed on 01/10/2022).

[66] Emily Tseng, Fabian Okeke, Madeline Sterling, and Nicola Dell. 2020. " We can learn. Why not?" Designing Technologies to Engender Equity for Home Health Aides. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–14.

[67] Agnes van Belle, Eike Dehling, and Daniel Foster. [n.d.]. Improving Candidate to Job Matching with Machine Learning. ([n. d.]).

[68] Carl Van Horn, Tammy Edwards, and Todd Greene. 2015. Transforming US workforce development policies for the 21st century. *Federal Reserve Bank of Atlanta and WE Upjohn Institute for Employment Research, Kalamazoo* (2015).

[69] Michael Veale, Max Van Kleek, and Reuben Binns. 2018. Fairness and accountability design needs for algorithmic support in high-stakes public sector decision-making. In *Proceedings of the 2018 chi conference on human factors in computing systems*. 1–14.

[70] Guri Verne and Tone Bratteteig. 2016. Do-it-yourself services and work-like chores: on civic duties and digital public services. *Personal and ubiquitous computing* 20, 4 (2016), 517–532.

[71] Earnest Wheeler and Tawanna R Dillahunt. 2018. Navigating the job search as a low-resourced job seeker. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–10.

[72] Melanie A Zaber, Lynn A Karoly, and Katie Whipkey. 2019. *Reimagining the Workforce Development and Employment System for the 21st Century and Beyond.* RAND.

Received July 2021; revised November 2021; accepted April 2022