Just Infrastructure? Field Research on a Standardized Assessment Tool for a Continuum of Care for People Experiencing Homelessness

Stephen C. Slota
The University of Texas at Austin, USA
steveslota@gmail.com

Kenneth R. Fleischmann
The University of Texas at Austin, USA
kfleisch@utexas.edu

Sherri Greenberg
The University of Texas at Austin, USA
srgreenberg@austin.utexas.edu

Michelle Surka
The University of Texas at Austin, USA
msurka@utexas.edu

Keyanna S. Evans
The University of Texas at Austin, USA
keyanna.s.evans@utexas.edu

James Snow
City of Austin: Public Works Department, USA
James.Snow@austintexas.gov

Sarah Rodriguez
City of Austin: Office of Design and Delivery, USA
SarahS.Rodriguez@austintexas.gov

Tara Zimmerman
The University of Texas at Austin, USA
tzimmerman@utexas.edu

ABSTRACT

As community-oriented programs move from intervention to infrastructure, questions of just and equitable access to that infrastructure both arise and become more consequential to those served. However, extant tools are general in scope, often undertested, and inconsistently linked with positive outcomes for served communities and service providers. We explore the dynamics and implications of a key tool within this infrastructure intended to enable portable collaboration across organizations serving those who are experiencing homelessness: the VI-SPDAT (Vulnerability Index - Service Prioritization Decision Assistance Tool). This tool, while providing a means of coordinated assessment, must itself be negotiated according to the values, data concerns, and goals of the agencies and service providers who make use of it. This paper reports findings from 29 interviews with individuals working in nonprofits, charities, and government agencies that provide services or resources to people experiencing homelessness within the City of Austin's Continuum of Care. The life-and-death stakes of the VI-SPDAT, which is designed to prioritize access to services based in part on a prediction of potential for premature mortality, drive home the need for equitable and just infrastructure.

KEYWORDS

Knowledge infrastructures; homelessness; VI-SPDAT; infrastructural justice; critical infrastructure studies.

INTRODUCTION

In leveraging information to seek a more equitable and just world, one of the major challenges that we face as a society and as information professionals is the injustice of homelessness. Former Hawai'i Governor Linda Lingle (2004) once said about homelessness, "But, this is a moral issue here, that we ignore at our own peril. We have come dangerously close to accepting the homeless situation as a problem that we just can't solve" (para. 6)." In his memoir, *Just Mercy*, lawyer and author Bryan Stevenson (2014) wrote, "my work with the poor and the incarcerated has persuaded me that the opposite of poverty is not wealth; the opposite of poverty is justice" (p. 18). This paper reports findings from a study designed to leverage information and technology to empower people experiencing homelessness and better equip service providers with data, information, and knowledge to maximize the potential for good of their limited resources.

Like many cities in the United States, the City of Austin, Texas's current approach to addressing homelessness is oriented around a Continuum of Care (CoC), a regional organization that coordinates access to federal assistance funding, with a dedicated organization known as ECHO (Ending Community Homelessness Coalition) taking on a leadership role among the many providers of services, shelter, or other resources in the area (ECHO, 2021). Coordinating of information resources and knowledge is done through an HMIS (Homelessness Management Information System). This approach, recommended by the US Department of Housing and Urban Development (HUD) combines a coordinated assessment approach with the development of an infrastructure for sharing information about participating clients and available resources. The components of CoC were created through the McKinney-Vento Homeless Assistance Act and then consolidated in HUD through the Homeless Emergency

Assistance and Rapid Transition to Housing (HEARTH) Act. A CoC provides funding to nonprofit, government, and other entities that serve people experiencing homelessness within a defined geographic area. CoCs, under this program, are required to use a coordinated assessment system that includes a standardized assessment tool, and to provide a central point of contact for coordination and sharing of data resources.

The standardized assessment tool used most commonly among cities participating in this program is the VI-SPDAT. The VI-SPDAT (Vulnerability Index - Service Prioritization Decision Assistance Tool), is a standardized assessment tool that uses a guided survey interview to prioritize limited resources for those experiencing homelessness according to the likelihood of mortality in the near future. In a recent 2015 report conducted by HUD's Office of Priority Development and Research, which reported on a workshop held among experts drawn from both government and academic roles, such coordinated assessments were described as "[lacking] a strong evidence base and... limited in their ability to select the best interventions for families and individuals or to predict which families would be the most successful in different interventions," (PDR, 2015, 5). However, "because of the regulatory requirement that all CoCs use coordinated assessment, no comparison group exists," (PDR, 2015, 4) to test these instruments, or to adequately assess their effects, in randomized controlled trials. As such, related in this report is a recommendation for "mixed-methods research to better understand the systems involved," (PDR, 2015, 4)—a call for research situated in practice that considers the efficacy and impact of these assessments.

In this paper, we report preliminary findings from interviews conducted as part of an ongoing study of approaches to homelessness amelioration in Austin. Throughout these interviews, an image of the VI-SPDAT emerges that emphasizes its infrastructural role as a key point of collaborative access for disparate, heterogeneous, and often parallel, providers of services and information for those on the continuum of homelessness. When using this tool, such service providers, alongside engaged local and state government agencies, expressed an awareness of the flaws of the assessment tool and described how they navigated established information systems and personal relationships to negotiate these known flaws. Participants related how the VI-SPDAT often fell short of its goal of prioritizing those most vulnerable for reasons both endogenous and non-endogenous to the assessment survey itself. In this paper, we engage with the 'coming to be' of a knowledge infrastructure (the HMIS, as mediated through coordinated assessment in the form of the VI-SPDAT) in Austin.

BACKGROUND

Approaches to the amelioration of homelessness are often fragmented, with significant asymmetries of knowledge, resources, and data expertise. For example, librarians, who in many urban settings are a first point of contact with those on the continuum of homelessness in need of information and support in their professional roles, often disagree as to their level of responsibility, or are unsure of their capacity for relaying expert knowledge, such as health information (Williams, 2016). The usefulness of information resources directly available to those on the continuum of homelessness is related, in part, to the flexibility and portability of those resources (Woelfer et al., 2009).

Community-based organizations (CBOs) have significant barriers in terms of access to open data and coordinated information systems, including tensions related to disparate access to data, limited utility of collected data, limited data capacity among CBOs, and the tendency of extant infrastructure to exclude the concerns faced by those organizations (Yoon & Copeland, 2020). Similarly, minor differences in how the issue of homelessness is presented evoke different values and differing levels of public support for ameliorating policies (Koepfler, Templeton & Fleischmann, 2012). Information intermediaries, like many of the organizations engaged with Continuum of Care, thus play a key role in addressing the information needs of those in disadvantaged or dependent circumstances and work to bridge knowledge gaps between services and these users (Buchanan, Jardine, & Ruthven, 2018).

Much like infrastructure itself, people experiencing homelessness might be thought of as similarly fading from visibility in the absence of systemic breakdowns (Koepfler, Mascaro, & Jaeger, 2014). Much as current federally led approaches to funding and addressing homelessness in communities relies on a continuum of care, our definition of homelessness embraces the notion that homelessness is itself a continuum, ranging across situations like housing instability and aging out of the foster care system, to reintegration from incarceration, episodic homelessness, living exclusively on the street, or couch-surfing. Ongoing, community-oriented efforts such as the Continuum of Care serve a valuable role in maintaining visibility and engagement with this diverse range of communities, but the technologies through which they understand, manage, and address homelessness bear significant consequence in how services are provisioned and the population of users is understood, advocated for, and prioritized.

The Knowledge Infrastructural Perspective

"One of the most important developments in science and technology studies (STS) has been to refocus attention away from the spectacle of the pageant of history toward the formation and operation of infrastructure" (Slota & Bowker, 2017, 530). Infrastructure studies, especially through the lens of knowledge infrastructures (Edwards et al., 2013), provides a means for understanding and assessing how novel systems become integrated with, work

alongside, or are in tension with existing systems already in use. These may be systems of standards, agreements, and national policy as well as sensors, storage, and analysis (Edwards, 2010). Infrastructure is not best defined according to the technical characteristics of a given system or set of systems, but instead through numerous relational characteristics as defined by Star and Ruhleder (2001). Following these characteristics, we can assert that a system is infrastructural when it is embedded and transparent in practice, learned as a part of membership, linked with conventions of practice, and embodying some set of standards. Infrastructure is also built upon an installed base that has some inertia of its own, exceeds a single site or physical location, resolves tensions between the global and the local, and becomes much more visible upon its breakdown. This heterogeneous list of features recognizes "that infrastructure [is] integrally a social, organizational, and physical phenomenon" (Slota & Bowker, 2017, 537).

In many ways, infrastructure encapsulates a discourse about the future (Larkin, 2013), where novel infrastructure is presented as both a vision of an idealized future and the pathway towards that future. In similar fashion, the development of novel infrastructure negotiates the tensions inherent in the "long now" (Ribes & Finholt, 2009) of its production, where work towards immediate needs is in tension with work towards future goals from the inception of its development. Infrastructure is not built as such (Bowker, 2018), but rather comes into being through the confluence of practice, policies, standardization, and system integration. Mediation (Latour, 1994) thus becomes a vital consideration in understanding how infrastructures assemble, organize, and become available to use (Baker & Millerand, 2008). In this work, we reminded that "as accretions that are formed slowly over time, infrastructures are made by and constitutive of diverse political rationalities, past and present" (Anand, 2015).

Conceptually, knowledge infrastructures may either disintermediate, providing a closer connection to data among an identified group of 'end users', or structure intermediation, where local participants are empowered as mediators of data and information flows between connected data and users (Baker & Millerand, 2008). Knowledge infrastructures are fragile (Borgman et al., 2016), and their durability is closely linked with the invisible work of maintenance, repair, and adjustment (Jackson, 2014). It is in repair and maintenance that "order and meaning in complex sociotechnical systems are maintained and transformed, human value is preserved and extended, and the complicated work of fitting to the varied circumstances of organizations, systems, and lives is accomplished" (Jackson, 2014, p. 222). No infrastructure is established in developed form—they are in a constant state of responsive adjustment to changing circumstance, systemic requirements, and necessary resolutions to key moments of breakdown. According to Anand, "thinking of infrastructure as accretion draws our attention to how these are not smooth surfaces that perform as planned; instead they are flaky, falling-apart forms that constantly call out for projects of management, maintenance, and repair" (2015, para. 1). The VI-SPDAT, in this study, is explored as the initial point of contact for the knowledge infrastructure that supports the provision of services to those on the continuum of homelessness.

History and Critique of the VI-SPDAT

The VI-SPDAT is the combination of two prior tools. The first, the Vulnerability Index (VI), was developed by Community Solutions to assess the risk of death of the survey-taker on the basis of medical history and prior conditions, and was based in part on prior research conducted by Boston's Healthcare for the Homeless program (Hwang, et al., 1997). The second, the Service Prioritization Decision Assistance Tool (SPDAT), was developed by OrgCode Consulting, Inc., and considered socioeconomic and psychosocial risk factors of homelessness. The combined tool, the VI-SPDAT, is among the more popular tools used in required prioritization of resources and has been deployed in over 1000 communities in the US, Canada, and Australia (OrgCode, 2015), and is notable in its accounting for social, psychological, and health risk factors in assessing vulnerability and prioritizing service provision. Questions in the VI-SPDAT consider factors such as environmental threats, social network threats, health conditions, alcohol and drug use, and mental health (King, 2018).

There are, however, reasons to question the validity and reliability of this instrument (Brown et al., 2018). The VI-SPDAT is a deficit-based assessment (Frisch et al., 2017), and lacks questions about the strengths that a surveyed individual might bring to their management of a home and family, instead focusing on areas where behavior and history indicate higher vulnerability. Its focus on discrete events, rather than patterns of behavior, potentially causes the VI-SPDAT to under-assess key risk factors for survivors of domestic and sexual violence (McCauley, 2020). VI-SPDAT scoring was also not found to effectively predict placement in housing, especially when compared to housing eligibility or consistent interactions with service providers (King, 2018). The VI-SPDAT's success has in prior studies been closely linked to the rapport between the assessor and client, especially considering the discomfort clients would often feel in honestly answering questions about risky behaviors such as drug use or sharing deeply personal information about mental health (Frisch et al., 2017).

The structure of the VI-SPDAT may also produce some level of racial inequity, as critical research into the intersectionality of the tool has indicated that it scores White clients as being of notably higher vulnerability than Black clients (Cronley, 2020), which is further troubled by the overrepresentation of those of Black identity among

the population of those experiencing homelessness (Henry et al., 2018). Gender differences in social support and mental health further complicate the fair provision of permanent supportive housing (Winetrobe et al., 2017), especially in underlying assumptions of vulnerability. Coordinated assessment, itself, may not be the most equitable means of prioritizing resources, with options such as lotteries or progressive engagement recommended by a team of experts as being more equitable and efficient (PDR, 2015). Rent assistance, similarly, may play a key role in the Housing First approach, with demonstrated effectiveness in improving quality of life and similar measures (Pankratz, Nelson, & Morrison, 2017), displacing the Housing First mentality that often underlies coordinated assessment approaches.

Infrastructure, as "flaky accretions of sociomaterial processes" that come to be through the relationships between humans, discourses, technology, and other things (Anand, 2017, 13), are "neither ontologicaly prior to politics nor are they the effects of social organization" (13). Infrastructure results both in spaces of visibility and invisibility, and centers and margins (Star and Ruhleder, 2001). Thus, an understanding of how an infrastructure produces both justice and injustice in its technical characteristics, operation, and social or organizational dynamics, is vital to those developing novel infrastructure, or engaged in its development, maintenance, and repair. This paper is driven by the exploration of how an infrastructure might become more or less just as it is used, iterated, and developed, and by understanding how components of that infrastructure, especially 'entry points' like the VI-SPDAT, bear consequence to how that infrastructure arranges knowledge about the world. As such, this analysis was directed towards a pair of complementary research questions: what are the social, organizational, and ethical consequences of an infrastructural 'tool' such as the VI-SPDAT, and how does such a tool work to produce a more or less just world?

METHODS

This study, which is a portion of a larger, in-progress, mixed-method study, focuses on the experiences of stakeholders within government and non-profit organizations working with those on the homelessness continuum in Austin, Texas. For this study, we interviewed 29 individuals, all of whom were engaged at various levels with the provision of services or information for individuals on the continuum of homelessness. Interviewees were selected initially following recommendations from key informants from the City of Austin who were collaborators on this project, then further developed through snowball sampling, to leverage the unique social knowledge of participants in identifying relevant future participants (Noy, 2013). Nineteen of the interviewed participants held leadership roles within their organization (Manager, Director, or Coordinator titles), where the remainder held more direct service provision or similar roles, such as working on homelessness 'street teams' to identify areas of service need or providing contract and grant support. Of these participants, 4 were drawn from ECHO itself, 13 from CoC-affiliated community organizations, 11 from collaborating local or state governmental roles, and 1 participant who was primarily in an academic role.

In order to draw deeply from the lived experience of those directly engaged with the knowledge infrastructure of the CoC, we structured these interviews according to critical incident technique (Flanagan, 1954; Morrisey, 2015). Interviews took approximately one hour and were recorded over teleconferencing software. Transcribed interviews were then analyzed inductively through thematic analysis (Clarke, Braun, & Hayfield, 2015), and key themes in the data were inductively identified as findings for reporting. Thematic analysis was selected due to its versatility in describing rich qualitative datasets both deductively and inductively. Major themes presented in this writing relate to service provider's engagement with their clients through data traces, the techniques and negotiations that come from managing a flawed system, and the infrastructural justice of service provision and information systems. The findings reported here are part of a larger study for which data collection is still ongoing. To inform and supplement the service provider interviews, we are currently engaged in data collection in the form of open-ended surveys delivered to users of those services who are experiencing homelessness somewhere along the continuum and engaged in data collection and cleaning for a complementary quantitative approach.

FINDINGS
HMIS and the CoC as Infrastructure

The coordinated HMIS system used in the City of Austin's CoC can be best characterized as a knowledge infrastructure intended to enable and support collaboration among the city/state government offices and service providers around the amelioration and management of homelessness in the region. In this approach, collaboration and coordination of parallel services was addressed through information infrastructure such as data sharing, coordinated assessment and entry processes, and participation in HMIS databases. HMIS, here, provides a central point of contact and data repository for groups within the CoC, among its other administrative and leadership roles. Participants often related that this data sharing infrastructure was among the only, or at least the most consistent, means of direct collaboration and coordination with these other agencies. As the below participant, who works in the Community Court system (a branch of the courts that deals only with those on the continuum of homelessness) relates, this led to gaps in coordination where those who did not have a license or access to the system felt excluding from ongoing work.

> "You know, our communication is limited to these open meetings, really. And we haven't really honestly had a one-on-one discussion with them... that's the case because the Public Health Department has the contract with ECHO. We don't. So, a lot of times, I hear things secondhand, and they obviously hear things secondhand, as well."

As indicated above, participants also related that this knowledge infrastructure was built upon a prior infrastructure of personal relationships, implicit knowledge, and in-person interactions. While the HMIS knowledge infrastructure was not intended to displace these dynamics, participants reported these modes of engagement as serving a secondary role in achieving their goals. A key item of note here is in the need for traces of individuals as they progress through the heterogeneity of disconnected, and often parallel, providers of services. Being able to find people and their histories—as data representations and as physical humans—and their traces in the infrastructure, was seen as vital to effective service provision. The loss of these traces was related to bear significant negative consequences for the individuals on the homelessness continuum in discovering and making effective use of vital services, such as access to prescription medication. The case below was related by the director of a faith-led coalition that mediates access to services and housing and describes these infrastructural effects in detail.

> "But you know, it's such a large organization that there's different teams and the teams don't communicate with each other. And so, for instance, one of our clients needed to get her medication and had been off of her meds for like six to nine months. And, and she had just in their system had been tagged as part of a group that is up north, you know, like a 30-minute bus ride from here, and she'd never even been there."

Of note here is that data quality becomes of issue—inaccurate location information arises as problematic for the individual described here, and her needs are clearly understood. This participant describes this as an issue of coordination and communication across different service providers, but the central dynamic here, and related consistently by other participants, is the loss of traces of an individual, both physical and data. This participant goes on to describe the consequence of this 'broken trace':

> "because she was tagged as part of that group, the doctor that was here couldn't see her. And so we housed her and she ended up literally tearing the drywall off the walls. And they've ended all of it was because just some tag in the system said that she was part of some teams you'd never even met with. But because she was part of that team, she couldn't see the doctor that was here because that doctor was part of a different team."

The individual described, due to the flawed data within HMIS, essentially lost access to medical care that would have enabled her to maintain the housing that the group was able to provide. Without contributions across the continuum that address mental health alongside physical health, ongoing access to housing was related as becoming significant fragile. Returning to the narrative, we find that these infrastructural interactions can even preemptively disqualify potential admissions to the system through lack of access to or capacity within the prior infrastructures subtending (Slota and Bowker, 2011) the HMIS system.

> "that's just kind of exemplar of a lot of other issues that have to do with, you know, their system... [being] just incredibly difficult for the for the folks experiencing homelessness to navigate... multiple appointments that... I have to somehow get a homeless person to sit on the phone for an hour and a half to do these intakes. And if they cut out early, the entire thing is wasted, and you can't count any of it. And then they don't get their meds."

Engagement with the CoC was built upon the assumption of prior communications infrastructure (telephones and cell phones) to which those on the continuum of homeless often have limited access, or no access at all. Similarly, frictions arose in providing services when assumptions about consistency and reliability of scheduling did not reflect the lived experiences of users. This same participant goes on to further relate,

> "And even if they make it through that, then they've got it, then they've got to meet with a caseworker who, some of whom, again, can only be met with via phone, and are all carrying like hundreds of people on their caseloads and can barely meet with a person once per month."

And even when all of these issues are effectively negotiated, additional bureaucratic steps to engage other supportive infrastructures further arise:

> "They've got to figure out how to get the meds from the pharmacy, they've got to figure out how to get a MAP [Medical Access Program].... [which] doesn't always cover Integral Care prescriptions. And then once you get your prescription, [you've got] to try to hold on to your prescription and not get it stolen and take your meds correctly... and if you'd lose your meds, they weren't going to replace them. So, it's like the odds that are stacked against a person trying to get mental health care in our system are... huge."

While the above story does not necessarily conform to the patterns of engagement related by service providers across the entirety of our participant group, it is nevertheless evocative of the sometimes-significant barriers to

following the intended process of individuals throughout a system. The individual's trace in the system was seen as necessary to achieve a desired outcome for that individual and required that infrastructural gaps were accommodated through individual work on the part of service providers, often personally or altruistically motivated. For the majority of participants' organizations, the VI-SPDAT, or coordinated assessment process, was the originating point of these traces, and bore consequence throughout the system for individuals so assessed. Needs and expectations evolve and change based in significant part on data traces within the heterogeneity of inconsistently-interlinked infrastructures within the CoC, and novel struggles can be introduced along each step of this process. This is a "fragile" infrastructure, where if traces are lost, progress is also lost, and, often, significant avoidable harm might occur—maintenance of the individual across the infrastructure is vital.

Negotiating Coordinated Assessment

The VI-SPDAT was a tool that was known to be flawed across all levels of engagement by our participants. Many related how they survey was found to insufficient for adequately assessing vulnerability of individuals within the system.

> "And, you know, with that coordinated entry system, they do an intake, and they do, you know, an acuity assessment, and a score, whatever. And that's how they're prioritized. But, you know, I appreciate the system, because I think it does create some transparency, and also accountability… but I also think there's still this population that just isn't able to do that assessment sometimes, or because they're so ill, and they don't realize they have issues or they're very paranoid. So, they don't want to tell anybody their business. They may score lower acuity when they're actually some of the most high-acuity folks."

Of interest in the above statement made by a participant holding a social work role within the Safe Haven veteran's organization is the 'mixed assessment' of the VI-SPDAT. This participant was personally aware of how the VI-SPDAT, in its reliance on self-reporting of medical and social conditions that are often embarrassing or threatening, could fail to adequately assess vulnerability because of the level of trust between the assessed individual and those conducting the assessment. This issue with self-advocacy was reported elsewhere:

> "A lot of the people that we serve are so ill that they were not scoring as a priority through the continuum of care process, they were scoring very low as a matter of fact, probably because they're not the best advocates for themselves, given their mental health and substance use issues. So, they were never going to get housing through the continuum of care, while we were still seeing the severe need for them to be housed, because they were literally dying on the street... The reason they're not getting prioritized is because those coordinated assessments are based on self-report."

This quote, from a member of the Community Courts, which serve those on the continuum of homelessness and represent the first point of contact for many who seek services and information, relates how participants can in fact be in such a vulnerable condition as to render coordinated assessment ineffective. Service needs, as related by our participants, neither start nor end with immediate housing. However, housing enables a point of trace contact, a means by which an individual might be recovered to the system for further case management, and thus has value in negotiating the accretion of infrastructures that comprise the Continuum of Care.

Individual traces throughout the system, then, were vital in both their necessity for progression through steps of care and service provision, as well as key factors in understanding the system and its outcomes. As such, the known flaws in the VI-SPDAT became less important to our participants than the means by which the tool might generate more consistent systemic traces. "This could be more efficient if we all had access to the same resources..." related an individual working in a service seeking housing for unhoused senior citizens. "Not having access to vital records… makes the whole process crumble." Issues raised in prior assessments of the VI-SPDAT also structured how leadership in the CoC approach negotiating it as a necessary, but flawed, tool. As related in the background section, in practice the VI-SPDAT tends to score with some level of apparent inequity, consistently scoring White clients as higher vulnerability as Black clients, for example. A participant in a leadership role in the coordinated assessment process related that:

> "past our pilot, [we have] implemented additional equity points on top of the existing scoring system for the VI-SPDAT. And basically, the plan moving forward along with our HUD support is to just kind of make sure that we're monitoring our outcomes and the kind of assessment pieces on a very regular scale, to make sure that we are prioritizing folks early on for housing resources, and that we can kind of right this inequity that we see in the disproportionate overrepresentation of Black African-Americans in our homeless population."

Again, of note here is the necessity of ongoing maintenance and repair of the VI-SPDAT as point of contact to the larger coordinated infrastructure of the CoC. A very important feature of the above quote is that the VI-SPDAT, though known to have inequitable outcomes, was also seen as a key point of inflection towards a more just infrastructure of care, one that has the potential to help correct disproportionate overrepresentation, rather than

initiate it, should it be sufficiently adapted to local conditions. Trained assessors were seen as key mediators in the process of gaining access to the infrastructure on the part of clients, and capable of improving the quality of data collected through this process of assessment through their own experience and expertise. This level of contextual knowledge was vital in assuring access to the infrastructure, as related in the below quote from a participant in a leadership role in Community Courts:

> "This individual, [who] did have... developmental disabilities and had been in and out of prison and jail for his behavior, when asked, 'Do you have access to food?' He said yes. And his access to food was eating out of the dumpster. And we knew that because we would see it..."

Finally, the nature of the VI-SPDAT as prioritizing through vulnerability, affords counter-intuitive engagement with infrastructurally-mediated resources, where reductions in apparent factors of vulnerability rendered clients more vulnerable due to scoring more poorly on the assessment. As related by the below participant, who held a leadership role in a veteran-specific organization:

> "This person is very ill, and he's gonna get out in a week when his IV antibiotics are done. If they're in a hospital, they're determined safe... So, it's like, you have to wait till they're back in a really horrible position... all that to say is like, there's just not a thorough assessment tool, and there's not a push. And I think there's also lack of, like, providers sometimes don't know what to do, when that happens, because it takes a lot of advocacy."

Across these findings, an image emerges of the VI-SPDAT as a necessary point of mediation between infrastructural resources and those who need them, and thus a facet accreted to that infrastructure. It is, however, significantly complexified by its fit with prior infrastructure and its need for ongoing maintenance and advocacy following the completed assessment. This is further complicated by how the VI-SPDAT's technical features were found to be potentially productive of inequity. However, in generating initial data traces within the CoC's knowledge infrastructure, the role of a coordinated assessment tool was seen as vital for coordination and collaboration among service providers beyond the federal mandate from which it originated.

DISCUSSION

The infrastructural perspective is a vital lens for uncovering the relational complexity of novel systems, especially those intended to support knowledge sharing and resource provisions. We considered in this paper the negotiations, dynamics, and relationships that enable the ongoing provisional maintenance of a knowledge infrastructure deployed by the City of Austin to coordinate and collaborate among the many governmental offices, community-based organizations, and non-profits that provide services, often disconnected and parallel, to those on the homelessness continuum. As a result, implicit knowledge and lived experience with negotiating this system on behalf of clients/service users was vital for effective navigation of the infrastructure, and shared success stories often related where this knowledge, born primarily of experience and history, was able to facilitate service access where other means was unsuccessful, in line with Star and Ruhleder's assertion that infrastructures are learned as a part of professional practice (Star and Ruhleder, 2001).

Coordinated assessment in general, and the VI-SPDAT in particular, is a clear illustration of the negotiations and invisible maintenance work (Jackson, 2004; Star & Strauss, 1999) that go into the development of knowledge infrastructures intended to address areas of vital social concern. Even when in possession of knowledge as to the shortcomings of the instruments, participants nevertheless continued to reference the assessment process as a major portion of how services are initially considered. In many ways, the VI-SPDAT could be *any* survey at all - what was related as valuable was less the specific information collected, and more in its role of initiating the 'chain of reference' in the system as it generates initial traces within the infrastructure. This fits well with Anand's (2015) notion of infrastructure as flaky accretion. Similarly, the need for trained assessors mediating access to the service infrastructure fits well with Buchanan, Jardine, & Ruthven's (2018) findings relative to the importance of information intermediaries.

Missing data traces were both a logistical hurdle for interviewed service providers and a key loss of agency over data among service users. Repeated and redundant collection of data as traces were siloed or lost, gaps in understanding how the data was being used to prioritize, and a lack of knowledge on where and how data exist about an individual, all happen when traces and interconnectedness of represented data are lost. While on the one extreme surveillance and potential targeting might be of significant concern (Clarke, Parsell, & Lata, 2020), on the other a lack of system visibility erodes rights of access to support. This Continuum of Care and its attendant systems represents a growing knowledge infrastructure, the negotiations and dynamics of its adoption and ongoing maintenance work (Jackson, 2014) encapsulating the 'long now' (Ribes & Finholt, 2009) of infrastructure development. Key to the operation of this system was how fragile data traces within the system become durable through ongoing supplemental, and often invisible, efforts on the part of those providing services and mediating

access to the infrastructure. As such, justice, in the infrastructural perspective, is closely related not only to the technical characteristics of the systems that accrete to form that infrastructure, but also to the daily, iterative and reflective, practices of those working through that infrastructure. As such, we identify here a need for further work understanding not only how infrastructures are built and used, but how they are maintained, repaired, iterated, and managed towards achieving social and political goals.

CONCLUSION

This paper evaluates this assessment and explores its role in initiating traces and structuring engagement within a knowledge infrastructure. The invisible work (Star & Strauss, 1999) of managing, negotiating, and maintaining these traces was vital to effective service provision through the system. Coordinated assessment is federally required for those communities seeking federal funding to address and ameliorate homelessness in a specified region. However, extant tools are general in scope, often undertested, and inconsistently linked with positive outcomes for served communities and service providers. This work raises the question: is the VI-SPDAT *a* just infrastructure, or is it *just* (only) infrastructure? Tools like the VI-SPDAT, as the first point of contact, more immediately raise questions of just and equitable access to infrastructure, but are often dismissed as unrepresentative, flawed tools, rather than consequential dynamics of that infrastructure in practice—as being just (only) infrastructure. Explorations of infrastructural justice do not effectively respond to studies of infrastructure that do not consider its temporality (Appel, Anand, & Gupta, 2018), and see it as a stable and consistent set of systems.

Infrastructure, in practice, is a messy, uncoordinated accretion (Anand, 2015) requiring constant maintenance, repair, and adjustment. So too is the VI-SPDAT. Even with the best intentions, tools are often chosen according to ineffectively defined needs or in the absence of a full understanding of the problem space. Each solution is not perfect and usually comes with unintended consequences, and usually in either development or fielding of a tool, we blame the tool instead of the gap in policy or process. It is perhaps too easy to dismiss the VI-SDPAT as inequitable or unjust solely due to some aspect of its design, rather than considering it to be, like all infrastructure, a "flaky, falling apart form" (Anand, 2015, para. 1) that grows through a regime of ongoing maintenance and adjustment. Generally, medicine and law are seen as life-and-death professions, warranting greater care in licensing of professionals in these fields. Physical infrastructures such as bridges, roads, and electricity service provision are of similarly high stakes. The VI-SPDAT provides a compelling example of how data, information, and knowledge infrastructures can share these life-and-death consequences.

REFERENCES

Anand, N. (2015). Accretion. Theorizing the Contemporary, *Fieldsights*. https://culanth.org/fieldsights/accretion

Anand, N. (2017). *Hydraulic City: Water and the infrastructures of citizenship in Mumbai*. Duke University Press.

Appel, H., Anand, N., & Gupta, A. (2018). Introduction: Temporality, politics, and the promise of infrastructure. In N. Anand, A. Gupta & H. Appel (Eds.), *The promise of infrastructure* (pp. 1-38). Duke University Press. DOI: https://doi.org/10.1515/9781478002031-002

Baker, K. S., & Millerand, F. (2007). Scientific infrastructure design: Information environments and knowledge provinces. *Proceedings of the American Society for Information Science and Technology*, *44*(1), 1-9. DOI: https://doi.org/10.1002/meet.1450440370

Borgman, C. L., Sands, A. E., Darch, P. T., & Golshan, M. S. (2016). The durability and fragility of knowledge infrastructures: Lessons learned from astronomy. *Proceedings of the Association for Information Science and Technology*, *53*(1), 1-10. DOI: https://doi.org/10.1002/pra2.2016.14505301057

Bowker, G. C. (2018). Sustainable knowledge infrastructures. In N. Anand, A. Gupta & H. Appel (Eds.), *The promise of infrastructure* (pp. 203-222). Duke University Press.

Brown, M., Cummings, C., Lyons, J., Carrión, A., & Watson, D. P. (2018). Reliability and validity of the Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT) in real-world implementation. *Journal of Social Distress and the Homeless*, *27*(2), 110-117. DOI: 10.1080/10530789.2018.1482991

Buchanan, S., Jardine, C., & Ruthven, I. (2019). Information behaviors in disadvantaged and dependent circumstances and the role of information intermediaries. *Journal of the Association for Information Science and Technology*, *70*(2), 117-129. https://doi.org/10.1002/asi.24110

Clarke, V., Braun, V., & Hayfield, N. (2015). Thematic analysis. In J. Smith (Ed.), *Qualitative psychology: A practical guide to research methods*, 222-248. Sage Publishing, Inc.

Clarke, A., Parsell, C., & Lata, L. N. (2021). Surveilling the marginalised: How manual, embodied and territorialised surveillance persists in the age of 'dataveillance'. *The Sociological Review*, *69*(2), 396-413. DOI: https://doi.org/10.1177%2F0038026120954785

Cronley, C. (2020): Invisible intersectionality in measuring vulnerability among individuals experiencing homelessness – critically appraising the VI-SPDAT, *Journal of Social Distress and Homelessness*, 1-11. DOI: 10.1080/10530789.2020.1852502

ECHO. (2021). Continuum of Care. https://www.austinecho.org/leading-system-change/continuum-of-care/

Edwards, P. N. (2010). *A vast machine: Computer models, climate data, and the politics of global warming*. Cambridge, MA: MIT Press.

Edwards, P., Jackson, S., Chalmers, M. K., Bowker, G. C., Borgman, C., Ribes, D., Burton, M., and Calvert, S. (2013). *Knowledge infrastructures: Intellectual frameworks and research challenges.* https://escholarship.org/uc/item/2mt6j2mh

Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin* 51(4): 327-358. DOI: https://doi.org/10.1037/h0061470

Fritsch, A., Hiler, H., Mueller, B., Wu, M., & Wustmann, J. 2017. The vulnerability of assessments: A qualitative analysis of housing professionals' experiences with the VI-SPDAT in Minnesota and a comparative review of alternative housing triage assessments. Prepared for *Hennepin County Office to End Homelessness, Minnesota Finance Agency*. https://conservancy.umn.edu/bitstream/handle/11299/190794/VISPDAT%20Capstone%20-%20Fritsch%20Hiler%20Mueller%20Wu%20Wustmann.pdf?sequence=1

Henry, M., Mahathey, A., Morrill, T., Robinson, A., Shivji, A., & Watt, R. (2018). *The 2018 Annual Homeless Assessment Report (AHAR) to Congress. Part 1: Point-in-time estimates of homelessness.* HUD Exchange. https://files.hudexchange.info/resources/documents/2018-AHAR-Part-1.pdf

Hwang, S. W., Orav, J., O'Connell, J. J., Lebow, J. M., & Brennan, T. A. (1997). Causes of death in homeless adults in Boston. *Annals of Internal Medicine. 126*(8):625-628. https://doi.org/10.7326/0003-4819-126-8-199704150-00007

Jackson, S. (2014). Rethinking repair. In T. Gillespie, P. Boczkowski, & K. Foot (Eds.) *Media technologies: Essays on communication, materiality and society* (pp. 221-240). MIT Press.

King, B. K. (2018). *Assessment and findings of the Vulnerability Index (VI-SPDAT) survey of individuals experiencing homelessness in Travis County, TX*. Dissertation prepared for the UT School of Public Health. Digital Commons @ TMC. https://digitalcommons.library.tmc.edu/uthsph_dissertsopen/11/

Koepfler, J. A., Mascaro, C., & Jaeger, P. T. (2014). Homelessness, wirelessness, and (in) visibility: Critical reflections on the Homeless Hotspots Project and the ensuing online discourse. *First Monday 19*(3).

Koepfler, J. A., Templeton, T. C., & Fleischmann, K. R. (2012). Exploration of values and frames in social media texts related to the Homeless Hotspots debate. *Proceedings of the American Society for Information Science and Technology*, *49*(1), 1-4. DOI: https://doi.org/10.1002/meet.14504901238

Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, *42*, 327-343.

Latour, B. (1994). On technical mediation. *Common Knowledge, 3*(2): 29-64.

Lingle, L. (2014). Keynote speech to the Chamber of Commerce of Hawai'i (Affordable Housing/Homelessness). *Public Statement*. https://justfacts.votesmart.org/public-statement/63019/keynote-speech-to-the-chamber-of-commerce-of-hawaii-affordable-housinghomelessness

McCauley, H. & Reid, T. (2020). *Assessing vulnerability, prioritizing risk: The limitations of the VI-SPDAT for survivors of domestic and sexual violence. Special Series: Coordinated Entry & Domestic/Sexual Violence*. National Resource Center on Domestic Violence. https://safehousingpartnerships.org/sites/default/files/2020-08/CoordinatedEntry-Assessing%20Vulnerability-Risk_0.pdf

Morrissey, M. E. (2015). A social ecology of decision making in serious illness: The salience of social care-seeking behavior. The Gerontologist, 55(Suppl. 2). 273–274. https://doi.org/10.1093/geront/gnv573.03

Noy, C. (2008). Sampling knowledge: The hermeneutics of snowball sampling in qualitative research. International *Journal of Social Research Methodology, 11*(4), 327-344.

OrgCode Consulting (2015). *Vulnerability Index - Service Prioritization Decision Assistance Tool (VI-SPDAT) Prescreen Triage Tool for Single Adults*. Community Solutions. https://everyonehome.org/wp-content/uploads/2016/02/VI-SPDAT-2.0-Single-Adults.pdf

PDR. (2015). Assessment tools for allocating homelessness assistance: State of the evidence. *PD&R Expert Convenings Summary Report*. US Department of Housing and Urban Development, Office of Policy Development and Research. https://www.coloradocoalition.org/sites/default/files/2017-01/assessment_tools_Convening_Report2015.pdf

Pankratz, C., Nelson, G., & Morrison, M. (2017). A quasi-experimental evaluation of rent assistance for individuals experiencing chronic homelessness. *Journal of Community Psychology*, *45*(8), 1065-1079. DOI: https://doi.org/10.1002/jcop.21911

Ribes, D. & Finholt, T. A. (2009). The long now of infrastructure: Articulating tensions in development. *Journal for the Association of Information Systems (JAIS), 10*(5): 375-398.

Slota, S. C. & Bowker, G. C. (2017). How infrastructures matter. In U. Felt, R. Fouché, C. Miller, and L. Smith-Doerr (Eds.) *The Handbook of Science and Technology Studies* (pp. 529-554). MIT Press.

Star, S. L., & Ruhleder, K. (2001). Steps toward an ecology of infrastructure: Design and access for large information spaces. In J. Yates & J. Van Maanen (Eds.) *Information technology and organizational transformation: History, rhetoric and practice* (pp. 305-346). Sage.

Star, S. L., & Strauss, A. (1999). Layers of silence, arenas of voice: The ecology of visible and invisible work. *Computer supported cooperative work (CSCW)*, *8*(1), 9-30.

Stephenson, B. (2014). *Just mercy: a story of justice and redemption*. Spiegel & Grau.

Williams, R. D. (2016). "We're not allowed": Public librarians' perspectives on providing health information to library users experiencing homelessness. *Proceedings of the Association for Information Science and Technology*, *53*(1), 1-10. https://doi.org/10.1002/pra2.2016.14505301079

Winetrobe, H., Wenzel, S., Rhoades, H., Henwood, B., Rice, E., & Harris, T. (2017). Differences in health and social support between homeless men and women entering permanent supportive housing. *Unstable Housing and Homelessness 27*(3), 286-293. DOI: https://doi.org/10.1016/j.whi.2016.12.011

Woelfer, J. P., Yeung, M. W. M., Erdmann, C. G., & Hendry, D. G. (2008). Value considerations in an information ecology: Printed materials, service providers and homeless young people. *Proceedings of the American Society for Information Science and Technology*, *45*(1), 1-9. https://doi.org/10.1002/meet.2008.1450450370

Yoon, A., & Copeland, A. (2020). Toward community-inclusive data ecosystems: Challenges and opportunities of open data for community-based organizations. *Journal of the Association for Information Science and Technology*, *71*(12), 1439-1454. https://doi.org/10.1002/asi.24346