



Characterizing the technological, logistical, and ethical needs of Partner Services.

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OVERVIEW

Introduction.

Across HIV and sexually transmitted infections (STIs), the real-time understanding of transmission networks of recently infected individuals is vital for the rapid diagnosis, treatment, and prevention of new cases, and for providing insight into how the disease is transmitted, which populations are at highest risk, and who should be targeted for intervention.¹

One of the most effective and widely implemented methods for understanding and intervening upon transmission networks is Partner Services - or interviewing a person newly diagnosed with HIV in order to identify any potentially exposed partners and notify, test, and if necessary, connect those partners to care.²⁻⁴ Listed by the Centers for Disease Control and Prevention (CDC) as an evidence-based intervention (EBI) for those newly diagnosed with HIV or STIs, Partner Services is a foundational public health response shown to be highly effective at slowing the spread of HIV.⁵

Unfortunately, as corroborated by our team's preliminary needs assessment of Partner Services conducted in partnership with the Chicago Department of Public Health (CDPH), the implementation of Partner Services by public health departments is often a challenge.⁶ For example, interviews are often conducted in-person by trained disease intervention specialists (DIS), which is a strain on health departments with limited financial and logistical resources.⁶ Furthermore, DIS must balance the competing priorities of building relational trust with clients while simultaneously recording detailed data on the identities of recent sex and drug-use partners - data which are extraordinarily sensitive.^{6,7} Finally, data capture itself is a massive challenge.⁸ By its nature, sexual and drug-use network data are complex and pose enormous methodological challenges for collection, processing, and storage.⁸

Due to these methodological challenges, many public health departments rely on low-technology solutions (e.g., generating a list of names and asking follow-up questions about each person listed). Navigating long and complicated paper protocols is not only tricky for interviewers, but these analog data are difficult to integrate into existing data systems and likely present a missed opportunity for public health officials who would benefit from access to local real-time data vital to targeting the most at-risk populations.

In response to similar difficulties in the collection of social network research data, our team developed a free, open-source, NIH-funded software suite called Network Canvas (R01DA042711). By building on the strengths of this existing tool – as well as our linkages to public health systems – the goal of this project was to understand the challenges facing Partner Services and how our software might be modified to provide a free and open-source data capture tool to simplify and modernize disease investigation. To this end, our team conducted a series of key informant interviews to characterize the most urgent needs of public health departments conducting Partner Services so that we might create a truly responsive and implementable tool.

Objective.

To characterize the current practices and the most urgent needs of a nationwide sample of public health departments conducting Partner Services in order to more effectively integrate and implement Network Canvas. Specifically, our team focused on understanding five core “areas of need” important for implementation. The first two areas identified potential issues relevant to the software's implementation within the disease investigation context: (1) Logistical Issues and (2) Ethical Issues. The last three areas guided our understanding of the

technical modifications required to effectively integrate the Network Canvas software into existing Partner Services workflows: (3) Interface Reconfiguration; (4) Deployment Reconfiguration; and (5) Data System Reconfiguration.

Methodology/Procedures.

In order to characterize the current practices and needs of Partner Services programming, our team first conducted a variety of exploratory activities to develop a needs assessment framework. These exploratory activities included individual meetings with project advisors, implementation partners, and national leaders in Partner Services, as well as attendance at webinars discussing salient topics within Partner Services and the review of technical documentation of systems currently implemented within public health departments. Notes from the exploratory meetings (n=7) were summarized and reviewed by the study team for common themes. Based on the knowledge gained from these initial exploration activities, our team then developed extensive key informant interview (KII) guides designed to elicit information on the five core areas of need and tailored to four categories of Key Informant Stakeholders: *Partner Services staff members*, *STI/HIV program directors*, *Informatics or Information Technology (IT) staff members*, and *clients previously enrolled and interviewed within Partner Services*. Utilizing these guides, our team then conducted a total of 16 structured KIIs, including one interview with a Partner Services client. The KIIs were audio recorded, summarized, coded, and reviewed by the study team for common themes. The Partner Services Stakeholders queried in our work represented a variety of levels, including DIS, IT staff, informatics staff, program directors, and national leadership. Although the research team is primarily based in Chicago, stakeholders were based across the United States, including in Chicago, Seattle, Atlanta, Columbus, Houston, and North Carolina.

Interview Guide Outline.

Interview guides were tailored to specific Key Informant role categories (e.g., *Partner Services staff members*, *STI/HIV program directors*, *Informatics or Information Technology staff members*, *clients previously enrolled and interviewed within Partner Services*), but had the following common sections:

- Participant Demographic Information
- Description of Agency
- Description of HIV Partner Services Program
 - Organization Administration
 - Specific Implementation
- Patient Interviews as a Component of HIV Partner Services Program
- Performance Metrics to Assess HIV Partner Services Program
- Overall Assessment of HIV Partner Services Program
- Use of Network Data and Impressions of Network Canvas
- Closing Questions and Comments

Across the above sections, our questioning sought to characterize current practices and needs of Partner Services as defined by Key Informants, and to understand how these needs might inform the implementation and integration of Network Canvas within the disease investigation context.

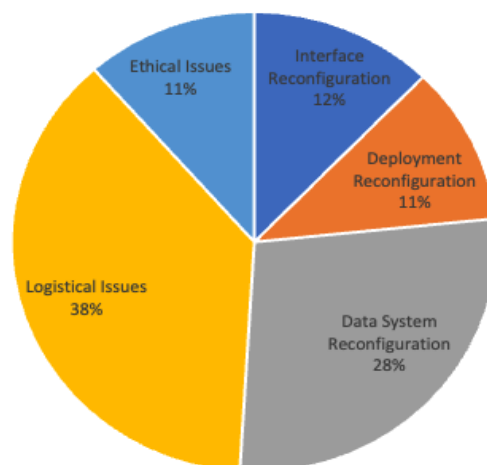
Analytic Method.

Through open-coding, the research team developed a codebook.⁹ Next, axial coding yielded a total of 24 codes: *low resources, connection, secure, remote, flexibility, efficiency, missing, building trust, sustainable, access, training, communication, simple, network data, control, adaptable, standardization, reporting, clinic, fragile, open, print, prevention, and live capture*. Each interview summary was coded and double-coded by members of our team. See [Appendix A](#) for the developed codebook.

Next, the research team categorized each coded excerpt into the relevant five core “areas of need”: *logistical issues, ethical issues, interface reconfiguration, deployment reconfiguration, and data system reconfiguration*. See [Appendix B](#) for the definitions of each area of need.

After coding was complete, the team calculated the frequency of each code and proportions of reported codes overall (See *Figure 1*) and within each area of need. The codes that were used the most frequently are discussed as key findings.

Figure 1. Areas of Need Across All Interviews

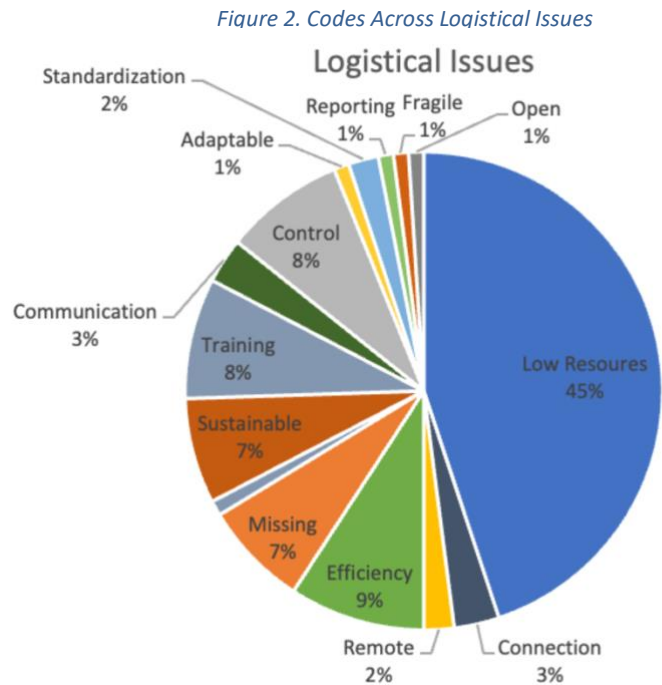


KEY FINDINGS

Logistical Issues.

Across all five “Areas of Need,” *Logistical Issues* were dominant (38% of all coded excerpts; See *Figure 1*), with the primary reported code under *Logistical Issues* being **Low Resources** (45% of coded excerpts under *Logistical Needs*; See *Figure 2*).

Low Resources is defined as public health departments being unequipped to handle the needs of Partner Services programming, including needs related to funding, time, staffing, and technology. Of note, of the excerpts coded as *Low Resources*, technology and staffing were indicated the most often, with 17 (of 51) coded excerpts indicating that **technology, devices, internet connectivity, and data systems were inadequate, outdated, or dysfunctional** and an additional 17 coded excerpts (of 51) indicating that **staffing, in number and in experience/expertise, does not meet needs of department**.



“It is difficult to change or customize variables in [Deidentified] Disease Reporting System.”

- STI/HIV Program Director

“Surveillance is still paper- and fax-based.”

- STI/HIV Program Director

“Running a report can slow down the entire system...data systems take two months to have changes made.”

- Partner Services Staff Member

“[Deidentified] County has 1 person in charge of HIV case investigation.”

- Partner Services Staff Member

“[Deidentified] County has 1 person in charge of the STD clinic.”

- Partner Services Staff Member

The intersection of low resources for both staff and technology has led to **immense bottlenecks around IT**.

“Low IT staffing and long wait times for hardware and software.”

- STI/HIV Program Director

“IT has been under resourced which can create barriers to efficient technology/data use.”

- Partner Services Staff Member

While staffing has been an issue long before COVID-19 – ***the COVID-19 pandemic has severely limited the resources available to Partner Services.***

“Seventy-five percent of [Partner Services] staff were reassigned to COVID.”

- Partner Services Staff Member

“Unsure if COVID funding will last. Without it, IT will be very underfunded.”

- Informatics Staff Member

Recommendations:

- Partner Services must invest time and resources in strengthening existing technological infrastructure and retaining staff.
- Technology is often deployed to promote efficiency; however, resources need to be put in place to strengthen and maintain existing systems rather than solely toward the implementation of new solutions. Technology should not be used as a band-aid for broken core infrastructure.

Ethical Issues.

Across all five “Areas of Need,” *Ethical Issues* were not frequently identified (only 11% of all coded excerpts; See *Figure 1*). Within *Ethical Issues*, however, two codes were principally reported - **Building Trust** (47% of coded excerpts under *Ethical Needs*) and **Secure** with (43% of coded excerpts under *Ethical Issues*; See *Figure 3*).

Building Trust referred to a need to **prioritize building rapport and trust with the client and keeping the client comfortable**. DIS were especially interested in keeping interactions with clients conversational.

“The most important thing is patient comfort.”

- Partner Services Staff Member

“Sometimes you just have to do more... like laying out a foundation for trust.”

- Partner Services Staff Member

Secure referred to the need for **data security and confidentiality being prioritized**.

“All new tech needs to be reviewed by the privacy and security office.”

- Partner Services Staff Member

Interestingly, some stakeholders believed that Network Canvas might improve comfort and trust in reporting partner information for some clients.

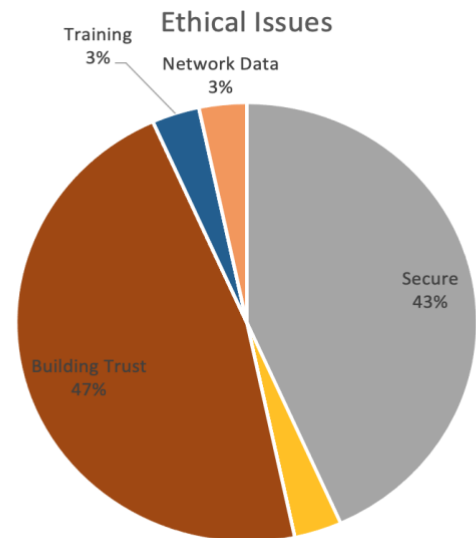
“Currently, some clients feel uncomfortable disclosing partner information. Entering this information on Network Canvas independently could alleviate some of that.”

- STI/HIV Program Director

Recommendations:

- Any data collection tool implemented within Partner Services must contribute to DIS efforts to establish rapport and build trust within the interview so that clients feel comfortable disclosing detailed and sensitive information about their partners.
- While data security and confidentiality measures are important, efforts by DIS to build and maintain client trust (which may include confirmation of confidentiality) represent the most salient ethical issues facing Partner Services programming.

Figure 3. Codes Across Ethical Issues



Interface Reconfiguration.

Three of the five “Areas of Need” focused on the technical modifications required to effectively integrate the Network Canvas software into existing Partner Services workflows. The first of which was *Interface Reconfiguration* where our team explored the potential need to reconfigure our existing software interfaces to better meet the requirements of Partner Services. Only 12% of all coded excerpts were relevant to *Interface Reconfiguration* (See Figure 1), with the primary reported code under *Interface Reconfiguration* being **Flexibility** (50% of coded excerpts under *Interface Reconfiguration*; See Figure 4).

Because of the structure of the Partner Services interview, and in line with a need to build rapport with clients, DIS expressed wanting *flexibility* from a data capture tool, including a desire for **the ability to pause, add notes, skip questions, and/or return to skipped questions**.

“DIS need the ability to navigate back and forth depending on the information they obtain during the interview.”

- Partner Services Staff Member

Furthermore, stakeholders indicated **the importance of data tools which allowed interview protocols and questions to be internally modified (as opposed to by a third-party company) in a quick and easy manner**.

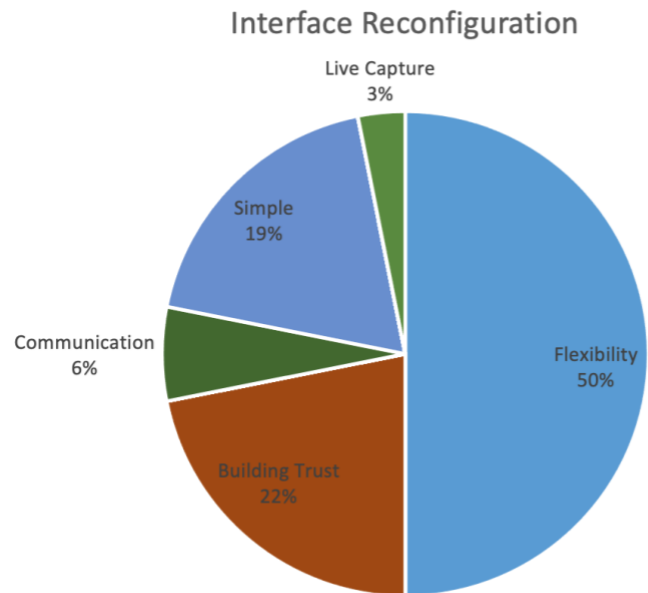
“The flexibility to add questions as things come up... a lot of systems, it’s just difficult to change things. It might take months and it costs a lot of money.”

- Informatics Staff Member

Recommendations

- Ensure data collection protocols are easily configurable by in-house Partner Services staff members who might have low technological expertise or immense time pressures.
- Utilize tools that support a conversational approach to interviewing (i.e., tools which allow DIS to easily navigate across questions in a nonlinear order to follow the flow of the conversations with clients).

Figure 4. Codes Across Interface Reconfiguration

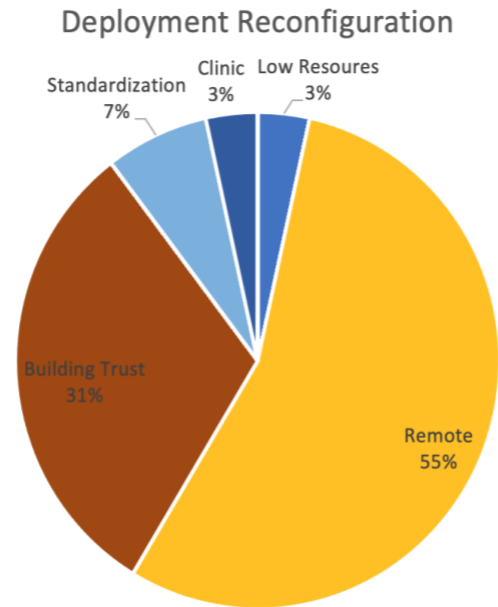


Deployment Reconfiguration.

The second “Area of Need” focused on technical modifications was *Deployment Reconfiguration* where our team explored the potential need to reconfigure how our software was deployed to effectively integrate the Network Canvas software into existing Partner Services workflows. Only 11% of all coded excerpts were relevant to *Deployment Reconfiguration* (See Figure 1), with the primary reported code under *Deployment Reconfiguration* being **Remote** (55% of coded excerpts under *Deployment Reconfiguration*; See Figure 5).

Many key informants stressed the importance of and value in *remote* options for interviewing and partner notification, whether **self-administered, online, or app-based**. Factors such as long transportation times to clients’ homes, remote work configurations for staff brought about by the COVID-19 pandemic, and an increasing trend toward remote solutions for Partner Services administration, even prior to COVID-19, all contributed to a widely held desire for remote functionality within any new tools.

Figure 5. Codes Across Deployment Reconfiguration



"In the last year we've started working from home, obviously... Most of us two days a week at home and three days a week at the office or somewhere around in there."

- Partner Services Staff Member

"It would be useful to send URL links to clients so that they could elicit partners on their own."

- Partner Services Staff Member

"Remote deployment is the future."

- STI/HIV Program Director

In addition to *remote*, **Building Trust** was also a frequent response within *Deployment Reconfiguration*. Nine (31%) excerpts were coded as *Building Trust*, which included three subcodes, *Rapport*, *Mistrust*, and *Comfort*. Within the context of deployment, some key informants emphasized the importance of building rapport and ensuring client trust and comfort when determining deployment reconfiguration.

"People are not gonna feel comfortable putting their information in a tool without trusting the person who asked them to do it first."

- Partner Services Client

Recommendations

- Optimize tools for remote deployment to ensure continuation of Partner Services outreach even when in-person interviewing is infeasible (e.g., during a pandemic) and when staff resources are low (e.g., insufficient time for locating clients in-person).
- Remote deployment methods need to be designed in such a way that they not only increase efficiency for Partner Services, but also promote client trust necessary for disclosure. Such methods might include

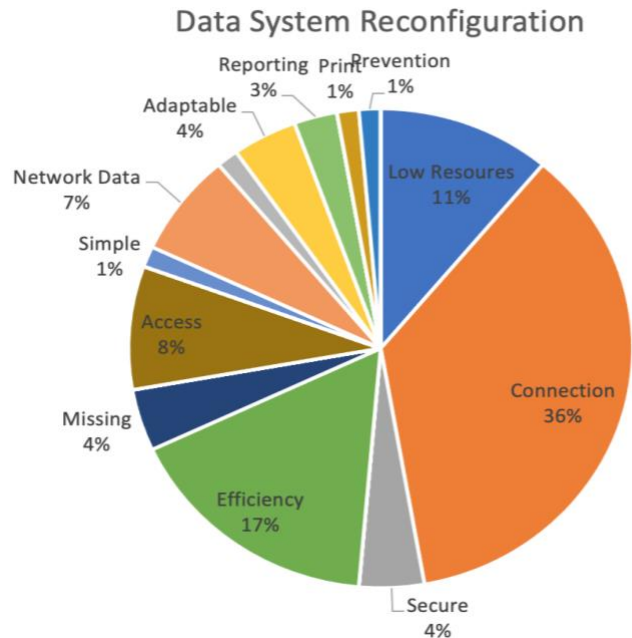
self-administered questionnaires which would give clients a greater sense of privacy during disclosure, yet the importance of DIS in building client trust should not be overlooked. Thus, tools that facilitate remote data collection while simultaneously enabling DIS to engage effectively with clients are essential.

Data System Reconfiguration.

The last Area of Need focused on technical modifications was *Data System Reconfiguration* (See Figure 6), where our team explored back-end data systems and workflow needs. As shown in Figure 1, 28% of all coded excerpts were relevant to this area of need. Within *Data System Reconfiguration*, the primary reported code was **Connection** with 36% of coded responses. The next most common code was **Efficiency** with 17% of coded responses.

Connection refers to a **desire for connection between data systems, as well as experiences of barriers to interoperability and the harmonization of data formats**. Key informants stressed that existing data systems are often siloed and disconnected, including federal, state, and department level health systems.

Figure 6. Codes Across Data System Reconfiguration



"Prior to COVID... public health has kind of a starvation mentality and people are just as happy to do things on spreadsheets, so we never kind of set up easy ways to move information around between systems. Like, our communicable disease system and our immunization registry are not hooked up... that seems like a pretty straightforward thing, and we don't have it."

- STI/HIV Staff Member

"[In Partner Services] we're always five years behind... when they're saying, well, why are you not using the most updated format, we're like oh, you know, we cannot take it...it has to be downgraded [for our systems]."

- Informatics Staff Member

Efficiency refers to the pressure on DIS, as they have **limited time to interview clients and are burdened by the time required for data entry**, so efficiency of these interviews is important. There is increasing movement toward "efficiency" and the building of electronic systems, but these systems often do not integrate with each other and DIS are faced with doing the hard work of moving and converting data between systems.

"We need to be able to receive, process, and respond to data quickly."

- STI/HIV Program Director

"...Important that Network Canvas would not duplicate work."

- Partner Services Staff Member

While efficiency is a driving force behind many new tech solutions, there is understandable apprehension from stakeholders that new tools will increase work for program staff and may not ultimately be responsive to those working in the field.

"They are collecting a lot of data that is never used."

- *Partner Services Staff Member*

"I wouldn't want [DIS] to do double the work...so we really need one system to cover the whole area where we work."

- *Partner Services Staff Member*

Recommendations

- Any new Partner Services tools must be integrated with existing data systems to avoid creating additional silos or duplicating work for already overburdened DIS. Investment in new technology must include planned integration with existing data systems to simplify reporting processes, enhance data actionability, and limit the need for manualized administrative procedures.
- Ensure that the data captured by Partner Services align with what is useful practically and/or analytically (i.e., avoid collection of data that will not ultimately be utilized).

RECOMMENDATIONS AND LIMITATIONS

Recommendations for Public Health Agencies Conducting Partner Services.

- Budget allocations should include sufficient resources to strengthen existing technological infrastructure and recruit/retain staff. The introduction of new technology should not be a band-aid solution to broken core infrastructure or severe understaffing.
- New technology should not be implemented without a clear and actionable plan for integration with existing systems.
- More data doesn't equal better data. Mandates for Partner Services data collection should be reviewed frequently to ensure only useful, actionable data are being captured.
- Technological solutions within the context of Partner Services are valuable to the extent they do not interfere with building client trust. Thus, any tools implemented within Partner Services should gain DIS buy-in before moving forward to ensure they contribute to – rather than detract from – DIS efforts to establish and maintain rapport with clients.
- Due to multiple factors (e.g., pandemics, hard to reach clients, DIS time constraints, potential increase in disclosure of sensitive information), health departments should invest in the infrastructure and technology necessary to conduct Partner Services remotely.
- Remote deployment methods need to be designed in such a way that they not only increase efficiency for Partner Services, but also promote client trust necessary for disclosure. Such methods might include self-administered questionnaires which would give clients a greater sense of privacy during disclosure, yet the importance of DIS in building client trust should not be overlooked. Thus, tools that facilitate remote data collection while simultaneously enabling DIS to engage effectively with clients are essential.

Recommendations for the Network Canvas Reconfiguration.

- For Network Canvas to be effective as a disease investigation tool within Partner Services, it must facilitate nonlinear data capture as DIS often gain vital information about client behaviors and partners through conversational interviewing methods. DIS must be able to navigate swiftly between question prompts and return to stages to complete missing data.
- As client trust is paramount to the success of Partner Services, the Network Canvas software should be secure to protect sensitive data, and interfaces should be intuitive for clients' easy comprehension.
- Ideally, Network Canvas should be able to integrate with existing health department and agency (e.g., Howard Brown Health) systems used for tracking and reporting without the need for additional administrative work by DIS.
- Network Canvas interview protocols should be readily modifiable by local staff without the need for outside assistance. Program staff should be able to remove, add, or edit information as relevant to capturing the most crucial data needed to facilitate Partner Services.
- Given the growing interest in conducting Partner Services remotely, Network Canvas should have the capacity to deploy interview protocols to a web browser. The design of a browser version should be informed by the perspectives of DIS and other Partner Services staff to help ensure the tool will help facilitate effective client engagement.

Limitations.

- The COVID-19 pandemic had mostly negative impacts on Partner Services staff - due to similarities between Partner Services and contact tracing, most DIS were reassigned to COVID-19. This placed an

unexpected burden on health departments and clinics who were still responsible for following up with individuals who were newly diagnosed with HIV and other STIs despite greatly reduced capacity. As a result, recruitment for KIs was incredibly difficult due to competing priorities, reassignment of staff, and substantial turnover – all due to the pandemic.

- Although all interviews were audio recorded, detailed interview summaries rather than transcripts were used for coding due to resource constraints and our prioritization of identifying critical action steps for improving the Network Canvas software. Further, interviews were coded by five different individuals, which could have led to inconsistencies. However, all interviews followed a strict interview guide, all interviews were double-coded according to codebook definitions, and all disagreements were resolved within larger team discussions.

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APPENDICES

Appendix A. - Codebook

Code	Subcode	Definition
Low Resources		Departments are not equipped to handle need. More details in subcodes.
	Funding	Lack of funding for HIV/STI Partner Services specific needs.
	Time	Lack of time to meet needs of department, agency, state, and clients
	Staffing	Staffing, in number and in experience/expertise, does not meet needs of department
	Tech	Technology, devices, internet connectivity, and data systems are inadequate, outdated, or dysfunctional
Connection		Desire for connection between data systems. Currently facing barriers in interoperability and format of data in export and import
Secure		Making sure data is secure and confidential is a priority
Remote		Would like interviews and partner notification that is remote, self-administrated, online, or app based
Flexibility		Want more flexibility from a data capture tool. Would like to pause, add notes, and skip and come back to questions.
Efficiency		There is not a lot of time to conduct interviews. Efficiency is important.
Missing		There is a lot of missing data and it is difficult to identify and correct
Building Trust		Building trust is important. More details in subcodes.
	Rapport	DIS prioritize the interview being conversational and having good rapport
	Mistrust	Clients hesitant to disclose information due to mistrust.
	Comfort	Clients sometimes uncomfortable speaking to DIS. Client comfort is important.
Sustainable		Need to ensure software is sustainable to justify investment of training time and other resources.
Access		Access to data is important. High access to data entry software, low access to reports from state.
Training		Emphasis on training on any new software
Communication		Barriers in communication between health depts and vendors, within health depts
Simple		Software should be easy to use
Network Data		Limited network data is collected, and often not used.
Control		Difficulties in getting approval at state and department level
Adaptable		Software should accomodate multiple diseases, infections, and features
Standardization		Need for standardizing DIS data collection
Reporting		Need to optimize reporting from providers and to state and federal programs
Clinic		NC could be used in clinics
Fragile		Automated systems are fragile and break easily
Open		Staff or organization is open to modernization
Print		Desire to print data
Prevention		Network Canvas appears useful for HIV prevention
Live Capture		Desire for data collection tool optimized for live capture

Appendix B. - Areas of Need

Areas of Need	Definition
<i>Logistical Issues</i>	<i>Public Health departments are frequently constrained by low resources and a high turn-over of staff. Furthermore, they are also constrained by a need for numerous institutional clearances prior to implementing any procedural or technical innovations. Therefore, it is exceptionally important to understand local logistical issues which impact the design of the software, and installation and implementation activities. Furthermore, our initial needs assessment will also outline health department needs in terms of training materials, what sort of supports would be most useful for our team to provide, and how to shape implementation protocols which are able to be evaluated.</i>
<i>Ethical Issues</i>	<i>Outlined by the CDC's National Guidelines, Partner Services must be client-centered, confidential, voluntary and noncoercive, free, evidence-based, culturally, linguistically, and developmentally appropriate, accessible and available to all, comprehensive, and integrative. Therefore, we will consider how these principles can be maintained – in particular data security and</i>
<i>Interface Reconfiguration</i>	<i>Our team will explore the potential need to reconfigure our front-end and our existing interfaces or the need to add new interfaces to better meet the requirements of Partner Services.</i>
<i>Deployment Reconfiguration</i>	<i>Our team will explore the potential need to reconfigure how our software is deployed - such as the protocol creation process, or the current requirement of in-person deployment on interviewer-controlled devices.</i>
<i>Data System Reconfiguration</i>	<i>Our team will explore the limitations of current systems, the back-end data system and data workflow needs, and how to best integrate Network Canvas into existing case management software.</i>

Appendix C. - Data Summary

		Areas of Need										
		Interface Reconfiguration		Deployment Reconfiguration		Data System Reconfiguration		Logistical Issues		Ethical Issues		
		32 12%		29 11%		72 28%		98 38%		30 11%		
Codes												SUM
	Low Resoures	0	0%	1	3%	8	11%	44	45%	0	0%	53
	Connection	0	0%	0	0%	26	36%	3	3%	0	0%	29
	Secure	0	0%	0	0%	3	4%	0	0%	13	43%	16
	Remote	0	0%	16	55%	0	0%	2	2%	1	3%	19
	Flexibility	16	50%	0	0%	0	0%	0	0%	0	0%	16
	Efficiency	0	0%	0	0%	12	17%	9	9%	0	0%	21
	Missing	0	0%	0	0%	3	4%	7	7%	0	0%	10
	Building Trust	7	22%	9	31%	0	0%	1	1%	14	47%	31
	Sustainable	0	0%	0	0%	0	0%	7	7%	0	0%	7
	Access	0	0%	0	0%	6	8%	0	0%	0	0%	6
	Training	0	0%	0	0%	0	0%	8	8%	1	3%	9
	Communication	2	6%	0	0%	0	0%	3	3%	0	0%	5
	Simple	6	19%	0	0%	1	1%	0	0%	0	0%	7
	Network Data	0	0%	0	0%	5	7%	0	0%	1	3%	6
	Control	0	0%	0	0%	1	1%	8	8%	0	0%	9
	Adaptable	0	0%	0	0%	3	4%	1	1%	0	0%	4
	Standardization	0	0%	2	7%	0	0%	2	2%	0	0%	4
	Reporting	0	0%	0	0%	2	3%	1	1%	0	0%	3
	Clinic	0	0%	1	3%	0	0%	0	0%	0	0%	1
	Fragile	0	0%	0	0%	0	0%	1	1%	0	0%	1
	Open	0	0%	0	0%	0	0%	1	1%	0	0%	1
	Print	0	0%	0	0%	1	1%	0	0%	0	0%	1
	Prevention	0	0%	0	0%	1	1%	0	0%	0	0%	1
	Live Capture	1	3%	0	0%	0	0%	0	0%	0	0%	1
	SUM		32	100%	29	100%	72	100%	98	100%	30	100%