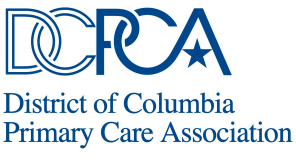
The DC Community Resource Inventory

DC CoRIE Phase 1 Final Report



1. Executive Summary

The DC Community Resource Information Exchange (DC CoRIE) has been initiated by DC's Department of Health Care Finance, and stewarded by the DC Primary Care Association, to develop data infrastructure that supports coordinated screening and referral across a range of health, human, and social services in DC. **One of DC CoRIE's primary objectives is the development of a Community Resource Inventory that can sustainably aggregate up-to-date information about the health, human, and social services available to DC residents.**

Through research with stakeholders that maintain directories across DC, our comparative analysis explored the range of overlapping records among existing directories, as well as the extent to which each directory included unique information that others lacked. These directories are diverse in vocabulary, granularity, and focus — yet face common challenges. **No single stakeholder reported satisfaction with the quality of their own resource data, due to a lack of capacity for maintenance**; all expressed interest in cooperative solutions, even those currently contracting commercial vendors.

Many stakeholders expressed a desire for a shared repository for resource data, yet also recognized structural contradictions in this idea. **Different types of users have different needs, so user-friendly design might entail different decisions in different contexts — one size can't fit all.** Furthermore, despite interest in collaboration, a significant amount of organizations want to keep their own systems. In this report, we propose a conceptual shift from one centralized system to a hub-and-spoke model in which a core pool of data is shared among many systems.

With this vision in mind, we reviewed a range of emerging opportunities to develop new kinds of solutions. First, **the Open Referral initiative has developed data exchange protocols that enable resource data interoperability — so the same data can be shared across multiple systems.** These protocols have gained traction among organizations in the DC area, such as the Capital Area Food Bank and DC's DHS, which can now publish standardized, interoperable data about the services within their institutional remit. Meanwhile, in other communities, referral providers are sharing

resource information with each other in real-time through cooperative networks. Lastly, **"pre-competitive" infrastructural business models are emerging through which private vendors can enhance the value of information available in public infrastructure — rather than compete with it.**

This document concludes with a set of recommendations, which are summarized here:

Recommendation #1: The DC Community Resource Inventory should function as a Data Utility — publishing up-to-date, standardized, open resource data as a public service.

Recommendation #2: The DC CRI should evolve as a federation of referral providers working together as a cooperative network.

Recommendation #3: DC government agencies should solicit resource directory information directly from the services they provide and/or fund.

Recommendation #4: the DC CRI should develop a sustainable business model through the monetization of guaranteed levels of service.

Recommendation #5: The assets of the DC CRI should be held in trust for the benefit of the residents of the District of Columbia, and governed by people who represent their interests.

Moving Forward

The District of Columbia has an unprecedented opportunity to evolve its health and social support system to be more coordinated and effective in promoting equitable quality of life for every District resident. A key component of this evolution is open access to up-to-date, comprehensive resource directory information. But a quality, sustainable CRI will not come easily or quickly. Through our work in CoRIE phase 1, DCPCA has laid out a roadmap to achieve this one element which stakeholders universally agree is a priority for our ecosystem. We look forward to ongoing partnership with the many government, health, and social support partners who share our commitment to a health system that gives everyone in DC a fair shot at a full healthy life. To learn more about this process, please reach out to David Poms at dpoms@dcpca.org.

ABOUT THIS REPORT

This report was produced by the **DC Primary Care Association,** working in collaboration with **Open Referral** and **Loup Design & Innovation**.

FEEDBACK

We welcome additional feedback on these findings and recommendations. Please comment on this document, or email David Poms at dpoms@dcpca.org.

RECOMMENDED CITATION

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We would also like to thank the following organizations who contributed time, talent, and/or resources to our research:

-Advocates for Justice and Education -AmeriHealth Caritas -Aunt Bertha -Bread for the City -Capital Area Food Bank -Child and Family Services Agency -Community Connections -Criminal Justice Coordinating Council -CRISP DC -DC Health -DC Health Matters Collaborative -DC Department of Aging and Community Living	-DC Department of Behavioral Health -DC Department of Disability Services -DC Department of Energy and the Environment -DC Department of Human Services -Interagency Council on Homelessness -Legal Aid -Maryland 2-1-1 -NowPow -Public Defender Service -Unity Health

Finally, we would like to thank all of our DC PACT members for their participation, guidance and support.

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2. Background

2.1 The DC Community Resource Information Exchange project

In 2019, DC's Department of Health Care Finance initiated the process of developing a DC Community Resource Information Exchange (DC CoRIE), to serve as data infrastructure that supports coordinated screening and referral across a range of health, human, and social services in DC. The first phase of development is being led by the DC Primary Care Association.

DC CoRIE's goal is to enable healthcare and social service providers to more effectively coordinate care that can address DC residents' health related social needs. A key objective of this initiative project is the development of a Community Resource Inventory (CRI) — and recommendations for scaling and sustaining such infrastructure.

2.2 The Open Referral Initiative

Initiated in DC in 2014, the Open Referral Initiative is a network of organizations and people who are working together to find new solutions to the challenges of maintaining and sharing resource directory information. In the years since, Open Referral has developed resource data exchange protocols that enable interoperability among different technologies that people might use to find resource information. This interoperability makes it possible for diverse institutions with common goals to find new, mutually beneficial arrangements that ensure reliable and sustainable management of resource data as a public good.

2.3 A process led by stakeholders

The DC CoRIE Planning Initiative designed its Community Resource Inventory planning process around engagement with stakeholders who already maintain directories of health, human, and social services in the District and the surrounding region. Such stakeholders have contributed their resource databases to this process for comparative analysis, and their

perspectives to our participatory research. Our research and development process explored opportunities to improve the quality of available data while decreasing the burden on any one agency to gather and maintain robust information. The findings and recommendations in this document reflect synthesized inputs from these stakeholders.

3. Research: What we learned

3.1 Methodologies

3.1.1 Data analysis

With support from the DC-PACT coalition, and encouragement from DC's Deputy Mayor of Health and Human Services, we solicited resource directories from nine agencies, and conducted a comparative analysis of their content and structure. Those directories were from:

- Advocates for Justice and Education
- Bread for the City
- Capital Area Food Bank
- Criminal Justice Coordinating Council
- DC Department of Aging and Community Living
- DC Department of Disability Services
- DC Department of Human Services and the Interagency Council on Homelessness
- DC State Board of Education - Office of the Student Advocate
- Maryland 211

Analysis took two forms. First, we conducted a landscape assessment of all ten directories using a single, aggregate dataset. This was followed by a deep-dive into each directory's data structure, robustness, vocabulary, and data quality.

- **Landscape assessment** — The ten resource directories combined contained 3,712 unique records (note that a "record" includes both organizations and services). We used these to understand which records appear in multiple directories or are repeated within single

directories. This aggregate data compared Name, Address, Phone Number, and URL.

- **Directory deep dive** — We analyzed each of the ten resource directories independently according to their data structure and contents. We explored directory completeness, vocabularies, fields available vs fields complete, overall data quality, and record-to-record content comparison between directories.

3.1.2 Stakeholder engagement

To understand the prospects for sustainability of a new CRI, we focused on maintainers of existing resource directories as primary stakeholders whose insights should inform new initiatives. We produced a purposive sample of stakeholder profiles, including nonprofits and government agencies serving aging residents, people experiencing homelessness and food insecurity, citizens returning from incarceration, and pregnant women and families with children under five.

We conducted six, hour-long interviews via video, using Loup's StoryEngine methodology. Questions revolved around successes and challenges involved in maintaining directory information, understanding more about who uses their directory, the breadth and depth of information about services, and how they want to move their work forward in the future. These interviews were conducted with:

- Interagency Council on Homelessness / Carter Hewgley
- Bread for the City / Stacey Johnson
- Criminal Justice Coordinating Council / Luis Diaz
- Capital Area Food Bank / Sabrina Tadele and Jake Erlich
- Department of Aging and Community Living / Yolanda Lyles and Tamara Moore
- DC Health, Help Me Grow / Vinetta Freeman, Omotunde Sowole-West, Whitney Carrington

From the transcriptions of these interviews, we applied inductive qualitative data analysis techniques to surface findings, which we presented using stakeholders' own vocabularies. (See Findings section, below.)

3.1.3 Landscape analysis

Working with the Open Referral Initiative, we explored the state of the field of information-and-referral within the District of Columbia and abroad, including a literature review of available articles and papers, as well as interviews with software vendors and regional information and referral (I&R) specialists. Open Referral engaged in dialogue with the Alliance of Information and Referral to learn about the finer points of standard practice for resource database navigation. By participating in conferences such as San Diego 211's Community Information Exchange expo, and the Robert Wood Johnson Foundation's All-In meetings and online forum we learned more about the field of health to human service care coordination.

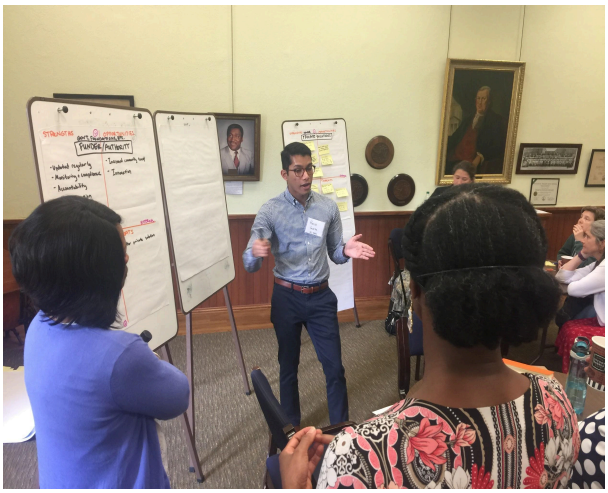
3.1.4 Workshop

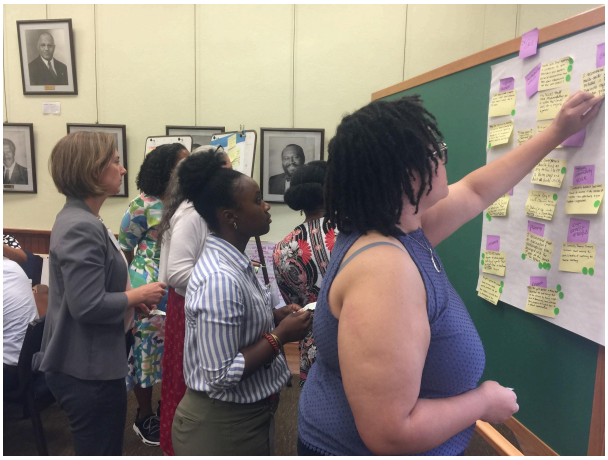
Synthesizing the research components, we created materials that were used as data and prompts for the participants during a day-long workshop on September 5th, 2019. The findings helped participants to understand the initiative, and also encouraged them to contribute input about their own experiences and needs to the project. The workshop was attended by 18 people representing 11 resource inventory maintaining organizations, several of whom had participated in our research process, and others who had expressed interest in participating in the dialogue. In addition, two people from DCPCA, two with Open Referral, and one from DHCF were present. The stakeholder attendees included:

- Interagency Council on Homelessness, Department of Human Services / Hersh Gupta, Dena Hasan
- Bread for the City / Stacey Johnson
- Criminal Justice Coordinating Council / Luis Diaz
- Department of Aging & Community Living / Tamara Moore, Yolanda Lyles
- Department of Behavioral Health / Sharon Hunt, Arielle Brock
- DC Health, Help Me Grow / Vinetta Freeman, Omotunde Sowole-West, Whitney Carrington
- Child & Family Services Agency / Natalie Craver
- Amerihealth Caritas DC / Cheree Ingram, Celeste Smith
- Department of Disability Services / Donald Clark
- CRISP / Perrin Hicks

- Maryland 211 / Quinton Askew

In addition, representatives from the Public Defender Service, Capital Area Food Bank, DC Health - HAHSTA, and DC Health Matters Collaborative could not attend the convening but participated by email afterwards in refinement of recommendations.





In the morning, workshop participants engaged with the research findings, and offered examples, clarifications, and expansions — a summary of these findings and participant feedback is contained in Section 3.2. In the afternoon, we reviewed an emerging set of opportunities for new methods of resource data management, to consider their various strengths and weaknesses, and to reflect on how they might relate to each other — these opportunities and stakeholder feedback on them are included in Section 3.3. Lastly, we generated an initial

set of recommendations for future action, which served as the basis for the refined recommendations included in this final report in Section 4.

3.2 Challenges for community resource inventory maintenance

These challenges emerged as common themes across our stakeholder interviews, field research, and data analysis; we revised them through workshop dialogue with stakeholders.

3.2.1 Challenge #1: Fragmented, redundant, competitive, unsustainable systems

Resource databases are incomplete or outdated; the information changes often.

The process of verifying and updating data is high-touch and time consuming, requiring phone calls and on-site visits. Without the capacity to ask detailed questions beyond what is publicly available on websites, the data remains incomplete; without constant updating, the data goes out of date. Once info is out of date, people stop using the CRI, and a cycle toward further obsolescence develops.

Organizations want up-to-date data, but lack the resources to maintain it themselves.

Some organizations have dedicated resource specialists, but most rely on interns or volunteers to do this work. None report being satisfied with their level of capacity for maintenance of resource data.

> "We would love to be able to get more information about capacity, turnover, and wait list times. The challenge is that is real-time data and we would need at least two people dedicated just to doing that all the time. That's a huge resource."

Directories have significant overlaps with each other — and also many unique records.

Any given directory may have a concentration of certain kinds of services, which reflect its mission and the needs of its clients, yet may be less useful for other purposes and in other contexts.

Lack of reliability leads to a workaround culture that further undermines sustainability.

> "My team member who manages the hotline has just stopped using [the directory website that their organization is paying for] because she feels she can't trust what's in there. Instead, she created a shorthand list of the biggest partner agencies… because she trusts that they're going to be open."

Key Question: Resource data is public information, yet it takes time and energy to maintain this information. Many organizations currently struggle with this challenge in isolation from each other. What might be possible if they were able to cooperate?

3.2.2 Challenge #2: One size does not fit all – diverse vocabularies and needs

> "Everyone thinks of things in a different manner. There is a vast listing of terms provided and you have the possibility of classifying it with too many terms. It's not helpful and causes confusion. You're thinking to yourself, 'Is this really correct?' "

> "It's like you get a Christmas present and it's the shape of the thing you wanted and it's in the box of the thing that you wanted, but when you go to open it, it's empty."

Directories collect varying kinds of information about services.

Different directories, intended to be used by different people in different contexts, might focus on different kinds of information about the same services. (i.e., disability accessibility, whether someone with a criminal record is eligible for a service, etc.) Some of these details are highly variable and even change often, yet are more important to some users than others.

Inconsistent and granular data makes it difficult to search, analyze, etc.

For example, the "Name" column in any given directory might refer to an agency, or a program within an agency, or a service within a program.

"Type of service" is a key variable here (i.e., service taxonomy such as 211/AIRS). Some categorical schema are too broad to be useful; others assign a custom type to each service. Stakeholders agree on a need for standardization, but also recognize tension between user-friendliness (simple descriptions) and precision (technically-specific descriptions).

> "There are far more similarities than differences, but the differences are critical."

There isn't a one-sized fits all approach.

- Different people have reasons to use different words to describe the same things.
- Different organizations have different priorities for what are the most important resources and what's the most important information.
- Different users have different criteria for what counts as user-friendly.

Key Question: Different vocabularies are used by different people to describe the same things. How might we enable cooperation amid this diversity?

3.2.3 Challenge #3: Data and tech are tools, not solutions (people serve people)

> "We need to continue to do outreach. A website is great, but we still need to touch base with people."

> "Many of our clients don't know what they should do, who they should talk to, and what is or isn't available."

Help-seekers are the ultimate focus, but service providers are the primary users.

All resource directory maintainers indicated that their key users are the people making referrals (i.e., service providers), who are trusted by clients and understand clients' needs. Up-to-date, accessible resource information could expand the number of people who can make effective referrals, including doctors and teachers.

Help-seekers seek help from people, not just technology.

Stakeholders noted that clients frequently prefer receiving resource information via in-person discussions and paper formats. Successful referrals are typically made by empathetic infomediaries with relationships across the ecosystem; they can be supported by web-based directories and other technical solutions — but not replaced.

User-friendly means different things to different people.

The journey as a framing principle was cited by several interviewees as more helpful than a searchable database organized by categories. Yet different kinds of help-seekers will be on very different kinds of journeys. One tool is not likely to serve all purposes.

Key Question: End users benefit from simple, direct information; service providers seek to understand the context of services so they can ensure a resource is relevant and a referral is likely to be effective. These needs entail different design considerations. How might we build systems that meet such variable needs?

3.2.4 Challenge #4: Systems change requires building with what already exists.

> "We all have expertise in something and that's what we need to build on."

> "There's so much diversity. I'm worried that any attempt at blanket engagement couldn't possibly be successful."

All stakeholders want new solutions, but many also want to keep existing systems.

Some organizations have made progress toward achieving their own objectives with new systems, and they want to continue with that progress rather than starting over entirely.

> "Our biggest partners have their own system or are unwilling to adopt a new one, and our smallest partners don't have the capacity."

Meeting diverse user needs requires balancing standardization with customization.

A centralized repository is often suggested as a solution, yet closer consideration reveals serious tensions in this idea. Stakeholders observe that "one size does not fit all," and empirical experience suggests that a centralized clearinghouse is prone to failure absent intentional design to serve multiple stakeholders.

Interviewees want solutions now, but they also value an iterative and inclusive process with good governance.

> "If you're trying to govern a process, you need an [institutional] body that you can turn to when questions come up."

> "This requires a high level of commitment, and sustained resource allocation."

There is an appetite to collaborate in a networked, ecosystem-oriented approach.

All stakeholders indicate a lack of capacity to solve this problem on their own, and recognize there is a lot to gain from working together.

> "My goal is to put that jigsaw puzzle together so that collectively all of these organizations with the same cause will understand who's doing what."

Key Question: There is widespread interest in a shared repository, yet many stakeholders want or need to keep their own system. How can something new align with, build upon, and support what already exists?

3.2.5 Challenge #5: Orgs lack incentives, capacity to report their own information

Stakeholders often ask questions about the role of organizations in reporting their own service information. There are an array of reasons why this is a complicated topic.

Organizations overwhelmed with demand, with no one responsible for promoting info.

Organizations often aren't paid on a fee-for-service basis, and they report that they are often already at capacity. This means it just isn't a priority for them to update their information in various directories – and that role often isn't assigned to anyone.

Funders collect data on outputs to report up, not on accessibility to report out.

Granting/contracting agencies collect many kinds of information from their providers, but it's typically information about inputs, activities, and outputs – not necessarily the information someone needs to know to access a service.

Furthermore, they collect this data to report up (to funding source) not out (to inform the public).

The most important information — capacity — often is the hardest to get.

Real-time information on service capacity is desired by many stakeholders, but providers lack incentives to provide this information.

Furthermore, capacity information might only be conveyed in ad hoc internal channels, and might not even be made digital at all.

These disconnects inhibit our abilities to evaluate service utilization, unmet needs.

Stakeholders expressed an interest in having funders mandate the collection of more granular resource data, with a belief that such info can create accountability, improve evaluation, and lead to better resource allocation.

However, they also acknowledge such interventions might require policy change, developing new technologies, and systems of monitoring and compliance.

Key Question: How can funders (contracting agencies and grantmakers) play a role in improving the supply of information about the services they fund, without placing unhelpful additional burden upon their funded partners?

3.3 Emerging opportunities for sustainability: interoperability and open data

We identified these emerging trends through an assessment of the information-and-referral field at large — and, through dialogue with stakeholders in our workshop and beyond, we articulated the opportunities that these trends present.

3.3.1 Opportunity #1: Emerging standards for resource data exchange

Open data is machine-readable (i.e., it can be automatically used by different computer programs for different purposes) and non-proprietary (i.e., freely usable without fees). Application Programming Interfaces (i.e., protocols that enable computer programs to access data from a database in real-time) enable the same data to flow among different systems.

The Open Referral Initiative (which began as a partnership among Code for DC, Bread for the City, and other communities around the country) has developed the Human Service Data Specification (HSDS) and API protocols (HSDA), which are open data formats for resource directory information.

As of November 2018, the Alliance of Information and Referral Systems endorsed HSDS and HSDA as industry standards for resource directory data exchange.

The development of interoperability standards for resource data sharing creates new opportunities for resource inventory maintainers to decrease costs and generate revenue. As a publisher of open resource directory data, a "Data Utility" (discussed in Opportunity #2) can sustain operations by (1) lowering the costs of resource data maintenance through data partnerships (discussed in Opportunities #3 and #4) among government agencies and other referral providers, while (2) generating revenue from service-level guarantees and premium features (discussed in Opportunity #5). This is an evolutionary approach to sustainability, applying new

strategies to augment the strengths of conventional information-and-referral systems.

Examples of Open Referral in use locally:

- **Link2Feed** is licensed by the Capital Area Food Bank as pantry intake management software, and has adopted Open Referral to receive information about resources for its pantry users (and, potentially, to publish resource information about pantries).
- **The DC Department of Human Services is developing a service registry for the Continuum of Care network** of homelessness service providers, using the Open Referral format to structure its database and API.
- **LegalServer** is used by several local legal aid providers, and uses Open Referral to receive and publish resource directory information from and to third parties.

3.3.2 Opportunity #2: Information-and-referral providers evolving into utilities that provide data as a service

The vast majority of conventional information-and-referral providers are dependent upon grants, donations, and/or contracts from government agencies that are subject to changing political leadership. Increasingly, the proliferation of resource referral programs is precipitating a market failure: more and more organizations are competing for funding to provide referral services, with fewer funders willing to pay for the information maintenance. Many referral providers are downsizing, consolidating, or even closing. Consequently, the field is in some turmoil.

Meanwhile, several emerging resource referral software vendors claim that they can supply resource directory data at a lower cost than conventional I&Rs, yet we've learned from stakeholders that these claims are underscored by serious drawbacks. Vendors' promises tend to hinge on at least one out of three factors:

1. Vendors scrape the websites of available local resource directories, repackage that data, and sell it as part of their software package.

2. Vendors assume that organizations will register, log in, and update their own information (yet our stakeholder interviews suggest this assumption is not sound).

3. Vendors pass on the cost of collecting the resource data themselves, in exchange for ownership over it, which they then sell at significant cost to third parties. These conditions suggest that privatizing resource data management is less sustainable and equitable in the long-run than investing in locally-operated and -owned resource information infrastructure.

Furthermore, issues with the commercial vendor market were noted in the April 2019 report from the Social Interventions Research and Evaluation Network based at the University of California-San Francisco, "Community Resource Referral Platforms: A Guide for Health Care Organizations":

> "As an increasing number of vendors and health care organizations create and maintain directories in the same geographical areas, some social service organizations have reported being called several times by different vendors to verify the same data, leading to response fatigue. One social services professional we spoke with pointed out that solving this very problem was one of the initial goals of the 2-1-1 system, and thought that chronic underinvestment in many 2-1-1s across the country had created a vacuum that led to the development of these alternative platforms. Although these largely for-profit platform vendors may be better resourced, ultimately it is neither desirable nor sustainable for multiple companies and organizations to each seek the same information from the same social service organizations in the same geographic areas. Some kind of centralized information infrastructure should be available for all to draw from."

As a result, we consider the challenge of sustainability to be a problem that does not yet have established solutions or easy

answers. That said, recent advances in interoperability among systems (see opportunity#1)—along with field research regarding the viability of data as a service business models—suggest an emerging set of new potential solutions that the DC CoRIE initiative is positioned to pioneer.

Conventionally, information-and-referral providers (such as 211) have operated call centers and websites that connect people to resource directory information. Recently I&R providers have begun offering web services, which provide resource directory data to third-party software systems — essentially providing "data as a service" to other referral providers and related institutional users.

A mature Data Utility might provide open resource data via API, yet still needs to recoup the costs of data maintenance by some means — so the data as a service model might entail various revenue streams such as service-level guarantees that stipulate production-level criteria for resource data supply, and/or premium features that provide value-adding functionality to paying business customers. See opportunity #5 for more on this.

In the CRI workshop, stakeholders noted that this model can decrease collective labor costs by ensuring production of reliable, canonical, open data that anyone can use. They also noted that sustainability will be a challenge, and that it may stand as a single point of failure — so a utility will need to work to gain and maintain the trust of its community, including through the facilitation of collective governance and data inputs.

Examples:

- **Ontario Open211** — The first Open211 platform.
- **Maryland Open211** — providing 211 data through a customized website to the MD Governor's office of crime prevention, specifically for use in prison — prompting government to stop funding for a redundant, competitive resource directory website.

- **Miami Open211** — providing customized hyperlocal websites for neighborhood groups that previously maintained redundant directories.

3.3.3 Opportunity #3: Government agencies, funders, and network institutions are publishing open information about the services they provide or fund

Government agencies fund services through grants and contracts, and network institutions (like the Capital Area Food Bank) provide formal support for entire service subdomains—and both can play a more active role in aggregating and publishing resource data from the service providers within their remit.

When funding agencies collect data from their grantees and contractors, they usually collect information about activities (inputs and outputs) that are reported up, rather than information about service accessibility (where are the programs and how are they accessed) to report out to the public. This is beginning to change. Some funders, as service provision authorities, are collecting and publishing resource data in service registries. (See the UK Government Digital Service's guide to registries here.)

A Data Utility could partner with these institutions to help them collect, maintain, and publish data about the services that they are already funding. This process entails systems change, monitoring, and associated data services — and as such, could potentially entail revenue models along with cost reduction for core operations.

Examples:

- **DC Department of Human Services** is aggregating information about homeless services for a Continuum of Care directory, built with HSDS and populated with information directly from providers to serve as the single canonical service record.
- **NYC's Service Inventory** — the New York City Mayor's Office extracted data from its consolidated HHS

contracting system to publish standardized open data on all contractors' services.

- **In the Florida Bar Foundation's Florida Legal Aid Resource Federation**, legal aid providers co-designed a form that each of them fills out in their own software, publishing to a shared open service registry. The registry can be accessed externally as open data.

How it can work:

- Funding agency / network organization requires its grantees/contractors/partners to update their information
- One standardized form for each provider: providers update their information in one canonical record
- An open service registry shares aggregated, machine-readable data with third parties

In the CRI workshop, stakeholders noted the potential strengths of this model include canonicalization of trustworthy service information from the source — which, if used by an ecosystem of tools and applications, can also yield valuable analytics and insights into program effectiveness and public investment patterns. This model has potentially transformative implications for both innovation and decision-making.

Stakeholders observed that this model will entail policy changes and operational changes across an array of governmental entities. Furthermore, stakeholders observed that an administrative mandate might not be sufficient to consistently solicit trustworthy information; monitoring, compliance, and feedback mechanisms will likely be needed. Given challenges with government leadership transitions and other operational considerations, this model in and of itself may not be a comprehensive solution — though it may be a valuable tactic as part of a broader strategy, such as in collaboration with a Data Utility.

3.3.4 Opportunity #4: Referral providers can more easily share resource data with each other as a cooperative network

Sometimes described as a data collaborative or data cooperatives, multi-stakeholder partnerships are enabling resource directory maintainers that previously operated in silos to engage in mutually-beneficial data exchange.

The CRI can decrease data maintenance costs over time by developing data partnerships with other organizations that maintain resource directories. Often specializing in a particular geography or issue area, existing resource directory maintainers in DC might be able to contribute as much as half or more of the contents of a CRI, simply by adopting new methods of publishing information that they are already maintaining.

By evolving the CRI as a data federation — coordinating cooperation among a network of resource referral providers, who can function as members of the federation—the CRI can shift its cost from unilateral data production to multilateral data collaboration.

Examples:

- **Community Information Online Consortium** — Many orgs share data (and divvy responsibilities for maintenance) in same platform
- **Ontario 211 <> FeedOntario Food pantries (Link2Feed)** — 211 network exchanging data w/ pantry network
- **Benetech Service Net** —Bay Area referral providers sharing updates among systems (open source prototype)

How might it work?

- Unique identifiers match records across databases.
- Divvying up responsibilities, ensuring attribution.
- Ongoing monitoring and quality control to establish and maintain trust.

Participants in the CRI stakeholder workshop were enthusiastic about this opportunity, though noted it faces considerable challenges. Strengths include: aggregation of expertise across a diverse network, resilience through distribution of agency, and promotion of collaborative capacities and social cohesion.

Weaknesses include: cooperation itself can be costly, and concerns about how to ensure fair distribution of responsibility while coping with free-riding. Stakeholders were optimistic about the potential to design a set of rules and incentives that could encourage reliable participation, and "domain captains" who receive responsibility (and material support) to bottom-line quality assurance for particular kinds of services.

3.3.5 Opportunity #5: Software vendors are providing tools with innovative user experiences, adding value to public information

A range of emerging software solutions are now available to institutions in need of user-friendly care coordination solutions.

Examples:

- Aunt Bertha
- Network of Care
- NowPow

How this works:

- Anchor institution pays for software license.
- Value-adding features for care coordination among organizations that use the software.
- Data ownership — held by vendor (by default, but not necessarily so)

In the DC CRI workshop, stakeholders (some of whom use some of these software systems) discussed both the advantages of user-friendly interfaces, and also the disadvantages that come with private ownership of public information.

These tools can meet immediate needs, and can scale, without being critically dependent upon consistent government or philanthropic leadership. However, stakeholders shared a conviction that public information and critical public health processes should not be captured by private companies, and that open infrastructure is critical to ensure both equity and innovation.

Stakeholders discussed the prospect of positive future change in which public information and associated infrastructure are established and held in trust, by a Data Utility, to be used by private vendors who add value, and perhaps steward, but do not own.

Our research suggests that a Resource Data Utility could publish open data — freely reusable to all users, including software vendors — while still generating revenue for services associated with that data.

The basic premise of this model assumes that while open data may be free, any institution that might operationalize the use of that data is likely to need contractual guarantees pertaining to its quality and delivery. Government agencies, healthcare institutions, and other relevant stakeholders are not likely to build their operations around a critical resource for which they have no operational guarantees. By meeting the need for trustworthy data services, a Data Utility can generate sustaining revenue through Service Level Agreements (SLA).

Potentially monetizable levels of service

Our research included dialogue with market actors such as care coordination software vendors, government agencies, and community anchor institutions. Feedback suggests such actors are likely to need guarantees of certain levels of service, such as:

- Reliable maintenance of resource data, perhaps at a higher frequency than default.
- Requests for correction, guaranteed within a given timeframe.
- High-volume APIs, at virtually-constant uptime.

- Technical support

With such guarantees, third-parties such as software vendors that currently manage data on their own are likely to pay instead for SLAs. (We estimate that a basic SLA might be worth $3,000 to $5,000 a month, across a market of at least half a dozen software vendors — perhaps amounting to as much as half of the operating cost of the CRI.)

Premium features

Aside from basic SLAs, the DC CRI can also generate revenue through features that add value to the basic — "raw" — open data.

For example, the CRI could offer:

- Customizable, white-labeled websites with specific geographical and/or topical focus.
- Metadata to improve search results and matching algorithms
- Customizable category management tools
- Specialized resource information that falls beyond core standards

Training and support

As a center of specialization on resource information navigation and use, the CRI can offer valuable consulting services such as:

- Hands-on training in screening, resource navigation, and referral
- User research and user experience design
- Evaluation and quality assurance

Business intelligence

A fully mature CRI that achieves adoption along the lines outlined above has at least one more significant potential

revenue stream: collecting, synthesizing, and making sense of data about the usage of the CRI's resource data.

By monitoring traffic across any third party system using the resource data API, the CRI can produce cross-channel analytics about patterns of searches, clicks, and other data about the use of resource data. These can be synthesized into needs assessments and other business intelligence valued by local institutions — from governments, to universities, to philanthropies, to healthcare payers, etc.

By becoming the canonical source of data that everyone uses, the CRI can become an indispensable source of intelligence about the operations of DC's health, human, and social service sectors, and the health of its communities.

4. Recommendations

With input from stakeholders ranging from DC-PACT to the resource directory maintainers convened in the DC Community Resource Inventory workshop, we offer the following recommendations in regard to development priorities and policy actions to facilitate the evolution of the DC Community Resource Information Exchange Infrastructure.

4.1 Recommendation #1: The DC CRI should function as a Data Utility — publishing up-to-date, standardized, open resource data as a public service

- This Data Utility should have sufficient capacity to update a minimally viable amount of core, public information for as many as 1,500 records about services, with updates made at a rate of more than once per year. Such maintenance should be expected to require 2 FTE. See the Verification Analysis Appendix for more data.
- The Data Utility should use open standards to structure and publish resource directory information. This entails use of the Human Service Data Specification and API protocols.
- The Data Utility should use the 211 taxonomy to categorize services; however, since the 211 taxonomy is both intellectual property and also a technical artifact that poses difficulties to non-technical users, the Data Utility should also support additional categorical methods — custom taxonomies and/or tags that can map to the standardized tags.
- The Data Utility infrastructure should be designed for the primary purpose of integration with third-party systems. (In other words, not a centralized system that everyone uses but rather the hub of a network of systems.) In a mature version of the DC CRI, users of third-party systems should be able to receive updates

from and submit edits to the CRI without having to leave their own system.

- The Data Utility infrastructure may not be intended to collect all information about every service, but rather serve as a common pool of core data to be maintained as a standardized, shared resource for access by a distributed set of resource information systems, each of which might use and augment this information as they see fit.
- The Data Utility should be designed to receive and reliably act upon feedback from users about the accuracy of the information about services that are listed in the CRI.
- The Data Utility should be appropriately staffed with sufficient human resources — including 2 FTE for resource data management, as well as capacity for partnership development, community engagement, training and support. We estimate a starting budget range of $500,000.
- The Data Utility should NOT be responsible for receiving or publishing user feedback about the quality of services (i.e., ratings and reviews). However, this data infrastructure can be leveraged by third-party systems which may themselves be designed to collect and publish such user feedback.

4.2 Recommendation #2: The DC CRI should evolve as a federation of referral providers working together as a cooperative network

- The DC CRI should be designed to aggregate resource data from, and publish resource data to, the network of referral providers that already operate in the District, many of which use their own technologies for resource data management and referral. Rather than a centralized system that everyone is intended to use, we

recommend a hub-and-spoke model that supports many distributed systems.

- The DC CRI should promote leadership among these referral providers, empowering them as partners (i.e., sector captains) holding responsibilities over data about their resource domains and rights in the governance of the CRI.
- The DC CRI's federation strategy should include engagement with referral providers in Maryland and Virginia to ensure regional coordination.
- Partners in the federation may become trustees of a Data Trust (see Recommendation #5); may eventually be eligible for some kind of compensation or other benefit in exchange for upholding resource data maintenance responsibilities.

4.3 Recommendation #3: DC government agencies should solicit resource directory information directly from the services they provide or fund

- In consultation with key actors such as the DC Open Government Office and the Deputy Mayor of HHS, DC CRI should develop replicable policy proposals that can guide agencies in the process of developing canonical registries of the services that they directly provide and fund through grants or contracts. A specific agency should be identified to pilot this process.
- To support DC government agencies in the development of service registries, the DC CRI should develop standardized, replicable, open-source forms and accompanying tools and procedures that can facilitate monitoring and publication. (See the Open Data Institute's report on government registries for more guidance here.)

- The DC CRI should develop tools and processes to support agencies in monitoring and compliance.
- This recommendation should extend to relevant public-private partnerships, philanthropies, and network institutions, all of which can play instrumental roles in collecting and publishing standardized resource information from their grantees and/or partners.
- The CRI should be responsible for synthesizing data from these registries, providing traffic analytics in return.

4.4 Recommendation #4: The DC CRI should develop a sustainable business model through the monetization of guaranteed levels of service

- During Phase 2, the CRI process should assess possible service delivery models, associated costs and potential price points for resource data as a service to care coordination software vendors, community anchor institutions, healthcare payers, etc.
- The DC CRI should engage regional funders of safety net services to support this infrastructure through program-related investments, yielding in return meaningful benefits from resource data services for these philanthropic organizations and their grantees.
- Phase 2 could conclude with the implementation of a collective financing agreement, utilizing deliberative processes and progressive bidding to arrive at agreed-upon price points.[1]

[1] As described in "Social Determinants As Public Goods: A New Approach To Financing Key Investments In Healthy Communities" by Nichols and Taylor in *Health Affairs*, August 2018.

4.5 Recommendation #5: The assets of the DC CRI should be held in trust for the benefit of the residents of the District of Columbia, and governed by people who represent residents' interests

- DC CoRIE Phase 2 should entail research and development of governing mechanisms, such as a Data Trust. This governing mechanism should ensure that the assets of the DC CRI are stewarded in the interests of DC residents, and that the rules pertaining to the management and use of the CRI should be set in part through participation of designated representatives.
- The Data Utility's core resource data maintenance capacity should be monitored, supported, and directed by a group of designated community stewards who represent the beneficiaries of the Trust — and meet regularly to establish style guidelines, resolve conflicts, and articulate priorities for future production.
- DC government agencies should mandate participation in the Trust from any third-party referral providers and associated software vendors that receive public funds for care coordination, as a standard contractual requirement.

5. Development: What we built

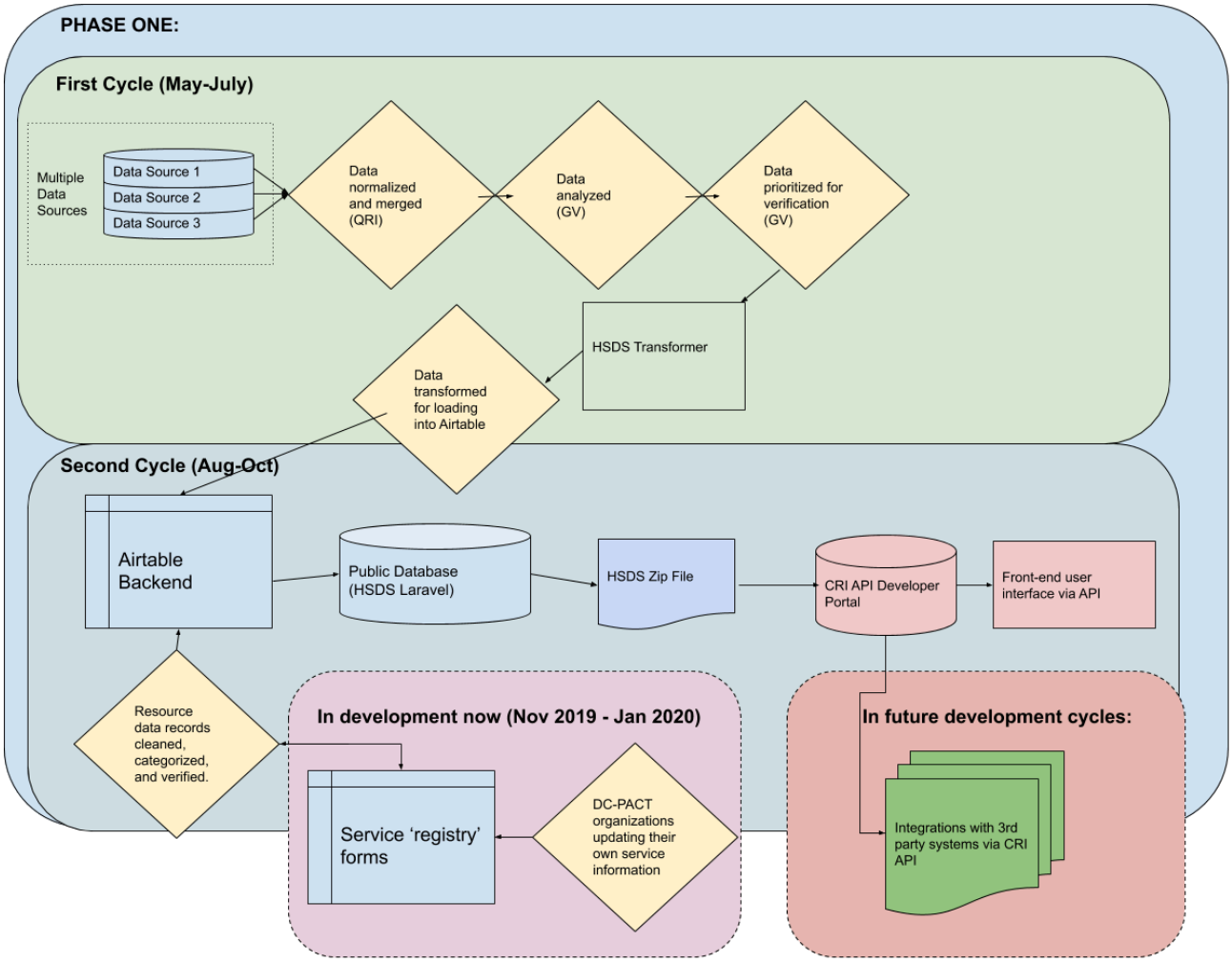
For DC CoRIE Phase 1, we developed a Community Resource Inventory Infrastructure as a proof of concept of a modular system designed to interoperate with other systems.

By developing minimally viable components through rapid iteration, we conserved limited resources while maximizing our ability to learn about stakeholders' needs and how to meet them in the future. This strategy mitigates the risks posed by an array of unknown factors regarding how diverse stakeholders might engage with a system that has never before existed.

Our basic CRI system consists of six components:

1. A content management system
2. A priority set of verified resource information
3. An API and developers' portal that provides documented access to the API
4. A reference implementation front-end that enables basic searching and browsing of the contents
5. Documentation of a workflow for record verification and maintenance
6. A form through which providers can submit their own service information to be reviewed and included (*this additional feature is in development now*)

Below, we describe each component.



5.1 A resource inventory content management system

For the CRI's content management system, we adapted an instance of Airtable—a free, web-based, spreadsheet-like CMS that has been adapted for the management of standardized resource directory data. The DC CRI's Airtable enables the editing of serialized resource records—with separate tables for organizations, services, locations, categories, and more. (It also can include a standardized API, which exposes the contents of the Airtable for third-party applications to access and, eventually, edit, directly from the source.)

Airtable is a free tool, although future versions of the DC CRI—should they continue to utilize Airtable—may benefit from an upgrade to leverage more advanced versions. For instance,

the DC CRI has articulated high-level specifications for forms that can solicit information directly from providers and submit to a queue for verification. Also, development of sophisticated taxonomy management tools — including multiple taxonomies — has been prioritized.

Guidance on using the Airtable is available in the Workflow Guide described below.

To populate this tool, we put in a merged 'superset' of data from the resource directories listed in section 3.1.1. We also continued to receive directories from other stakeholders after the bulk of the work to populate the AirTable was complete, including from the DC Health Help Me Grow program and Children's Hospital Pediatric Mental Health resources, and we intend to add these and other directories to the superset, to be refined and added to our normalized set at a later date.

5.2 A prioritized subset of verified resource directory information

Within the Airtable, we've aggregated a set of data about resources available in DC, and verified a subset of those resources. (For more analysis of the contents of this database, and the process of producing it, see Appendix C: Data Verification.)

We applied multiple methods to prioritize the records that would be selected for verification:

1. Analyzed the stakeholder research conducted by the DC CoRIE project, to identify the types of services that local stakeholders indicated are important for effective care coordination.

2. Prioritizing services that appeared multiple times across our comparative analysis of resource directories, and which appeared to be associated with our target categories.

3. Prioritized organizations that are already a part of the DC-PACT coalition, a formal partner of DC CoRIE

initiative that consists of the most likely immediate users of the CRI.

By the end of Phase 1, we have verified information on approximately 150 organizations. Most records required between 30-60 minutes to compile, though some took as many as two hours. In this process, we collected data that was publicly available or offered upon initial correspondence; additional layers of service detail (such as complex eligibility criteria, or capacity) may not be readily offered by organizations, and will require additional time to collect.

5.3 A guide for resource record verification

We produced a guide to resource data verification, which is available here. This documentation provides step-by-step instructions by which a designated resource data administrator can use the AirTable to aggregate high-quality information about an organization, the services it provides, and the locations at which the services are offered.

5.4 A developer portal with live documentation of the CRI API

The DC CRI Developer Portal provides technical guidelines for using the CRI's database through an Application Programming Interface (API). The portal's features include account registration, documentation, a live testing environment, and a reference implementation application that demonstrates use of the CRI API. All together, this provides software developers with access and support for the process of building applications and integrating systems.

This developers' portal can and should evolve as the DC CoRIE initiative further defines the primary use cases and functional specifications for the DC CRI.

The DC CRI API and Developer Portal are built using the Human Service Data API protocols, which are established industry standards. This enables any software system that uses the HSDA protocols to interoperate with the DC CRI — and, if a

future version of the DC CRI uses some alternative technology, the use of HSDA protocols can enable interoperability to persist across system transitions.

5.5 A reference implementation of a resource locator front-end

The DC CRI website [http://dc.openreferral.org/] provides a basic interface to enable simple searches and category filters for the contents of the CRI. This website has been deployed using open source software, with an emphasis on simplicity.

There are many potential ways to search or browse a resource directory; given the broad range of open questions about how the infrastructure will be used, we minimized investments of our limited resources in developing such user-facing search functionality.

Future development objectives might include:

- Guided search
- Screening tools to yield suggested results
- Sophisticated category navigation
- Favorites / flags

5.6 A service registry form

We are now in the design process to build a system of forms through which providers can submit their own service information to be reviewed and included in the CRI. For the immediate future, these forms will be used by DC-PACT members to submit information about their own services.

In the course of this phase of development, we will document this workflow, and evaluate the policies and procedures that should be in place to ensure compliance and accuracy. We will also scope several scenarios by which this system of forms could be replicated by DC government agencies, funders, and other network bodies, so that they may develop their own interoperable service registries.

5.7 What we didn't build: "Yelp-like" user feedback mechanisms

Through the course of our research and workshop, we received a significant amount of feedback from stakeholders expressing interest in "Yelp-like" user ratings and reviews.

We find the solicitation of user feedback on the quality of services to be important, even potentially transformative — and we encourage DC CoRIE to support stakeholders in appropriate efforts to develop their own feedback collection strategies. However, we do not recommend building such features into the core CRI system. Challenges related to accuracy, security, and other liabilities are significant. Since the CRI system would serve as a hub of canonical information, subjective user feedback could be associated with records supplied by CRI when aggregated and published by third parties (such as Yelp itself) on their own tools.

Ultimately, the DC CRI should be understood as infrastructure that can serve third-party applications; these applications themselves might collect and store such feedback, without ever adding that sensitive, context-dependent data directly to the CRI itself.

Moving Forward

The District of Columbia has an unprecedented opportunity to evolve its health and social support system to be more coordinated and effective in promoting equitable quality of life for every District resident. A key component of this evolution is open access to up-to-date, comprehensive resource directory information. But a quality, sustainable CRI will not come easily or quickly. Through our work in CoRIE phase 1, DCPCA has laid out a roadmap to achieve this one element which stakeholders universally agree is a priority for our ecosystem. We look forward to ongoing partnership with the many government, health, and social support partners who share our commitment to a health system that gives everyone in DC a

fair shot at a full healthy life. To learn more about this process, please reach out to David Poms at dpoms@dcpca.org.

Appendices

Appendix A: Aggregating data from multiple sources

QRI provided data transformation services to the DC Community Resource Inventory initiative. Their feedback from the process is below.

Technical challenges

For the landscape assessment we produced a single aggregate dataset as a basis for analysis. This aggregate dataset collated program information from a disparate number of sources.

From a technical perspective, building this dataset involved three primary challenges:

- Data Acquisition
- Program Collation
- Managing Changes to Data and Process over time

Data acquisition

The primary goal of data acquisition is to get data into a form that can be collated. Acquiring data for this project required combining several different techniques:

1. Emailed Excel Spreadsheets
2. Scripted Web scraping
3. Headless Browser Web Scraping
4. Automated PDF text extraction
5. Manual text extraction
6. Consuming web APIs

We approached this project with the assumption that we could not ask that data be delivered to us in a separate form, and would instead need to use whatever techniques necessary to get data into a workable form. This helped us stay on time in terms of data deliverables, using technical solutions to reduce communication burden created by asking for data in different forms.

During data acquisition we were surprised to discover many directories themselves contained duplicate records. In many cases this comes from listing the same program in different categories or for different audiences. To accomodate this each data source had to be checked and deduplicated either at the point of ingest or as a second step.

Program collation

With each data source acquired in a comparable form, the next challenge is to deduplicate programs between data sources. To do this we wrote and hand-tuned an algorithm that compared each program record to a growing list of deduplicated records, generating a score for every comparison. If that score is above a certain threshold, it's considered a match and collated with the existing record.

To compare programs we used two primary features: the name of the program and its address. For name comparison we processed titles down, searching for exact name matches and assigning a lower correlation value if unique words within both program names matched.

For geospatial correlation we first built a deduplicated index of all address across all data sources, and geocoded those addresses, producing a latitude and longitude for all known addresses across all programs. During the collation process, any program that has an address fetches its lat/long value from this index, for comparison to other programs. Programs with the same address will produce the same lat/long value when run through the same geocoding process, producing a match.

To check our work we built a visualization that allowed us to view the aggregate de-duplicated records overlayed on a map for spot-checking. Tuning the algorithm involved checking the results of runs with different match-threshold values for over and under fitting.

Managing changes to data and process over time

The downside of using many approaches to acquisition and a custom collation algorithm is additional complexity in some future scenario in which one might re-run these acquisition processes as data sources change.

To solve this problem, we checked each data source, the geocoded index, and the aggregate dataset into version control. By independently versioning each dataset, we are able to react to changes to each data source as they come. As the original data sources accumulate changes to their records over time, QRI can identify and process those changes in comparison to previous versions. This capability may be a necessary precursor to effective federation of resource datasets.

Appendix B: Comparative data analysis

Overview

With support from the DC-PACT coalition, and encouragement from DC's Deputy Mayor of Health and Human Services, we solicited resource directories from ten agencies, and conducted a comparative analysis of their content and structure. We compared these ten directories to understand record quality, overlap, and frequency. ("Record" here includes both organizations and services.)

These ten directories yielded 6,242 records — 2,530 (40%) of these overlapped across directories, resulting in 3,712 unique records. Directory size ranged from 108 records to 2,157 records. Directory focus varied from issue-specific to general, and this was reflected in data profiles (which services were listed, how).

Methods and limitations

Analysis took two forms: a Landscape Assessment of all ten directories using a single, aggregate dataset; and a Deep-dive into each directory's data structure, robustness, vocabulary, and data quality.

Landscape assessment

We used the 3,172 unique records to understand which records appear in multiple directories or are repeated within single directories. This aggregate data compared Name, Address, Phone Number, and URL.

Deep dive

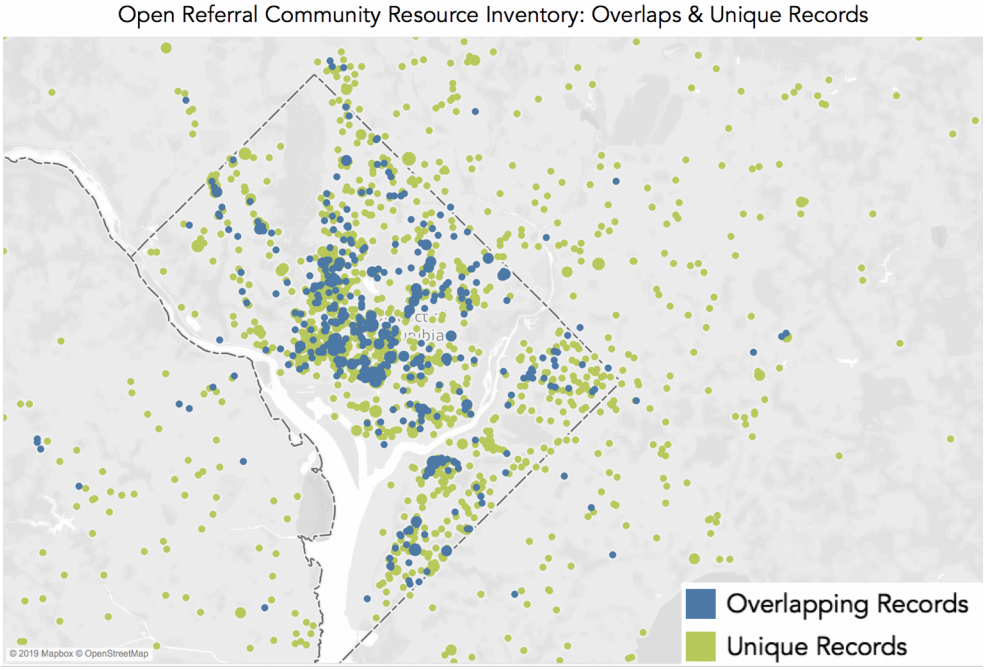
We analyzed each of the ten resource directories independently according to their data structure and contents. We explored directory completeness, vocabularies, fields available vs fields complete, overall data quality, and record-to-record content comparison between directories.

Considerations

The Phase I Comparative Analysis should be considered as just that—a first phase. The ten directories included in analysis provides a useful picture into the quality and structure of contributing agencies' data, but should not be taken as a comprehensive or accurate picture of the DC services landscape. This analysis highlights the informational potential of these data, when maintained and verified, and should provide the basis of further research and reporting.

Record overlaps

Geographical overlaps

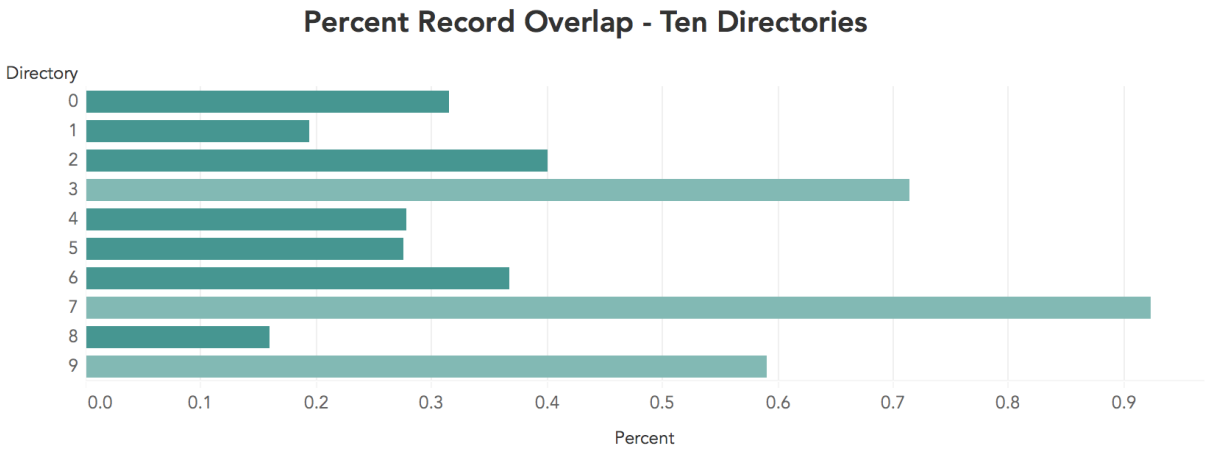


This map shows the geographic spread of the contents of ten directories used in this analysis. Each dot represents a record—its size denotes its frequency in the set. Small dots represent records that appear once, larger dots represent records that appear multiple times in various directories. Blue shows unique records; green records appear in two or more directories. 40% of all records occur in multiple directories. (Most overlaps occur in DC proper, which suggests that the amount of unique records is skewed by the inclusion of 211

Maryland's contribution of resources located outside of the District that are available to DC residents.)

Content overlaps

Overlaps between directories were not consistent enough to show a trend. Directories with issue-specific objectives had less record overlap with other, more general sources.



Percent Record Overlap: this graphic shows the portion of each directory that overlaps with other sources. Light blue shows records with over 50% overlap.

The graphic on the next page shows Record-to-Record comparison of one record (My Sister's Place) across seven directories. Note: website, address, and phone information was included in all sources, but is not shown here.

	DIRECTORY A	DIRECTORY B	DIRECTORY C	DIRECTORY D	DIRECTORY F	DIRECTORY H	DIRECTORY I
NAME	My Sister's Place	My Sister's Place	My Sister's Place	My Sister's Place	My Sister's Place	My Sister's Place	My Sister's Place
LATITUDE							38.91649347
LONGITUDE							-77.03355964
PARENT AGENCY						My Sister's Place	
COVERAGE						DC - Washington	
ACTIVE						FALSE	
HOURS	24/7	24 hours			24 hours		
TAXONOMY	Domestic Violence Shelters | Family Crisis Shelters	Mental Health | Counseling | Domestic Violence | Family Services | Childcare	Housing | Shelters, Transitional housing/Single Room Occupancy | Domestic Violence	Violence and Sexual Assault	Disability Specific Information		DESCRIPTION MUST BE FILLED
DESCRIPTION	Provides assistance and social services referrals for families who are victims of domestic violence.	My Sister's Place provides confidential, emergency shelter for victims of domestic violence. Women and families are welcome. Call the hotline for information on how to enter the shelter. Capacity to shelter up to 15 families.	My Sister's Place (MSP) is part of an interactive community committed to eradicating domestic violence. MSP provides safe and confidential shelter and transitional-to-permanent housing to battered women and their children.	24-hour hotline, shelter, and counseling for battered women and their children	My Sister's Place, Inc. is a non-profit agency exclusively serving battered women and their children. Their programs consist of emergency shelter and transitional housing, as well as community outreach, and RISE (Reaching Independence through Survivor Empowerment).		
ELIGIBILITY	None		Eligibility Criteria: Victims of domestic violence & their children (No boys over 12 yrs old).				
LANGUAGE			ASL or other assistance for hearing impaired, Spanish				
FEES	No Fee.						

Comparison of SOME: Behavioral Services across three directories. Note: website, address, and phone information was included in all sources, but is not shown here. Latitude, longitude, parent agency, coverage, and active information was not included in directories A, C, or E.

	DIRECTORY A	DIRECTORY C	DIRECTORY E
NAME	SOME: BEHAVIORAL SERVICES		
HOURS	Mon-Fri 8am-12pm and 1pm-3pm		08:30AM - 12:00PM (MON TUE WED THU FRI): Employment /Day Labor /Training 01:00PM - 03:00PM (MON TUE WED THU): Medical Services 08:00AM - 11:00AM (MON TUE WED THU FRI): Mental Health / Counselling
TAXONOMY	Assessment for Substance Use Disorders | Substance Use Disorder Education/Prevention Substance Use Disorder Counseling | Substance Use Disorder Drop In Services Substance Use Disorder Issues	Mental Health, Substance Abuse | Co-occurring mental illness & substance abuse disorders | Men, Women Intensive outpatient, Outpatient, Partial hospitalization/day program, Residential long-term treatment (more than 30 days) Access to recovery voucher, Public funding	Mental Health / Counselling, Medical Services, Dental Services
DESCRIPTION	Encourages individuals with substance abuse issues to seek help. Assesses the need of the client during the initial intake stage, where clients work with an addiction counselor to determine the program best suited to their needs.	SOME (So Others Might Eat) is an interfaith, community-based organization that exists to help the poor and homeless of our nation's capital. SOME will meet the immediate daily needs of the people we serve with food, clothing, and health care...	
ELIGIBILITY	Adults with substance abuse issues	Eligibility Criteria: Homeless who live within 8 block radius of the clinic.	No restrictions mentioned.
LANGUAGE		ASL or other assistance for hearing impaired, Spanish	
FEES	No Fee, Sliding Scale (for residential treatment if client has income or disability benefits)		

Potential utility of data

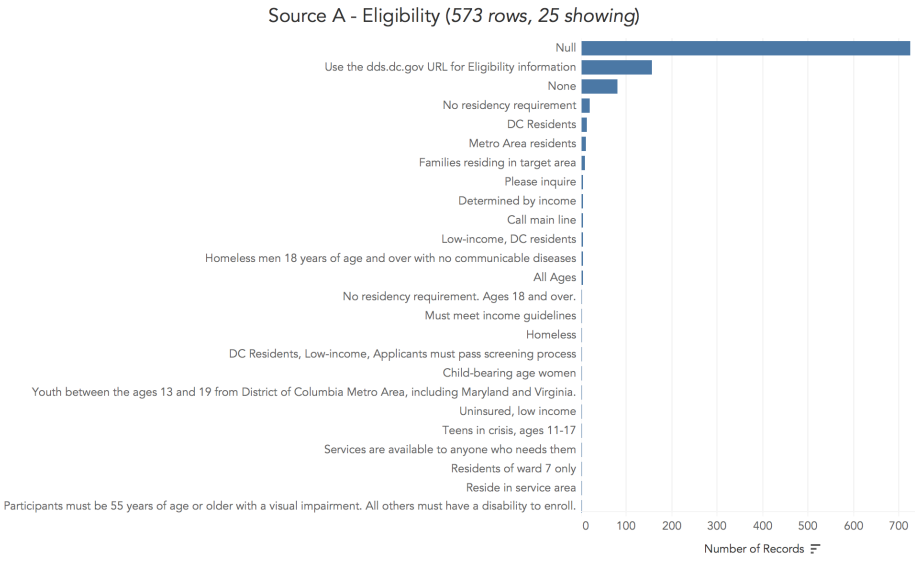
Many directories listed potentially useful fields, such as Eligibility, Taxonomy, Documents Needed, Payments Accepted, and others. These fields, however, are only useful in an aggregate sense when they list record-specific information. Many fields contain entries like "Please call provider" or "Use the dds.dc.gov URL for information" instead of actionable information.

Latitude and longitude

Only four directories include latitude and longitude, otherwise known as geocoded addresses. These fields are critical for aggregate mapping capability, and can provide DCPCA and it community with invaluable geospatial awareness. Collecting this information at the source (i.e., in a directory) is more time- and cost-effective than geocoding large datasets at a later point in time.

Eligibility

Many directories contain Eligibility fields, but most are not effectively used. The graph below shows some of Source A's Eligibility information—over 700 records don't list anything, and over 100 records list "Use the dds.dc.gov URL for Eligibility information." Other records eligibility information is either granular or uses inconsistent language to describe common attributes—each occurs only once throughout the dataset (e.g., Youth between the ages of 13 and 19 from DC Metro Area, including Maryland and Virginia; Must meet income guidelines; Determined by income; etc.). Note: this graph only shows 25 of 573 rows, or 4% of Source A's Eligibility listings.



This is a trend seen not only in eligibility, but Taxonomy, Description, and other fields across ten directories.

Target population

As with Eligibility, Target Population is a field with highly granular information—this may prove useful for a service navigator, but hinders aggregate comparability. Below is a small segment of one directory's Target Population listings.

Ward 8 residents, in receipt of a court or eviction notice
Ward 7 residents, in receipt of a court or eviction notice, disconnected utility services or cut-off notice..
Ward 5 residents, in receipt of a court or eviction notice, disconnected utility services or cut-off notice..
Ward 4 residents, in receipt of a court or eviction notice, disconnected utility services or cut-off notice..
Ward 2 Residents
Ward 1 and Ward 4 residents, in receipt of a court or eviction notice, disconnected utility services or c..
Volunteers must be 18 years old and must have either a BA or 3 years related service experience.
Visit website
Victims of domestic violence in the District
Up to age 18 years And up to 21 years for CFSA involved youth. No referral needed.
Unemployed or underemployed; physically able and available and actively seeking work
Underserved Latino children, ages 2.5 to 8, in Barbara Chambers child center at DIW, or at partner sit..
Unable to service severely impaired individuals; classes are offered for adults and teens.
TSP will be open to any student with a need for academic or college access support, but the expectat..
This project will target Latino entrepreneurs in low-income communities of Washington DC who are in..
This project targets the 9,365 citizenship-eligible Latinos in D.C., focusing on the most vulnerable, incl..
This project serves elementary school-aged Latino/Hispanic youth through theatre workshops; the sec..
This project hopes to serve all of the Latino youth attending high school in the District. We also plan t..
This program will target Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, and Intersex (LG..
This program extends our reach into the Latino community. This season approximately 167 students fr..
The youth program will serve youth from Ward 4 of Latino and Afro-Latino descent by partnering with..
The target population to be served are low income, Hispanic/Latino and other seniors that are 60 year..
The target population is Latino youth, grades 6-12, at Cardozo Education Campus including Cardozo ..
The proposed project primarily serves vulnerable, financially disadvantaged children, teens, and famili..
The primary target of our Prosperando Juntos program is the Latino owned businesses in Columbia H..
The MCIP Teen Pregnancy Prevention Program will serve 700 Latino students in grades 8-12 who are ..
The Hispanic community and other minority-owned businesses living and working on the District of C..
The design of Dialogue on Diversity's program cycle is intended to appeal to a national audience of a..
The Avenues to Success for Latino Youth program will serve 30 Latino youth and young adults, ages 1..
The After School Program will serve young men and women between the ages of 13 and 21 who resi..
The Â¡DC Ahorra y Prospera! (DC Saves and Prospers) Campaign seeks to financially empower 1) Lati..
Teenage mothers, referred by DC Child and Family Services Agency (CFSA)

These are highly informative, but so customized that any snapshot of services for a subset of folks is near impossible to determine.

To understand what "good" might look like, we built a heatmap of concise population descriptions against service category:

Categories & Populations: This graphic shows the potential of these fields, once categorization and population descriptions are standardized and used.

Further research and recommendations for building data capacity

The data included in this analysis give us a sense of these directories data health. When viewed through the lens of this projects' stakeholder engagement activities, these gaps in data and/or data quality will help determine which capacities to build where (e.g., facilitate consensus around taxonomy and levels of specificity within that taxonomy, clear, codified population definitions for the DC social services community to use, data maintenance resources—whether through intern programs or other solutions).

Further research to support this work can include:

- **Utility of aggregate measures** — Is mapping capability actually useful for service navigators and policymakers? Are aggregated service types and eligibility criteria supportive to service navigators?
- **Best practices in social services resource data maintenance** — How often should field definitions and vocabularies be checked for quality and compliance?
- **Once cleaned up and maintained, what information can these data provide agencies, consumers of services, policymakers, and intermediaries?** How can providers design for easy and accessible information synthesis?

Appendix C: Data verification analysis

Overview

This document presents an analysis of the verification work done during Phase I of the DC Community Resource Inventory pilot project, over the summer of 2019.

This work was conducted according to an established workflow for verification (which was itself designed by Ariadne Brazo, the designated verifier) in order to effectively test, iterate, and prepare that workflow for use by others in future phases.

Verification was conducted in the DC Community Resource Inventory (CRI) Airtable, through a combination of web-based verification and call-based verification. Some verification also took place over email when prompted by the organization. Data was analyzed both on a quantitative and qualitative level to gain insights on the verification work.

Definitions

- Organization: An agency, government or non-profit, that offers programs/services
- Service: sometimes called programs, services are activities or resources that are offered by organizations to help people in need.

  Examples: Nutrition counseling, individual therapy, primary medical care, etc.
- Out of business (OOB): When an organization has ceased operation permanently or indefinitely
- Locations: The physical address(es) of an organization, sometimes confidential
- Schedules: The various hours of operation that sometimes differ by service and location

Estimates & actuals: the numbers

Estimates

The target for verification was 150 organizations, providing an estimated 450 services. A single clinic might offer upwards of 10 different medical services — from primary care, to sexual health, to insurance enrollment — whereas a food pantry might just offer one or two services such as the food pantry and meal delivery.

Actuals

- 158 organizations were vetted
- 150 organizations were verified
- 6 organizations were unverifiable
- 2 organizations were marked out of business (OOB)
- 691 services were verified

Verification methods

Web-based verification

The verification workflow document outlines methods for assessing how up to date an organization's website is, and how important it might be for a phone call to confirm the published information is still accurate.

When an organization has a website with sufficient quantity and quality of information, reviewing the website is the most efficient method of resource directory record verification. (In particular, the agencies in DC PACT tend to have excellent websites that allow for more efficient verification.) By leaning heavily on this method in its initial phase, the CRI can get the most information initially. Call verification can then be used to fine tune these records and seek out unpublished services.

Call-based verification

Calling an organization is necessary sometimes and provides direct contact to the agency. It is, however, difficult to achieve. A few reasons include the following:

- Time: Staff at organizations are quite busy and often don't have time to outline in detail their services
- Availability: It can be very difficult to successfully reach the right person to speak to. Several call-backs can be necessary and attempts can get lost in voicemails
- Knowledge: Sometimes, calls reach a volunteer who may not be fully knowledgeable of all the services offered. Additionally, the verifier may not be aware of the limitations of the contact's knowledge and therefore not seek out another point of contact.
- Breadth of information: A point of contact who is busy and eager to finish up the call may lean towards quickly confirming information on existing services. This makes uncovering unpublished services difficult.
- Trust: The organization needs to trust the caller and often, organizations are wary of offering up information on their services or application process to someone they perceive as a stranger. This is why a recognized name such as the DC Primary Care Association is key to utilize in the call script.

Looking forward, call-based verification will likely be a larger part of the workflow over time, as the low-hanging fruit of organizations with quality websites are processed, and additional inquiry is required to identify unpublished services and to fill in information gaps.

Email-based verification

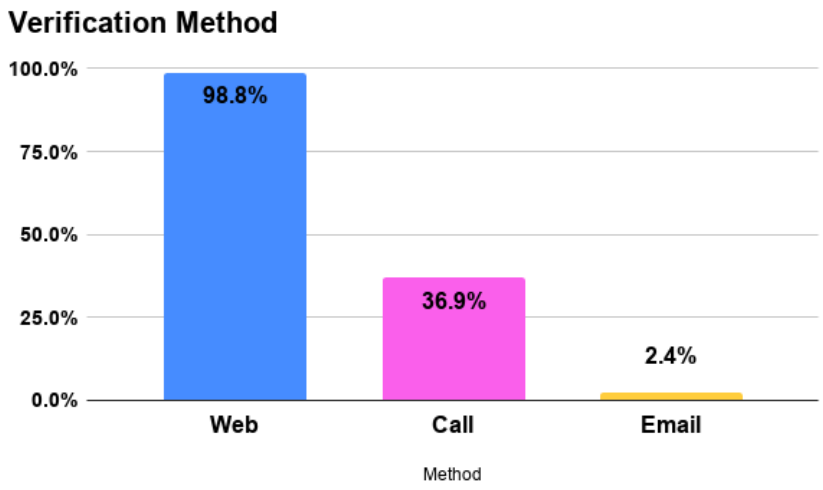
Email verification is infrequent but quite useful. Getting a written account of services and application processes is ideal but often difficult to get. When a voicemail or website encourages an email to a direct point of contact, this can be a great source of information.

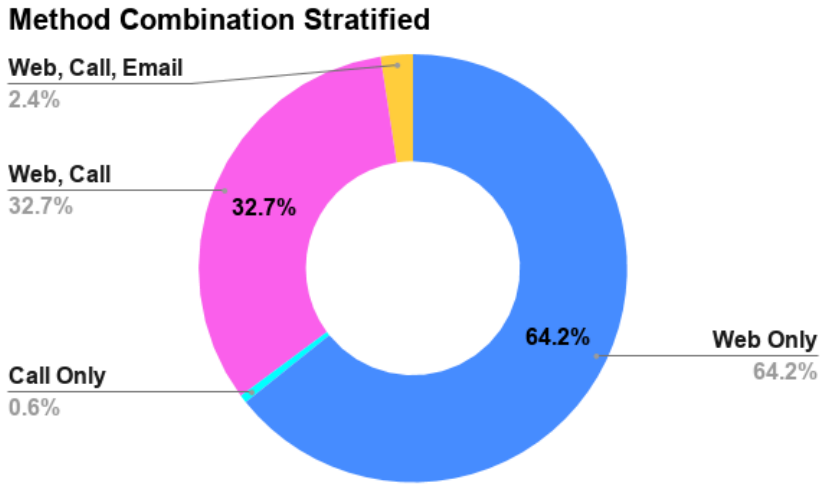
Previous experience in the field has revealed that mass blast emails are not successful. The percent of responses is usually in the single digits. Mass email communication is only really advisable when the organizations receiving the email are

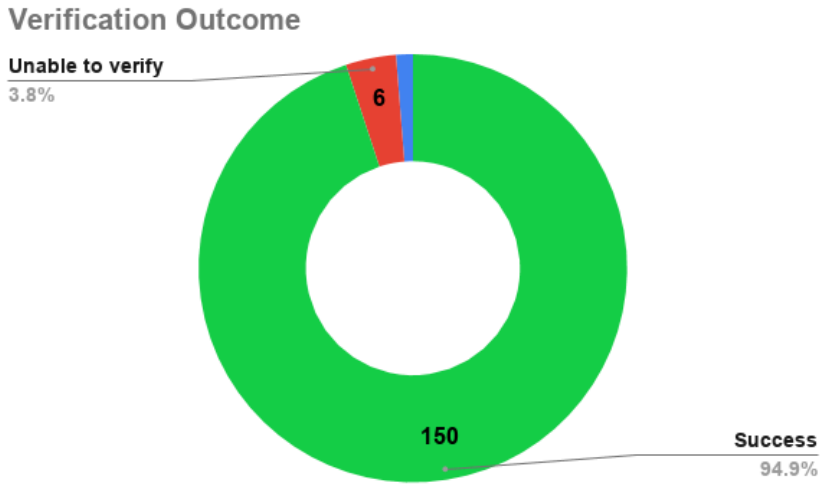
expecting it as part of a wider effort with other forms of engagement.

Outcomes

Here are a few charts outlining the quantitative outcomes of the various verification methods.







Verification outcome definitions

- Success: All or the vast majority of apparent information was verifiable
- Partial success: Most of the apparent information was verifiable but some info could not be found or verified. This usually means the website offered a good amount of detail but the supplemental phone call and/or email attempt failed.
- Unable to verify: Due to a lack of working phone number and possibly a lack of website, this organization could not be verified
- OOB: This organization is permanently or indefinitely out of business

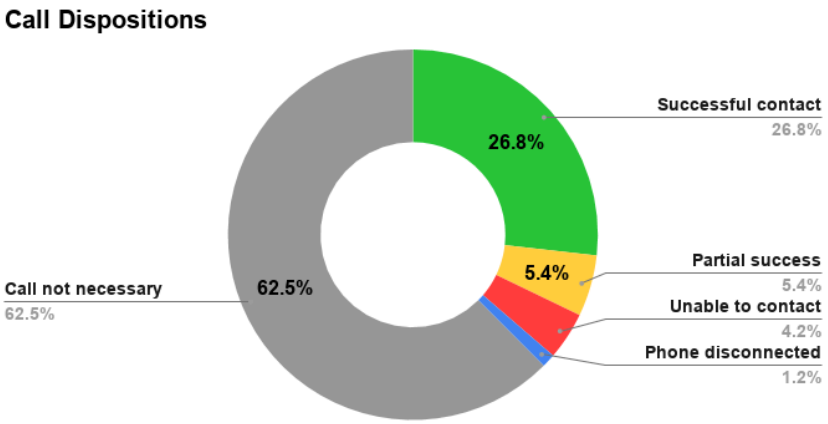
Call dispositions definitions

This simply refers to the status of the call attempt.

Note that "waiting for call back" is a temporary status and thus not reflected in the outcomes of this pilot project.

- Successful contact: Contact with the agency was made and all or most of the needed information was given

- Partial success: Contact with the agency was made but most or all of the information needed on the call was not given
- Unable to contact: Contact could not be established after repeated efforts
- Waiting for call back: The verifier is still waiting for a call back from the organization. This is a temporary status and not a final outcome.
- Call not necessary: Web verification yielded rich results and thus a call was not necessary



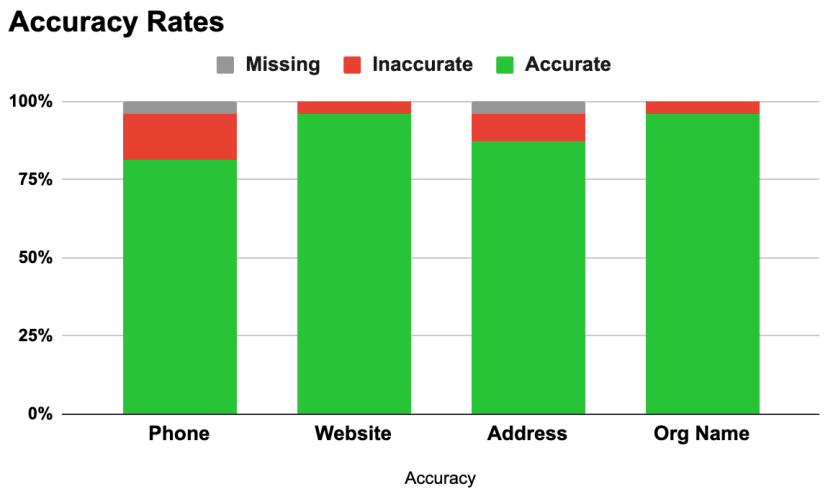
Accuracy

The source data in the CRI ended up providing a typical level of accuracy for unverified data. Since the data comes from many sources, the accuracy rate prior to verification is slightly higher than typical accuracy rates but still has substantial inaccuracies. This indicates that the verification method and labor would provide substantial improvements to the accuracy rates of basic information.

Please Note: These rates indicate accuracy of the raw data. This does not indicate the quality of the raw data. Accuracy simply refers to whether the information given is strictly true or false. Quality refers to how in depth that information is and how effectively it conveys information to the reader. The

aggregated data sources drastically lacked available information on these organizations. In the data entry section below, it's clear that this verification method yielded tremendous amounts of information that the aggregated sources lacked.

Accuracy Percentage	Accurate	Inaccurate	Missing
Phone	81%	15%	4%
Website	96%	4%	0%
Address	88%	8%	4%
Org Name	96%	4%	0%



Data entry

Quantity

The aggregated data sources, although with slightly above average accuracy rates, drastically lacked the breadth of information available on the web and through call and email verification. Of these 150 organizations that were verified, the following data points were verified

- 691 Services
- 414 Locations
- 385 Schedules

Services

- 691 services were verified, almost all of which had a detailed description directly from the organization itself.
- Organizations had a range of anywhere between one and 29 services

  NOTE: organizations have such a wide range of services that the average number of services per organization is only useful as an estimate for large data sets
- The average number of services per organization is just under seven
- Two services were removed since they are no longer being offered

Locations

- 308 locations were verified
- Organizations had a range of 1-13 locations
- The average number of locations per organization is two
- Two locations were marked OOB

The range of locations for an organization was much smaller than the range of services. This is typical. The organizations with the most amount of locations were health systems/clinics and agencies with temporary-permanent affordable housing locations.

Available web information

We used a five star rating system to rate the amount of necessary information available on an organization's website. This has no bearing on the quality of services offered at that organization and in no way is a critique of the organization. It's merely a tool for tracking how many websites offer what level of information.

Website Rating	% of Organizations
5 Star	68%

4 Star	18%
3 Star	7%
2 Star	5%
1 Star	3%

Time to verify

Methodology

To measure the time it takes to verify an organization, we utilized a timer tool in Airtable. This tool tracked the time to verify each organization and was stopped whenever there was a break in between verification. Note that these statistics reflect the exact amount of focused time doing verification on a given organization. It does not reflect other tasks such as, but not limited to:

- Loading up the verification queue
- "Digital housekeeping"
- Correspondence
- Data cleaning
- The typical rhythms of a normal work day

Timing the verification work is not necessary for future phases but is recommended for analysis purposes.

Findings

- Average time per organization: 27 minutes
- Range: From 2 hours 6 min to 3 minutes
- Average time per service: 4.5 minutes

Limitations

Our sample set is too small to draw significant conclusions around some other valuable insights. These insights will be achievable once verification work is being done full time and a larger sample set is available.

Time to verify by method

Knowing how each verification method (web, call, email) affects the time to verify would be a fantastic insight both out of curiosity and for planning verification work. If we had a

large enough set, we could identify how much more (or less) time it takes to verify when a call is necessary, how email affects the time to verify, and more.

Days to verify

We did not track over how many work days an organization is verified. Almost all of them were verified on the same day but when calls are made or a call back/email is being awaited, it takes a few days to finish. This would be a useful measurement as well.

Time to verify by category

With a larger data set, we could gain some insight into the time to verify by service category. A hypothesis is that it would correspond to the complexity of the service where medical care and affordable housing lead the pack.

Verification tiers & strategies

One route for simplifying this process is to outline a tiered table of verification breadth. This would give guidance to the verifier as to how extensive their research should be and could better target the financial investment in verification work. It could also help with strategy around verification.

Verification tiers

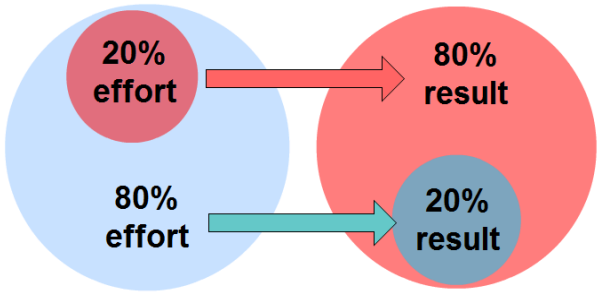
Focuses	Definition	Tier 1	Tier 2	Tier 3	Tier 4
Web verification	Verification through what's available on the org's website, high level taxonomy	✅	✅	✅	✅
Minor calls	Calls to fill in minor gaps from web verification		✅	✅	✅
Moderate calls	Eligibility details, contact info, simplified application processes, "programs" bundling, detailed taxonomy			✅	✅
Extensive calls	Fees, capacity, detailed application processes, etc				✅

Average Time per Org		30 mins	40 mins	60 mins	80 mins

Verification strategies

It's important to see the CRI as a new system that needs to grow. Meaning, the strategies for verification should focus on building up this database from its starting point which, with the exception of pilot data, is raw and unverified data. It's possible to approach this with a high intensity of verification from the start but a more measured and strategic approach would start with verification at a high level and work its way down into the finer details.

Consider the 80/20 principle (AKA the Pareto Principle). This theory stipulates that 80% of the most important results you need in a project can be accomplished with 20% of the effort. The remaining 20% of the results you need, the fine tuning, takes up the other 80% of your effort.



As far as the CRI goes, this would roughly translate to that first 80% of the results being achieved through Tier 1 (web verification only) or perhaps Tier 2 (web and minor call verification).

Here is a great example of how Tier 1 verification created a lot of gain for only 17 minutes of work. The DC Center for Independent Living (a full case study below) has a great website allowing us to lay a solid foundation of data on this organization. Check out this before and after:

BEFORE	AFTER

Description: Provides Blind & Visually Impaired services. Locations: 1 Phones: 1 (voice) Services: 1 Name: Low Vision Services Description: Provides Blind & Visually Impaired services.	Organization: DC Center for Independent Living Description: We are a private non-profit organization that assists DC residents with significant disabilities to live independently in their homes and in their communities. Locations: 3 Phones: 6 (voice, fax, tty specific to location) Services: 7 Service 1 Name: Low Vision Services ● Description (Preview): Provides services for folks with vision problems from limited vision to blindness. Service 2 Name: Information & Referral ● Description (Preview): DCCIL provides disability-specific information and referral to ensure people with disabilities have access to information... Service 3 Name: Additional Services ● Description (Preview): In addition to our core services, DCCIL also provides an array of other related services. These services include but are not limited to ADA information and consultation, relocation by choice, benefits planning... Service 4 Name: Independent Living Skills Training ● Description (Preview): DCCIL provides IL skills training in specific areas needed to achieve independent living... Etc.

As you can see, Tier 1 verification yielded a great amount of missing information for only 17 minutes of work. If you were to go to a higher tier of verification on this in the second round of verification, you could then drill down on some of these services. For example, the "Additional Services" section could be expanded to research each of those additional services individually.

In addition to our core services, DCCIL also provides an array of other related services. These services include but are not limited to ADA information and consultation, relocation by choice, benefits planning...

This could then be expanded to include individual service entries looking like this:

- Service Name: ADA Information & Consultation
- Service Name: Relocation by Choice
- Service Name: Benefits Planning

Based on the success of this method, we suggest starting with Tier 1 verification to first gather all the websites of organizations in the CRI and all the data available on their websites. This would lay a strong base to then go further into from there. All this to say, the strategy doesn't have to be black and white, all or nothing. Here are some examples of strategies to take.

Example 1. Laying a base

Aim: Fill out the majority of information by using Tier 1 web verification and applying the high-level taxonomy.

Steps:

1. Utilize the taxonomy to categorize all organizations with high level service categories such as "Health," "Housing," and "Food."
2. Filter all organizations in the CRI down to ones where the CRI does not yet have a website listed
3. Search for websites for all orgs with missing urls
4. Utilize Tier 1 verification to fill in all available web information on organizations in the CRI with websites

Example 2. Building up health services

Aim: Target all organizations providing health services using Tier 2 verification.

Steps:

1. Filter organizations to just "Health" services

2. Web verification to lay a base of all available online information
3. Minor call verification to fill in minor gaps with phone calls

Example 3. Detailing housing applications

Aim: Gather application processes on housing services in the CRI.

Steps:

1. Filter organizations to just "Housing" services
2. Using Tier 4 verification conduct web verification and then extensive call verification

Examples of verified resources

To help illustrate the improvements made by this verification process and the HSDS data model, here are a few examples of what the data looked like prior to verification and then after.

Example 1.
DC Center for Independent Living: 17 Minutes

Before verification

Name	DC CENTER FOR INDEPENDENT LIVING/LOW VISION SERVICES
Address	1400 Florida Avenue NE Washington, DC 20002
Website	http://dccil.org
Phone	202-388-0033
Description	Provides Blind & Visually Impaired services.
Locations	1400 Florida Avenue NE Washington, DC 20002
Fax	None
TTY	None
Application Process	None

After verification

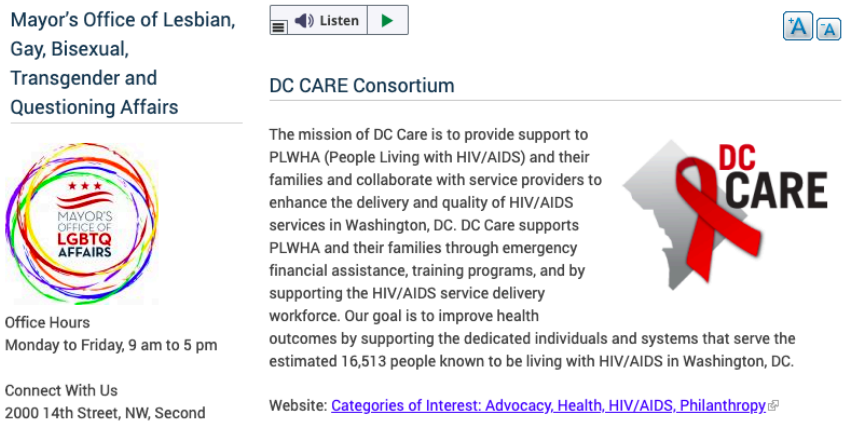
Organization				

Name	DC Center for Independent Living			
Website	http://dccil.org			
Locations				
Location Name	Address	Phones	Phone Type	Schedule
DC Center for Independent Living - Main Office	2600 12th St, NE Washington, DC 20018	(202) 388-0033	Voice	Monday - Friday 9:00AM - 5:00PM
		(202) 398-3018	Fax	
		(202) 470-1534	TTY	
DC Center for Independent Living—SE Satellite	840 Chesapeake St, SE Washington, DC 20032	(202) 889-5802	Voice	Monday - Friday 9:00AM - 5:00PM
		(202) 889-1159	Fax	
		(202) 470-1534	TTY	
Greater Washington Urban League	2901 14th St NW Washington, DC 20009	(202) 280-6899	Voice	Monday - Friday 8:30AM - 5:30PM
		(202) 234-0792	Fax	
		(202) 470-1534	TTY	
Services				
Service Name	Description	URL	Application Process	Taxonomy
Low Vision Services	Provides services for folks with vision problems from limited vision to blindness.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Health
Information and Referral	DCCIL provides disability-specific information and referral to ensure people with disabilities have access to information needed to achieve or maintain independence in their communities.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Care
Additional Services	In addition to our core services, DCCIL also provides an array of other related services. These services include but are not limited to ADA information and consultation, relocation by choice, benefits planning, travel training, asset management, orientation and mobility and rehabilitation teaching for people who are blind or visually impaired, basic computer skills, housing resources (we do not provide housing directly) and limited transportation services. DCCIL provides services to individuals with significant disabilities as well as to the local community at large.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Transportation, Health, Housing, Care
Independent Living Skills Training	DCCIL provides IL skills training in specific areas needed to achieve independent living, ensuring that people with disabilities achieve and maintain their independence.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Care

Peer Counseling	DCCIL preserves its integrity as a grassroots organization by implementing peer support to achieve objectives set by the disability community itself. The value placed on peer support in the Independent Living Movement is paramount and unique, and the significance of a system that values the peer-to-peer relationship is often overlooked by a society that is accustomed to valuing the opinion of professionals and "experts" over the goals and needs of consumers.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Care
Transition Services	DCCIL assists individuals with significant disabilities who live in nursing homes and other institutions to transition to community-based residences as well as assist in establishing community-based supports and services, provides assistance to individuals with significant disabilities who are at risk of entering institutions so that the individuals may remain in the community and facilitates the transition of youth who are individuals with significant disabilities.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Care
Individual and Systems Advocacy	DCCIL advocates for improved accessibility, and assists people transitioning from nursing homes to independent living in their communities. DCCIL staff advocate on an individual and system-wide basis to ensure the civil and human rights of people with disabilities.	https://dccil.org/what-we-do/our-core-services/	Call for intake. Services are provided to residents.	Legal

Example 2.
DC Care Consortium: 3 minutes

The DC Care Consortium appeared to be a typical service for folks living with HIV/AIDS. We used their website to confirm basic information on the program.



There wasn't any information on the application process and we wanted to get a little more information on the program specifics. When we called, however, the contact informed us that the program was no longer in operation. They had to confirm that with a colleague so they asked for our email to follow up later, which they did.

By going further into the verification work by making a call, and offering an email address, we avoided listing a service that is no longer in operation.

Example 3.
Community Connections: 38 minutes

Community Connections had a good website but the application process was unclear and it wasn't apparent what services were offered at what location. We called to gather that information and was sent to someone's voicemail. The voicemail encouraged us to email them directly so we did asking about these data points. The contact emailed back giving us the following info:

1. *["How to apply"] is difficult to answer because we have several front doors at CC. But, at a minimum, we have open access hours for clinical services and homeless services on Thurs and Fris from 12-4.*

2. *We offer services for youth and families as well as housing management, at 650 location. All others are located at 801.*

2300 MLK is no longer an active location, and an update to our website is in progress.

This email not only helped illuminate some of the information we needed but gave us some unsolicited information on schedules as well. This resource did take higher than average verification time but it yielded richer information. We would call this a Tier 2 verification.

Phase I data points: inclusion & costs

This section describes which types of information were collected in Phase I — and which were excluded — how extensive the research was and why, and cost estimates for going deeper on verification work in the future.

Data Point Exclusion in Phase I

Please first open this spreadsheet as a reference point. That sheet covers every data point in the HSDS in regards to its inclusion or exclusion in Phase I of the CRI verification pilot. This section of the appendix will simply address a few of the more notable exclusions.

Capacity & wait time

We did not include capacity in the CRI. Capacity, referring to an organization's ability to take on new members/patients/clients/etc — along with wait times — is notoriously difficult to track, in part because it changes so rapidly — and also because organizations sometimes lack strong incentives to provide the information.

Our recommendation is that capacity information should only be included in situations where there is a formal partnership

that establishes an agreed-upon method of supplying the information from the organization to the CRI.

Fees

Fees take a lot of time and contact to research. We hypothesize that these change less frequently than capacity and wait time but the labor involved in getting this information is time intensive beyond the scope of Phase I. The real issue is that you need the following info to do this effectively:

- An extensive fee outline on the website

... or ...

- Successful contact with the correct individual(s) at the organization and
- An accurate and comprehensive fee outline and
- Willingness of the individual to disclose fees (which is often not given)

Transportation

Tracking transportation is a bit like reinventing the wheel. Google Maps has effectively covered this functionality when it comes to metropolitan areas like DC. Additionally, it's impossible to anticipate the starting location of the member/patient/client/etc.

Programs

Programs, in the HSDS data model, refers to a bundle of services. For Phase I we simply stuck to services without attention paid to Program bundling. This is covered in higher tiers of verification and should be included in future iterations. It's much more on the end of "nice to have" information but can provide useful structure to the data.

Extensiveness

Some fields, although included, were not extensively researched in Phase I. This is due to a few reasons:

- There was limited scope for the Phase I pilot project in order to maximize the amount of records covered in Phase I
- Some fields, such as Eligibility, have a wide range of how deep you can go into them. We chose to stay close to the surface level to maximize the amount of records covered in Phase I.

Eligibility

Eligibility was included in Phase I. We kept Eligibility to the level that an organization reported on their website or where the organization would speak to us about it over the phone. Some services also didn't require an explanation of eligibility such as primary medical care or nutrition counseling.

Eligibility can be dug into in much greater detail provided the organization cooperates on this subject. For example, food pantries that limit access to a particular poverty level could have that exact income bracket included. This information may or may not be provided at a clear level of detail on a website; phone calls are often required to solicit clear and specific eligibility criteria.

Taxonomy

We utilized the Open Eligibility taxonomy initially as our system for categorizing services. This taxonomy represents a reasonably well organized system of service categorization without being as time intensive as the AIRS taxonomy. AIRS can be included in the future but this requires another level of credentials for resource verifiers as well as much more time focused on taxonomy.

We only stuck to the top level service categories. Full taxonomy tagging will take more effort — in stakeholder research, we heard from 211 providers that it takes roughly 15 minutes to properly taxonomize a program/service — and is recommended for future iterations.

Contact

A point of contact was documented where an agency explicitly outlined this on their website. Otherwise, we did not go after this information over the phone for Phase I. This could definitely be included in later iterations of the CRI and could provide a lot of value. Points of contact are unlikely to change frequently so it should fit well into the resource verifier's workflow.

Projected Time Estimates

This section covers the time estimates for including other data points in future iterations. These are estimates of averages over many records and will vary from one organization to another. There is also a suggested verification tier that could be used to guide the level of verification.

Estimates

These estimates are based on previous attempts to gather this information and take into account

- Call time
- Number of calls needed to make successful contact
- Locating the correct person

Data Point	Average Time per Org	Notes
Contact	4 mins	
Capacity & Wait Time	10 mins	Not recommended unless organizations do this themselves. Otherwise it will be out of data very quickly.
Eligibility	10 mins	
Fees	5 mins	Likely a moderate success rate
High-level taxonomy	3 mins	Could be simplified with a tagging script
Detailed taxonomy	15 minutes	211 taxonomy codes are highly technical and require trained expertise and time.
Transportation	5 mins	Not recommended (this information is acquirable from 3rd party sources if lat/long data is available)

Appendix D: Raw stakeholder recommendations

Recommendations made at 9/5/19 convening

1. **Mapping Feature**
   a. CoRIE should include a mapping function to help clients determine which resource is closest, and how to get there.
   b. The DCCRI should develop a set of minimum reporting standards to recommend to DHCF that include geocoding, capacity, and eligibility.
2. **Accessibility Users**
   a. Make sure final repository is accessible for both providers and seekers (a lot of conversation has been about infrastructure, not end user product).
   b. The DCCRI should make recommendations on a system that could work for a majority of agencies.
3. **Governance**
   a. I recommend that **a multi-sector group is included in the business requirements collection process.**
4. **Open API**
   a. All government agencies that fund human services should collaborate to share information through an open API, with oversight and public publishing managed by a single org (data utility).
   b. DC Government should fund an organization to facilitate a data coop and host a data utility.
   c. Single data repository (back-end/core data standards).
   d. Agencies can have their own vendors to display data/reports/track numbers.
   e. **CBO's should not have to enter data into multiple sources** (more discussion needed about closed loop referrals).
   f. A combination of a single organization and Government (decision making compliance), data Co-op standardization, SDUH Admin.
5. **Vocabulary Standards**
   a. The DCCRI should produce a template for the district on vocabulary that can be used universally, so that sharing could occur across all platforms.
6. **Feedback/Community Voice**

    a. **Community members and users should be involved in the creation of the system, and also have the opportunity to give feedback and suggestions.**

7. **Government Mandating**
    a. **All DC government agencies that fund human services should mandate their CBOs to update a set of core information in a centralized database.**
    b. Th DC government agencies that provide human services should mandate grantees maintain their profile in the CRI.
    c. **DHCF should create/implement a model that leads the way for the district to allow for open-shareable data to be used by all government agencies. This implementation should be the model/pilot for how all government agencies will share data, mandate contractors/grantees to update data, and is a vendor is selected, to provide an interface to that data. The vendor should agree to all standards of the open referral/database management requirements defined in this implementation.** The Mayor should adopt these standards across government agencies/data should be accessible to CBOs.
    d. DC culture and organization would enable a funder/authority model to be successful (here, government rules).
    e. **Allow private organizations to pay for access to the government mandated and monitored database, to create end user access tools.**
    f. DC government should require orgs it funds to update data in repository
    g. All human service agencies should **analyze how many grantees and contractors could be required to maintain up to date information** for feasibility of funder/authority model.

8. **Owned @ Mayoral Level**
    a. For the most robust integration, CoRIE should be "owned" at mayoral level, not individual agency level. ← ***significant concern expressed re this recommendation, more than anywhere else***
    b. DC government agencies that provide human services should create one repository at the mayor's level instead of segregating by agency. ← ***significant concern expressed re this recommendation, more than anywhere else***

c. DC government agencies that provide human services should dedicate resources to developing a city-wide resource portal.

9. **Medicaid**
    a. CRISP collect SDOH data for doctors EHR and claims for use to single database
    b. DHCF lobby to CMS to **create payment codes to reimburse doctors for collecting SDOH needs, and submitting the info with their claims.**
10. **Partnerships**
    a. The DC government agencies that provide human services should continue to create partnerships for quality service.
11. **Planning**
    a. An evaluation and sustainability plan should be developed within the first year of the launch.
12. **Cost Benefit Analysis**
    a. DCCRI initiative should evaluate the cost and benefits of instituting a resource inventory.
13. **Convening**
    a. The DCCRI should **hold a forum for decision makers and fiscal agents that can fund these initiatives, in order to create buy-in.**
    b. DC Government agencies that provide human services should **convene providers to demonstrate the resource inventory and get their feedback.**
14. **Research**
    a. The DC Government should sponsor **a study that identifies the cost savings that can be achieved by having a single standardized resource database.** The study should be presented at the Federal level for national implementation.