Environmental Scan Brief

Report Prepared for: The North Dakota Health Information Network

June 30th, 2016

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Introduction:

CedarBridge Group (CedarBridge) was contracted by the State of North Dakota Health Information Technology Department on behalf of the Health Information Technology Advisory Committee Network (HITAC) in April, 2016 to conduct an environmental scan of the current state of the operations and service offerings of the NDHIN, as part of a larger engagement to develop a business plan for future Health Information Exchange (HIE) service offerings. CedarBridge has used several methods for gathering information during the environmental scan beginning with an extensive review of historical documentation of the business, policy, and technology development for Health IT and HIE services in North Dakota over the course of the past five years.

Following the document review, CedarBridge worked with staff of the NDHIN to identify key stakeholders for telephone and in-person interviews, ultimately conducting 33 key stakeholder interviews, including 17 during a week's tour of four North Dakota cities, and the remainder via conference phone calls. Simultaneously, CedarBridge developed and distributed customized stakeholder surveys to seven healthcare sector associations, allowing their members to weigh in on the NDHIN's current and potential future service offerings, and provide insight into the perceived challenges and opportunities.

CedarBridge has encapsulated all of the work described above into the following written brief, in which we distill and synthesize the relevant findings on the current state of electronic health information exchange in North Dakota. We anticipate that the NDHIN will use this research to inform discussions by the North Dakota Health Information Technology Advisory Committee (HITAC), and with legislators, the Governor's Office, and other important stakeholders to build sustainable support for ongoing HIE services for North Dakota healthcare providers and patients, through the state asset of the NDHIN.

Executive Summary:

The North Dakota Health Information Network has made tremendous progress in the last three years, following an early delay in the development of the HIE technology platform of the NDHIN that resulted in a mutual agreement of separation between the NDHIN and its originally selected vendor. After a brief reboot and re-awarding the contract for providing HIE technology solutions to Orion Health, the NDHIN developed a comprehensive coalition of stakeholders in North Dakota's diverse and competitive healthcare ecosystem who are active supporters of the NDHIN's growth. Further, with Orion's technology backbone, NDHIN has built a solid Health Information Exchange infrastructure in an ever-evolving and challenging technology space, including connections to several of the state's major public health platforms, including the North Dakota Immunization Information System (NDIIS) and the Prescription Drug Monitoring Program (PDMP). The NDHIN has also delivered HIE services that have enabled providers to meet Meaningful Use measures and improve collaboration and

interoperability between 186 organizations, including some of the largest healthcare organizations in the state.

Major challenges facing the NDHIN at this point in time include: (a) a lack of wide-spread awareness of providers and patients of the system's mission and existence; (b) providers and organizations who are not yet sending a full complement of data into the system; (c) a comprehensive, complete roll-out of all functionality in currently connected stakeholders; (d) a large number of small providers, organizations, and specialties in the state who are not yet connected to the NDHIN; (e) a recognition of value and return on investment by stakeholders; and (f) a solid, long-term sustainability plan that is agreed upon by all stakeholders.

The next step for CedarBridge as part of this initiative will be to build a future state vision for the NDHIN, accompanied by an analysis of the expected return on investment (ROI) for expanded HIE services that could be offered by the NDHIN. This ROI analysis will be contrasted to best and promising practices gleaned from other HIE's across the country. Finally, CedarBridge will provide a comprehensive business plan to build a roadmap for the NDHIN to transition from the current state, to the desired future state. The business plan will include project timelines, a pro forma budget, and sustainability opportunities to meet the challenges outlined above.

The NDHIN Background and Historical Document Review:

CedarBridge conducted an extensive historical review of documentation provided by the NDHIN, dating back to its inception (please see Appendix A for a list of all reviewed historical documentation). This analysis proved useful in building CedarBridge's understanding of the NDHIN's operational history, governance, policies, legal structure, and engagements with the state legislature and federal agencies. In addition, this document review provided CedarBridge with information on the current environment of North Dakota health and healthcare, relevant activities by the state legislature and other state departments/entities, and details regarding vendor systems and current/future offerings.

In 2008, the Governor, appointed the members of HITAC to perform the first environmental scan of North Dakota concerning electronic health record system (EHR) adoption, telehealth, and HIT Workforce. The HITAC has been the governance entity for NDHIN ever since. In 2009, the North Dakota legislature appropriated up to $8 million to augment the $5 million State Health Information Technology Cooperative Agreement awarded by the Office of the National Coordinator (ONC) to develop a strategic and operational plan for statewide HIE, and ultimately, to build the NDHIN's services across the state. In the 2009 and 2011 sessions, a total of $10 million was allocated for the State of North Dakota Bank Loan Fund to offer low interest loans to healthcare providers across the state to incentivize the purchase of EHR systems.

Currently the state of North Dakota has 73% of physicians and over 90% of hospitals demonstrating Meaningful Use: Stage 1 with a certified EHR system. These numbers

were validated by the stakeholder surveys (described below). North Dakota ranks as a national leader in adoption and is well positioned for accelerating the use of electronic health information exchange. This success was due in large part to the efforts of the REACH Regional Extension Center Service (REC), as the REACH staff assisted 5,019 primary care physicians at 630 clinics across North Dakota and Minnesota as well as 33 of the 36 Critical Access Hospitals in North Dakota in their adoption and use of EHR systems. Over $105 million in Meaningful Use payments have been distributed to providers in North Dakota.

The NDHIN completed a comprehensive vendor selection process and a contract was executed in December 2011. In February, 2013 that contract was mutually terminated. In April 2013, following a request for proposal (RFP) process, a new vendor, Orion Health, was procured.

Over the course of the last three years, the NDHIN has implemented a state-of-the-art interface engine and HIE core technology services including an enterprise patient master index, state-wide provider directory, record locating service, and a DIRECT messaging Health Information Services Provider (HISP) along with web based DIRECT services. Users are able to query the system displaying a patient's longitudinal patient record, and exchange diagnostic images via image exchange. Also public health systems such as the immunization registry (NDIIS), electronic reportable labs, syndromic surveillance, and the state's PDMP have all been integrated into the NDHIN. The NDHIN is currently working to integrate with the state cancer registry and a new state-wide, citizen-ran advanced directives registry.

Today, 186 healthcare entities have signed the NDHIN Participation Agreements and hundreds of individual providers are sending DIRECT secure messages via the NDHIN web-portal client and capabilities within their own EHR systems. While the usage numbers are currently low, they have shown a very aggressive, accelerated growth in the past six months.

With the core infrastructure solidly in place, the NDHIN now wishes to meet its current challenges of accelerating additional provider connectivity, adding necessary patient healthcare data to the repository, increasing the volume of exchange transactions, and evaluating additional applications and services that will provide value to NDHIN's stakeholders. Per the 2014 Center for Rural Health's *Evaluation of the NDHIN*, we have found that stakeholders are still "very optimistic and continue to think the project [NDHIN] is critical to the state's well-being." Overall, the initiation of the NDHIN organization was well-thought-out, well executed, and a near-textbook case study of an early development of an HIE.

Current Vendor Review:

NDHIN's primary vendor, Orion Health, was interviewed by the CedarBridge team and gave an in-depth presentation of the currently installed platform, their new platform offering, and some insights into their immediate plans for extending more robust HIE

services. Orion is a marketplace leader with a solid and very capable platform. They have been found to be responsive to the NDHIN's needs and have expressed a willingness to expand their current partnership in many areas.

The current NDHIN platform is comprised of the industry-leading *Rhapsody Interface Engine*, an enterprise state-wide master person index, state-wide provider directory, record locating service, and a clinical data repository. Additionally, a DIRECT secure messaging HISP is included in the current technology stack. Diagnostic images can be exchanged through an eHealth Technologies software extension to the Orion platform. The current system allows for single sign-on from provider EHR systems and provider alerts when patients are admitted to hospitals or abnormal labs results are charted.

Orion recently announced the launch of their *Amadeus* cloud-based platform, supporting analytics and precision medicine. As part of developing a business plan for NDHIN (including ROI for new services and tools), CedarBridge will be analyzing the benefits of a migration by NDHIN to this platform based on several factors, the most important being the expressed service needs of stakeholders.

Orion's *Amadeus* platform supports diverse clinical data and can also ingest social, behavioral, and genome data sets, all of which are needed to provide care coordination among care teams for accountable care organizations (ACOs) and other value-based payment models to thrive. *Amadeus* also offers a thorough collection of open Application Programming Interfaces (APIs) for custom development. This platform provides specialized data spaces for genomic, payer, and consumer data, each of which is accessible through privacy and security-enabled APIs, using the REST(ful) standard for data transport. Orion supports a variety of APIs in the new platform including those accessed via high-level programming languages (e.g. SOAP) and those accessed via web-based calls (e.g. REST). Orion also supports Fast Healthcare Interoperability Resources (FHIR), a new systems interface specification showing tremendous promise in the health information exchange world. *Amadeus* provides the ability to add custom data spaces which will allow for additional provider-type patient data in the future, such as chiropractic, optometric, dental, and more.

In December, 2015 Orion Health introduced advanced analytics and care coordination modules, as well as an advanced patient Personal Health Record (PHR) that allows for scheduling of appointments from multiple connected provider systems and the input of patient reportable telehealth data from mobile Apple iOS devices.

Orion Health is an international business based in New Zealand with major installations in the United States, Canada, and Great Britain. Orion has been in operation since 1993, capturing the 2015 Technology Provider of the Year award (*UK HealthInvestor Awards*) and in the same year, the Healthcare IT Company of the Year (*Frost & Sullivan*). Approximately 30 percent of the $150 million-plus revenue that Orion generates per annum is invested into research and development. The software currently manages over 100 million patient health records globally. Orion announced year-end financial results

for the year ending March 31, 2016, achieving operating revenue of $207 million (growth of 26% from the previous year). With $59 million of cash reserves, Orion Health has sufficient cash and facilities to find its current growth strategy.

Summary of Stakeholder Surveys:

A total of 323 individuals responded to the stakeholder surveys that were distributed to membership of the associations listed below. Seven versions of the stakeholder surveys were created and customized based on the unique workflow of different organizations associated with each association. Associations that participated in this survey included:

- North Dakota Medical Association
- North Dakota Hospital Association
- North Dakota Optometric Association
- North Dakota Chiropractic Association
- North Dakota Dental Association
- North Dakota Long Term Care Association
- North Dakota Pharmacists Association

These associations selected from their membership the organizations or individuals to whom they thought were best suited to respond to this survey. The associations also assisted with the customization of certain questions and they acted to ensure adherence by submitting follow-up reminders. As CedarBridge did not directly contact all members of these associations, we are unable to know the exact number of organizations or individuals who were asked to participate in the survey, or the cumulative response rate. The 323 responses are a significant number and reflective the popularity of the subject matter.

The majority of questions included in the surveys were identical regardless of the responding association. These questions focused on the current state of, and need for, health information exchange by the provider or organizational representative responding to the survey. For each association there were some questions customized for that respective association for the possible future NDHIN application value.

CedarBridge used the online tool *SurveyMonkey* to create and distribute the surveys. This tool allows for skip logic, question and answer piping, and carry-forward responses, all of which were used in the North Dakota stakeholder surveys. Due to those factors in survey design, the number of questions seen by respondents varied, not only by each association, but also based on each participant's responses. For example, all participants were asked "Do you currently exchange patient data with providers outside of the state?" the next question was based on their response. Only those organizations that responded affirmatively were then asked "In what state (or States) are those providers located?" while those who responded "no" were piped to the next question. Additionally, only current users of the NDHIN were asked about their satisfaction with the system.

The following section gives a high level overview and analysis of the 323 collected responses. A detailed analysis of the survey results can be found in Appendix B.

Awareness of the NDHIN and its Mission:

Across all survey respondents, 43.4% are currently aware of the NDHIN's mission. Awareness varied significantly by association membership. Amongst hospital respondents, 92.6% are aware of the NDHIN's mission. However, only 22% of chiropractor respondents and 19.2% of dental respondents are aware of the NDHIN's mission. This reflects our findings that the largest and most frequent users of the NDHIN are hospitals (and, to a lesser extent, affiliated clinics) and that the NDHIN's outreach efforts thus far have been focused on these groups.

When asked what is keeping users from using the NDHIN, the third most common response that was provided by respondents was "lack of awareness." It is notable that this response was commonly selected despite that fact that it was not a dedicated option on the survey - respondents were required to select "other" and manually write-in their response. It is very likely that this option would have been selected more frequently if it was one of the dedicated options available to respondents.

Awareness of the NDHIN's single sign-on offering (SSO) is also low amongst respondents, with a large majority of respondents unaware of the SSO option via the NDHIN. Hospitals and long-term care (LTC) association members were the most aware of the SSO option. It is likely that the low awareness of SSO by other stakeholder groups is because the SSO option is not currently available for all users and systems.

Use of Electronic Health Record Systems:

More than 75% of all respondents currently employ an EHR system at their organization, including more than a 95% adoption amongst hospital respondents. High adoption of EHR systems increases the potential value of the NDHIN as it is less cumbersome for organizations with existing information systems to connect and use the NDHIN services.

There are a wide range of EHR systems/vendors that are currently in use by the organizations who participated in this survey. Every group identified at least 6 different vendors that are currently in use. Chiropractors identified the most unique EHR systems with 18. It is notable that more than 25% of respondents from each group reported that they are utilizing one specific system (listed below). This information provides NDHIN the opportunity to analyze the highest value of interface development.

- Chiropractor – ChiroTouch (41.5% of respondents)
- Dental – Patterson Eaglesoft (31.5% of respondents)
- Hospital – HealthLand Centriq (25.9% of respondents)
- Long-Term Care – PointClickCare (32.6% of respondents) and MatrixCare (28.8% of respondents)

- Medical – Epic (69.2% of respondents)
- Optometric – RevolutionEHR (36% of respondents)
- Pharmacy – Epic (33.34% of respondents)

Respondents who have not adopted an EHR system identified cost and lack of organization priority as the main reasons why their organization have not yet pursued an implementation. Most of these respondents do not think their organization has any plans to implement an EHR in the near future.

Health Information Exchange within North Dakota:

More than 75% of respondents acknowledge that they are currently sharing patient information with external providers/organizations, whereas nearly 85% of respondents acknowledged that they are receiving patient information from external providers/organizations. The most commonly identified types of information that are being shared are clinical/diagnostic histories and medication histories, and most frequently hospitals and clinics are the two entities that are sending and receiving information.

The fax machine was identified as the most common tool for sending patient information, with over 79% of respondents identifying fax as a method for health information exchange. Following the fax machine, the other frequently identified methods for sending patient information were: email (31.7%), telephone (27.7%), EHR-to-EHR (20.8%), DIRECT messaging (15.8%), traditional mail/hand-delivery (12.9%), and the NDHIN (11.9%). These same methods were identified at similar rates for receiving patient information.

Use of NDHIN for Health Information Exchange:

As mentioned above, only 11.9% of respondents identified NDHIN as a method for sending patient information to external provider/organizations. In addition, only 9.1% of respondents identified the NDHIN as a method for receiving patient information. While at first glance, these numbers seem low, when compared to the percentage of respondents who identified themselves as current users of the NDHIN (16.4%), they actually show fairly strong use of NDHIN service by current participants. It is worth noting that 47.8% of hospital respondents reported that they are using NDHIN for sending patient information and 43.4% are using it for receiving patient information.

Health Information Exchange with States Outside of North Dakota:

Nearly 50% of all respondents said they exchange information with organizations or partners outside of North Dakota. Minnesota is the most commonly identified state that respondents are sharing information with (70.7%) and South Dakota is the second most common (55.4%). The surveys confirm a need and strong interest in exchanging health information across state borders. Several important NDHIN stakeholders operate in more than one state, or close to a state border,

and the perceived value of regional data access was well represented in the surveys.

Satisfaction with NDHIN Functionality:
The surveys used logic to skip certain questions based on previous responses so that only current users of the NDHIN were able to respond to questions relating to user satisfaction and currently available functionality. Across all users the majority reported being either neutral, satisfied, or very satisfied with NDHIN. Only one current user reported that they are unsatisfied with the NDHIN.

Value of Current Applications:
All listed applications were identified as valuable (or potentially valuable) by respondents (responses varied by association). DIRECT messaging was identified as being currently (or potentially) valuable by 76.1% of respondents. Only 51.63% of all respondents indicated that a longitudinal health record is currently (or would be) valuable. Dental and pharmacy respondents indicated that a longitudinal health record would not be of value, reflecting that these professions are interested in a smaller, more specialty-focused data set.

All respondents expressed value in provider directory services and with the exception of pharmacy respondents, all saw value in the exchange of diagnostic images. Finally, public health reporting applications were viewed as valuable by hospital, LTC, medical, and pharmacy respondents.

Survey responses to this question may have been impacted by the fact that detailed descriptions of the functionality and use cases of each application could not be provided in the survey due to space constraints.

Why are some Providers Not Participating in the NDHIN?
When asked about the biggest barrier to participating in NDHIN, respondents indicated cost was the main reason they do not currently use NDHIN services. This data reflects a lack of awareness about the system and organization policies, as NDHIN has not charged any user fees to date. This data may also imply that the organizations/individuals who are not currently using or aware of the NDHIN answered cost as an assumption based on experience with past technology and information system projects. In addition, it is possible that respondents are considering cost to extend beyond monetary resources, including staff time and effort. Respondents were not given the opportunity to elaborate on why cost was a barrier to them.

In-Person and Telephonic Interviews:

CedarBridge conducted a total of 33 in-person and telephonic interviews (16 telephonic and 17 in-person, including office hours) during the course of this environmental scan.

One additional telephonic interview is scheduled for July 8th. The full listing of organizations that were interviewed by CedarBridge can be found in Appendix C.

During the interviews, the CedarBridge team engaged stakeholders in discussions regarding their organizational backgrounds, the current state of health IT systems and health information exchange, current value and use of the NDHIN, and additional data sources and applications/services that would provide potential value in the future state of the NDHIN. These responses were documented to prepare for a future desired state report and presentation.

Below is a brief summary of our interview findings, including a brief description of the current value and identified future value of NDHIN. Overall, stakeholders support the mission of the NDHIN and have confidence in its leadership. Stakeholders want to work with the NDHIN to enhance the offering in order to derive the recognized value and high-yield cost/benefit potential.

Current Use and Value of the NDHIN:

Current use of the NDHIN system amongst the stakeholders who were interviewed was varied. Most of the hospitals (including Critical Access facilities) are contributing and accessing data within the system to varying extents. Two hospitals are contributing diagnostic images to NDHIN's data repository. Users identified the following ways that they are currently finding value in the NDHIN (not a complete list):

- Ability to access and send clinical data to/from external providers and organizations, including images and labs
- DIRECT messaging:
  - o Several of the organizations who were interviewed are utilizing the DIRECT web-client provided by NDHIN, however many others were using the DIRECT capabilities that are built into their EHR system
- Connection to the North Dakota Immunization Registry (NDIIS)
  - o This was described by several interviewees as a time saver for nurses and a convenient way to access data and identify gaps in care
- Connection to the PDMP through single sign-on
  - o Many agreed that this was a valuable connection, however issues were identified. When using the PDMP through NDHIN, doctors are not allowed to delegate access to their nurses and are not able to access the PDMPs of bordering states. These limitations do not exist when access the PDMP directly.
- Single Sign-On (SSO) with select EHR systems
  - o The organizations who have completed the implementation of SSO between their EHR and NDHIN found this to be very beneficial for limiting disruption to clinical workflows

A significant number of stakeholders who were interviewed do not currently use the NDHIN's services. Reasons provided during interviews include (not a complete list):

- A complete or partial lack of awareness of the NDHIN and its service capabilities.
- Lack of training:
  - Examples included how to use the NDHIN's services, what functionality is available, what use cases are associated with the available functionality, and how to implement the NDHIN's services into clinical workflows effectively.
- Vendor change:
  - Several interviewees stated that they were previously using the NDHIN but stopped using it when the NDHIN's vendor changed to Orion Health. They stated that they did not receive proper training for how to manage the change in platform.
- Data limitations:
  - Several interviewees were hesitant to use or expand their usage of the NDHIN until more users were contributing valuable data to the system.
- Data privacy and security:
  - This concern was only cited by organizations who had a large volume of shared patients in Minnesota due to stricter privacy and consent laws.

Future Value of the NDHIN:

Interviewees were engaged in discussions centered around the NDHIN Current and Future State "Eye" Chart, which can be found in Appendix D. Interviewees were led through the current functionality, and then into discussion around possible future functionality, connections, and applications for the NDHIN. The goal of this discussion is to find out which items will be valuable to NDHIN's stakeholders and enable them to provide the highest quality healthcare to the people of North Dakota. The below list of items were the most commonly identified items of future value (not a complete list). This list is organized by the categories found along the top row of the Eye Chart in Appendix D (dark blue boxes).

State Systems – All of the state systems were identified by interviewees as being valuable data sources, or recipients of data. The most commonly identified state systems included:

- State Registries – A large number of interviewees believe that connections with additional state registries would be very valuable. This included cancer registry, autism registry, EMS (trauma) registry, WIC database, and several others. There were also suggestions to create new registries, such as a hearing registry.
- Behavioral / Mental Health (Department of Human Services)

- Developmental Disability Unit (THERAP System)
- Corrections – Responses varied based on the geographic location of interviewees and their proximity to correctional facilities. In addition, the specific services that are provided by interviewees impacted the level of interaction occurring with correctional facilities. Some legal concerns related to privacy were raised around correctional health data.

Federal Systems – All of the federal systems were identified by interviewees as being valuable data sources, or recipients of data. The most commonly identified federal systems included:

- Indian Health Services (IHS) and the Department of Veterans Affairs (VA) – these were by far the most commonly identified federal entities. Organizations across the state would find value in a VA connection, whereas organizations that prioritized a connection with IHS were typically in close proximity to a reservation. Both of these connections are being pursued by the NDHIN currently.
- Connection with other states – All bordering states were identified by some interviewees, largely correlating to their geographic location. Minnesota and Montana will be more difficult connections due to their lack of a state-wide HIE, but a connection with South Dakota is currently being pursued by the NDHIN. In addition, "snowbird" states (Arizona, Texas, California, Florida) were identified as valuable connections given the large number of North Dakota residents who seek warmer weather during the winter months.
- CMS, CDC, others – these connections were ranked as very valuable by a number of interviewees for their potential to streamline reporting requirements.
- Department of Defense (DoD) – This connection was not identified as being of as much value as the VA or IHS. This is because the DoD consists of a younger and healthier population. There were several specific use cases that present value with a DoD connection: (1) entities that are providing chemical dependency services to DoD personnel, such as Prairie St. Johns, and (2) immunization information, which is not currently being contributed to the NDIIS by the DoD.
- Social Security Administration – Interviewees believe there is some value that could be created from this connection, if it was implemented correctly. This connection could help organizations streamline the process for eligibility determinations.

Meaningful Use (MU) Provider Systems – Provider systems were separated into MU and Non-MU categories because of the incentives that MU providers/organizations received to implement EHR systems and other infrastructure. The most commonly identified MU provider systems included:

- Chiropractors – A large amount of interviewees identified this connection as being valuable. Chiropractors are providing a large amount of care in

the North Dakota healthcare system, and there is a recognized need for exchange between them and PCPs or hospitals.

- Large Reference Labs – Connections to large reference labs such as LabCorp and Quest, was seen as being very valuable by interviewees although these companies have a very small market share in the state and few providers contract with them. Many of the larger EHR vendors have already implemented connections with these reference labs, however patient matching and connections to smaller organizations still present strong value propositions.
- Dentists – There is some value recognized for exchanging information with dentists, primarily medication lists to identify prescribed blood thinners.
- Optometrists – There is some value recognized for exchanging information with optometrists and ophthalmologists, including images of eyes and information on diabetic eye exams.
- Mini-Clinics (such as community pharmacies) – Mini-clinics within pharmacies are providing an ever-expanding amount of services including diabetic management and counseling, hypertension management and counseling, medication therapy, and immunizations. There is a recognized need for a bi-directional exchange of information with these mini-clinics.
- Urgent Care Clinics – Connections with urgent care clinics was seen as valuable to some interviewees if it could be combined with an analytics/care coordination platform. One use case for this connection would be the ability to identify reoccurring minor ailments that have the potential to be a chronic condition (e.g. respiratory infections being an indicator for CPOD).

Non-MU Provider Systems – Non-MU providers did not receive incentives to implement an EHR system. However, many of these organizations are still using an EHR or web-based documentation tool. The most commonly identified Non-MU Provider Systems include:

- Pharmacies – The ability to access accurate medication lists (including historical information, and information on both prescribed and filled medications) was the most commonly identified future value that the NDHIN could pursue. There is a desperate need for this information across the state, and robust, accurate access to this information will have an immediate impact on patient care and safety.
- Long-Term Care – Connections with LTC facilities (including Skilled Nursing, Assisted Living, Nursing Homes, and Basic Care) was the second most commonly identified future value that the NDHIN could pursue. State-wide there is a very strong need for robust health information exchange between LTC providers and nearly every other provider type identified.
- EMS – Emergency Medical Services was identified by hospitals as being a high-value connection. There are many concerns that this connection is

severely limited by the ability to effectively implement efficient electronic data capture into the workflows of EMS providers.
- Behavioral Health – Connections to Behavioral Health providers was recognized as one of the most highly valuable future state connections that the NDHIN could pursue. However, as this is a very complicated and delicate connection with more stringent consent and privacy laws, many organizations did not identify this as being immediately valuable due to their skepticism that this connection is even possible under current laws.

Payment Models – Interviewees who were currently involved in, or pursuing models such as accountable care organizations (ACOs)and patient centered medical homes (PCMH) understood the value that the NDHIN could represent for data analysis and care coordination. As the industry shifts to value-based and pay-for-performance payment models, this value will continue to grow.

Payer Systems – Connections between provider organizations and payers is undeniably valuable, as there is a robust amount of information currently being exchanged. As discussed in the Payment Models section, as reimbursement models continue to shift away from fee-for-service, the value of these connections will continue to grow.
- Payers – Many individuals understood the value of integrating claims and clinical data. Payers also recognized that they could benefit from data access in order to identify gaps in care, complete quality reporting requirements, and for claims adjudication if the connection was implemented properly with adequate security and privacy controls in place.

Patient Engagement Assistance – The most commonly identified valuable patient engagement items included:
- Patient Portal and Patient Reportable Data – Many interviewees recognized the value in having a single, comprehensive patient portal across healthcare entities. As a result of Meaningful Use, patients often have a different patient portal associated with each provider or organization that they receive care from, as EHR vendors embedded this technology into their systems. This can become cumbersome to manage and was recognized as a valuable piece of the NDHIN's services. In addition, allowing patients to contribute self-generated data (such as weight, or data from Wearables like FitBits) was viewed as valuable to some interviewees.
- Telehealth – Integration of medical devices with the NDHIN was recognized as valuable by several interviewees. One use case was provided by the North Dakota Early Hearing Detection & Intervention program. Ability to identify and intervene on children with hearing issues could be improved if the results of hearing exams were pushed to NDHIN by medical devices.

Applications – The most commonly identified applications of value included:
- Analytics and Care Coordination – A shared analytics and care coordination platform utilizing the NDHIN's data repository was frequently identified by interviewees across the continuum as being extremely high-value in the future state. This is a service that the NDHIN is uniquely positioned to provide, and could provide enormous value to all types of providers, payers, and state/federal entities.
- State Credentialing System – Currently, the process for credentialing is cumbersome for many of the interviewees we spoke to. Having the NDHIN manage a state-wide credentialing system was recognized as being extremely high-value in the future state.

Conclusions and Observations

Strengths and Opportunities:

The conservative, thoughtful approach taken by the NDHIN in the early years of ONC's Cooperative Agreement with North Dakota, carefully appraising the industry, vendors, technology and stakeholder onboarding, has served current and future NDHIN participants well. Through careful decision-making by the NDHIN management team and close partnerships with key stakeholders, the NDHIN has been successful in remaining in a strong financial position while many other state-designated HIEs are experiencing insolvency and have lost the confidence of their stakeholders. The NDHIN leadership and state officials were not afraid to change vendors when there were early signs of trouble, saving money and time in moving forward with the Orion HIE service platform.

The NDHIN team has also been successful in developing a governance framework that appears to be working well, with strong stakeholder involvement in workgroup and committees to formulate the necessary policies and standard operating procedures that are essential for trust to be established and maintained in the HIE services. Key to the success in establishing a strong framework for governance includes the work of the NDHIN leadership to build solid relationships with key members of the North Dakota legislature, with the Governor's staff, and with agency heads, who have all been instrumental in positioning the NDHIN with invaluable political and financial capital.

Initial funding of the first phase of the NDHIN operations was enabled by Federal and State dollars through the ONC Cooperative Agreement and the aforementioned investment made by the North Dakota legislature. As with many new technologies, the value increases exponentially with the number of users, and the NDHIN has been wise to postpone adding user subscription fees until the service offerings have been well established. This strategy has been beneficial to early participants in the NDHIN and has helped earn trust and confidence from stakeholders who are highly engaged.

When the NDHIN moved to the Orion Health HIE services platform, they chose a well-established vendor with a solid offering. Orion came to the HIE market with a fully developed interface engine, making them uniquely qualified to handle the variety of data coming into an HIE. Orion has reacted quickly to the changing requirements of the healthcare ecosystem and recently introduced a new, highly advanced technology platform with more functionality and additional modules that support genomic data integration, data analytics and care coordination.

The roll out of DIRECT secure messaging, also integrated into the Orion platform, has been well executed, with major health systems in the state utilizing the NDHIN as their central HISP provider. This strategy by Orion is in contrast to some other HIE vendors who have been slower to embrace DIRECT as one of a suite of HIE tools. Utilization of

DIRECT messaging through the NDHIN has increased monthly since deployment and exponentially month to month in the first half of 2016.

NDHIN has also recently implemented Image Exchange that has elicited a great deal of interest from the major hospitals in the state and is beginning to spark interest from ambulatory clinics and chiropractors. The stakeholder interviews provided insight on opportunities for the NDHIN to build on the excitement from providers about accessing this new functionality.

Perhaps one of the most underutilized but most valuable features the NDHIN has implemented is the ability to subscribe to patient alerts immediately notifying providers and payers when a patient has been admitted or discharged from a hospital or emergency department, or charted an abnormal laboratory result, etc. Nationally, patient alerting is the fastest growing and most successful application that successful HIEs are implementing.

The single sign-on (SSO) capabilities offered by the NDHIN are also of high interest to stakeholders. The SSO features allows providers to log into their own EHR systems, search for a patient and then click on a link to the NDHIN which automatically validates user credentials, logs them into the NDHIN system and displays the patient's record in NDHIN they were viewing in your own EHR system. This occurs without interrupting a provider's workflow in his or her native system and provides a seamless environment where providers can easily query for patient information. By far, this was the most requested feature that stakeholders believe will allow them to utilize the NDHIN more often.

Finally, not to be overlooked is the access to public health systems, such as the state Immunization Registry (NDIIS), Electronic Reportable Laboratory tests, the state Syndromic Surveillance system, the state Prescription Drug Monitoring Program (PDMP) and in the future, the state Cancer Registry as well as a state-wide Advance Directives Registry. The NDHIN bi-directional interface to the state immunization registry is known as one of the best deployed in the country and has been held up as a model for other states. Single sign-on to the state PDMP system has also been a great asset to providers.

Many of the above successes are quietly *bringing daily value to stakeholders,* such as DIRECT secure messaging, access to the NDIIS, PDMP, and other public health systems access. Others such as subscribing to patient alerts and diagnostic image exchange are just beginning to be discovered by current and potential NDHIN participants. These services, along with longitudinal patient record queries for comprehensive patient histories and other features are starting to bring substantial value to the stakeholder organizations.

Recommended Improvements:

Based on the survey data, it is clear that the largest area for immediate improvement the NDHIN can implement quickly would be in building awareness of the NDHIN and its service offerings, and with onboarding and training for new NDHIN users, and existing users when additional services are added. The gaps in the areas of communication and training are largely due to the lean staffing model the NDHIN has employed during the initial development years of HIE services.

The staffing model has had both positive and negative effects to the NDHIN operations. On one hand, keeping expenses down and not bringing in personal too quickly in the risky and evolving health IT environment has been an appropriate strategy. However, during the interviews, many stakeholders across the state shared that they needed additional training, and in some important examples, many potential participant groups are largely unaware which services exist today.

This is a common growing pain with HIE's around the county at this stage of the nation's transformation of healthcare delivery and payment models, and the NDHIN will need to become more adept in marketing the value of the services offered. The transition from the initial cautious, low transactional development years into an environment where HIE services will have higher value to stakeholders participating in new payment models that demand care coordination has been slower than expected, and in many places, may be hampered by the relatively slow evolution of HIE technology and of EHR interoperability.

In the near-term, an awareness campaign featuring the NDHIN service offerings, with onboarding and additional training support for new and existing participants should be of the highest priority for the NDHIN. Additional resources should also be applied to increasing the frequency and expanding the content of all external communications about the NDHIN. Communications should be delivered through multiple channels, including building a social media presence, with features of user stories and new service highlights, in order to build knowledge about the NDHIN and increase interest and support for the NDHIN services. Partnerships with the UND Medical School and various nursing schools cross the state would also be beneficial to the NDHIN.

The awareness campaign, provider onboarding and training efforts will be resource intensive for the next few years, but over time we would expect fewer resources will be needed for these activities. The increased external communications efforts should be considered to be an ongoing need for the NDHIN, and should be included as a permanent budget item.

The NDHIN would best be served by contracting with a communications and business development organization such as was the case in the early days of the CMS Meaningful Use Incentive Program. An organization modeled after the REACH incentive program in North Dakota is an ideal example. Substantial funding for these services is still available through the Centers for Medicare and Medicaid Services (CMS). CedarBridge

recommends an accelerated, short term program of 3-4 years, organized with customer relationship management and project management software designed to bring the following to all MU, non-MU eligible providers and patients across the state. This also includes all current stakeholders.

(a) Build awareness and recruit new NDHIN participants: A multi-tiered marketing campaign should be developed and executed, targeting the different segments of the healthcare community. This will require the development of a concurrent and on-going environmental scan of each organization's current system and exchange capabilities as well as development of marketing materials and demonstrated return on investment examples. Additional details on this recommendation will be included in the the NDHIN Business Plan, which is a future deliverable under the CedarBridge contract with NDHIN.

(b) Assist with on-boarding and training of new and existing participants: With hundreds of providers not currently exchanging healthcare information in the state, assistance in the physical onboarding of the organizations from technical connectivity to comprehensive training of all personnel will be required. Tracking of the onboarding success of each feature and service offering of NDHIN is required to ensure all available data is being shared and users are fully trained in each feature and service of the NDHIN. Further, a methodology needs to be implemented to ensure new healthcare workers entering the workforce are trained in the future as well as training for current users when new versions and/or features and functions are added to the HIE. Additional details on this recommendation will be included in the the NDHIN Business Plan, which is a future deliverable under the CedarBridge contract with NDHIN.

(c) Expand external communications with current participants and key stakeholders: While NDHIN has done a good job providing current stakeholders with general communications, the surveys and interviews conducted during the environmental scan show large gaps in the knowledge and awareness of the full range of NDHIN service offerings, and the value propositions those services offer to participants. The current monthly NDHIN update conference calls are well attended with 50-60 attendees per month but with the vast number of providers and staff across the state additional techniques of communicating to the masses are required. Multiple communication strategies and delivery methods should be deployed, including examples as simple as the current plans for publishing a listing of "who" is sending "what" data on the NDHIN website so users know what information is out there and what they can be sure of finding during searches. Additional details on this recommendation will be included in the the NDHIN Business Plan, which is a future deliverable under the CedarBridge contract with NDHIN.

An additional opportunity for improvement of the NDHIN operations would be to apply a dedicated resource to develop and manage a more comprehensive project management approach. The creation of a complete enterprise-wide project plan, with a dedicated program manager tasked to track the full scope of the NDHIN initiatives would give management and policy makers a more accurate view of all of the NDHIN projects underway at any point in time, with better tracking of timelines, budgets, dependencies, resource needs, potential risks, and risk mitigation strategies for each project. Additional details on this recommendation will be included in the the NDHIN Business Plan, which is a future deliverable under the CedarBridge contract with NDHIN.

Lastly, it is highly recommended NDHIN take advantage of matching funding from CMS to accelerate and grow the HIE services, stakeholder connectivity and data availability of the NDHIN system. Substantial federal funding is available to support the Medicaid Enterprise Health IT infrastructure and provide assistance to all Medicaid providers to be able to participate in HIE services. Some, (not all) of the federal funding is time-limited through October, 2021 with an attractive match rate of 90% federal funding to 10 % state funding for many activities to expand HIE services. Other federal/state matching rates are available, depending the particulars of a given state's make-up, and on other stakeholder investments being made. This funding has a relatively short window of opportunity and therefore should be maximized to develop the technical infrastructure needed for a transformed healthcare system, while available.

High value future opportunities:

This report is primarily focused on the current state of the NDHIN and on immediate-term opportunities for improvements that can be quickly applied to improve the NDHIN's current level of operations. Future reports from CedarBridge Group will detail promising practices for delivering and managing HIE services, and will recommend high value future applications and services opportunities. The list below is intended to provide an initial listing of areas being explored for future enhancements to NDHIN's offerings. It should be noted that all of the areas below are eligible for high percentage matching funding from CMS.

Administration
- Federal funding of staff salaries and organizational expenses
- Consultant fees, project management
- Contracted onboarding and communications organization

Core Services
- Orion Amadeus platform upgrade
- Single sign-on expansion
- Trust Broker (HISP/XDR)
- EHNAC Certification

- Behavioral Health/Substance abuse data integration, consent management
- Payer data integration and appropriate access
- Non-MU provider data integration into patient records
- Medication listing and reconciliation and fill histories
- Vital sign collection
- C-CDA discrete data mining
- Enhanced Prescription Drug Monitoring Program Access
- State-wide onboarding and interfacing campaigns
  - o Hospitals, Clinics
  - o Payers
  - o Behavioral Health/Substance abuse
  - o Long term care
  - o Home health Care
  - o Emergency Medical Services
  - o Optometrists
  - o Chiropractors
  - o Dentists
  - o DME Providers
- National and Regional Lab Providers
  - o North Plains Laboratory
  - o Quest Diagnostics
  - o LabCorp
- Federal Provider Systems Integration
  - o VA
  - o IHS
  - o SSA
- State-to-State Record Sharing (Manual/Automated)

New Applications
- Collection of eCQM's
- State-wide Advanced Directives Registry
- State Cancer Registry
- Care Coordination
- State-wide Credentialing
- Data Warehouse/Analytics

Appendix A – Reviewed Historical Documents

Listing of historical documents reviewed by CedarBridge:

- NDHIN Data and Access Usage Patterns
- Previous NDHIN Environmental Scans (2010)
- North Dakota Oral Health Report, 2016
- North Dakota State Health Improvement Plan
- Center for Rural Health EHR Adoption Rate in North Dakota Fact Sheet
- Community Healthcare Association of the Dakotas Landscape (9/11/2015)
- Center for Rural health North Dakota Hospital Chartbook (December, 2015)
- Revised Strategic and Operational Plan for ONC (2/6/2010)
    - Strategic and Operation plan for ONC (2013 Update)
- Addendum – North Dakota Strategic and Operation Plan to ONCE (3/17/2011)
- North Dakota Letters of Support to ONC (September, 2010)
- Orion Health PowerPoint Presentation (5/31/2016)
- NDHIN Participation Agreement
- Third Biennial Report – Health Issues for the State of North Dakota (2015)
- NDHIN Web Site
- NDHIN Project Narrative (March, 2015)
- HITAC Meeting Minutes (11/24/2015)
- Dakota Conference on Rural and Public Health Celebrates 30 years (July, 2015)
- Intra-Rural and Urban Primary Care Physician Findings: AAMC 2009 Physician Survey of Primary Care Chartbook
- Community Health Needs Assessments: Process and Results in North Dakota (6/17/2014)
- Center for Rural Health Activities in North Dakota (2013-2014)
- North Dakota Critical Access Hospitals & Referral Centers
- North Dakota Dental Health Professional Shortage Areas
- North Dakota Health Professional Shortage Areas
- National data from ONC, CMS, and CDC (e.g. The National Ambulatory Medical Care Survey)
- Medicaid EHR Incentive Program – Information and Directors' Letters
- Proposed 2016 North Dakota CMS IAPD
- Proposed 2016 NDHIN Subscription Rates
- NDHIN Initiation Legislation
- North Dakota Telehealth Legislation (2015)
- Materials from North Dakota Legislative IT Committee
- 2015-2017 North Dakota Statewide IT Plan
- REC data on attestations

APPENDIX B – Detailed Survey Analysis

Overall Survey Participation:
- 69% of all respondents completed their surveys (31% skipped one or more questions, excluding final question)
    - 85% of Hospital respondents completed their surveys
    - 60% of Medical respondents completed their surveys

Question 1 – Are you aware of the mission of NDHIN?
- Summary:
    - Awareness of the NDHIN's mission is strong only among Hospitals and, to a lesser extent, Long-Term Care and Pharmacies. It would be safe to assume that awareness of the NDHIN's features, functions, and capabilities (beyond the mission) would be even lower.
- Highlights:
    - 43.39% of all respondents are aware of the NDHIN's mission
        - 92.59% of Hospital respondents are aware of the NDHIN's mission
        - 66.67% of Long-Term Care respondents are aware of the NDHIN's mission
        - 19.23% of Dental respondents are aware of the NDHIN's mission
        - 22.03% of Chiropractor respondents are aware of the NDHIN's mission

Question 3 – Does your organization use an EHR system?
- Summary:
    - More than three quarters of all respondents employ an EHR system at their organization, including very strong adoption amongst Hospitals and Medical respondents. High adoption of EHR systems increases the potential value of NDHIN as adoption of the system would be a significantly smaller lift for these organizations.
- Highlights:
    - 76.39% of all respondents claim that their organization has an electronic health record system.
        - Only 1 Hospital respondent reported that they do not employ an EHR system.
        - Only 2 Medical respondents reported that they do not employ an EHR system.
        - 56.52% of Pharmacy respondents do not employ an EHR system.
        - 40% of Dental respondents do not employ an EHR system.
        - 25.76% of Long-Term Care respondents do not employ an EHR system.
- Limitations/Qualifiers:

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- The survey did not provide a detailed definition of "EHR" and therefore some respondents may have mistakenly responded "no" under the assumption that their system did not meet the definition of an EHR.

Question 4 – Who is the vendor of your EHR system?
- Summary:
  - There are a wide range of systems currently employed by every group of respondents who participated in this survey. However, each group had at least 25% of their respondents utilizing a specific system/vendor, which provides NDHIN with a way to prioritize valuable connections.
- Highlights:
  - Chiropractor respondents identified 18 different systems that are currently in use.
    - 41.47% of Chiropractor respondents employ the ChiroTouch system.
  - Dental respondents identified 9 different systems that are currently in use.
    - 31.46% of Dental respondents employ the Eaglesoft (Patterson) system.
  - Hospital respondents identified 7 different systems that are currently in use.
    - 48.15% of Hospital respondents employ the Epic system.
    - 25.9% of Hospital respondents employ the Centriq (HealthLand) system.
  - Long-Term Care respondents identified 8 different systems that are currently in use.
    - 32.64% of LTC respondents employ the PointClickCare system.
    - 28.8% of LTC respondents employ the MatrixCare system.
  - Medical respondents identified 10 different systems that are currently in use.
    - 69.16% of Medical respondents employ the Epic system.
  - Optometric respondents identified 8 different systems that are currently in use.
    - 36% of Optometric respondents employ the RevolutionEHR system.
  - Pharmacy respondents identified 6 different systems that are currently in use.
    - 33.34% of Pharmacy respondents employ the Epic system.
- Limitations/Qualifiers:
  - The number of respondents (in each group except Hospitals and Medical) who claimed that their organization did not employ an EHR varied greatly from the number/percentages of those who claimed the same thing in Question #3.

Question 5 – Does your organization use a certified EHR system?
- Summary:
  - 76% of all respondents indicated that they are using a certified EHR system.

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- 92% of Hospital respondents indicated that they are using a certified EHR system.
- 95% of Optometric respondents indicated that they are using a certified EHR system.
- 88.89% of Chiropractic respondents indicated that they are using a certified EHR system.
- Limitations/Qualifiers:
  - Based on the number of respondents who skipped this question, many respondents were unwilling to search through the hyperlinked directory to verify if their EHR system is considered "certified."

Question 6 – Why has your organization not implemented an EHR?
- Summary:
  - Cost and a lack of organization priority are the two prominent reasons why respondents' organizations have not implemented an EHR.
- Highlights:
  - 61.19% of respondents selected "Cost" as one of inhibiting factors to implementing an EHR.
  - 38.8% of respondents selected "Not a Priority" as one of the inhibiting factors to implementing an EHR.

Question 7 – Does your organization plan to implement an EHR?
- Summary:
  - Due to question skipping logic, this question was only available to the respondents who answered "No" to having an EHR in Question #3.
  - The majority of the respondents to this question either selected "No" or "Unsure" when asked if their organization plans to implement an EHR. The responses to this question could imply that further adoption of EHRs will be limited in the coming years. This question was only available to the respondents who answered "no" to having an EHR in question #3.

Question 8/9 – Does your organization share patient information? With who?
- Summary:
  - More than three quarters of respondents are sharing patient information with other organizations. Unsurprisingly, primary care and hospitals were the two most common entities that organizations are sharing data with. Each group of respondents identified a strong need to share data with other members of that same group.
- Highlights:
  - 92.59% of hospitals are sharing patient information with other organizations.
  - Only 50% of Pharmacy respondents are sharing patient information with other organizations.

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Question 10 – How does your organization send patients information outside of your organization?
- Summary:
  - Only 11.88% of all respondents identified the NDHIN as a method for sharing patient information. However, 47.83% of Hospital respondents are using NDHIN to share information. This data could imply that NDHIN outreach efforts have been heavily focused on Hospital entities thus far. The most frequently identified method for sharing data was the fax machine.
- Highlights
  - 78.21% of all respondents identified the fax machine as a method for sharing data.
  - Zero respondents from the Chiropractor, Dental, and Optometric (and only one Pharmacy) are using NDHIN to share information.
  - 12.8% of all respondents manually wrote-in that they are sharing data via snail mail or hand delivery.

Question 11 – What kind of information is being exchanged with outside providers?
- Summary:
  - Clinical/diagnostic history and medication history are the two most commonly identified items that respondents have a desire to share with outside providers. This demonstrates the value that providers would see in being able to access medication information via NDHIN.
- Highlights:
  - Hospital, Long-Term Care, and Medical respondents identified the need to share all items listed in the survey, demonstrating their diverse need for data.
- Limitations/Qualifiers:
  - Only 45.77% of all respondents identified demographic data as an item they need to share. This could illustrate that the respondents of this survey were largely clinical or other staff members who do not have visibility of patient matching issues.

Question 12 – Who do you need (or wish) to share information with?
- Summary:
  - Payers, Pharmacies, Hospitals, and Long-Term Care facilities were the most commonly identified entities that organizations need (or wish) to share information with. Surprisingly, only 35% of respondents identified a need (or wish) to share information with behavioral health providers and 24% identified government entities.
- Highlights:
  - 72.77% of all respondents identified payers as a group they needed (or wished) to share information with.
  - 64.92% of all respondents identified pharmacy as a group they needed (or wished) to share information with.

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- 64.39% of all respondents identified hospitals as a group they needed (or wished) to share information with.
- 72.09% of LTC and 60% of Hospital respondents identified behavioral health as a group they need to share information with.

Question 13/14 – Does your organization receive patient information from out side providers? How do you receive the information?
- Summary
  - 85% of all respondents are receiving patient information. However, more than 25% of Chiropractors and Pharmacy respondents are not receiving patient information to coordinate care.
  - Only 9% of all respondents identified the NDHIN as a method for receiving patient information. Compared to the 11.88% that identified NDHIN as a method for sending information, this demonstrates that fewer users are accessing the NDHIN for information. However, 43.48% of Hospital respondents are using the NDHIN as a method to access information, implying that the NDHIN outreach efforts were focused on these entities.
  - Fax machine (78.26%) and telephone (37.94%) were the two most commonly identified methods for receiving patient information
- Highlights
  - Zero Chiropractors, Dental, and Optometric (and only 1 Pharmacy) respondent identified the NDHIN as a method for receiving patient information.
  - Only 13.83% of respondents identified Direct messaging as a way of receiving patient information.
  - 16.99% of all respondents manually wrote-in that they are receiving patient information via snail mail or having it hand delivered.

Question 16 – What types of clinical information do you receive most frequently?
- Summary:
  - Clinical/diagnostic history and medication history were the two most commonly identified types of information being received. Less than 50% of respondents identified demographic data as a type of information being received, which could imply that the respondents do not have visibility into any patient matching struggles.

Question 17 – Is health information exchange integrated into the workflow of providers?
- Summary
  - Based on written responses, there was a lot of confusion around this question and many of the respondents did not understand what was being asked. Many respondents believed we were asking if the NDHIN was integrated into the workflow, rather than general health information exchange.

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Question 19 – Are you aware of the Single-Sign-on option for NDHIN?
- Summary:
  - The vast majority of respondents were not aware of the SSO option for NDHIN. Hospitals and LTC respondents (who are also the most common users of NDHIN) were the most aware of the SSO option (~25% of respondents).
- Limitation/Qualifiers:
  - 26 individuals were aware of the SSO option for NDHIN, but only 3 individuals said that they were using this option. This either implies that respondents (a) do not have a system that is SSO-compatible with NDHIN but are aware of this option, or (b) did not read fully read and understand the survey question, answering "Yes" before seeing the option "Yes and we use it."

Question 20 – Rank the most significant barriers your organization faces in exchanging health information.
- Summary:
  - Cost and workforce were the two most significant barriers to exchanging health information.
- Limitations/Qualifiers:
  - Some respondents may have been confused by the options available in this survey question. Clinical Staff Resistance/Indifference, Billing Staff Resistance/Indifference, and Lack of Adequate Staffing could all be considered a Workforce issue. Therefore, the Workforce option could have received more votes if these options were all lumped together. Lack of Adequate Staffing could also be considered a Cost barrier.

Questions 22/23 – Do you currently exchange information with organization outside of North Dakota? Where?
- Summary:
  - Nearly 50% of all respondents said they are exchanging information with organizations/partners outside of North Dakota, and 32.32% said they were not (20.7% were unsure). Minnesota is the most commonly identified state that respondents are sharing information with (70.65%) and South Dakota is the second most common (55.43%). This is not surprising given that Fargo and Grand Forks are both very close to the border with Minnesota.
- Highlights:
  - Hospitals and Medical respondents are the groups most frequently exchanging with organizations and partners in other states, whereas Long-Term Care, Dental, and Pharmacies are the least likely.
- Limitations/Qualifiers:
  - We could not geographically map the location of all respondents, therefore it is difficult to cross-walk responses to the physical location of respondents.

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Question 24 – If your organization does not currently use and HIE, do you plan to use one in the future?
- Summary:
  - A large number of respondents skipped this question. I verified that this was not an issue with the survey logic. Amongst the respondents who provided an answer, the majority plan to use an HIE sometime in the future. The least likely at this point are the Chiropractors.

Question 25 – Are you a current NDHIN user?
- Summary:
  - Only 16.37% of all respondents identified themselves as an NDHIN user, however 18.58% of respondents indicated that they are unsure whether or not they are a current user of NDHIN.
- Highlights:
  - 50% of Hospital respondents indicated they are users of NDHIN.
  - 34.69% of LTC respondents indicated they are users of NDHIN.
- Limitation/Qualifications:
  - If this question was posed earlier in the survey, there would have likely been a larger number of respondents.
  - The term "user" was not defined which could have impacted how people responded if they were confused whether this meant that they were accessing data, contributing data, or both.

Question 26 – Current applications of NDHIN that are (or would be) valuable.
- Summary:
  - All listed applications were identified as valuable (or potentially valuable) by respondents. 76.08% of respondents indicated DIRECT messaging is (or would be) of value, whereas only 51.63% of respondents indicated a longitudinal health record is (or would be) of value.
    - Fewer Dental and Pharmacy respondents indicated that a longitudinal health record would be of value, indicating these professions are only interested in a small, specialized data set.
  - Hospitals, LTC, Medical, and Pharmacy respondents all indicated value from Public Health Reporting.
  - All respondents except for Pharmacy expressed value in Diagnostic Imaging Exchange.
  - All respondents expressed value in Provider Directory Services.
- Limitations/Qualifiers:
  - The survey did not provide enough room to provide detailed description of each application. This could have been valuable in achieving true measurement of priorities and value by each group.

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Question 29 – What do you like about NDHIN?
- Summary:
  - Very few respondents answered this question (as it was based on logic from previous questions). Of the users, the most respondents identified "easy communication for referrals" as the thing they like about NDHIN.

Question 30 – Do you have security concerns with NDHIN?
- Summary:
  - Nearly 90% of respondents do not have any concerns with NDHIN's security. This illustrates that very few providers are unwilling to share data electronically through NDHIN.

Question 32 – Level of satisfaction with NDHIN?
- Summary:
  - Of the small number of respondents that answered this question, only one user said they were unsatisfied with the NDHIN. Most respondents answered either "satisfied" or "neutral."

Question 34 – What is keeping you from using NDHIN?
- Summary:
  - The most commonly selected option for this question was "cost." NDHIN has not charged any user fees up to this point to use NDHIN, which implies that the people who are not using or aware of NDHIN answered "cost" as an assumption.
  - The second most common answer was "lack of data" (27.1%)
  - The third most common answer was users manually writing that they are not using NDHIN due to a "lack of awareness." This answer would have scored higher if it was an option in the survey.

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APPENDIX C - List of In-Person and Telephonic Interviews				
Organization	**Name**	**Role**	**Type**	**Telephone/ In-Person**
Essentia	Dennis Dassenko	CIO	PPS	Phone Call
West River	Matt Shahan	CEO	CAH	Phone Call
McKenzie County	Dan Kelly	CEO	CAH	Phone Call
Ashley Medical Center	Linda Pfeifle	Med/Rec	CAH	Phone Call
St. Aloisius Medical Center	Greg LaFrancois Sandy Teubner Marian Hase		CAH	Phone Call
Dakota Eye Clinic	Bill Marion	Administrator	Clinic	Phone Call
Great Plains Womens Clinic	Leland Tong	Technical Director	Clinic	Phone Call
Carrington Drug	Matt Paulson	Director	Pharm	Phone Call
Churchill Pharmacy	Dan Churchill	President / Pharmacist	Pharm	Phone Call
SACCHO	Mary Korsmo	Executive Director	LPH	Phone Call
Metro Ambulance	Neil Frame	President	Association	Phone Call
CHAD	Sue / Mary		Association	Phone Call
Quality Health Associates	Barb Groutt	CEO	HITAC	Phone Call
North Dakota Legislature	Judy Lee	Senator	Legis.	Phone Call
North Dakota Legislature	Robin Weisz	Representative	Legis.	Phone Call
Grand Forks Public Health	Debbie Swanson	Public Health Department	LPH	Phone Call

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Organization	Name	Role	Type	Telephone/ In-Person
Minot Office Hours	EHDI Program		State	Office Hour
Bismarck Office Hours	Central Valley HD (Robin Iszler)	Unit Administrator	LPH	Office Hour
	Sanford (Sharon German)	Director- IT Applications	HITAC	Office Hour
	Coal Country (Megan Foller)		Clinic	Office Hour
Grand Forks Office Hours	Northwood Deaconess (Stacy Jacobson)		CAH	Office Hour
	Altru provider	Representavie of Lanette Dickson	PPS	Office Hour
	Mike Mullen	Special Assistant Attorney General		Office Hour
Altru	Alex Todorovic	Director of Information Systems	PPS	In Person
	Matt Schumacher	Director of Technology and Support Systems		
	Mark Waind	Chief Information Officer		
Blue Cross Blue Shield	Sharon Fletcher	Chief Administrative Officer	Payor	In Person
	Chelsea Matter	Provider Partnership with BCBS		
Noridian	Troy Aswege	Senior VP Medicaid and State Operations		
Center for Rural Health and University System	Brad Gibbens	Deputy Director	State	In Person
	Doris Wang	Nutrition		
	Meladie	Social Work		

Organization	Name	Role	Type	Telephone/ In-Person
CHI-St. Alexius	Terry		PPS	In Person
	Jane			
	Dr. Allen			
	Dr. Hyder			
Department of Human Services	Tory	HIT Administrator	State	In Person
	Jenny	IT Director		
	Rosalee	State Hospital		
	Kurt Link	Solutions Architect		
	Jeremy	Solutions Architect		
North Dakota Department of Health	Mike	Disease Control	State	In Person
	Molly			
ND Hospital Association	Jerry Jurena	President	Assoc.	In Person
Mid-Dakota Clinic	Jamey Grossman		Clinic	In Person
	Rebecca			

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Organization	Name	Role	Type	Telephone/ In-Person
North Dakota Public Employee Retirement System (PERS)	Brian		State	In Person
Information Technology Department	Mike Ressler	Chief Information Officer		
Office of the Govenor	Tami Ternes	Senior Policy Advisor		
North Dakota University System	Lisa Feldner	Vice Chancellor for Information Technology		
Prairie St. Johns	Jennifer	CEO	Mental/ Behavioral Health	In Person
	Scott	IT Director		
	Thomas Eide	Chief Financial Officer		
Sanford (HITAC)	Ken Giles		PPS/Payor	In Person
	Sharon German			
	Paula Sheers	Information Technology		Skype
	Jan Bernett	Executive Director Clinical Informatics		
	David	Chief Privacy Officer		
	Wyatt York	Sanford Health Plan		

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Organization	Name	Role	Type	Telephone/ In-Person
Sakakawea Medical Center and Coal Country Health Centers (CCHC)	Megan Foller	IT Specialist	Clinic	In Person
	Chastity Dolbec	Clinic Quality Care Director		
	Todd Bortke	Koble Group	Consult	
	Darrold Bertsch	CEO	BTWAN	
	Jason	IT		
	Adam	IT		
Trinity	Harvey Wittmayer	IT Applications Manager	PPS	In Person
	Dr. Alex Kennedy	Head of Quality		
	Dr. Jeff Sather	Chief of Medicine		
Koble Group	Chad Peterson	President/CEO	Consult	In Person
	Todd Bortke	Chief Technology Officer		
	Lindsay	Chief Administrative Officer		

APPENDIX C

APPENDIX D – NDHIN Current State "EYE" Chart V2.0

Back Office Admin	HIE & DIRECT Infrastructure	State Systems	Federal Systems	MU Provider Systems	Non-MU Provider Systems	Payment Models	Payer Systems	Patient Engagement Assistance	Applications
Operations	-Query- Clinical Data Repository Record Locating Interface Engine	Immunization Registry	Sequoia Project	Hospitals	Local Health Departments (Community Assessment)	ACO	Claims History	PHR Patient Portal	Advanced Directives Registry
Security Privacy Consent	eMPI	Reportable Labs	Indian Health Services	Clinics	K-12 School Nurses	PCMH	Risk Scores	TeleHealth Patient Reportable	Data Warehouse & Analytics
Policies	Provider Directory	Syndromic Survelliance	Veterans Affairs	Urgent Care Clinics	Behavioral Health	Health Homes	Gaps in Care	Mobile Apps Patient Reportable	Credentialing
Processes	IHISP	Cancer Registry	Boarder State South Dakota	Mini-Clinics	Residential Treatment Centers	Care Coordination	Medicaid/CHIP Plans	Patient Alerting	Chronic Disease Registry
Help Deskl Support	Image Exchange	PDMP	Snow Bird States Arizona, etc.	Large Reference Labs	LTC	Social Services Intergration	Medicare Plans	Assisted Living	
Finance Sustainability	Subscription Alerting	State Agencies DIRECT	Other States Alaska, etc.	Chiropractors	Home Health	Referral System	Commercial Plans	Sitters	
Governance	EMR Integration SSO	Health Department	Boarder State Minnesota	Dentists	EMS	Episodic Quality Reporting	Large Self-Insured Employers	Home Care	
Provider Relations	Upgrade to Amadeus Platform	DD EMR	Boarder State Montana	Optometrists	Pharmacies	Medicaid Shared Savings Program	NDPERS	Transportation	
Payer Relations	CCD Descrete Data	Corrections EMR	Social Security Administration		DME Prosthetics		Workman's Comp	Fitness Centers	
Patient Relations	Wellness & Gaps Window	Mental Health EMR	Department Of Defense		Podiatry		HEDIS, STAR Reporting Audits	Weight Management	
	Genomic & Social Data	State Veterans Home	CMS, CDC, Others.		Audiology				
	MMIS, Eligibility, Insurance Exc. Integration	University Student Health	National Registries		Newborn Screening				

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Legend:
- Column Heading
- Mature offering
- Poss. Enhancing
- Building in 2016
- Waiting on partner
- Opportunities

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