



NORTH WESTERN ONTARIO DIGITAL HEALTH STRATEGIC ROADMAP

May 2023



Executive Summary

We deliver care to our diverse populations, including our significant remote, indigenous and francophone populations. We need to progress our digital maturity and do more digital innovation to meet our unique needs.

Our Vision is -

to be a leading health system - enabled by innovative digital transformation - where partners work together to achieve the best outcomes and care experience for the people of Northwestern Ontario

This Roadmap outlines the path to achieving the Vision, in three phases. Each Phase both progresses our Vision and prepares us for the next Phase -

- ❖ Phase 1: *Transforming Care Innovatively ... with the North Western Ontario Health Record (NWOHR)* will see a 'single', person-centered digital record for the North West, while building the capacity to deliver the subsequent phases.
- ❖ Phase 2: *Transforming Care Innovatively ... through advanced analytics & research* will see us more robustly use our data for advanced analytics, operational management, quality improvement, planning and research, leveraging the foundations laid in Phase 1.
- ❖ Phase 3: *Transforming Care Innovatively ... with new digital health* will see further innovation, leveraging Phase 1 and building from Phase 2.





OUR PEOPLE AND OUR DIGITAL HEALTH SERVICES IN NORTH WESTERN ONTARIO -



North Western Ontario is comprised of

North Western Ontario sits on the traditional lands of the Ojibwe/Chippawa/Anishnaabe, Oji-Cree and Mushkegowuk/Cree Peoples and occupies the lands of the Robinson-Superior Treaty, Treaty 9, Treaty 5 and the Ontario portion of Treaty 3.

We recognize the footsteps placed before our time and are grateful for the opportunities to work together.

- 237,584 people¹
- Half of whom live in a city¹
- The other half live among 40 billion trees spanning 526,417 km² (half of Ontario) with 250,000 lakes and 100,000 km of rivers
- At least 24 ice road or fly in accessible communities¹
- 25.9% of the population is First Nations and up to 13% Francophone¹
- Just under 100 organizations providing health care across 4 Ontario Health Teams (OHTs) –
 - All Nations Health Partners
 - Rainy River District
 - Kiiwetinoong Healing Waters
 - City and District of Thunder Bay
- 1 Medical school, 2 Applied Health Research Institutes and 4 Higher Education schools

¹ Health Quality Ontario. Health in the North.2017. <http://www.hqontario.ca/portals/0/Documents/system-performance/health-in-the-north-en.pdf> accessed October 31, 2022



We are not without our challenges

- The diabetes rate is 3x higher for our First Nations communities¹
- 12.4% of people have Chronic Obstructive Pulmonary Disorder²
- Emergency Department visits solely attributed to alcohol are the highest in Ontario by a factor of 3-4x³
- Among the highest mortality rates in the Province⁴
- Thunder Bay and District has the highest rate of deprivation in the Province, almost 2x the Ontario Summary Measure average⁵

¹ Province of Ontario. Ontario Aboriginal Diabetes Strategy. aboriginaldiabetes.weebly.com/uploads/1/9/6/1/19615933/ontario_aboriginal_diabetes_strategy.pdf accessed October 21, 2022.

² Health Quality Ontario. COPD Quality Standard Measures of Success, by Local Health Integration Network (LHIN) region, 2016/17 <https://www.hqontario.ca/Portals/0/documents/evidence/quality-standards/qs-chronic-obstructive-pulmonary-disease-data-table.xlsx> accessed October 21, 2022.

³ Public Health Ontario. Mental Health Emergency Department Visits Health Equity Snapshot | Public Health Ontario accessed October 21, 2022,

⁴ Public Health Ontario. All-Cause Mortality Snapshot | Public Health Ontario accessed October 21, 2022.

⁵ Public Health Ontario. Potentially Avoidable Mortality Health Equity Snapshot | Public Health Ontario accessed October 21, 2022.





Becky's Story

This story is a compilation based on several different clinical encounters I had while working in the Emergency Room. It highlights the issues that clinicians and social service providers in our region experience regularly that could be mitigated and addressed by an integrated regional Electronic Health Record.

– Dr. Stephen Viherjoki, Family & ER Physician, Dryden

Becky was an adolescent woman who presented to the Dryden ER accompanied by a child services worker. A physician examination/intake physical was requested as she had just been apprehended from a foster family in a nearby town after doing extensive damage in the home, running away on several occasions and revealing that she had been sexually abused at this location. Becky had lived her early years “Up North” and was removed from her parents home due to neglect arising from substance abuse.

The child services worker that night was the on-call worker and not her primary worker. She did not have Becky's records and was unable to access her care plan. They could not advise on her vaccination status, list of medications or any relevant history. Becky was upset and hesitant, having been brought to a hospital far from her home and in the company of a total stranger. She only consented to a very minimal physical examination. She was unable to verify her medication names or doses. She denied being physically or sexually abused in her foster home, but admitted running away multiple times. After the examination and my short discussion with her, I discharged Becky into the care of the Child and Family Services (CFS) worker to stay in a local hotel.

Several hours later Becky was returned to the ER by the police. They requested a mental health assessment as she had ran away from the CFS worker. When she was found in the streets she was threatening to kill herself if they brought her back to the hotel. After the CFS worker arrived we spent some time developing a safety plan together. The plan required two workers to be present at all times and at least one awake. She was clearly not suicidal, but was making conditional threats to get her way. Again, she was discharged.

A few days later police brought Becky into the ER again. This time she was severely intoxicated, agitated and threatening violence to herself, the police, and staff. Previously that evening her workers had let her go for a walk alone and, when she failed to return, police were assisted in locating her and bringing her to the ER. Physical and chemical restraints were used to ensure her safety. Becky spent the rest of the night in the ER sleeping off the intoxicants.

The next morning when I tried to ask the CFS worker what their new plan was, they advised me they felt

Becky was beyond their capacity to care for and they were unable to take her back into their care. This occurred despite the fact that Becky was not violent or suicidal once the intoxicants had worn off.

As I was unsure how to proceed and knowing that I was unable to effectively keep this child safe on an unsecured medical ward, I contacted the on-call child psychiatrist in Thunder Bay. The psychiatrist exhibited a lot of compassion towards this situation and agreed to accept Becky in transfer. Becky was not certifiable under the mental health act. It was fortunate she was willing to proceed with this plan, only because it kept her away from the CFS workers.

In Thunder Bay they also had difficulty obtaining a clear picture of her medical history, previous assessments and diagnoses, as her records never followed her when she moved from foster home to foster home in various communities. The team in Thunder Bay documented that they felt Becky returning to the foster home in Fort Frances was deemed too dangerous given her previous behaviour there. The CFS team initially agreed with this assessment. The psychiatry team concluded the best strategy was to place Becky with either relatives or other willing foster parents in her home community up north. However, another plan was developed by the CFS agency involving the parent of one of her previous foster families (Becky had forged a close “grandmother/grandchild” type relationship with this person) and she was discharged into her care.

A few months later Becky returned to the Dryden ER. This time her primary child worker was present. I questioned her as to why Becky was in the original foster home in the nearby town despite explicit documentation from her Thunder Bay care team that it was deemed an unsafe place. The worker explained they had disagreed with that assessment and had advised the psychiatry team they felt the home was safe enough as a second option. The original plan had failed when the akin-foster grandmother had fallen ill. The CFS workers had not taken formal notes or documented the meetings.

Due to the complexity of this case and lack of documented information, a secondary agency was contacted to assist with planning for Becky's care and safety. This action sparked a meeting between managers of the two agencies and a plan was forged. After this discharge I never saw or heard an update regarding Becky again.

What Becky's Story means for digital health

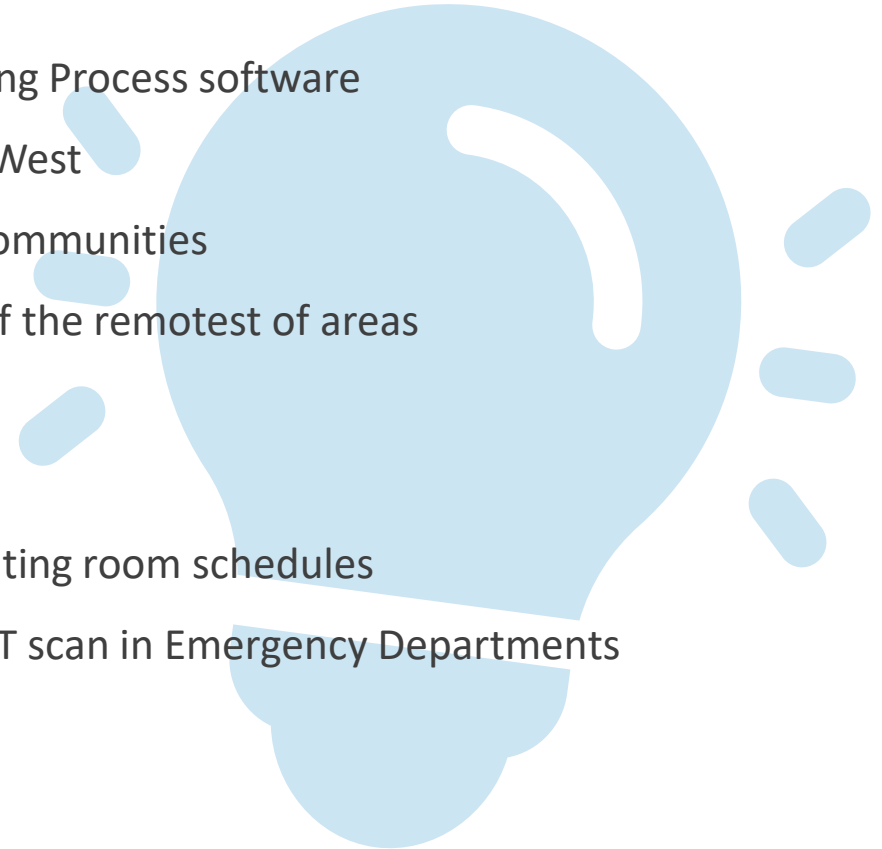
A shared record that is centered around a patient and across all providers of care, could have given all health care workers in North Western Ontario access to Becky's records. This would have –

- + *helped child services workers better understand her behaviours and guide management strategies.*
- + *allowed primary care providers in her new communities to continue with previous successful medical treatments and understand previous failures.*
- + *provided safer care in the Emergency Room with basic information, like medication dosing and vaccination status, and avoided potentially dangerous drug interactions or adverse drug reactions.*
- + *provided Child and Family Services workers an earlier opportunity, through her care plan and history, to appreciate that placing her back in to the home in Fort Frances was a poor idea.*
- + *provided a clear and understood safety plan.*
- + *better allowed for advocacy on Becky's behalf.*



We have some unique digital health innovations, a sample of which are -

- **Sharing a single electronic patient record** between the hospitals for over 20 years
- Long standing and robust users of **telemedicine**, pre-COVID19 pandemic, to provide access across our large geography
- **Developing our own software** to meet our needs, for example, Credentialling Process software
- Operating a **Virtual Paediatric Emergency Department** covering the North West
- **Virtually caring** for patients with emergencies in many Far North, remote communities
- Using **personal monitoring devices** to monitor our patients living in some of the remotest of areas
- Building a **smart app** to locate the most suitable stroke service in real time
- Using **Smart Glasses** to assist in remote wound care
- Using **Artificial Intelligence** to analyze medication administration and operating room schedules
- **Created predictive models** to tell us what patients require admission or a CT scan in Emergency Departments
- Developing problem-oriented **clinical software**
- Leading **digital health research** in learning systems

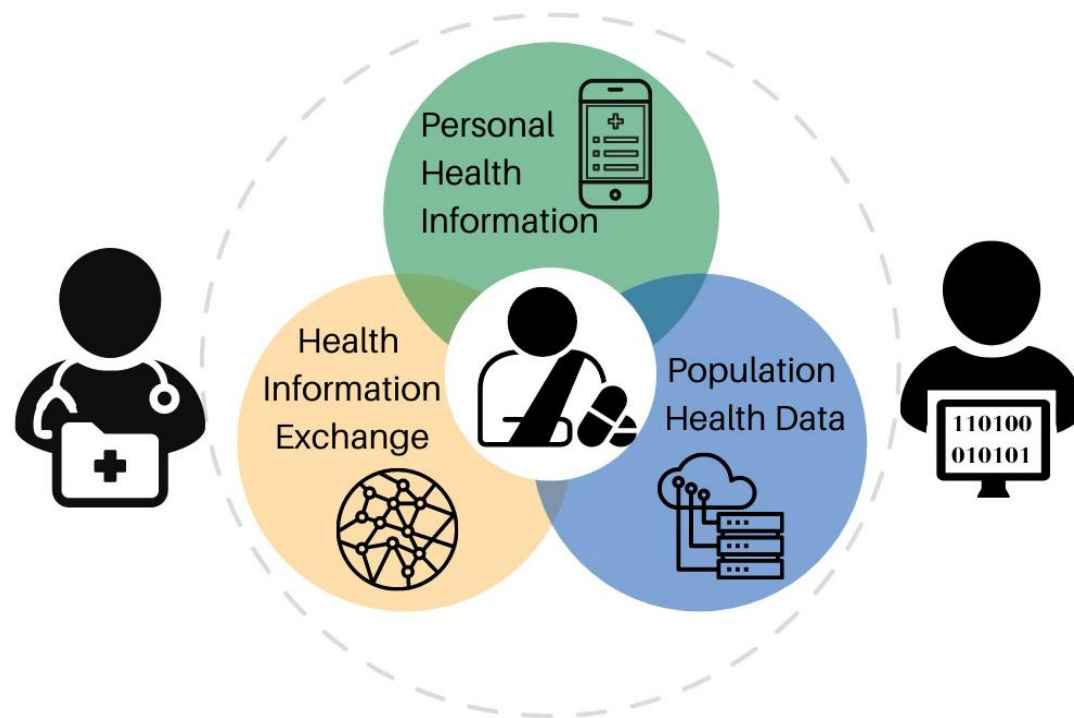




LOOKING FORWARD -



Digital health care is evolving in Canada



Person-centered data provides the right data to the right people at the right time by design.

Canada' strategy is to optimize the promise of health data by establishing digital-age approaches:

- The capacity to ensure that all personal health information is collected in a single patient record.
- The seamless exchange of health information between trusted health data stewards.
- The capacity to use and to provide duly authorized access to health information by health data stewards, with appropriate levels of access and de-identification, for public good.

We have established Principles to guide our digital health journey

GUIDING

PRINCIPLES

1

Digital tools and data enable all aspects of the health and care system for the good of patients, clients, residents and citizens across all of the North West.

2

The digital maturity of all health care partners and sectors is of equal importance and no sector or organization will be favoured over another.

3

Decisions on digital investment will be based on impact/value for money for the proposed time, within an agreed strategic direction.

4

Design of digital solutions will include all health care partners with compromises for the greater good when there is no other option.

5

Digital, operational and clinical teams across health and care partners will work as one team to deliver agreed digital programs.

6

For maximum value, to the extent possible, standard design and configuration will be used following the 80% standard to 20% custom guide.

7

To the extent that it is practical health and care partners will be actively engaged.

8

Health care partners will both share and make use of collective digital toolsets.

9

Digital knowledge will be freely shared among peers irrespective of organization.

10

All health care partners will gain from working together and will share responsibilities, costs and risks appropriately.





We've asked patients, clients and families about their needs and wants

*90 participations
5 workshops*

Digital access and technology barriers must be addressed.

Surveys with patients showed their top priority is their need for a complete medical record accessible to them, their families, caregivers and healthcare providers, in particular medications.

There are people who don't have computers, phones or good internet; they will need support.

We need to consider poverty, mental health, and use of emergency shelters. All need access to technology and help.

I need to tell my medication story over and over, and I'm a bad storyteller.

Sometimes we still need to see patients to appreciate what is really happening, e.g., if a patient had on two different shoes.

Concerned that we will create a larger issue. We must continue to offer traditional methods and forums including phones.

We need to ensure that patient- entered data is secure and is not used for non-clinical purposes without consent.

We've also heard from clinicians and staff on their wants and needs

*1,201 participations
28 workshops
30 demonstrations
4 Ontario Health Teams*

A tool is needed to manage communications between providers.

We don't have time to use the provincial ClinicalViewer

Many patients seen by mental health and addictions providers don't have phones; access to technology is an issue.

We need to improve the link between Primary Care and Specialty Care.

It would be ideal if all were using 'one database' to allow providers to 'talk to one another'.

The current system requires clients to re-tell their stories from provider to provider.

Many of our patients do not trust the health system.



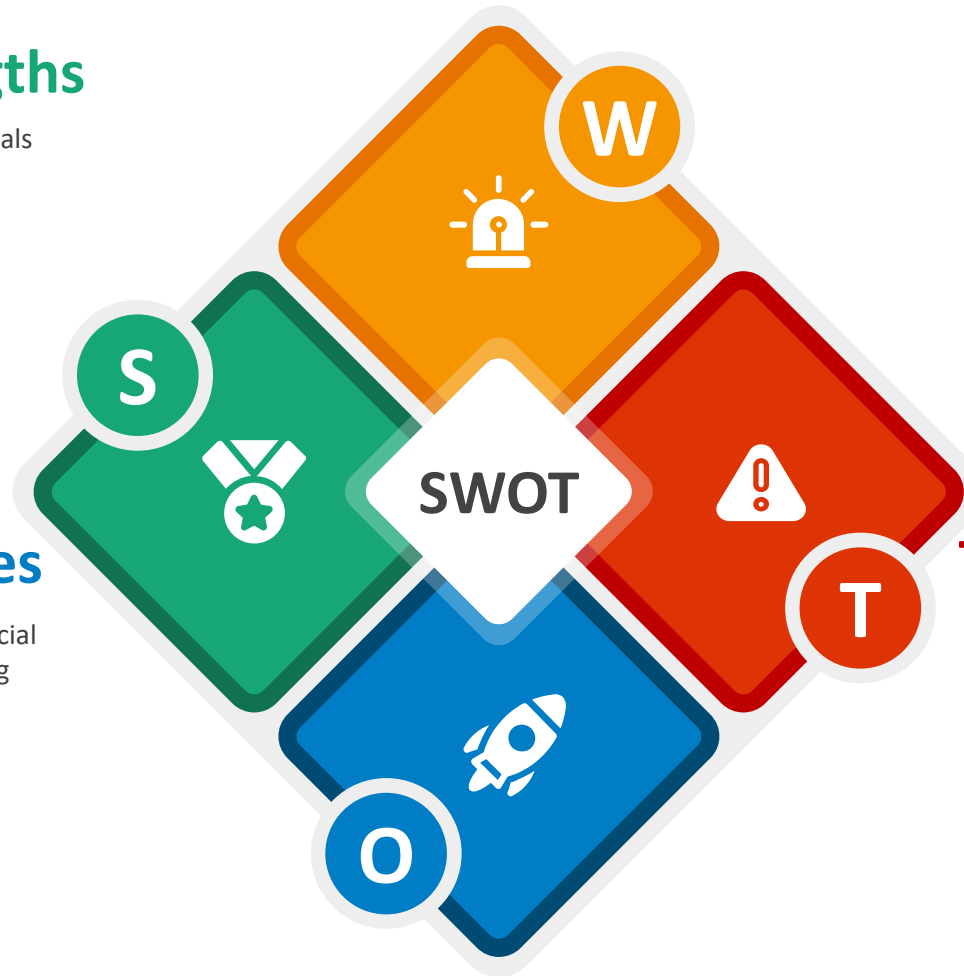
We have Strengths, Weaknesses, Opportunities & Threats that have informed our Vision

Strengths

- A vanguard shared patient record across hospitals
- Early adopters of digital health technology
- Experience with a systematic approach to EHR
- Executive support and strong leadership
- Already building a system-wide Regional Cyber Security Operations Centre
- A strong foundation in working collaboratively
- A Digital Health Council spanning the care continuum

Opportunities

- Improve health equity through use of Artificial Intelligence (AI) and Remote Patient Monitoring (RPM)
- Improve health system operations across the continuum including emergency services
- Personalize care including mental health and addiction needs
- Enhance care and service excellence
- Become more outcome and evidence based
- Working with and through the Ontario Health Teams



Weaknesses

- An excessive variety of records – electronic and paper
- Limited information exchange
- Limited robust information sharing outside of hospitals
- Low levels of digital maturity
- Technology infrastructure is insufficient
- Under-resourced technical support

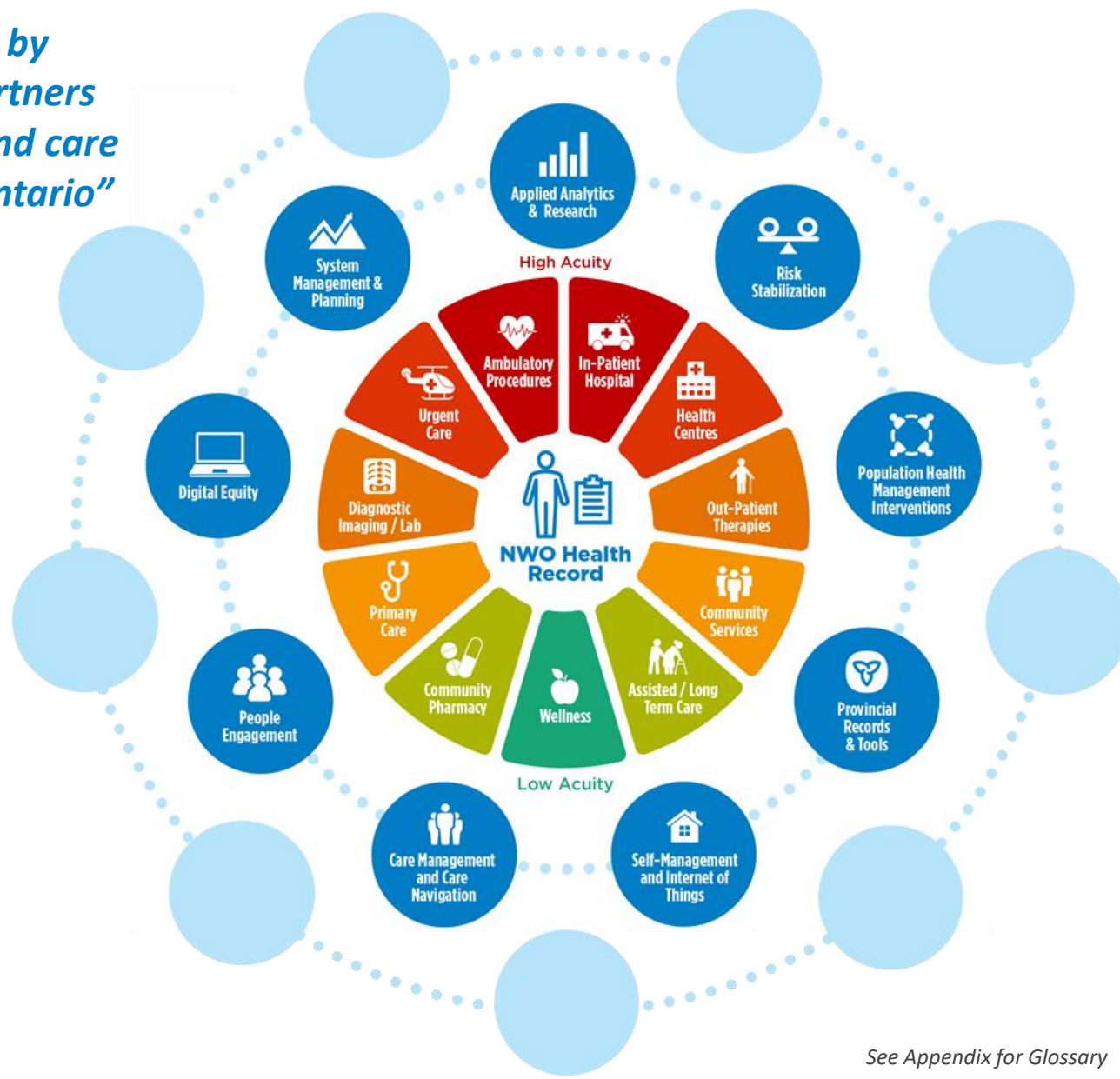
Threats

- Limited end user acceptance and/or insufficient training
- Lack of standardization
- Poorly executed change management persists in digital health changes
- Lack of human resource capacity
- Ontario Health Teams are evolving
- Multiple, independent health care providers & commissioners to be included
- Exchange rate fluctuation increasing costs

Our Digital Health Vision is...

“...to be a leading health system - enabled by innovative digital transformation - where partners work together to achieve the best outcomes and care experience for the people of North Western Ontario”

- **At the centre** of our Vision, a person, patient, client
- **Each person is surrounded by a person-centric record**, one where clinicians work seamlessly in a single record, regardless of where they work or how they are funded (*the graphic's multi-coloured circle slices*)
- **Many other tools** will both link into and leverage the single health record (*the graphic's blue bubbles*)
- **As technology changes** and we continue to innovate, our Vision provides for those tools also to link into our record (*the graphic's hollow outer bubbles*)





Our Vision can be seen through these statements

- **Bridging the North West's Vast Geography** – Our geography is challenging, and the population is dispersed - digital health solutions are a way to improve access and meet our patient/client and clinician needs with efficiency and convenience.
- **Developing a Person-Centric Record** – Our 128+ electronic patient/client records today are organization-centric. A shift to a patient-centric record eliminates waste by replacing outdated processes and leveraging new digital health tools, applications, and collaboration between patients and clinicians. It will also bridge the workflow between Provincially and Federally-organized care.
- **Utilizing the Provincial Health Record** – Several Provincial patient records exist in the current state, the digital health renewal aligns Provincial assets to appropriate uses.
- **Addressing Local, OHT and North West Needs** – Each organization and OHT has its own needs and problems – a unified and single digital health renewal addresses the needs and problems in a coordinated approach to grow and scale the North West's digital health maturity.
- **Providing Access and Analysis of Collective, Unique Patient Data for Safety, Quality, and Research** – Data and analytics are a foundation of a learning system – a digital health renewal facilitates data and analytics across the continuum of care (and multiple organizations) to enable research discoveries and advancement in a patient centric culture.
- **Advancing the North West's Digital Health Equity** – Our ability to utilize digital solutions can be a challenge. In particular this is an issue in First Nations communities. Our vision is to ensure all people have equitable access and benefit to digital solutions.
- **Maturing the Digital Care Continuum for all North West Healthcare Organizations** – All organizations are important to health and care delivery - a digital health renewal illuminates a clear path to digital maturity for all our organizations and systems in the current care continuum by introducing unified digital health tools and applications in a renewed digital care continuum.

Our 8 Key Problems in the North West

01

Lack of access to clinical data across care types within organizations and across the care continuum (including nursing stations in First Nations communities) in particular, addictions and mental health

02

Lack of insight into a patient's schedule regardless of where they are receiving care

03

Lack of easy access to data to support quality improvement, research, etc.

04

Numerous different sources of information from which to search and compile clinical information for timely diagnosis, care and treatment

05

Lack of ability to properly coordinate care across multiple organizations

06

Lack of computer-assisted patient safety measures, importantly including medications reconciliation across care instances computerized ordering/administration, predictive risk management and automated risk detection

07

Inequity in access to digital health

08

We are not always data-driven in our plans and actions





Our Vision will be achieved in phases

Transforming care innovatively...

PHASE 1

*...with the North Western
Ontario Health Record
(NWOHR)*

PHASE 2

*...through advanced
analytics & research*

*while continuing to build the
NWOHR*

PHASE 3

...with new digital health

*while continuing to build the
NWOHR & advancing analytics &
research*

North Western Ontario Health Record

The NWOHR is a 'single', person-centric record spanning the continuum of care in North Western Ontario





Transforming care innovatively... *...with the NWOHR*

PHASE 1

...with the NWOHR

PHASE 2

*...through
advanced
analytics &
research*

PHASE 3

*...with
new digital
health*

Key Foci

- **Automating as much as possible of the care continuum**
 - Acute; diagnostic; urgent, ambulatory; rehabilitation; mental health; complex continuing; long term; and primary care across the Provincial/Federal health jurisdictions. Connecting with the Provincial record and community pharmacies
- **Improving decision-supports for clinicians**
 - Alerts like drug-drug interactions, prompts like sepsis review, and more data availability, easily
- **Improving management with dashboards**
 - Patient flow, bed status, etc.
- **Beginning to rebalance digital equity and support wellness**
 - Patient/client portal and supporting efforts to bring digital equity

Supporting Foci

- **Laying the foundations for teaching, advanced analytics and research**
 - Digital health research – ‘Evaluation of a crowd-sourced engagement approach’; ‘Evaluation of learning health system benefits from a shared record’
 - Big data availability and improved tools
- **Continuing to build system-wide privacy and security**
 - North Western Ontario Regional Cyber Security Operations Centre





Transforming care innovatively...

PHASE 1

...with the
NWOHR
record

PHASE 2

...through
advanced
analytics &
research

PHASE 3

...with
new digital
health

Key Foci

- **Enabling data-driven system management and planning, risk stratification and population health management**
For example, using data that will now be available for analytics across planning, research, and treating communities of people
- **Applying advanced analytics tools**
For example. artificial intelligence, digital twins, predictive modelling, and more
- **Systemically enabling and conducting research through our data**
Research in and for the North West working with local research organizations
- **Consolidating or renewing ancillary and back-office information systems**
A renewal of ancillary/ back office automation, for example, digital pathology and human resources

Supporting Foci

- **Adding more of the care continuum to the NWOHR**
In particular more long term and primary care and adding health centres, assisted living and community care
- **Incorporating the NWOHR into the teaching curriculum**
- **Adding newer digital capabilities, e.g., internet of things, new data streams and self-management**
- **Continuing to advance digital equity, privacy and security**





Transforming care innovatively...



PHASE 1

...with the
NWOHR
record

PHASE 2

...through
advanced
analytics &
research

PHASE 3

...with
new digital health

Key Foci

- What new innovation is there?
- How can we further take advantage of technology and data?
- How do we advance digital health innovation in the North West?

Supporting Foci

- Adding more of the care continuum to the NWOHR
- Continuing to advance analytics, research, digital equity, privacy and security

Benefits, Costs, and Risks

PHASE 1

Transforming care innovatively... with the NWOHR record

PRIMARY BENEFITS are around direct clinical care, for example

- Patient safety decision-supports and alerts from the NWOHR
- Patient experience and quality features from a common record among many organizations.

This Phase will see the Digital Maturity leap from a low to a high level.

Data will also be more accessible as tools and capacity continues to grow.

COSTS

Primary investment in the Roadmap is in this Phase, with the NWOHR deployment

RISKS

This is the hardest phase, with the transformation of most front line clinical processes. As this is an expensive phase, it also makes it the highest risk.

PHASE 2

Transforming care innovatively... through advanced analytics & research

PRIMARY BENEFITS are from using the data from the NWOHR, for example

- Improving operational management
- Supporting quality improvement initiatives
- Utilizing population tools for risk stratification, cohort-based interventions, and service planning
- Enabling research.

This Phase will see the Business Intelligence Maturity progress from a low to a medium level.

COSTS

Investment in this Phase of the Roadmap is expected to be in building capacity of our teams and could include additional data tools, like artificial intelligence and modelling tools.

RISKS

The risk of delivery is moderate in this Phase and is associated with focusing on building capacity. However we must ensure we maximize our investment through this phase.

PHASE 3

Transforming care innovatively... with new digital health

PRIMARY BENEFITS are from supporting innovation, for example

- New innovations for patients/clients/citizens
- New innovations for clinicians.

COSTS

Investment in innovation can be supported through external investment and also from pockets of seed funding.

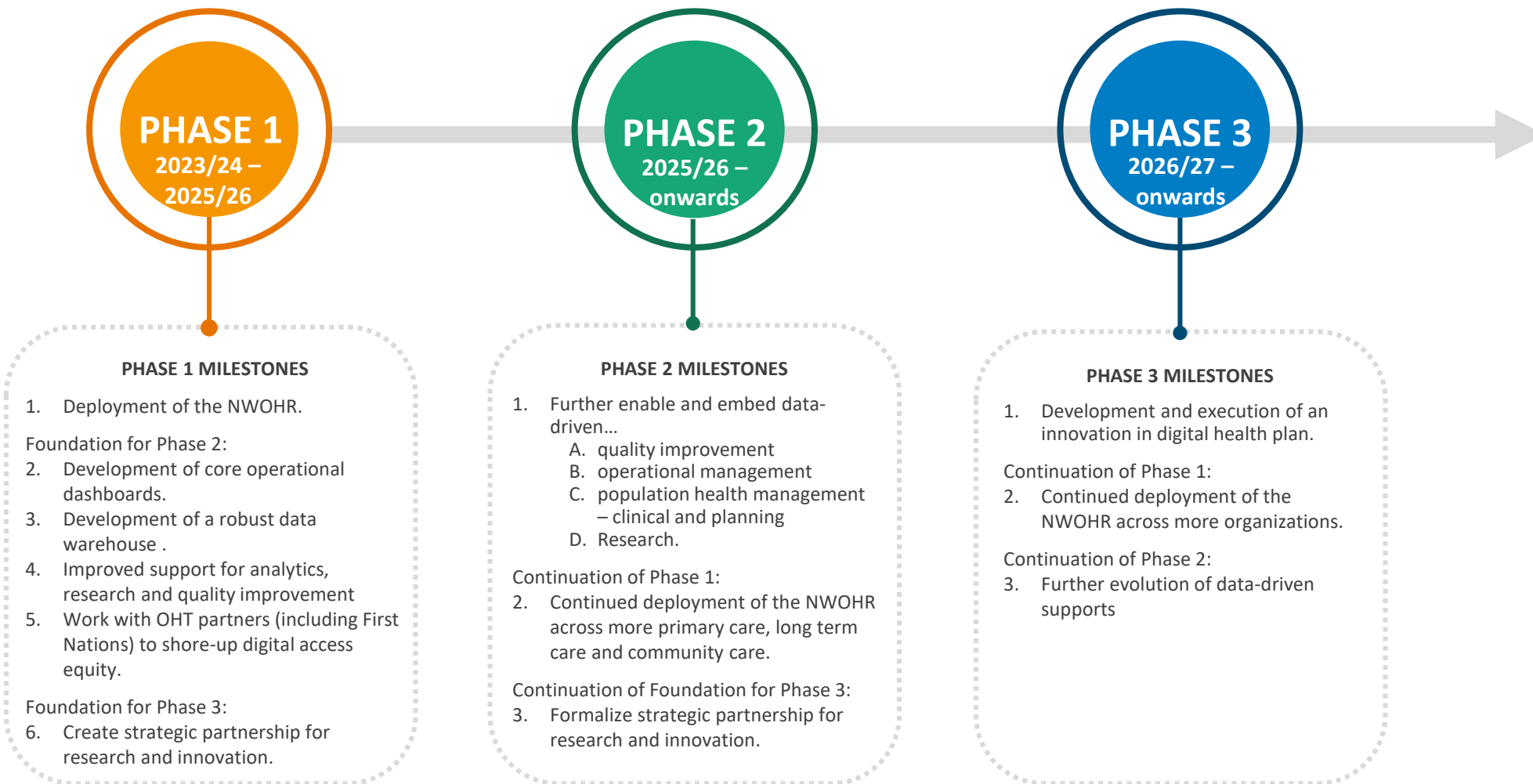
RISKS

The risk of delivery is moderate in this Phase as innovation, by nature, is trial and error. However we must ensure we continually innovate to advance digital health and leverage strategic relationships to stay current.





Timeline





NWOHR	North West Ontario Health Record. A single record across the North West of data in various forms (text, codified, images, etc.) and with specialized automated decision-support, for example, the ability to reconcile home and in-patient medications on admission.		
INNER CIRCLE of the VISION		MIDDLE RING BUBBLES of the VISION	
Ambulatory Procedures	Procedure-based and clinical services provided by regulated health professionals in an out-patient setting that do not require an overnight hospital stay.	Applied Analytics & Research	Clinical and supporting data from the massive amounts of patient/client visits and other sources to gain insight with the aim of advancing clinical care and quality improvement specific to North Western Ontario's population needs.
In-patient hospital	Care provided in a hospital or in-patient facility where one spends at least one night under the care of doctors, nurses and other allied health professionals.	Risk Stabilization	Mitigates clinical risks by using high-quality, timely and integrated health data for evidence-based clinical interventions and decision making, real-time actionable notifications, integrated safety reporting, and standardized templates and order sets.
Health Centres	Services provided by non-profit organizations that provide primary health and health promotion programs for individuals, families and communities.	System Management & Planning	Utilizes data to inform planning and development of services including innovative services to create an integrated care system that better meets the needs of North Western Ontario.
Urgent Care	Treatments for urgent but non-life threatening illnesses or injuries such as sprains, strains, infections, cuts, fevers and or broken bones.	Digital Equity	Enables equal access and opportunities for people, caregivers, and/or organizations to technologies regardless of location or socioeconomic status.
Diagnostic Imaging / Laboratory	Diagnostic Imaging, consisting of various techniques to view the inside of the body to identify illness sources or injury for diagnosis (X-rays, CT, Ultrasound, MRI, Mammography etc.). Laboratory provides a range of tests for in-hospital and clinic for diagnosis of diseases and medical conditions (chemistry and hematology blood, urinalysis, microbiology, and pathology).	Population Health Management Interventions	Leverages data collected to identify and address gaps in care for a defined group of people, to provide additional support through programs and services with the aim at increasing overall health outcomes and strengthening public health measures.
Out-Patient Therapies	Therapy-based treatments, services, and rehabilitation for patients provided by allied health professionals.	People Engagement	Facilitates communication and collaboration with patients and clients across the continuum of care.
Community Services	Services enhancing access and coordination for those needing care in their home, school or community by providing guidance on local support services and agencies.	Care Management and Care Navigation	Assists and supports patients and clients, their caregivers and organizations by providing easy access to care and information that best manages health and social care needs.
Primary Care	First-contact service that provides care, coordinates and ensures the ease of movement across the whole care continuum.	Self-Management and Internet of Things	Empowers patients and caregivers alongside their health care providers to take control of their own care in and out of the hospital by using technologies that enable self-monitoring in order to enhance both personal health and care delivery. Internet of things further contributes data for care and analytics.
Community Pharmacy	Public access to medications and general advice about health.	Provincial Records & Tools	Integrating with the <i>Provincial Electronic Health Record</i> and <i>Provincial Information Exchange</i> facilitates the sharing of meaningful health information across health systems for the benefit of people, their care, and planning and research.
Assisted / Long Term Care	Provides varying levels of care and support such as assistance with everyday tasks, to full-time monitoring with personal, physical, mental, and medical needs.		
Wellness	Services that administer health promotion, harm reduction, and disease prevention programs with the aim at educational, proactive, preventative health initiatives.		
OHT	Ontario Health Team. A local health system. North Western Ontario has four OHTs.		
Private	The record and data are private to the person and not shared or accessed where not needed to provide care.		
Secure	The record and data are secure for unauthorized access.		



**For more information on the North Western Ontario
Digital Health Roadmap –**

Info.NWOHR@TBH.net

