Saskatchewan: The Solution
Following the field study, the team evaluated healthcare procedures, efforts, and activities to distill program shortfalls and challenges. Based on these findings, a solution to enhance the coordination of care, promote patient and practitioner safety, and improve patient outcomes was developed.

Mobile Healthcare System
mHealth would provide the type of information access, security, and reliability that could revolutionize remote office productivity and case management. Simply digitizing medical record information allows healthcare professionals to manage, access, and share crucial data in a true team environment. Collaboration fuels the nursing engine, and so bringing information to each practitioner's fingertips with anytime/anywhere access will empower them to make faster and more informed decisions. Processing patients more quickly directly translates to improvement in patient care. Additionally, with the newfound time savings, nurses will have increased availability to spearhead new much needed disease prevention campaigns such as Hep-C.

However, unique challenges that exist in remote office locations and unconventional work environments (such as those in First Nations communities) have created system requirements that cannot be fulfilled with off-the-shelf Electronic Medical Record (EMR) systems.

A more innovative mobile healthcare solution is needed. First Nations nurses do not work in conventional medical office spaces. During "typical" patient visits, nurses do not have power outlets for computers, desk space for paperwork, or discretion behind closed doors. As a result, mainstream EMR systems that rely on computer terminals, continuous connection to databases, and heavy computer processing are not practical solutions. The unique nursing environment requires greater flexibility, portability, and extendibility than traditional solutions offer. To meet this need, a truly mobile nursing station that is tailored to the distinct needs of First Nations healthcare is needed. Mobile tablet-based devices could provide the essential features to address and resolve common workflow practices and operational issues. Mobile healthcare is an innovative solution to a complex problem.

The nurses need operational efficiency with the flexibility to maintain their own fluid practice methods as well as "gear up" for subsequent workflow evolutions and technology advances. In fact, once digitized the data will be poised for migration and replication through any electronic system Health Canada or Provinces may choose to deploy in the future.

Mobile healthcare would provide complete access to patient medical information. In lieu of heavy and cumbersome three-ring binders, nurses can carry comprehensive documentation in the palm of their hand. Keeping information at hand is a cornerstone of effective treatment.

The system will extend information reach beyond the office to support nurses in the field treating patients at their homes, in vehicles, or wherever service is needed—without constraint. For the first time, Community Health Nurses will also enjoy a multi-user environment where more than one nurse can access patient information simultaneously. Gone will be the days of coordinating patient visits to ensure that nurses and administrators can retrieve from and contribute to patient files at the time of need.

Digital information is more searchable saving time and facilitating more complex analysis and variable considerations. Community Health Nurses can avoid relying on memory for specific details and can quickly find specific information leading to more accurate diagnoses and treatments, and ultimately better quality of care.

Dynamic form fields provide more accurate and consistent data entry through list box style choices rather than free-form fields. By better governing the information entry, the data management system can better search, retrieve, and present information so nurses can get a more holistic client view and make more informed decisions.

Transformative Technology
Mobility is at the heart of innovative field service. Ubiquitous access to information is becoming a reality as LTS and 4G coverage continues to envelope even the most rural locales.

The Mobile Nursing Tool is part of a greater technology system that could later integrate with other data management tools and components as they inevitably intersect to bring additional time and cost savings to the nursing field.

Using secured consumer-grade devices such as iPads, the technology investment and total cost of ownership has been dramatically reduced without compromising the essential requirements of functionality and scalability to support nurses in rural environments across Canada.

Understanding the difficulty in training and supporting remote users, the technology has been simplified to sidestep the typical "enterprise" deployment framework. Instead, users are presented with mainstream consumer-grade devices they are already used to using. The software has been developed using the same intuitive interfaces and familiar work flows that people use to manage their own daily work lives.

The entire system has been devised and built in response to requirements voiced by actual First Nations nurses and administrators, and has been heavily influenced by recent advancements in mobile information systems including strategies, equipment, and methodology.

The Mobile Nursing Tool will provide:
- Cloud based services designed to assist disparate jurisdictions agree to a standard collective/collaborative technological solution
- Low cost of ownership hardware options – iPad's, Tablets and Smartphones
  - Easy to replace and upgrade assets with cheap and included operating software
  - Ruggedizing options to protect field assets
- Secure "texting" and team management communications options
- Video conferencing that finally connects to all existing enterprise assets, as well as most Laptop/Desktop computers as well as iPhones, iPads and Android Smartphones (Health Canada ROI benefits based on existing eHealth investments)
- Case management benefits based on "On Demand" access to Provincial Doctors/Pharmacists, Private Labs, Field Nurses, Clients and and/or First Nations Communities
- Net new Emergency/Disaster Management options via targeted and secure "Alert Notifications"
- Secure cached data access when Carrier based networks and Wi-Fi Networks are unavailable
- Practically unlimited access to forms, documents and training materials
- Document management and version control

Mobile Nursing Tool: iPAD App Simulator
After thorough investigation, in depth discussions with field nurses, and development of various use-case scenarios, a prototype mobile nursing application was developed to operate on consumer Apple iPad devices. The feature set, services, and workflows have all been engineered to meet the initial requirements of the target users-- First Nations regional nursing teams.

Saskatchewan: The Value
The Mobile Nursing Tool (MNT) will unquestionably help First Nations nurses improve their level of care and service. Results extending from the Spiritwood Field Study indicate that the nursing community could witness a

transformation in the way they operate on a day-by-day basis. The following benefits are in scope of a future, scalable Mobile Nursing Tool as presented to the Saskatchewan field-testing stage of the pilot:

Responsiveness: Currently, nurses are forced to limit patient case management to visits commensurate with the paperwork they can physically manage. With bulky binders, disparate notes, and improvised workspaces, nurses have been coordinating their daily efforts on the limited number of patients proximate to travel routes. With Mobile Nursing Stations, nurses could increase their patient loads seeing more patients in any given trip into the field.

Access: Multi-user access in patient information would also improve service levels. When a nurse brings the patient information out into the field, it is no longer available at the nursing station for any other purposes. Since patient information binders can only be in one place at a time, patient information needs across locations could be met.

Quality: Perhaps of even greater value than increased access to information is the quality of information available in the field. The current system allows only print materials that can be collated into binders. Typical patient data includes biographical information, individual test results, and previous session notes. The mobile Nursing tool introduces digitalinformation that brings an ease of data manipulation such as ad hoc longitudinal analyses, comparisons, and summaries. The insight from such reporting can now only be produced through time consuming manual effort that cannot be quickly extended once new information is available.

Effectiveness: Disease prevention is a very important objective of First Nations nurses, and Mobile tools would revolutionize those capabilities and effectiveness, too. Convincing at-risk individuals to change their behavior involves emotional, intellectual, and logical appeals. Mobile devices capable of displaying multimedia messages such as video, audio, photos and more will drastically extend the available avenues of presentation that nurses could employ to communicate their message.

Graphic images and detailed renderings could be displayed and zoomed in for greater detail and explanation. Video could be played, paused, and reviewed for maximum impact. Information could be validated through online searches and cross-reference.

Integration: Communication services bring patients and physicians together with fewer delays. Nurses are the field support in this battle for medical support, while doctors provide the definitive assessments and treatment protocols. Doctors are in even shorter supply than nurses and access to their expertise bottlenecks information flow to patients and ultimately the expediency of treatments.

Video conferencing enables disparate parties to share conversations, body language expression, and reference documents through real-time audio/visual communication. Integrated video conferencing services would facilitate doctor-nurse and doctor-patient communication. This technology would mitigate delays precipitating from scheduled doctor visits into remote areas.

The doctor shortage affords only intermittent on-site doctor attention and many patients simply cannot wait for such services. Secure mobile video conferencing could rapidly connect with existing enterprise Video conferencing revolutionizing how nurses in the field connect with patients, doctors and pharmacists. The freedom of "on-demand" access to previously unavailable resources when they need it would profoundly change the field nurses existing communications ecosystem, and at significant time and cost savings.

Efficiency: The Mobile Nursing Stations would improve efficiency in every aspect of healthcare service. Of upmost importance is the ability to search data, resources and information. The current hard copy system has no method to quickly find specific pieces of information from among the potential hundreds of pages of notes and forms compiled for each patient. Digital information can be found and retrieved in milliseconds.

Accuracy: Human errors as simple as misfiling a document may be catastrophic to patient care since that critical information may effectively be gone forever. With no search function, there are no keywords or data footprints such as save dates to triangulate the location of missing documents. Digital document management solves this routine and potentially fatal complication.

Validity: Once in hand, the validity of such information comes into question. With today's hand written forms and notes, spelling errors, inconsistent descriptions, and data omissions can further complicate treatments and service levels. Digitized forms ensure text legibility in any language, and can provide data consistency (and time savings) through multi-select fields as opposed to free-form text areas whereby data entry can be heavily influenced by vernacular and writing style upon entry.

Additionally, electronic forms can provide requirement and auto-fill functions. For example, select fields deemed essential for patient records can be configured as required fields to ensure that no critical information is omitted. The prompt to enter the required information before proceeding can sidestep future delays experienced today. Simple routines such as pre-populating patient demographics on each form can trim significant time from repetitive data entry.

Multi-page documents are oftentimes separated from information sets. Digital forms can be configured to assign and automatically insert identification codes onto each page when printed to ensure that pages are not inadvertently collated into other patient information.

Collaboration: The opportunity to share successful strategies and resources transcends the closed patient management strategy and begins to evolve a network approach to regional and national healthcare management. Additionally, the elevated privacy and discretion should lead to greater patient participation in medical regimens and disease awareness campaigns.

Nurses and physicians should be able to leverage their collective intelligence in diagnosis and treatment protocols, patient communication and persuasion approaches, and prevention campaigns.

Reliability: Nurses will be able to focus on their work without fear of data loss. Disaster recovery has been a chronic problem for First Nations nurses…and ultimately for patients. The introduction of redundant systems working behind the scenes to secure and safeguard data, as well as facilitate rapid restoration in the event of disaster is a crucial element of the system design. The Mobile Nursing tool will help Community Health nurses do more, and do it better.

Extendibility: Offer new services such as homecare, diabetes assessment, mental health, etc. without the need for any additional gear. New programs can create training tools and other features to run on this app and device, which is already proven in the field.

Turnkey: Application extensions, patches, and upgrades can be remotely installed and maintained via Private Sector "Service Level Agreements" to ensure maximum uptime and in-house technical expertise. Additionally, since the devices are hand-held and consumer-based, they are easy to acquire and configure for field use.

Security: Patient data, electronic communications and sensitive training and education information can be protected and stored using advanced "Off the Shelf" technologies that work seamlessly with many of todays most popular consumer based assets such as Tablets and Smartphones. Enterprises such as Health Canada, the Provinces and First Nations communities would have the ability to control all aspects of the data lifecycle thus supporting scalable collaboration built on established and fully supported electronic standards.

Safety: "Panic Button" features offer Nurses whom find themselves in dangerous or compromised situations quick and discreet ways to call for help. Mission critical features such as these will bring greater efficiency through the entire patient management lifecycle by way of greater access to information, faster response times, improved accuracy, and more dynamic content.

These process improvements translate directly into better patient care, and better patient outcomes.

Conclusion
Health Canada (FNIHB Saskatchewan Region), in its current configuration, will soon be unable to cope with the volume of clients and client cases in First Nation communities.
Therefore, we believe a Mobile Health solution exists and has been demonstrated, that will meet the information and volume based challenges, along with introducing benefits and improvements in:

- business process efficiencies
- secure collaboration
- secure records / record storage
- emergency management technologies
- information distribution
- training and education

This pilot project is a significant initial step in radically improving the healthcare delivery methodology beginning in remote rural communities.

Until a solution like this is realized, the population of 1 million First Nations people is at risk from communicable diseases prevalent in communities where medical relief and prevention cannot keep pace with increasing patient demand.

There are many opportunities for improvement, however the traditional option of increasing manpower is not a viable long-term solution—it will only mask the symptoms since increasing infection incidences and survival rates maintain greater numbers in patient care. The healthcare apparatus responsible for supporting medical and preventive services to First Nations people is dismal; technical innovation is the prevailing and most promising strategy for improvement. The success of this project brings better patient outcomes and a better prognosis for Canadian healthcare.