Geospatial Architecture for The Cree/Naskapi Land Registry System as An Economic Development Mechanism for Canadian Aboriginal People

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Key words: Land registration, cadastre, land administration, geospatial infrastructure, land property rights, survey system, e-government, Northern Quebec.

SUMMARY

The aboriginal land registry system across Canada varies depending on diverse land rights regime for each First Nation group, such as their vision of the land, ownership and the environment, communal or ancestral land rights. Independently from land right regime, the land registry becomes an important and essential tool for economical development when a geospatial reference is attach to the land properties. Specifically for the Cree and Naskapi people in Northern Quebec, the adoption of a computerize information system allows them to manage their territory and the environment using the land registry as a first source. In addition, this information is essential to support an e-government and e-governance.

This paper describes the results of a study for modernizing the analog Cree/Naskapi Land Registry by integrating it into the Indian Land Registry System (ILRS), which was developed by the Ministry of Indians and Northern Affairs Canada (INAC) for the First Nations. This work explains the Cree/Naskapi land rights regime, the conceptual land tenure differences between private land ownership, the legal cadastral issues, the geospatial infrastructure, the importance of land management in the Web, and the benefits in the economic development and land planning to the native communities in Northern Quebec.

SOMMAIRE

Le registre foncier des autochtones à travers le Canada varie selon le régime foncier de chaque peuple autochtone qui a des régimes coutumiers et sur la vision de la terre comme propriété communale et ancestrale. De façon indépendante des ces nuances dans ces régimes fonciers, le registre des terres s'avère un outil de développement économique important quand on ajoute une référence spatiale à l'inventaire des terres et biens-immeubles. Dans le cas plus spécifique des communautés authoctones Cris/Naskapi du Nord du Québec, l'adoption d'un système informatisé du registre foncier permet de l'utiliser comme un outil de gestion du territoire et de l'environnement, ainsi que pour supporter les activités dans un état de gouvernance électronique

(e.gouvernance).

Cette présentation expliquera les résultats d'une étude sur la modernisation du registre foncier Cri/Naskapi afin de l'intégrer dans le Système de Registre des Terres Indiennes (SRTI) du Ministère des Affaires Indiennes et du Nord du Canada (AINC) pour les Premières Nations. Dans cette présentation, on décrira le régime foncier des Cris/Naskapi, les différences par rapport au concept foncier des terres privées et publics, le « cadastre foncier» des terres indiennes, l'architecture géospatiale, la gestion des données géospatiales, l'importance de la gestion des données foncières sur le Web et les bénéfices pour le développement économique et pour la planification du territoire dans les communautés autochtones du Nord du Québec.

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1. INTRODUCTION

The Government of Canada has a mandate to support the land administration systems for the Aboriginal people (First Nations, Inuit and Métis) in Canada. There are two main federal ministries involve on Aboriginal land in Canada: Ministry of Indian and Northern Affairs Canada (INAC) and the Ministry of Natural Resources Canada (NRCan). The first, INAC is in charge for meeting the Government of Canada's commitments and obligations to First Nations, Inuit and Métis, and for satisfying the federal government's constitutional responsibilities in the North. The second, NRCan is responsible for using and developing Canada's natural resources, as well as the promotion of the competitiveness of Canada's natural resources products. In addition, the NRCan Surveyor General Branch has a mandate to survey all Federal and Indian[1] land and maintain an inventory of all Aboriginal land.

The Cree and Naskapi people are aboriginal communities based on the North of Quebec (eight James Bay Cree communities and Naskapi community of Kawawachikamach). These communities have a land administration system that allows the Indian bands on these lands to manage their territory. This land administration system was put in place by the Government of Canada, under the terms of the Cree-Naskapi (of Quebec) Act (1984) and take in account of the specific needs of each of these communities, but by 1986 after the approving of the "Cree-Naskapi Land Registry Regulations" the Land Property Registry started to be implemented [Sasseville, 1997]. Under the James Bay and Northern Quebec Agreement (IBNQA), Indian and Northern Affairs Canada (INAC) has an obligation to keep a current land registry for the Cree-Naskapi First Nations [Beaulieu et al., 1990].

INAC is currently in the process of modernizing the land registry system for the Cree and Naskapi based on and integrated to the new Indian Land Registry System (ILRS) implemented in

[1]"Indian, the term used by Europeans to identify Indigenous people of South, Central, and North America, is believed to have originated with Christopher Columbus, who thought he had reached Asia when, in fact, he had arrived in the Caribbean. The term persisted and has been used indiscriminately to refer to all Aboriginal peoples on these continents with the exception of the INUIT of the Canadian Arctic and the Greenland and Alaska Eskimo. The Government of Canada, in section 35(2) of the Constitution Act of 1982, defines 3 groups of Aboriginal people in the Constitution: Indians, Inuit and MÉTIS. Indians are categorized as status (also referred to as registered), non-status and treaty Indians. "[The Canadian Encyclopedia, 2011]

2010. A requirement was identified a few years ago to have an automate solution for the Cree/Naskapi created to facilitate registering land, to streamline the business processes as well as ensure data integrity through an automated process supported by the information technology. In addition, this solution will support Cree and Naskapi local governments as tool to promote economic development in the region.

The trend of modernize the land administration system by computerize the land property registry and the cadastral database infrastructure sound very encouraging, but it is important to mention that in order to really have a geospatial architecture to support the economic development of a community it is important to consider the legislation and all community development mechanism to really create an useful tool for the institutions in charge of the community. As a result, a good land registry model must be respond to the current land tenure issues of the people, in this case the Cree and the Naskapi.

2. CREE/NASKAPI LAND PROPERTY RIGHTS SYSTEM

The land occupied by Cree and Naskapi communities is managed by the results of regulations and laws form different legislation, treaties and agreements between the two levels of government in Canada (federal an provincial) and the Indian bands.

It is clear that a land property rights system consists of the approach of governing the use and the development of the land. Several authors define three characteristics or sub-systems common to the Property rights regimes [Sasseville, 1997]:

1. The land management subsystem. This structure consists on all mechanisms to guarantee that the rights granted are consistent with the government policy, based on acts and regulations.
2. The land registry subsystem. It secures the transaction, acquisition, exchange and mutation of land property rights by using a public land registry.
3. The land surveying subsystem. It ensures that the geospatial location, geometry and extend of the property rights and interest are stored in an inventory such as spatial database as well as the physical demarcation in the field.

Figure 1: The foundation of the Land Property Right System.

To have a good understanding of the geospatial architecture for the Cree/Naskapi Land Registry System it is necessary to summary the above-mentioned subsystems.

2.1 The Cree/Naskapi land management subsystem

The foundation of the Cree/Naskapi Land Management subsystem started on 1975 by signing the James Bay and Northern Quebec Agreement (JBNQA) for the Cree and Inuit and the Northeaster Quebec Agreement (NEQA) signed on 1978 for the Naskapis.

Furthermore, the Government of Quebec promulgated an Act Respecting the Land Regime in the James Bay & New Quebec Territories on 1979. This is an important precedent, because this particular act legalizes the allocation of territory for Cree and Inuit communities under the JBNQA and for the Naskapis people under the NEQA.

The above-mentioned Act defines the jurisdiction on the Cree/Naskapi lands. As a result, four types of categories of lands define the type of ownership for the Cree/Naskapi territory (See table below).

Category	Area for Cree land	Area for Naskapi land	Type of transfer	Government of Canada	Restrictions
1A	3,299.6 km²	41.93 km²	Government of Quebec transferred by temporary deed to local government (Indian bands)	Final transfer to the Government of Canada (1984) to administrate, manage and control the land. However, the Government of Canada delegated these functions to the bands under section 109 of the Cree-Naskapi (Quebec) Act on 1984.	Quebec retained bare ownership of these lands.
1B	2,244.5 km²	284.37 km²	These lands are surrendered, by letters patent, in full ownership to landholding corporations.	N/A	These landholding corporations cannot trade or dispose of these lands except to Quebec.
II	69,995.2 km²	4,144 km²	Cree/Naskapi people has right to practice their traditional fishing, hunting and trapping activities.	N/A	Quebec has the right to administrate these lands.
III	N/A	N/A	N/A	N/A	Quebec public lands not included in category I and II lands.

An important specific legislation was prepared by the Government of Canada for the administration of the 1A and 1A-N lands, which is the Cree-Naskapi (of Quebec) Act on 1984. This act stated that the Government of Canada delegates the administration, management and control of 1A and 1A-N lands to the bands[2]. In addition the Cree 1A and Naskapi 1A-N lands are

[2] "Band is a basic form of local residential group in traditional simple hunting and gathering societies all around the world. Today the Canadian government uses the term "band" to describe the local unit of administration by Indian and Northern Affairs Canada. These units include the dozens of more complex native societies that were traditionally organized not as bands but as tribes or chiefdoms. There are over 600 of these modern administrative bands, which

not longer Indian reserves[3] governed by the Indian Act. This different status is essential to understand some differences between the Cree/Naskapi Land property regime and the other first nations.

2.2 The Cree/Naskapi land registration subsystem

The land registration is governed by legislative provisions to protect the Indians rights on lands of category 1A and 1A-N. Some of these provisions are: immunity from seizure, inalienability, the special mortgage program and the non-application of the acquisitive prescription.

The Cree/Naskapi bands have the power to grant some land property rights of use and habitation to their members on category 1A and 1A-N lands.

The land registration system for the Cree and Naskapi was created by the Cree-Naskapi Act, specifically in Section151, to guarantee the proper management of the rights granted and settle. Consequently, only on 1986 was approved the "Cree-Naskapi Land Registry Regulations"(SOR/86-1060).The later provides the registration of all lands transactions and administrative decisions affecting the rights of use and occupation granted collectively and individually to Indians on category 1A and 1A-N lands.

The existing land registration process is in compliance with the regulations for the registration of rights and interests in Category 1A and 1A-N Cree/Naskapi land and in buildings situated thereon, pursuant to sections 151 and 152 of the *Cree/Naskapi (of Quebec) Act* (S.C. 1984, c. 18). These regulations, created for a paper-based land registry, define the terms and conditions for registration as well as the powers of registrars. This registry process is defined as a "dual system or dual registry," which requires bands in each community (eight in Northwest Quebec and one in the Northeast) to appoint a local land registrar and the Government of Canada to assign a central land registrar (currently in Quebec City) [Sasseville, 1997]. The present process also involves the Department of Natural Resources Canada to locate the rights/interests of the land or building in a land registry plan and the land parcel plan.

The following figure shows the current processes and the organizations involved in this workflow. The current land registry requires fifteen (15) processes to register a right/interest. Each process is briefly explained below. Six (6) of these processes are external and carried out

function as small native municipalities and are managed by elected band councils according to the laws of the INDIAN ACT of Canada.." [The Canadian Encyclopedia, 2011]

[3] "Indian reserves are lands set aside for the exclusive use of registered or status "Indian" and only status Indians can "own" land on a reserve, but not all Indian bands have reserves. The Indian Act stipulates that only registered band members may reside permanently on a reserve unless the band has adopted a residency bylaw that regulates the right to live on the reserve." [The Canadian Encyclopedia, 2011]

by NRCan. The Cree/Naskapi land registry process has two main steps: (1) register the land or building right/interest in the index book; and (2) Define geographically the extent of the right/interest in a registry plan. The rights or interests subsequently recorded in the index books and on the land registry plans are identified by the CRINA number.

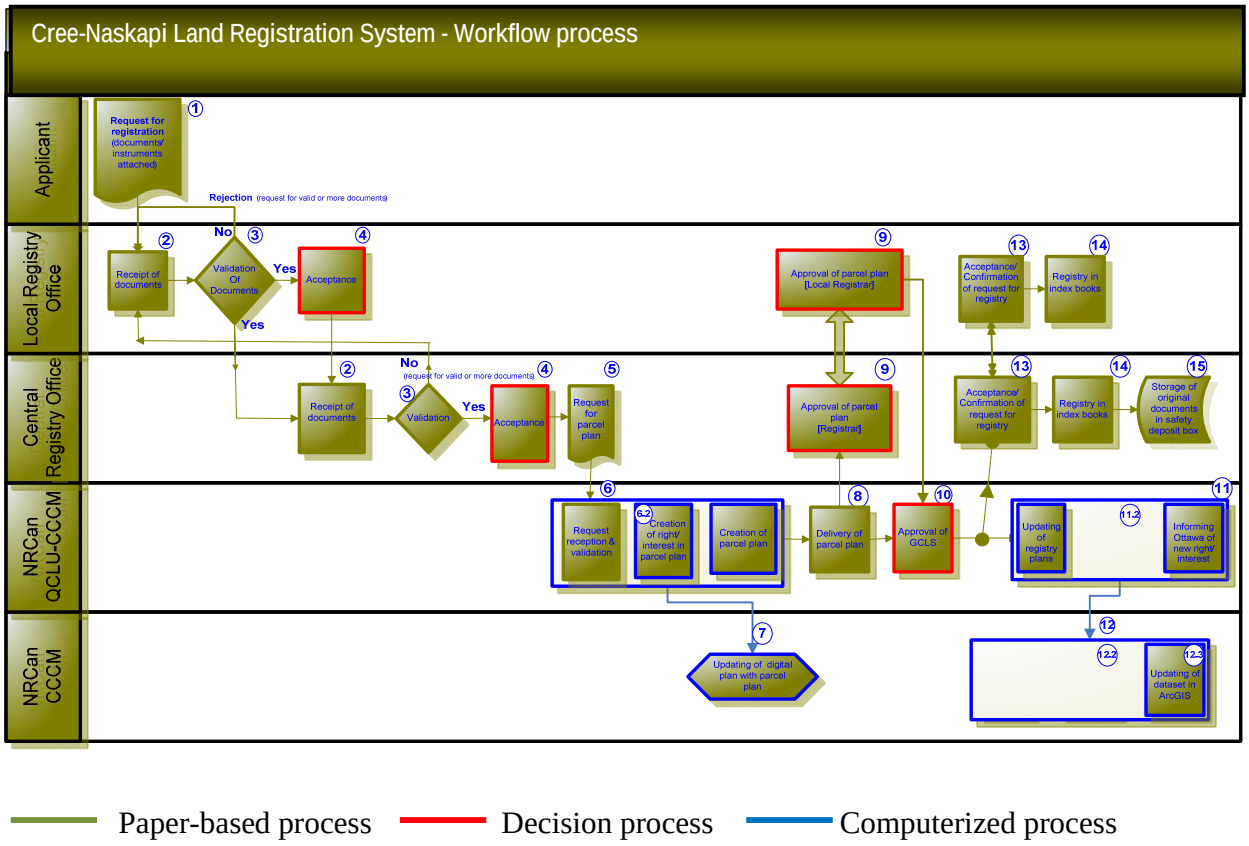

Figure 1: Cree-Naskapi Land Registration work flow

The following describes the most important processes to record the property rights on the Cree-Naskapi Land Registry System. However, it is important to mention that many of these processes have been changed during the current modernization at INAC and NRCan.

1. Request for registration

   The applicant, who is the person transferring, receiving or claiming the interest or rights, must submit the request for land or a building situated within the IA/IA-N land boundaries of the community using different documents to initiate the process for registering land or building rights/interests.

2. Receipt of documents

   A person who wishes to register specific rights/interest in a piece of land or in buildings situated on Category IA or IA-N land of a band must submit documents evidencing that right or interest. The request is forwarded to the local land registrar or the central land registrar.

3. Validation of documents

   This is the process whereby the registrar receives the documents and proceeds to validate the evidence.

4. Acceptance of the request for registration

   Following the validation process, the registrar accepts the request for registration and the documents attached.

5. Request for the parcel plan

   This is the second key step in the process, which involves graphically representing the location and the extent of the right as well as confirming the CRINA number for the designation of that right in a parcel plan. This process consists of requesting a parcel plan from the Quebec Client Liaison Unit (QCLU, Surveyor General Branch, Natural Resources Canada).

6. Parcel plan preparation process

   6.1 Receipt and validation of the request for parcel plan
   This process is carried out entirely by the Quebec Client Liaison Unit (QCLU, SGB - Surveyor General Branch, Natural Resources Canada). The QCLU has all the land registry plans for each community in digital format, and all assigned CRINA numbers are included on these electronic plans.

   6.2 Creation of requested right/interest in the land registry plan
   The QCLU uses the documents submitted by the central registrar to locate and graphically represent the right or interest in the land registry plan. Several processes are carried out to ultimately create a PDF file of the land registry plan that is stored on the QCLU server.

   6.3 Creation of the parcel plan
   The parcel plan is created from the up-to-date land registry plan. QCLU extracts the required information to create the parcel plan and adds internal code numbers to it.

7. Update of the digital file

   This process consists of creating an internal control mechanism to determine exactly when this right was entered in an .XLS file. The date is entered for each step.

8. Delivery of the parcel plan to the central registrar

   QCLU delivers the preliminary parcel plan to the central registrar in hardcopy format

for approval.

9. Approval of the parcel plan (central/local registrar)
   The central/local registrar receives the hardcopy of the preliminary parcel plan. The central registrar writes the registration number on the approval form for Surveyor General Branch (SGB) ratification.
10. Final approval and delivery of the parcel plan

    The SGB is in charge of final confirmation (signed by the federal surveyor) and delivers the final parcel plan to the central/local registrar.
11. Update of the registry plan

    11.1 Update of the registry plan The Quebec Client Liaison Unit (QCLU), Natural Resources Canada creates the final update of the land registry plan and the "proposed" designation is removed.

    11.2 Storage of the parcel plan in SRIS This activity consists of storing the digital parcel plan in the QCLU's spatial database, which uses the Survey Record Information System (SRIS).

    11.3 Notice of new land right/interest This activity consists of informing Natural Resources Canada (NRCan) in Ottawa via internet that the new right/interest is available in the QCLU's spatial database.

12. Final process at NRCan – Update of the registry database

    12.1 Data conversion in the SGB system (SRIS) After receiving the notice of a new right/interest, the SGB determines whether the parcel plan identified by the RSQ number is accessible. The QCLU subsequently scans and stores the plan in TIFF format.

    12.2 Creation of the parcel plan image file With the above-mentioned parcel plan in the SGB system, the parcel plan is then reformatted in raster file and stored in the SRIS system for image file management.

    12.3 Update of the cadastral database This activity consists of updating the Cadastral Management Database (CMDB).

13. Acceptance and confirmation of the request for right/interest registration

Upon receipt of the final parcel plan, the central or local registrar accepts the registration by stamping the year, month, day and time of receipt on each document. The central (or local) registrar then sends the original documents to the local (or central) registrar for confirmation (confirmation stamp). The source documents are stored in a safety deposit box at the central office. The local land registrar keeps a certified copy bearing the stamps "registration accepted" and "registration confirmed" for archival and consultation purposes.

14. Recording of the land right/interest in the index books

Once the documents have been accepted and confirmed, the central registrar organizes and records the information in chronological order.

2.3 The Surveying subsystem

The Cree-Naskapi Land Registry process requires to identify the extend of land rights or interests, as well as the geographical location. Section 206 of the Cree-Naskapi (of Quebec) Act has amended a section of the Canada Lands Surveys Acts, which allows the Regional Surveyor of Quebec for establishing a system for dividing and designated land for the Land Registry.

The mechanism for identifying rights and/or interests to be registered is a graphic representation in an enlargement of part of the land registry plan to a known parcel plan. This is not a lot of a land subdivision, but rather a graphic representation and location of the right/interest in the land and the building. Several sections of land can be represented, for example the right of *superficie*, which is a right in a section of land. If the beneficiary asks for a property right in the land or buildings for each piece of land, it is also important to graphically represent this right. This differs significantly from the traditional concept of cadastre and registration, where the lot is already defined. In the Cree-Naskapi land survey process, the extent of the land (or building) is subsequently defined against the land right/interest. The registrar has to send a technical description of the right/interest for the land or building to NRCan to identify the extent of this right/interest in the land registry plan. The next figure shows part of land registry plan 5189 (Mistissini) and the small parcel with CRINA numbers are included in a separate parcel plan.

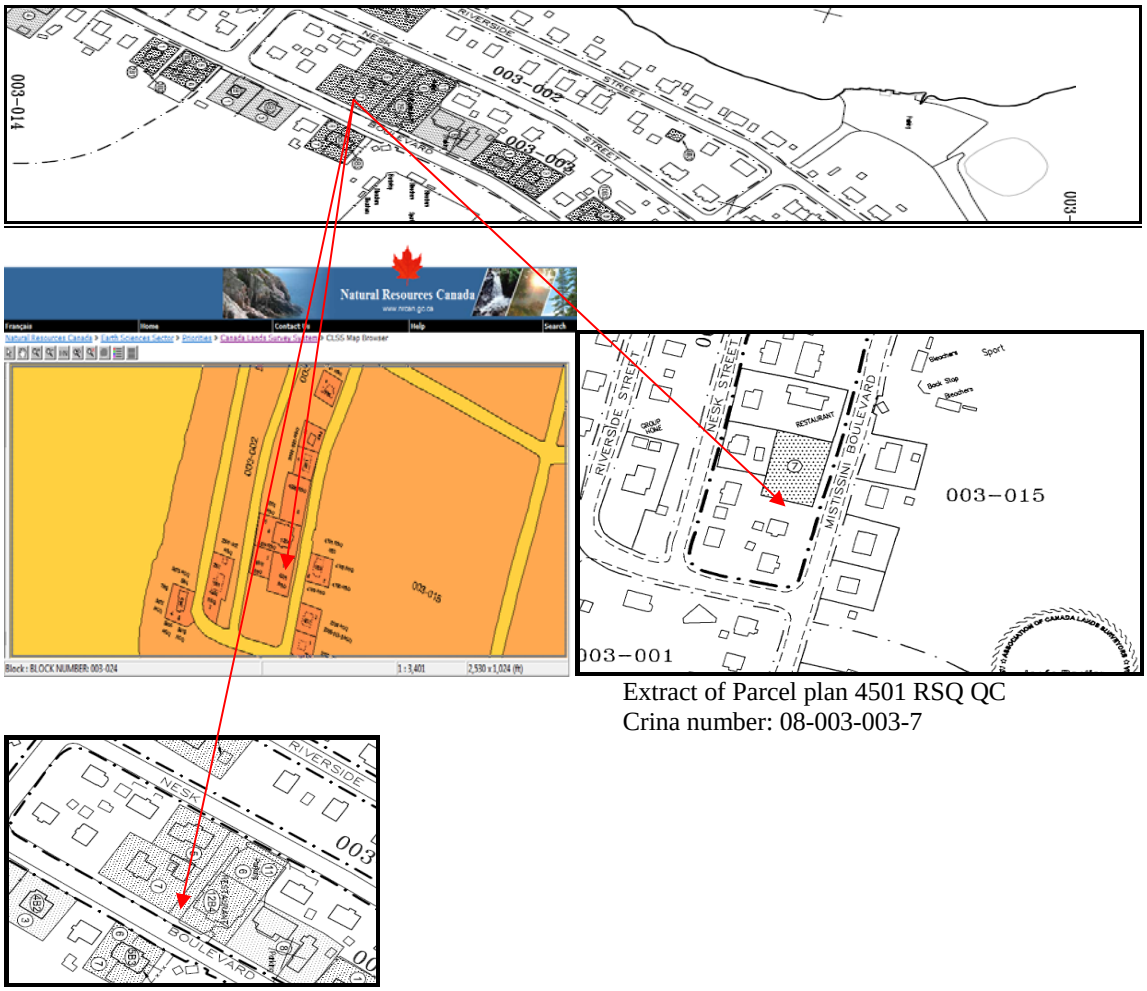

Figure 3: Extract of a land registry plan from NRCan/SGB map browser and PDF (view of rights)

Number 7 designates the type of right for this extent of land. There is a building inside the parcel, but it has not been registered. It is important to note that only the shaded areas were registered in the land registry system. This is the current reality and a significant percentage of the land and buildings remain unregistered.

The business process for registering the right/interest in land and/or buildings is quite simple, but cooperation with NRCan is paramount to ensure that the extent and the location of this right/interest are correct. NRCan has the expertise, the experience and the mandate, under the

Canada Land Surveys Acts to identify and locate the right/interest in Category 1A land or 1A-N land as defined in the *Cree-Naskapi Act*. It is therefore important that NRCan be actively involved in the Cree/Naskapi Land Registry, not only in the CRINA number synchronisation process, but also in the monitoring of registration status.

At this moment NRCan is modernizing the Cadastral Systems, which is part of the Canada Lands Survey System (CLSS). The CLSS supports more than 23 property rights regimes in Canada, and one of them is the Cree/Naskapi Land Registry System. Furthermore, NRCan is providing support to INAC to be able to automatically synchronize the CRINA number with the land record number created during the transaction at the Cree/Naskapi Land Registry system.

3. THE GEOSPATIAL INFRASTRUCTURE FOR THE CREE/NASKAPI LAND REGISTRY SYSTEM

Since 2006, several studies have been done to define a geospatial infrastructure for the Cree/Naskapi Land Registry System. Based on these studies and particularly from Leclerc [Leclerc, 2007] there are four main components to describe the geospatial infrastructure:

- The system environment
- The data model
- The functional model
- Technological infrastructure

These four components are essential to describe some of the issues that may constitute barriers in the implementation of the Cree/Naskapi Registry System. However, it is important to bear in mind that this particular analysis were conducted during the last phase of the ILRS upgrading process (between 2009 and 2010), which important development were conducted by INAC. As a result, and for this particular paper, the description will only outline the system environment and the data model.

3.1 The System environment

Every system has different types of users, and understanding the relationship and interaction between them is vital to defining a suitable automated process. The diagram below represents a revamped proposed version of the current Cree/Naskapi Land Registry. The main purpose of this model is to be able to take advantage of the new operational ILRS, and instead of recreate a new system, integrate the Cree/Naskapi Land Registry within the ILRS.

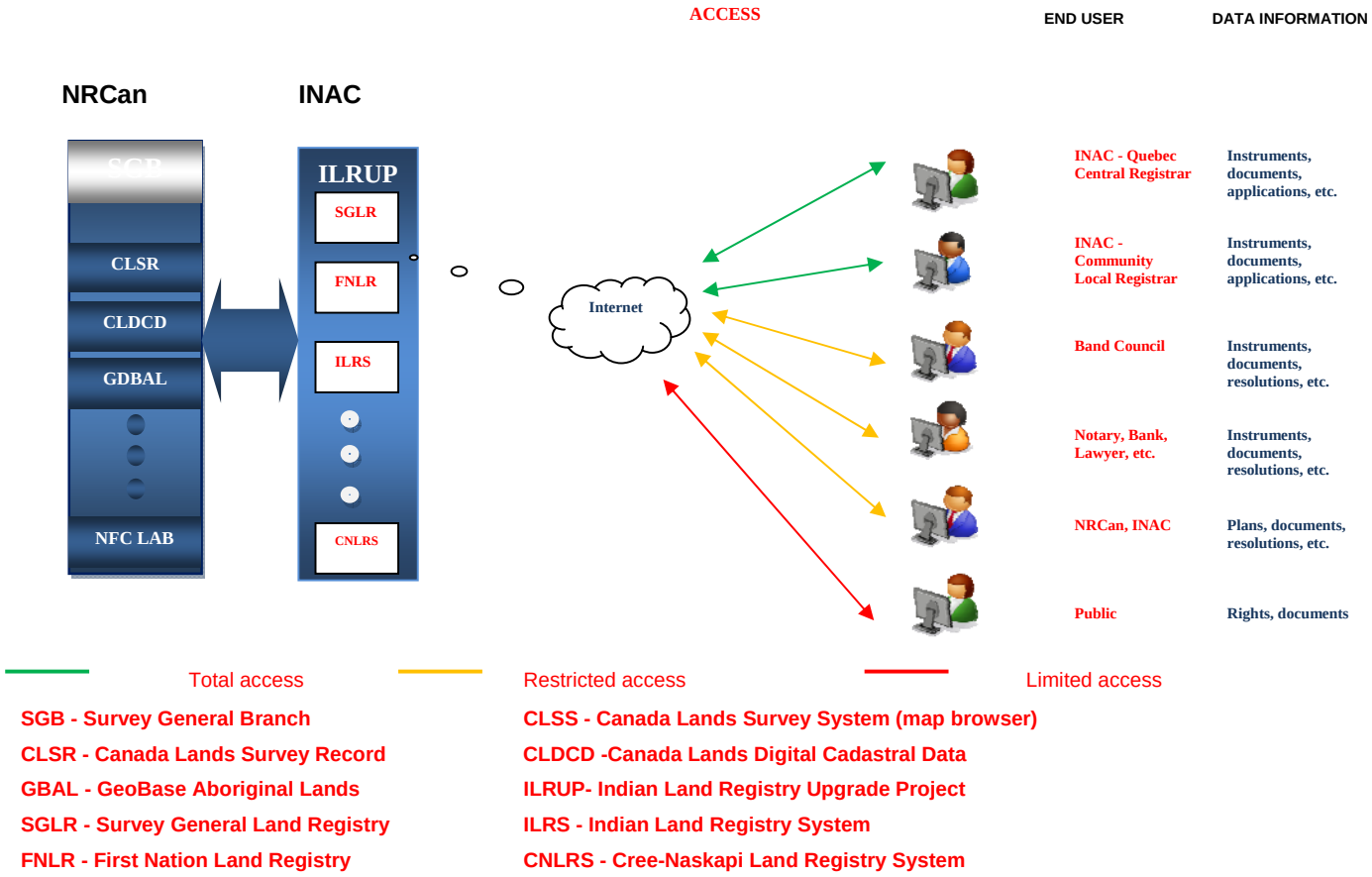

Figure 4: System interactions and relationships

Figure 4 shows the Cree/Naskapi system interaction and relationship with different organizations and users. The new Cree/Naskapi Land Registry System, CNLRS, will be totally embedded in the ILRS, and will use all technological capabilities, such as web-enabled features and query, search, and edit functions. The current option uses the integrated concept and has developed different types of interfaces to enable interaction with external systems and to accelerate the process.

The integrated Cree/Naskapi system (CNLRS) draws on the ILRS enhancement for system access, which is governed by the ILRUP. There are different kinds of access restrictions depending on the actor type, including:

- The central registrar has total access to the data and information and has exclusive data rights in order to manage and maintain different sets of data (registration status, priorities in analyzing documents, etc.).
- Local registrars have the same type of access permission as the central registrar. Eventually, the local registrars may perform the same types of tasks as the central registrars.
- Bands grant land/buildings rights for beneficiaries (Cree/Naskapi people) in land categories 1A and 1A-N. Bands may have restricted system access, but with almost complete rights to query, search, applied and other type of data management. However, registration acceptance or confirmation access is available only to registrars.
- Notaries, lawyers and financial institutions (banks, credit unions, etc.) have restricted access, but one important task available to them is on-line registration and attaching scanned legal documents. The possibility of monitoring application status on-line will also be a common practice.
- Federal, provincial and municipal agencies can also have restricted system access.
- The general public has limited access, but it is vitally important for the land registry to keep information public, provide a mechanism to secure land tenancy, and give transparency to the overall registration and promotion of land rights/interests. This is and will continue to be a system with public information.

3.2 The data model

The data model proposed before in other studies [Leclerc, 2007] follows the current paper-based system, which is acceptable. A review of this data model diagram and the more complex ILRUP [INAC, 2009] revealed that the ILRS needs to take several issues under consideration to fully adjust to the CRINA business concept.

The following diagram shows different sequential processes in each box, and for each box there are other types of entities. Some external processes are performed by NRCan and are related with the geospatial data. The ILRS-integrated CNLRS system will only use the geospatial information to link with the right/interest.

The following is a list of interconnected entities in the data model reviewed: Documents, Right/Interest, Request for registration (application), Status, User (internal/external), Party, Civic address, Building, Land, Band, Original Lot Boundary and Block.

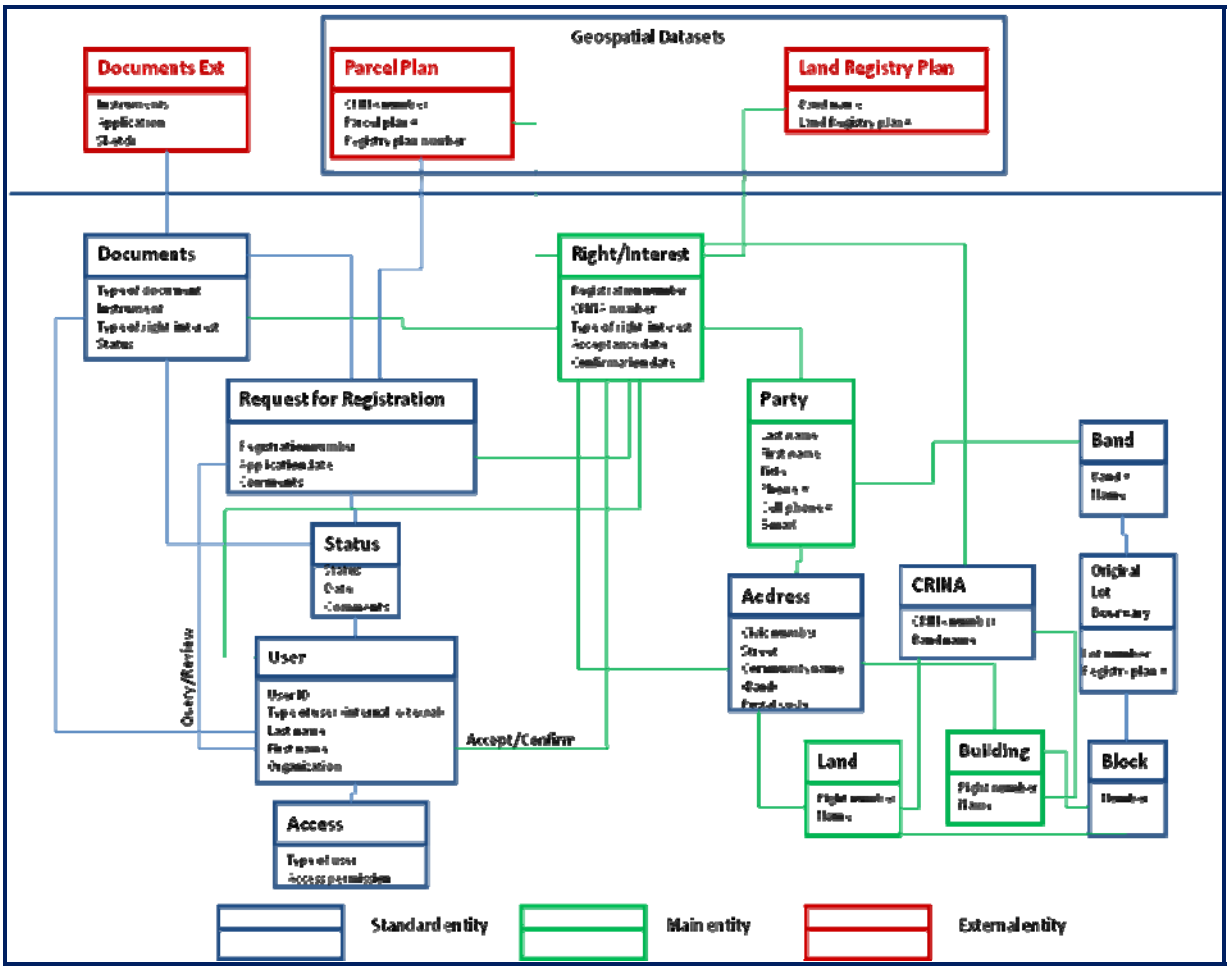

Figure 5: Data model for the Cree/Naskapi Land Registry

This data model is used as a base to integrate it within the ILRUP. The ILRUP is already operational since mid 2010. As a result, the integration was expected to begin by the end of 2010. This integration initiative is also in line with Indian and Northern Affairs Canada's policy that seeks to build enterprise-wide applications whenever possible in an effort to avoid duplication and reduce costs for meeting similar business requirements.

4. CONCLUSIONS

The modernization of the Cree/Naskapi Land Registry is a big step forward for INAC and the Cree/Naskapi Bands, because will pave the road to enhance land administration and territorial planning. In addition, the current recommendation to embrace the modernization of the land registry system is based on several analysis and studies. It is clear that the current number of land transactions on these communities is not the right argument to achieve this endeavor, but rather the expectation that the occupied land can be developed to increase the value. In addition, the Cree/Naskapi Land Registry database would support different type of systems to improve the government in each community, if the database and information management tools are adequate to be easily employed by the local government.

Some of the most important benefits for the Cree/Naskapi Land Registry case in order to develop a proper data infrastructure for a land registry system to be taken in consideration maybe summarized as follow:

1. **Fast track and flexible solution**

   Because there is available solution (ILRUP)that already contains three different types of land registry systems and both the differences and similarities of the requirements are achievable in the integration scenario, it is safe to assert that the integration phase will be faster and more flexible than building an isolated, stand-alone solution.

2. **The proposed technology meets institutional departmental IT standards**

   The new ILRS solution (ILRUP) uses a Web-based IT solution that meets, in this specific case, INAC's high-level standards. This means that the integration will build on the most modern, efficient and adequate technology required for the Cree Naskapi Land Registry.

3. **Efficient, on-line registration process**

   The new ILRS allows for on-line registration, and will avoid redundancy for the three different land registries. In the case of the Cree Naskapi, similar types of efficiencies will be used, but on-line registration will also notably expedite the process of land/right registration. There will be additional important benefits for the registrars, such as the ability to query, search and retrieve land rights information from different offices.

4. **Faster synchronisation mechanisms between land registry and geographic information**

   The option of visualizing the land right/interest extent in the digital map and on-line is currently available in the ILRS. This capability will allow the registrars and other users (e.g., notary, lawyer, land surveyor, etc.) to review the extent of the land right and compare it with the instrument. It is a validation alternative that is not available to the

registrar, but which will preclude a series of potential problems and conflicts between grantees and grantors.

5. **Reliable and user-friendly system for other kinds of land administration and planning uses**

   The main objective of a land registry is to keep the land right/interest in a secure media format and to keep all land right/interest related information current. Different tools are used to maintain and keep all of this information in a secure location. However, a well-designed and user-friendly land registry system can be used for other types of applications, including land planning, supporting land survey activities, and as a tool for retrieving land-related information for urban infrastructure, etc. As part of the Cree/Naskapi agreement, the land registry must be used by the band for land development economy.

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BIOGRAPHICAL NOTES

Gabriel Arancibia is a Quebec Land Surveyor, Canadian Professional Surveyor, Survey Engineer and also detain a M.Sc. in Geodesy from Université Laval. More than twenty five years of management and consulting work experience. Presently, he is working as project director for **AECOM** in Land Surveying, Mapping and GIS Services. Formerly, was a CEO of a geomatics and land surveying service firm (***InterGis***) in Ottawa region and abroad, i.e. IMF consulting mission in Mali to review the process in mapping, land registry and cadastre, also for the ADB municipality government strengthening assignment in Nepal and cadastre updating project in Ecuador. Since 2009, Mr. Arancibia has been in charge of several contracts, such as the integration of Cree/Naskapi Registry for INAC (Ministry of Indian and Northern Affaires Canada), geomatics advisor for a second year in a row in Mapping, Cadastre and Land Registration project in Pakistan, as well as prime consultant for different organizations in Canada and abroad. In 2008, Mr. Arancibia worked in Nepal for half year and for a year and half as National Director for a Land Administration project in Costa Rica. On July 2006, he was on assignment for a Tsunami mission in Banda Aceh (Indonesia) and few months before in the Maldives. He was on assignment for four years in Bolivia as National Director for the consortium of **Roche Groupe Conseils** and **Deloitte, Touche & Tohmatsu – Emerging Markets Group,** for the CDN$3 million Water and Sanitation Information Management System Project.

Was formerly involved in the Philippines as a Domain Expert Cadastre/GIS/Land Registration for Unisys in the US$45 million Land Titling Computerization Project of the LARES Consortium.

Prior to these activities as an independent senior manager and consultant, was Vice President of Business Services at ***Eastcan Geomatics Ltd.,*** in Halifax, Canada. He was also a Senior Manager and Consultant in Winnipeg, Canada, with ***Linnet***, a Software Integrator and Application Development firm with applications in **Municipal, Forestry, Agriculture and Land Management (Mapping).**

Worked in Montreal as a supervisor at one of Quebec's first Land Surveyor firms, ***T.T. Katz***, from 1985 to 1991, using IS for the first Cadastral Renovation initiative in Quebec, and as a geomatics consultant, for several organizations including ***Leica Canada, SNC-Lavalin***, Cegep Ahuntsic and the Quebec Department of Transportation.

Has extensive international experience and since 1992 has been actively involved in IT/GIS business development, identifying and acting on potential projects in Latin America. More The latest 10 years, he has participated in consulting assignments in Nepal, Mali, Colombia, Costa Rica, Pakistan, Peru, Indonesia, Maldives, Bolivia, El Salvador, Argentina and the Philippines.

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