The Land Registration Improvement Project

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The Land Registration Improvement Project has previously, and to some extent still is, known by the name of POLARIS. POLARIS is an acronym which stands for Province of Ontario Land Registration Information System.

In 1978, a comprehensive report titled "An Improved Land Registration System for Ontario: Design Concepts and Recommendations" was completed by the Land Registration Management Committee.

The basic recommendations of that report are:-

- the Province shall retain responsibility for land registration;

- both the registry and land titles systems shall be retained, at least in the short term;

- both systems shall be improved to the extent possible;

- a single system for land registration shall be used if, after improvement to both, one system proves clearly superior.

The concepts report was submitted to senior levels of government and in July 1979 Cabinet gave approval in principle to the concept of achieving modern reform through improvements to the existing dual system of Land Registration.

Approval of a proposed organization for the project was given in December 1979. The organizational structure consists of a Project Director, four managers, one each for the areas of surveys, legal, systems and operations.

Mr. Norman K. Harris was appointed to the position of Project Director in July of 1980. All of the managers and most of the analysts, technical and support staff have been hired and are now working on the project.

PROPERTY MAPS WHAT ARE THEY AND HOW WILL THEY BE BUILT?

The Concepts Report states that a property map must have the following general characteristics:

- all registered properties are shown;

- the properties shown exist on the ground;

- the relative location of a property to its neighbours is correct;

- a property illustrated on a map (to scale) has approximately the size and configuration of the property existing on the ground; and

- properties are related to the ground in some manner.

The process of building the initial property maps can be divided into two components. The first component consists of the collection of the data which exists in the 65 land registration offices in the province. This data is contained in plans of survey and registered documents and provides information about property boundaries, property ownerships and values and the encumbrances which are relevant to those properties.

The boundary information does not normally give the geographic position of a property, that is, it does not define the boundaries in terms of longitude and latitude or plane co-ordinates.

Instead, the property boundaries are defined in terms of their position within a township lot, or in relation to another registered plan.

The township fabric which was superimposed on much of the ground surface which forms the Province of Ontario is composed of a series of more or less regular grids and some of the intersection points of those grids were marked on the ground by survey monuments. These grids, however, are inadequate as a control network since they suffer from some severe deficiencies:-

1. The geographic position of the grid intersections was not determined;

2. The dimensions of the grids laid out on the ground rarely fits the intended dimensions and no accurate record of the differences exists unless a resurvey has been completed;

3. The original monumentation has disappeared in many instances;

4. The orientation of the various township systems differ; and

5. The Province is not completely covered.

Combined with these problems are those imposed by the fact that the plans and documents which exist in the land registration offices can, and often do, contain information which is wrong or not clear. In addition, information may be missing from the land registration system.

The result of all of these problems is that an individual will experience considerable difficulty when an attempt is made to plot, on a piece of paper, all the properties which exist in a given area. Quite often the boundaries of properties will not fit together properly.

The completion of the first component, then, involves collecting the data from the land registration offices, dealing in some manner with the errors and inconsistencies contained within that data, and producing a property map which shows the properties, to scale, as they exist on the ground. This goal must be realized without resurveying all of the properties in the province.

The problems which exist with the data that will be gathered cannot be solved by applying just a mathematical adjustment. The solutions applied must take into consideration the law that applies to land boundaries, surveying and land ownership.

The second component in the map building process involves the determination of the relationship between property boundaries and the ground. Where do these properties exist on the earth's surface? This relationship is determined by calculating the geographical position of boundary corners.

It is envisioned that this ground relationship will be determined from various sources such as:-

1. Ontario Base Maps (OBM) which show both U.T.M. co-ordinates and the township fabric.

2. Derivation of U.T.M. co-ordinates for the intersections of transportation networks through the use of the Ministry of Transportation and Communication's transportation network geocode.

3. Existing maps, plans and surveys which show co-ordinates established through ground survey for township lot corners or property corners.

It is readily apparent when examining the sources of the information that will provide the ground relationship required for the man-made property layer (that is, a layer of information about land that is comprised of theoretical lines that

form property boundaries on the earth's surface) that the precision of this information will vary. Ground surveys which relate township lot corners and property corners to geodetic control stations will provide precise co-ordinate values for those corners. Co-ordinate values obtained from the other sources mentioned will vary in precision with the circle of error being perhaps as much as thirty feet in some cases.

The completion of the second component in the property mapping process, then, requires that the best possible ground definition of the township lot fabric be obtained and the property boundaries be fitted into this framework.

The solving of the problems inherent in this process will be difficult. Since we are lacking the precise co-ordinate values for the township lot fabric which would provide a rigid reliable framework within which we could fit the existing properties and considering the fact that the land registration system will often provide accurate geometric definitions of properties or even township lots (which we would prefer not to change) the situation becomes somewhat fluid.

Although I have described the above process as two separate components they may, in fact, occur simultaneously. The difficulty of the problems which must be solved can be alleviated to some degree by making full use of all existing mapping prepared by government ministries, municipalities and other agencies. The Ministry of Consumer and Commercial Relations would especially benefit from mapping programs which result in maps which show township lot framework, cadastral fabric (the registered plan layer) and property ownership, all of which are related to the ground. An example which is close to this type of mapping is provided by Ontario Base Maps which have had the cadastral layer added by a municipality.

The goal of the Land Registration Improvement Project is not just to develop the capability to produce a hard copy property map which can be displayed in a land registration office (LRO). Rather, it is our intention, through the processes outlined above to create a collection of data about land inside a computer. This computerized file will not only describe the geographic location of the parcel boundaries but also such attributes as ownership, encumbrances and possibly land use. By associating with any given parcel a description of its boundaries in UTM co-ordinates together with data such as value and owner's name the computer system will have the capability of providing much more than a hard copy property map. This arrangement of this type of data will allow us to combine the data in various ways to produce information which is very useful to government, municipalities and many agencies in the private sector.

This type of information, which can be related to a specific piece of ground, is of great value to those individuals who are responsible for the management, development, appraisal, taxation or sale of land. The system I have referred to can be described as a **georeferencing system.**

The opportunity also exists to combine other data which are not resident within the land registration systems, such as data on taxation, utilities, zoning, housing, soils etc. Since these data are collected by other ministries or agencies, who are responsible for their accuracy, completeness and timeliness ways would have to be developed for exchanging these data with ours.

Such facilities would provide, in the Province of Ontario, a series of digital data files, which contain data about land, and which together form a provincial land data base.

This concept of the ability to exchange information can be referred to as compatibility. Compatibility is essential in order to avoid duplication of information in files or on maps.

Compatibility also allows greater scope in planning and managing our resources since information from various sources can be combined and it becomes economically feasible to gather much larger amounts of information.

Compatibility is concerned with the extent to which data or maps can be usefully shared by two or more distinct users. In other words, to what extent can user A receive data from user B, merge it with A's own data and obtain information from the combined data?

There are two areas of compatibility which we must investigate. One is the thematic mapping and the other is computerization. As far as thematic mapping is concerned, we are interested in the degree to which the Land Registration maps could be used by other organizations. In the realm of computerization we are interested in our ability to supply land-based data to other organizations and also to receive such data from external sources.

Since a large part of our concern revolves around computerization, we should first identify the ways in which we might use computers. There are three ways in which computerization could occur:-

1. Maps can be digitized to provide a graphics file. Such a file describes points, lines and polygons. These may be grouped into classes, e.g. roads, rivers, properties, etc. In effect, this simply provides an automated map drawing facility;

2. "Standard" data processing files which are in use in the electronic data processing field today (e.g. describing owner, tax value etc. of each property) can be geo-coded by having the geographic location of some point within the property (e.g. centroid) added to that property record; and

3. A geo-referenced system can be developed which essentially combines the first two. For each property, the single system would contain:

- data concerning the shape, size and geographic location of the property.

This data is sufficient to plot a map of the property, and

- attribute data such as owner, tax assessment, etc. which is related to specific properties.

The Land Registration Improvement Project could create digital files of information and the required mapping capability using either a combination of the digitized maps plus the standard data processing files which have been geo-coded in some manner or it can use a geo-referenced system.

A geo-referenced system would provide adjacency and would allow for precise geographic analysis which can be combined with non-geographic data. It will also allow questions to be asked concerning the relationships of features (such as properties) and the related attribute data on an "ad hoc" basis. A geo-referenced system, however, may be expensive to build.

The combination of digitized maps plus standard data files, on the other hand, requires that questions be predefined to a much greater degree so that the ability to provide the answers is built into the system. It also may be difficult to build in the concept of adjacency.

The objective of compatibility, as far as maps are concerned, can be very easily summarized by stating that it should be possible to overlay two maps of the same area in order to derive composite information. The factors which determine the possibility of doing this are as follows:-

- map projection;
- scale;
- size and orientation of area covered;

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- equivalent grid cells to allow identification of identical points;
- symbology;
- positional accuracy of:
  - township fabric;
  - cadastral fabric;
  - map format.

The most basic level of compatibility would be provided if the two map series shares the same:-

- map projection; and
- scale.

It would then be possible to overlay the two maps to combine their information. If the maps did not cover precisely the same area, the lack of uniform grid cells would complicate (slightly) the process of aligning the two maps. Lack of positional accuracy could result in the same feature appearing in different positions. Different symbologies could make reading the maps difficult.

It should be noted that if maps are computerized, the question of scale is less important since automatic changes of scale are possible.

Positional accuracy will be the hardest attribute to provide. Provision of complete accuracy would require a multitude of decisions concerning the relative merits of conflicting sources of information. In many cases the L.R.O. data would be more accurate than OBM data and this could necessitate changing the OBM base. Ideally, accuracy would imply that each feature would be defined by one agency. Practical considerations may make this ideal impossible to achieve.

We are rapidly entering an era where new and very exciting technology will radically alter the manner in which we gather data and extract information that is required. We will be able to assemble large volumes of information in amazingly short periods of time in order to better manage our land and resources. ●