INFORMATION MANAGEMENT STRATEGIES FOR REPORTING ON PROTECTED AREAS INFORMATION

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Abstract

To capture, manage and report on protected areas information, the Ontario Parks Planning and Research Section has engaged in developing a multi-user information system. Using a new approach to information management, this application provides the foundation to meet diverse data and analysis needs for work around regulation, planning, and future projects like monitoring and State of the Protected Areas Reporting. Using an architecture approach to building the Protected Areas Registry (@PAR), our business functions were identified and translated into business requirements. This approach created the first building block in an overall information strategy to better integrate protected area information. This enterprise approach to business architecture depicted the connection between services and user requirements. The application will manage base information related to protected areas including policy initiative, size, class, geographic context, and at high level track the regulation and management planning process. As an internal web based application it makes integrated information and automated reports accessible to park's staff, planners, ecologists and regulation coordinators across many MNR offices. For external information needs the @PAR system reports can be exported and made available through electronic means. Future development of this system will expand to encompass other park's business related to inventories and monitoring.

Introduction

In response to a growing need for consistent protected areas information to support science, research and planning needs, a business architecture approach was taken to understand requirements, set priorities and select solutions. This undertaking was also influenced by the new standards for information management and technology at the Ministry and Land Resource Cluster level. The need for a systematic approach to managing information coupled with the information management standards created an ideal environment to translate business requirements to an operational information system. By promoting enterprise approaches and electronic service delivery, an iterative approach to application development like rational unified process (RUP) and the concept of building for re-use was applied. Through a collective developmental process the first end-user product of this architecture approach has produced @PAR, the Protected Areas Registry system. This multi-user web based application will manage and track Ontario's regulated protected areas. Ontario Park's staff will have access to information about policy initiative, size, park class, geographic context, and at high level track the regulation and management

planning process. In addition, it includes a protected area profile that includes integrates baseline and geographic overlay information. This paper covers how technology is being leveraged to provide persistent and standard information at the protected area site and provincial system level. This application fits into an overall strategy to better integrate data and present it to the user. The intended audience includes Ontario Park's staff and the MNR staff involved with Provincial Parks and Conservation Reserves. The initial implementation will focus edit functions to a limited number of staff; with subsequent analysis more users with edit privileges will be able to collaborate on projects by having joint author roles in this tabular system. The generation of standard format reports will also assist in creating information products for the public and partners.

Overall, technology was leveraged to provide persistent and standard information to summarize data at the protected area site and provincial system level, respond to daily queries, and report on the status and size contribution of protected areas. In the development of a multi-user information management system it is important to have a vision to provide scope and ensure long-term use or success. Ontario Parks is striving to move the enterprise architecture solution forward and build a base system to facilitate the continuation of architecture of more services as resources and priorities allowed.

Goals

It was well understood that the vision for this system should recognise that protected area's are dynamic and that research and planning activities require long-term support to analyse datasets over time. This theme of integrated and systematic information helps support the corporate mission statement and enable the transfer of scientific knowledge and information stated in *Beyond 2000*, the document for Ministry of Natural Resources Strategic Direction (OMNR, 2000).

In general, success was linked to a design that was based on well defined user needs and well communicated goals. The vision for the system is to provide the following:

- improve access to information, digital products and data sharing;
- promote collaboration amongst staff and other program; build capacity;
- integrate information about protected areas using both spatial and tabular data;
- provide standard automated reports;
- support base data and sound information management techniques;
- decision support tools, automation and easy to use information systems;
- credibility, standard techniques and documented processes;
- move the enterprise architecture solution forward; and,
- best practices, directions around I and IT standards and system life cycles.

The management planning and regulation process for protected areas is information rich; to support these processes the integration of many sources of information are required, specifically, for internal collaboration in project work flow and data for reporting requirements needed for external consultation. With these requirements it was necessary to build a protected area profile for foundation information. In addition to these core business

functions the data and integrated reports provide some of the key pieces required for other projects, in particular the building of the State of the Protected Areas Report. This theme of integration helps support the corporate mission statement and enable the transfer of scientific knowledge and information (Beyond 2000).

As part of our larger information management strategy this system will integrate and link with other corporate applications. Using web addresses, the registry will store the URL address of documents, pdf's of management plans and inventories, stored in our corporate document management system (ODMS.) Other applications developed in parallel like the *Ontario Parks Atlas*, an ArcIms interactive web map application, will utilize the same protected area base information, by building from the same source base tables. Also, future development of this system has the potential to encompass other park's business related to inventories and monitoring.

Approach

Based on the results of an 'Enterprise Architecture' done in collaboration with the Natural Heritage Information Centre (NHIC), collectively our services and business functions were identified and prioritized. This high level exercise, along with current business priorities, focused the next steps for Ontario Parks to take a small piece of the architecture, mainly the regulation and management direction functions. Enterprise architecture is a framework that applies to organizations to provide logical structure for classifying and organizing the descriptive representations of the organization that are significant to its management. (Government of Ontario, 2003) This process helped us to organize the information, how we needed to use it, where it was derived, identified the various pieces, processes and high level rational.

In the scoping exercise that followed, it was important to view existing methods of information retrieval and data uses, including standalone excel, GIS based shapefiles and coverages, word tables and access systems. Using a small multi-disciplinary expert group, staff in Ontario Parks used collaborative sessions to refine business rules, detail and data requirements to create 'Use Cases' depicting our requirements to create a logical data model. The Use Case presented a means to document needs, business rules and attribute definitions. A development team used these documented Use Cases to create a live prototype. Parks staff used this concept and visual representation of the application prototype to review and validate their requirements.

As with any system, implementation involved other important steps to consider data migration, quality assurance, user acceptance testing, user manual documentation and review evaluation and feedback
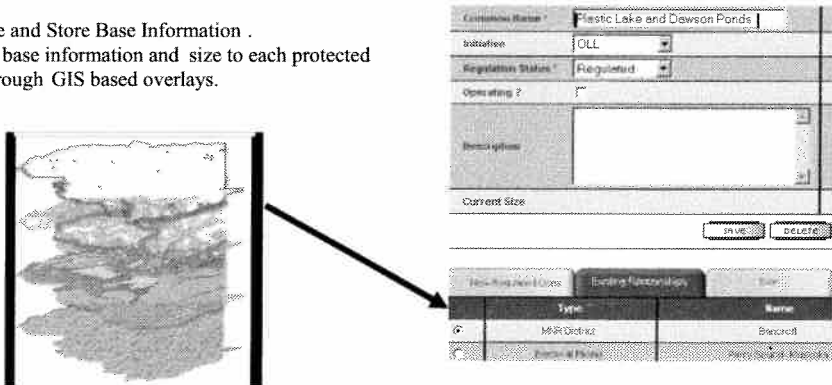
Application Components

The Protected Areas Registry application is based on J2EE n-tier technology and is presented to the user through their internet browser. The application has four main modules

to provide information about protected areas from inception to regulation.

Protected Area Profile. This module will contain the base information about the site and relate associated information on heritage values, designations and administrative boundaries, derived by an ArcGIS overlay processes (Figure 1). The record will contain the name of the geographic area, and the size represented in hectares. For example the District name, Peterborough, and the amount of hectares the protected area represents within the Peterborough district.

Figure 1. *The overlay process using Quetico Provincial Park. These routines are performed in ArcGIS using the Identity feature. Overlay results are summarized and then reported in the @PAR system.*

Regulation Activities. This area will contain the area and usage regulations applied to each protected area, with area sizes and regulation number. As part of the regulation process a protected area Policy instrument, Act, or legislation will be recorded. Specific information on regulated uses like hunting and the defined area of the use will also be recorded.

Management Direction. This area will track the type and status of management direction plans created for the area with approval dates.

Projects Tracking. This area is flexible to track projects, the details around each stage

of the process and associated issues.

To understand the scope of this project, the definition of protected area must be examined. Protected area has been defined as: An area that has been given (or is proposed to be given) some level of protection from development and human activity, either through legislation, regulation or through an instrument with a private land owner such as an easement. This definition is broad in intent and will enable the future incorporation of other protected areas types. The first release will focus on four types of protected areas; Provincial Parks, Conservation Reserves, Wilderness Areas and National Parks. Each protected area will be associated with a regulation or proposed policy instrument. National parks are tracked for the purposes of understanding the sum or land protected at various levels.

Integrated Data

Area profile information will be derived from overlay analysis of protected areas in combination with 12 – 15 various digital layers. Each protected area record will contain information about its representative size along with the total size for each area profile overlay. The following set of standards and steps prepares data for integration to populate protected area and area overlay profiles in the @PAR system. The best technique to bring together area based information is to leverage GIS technology. For data preparation the spatial operations will be prepared outside the system; existing data layers stored in NRVIS can be analyzed in Argos with the identity operation. Each protected area record is stamped with the overlay attributes and a size for the intersected polygon derived. Profile information will be used to understand surrounding land-use, designations, class targets, and administrative and natural boundaries for reporting on an individual and protected area system basis. This presents the user with an effective use of information, seamless, analysis of trends, and set reports all from one source. The difficulty in designing a system to bring many pieces together typically centers around 'scope-creep' and changing business priorities. The most efficient practice around this involved the focused effort on the original intent and vision for the system; additional user input was directed into the communication and planning future development and application enhancements.

Benefits

Using a formal approach to business architecture and systems development is resource intensive but the long-term benefits are many fold. The system incorporates policy driven business rules, and treats data as an asset by introducing security and storage procedures. The big picture exercise that an architecture approach introduces makes your data model more broad reaching and extendable.

Business architecture prepares a program area for an overall information strategy that assists in measuring our desired outcomes by supporting the strategy of Knowledge and Information. To achieve the desired outcome of Natural Resource Science and Information Available this database and system create a foundation to build additional

services and functionality. The system is also integrated and linked with other information systems to provide consistent information (Figure 2).

Figure 2. The system overview and how @PAR links to other systems. In future, development will be targeted at a more dynamic solution between the maintenance and presentation of the spatial and tabular data.
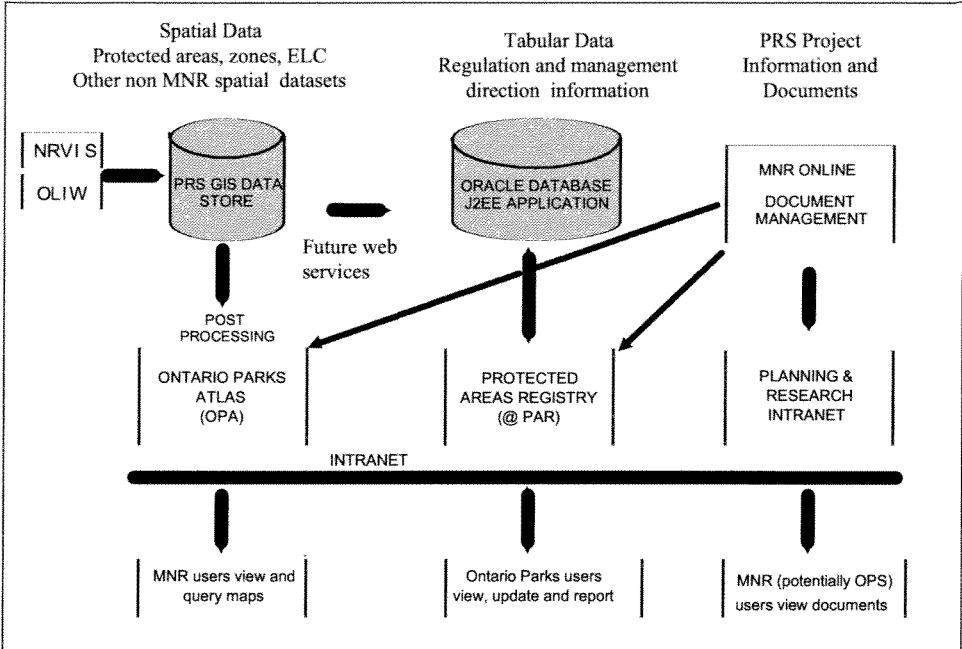
Overall, functionality has been built for users depending on their role and permission to view, search, manage, update and report. Data is stored centrally with business logic and accessed across multiple sites throughout the province. In expressing the need for reporting functions the user of the system also has the ability to filter and generate reports, create new standard products that provide relevant summaries and value added products. In addition to these benefits there are many more that build decision support:

- accessible to all Parks staff to view and reports at a provincial, region, district and zone scale;
- improves ability of staff to collaborate on projects;
- provides database and system foundation ;
- central source for baseline information, consistency and standard reports on protected areas;
- add value, credibility and demonstrate accountability;
- identify opportunities, needs and gaps in information;
- roll up protected areas information on various scales;
- dynamic and long-term support to analyse data sets and protected area status over time;
- business rules and security helping to treat information as an asset; and,

• introduces a vision to work toward a higher level program strategy.

Conclusions

The ability to systematically store, capture, manage and report on protected areas information has provided Ontario Parks with a decision support tool and ability to respond to the many queries on protected area numbers and status. By taking a business approach to information the program area can be much more strategic about managing information to benefit research, analysis and reporting.

A transaction web based system was required to record the history of a protected areas as it goes through regulations, possible additions, planning and policy initiatives, changes in area size and shape, and usage. The base information allows analysis of management practices, assists in the regulation process, size and representation targets.

As an internal web based application it makes integrated information and automated reports accessible to park staff, planners, ecologists and regulation coordinators across many MNR offices. Future development of this system will expand to encompass other park's business related to inventories and monitoring.

Through post-implementation feedback and priorities the future development roadmap will be charted. This system has the potential to encompass other park's business related functions such as capturing inventories and monitoring information.

Acknowledgments

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