



Smart Grid Road Show 2008: A Transmission GIS is More Than A GIS

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Manitoba Hydro Facts



Manitoba Hydro is a Crown Corporation and the province's major energy utility:

- Serves 521,600 electric customers throughout Manitoba and 261,150 natural gas customers in various communities throughout southern Manitoba;
- Has capital assets-in-service at original cost exceeding \$11 billion;
- Operates 14 hydroelectric generating stations, primarily on the Winnipeg, Saskatchewan and Nelson rivers;
- Transmit electricity from 24 kV to 500 kV including direct current (HVDC) transmission systems; and
- Exports electricity to over 30 electric utilities through participation in four wholesale markets in Canada and the mid-western United States.

1. Introduction

The Changing Transmission Business...



Transmission Business Continues to Change



The nature of the transmission business has changed considerably over the past decade:

- Increased external oversight related to reliability, judicious expenditure, property rights, and corporate societal responsibility;
- Increased citizen awareness and entitlement, and environmental issues - There is little room for an error or any forgiveness with operating a transmission line; and
- While many utilities have in place well developed and proven processes, the changing business environment is quickly rendering the current transmission line maintenance practices outmoded.

2. Transmission GIS



A Geospatial Maintenance & Inspection Solution

Why Implement A Transmission GIS?



- Provides a spatial reference to M&I data that is often collected by utilities;
- Provide an asset repository that will compliment the existing enterprise maintenance management system for spatial location of transmission assets;
- Allow the replacement of property and maintenance applications that are becoming outmoded from a business support perspective;
- Provide a means of performing field based maintenance and inspection (M&I) data capture; and
- Provide a means of performing office based analysis of M&I data capture.

Previous MH GIS initiatives have targeted primarily the distribution and power supply areas.

Building A Scalable Solution



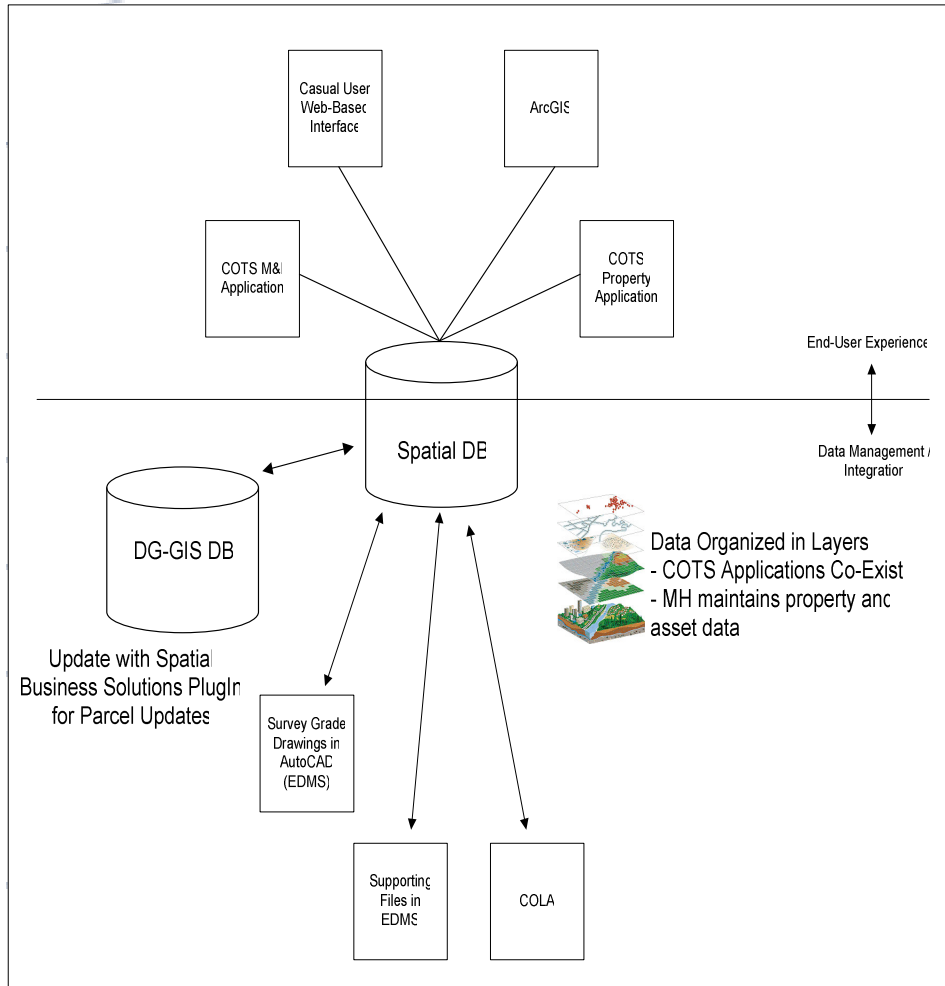
In addition, the deployment of the T-GIS will establish the technology foundation to enable:

- Integrated transmission design;
- Improved access to asset information and history to all field resources through a spatial reference; and
- More effective interaction between Power Supply and Distribution business areas.

Functional Differences of the GIS

Item	Characteristic	Distribution GIS	Generation / Environmental GIS	Transmission GIS
1.	Ability to support high volume of design alternatives.	X		
2.	Able to receive data from other GIS and Oracle spatial with ease – synchronization.	X		
3.	Intuitive approach to creating, maintaining, and viewing polygon based data.		X	X
4.	Maintenance and Inspection functionality (M&I).			X
5.	Property / Real-estate Management functionality.			X
6.	Integration with document management.	X		X
7.	M&I field capture.			X
8.	Integration with electrical analysis.	X		X
9.	Integration with structural analysis.			X
10.	Integration with CIS.	X		
11.	Corridor / ROW management, including vegetation management.			X

T-GIS Architecture



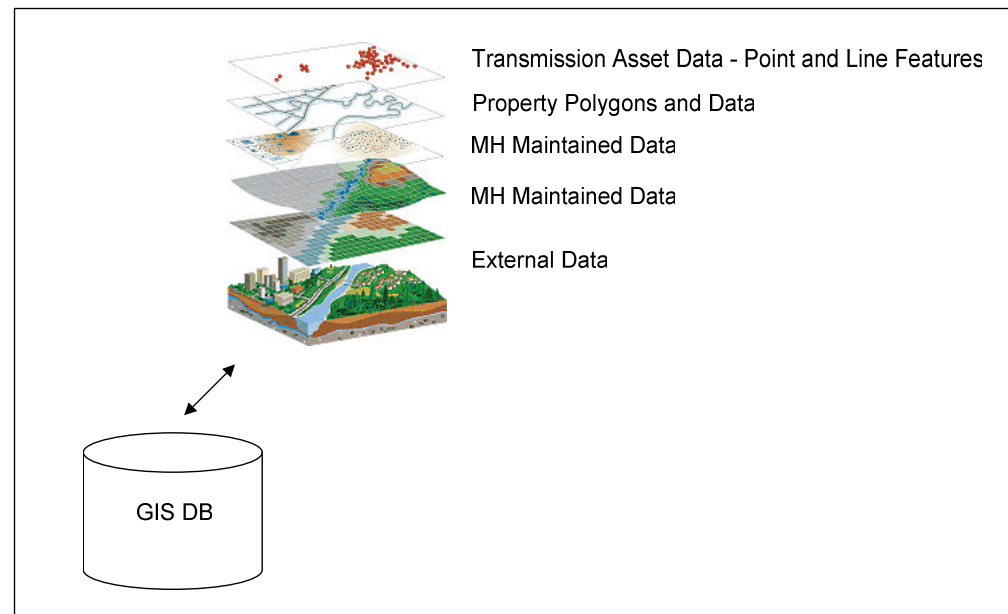
- The T-GIS should leverage existing technology investment and knowledge at Manitoba Hydro.
- Several technology platform options were investigated within the scope of the T-GIS assessment.

T-GIS Environment / Functionality



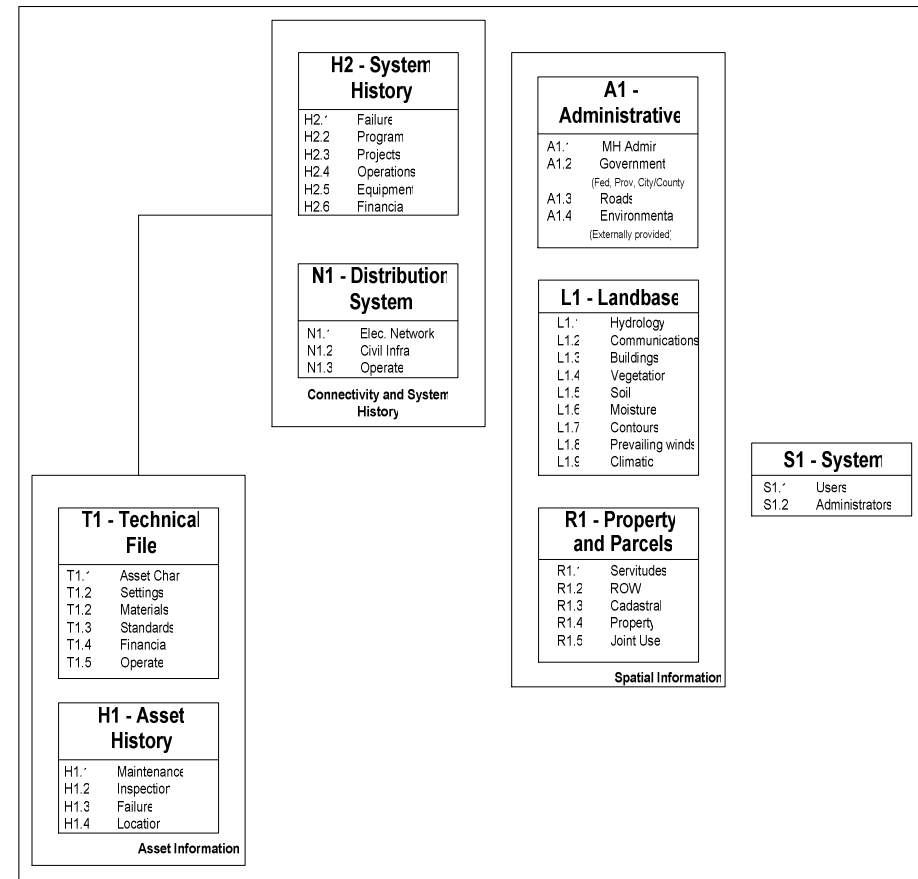
T-GIS will allow Maintenance and Property users to:

- Locate assets spatially;
- Reference physical characteristics and properties;
- Report thematically; and
- Visualize and analyze based on location.



Data Requirements

- Landbase;
- MH Administrative Data;
- Transmission Asset Information;
- Maintenance and Inspection Data;
- Property and Parcel Mapping.



Transmission Business Area Data Relationships

Application Requirements



With the GIS data in place T-GIS will deliver:

- Basic GIS functionality;
- Transmission line M&I;
- Vegetation Management;
- Environmental Licensing Compliance, as a component of M&I / vegetation management; and
- Property Management.

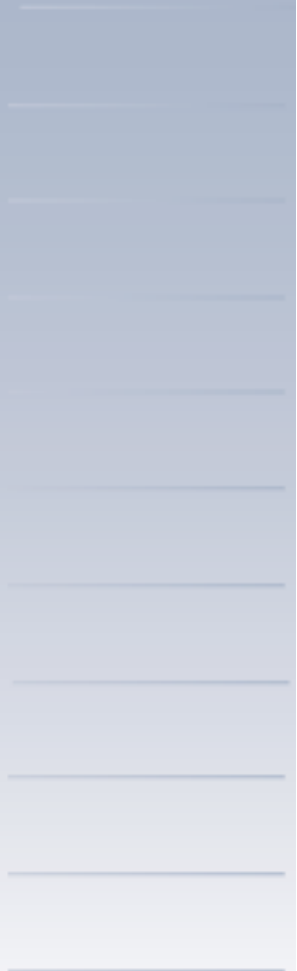
Implementation of the T-GIS will enable a utility to merge, interface or retire existing stand alone applications.

Integration Requirements

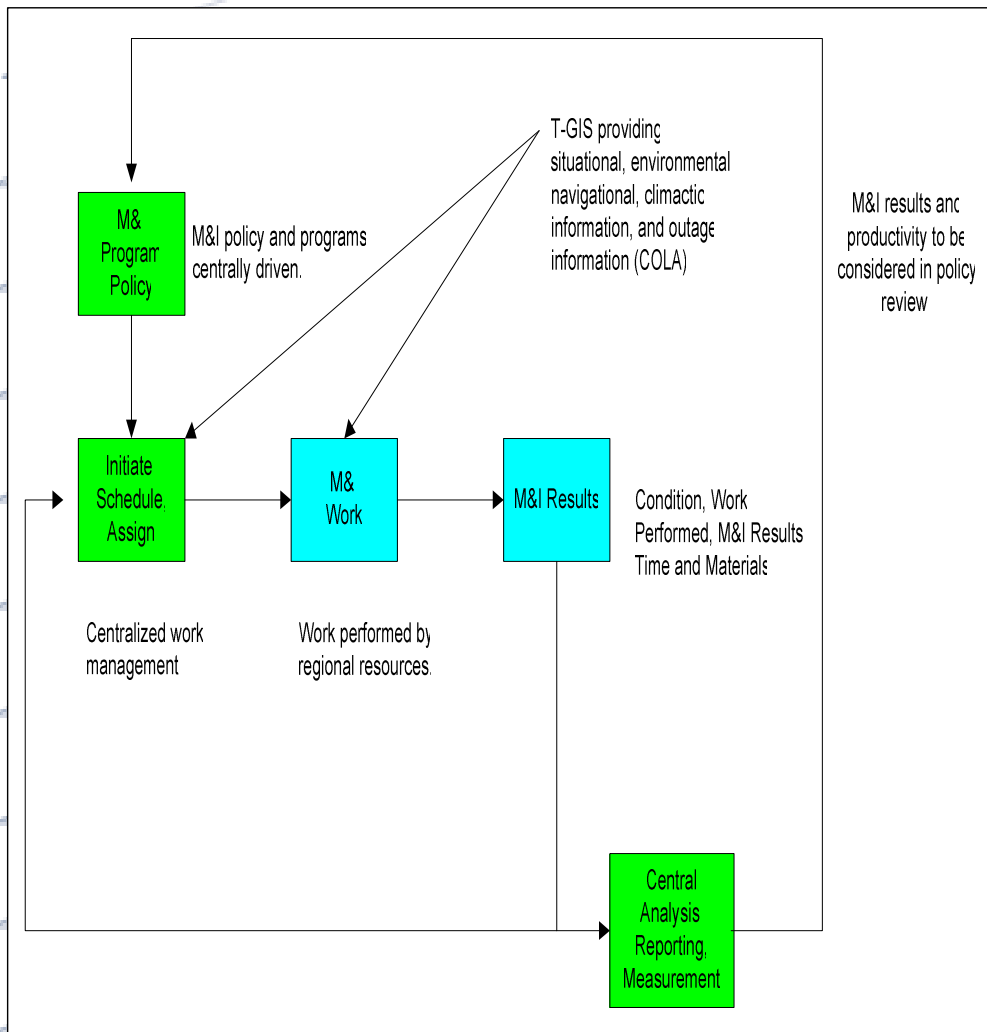


- Integration of transmission line design with T-GIS;
- Integration of electrical system analysis into T-GIS;
- Continued integration of links to electronic documents;
- Inclusion of additional M&I related databases;
- Integration with CIS to enable automated billing for leases and secondary land use; and
- Integration of additional reporting and analytics.

3. Business Process Impacts

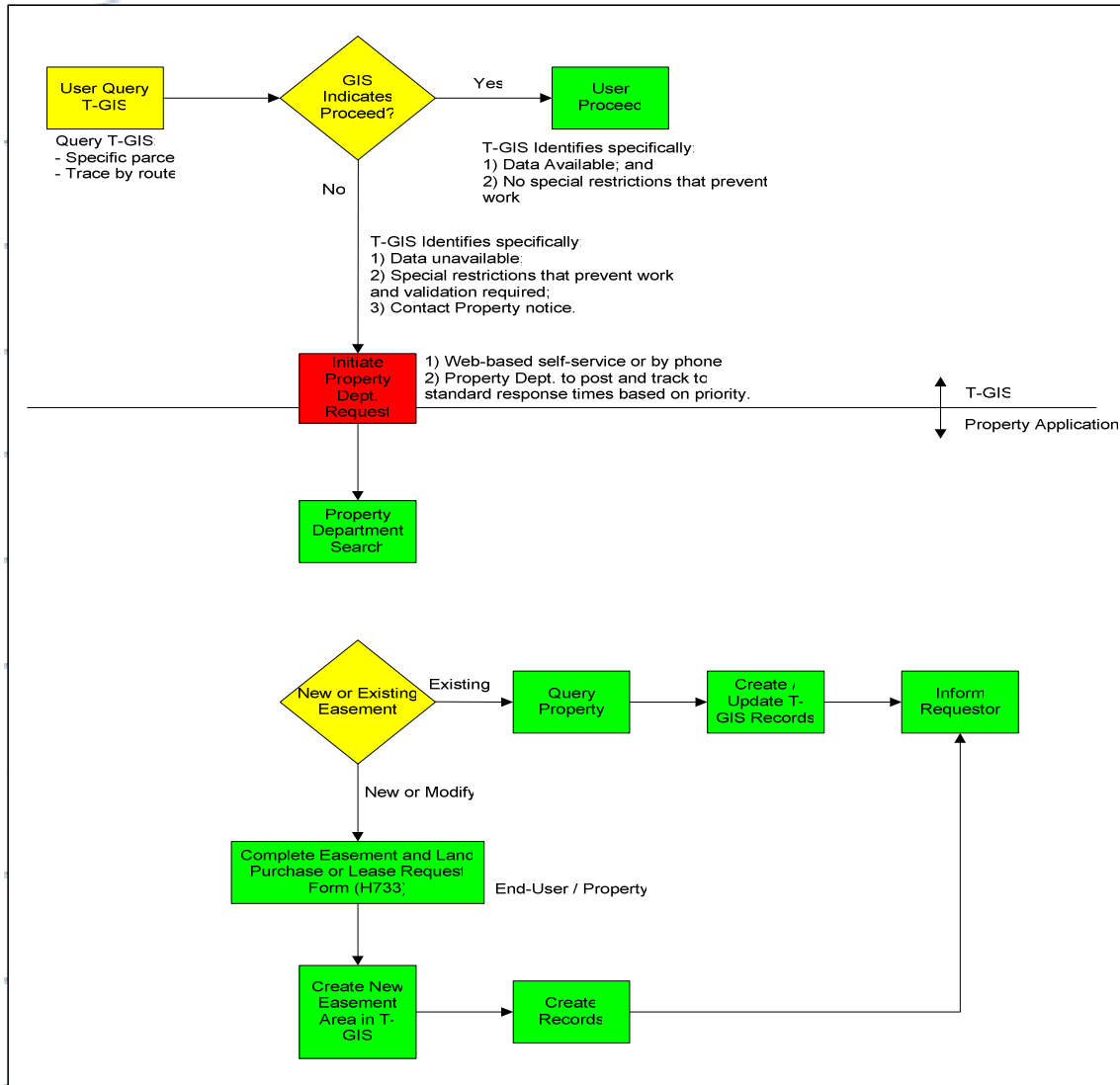


T-Line M&I Business Process Impacts



- Increased visibility on work will allow improved resource allocation and leveling across work areas;
- Next day visibility on M&I results will allow for a more accurate assessment of required work prioritization;
- Capture of estimated vs. actual effort will enable better workload forecasting; and
- Enable central management to provide visibility on corporate performance against NERC Reliability Standards.

Property Management Business Process Impacts



- Specific property searches based on R / W corridors;
- Enable self-service queries within the T-GIS where data is known and available; and
- A work flow engine to initiate and track the work status online.

4. Business Case Highlights



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Business Case Considerations



- Best fit base technology solution;
- Minimal customization;
- Compatibility with third party data sources;
- Lowest implementation risk; and
- Overall best value solution.

A Four Phase Implementation Plan



- Phase 1 – Maintenance, Property, and Infrastructure – Provides base technology to collect the data to support immediate M&I and Property Management functional needs.
- Phase 2 – Data Rationalization – Complete the collection of the necessary asset data to form a foundation for the implementation of analysis and design integration.
- Phase 3 – Requirements Validation – Review the overall direction with the implementation of analysis and design within the GIS.
- Phase 4 – Analysis and Design – Implementation and integration of analysis and design functionality within the T-GIS infrastructure.

Quantitative Benefits



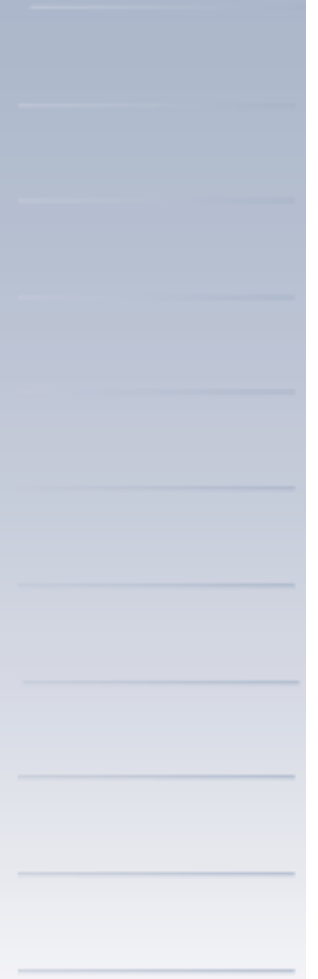
- Improved utilization of field resources;
- Ability to assign resources throughout the MH service territory and reduction in reliance of local knowledge;
- Greater ease in regulatory reporting related to M&I activities;
- Ability to better understand asset failure rates and forecast reliability;
- Improved overall reliability at transmission level;
- Build a more accurate and easily accessible property data repository; and
- Better ability to forecast resource and staffing requirements.

Implementation Risks



- Adequate Staffing – Utilizing software vendors resources and minimizing integration with legacy systems can should be considered.
- Data Redundancy – Duplicate transmission asset data records – Considerable judgment are needed in identifying the most appropriate data source.
- Spatial Data Accuracy – Discrepancies in the positioning of landbase related polygons – Establishing workarounds is imperative.
- Wireless Coverage – In utilities with vast and sparsely populated service territories, wireless coverage is often a challenge – Offline synchronization of data at secure WiFi hotspots should be considered.

5. Summary and Discussion



T-GIS Is Not Just Another GIS



The T-GIS initiative is very different from the previous GIS projects undertaken at many utilities:

- Distribution GIS (D-GIS) and Power Supply GIS (PS-GIS) are often designed to provide a spatial component to non-GIS applications that benefit from spatial enablement of asset data.
- T-GIS is a spatially-enabled asset repository that will provide tools to assist key transmission line maintenance and property management business processes.

Lessons Learned from Manitoba Hydro



- A compelling business case can be developed to justify deploying a GIS solution to management transmission asset M&I:
 - Project IRR associated with the T-GIS investment is above commonly accepted industry hurdle rate; and
 - The payback period is consistent with utility IT investment baseline.
- A phased deployment of the T-GIS solution can better management risk while supporting the immediate M&I needs:
 - Establish long term Vision and conduct Business Case assessment;
 - Establish GIS infrastructure to serve as a technology platform for expansion; and
 - Focus initially on implementing the transmission asset M&I and property management application, both office and field components to start realizing return of investments.

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