



Case Study: Centre for Topographic Information



Key Facts:

Industry: Government

Problem: Ensuring accurate data translation and transformation for new standard data model

Solution: FME

Results: Flexible, efficient data sharing

Location: Quebec, Canada

The Centre for Topographic Information of Natural Resources Canada uses Safe Software's FME to manage conversion of National Road Network data between a Linear Referencing model and a segmented model.

The Organization

The Centre for Topographic Information (CTIS), a division of Natural Resources Canada, is responsible for the acquisition, management and dissemination of topographic information for the Canadian landmass. CTIS is realizing its mandate through the provision of national framework datasets via the national GeoBase initiative of the Canadian Council on Geomatics (CCOG) www.geobase.ca.

The Situation

Effective management of infrastructure as critical as a country's transportation network relies on high-quality base geospatial information. This information must be accurate, up-to-date, and standardized across the entire country. To be truly beneficial, the information must also be available in a model that is immediately useful to end users.

Most out-of-the-box GIS applications use a segmented road model to link information about real-world road conditions to the correct position on the corresponding map feature. Within the transportation industry, however, the Linear Referencing System (LRS) approach is the preferred method for linking information about a stretch of road to the corresponding section of a road map feature.

Linear referencing offers several key advantages over the segmented model. With a segmented model, road centerlines displayed on the map are broken into a new segment wherever the characteristic of the road changes; representing only two or three different characteristics often results in fragmentation of the road centerline into multiple segments. The segmented model is also labor-intensive to update, since line segment lengths require continual adjustment as road conditions change.

Using a linear referencing model, event information is stored in an event table and managed independently of road features. Road lines are typically continuous features, segmented only at intersections or at provincial or territorial borders. Linear referencing allows many different attributes to be described for any given stretch of road, and updating changes in road conditions and other attribute information involves edits to the event table only - no editing of the road map feature itself is required.

The Challenge

CCOG members, both provincial and federal, were tasked with the creation of the National Road Network, version 1 (NRNv1) - a single dataset of two-dimensional vector map data for over 1,000,000 km of publicly accessible roads in Canada. As envisaged, the NRNv1 would benefit government agencies and transportation industry stakeholders by providing a standard data model with continuous coverage across all provinces and territories.

As the lead CCOG organization tasked with the creation of the NRNv1, CTIS' responsibilities included collating existing data resources provided by federal, provincial and municipal partner agencies, collecting a large volume of GPS (Global Positioning System) data for roads not represented adequately in existing datasets, and distributing the resulting NRNv1 dataset. CTIS was also responsible for coordinating annual updates (through maintenance agreements) provided by closest to source partner organizations. CTIS distributes this data in the segmented model through the GeoBase portal at www.geobase.ca.



Much of the NRNV1 data provided to CTIS from collaborating agencies is provided in a segmented model. However, CTIS also recognized that some provincial partners would require NRNV1 data in the LRS view. To accommodate these needs for divergent data models, CTIS required a solution that could:

- transform segmented data to LRS data
- transform LRS data to segmented data
- transform LRS data into any one of the three LRS distance measures required by the end user - either percentage measures, ground unit measures, or point locations defined by coordinate values
- preserve the spatial accuracy of the data while moving from the segmented view to a LRS model, and also the accuracy of measure values
- ensure the conversion from LRS to segmented and back to a LRS model is lossless and that all attributes and coordinates are preserved.

The Solution

Based on previous collaborative projects between Natural Resources Canada and Safe Software, CTIS identified Safe Software's FME® platform as a superior solution for restructuring both map feature geometry and associated attribute data.

In consultation with CTIS, Safe Software's Professional Services team designed a number of FME data transformation workflows in FME's Workbench application to convert LRS data to the segmented view, and vice versa.

FME was able to read any Linear Reference Method (LRM) provided in the event table - either ground unit measures, % distance measures, or point measures - then create a segmented data model by splitting road centerlines at the appropriate locations to represent changing attribute values. FME also copied attribute values from the event table across to the corresponding road segment.

To create LRS data from the NRNV1 segmented view, FME's Workbench transformers calculated the length of each segment of road that matched a given attribute value, then stored the resulting measures in the event table in three different LRMs - as ground unit measures, % distance measures, and coordinate values. Road segments were then joined to create a continuous road feature or route.

The Benefits

The first version of the National Road Network - the NRNV1 - was available for all provinces in Canada by March 2005. NRNV1 offers a limited set of attribute information for many regions, including number of lanes, road surface type, and route name, number, and classification, and is available in the segmented data model. Customers requesting NRNV1 data are able to download segmented data as GML or ESRI Shapefiles via the GeoBase website at www.geobase.ca/geobase/en/data/nrn/index.html.

A demo dataset of the second version of the NRN (NRNV2) has been available from the GeoBase portal since March 2007. The demo dataset includes additional address information such as address ranges and street names, and is available in KML format in addition to GML and ESRI Shapefiles.

FME's Workbench application enabled CTIS to provide on-going data sharing with certain partners and maximize the utility of the NRNV1 data for each partner agency by providing NRNV1 data in either a segmented view, or a LRS view using any of the three common distance measuring methods.

Learn More

To find out how FME can help address your data interoperability challenge, or to download a free evaluation copy of FME, visit www.safe.com.



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