A DIGITAL LAND-PARCEL INFRASTRUCTURE FOR FRANCE

Large Scale Reference Database

All users of geo-information require large-scale maps accurate to the metre or even, in urban areas, the decimetre. This, along with anticipated new uses and needs, has driven development of Franceâ€™s Large Scale Reference (RGE) database. The work has meant rectifying the coordinates of digital cadastral maps to fit existing orthophotos and topographic databases.

The Large Scale Reference (RGE) database is a set of consistent and complementary data which serves as a digital mapping-based infrastructure for the whole of France. Thematic data relating to a wide range of applications can be located or updated on the RGE database. Developed, maintained and made available by the National Geographic Institute of France (IGN), RGE comprises four separate but related databases:

- Orthophotographic Database
- Topographical Database
- Postal Addresses and Street Names Database
- Land Parcel Database.

The last, called within RGE the Parcellaire DB, is being produced by IGN from digital cadastral data in the Land Registry provided by Franceâ€™s Direction GÃ©nÃ©rale des Impots (DGI) under a multi-year agreement.

Public Domain
Cadastral maps provided by DGI each represent a cadastral division and are delivered in vector or raster format, depending on the area covered. One of the problems encountered is that these digital cadastral maps do not very well match existing orthophoto and topographical databases. Therefore a rectification stage is required to transfer the coordinates so that the cadastral map fits the other RGE databases. A first step towards rectifying the cadastral database is to subject the vector files to batch process, where some analysis and pre-processing is carried out to prepare the data for the Land Parcel Database production process. Next, the public domain, land â€˜parcelsâ€™ that are not privately owned, such as roads and pavements, are extracted and compared with the road axes from the topographic database.

Edge Matching
In a next step, transformation parameters are determined to actually re-compute the coordinates in the DGI dataset. This is done by predefined methodology consisting of several stages. In the first, an overall Helmert transformation is carried out, which transforms the entire vector map to the coordinate system of the topographic database using â€˜root mean squaresâ€™ methodology. In the second stage, more displacement vectors are determined to enable interactive application of a rubber-sheeting transformation to each new vector until the public domain is correctly positioned with the orthophotos or the road axes on the topographic database. The next stage is edge matching: by defining matching points on adjacent boundaries of the cadastral divisions, average positions for the limits are automatically computed. This takes account of rules including tolerance based on scale and quality of the data to control distortion of the cadastral maps. The land parcels at cadastral division borders are then automatically adjusted to fit the new boundaries. The same process is then applied to council boundaries in order to edge-match these.
Of course, over time, as land and property parcels change, the DGI will provide updated cadastral maps. To cater for this all metadata, such as displacement vectors and edge-matching parameters used in the transformation and rectification processes, are stored in an XML file so that they can be applied again, automatically, when the updated cadastral maps have to be processed.

Concluding Remarks
All the processing is done with CadSIS software. Development and implementation of the applications was carried out by Lyon-based Geomod, a Cadcorp business partner, in partnership with FIT Conseil, awarded a contract by IGN in 2004. Using the CadSIS system, many of the tasks involved in creating the Land Parcel Database have been automated.

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