Official Surveying in Luxembourg

✓ cadastral databases
✓ update procedures
✓ data exchange techniques

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Data inventory

- Parcel ownership and rights database
  (Publicité foncière (PF))

- Digital cadastral map
  (Plan cadastral numérisé (PCN))

- Official surveying database
  (Mensuration officielle (MO))

- National address database
Parties involved

National center for information technologies (CTIE)
- Database for parcel ownerships & rights
- National Adress DB
- National Citizen DB

National cadastre and mapping authority (ACT)
- Management of the official GIS Databases
- Official Survey management & control
- Survey jobs

Private Surveyor (Géomètre officiel (GO))
- Survey jobs
Parcel ownership and rights

- separate database (IBM-DB2 mainframe) and software (Publicité foncière)
- localized externally (CTIE)
- connected with the GIS / cadastral databases through webservices
- reference database for
  - Parcel ownership and rights
  - Parcel identification numbers (ID)
  - Field names and other reference lists
Digital cadastral map (PCN)

- Nationwide definition of an approximate mutual position of parcels
- Partly based on official surveyings
- Origin: ancient, analog and not georeferenced cadastral maps (scale 1:2500), updated manually from 1824 to 2000
Digital cadastral map (PCN)

- Digitization and geo-referencing from 1997 to 2001
- In 2002, introduction of a CAD-based update concept, used until 2012
- Beginning in 2012, cadastral data is stored in a modern SDE-database and managed with ESRI-based software products
  (GEONIS, GEOCOM Informatik AG, Switzerland (CH))
Digital cadastral map (PCN)

- Build with point, line and polygon featurelayers
- Based on a centroid-edges GIS scheme
  - 680,000 parcels
  - 194,000 buildings
  - 6,34 Mio parcel edges
  - 1,24 Mio building edges
- Change records through ArcGIS-GeoDB history and additional historical data stored in GIS and ownership databases
- Proof of historic parcel and rights mutations possible until origins
Digital cadastral map - challenges

- Initial data quality (1824) and error propagation during almost two centuries of updates created an inhomogeneous dataset presenting up to 25 meters of dislocation opposite to the national coordinate system (LUREF)
- Building representation is out of date or rather incomplete on cadastral map due to a lack of survey obligation

➢ Cadastral map is thus quite unsuitable as a planning document, which is however largely required
Solution statements

- Position adjustments on cadastral map
  - local adjustments with affine transformations (Delaunay-Algorithm)
  - position accuracy is improved up to 80%
  - maximum accuracy up to 1-2 meters
  - 30% of the parcels located in urban areas have actually been treated

- Complete renewal of the building data (LiDAR, orthophotograph,...)

- Parallel buildup of the official survey database (MO) containing precisely measured surveying data
The national address database contains:

- exclusively alphanumeric data (Municipality, locality, street, housenumber,...)
- interface with
  - the national population database (RNPP)
  - the parcel owner and rights database (PF)
  - the GIS-system
- connection between address and parcel
  - countrywide georeferenced addresspoints
- Web-services for external users
Official surveying (MO) - contributors

- Private surveyors, established by law in 2002
- National cadastre authority
  - treats unfortunately still 58% of the official survey jobs
  - supervises the cadastral compliance of the activity of the private surveyors
  - archiving, management and update operations on all cadastral data
Official surveying (MO) - technology

until 2002
- separate CAD-Data
- central data archive
- analog update operations on cadastral maps

2002 - 2012
- separate CAD-Data
- central data archive
- CAD-based update system of cadastral data

from 2012
- central GIS-Database
- intelligent and automated DB-update system for surveying and cadastral data (MO & PCN)

from 09/2014
- introduction of GML-based data exchange format
- fully automated data exchange with private surveyors
Official surveying (MO) - technology

- data management with ArcGIS versioning technology (reconcile/post)
- efficient database lock on all parts concerned by updates
- combined PCN and MO data update procedures
- guaranteed data consistency and identical update status of both databases
- predefined processes lead to error minimization and efficiency
Official surveying (MO) – data exchange

- data exchange procedures between private surveyors (GO) and national cadastre authority (ACT)

- **GO2ACT**
  - standardised GML interface (starting on 15/09/2014)
  - XML schema described in INTERLIS-GML 2.3
  - online data upload possibility
  - rigorous data verifications of all features (geometry, attributive, ...)
    - error reports sent by email
  - database integration procedures managed by FME and ArcGIS server

- **ACT2GO**
  - fully automated GML data supply (PCN & MO)
  - free of charge
Official surveying (MO) – data exchange

Survey job

Download link for GML-Data

Postal mail from ACT to GO

Dossier buildup

FME Data-Export (PCN / MO)

Job request GEOPORTAL-Wizard

private surveyor (GO)
Official surveying