Hungarian State Railways (MÁV) counting using GNSS technology.
This class gives an insight on how MAV, the Hungarian objects with high precision (5 cm ~ 2 cm) can be built in 14 month. Data collection is key as 90% of resources are often used for data collection. Environment including civil & electrical engineering is handled in one measurement process.
7,800 km railway lines
400,000 widely dispersed assets
60% Flat land covered with fields or forest
40% Hills covered with forests or trees
Measuring environment
5,200 km non-electrified line
2,600 km electrified line
6 + 1 groups

Overhead Line

Utility Management

Object of 7 different „utilities”
The limited availability of updated maps and GIS initiatives and no surveying experts led to his own GPS methodology to resolve data.

- Analyzed data collection
  - Geodetic surveying
    - Cost and time problems
  - Raster design bases
    - Precision and availability
  - Helicopter based collection
    - Cost and time problems
Hungarian reference station infrastructure operated by the national surveying and mapping authority.

Horizontal, $\leq 3$ cm (1 $\sigma$) vertical over the whole country.

Equipment:

- GPS+GLONASS

High availability (>99.5%) Monitored service quality

0.5%
GPRS communication needed for high precision location.

Countrywide coverage of GPRS services in Hungary.

Areas of reception color codes:
- 2W internal antenna
- 2W external antenna
- No reception
Apartments with independent graphical interface level – some assets are components of independent objects used by all departments. Different attributes needed for specific objects needed for all objects.
Measurement area categories

- Non-electrified
- Extra
- New technology ratio

Category-based measurement expectations
Task allocation
Generate task
Allocate resources
Holiday planning

Preparation
Map analysis
Support info
Device update

Metal
Teaching
On
Use
Help
A measurement area and knowledge of the territory are needed.

Local arrangements are needed for access to high-risk rail areas for operation management.

Planning is performed in the 6 territories, assured by reporting.
220 different objects (on the earth objects)

sources for measurements available + colleagues with special skills

or -> repeated measurement needed
16 groups work remotely over the whole country, but this is strongly related to measurement time. Measurement is important to follow the development and ensures strong control of both measurement territories.

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ual to measurement time in normal procedures is a performance and quality issue and upload is broken down to small cycles as altogether 200 jobs were in progress x 7 divisions included in each process is built from 7 steps processes steps are "umbrella" task management supports parallel processing and control
Task management

Adjust
- Automatic
- Manual

Control
- Local expert types
- Integration control
- Documented feedback
- Controlled time
Minimum manual only for corrections of measurements.

Parallel control of 7 departments.

AutoDesk SW based with AU partner add.

Limitations of GIS device in data processing contains all necessary data for processing but not in final – GIS ready - form.

AutoDesk TopoBase 2008 based Upload.

Automatically performed for data adjustments.

Unexpected corrections have to be performed manually.

Job Management.
6 territories

Having independently available at the review, the uploader is not available at the review. The control of correction has to be simple; the uploader has to wait till all reviews are performed.

Task management functionality was introduced with parallel processes.

Central second level support and control discussing unified approach, controlling unified approach.
Organize access to the data

Plan for systematic quality improvement and individual issue handling

Expect unplanned users to come with unplanned questions

Quality issues of building measurement and interface requests
At the moment working at MÁV

All steps can be improved with location based info - GIS

Stage by stage approach needed

Boundaries of each stage have to be clearly communicated in basic

proven info - GIS

roach needed

stage have communicated in basic
16 times cost saving for data and load.

The cost versus cost – 4 times

Referencing versus referencing versus 4 times savings based on MÁV knowledge system" effect.
The railway aspects of MÁV GIS project was governed by Mr. Dr. László Mosócz, resident of the Hungarian State Railways.