

# HMK – Swedish handbook in surveying and mapping

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# Outline

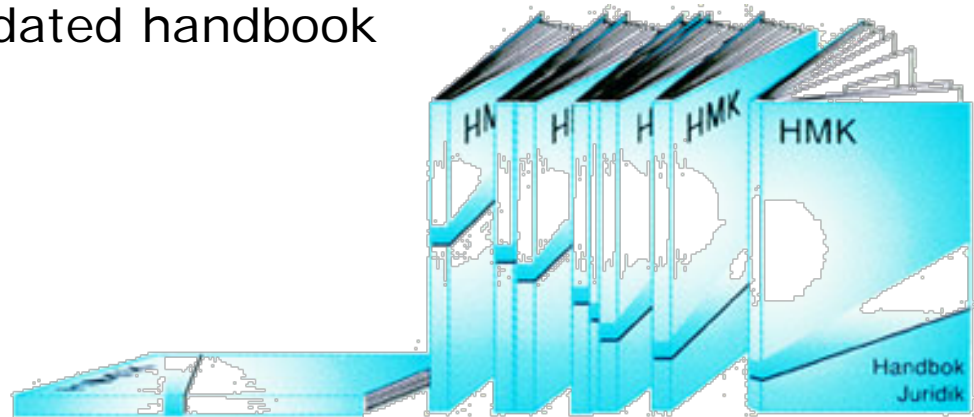
- Background
- The HMK project in general
- The geodetic part of HMK
  - Structure
  - Guidelines
- Time plan



# Background

Lantmäteriet, the Swedish mapping, cadastral and land registration authority, has a long tradition of supporting the Swedish surveying and mapping community.

- 9 handbooks were published in the mid-90s
- The books were widely spread, and some parts are still used.
- New techniques and new working methods have indeed increased the demands for an updated handbook



# The HMK project

## HMK Introduction

- An overview of the different documents
- A document describing geodata quality
- Dictionary and a list of used abbreviations

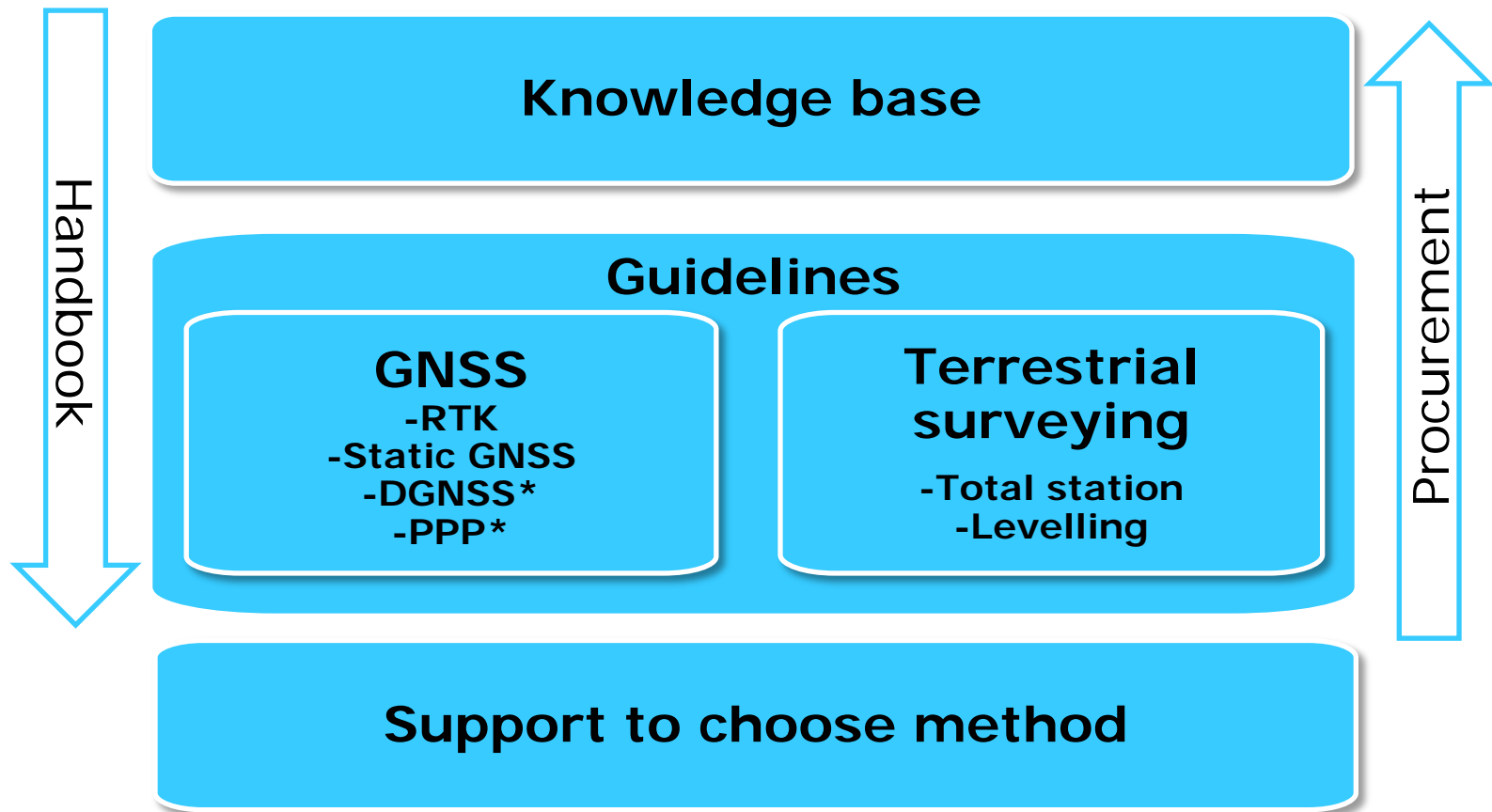
## HMK Geodata capture

- Aerial photography
- Photogrammetric surveying
- Laser scanning
- Orthophoto
- Digital elevation models.

## HMK Geodesy

- Knowledge base
- Guidelines
- Support to choose method

# Structure of the geodetic part

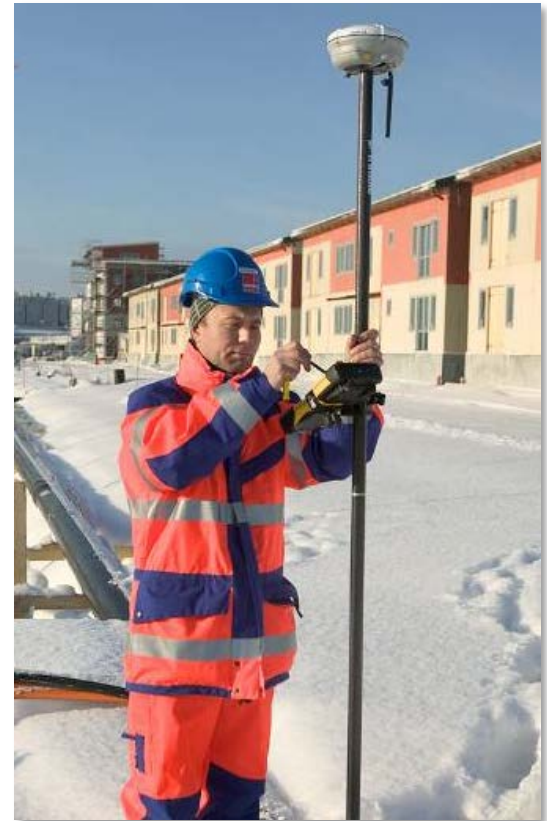


# Knowledge base

- Information concerning the geodetic infrastructure in Sweden
  - reference systems and frames
  - map projections
  - geodetic surveying in general
- Can be used in an educational purpose.

# The guidelines will be described with different “quality levels”

- “Quality levels” describe a set of *recommended procedures* for a given surveying technique.
- The purpose of such procedures is to ensure that expected levels of measurement uncertainty can be attained.
- The “quality levels” will be described by parameters that can be adjusted by the user to reach different levels of expected uncertainty.



# GNSS - RTK

Examples of user procedures that directly or indirectly affect measurement uncertainty with network-RTK.

- Directly:
  - observation time (session length)
  - number of sessions
  - time separation of sessions etc.
- Indirectly:
  - constraints on satellite geometry (elevation/DOP filters)

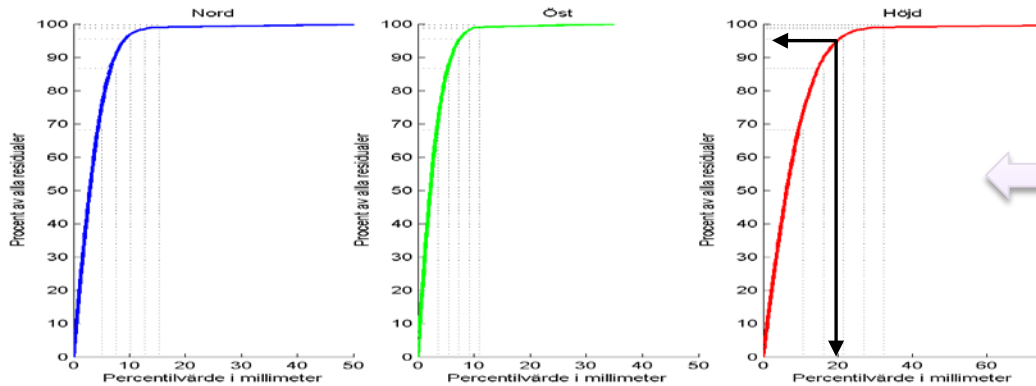
Level	Session length	Number of sessions	Session separation
I	≥ 3 seconds	1	-
II	≥ 10 seconds	1	-
III	≥ 10 seconds	2	10-20 minutes
IV	≥ 30 seconds	2	15-30 minutes
V	≥ 180 seconds	3	20-45 minutes



# RTK - Establishing observation parameters

Data collection campaign during summer 2014

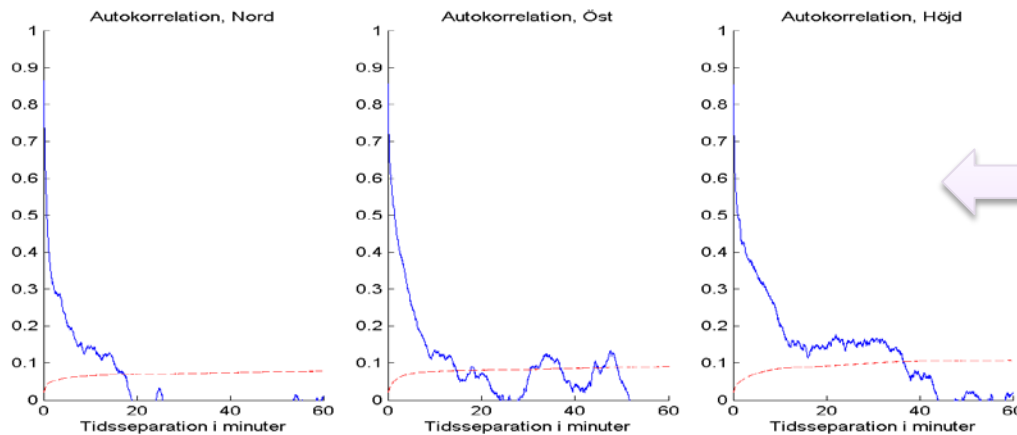
– Analysis on-going



Height position uncertainty,  
95th percentile  
(coverage factor  $k \approx 2$ )  
estimated as 20 mm

Preconditions:

- 35 km network
- 13 km rover baseline
- Low-moderate ionosphere



Analysis of time separation  
derived from autocorrelation  
function of RTK time series.

# GNSS - Static GNSS



- The chapter Static GNSS in the GNSS module will gather and update guidelines from the existing documentation.
- The guidelines in this chapter will be written in co-operation with HiG (University of Gävle)

# Terrestrial surveying

- In the first version the aim is to describe the methods in the old HMK handbooks that are still valid today.
- Later on we will also include guidelines for new methods such as terrestrial/GNSS-methods and terrestrial laser scanning.
- The guidelines in this section will be written in co-operation with KTH (Royal Institute of Technology, Stockholm)

# Support to choose method



**Suitable techniques**

**Conditions**  
Possible access to benchmarks, Network-RTK, communication etc.

**Method adjustment**  
Recommended adjustments in the method due to environment etc.

Recommended technique and method.

- Tables with specified parameters to all described methods.
- Expected uncertainty is the initial parameter.
- References to the guidelines.
- Can be used in a procurement process.

# Publishing and time plan

- All documents will be published in digital form on our website [www.lantmateriet.se/hmk](http://www.lantmateriet.se/hmk) free of charge.

Published in 2013:

HMK-Introduction

HMK-Dictionary

HMK-Aerial photography

HMK-Reference systems  
and geodesy\*

\*) To be replaced in 2014

Planned in 2014:

HMK-Geodata quality

HMK-Laser scanning

HMK-Orthophoto

HMK-Photogrammetric  
surveying

HMK-Geodesy

Update existing documents.

Planned in 2015:

HMK-Metadata

HMK-Cartography

Update existing documents.

## Spread the word... Roadshow 2015

- The HMK project will arrange about 10 workshops in different places around Sweden in 2015.
- The workshops will meet, describe and help the user community to use the HMK documentation.

