

Quality improvement to the Swedish Cadastre

It started 380 years ago and is still developed



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Content



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- Swedish Cadastral system
- Steps of development
- Methods and efforts of quality improvement

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About Lantmäteriet



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•Our task is to contribute to an efficient and sustainable use of Sweden's real estate, land and water.

•We are responsible for property formation and provide an extensive amount of information on our country's 3.2 million real properties.

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Information in the Integrated Cadastral System



Real Property Part

- ♦ Property units
- ♦ Joint property units
- ♦ Co-ordinates
- ♦ Plans, regulations and rights
- ♦ Urban blocks
- ♦ Joint facilities
- ♦ Cadastral Index Map

Property Tax Assessment Part

- ♦ Total assessed value
- ♦ Assessed value for land
- ♦ Assessed value for buildings
- ♦ Basis for valuation
- ♦ Owner

Building Part

- ♦ Building unit
- ♦ Address
- ♦ Co-ordinates

Address Part

- ♦ Address unit
- ♦ Property unit

Land Register Part

- ♦ Title
- ♦ Leasehold
- ♦ Mortgage
- ♦ Rights
- ♦ Notifications

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Organisation of the Integrated Cadastral System

Legal and Physical Cadastre (Real Property Register)

(From 1 of June)

- Ministry of Environment
- Lantmäteriet
- Cadastral Authorities (21 State and 38 municipal)
(1 State from 1 sept.)

Fiscal Cadastre

- Ministry of Finance
- National Tax Board
- Regional and Local Tax Authorities



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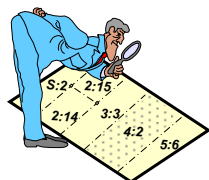
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Quality improvement to the Swedish Cadastre

Pilot study
(2005)

FiFi

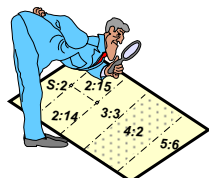
Förstudie informationsutveckling
Fastighetsinformation



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Aim of the pilot studie

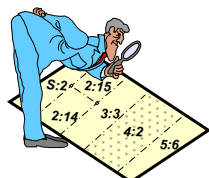


- Investigate users´point of view
- Give priority to activities

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Users´ point of view

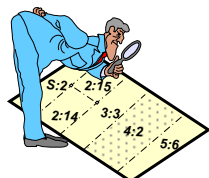


- Better geometric quality
- Lack of information related to properties, rights , plans and regulations
- Better GIS functionality
- Need of metadata
- Use of standards

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Ranking in order of priority



1. Improved geometric quality in the Cadastral Index Map.(Especially boundaries in rural areas)
2. Complete and correct information about the property units
3. Complete and correct representation of rights, easements, joint facilities.
4. Complete and correct representation plans and regulations
5. Complete and correct representation of the properties area
6. Complete representation of cadastral sureys

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ALBIN (Quality Project)

Mars 2006							V
Måndag	Tisdag	Onsdag	Torsdag	Fredag	Lördag	Söndag	
27 Lage	28 Fetisdagen Maria	1 Albin, Elvira	2 Erna, Ernst	3 Ounborg, Ounvor	4 Adkian, Adriana	5 Tora, Tove	9
6 Ebbe, Ebbe	7 Camilla	8 Internationella kvinnodagen Siv	9 Torbjörn, Torleif	10 Ada, Edla	11 Edvin, Egon	12 Kronprinsessans namnsdag Viktoria	10
13 Greger	14 Malkås, Maud	15 Christel, Kristoffer	16 Gibert, Herbert	17 Gertrud	18 Edmund, Edvard	19 Josef, Josefina	11
20 Joakim, Kim	21 Världspolisdagen Bengt	22 Kennet, Kent	23 Gerdt, Gerda	24 Gabriel, Rafael	25 Marie bebödeloedag	26 Sommarid börjar, lockan ställs en timme framåt Einarset	12
27 Rolf, Rutolf	28 Malkin, Morgan	29 Jens, Jonas	30 Hölger, Hölfrid	31 Ester	1 Herold, Hervor	2 Oudmund, Ingemund	13

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Purpose of the project

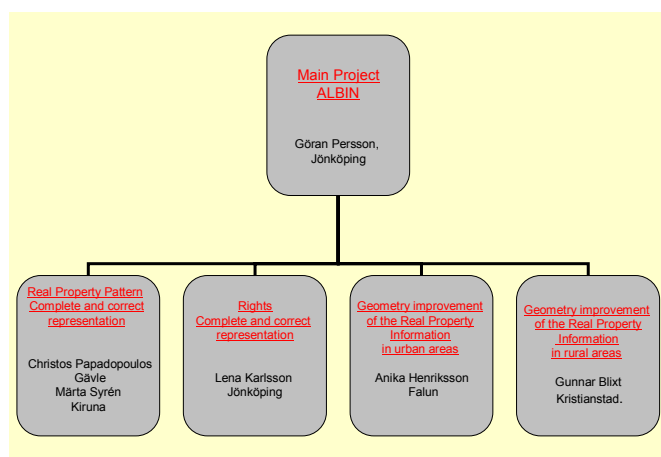
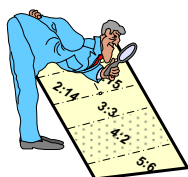


Increase the use of the cadastral information by increasing the quality of the data and decreasing the administration and delivery costs.

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Four subprojects



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Time, staff and Economy

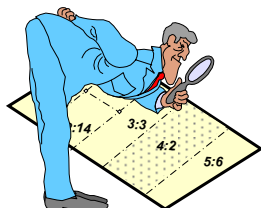


- More than 3 years
- More than 60 persons
- Div. I and F are staking more than 10 millions € together.

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Real Property units, Complete and Correct representation



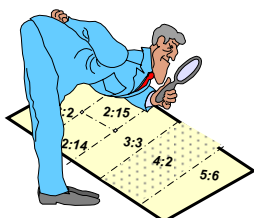
Example

- Obvious typing errors will be corrected.
- Properties that exist in Real Property Register but not in the Cadastral Index Map and vice versa will be investigated and corrected.
- Settled or other valuable areas will be registered.

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Rights Complete and Correct Representation



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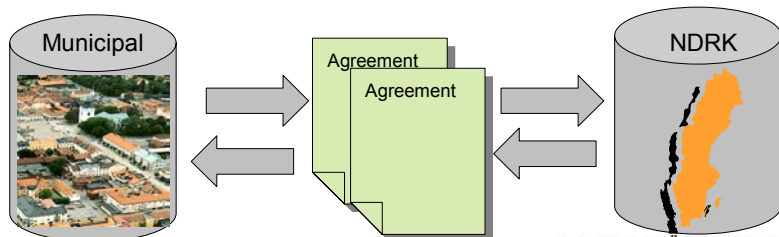
Example

- Completing the cadastral index map with easements shown in the Real Property Register but not on the map.
- Completing the map with joint facilities and utility easements shown in the Real Property Register but not on the map.
- Completing the map and register with information from cadastral procedures carried out within the old Act on private roads.

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Geometry improvement of the Real Property Information in urban_areas

- Increase the geometric quality of data in urban areas with material from municipalities'
- Fit in small villages with good internal geometric quality but with bad external geometric quality.



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Geometry improvement of the Real Property Information In rural areas



Development of methods
to face the problem of geometry
improvement in rural areas

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Identify Results

Field	Value
FNL_FR	50108368
KOMMUNKOD	0580
TRAKT	GAVEL
BLOCKENHET	1:11
DMRNR	1
SAMJELITT	<null>
TILLAGG	<null>
REGTYP	F
REGOTYP	FD
GEOMTYP	1
FRMATCH	1
DETALJTYP	FASTIGHET
ADAT	2005-12-08
KNID	500

Methods

Two basic conditions



Legal conditions

- The Swedish boundary system

Technical conditions

- Existing geometric quality in the Cadastral index map
- Existing Quality-marking in the Cadastral index map (GDB-Alfa the database)

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Legal conditions

Land Code

strict hierarchy of boundary evidence



1. Boundary marks



2. Cadastral maps and documents

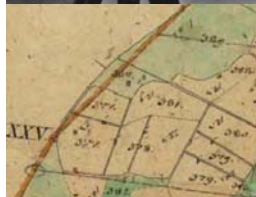


3. Possession and other circumstances

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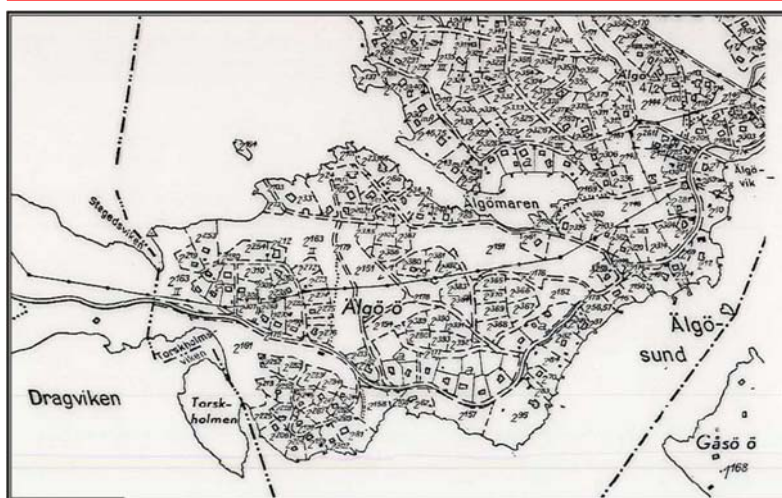
Technical conditions



- Data from *many sources* in the cadastral index map
 - land use maps, based on orthophoto in rural areas
 - terrestrial measurements in updating phase
- Both digitized and measured data are used – geometrical quality vary

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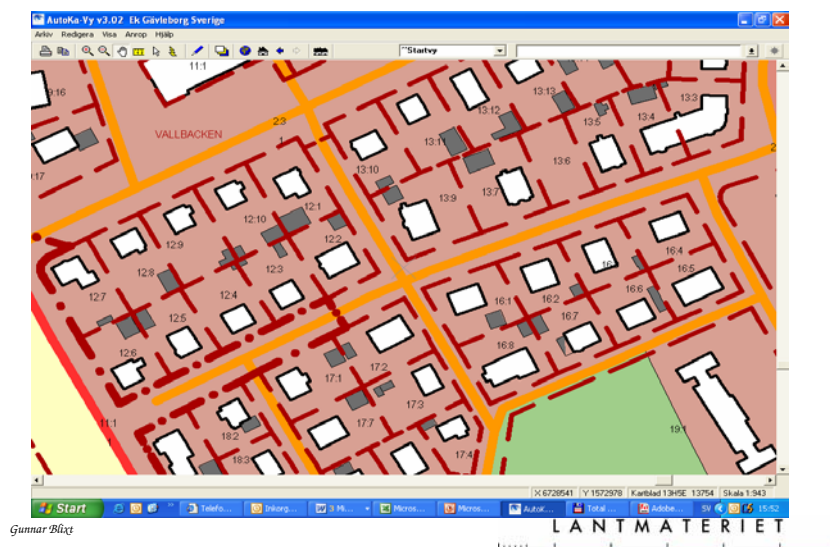
Example of an old Cadastral Index Map



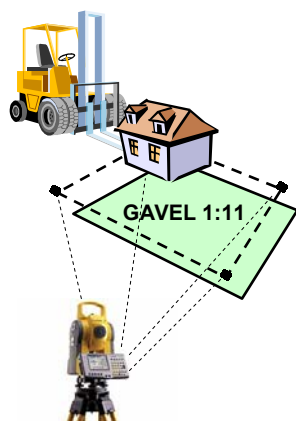
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Example of a new Cadastral Index Map



Methods



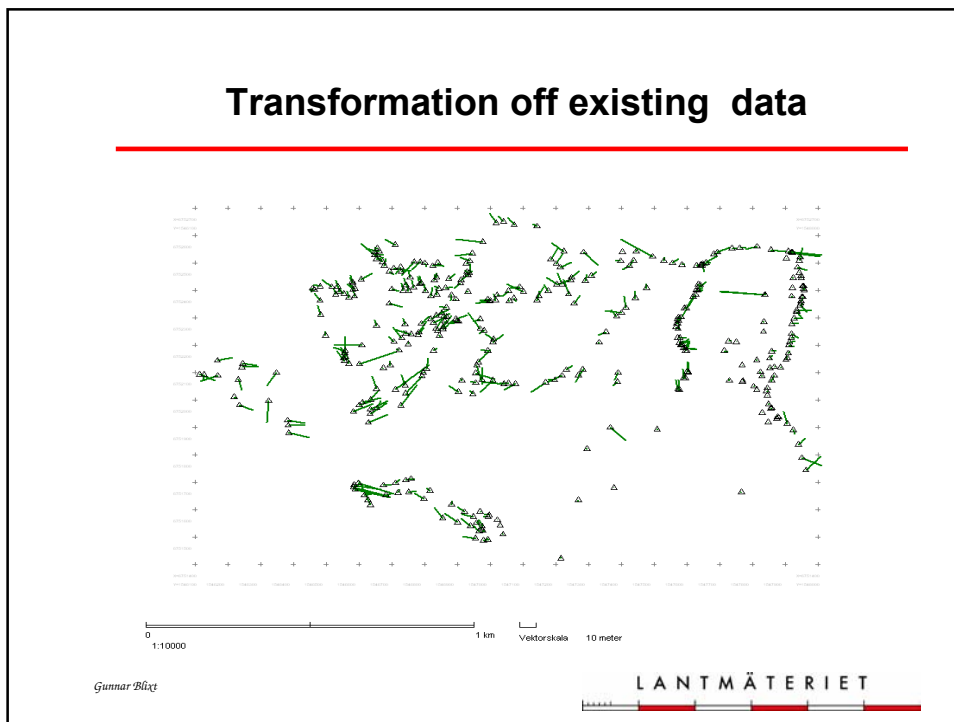
A number of methods that increase the geometric quality in the index map has been tested :

- Transformation
- Georeferencing of old maps
- GPS surveying
- Aerial photogrammetry
- Satellit images
- Archive research in the digital archive ARKEN

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Transformation off existing data



ArcCadastrre - Untitled - D:\Projekt\ALBIN\Test_Landsbygd\Ockelbo\Ockelbo.mxd

File Edit View Insert Selection Tools Window Help

1:4 000

2D Transformation Layer: From <None>

Editor Task: Create New Feature Target:

Layers

- New Plotting Style
- graskt_nya
- fastgr
- 21-OCK-158-1.jpg
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3

Georeferencing Layer: 21-OCK-158-1.jpg

Link Table

Link	X Source	Y Source	X Map	Y Map	Residual
1	1.980289	0.639598	1547376.767000	6751880.820000	3.036202
2	1.442971	1.825423	1547293.348000	6751822.716000	3.421657
3	2.934314	6.295136	1547474.929000	6752412.311000	3.19326
4	4.233522	6.821491	1547644.739000	6752493.726000	1.98561
5	4.654024	4.445729	1547714.912000	6752179.103000	4.60650
6	6.353428	1.108882	1547970.982000	6751754.912000	1.31310

Auto Adjust Transformation: 1st Order Polynomial (Affine) Total RMS Error: 3.10937

Display Selection Job Attribute

Drawing 10 B I U A

1547514.91 6752182.91 Meter

Archiv research

förteckning (2.5 g v Reg 10)

Punkt nr	X	Y
7436	6751933.68	1547872.73
7437	6751919.65	1547846.22
7438	6751954.77	1547827.59
7439	6751969.00	1547853.94
7441	6751970.40	1547856.52
7442	6751936.56	1547878.18
12055	6751853.31	1547896.48
12056	6752041.70	1547907.89

TEKNISK BESKRIVNING

Koordinatförteckning (System lokalt)

Pkt	Mark	x	y
1	rm	1000.00	1000.00
2	"	989.40	1038.75
3	"	951.08	1028.97
4	"	963.03	981.81
5	tp	1019.39	1046.60



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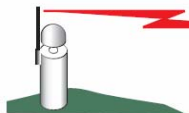
In the Cadastral files are different kinds of coordinate lists stored :

1. Coordinate lists connected to the national geodetic network
-direct use
2. Coordinate lists **not** connected to the national geodetic network
-GPS and transformation
3. Technical descriptions
Polar, Orthogonal and other
- constructions

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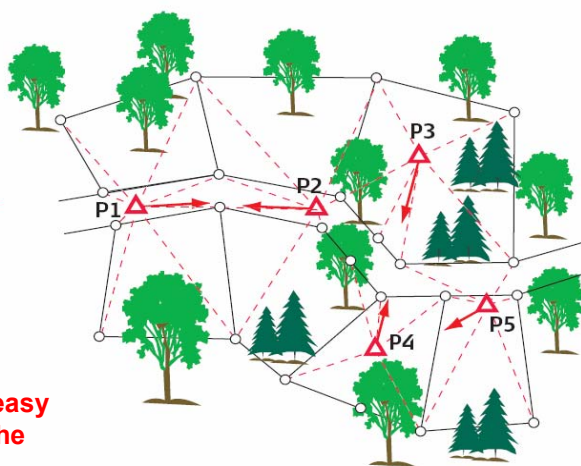
Methods

GPS Network
RTK
technique



Experience:

**accurate, rapid and easy
method to improve the
geodetic quality**

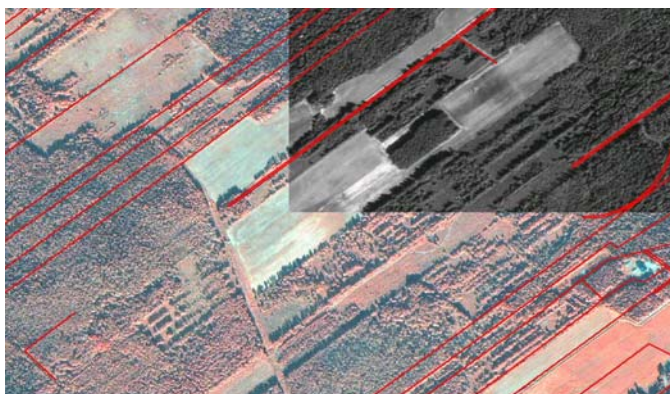


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Methods

Aerial photogrammetry, Satellite images and GPS surveying

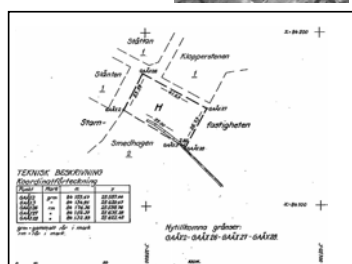


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The method

To combine different technical aids and tools



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- Inventory of existing geometric quality
- Local knowledge
- Boundary marks
- Cadastral documents and maps (ARKEN)
- Archive research
- Survey archive
- Ortophoto
- GPS-survey
- OCR-program
- Program for map construction

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Test produktion



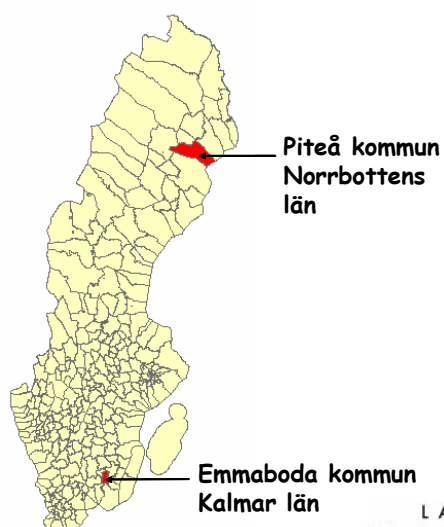
Three main activities

- *Test produktion*
- *Cost/ benefit analysis*
- *Produktion plan*

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Test areas



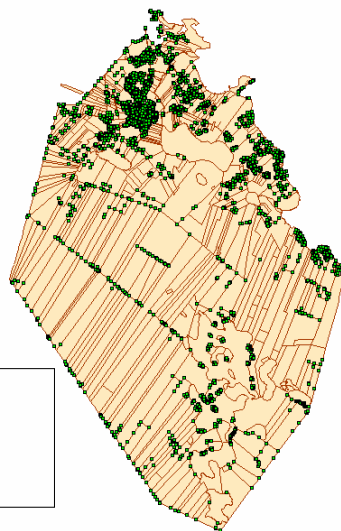
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Test area North

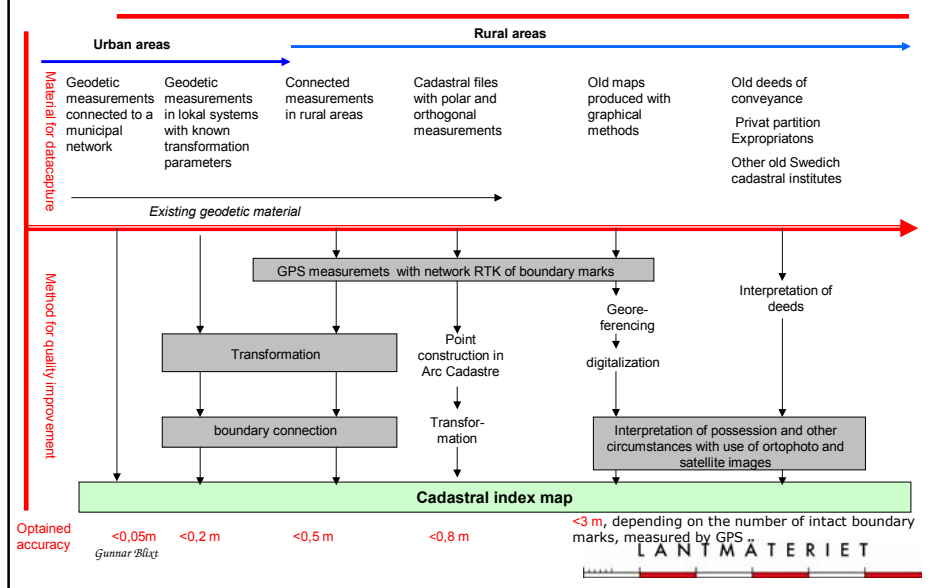


Area = 59 km²
 Properties = 1000
 Forested land

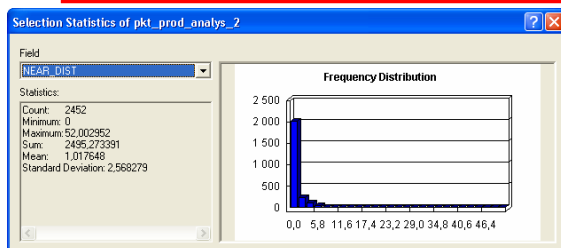


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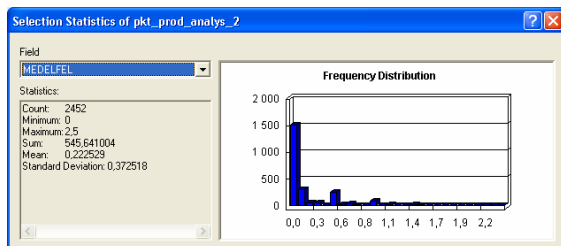
Accuracy obtained and methods used for quality improvement of different types of boundaries



Accuracy obtained area North



Before improvement
 Maximum = 52 m
 Mean error = 4,5 m (from existing quality marking system)
 Before improvement
 1216(2452) > 1m



After improvement
 Maximum = 2,5 m
 Mean error = 0,37 m
 After improvement
 91(2452) > 1m

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Cost/ benefit analysis

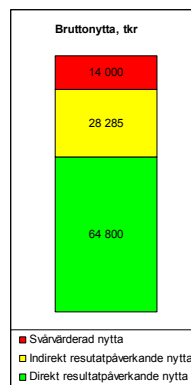
Resultat av nyttoanalysen

BRUTTONYTTA		TKR
Direkt resultatpåverkande nytta		64 800
Indirekt resultatpåverkande nytta		28 600
Svärvärderad nytta		14 000
Sa Bruttonytta		107 400

NYTTOKOSTNAD		TKR
Nyttokostnad		45 800

NETTONYTTA		TKR
Nettonytta (Bruttonytta - Nyttokostnad)		61 600

NYTTOFAKTOR		
Nyttofaktor (Bruttonytta / Nyttokostnad)		2,34



The investment gives 2,34 Pay back

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Produktion plan



Cooperation

Produktionsplan

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Project Following-up system

www.metainfo.se/website/albin/viewer.htm



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