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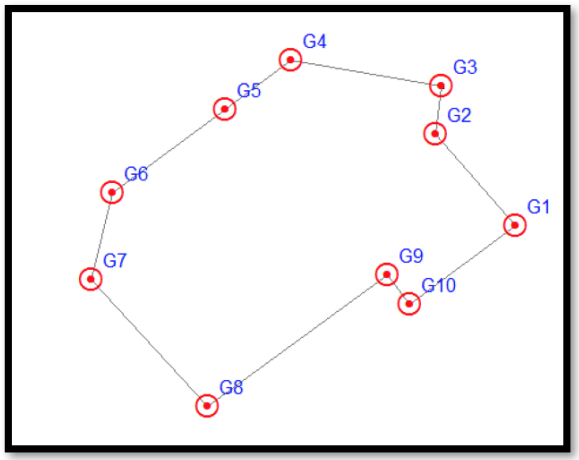
COORDINATES OF BOUNDARY POINTS IN NORWAY

Helge Nysæter

Norwegian Cadastral System

- German style cadaster (title system)
  - Land register
    - Parcel no. + owner
    - complete and guaranteed
  - Cadaster
    - Boundaries shown in map
    - Incomplete, not binding
    - Surveying mandatory when subdividing property

Measurements and calculations




```
00 Output from Trimble Survey Controller job
01 Parcel_38_5  26102015 002                $11_
00 VRS base: 60.38591°, 5.15303°, 80.864m
05 G1                  6700584.839  288000.599   33.087
47   0.00006429   0.00002664   0.00015849   0.00000709   0.00004454   0.00002087
46 26102015 10:35:04 16  1.45  0.000  11  94
00 WA Fixed   Prec:0.006/0.011  PDOP:1.5  Pos:11  SVs:16  UTC:10:35,26/10-2015
```

Gemini | **Oppmåling** — **Ytre pålitelighet**

Prosjekt: C:\Users\Håvard\Desktop\Hib\Oppmålingsforretning\innmaalingsund\22.9\
Koordinatsystem: UTM(EUREF89) - SONE 32 — 23.09.2015

Ytre pålitelighet, maks. punktdeformasjon

Punkt	Def. Nord	Def. Øst	Def. H	Obs. fra punkt		Til
	Def.	Norm	Faktor	Grovfeil	Observasjon	Merknad
HP1	-0,002	0,020	0,000	HP1		HP1
	0,020	0,100	0,20	0,049	6 684 888,870	Koord:Nord
HP2	-0,002	0,017	0,000	HP2		HP2
	0,017	0,100	0,17	0,071	6 684 851,950	Koord:Nord
G1	-0,002	-0,001	-0,010	HP3		G1
	0,009	0,100	0,09	0,00900	106,38100	Konv:Vert.vinkel
G2	0,000	0,044	-0,010	G2		G2
	0,044	0,100	0,44	0,076	6 684 951,866	Koord:Nord
G3	0,002	0,058	0,000	G3		G3
	0,058	0,100	0,58	0,085	6 684 957,075	Koord:Nord
G4	0,002	0,007	-0,040	G4		G4
	0,044	0,100	0,44	-0,086	25,450	Koord:Høyde
G5	-0,002	-0,001	-0,010	HP3		G5
	0,013	0,100	0,13	0,01200	107,48400	Konv:Vert.vinkel
G6	0,010	0,007	0,000	HP3		G6
	0,012	0,100	0,12	0,032	139,763	Konv:Avstand
G7	-0,002	-0,001	-0,010	HP3		G7
	0,010	0,100	0,10	0,01100	108,47500	Konv:Vert.vinkel
G8	0,003	-0,010	0,000	HP3		G8
	0,010	0,100	0,11	0,01200	329,56700	Konv:Hor.retning
G9	0,001	0,004	-0,030	G9		G9
	0,034	0,100	0,34	-0,065	26,008	Koord:Høyde
G10	-0,002	-0,001	-0,010	HP3		G10
	0,009	0,100	0,09	0,00800	107,09400	Konv:Vert.vinkel

Covariance values for weighting

- Coordinates (NEH) not independant
- Covariance matrix used for weighting, like in static GNSS-surveys
  - Not mandatory according to govt. standards, but the software used by the municipalities calls for these values.

```
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```
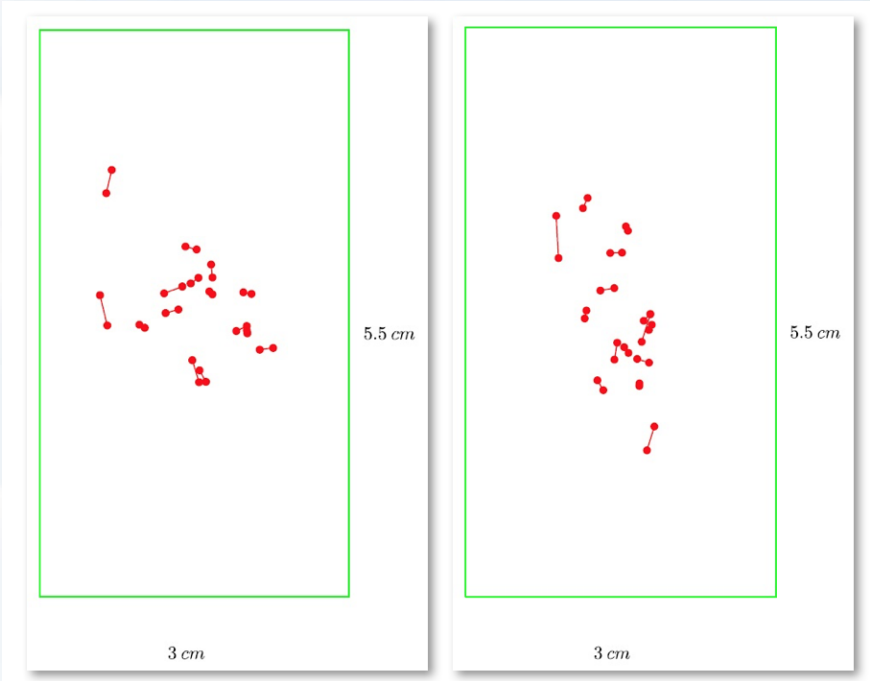

Effect of covariance values for weighting



$< 1\,cm$!

Blunder detection and reliability analysis justified

Conclusion

- In Norway, we use all the tools every time!
  - There should be no possibility of errors (one may think).
- But what if the tools are too complicated, too expensive, and some of them of no benefit at all?
- A professional surveyor would know which tool to be necessary in each different case.