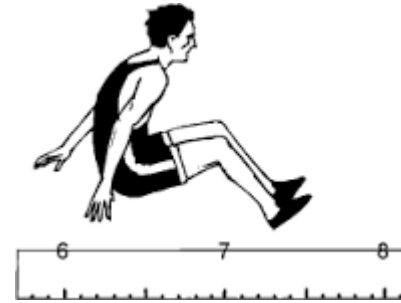


Precision and accuracy

Data interoperability working group, Baveno 2015

Precision of numbers

- ▶ precision often reflects accuracy
 - ▶ sports result (centimeters in sand pit)
 - ▶ signpost (miles or kilometers to town)
 - ▶ reference parcel area (square meters)



... but how about coordinates ?

Do we look at our coordinates ?

- ▶ you see the map, not the numbers
- ▶ how precise is a reference parcel boundary ?
- ▶ meters, decimeters, centimeters, millimeters ?
- ▶ believe it or not, we did much better than that !
 - ▶ micrometer precision 6789543.453923
 - ▶ nanometer precision 6789543.453923767
 - ▶ floating-point monsters 6789543.12600000000000414145555555

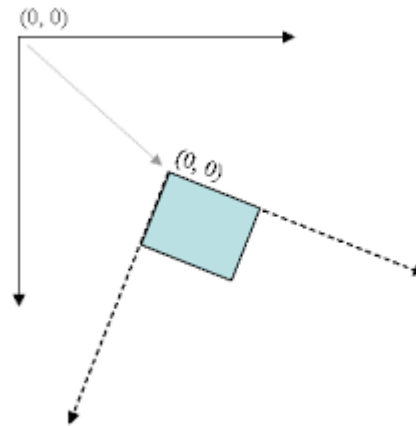
Does excess precision matter ?

- ▶ It has an impact on text file size (GML, WKT)
- ▶ example: ancillary data through 32 kilobyte buffer
- ▶ 9 digits after decimal point in transferred coordinates
- ▶ earlier dozens of transfer errors or buffer overflows
- ▶ quick fix: coordinates rounded to mm upon write
- ▶ only two overflows encountered in three years

```
3357895.876543982 6984352.473259801  
3357895.877 6984352.473xxxxxxxxxxxxxx
```

Sources of excess precision

- ▶ ancillary or external data
- ▶ data collecting devices
- ▶ geometric computations
- ▶ FLPIIS digitizing software



To-do: filter out extra digits from data sources and existing data

Removing excess precision



- ▶ January 2015: FLPIS converted from obsolete national grid to ETRS
- ▶ transformed coordinates rounded to three decimal places (mm)
- ▶ about 35000 reference parcel areas (3 % of FLPIS) would have changed by one square meter
- ▶ small changes due to rounding were overwhelmed by bigger changes due to the coordinate transformation
- ▶ golden opportunity to get rid of excess precision

Choosing the correct precision

- ▶ wouldn't centimeter or decimeter precision have been just as right ?
 - ▶ indeed closer to the accuracy that can be achieved in practice
 - ▶ but area changes not congested in ETRS transformation
 - ▶ expected more technical and tolerance issues
- ▶ precision implicitly sets the upper limit for accuracy
 - ▶ assume that coordinates are never more accurate than mm
 - ▶ reference parcel area in square meters is also such a limit

LPIS accuracy measures

- ▶ if precision sets the upper limit, then how do we know the lower limit ?
- ▶ LCM 1.2 : cartographic references can be roughly be divided into digital orthophoto imagery and cartographic map products at scale 1:10000 or more detailed.
 - ▶ usually presumed more detailed
 - ▶ cross-compliance data (environmental) sources maybe 1:50000
- ▶ buffer tolerance GNSS/orthophoto 0.5 m, 0.75 m, 1.0 m, (1.25 m, 1.5 m)
 - ▶ validation procedure up and running
 - ▶ not for external data capture methods

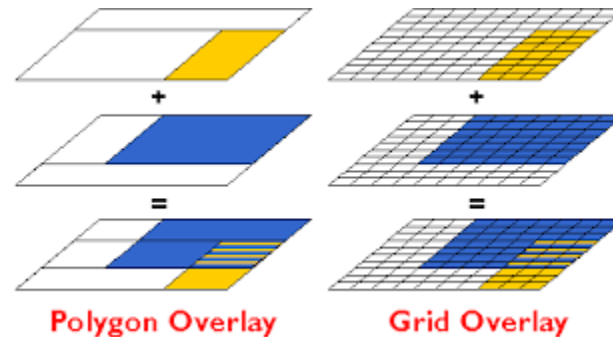
Accuracy classification

- ▶ consolidate accuracy into a single measure
 - ▶ buffer tolerance
 - ▶ map scale
- ▶ assign value ranges to accuracy classes (buckets)
- ▶ do different data sets fit into the same set of buckets ?
 - ▶ how to compare accuracy for interoperable data sets



Accuracy interoperability

- ▶ determining tolerances
 - ▶ minimum mapping unit (e.g. 100 m²) for LPIS layer accuracy
- ▶ polygon overlay
 - ▶ layers with different accuracies
 - ▶ intersect with cross-compliance data
 - ▶ eliminate minimal intersections ?
- ▶ result area precision
 - ▶ reflect accuracy of result
 - ▶ is rounding precision the easy way to account for accuracy ?



Footnote: LPIS QA 2014

- ▶ control data less accurate than inspected data ?
 - ▶ buffer tolerance class 0.75 m for upkeep orthoimages
 - ▶ buffer tolerance class 1.0 m for QA orthoimages
 - ▶ quite obvious for experienced FLPIIS operators
- ▶ better not to be too precise with accuracy ?

