Reference Frames: The foundation of Spatial Data Infrastructure

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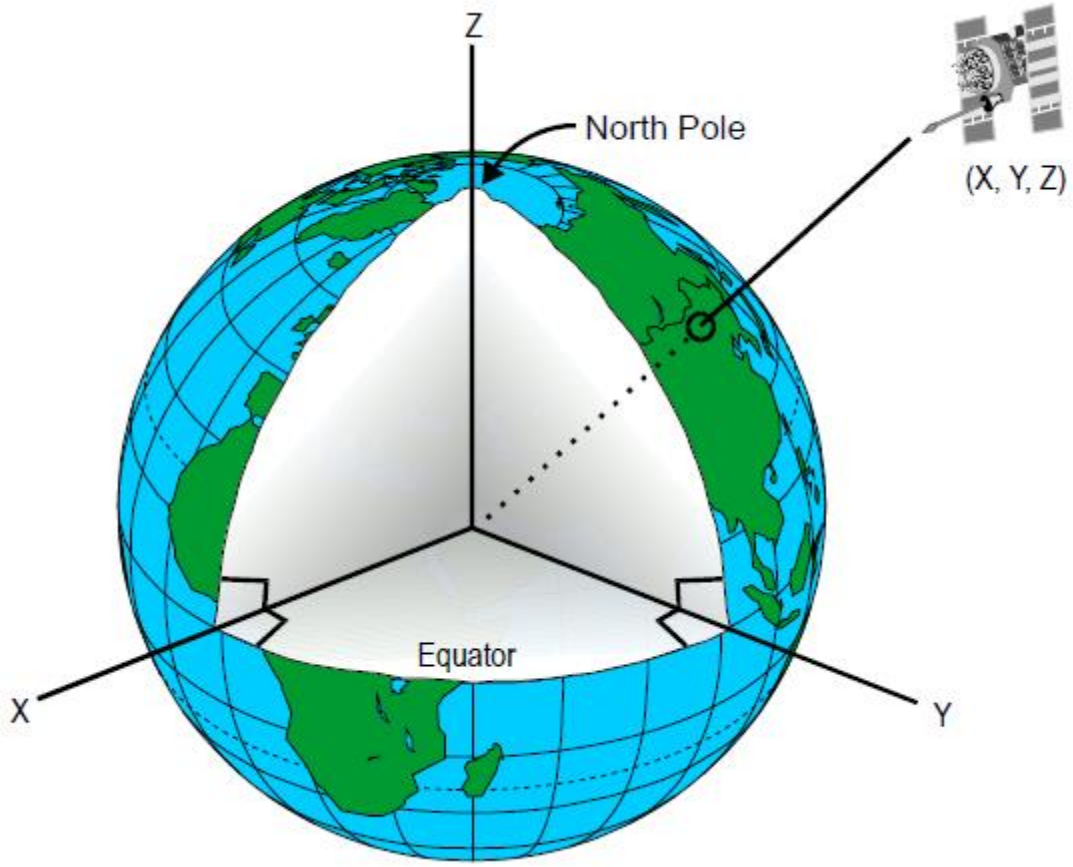
Geospatial data has no value without a reference frame!

What is the temperature?

Basics - What is a reference frame?



- A reference frame is a three-dimensional coordinate system that describes the earth's body so that we can position our selves on earth surface.
- There are multiple reference frames all over the globe that can describe our position.
- Because of continental drift, post-glacial rebound, earthquakes, volcanoes, etc., we are in constant movement (dynamic).
- Global reference frames take this into consideration.

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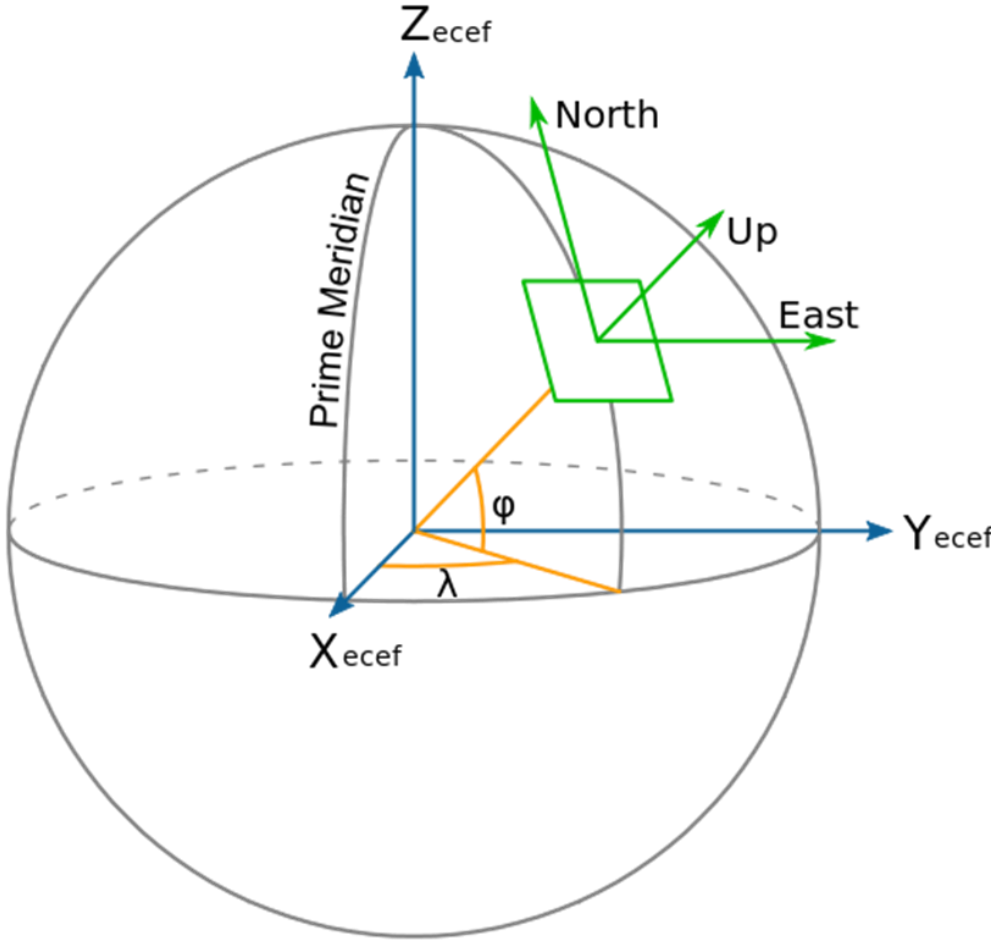
Global vs. National reference frames

- Global reference frames – Earth fixed
  - Fixed to the center of the earth
  - For example, WGS84 or ITRF2020

- National and regional reference frames – Plate fixed.
  - Fixed to a continental plate.
  - For example, ETRS89



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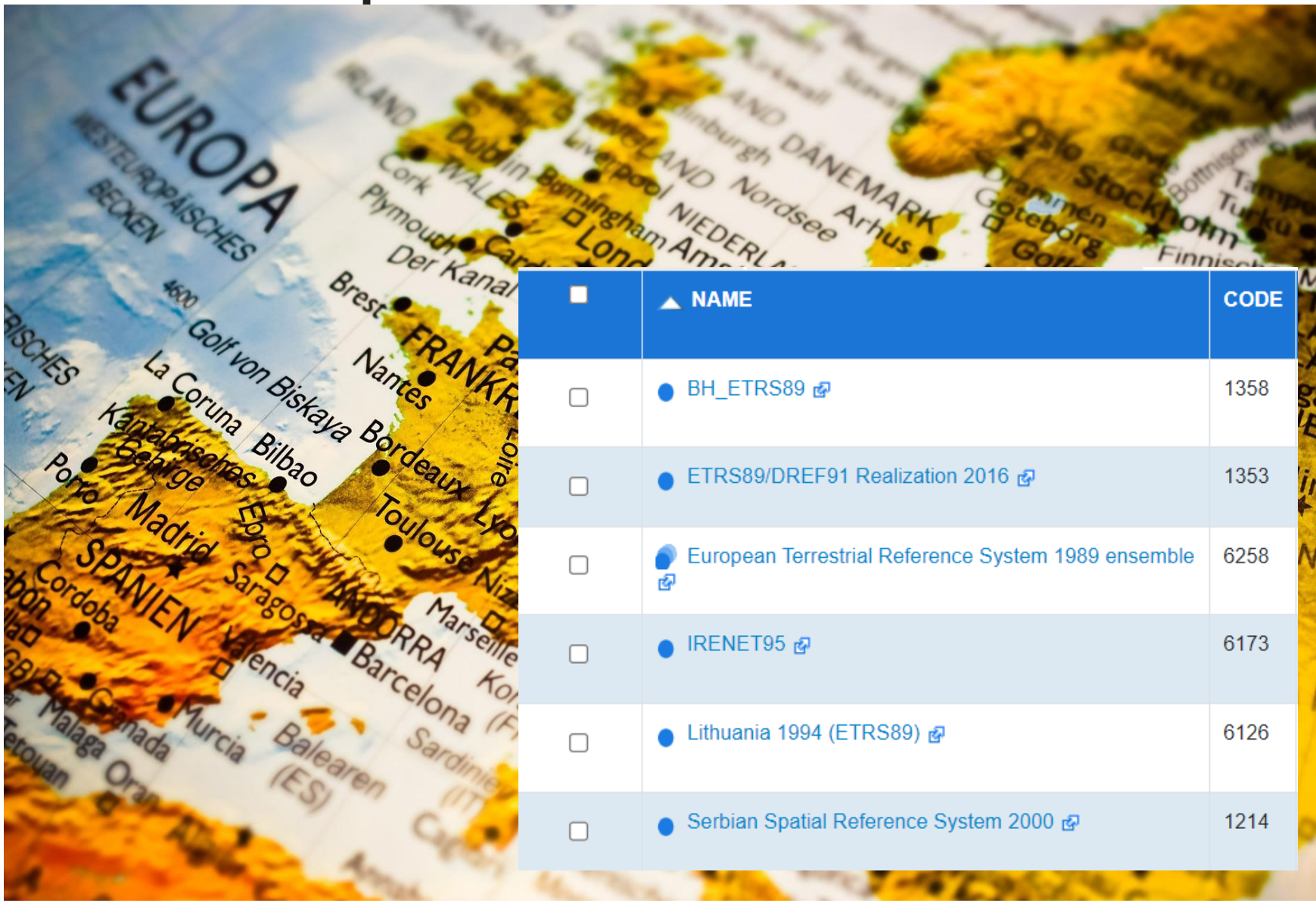
Reference frames in Europe – ETRF89?

- Multiple national realizations of ETRS89
- Different EPSG codes for national realizations
- National realizations with different reference epoch
- Shifts between realizations at cm level



	NAME	CODE
☐	BH_ETRS89	1358
☐	ETRS89/DREF91 Realization 2016	1353
☐	European Terrestrial Reference System 1989 ensemble	6258
☐	IRENET95	6173
☐	Lithuania 1994 (ETRS89)	6126
☐	Serbian Spatial Reference System 2000	1214

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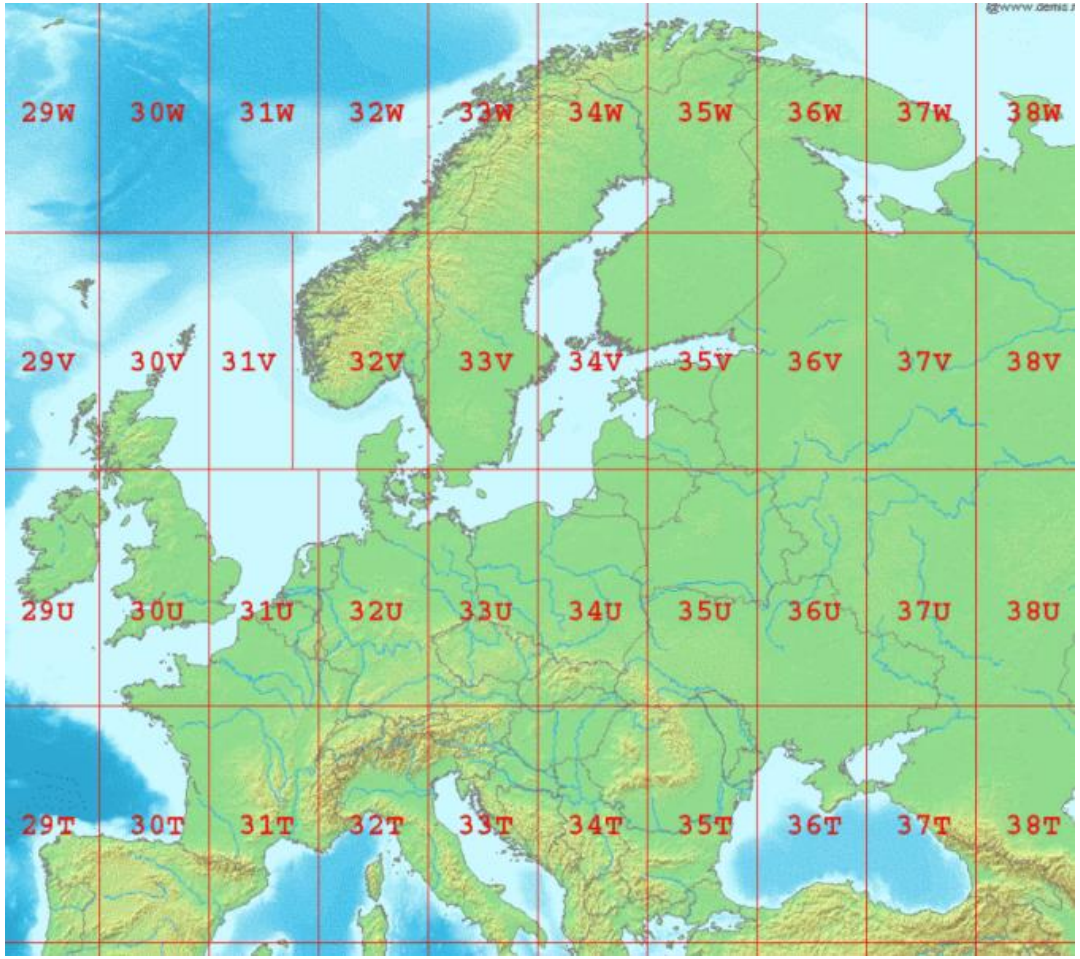
What about projections?

The most maps are visualized and presented in a projection.

Projections are in reality only a derivation of a reference frames.

- Coordinates between projection zones are huge
- Coordinates are pretty smaller (0.7-200 m in Europe) > ambiguous



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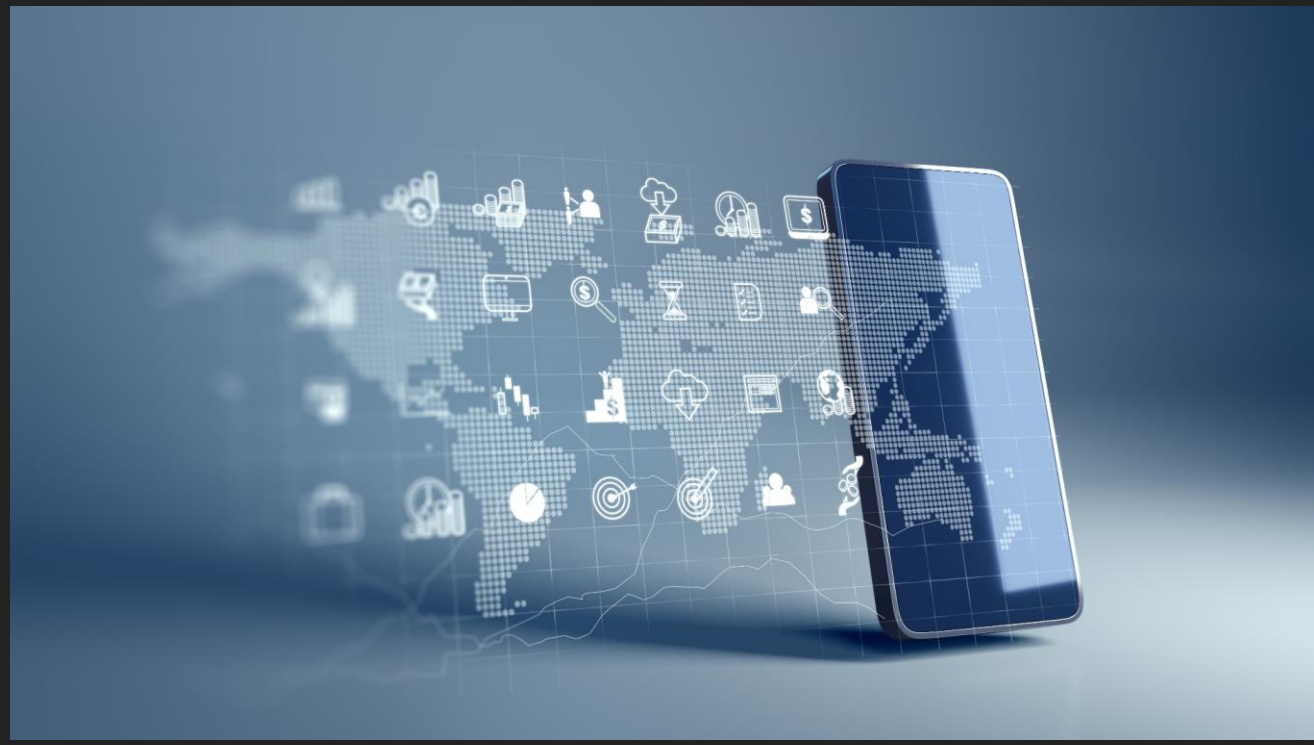
Trends

- High accuracy positioning services – Galileo-HAS.
  - Operating in a global reference frame.
- Spatial data operates in national reference frames.
- More users of geodata that are non-professionals
- Increasing use and collection of geographic data



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ITS – meeting the challenge with reference frames

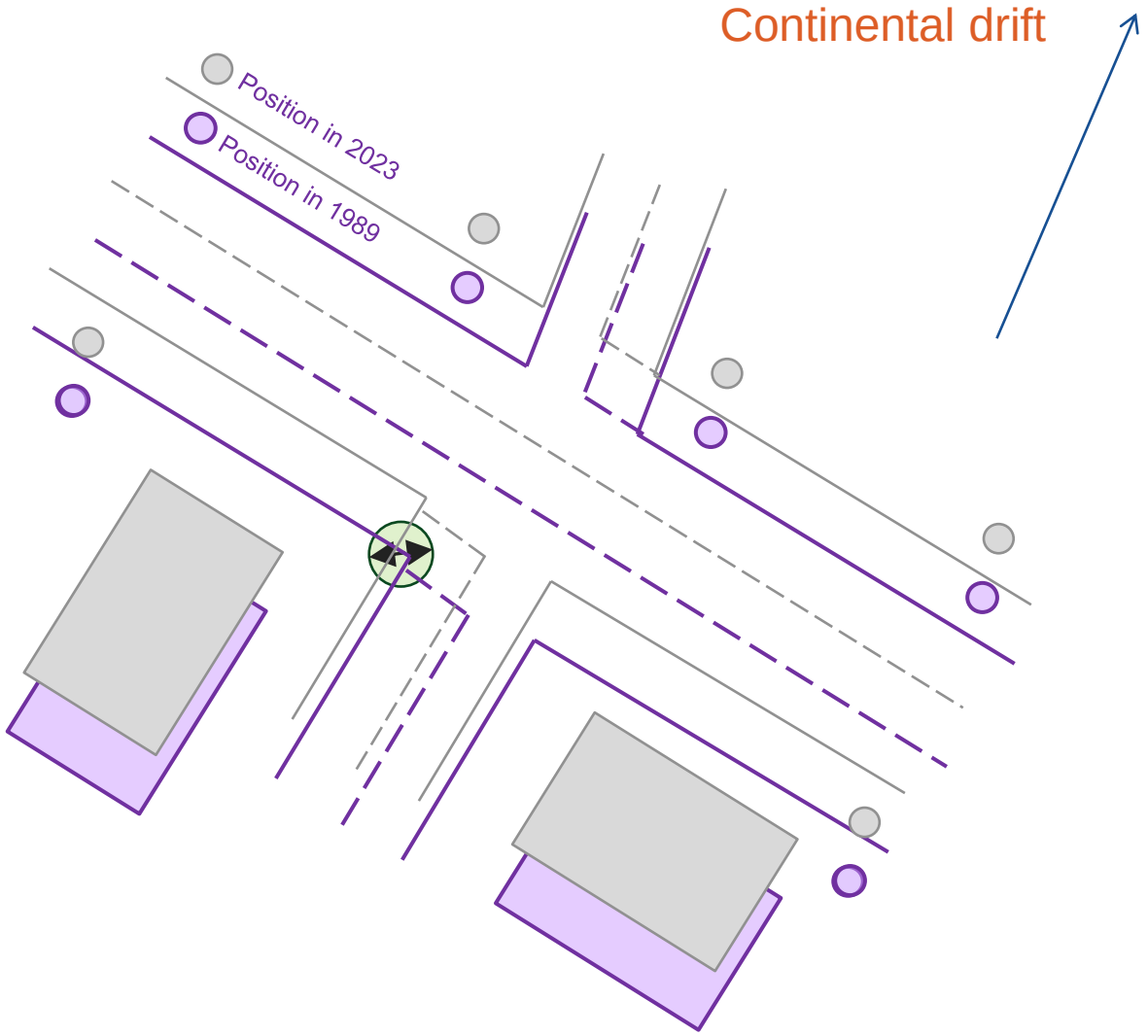
Geodetic point of view

- HD maps
- GNSS position

Make it simple!

- Users are not geodesy or geomatics professionals
- Users cross borders and source geodata from multiple sources

"the challenge with reference frames is their existence"



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- EPSG
  - Technically it does work very well
  - Reference frames updates
    - How do users know when a reference frame is updated?
    - Which code to use now?
- WGS84 with suffix
  - Rarely noted
  - Suffix not in ITS standards
- ITRF2014 and WGS84(G2139) is close to identical
  - Why do we have both?

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What is the problem?

ITS community

Cross border operations

New positioning services that operates in a global reference frame

Increasing use of global reference frames, especially WGS84

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What can we obtain with one unified reference frame for Europe?

How should we meet the futere users of spatial data?

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Spørsmål?

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