

Geodetic Reference System 2015 – the Approach in North-Rhine Westphalia, Germany

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Key words: Geodetic and positioning measurement, National geodetic reference systems, frames and datums in practice, e-governance and SDI, public-private partnerships

SUMMARY

With the introduction of the ETRS89 and the use of the Satellite Positioning Service of the German National Survey (GNSS CORS RTK network SAPOS®) the geodetic spatial reference in Germany has started a strategic change. Parallel to this technical development declining financial resources determine the governmental acting.

As the kernel state task the geodetic reference has to be provided up to date for the entire state and under consideration of the decisions and principles of the AdV, the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany.

As a result the use of the SAPOS® GNSS technology traditional tasks in the point field became useless. In fact there is no more use for the classical point field at all. In addition GNSS will be used increasingly to determine heights. From now on SAPOS® is the central service approach and the spatial data infrastructure component of the geodetic reference frame.

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1. GEODETIC REFERENCE SYSTEM: PROCESS VIEW AND ORGANIZATIONAL DEVELOPMENTS

In the surveying and mapping law of North-Rhine Westphalia the kernel activities of data collection, data maintenance and data provision are defined. Under the pressure of cost reduction the German State of North-Rhine Westphalia decided in 2007 to reorganize its surveying and mapping administration (Riecken 2010a). In North-Rhine Westphalia the cadastral work is done in the responsibility of the municipality level and was not affected by organizational changes. The main focus for the aforementioned reorganization on the state level was:

- Concentration on kernel tasks, reduction of the employment body
- Private business replaces administrative activity
- Restructuring of the organization under consideration of work processes and quality measurement

With respect to the kernel activities the data collection was almost privatized, the data maintenance became the central administrative activity and the data provision was opened to public-private partnership:

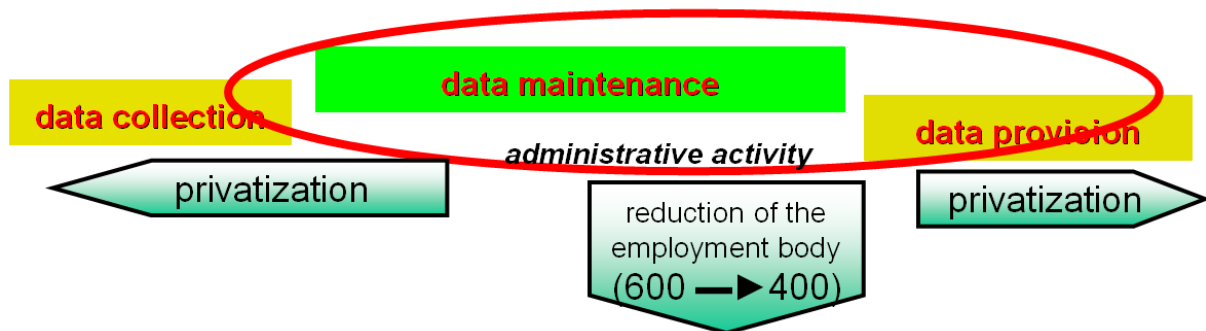


fig.1: process view - private business replaces administrative activity

In addition in 2008 this process view became the basis for the new organizational structure. The surveying and mapping administration was divided into the three sections of “Topographic Information Management”, “Topographic and Cartographic Information System” and “Data Centre and Spatial Data Infrastructure”. A fourth section was built to be responsible for “Data Standards and Geodetic Reference Network”.

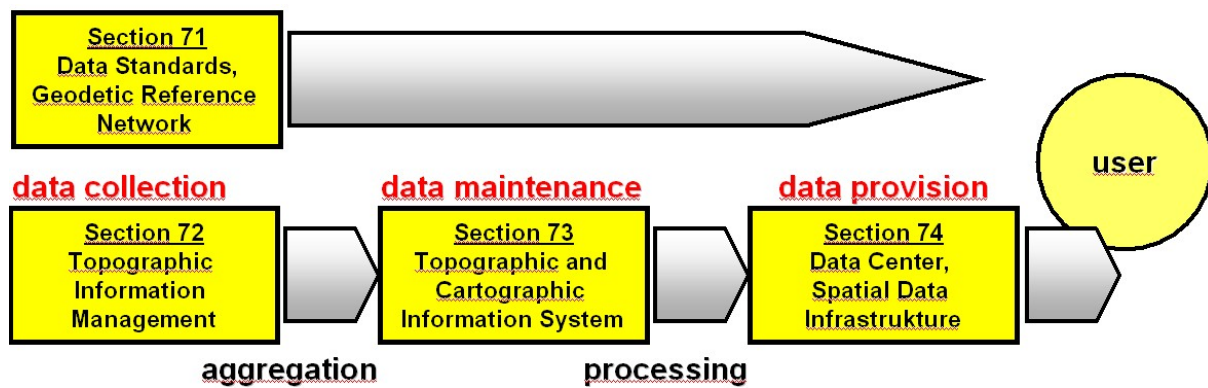


fig.2: process view - restructuring of the organization

For each section the kernel tasks were described to define the spatial data infrastructure the state wants to provide. As part of this definition phase the personal resources had been fitted. During this process 200 from about 600 positions were omitted on the state level (fig. 1).

In more than 200 years of history of cadastral and the surveying and mapping tasks have gone through radical change, especially during the last 30 years:

ca. 1800 - 1980:

The analogue world was focusing on the production of cadastral maps, topographic maps and trigonometric points.

ca. 1980 - 2010:

Since about 1980 the digitalization started and multi purpose information systems were established.

since 2010:

During the last years the service approach is dominating digital activities, accompanied and supported by legal regulations like the INSPIRE directive.

This automation process extinguished a general reduction of the employee body of about 50 %. In the area of the geodetic reference frame the reduction was even larger and exceeded 60% in the last 30 years. It is easy to predict, that further automation will be achievable and that the employee body will decrease.

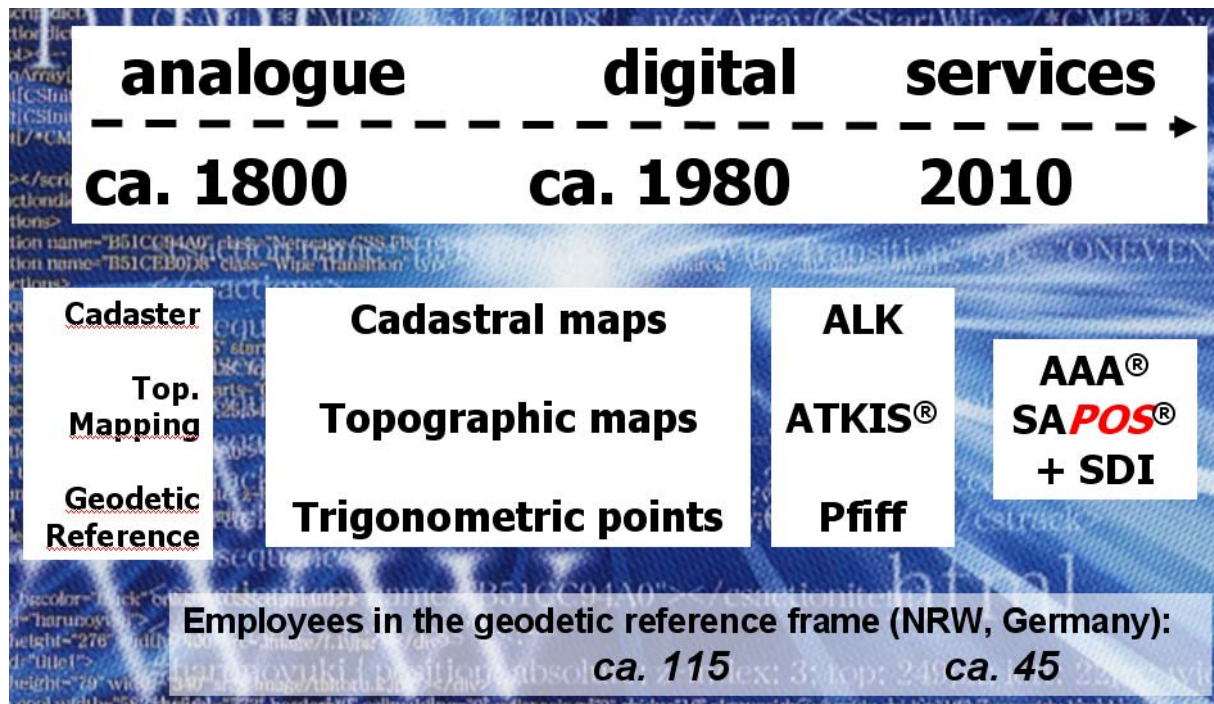


fig.3: Developments in the Cadastral and Surveying and Mapping Administration

2. THE FUTURE OF GEODETIC POINT FIELDS IN GERMANY

Ten years ago the discussion of the future of geodetic point fields lead to a common strategy of the Surveying Authorities of the States of the Federal Republic of Germany (AdV). The AdV decided to realize the geodetic reference frame out of the following four components:

- Geodetic fundamental points (“Grundnetzpunkte GGP”) in ETRS89
- Reference station points (RSP) / GNSS CORS RTK network in ETRS89
- leveling points of first order (in the system DHHN92)
- gravity points of first order (in the system DHSN96)

Today this strategy is implemented in North-Rhine Westphalia, Germany. As a special situation the reference station points are also determined as geodetic fundamental points. These geodetic fundamental points are defined by:

- Point distances up to 30 km
- 3D-marking
- 2 additional ground control points
- Accurate 3D-coordinates determination by GNSS (in ETRS89)
- Accurate levelling determination in the official system (DHHN92 = German primary levelling network 1992)
- Accurate gravity determination in the official system (DHSN96 = German primary)

- gravity network 1996)
- : Periodical controlling / monitoring

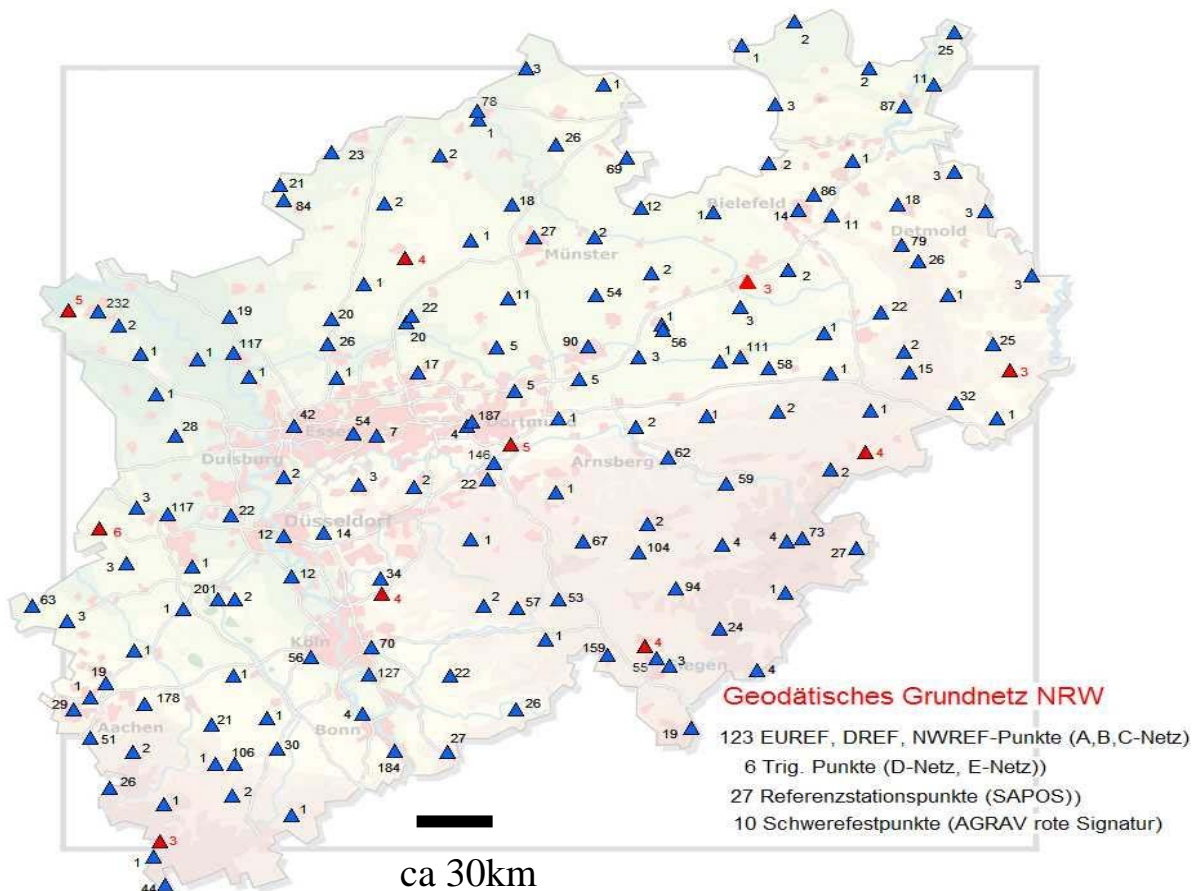


fig.4: Geodetic fundamental points (“GGP”) in ETRS89 in North-Rhine Westphalia

The aforementioned concept of the AdV was implemented in three measurement campaigns:

- 1st order levelling campaign „DHHN 2006-2011“
- GNSS-campaign 2008
- Absolute gravity campaign 2008

It were the goals of these measurement campaigns to renew the 1st order levelling network, to determine harmonized ETRS-coordinates in Germany, to determine heights (Molodensky) using GNSS, to give up point fields of lower order and to improve of the German (quasi) geoid “GCGXX”. All theses measurements were directly connected to the fundamental points and to the GNSS reference stations. In North-Rhine Westphalia the geodetic reference frame will be defined with respect to the aforementioned strategy of the Adv (fig. 4):

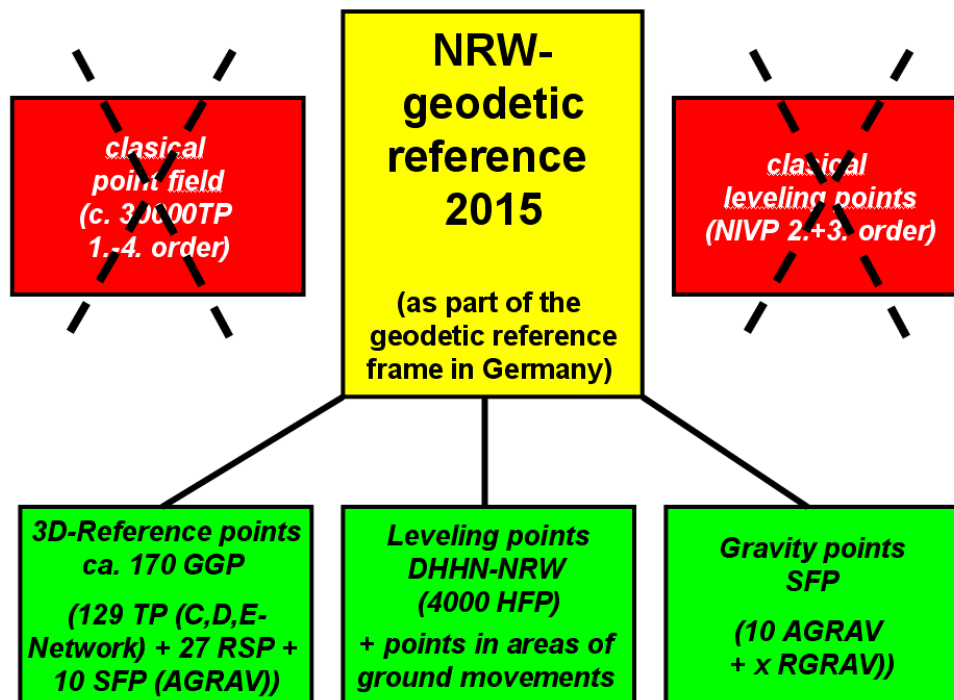


fig.: geodetic reference (point field) in North-Rhine Westphalia

From now on the Satellite Positioning Service of the German National Survey (GNSS CORS RTK network SAPOS®) - in North-Rhine Westphalia realized by 27 RSP (= reference station points) will provide the geodetic reference for the whole state. SAPOS® is the spatial data infrastructure component of the geodetic reference frame.

3 CONCLUSIONS

In the last years CORS GNSS (SAPOS®) was established as the fundamental measurement technique to determine 2D-cadastral coordinates and 3D-coordinates for all kind of applications. Other measurement techniques are losing importance. In the future the GNSS-technique will be available to determine heights (dynamic information) in which the accuracy will depend (restricted) on the accuracy of the ellipsoidal height of the (CORS GNSS) SAPOS-stations and the accuracy of the geoid (undulation model). For this reason reference station points are determined as fundamental points. The determination of the (accurate) 1 cm-geoid is an important goal and on the agenda for the next years. North-Rhine Westphalia is well prepared for the upcoming activities in the fields of Geodetic Reference System 2015 (Riecken 2010b).

REFERENCES

Riecken, J.: Spatial Information Management in the Context of Organizational Development – the Approach in North-Rhine Westphalia, Germany, FIG congress 2010a

Riecken, J.: Geodätischer Raumbezug 2015 in NRW, zfv 4/2010, S. 219-225, 2010b

BIOGRAPHICAL NOTES

From 2002 to 2007 Dr. Jens Riecken was responsible for “Cadastral Information Systems” in the Surveying and Mapping Agency of North-Rhine Westphalia. During this period he was involved in the standardization of spatial information. Jens Riecken was one of the main actors in the SDI developments and was member of several state and federal working groups and member of the EU expert group INSPIRE.

In 2008 and 2009, when the Surveying and Mapping Agency of North-Rhine Westphalia became the department “GEObasis.nrw” in the North-Rhine Westphalia Cologne District Government, Jens Riecken was chair of “Data Standards, Geodetic Reference”. He was still in charge for the standardization of spatial information and in addition for the realization of the geodetic reference, nowadays by satellite positioning services.

Since 2010 Jens Riecken is working for the Ministry of the Interior and Local Affairs North-Rhine Westphalia and he is in charge for general decisions.

Jens Riecken is the Vice-president of the DVW e.V., the German Association of Geodesy, Geoinformation and Land Management.

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