



GEO Services at Swiss Re: Maintaining a company-wide centralized geodatabase

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Abstract: *The GEOdatabase is Swiss Re's group wide standard repository for geographical data. It is fully integrated into the company's IT infrastructure and covers a vast range of worldwide administrative information, including data on countries, states, counties, zip codes and communities as well as global natural hazard information.*

Various demands need to be satisfied to supply corporate applications with up-to-date geographical information from a single centralized database. Accordingly, the daily business of Swiss Re's GEO Services team ranges from client and data migration support to developing solutions for tool-specific data requirements.

While data updates and maintenance are the essential basis for ongoing quality improvement, they must not affect the normal course of business. To ensure smooth operation, Swiss Re has therefore implemented a set of clearly defined data update workflows and information and feedback processes.

Swiss Re

[Swiss Re](#) is one of the world's largest reinsurance companies. The company operates through more than 70 offices in over 30 countries providing risk transfer, risk financing, and asset management. Swiss Re has been in the reinsurance business since its foundation in Zurich, Switzerland, in 1863. It is organized into three business groups - Property & Casualty, Life & Health and Financial Services - which are supported by the Corporate Centre.

Reinsurance provides insurance for insurance companies to spread the risk of direct insurers. This requires Swiss Re to constantly improve its methods for assessing and managing risks - one possibility is using GIS for research and analysis.

GEOservices at Swiss Re

GEOservices are part of Cat Perils and Tools, Chief Underwriting Office. The team provides internal and external GIS support as well as tool development.

The GEO Service team supports new and existing applications/tools with required geographic data, updates and datasets. It also helps internal clients to migrate their geographic information by mapping existing names/codes to their corresponding values stored in the GEOdatabase. The team maintains and updates applications such as the Interactive Hazard Atlas and CatNet for Clients for online access to geographic information. It also visualizes claims data and provides tool specific data for Swiss Re internal tools.

GIS technology at Swiss Re helps to better assess natural hazards and man-made risks. GIS software is also used for data preparation for modeling, for analyzing portfolio data and their display using electronic maps.

In 1996 Swiss Re decided to choose Geographic Information Systems from ESRI. Arc/Info and ArcView were used in the Natural Catastrophe unit only for providing group-wide services (e.g. portfolio distributions, mapping, support for earthquake and flood modeling).

In 1999 the first electronic Natural Hazard Atlas, an intranet based application, was launched. In 2000 an Internet Natural Hazard Atlas followed. In 2001 server based Catastrophe Rating functions together with GIS services were implemented. In 2004 the implementation of web based services (address encoding and flood lookup) was realized. The GEOdatabase is now established as company wide standard of geographic information.

Currently, the full suite of enterprise software products (ArcGIS, ArcSDE, ArcIMS) is used to satisfy the growing demands of the user community for access to data, analysis and mapping. The geographical information is stored in Oracle (the attribute data is also available in DB2) and is available in all standard environments.

GIS/RATOS Services at Swiss Re

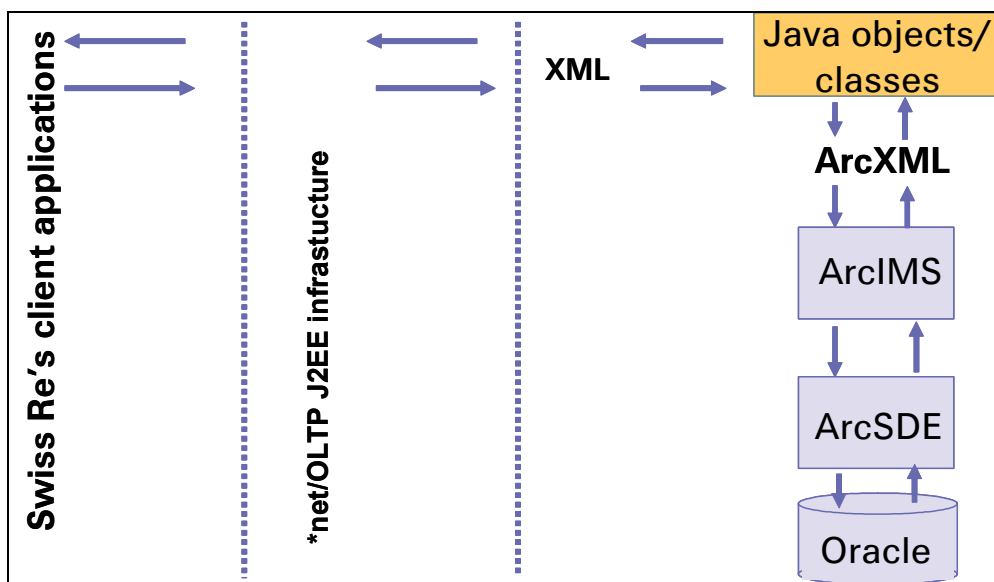


Figure 1 GIS/RATOS Services at Swiss Re

SwissRe GEOdatabase as group wide standard repository for geographical data

The GEOdatabase is Swiss Re’s group wide standard repository for geographical data and as such the company standard for geographic names. Unique IDs for geographic features are maintained and should be used throughout the enterprise. As there are numerous applications and some of them still using their own Codes or IDs a main task is the mapping of the different codes and the availability of several code information (ISO 3166 3-digit, 2-digit, numeric and character, FIPS, Swiss Re internal country codes (SIS)). In the future no more data migration for other tools/systems should be needed.

Various applications/clients use the GEOdatabase

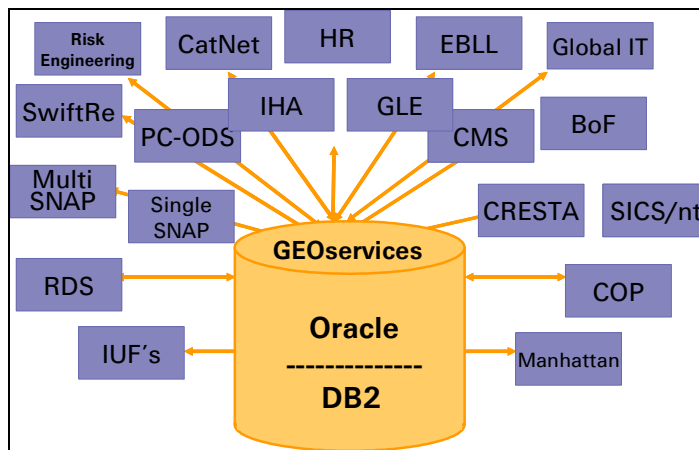


Figure 2 Various applications access the GEOdatabase

As the GEOservices team is the owner of all the geographic data at Swiss Re you can see it as one center of competence providing centralized services. This ensures that across the enterprise the same data quality level is encountered.

The SR GEOdatabase covers a vast range of worldwide administrative information, including data on countries, states, counties, zip codes and communities as well as global natural hazard information and is fully integrated in the company’s IT infrastructure. Thus information can be easily exchanged between different systems.

There are several sources/providers for Swiss Re’s geographic information as various demands of the corporate applications need to be satisfied from one single centralized geodatabase.

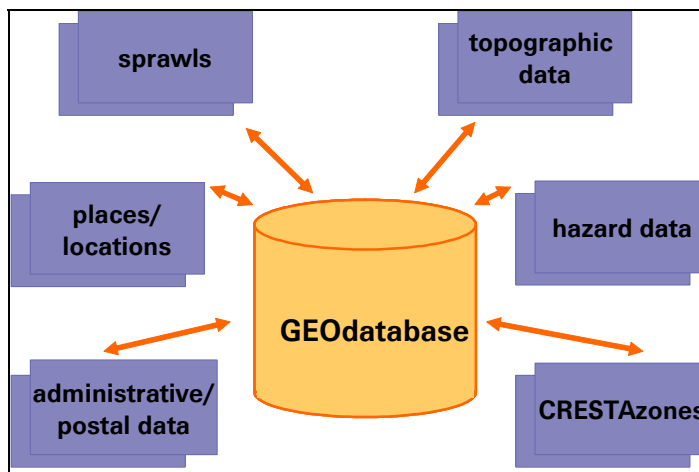


Figure 3 Available data in Swiss Re’s GEOdatabase



- Administrative data are purchased from [GFK Macon AG](#), Waghäusl, Germany.
- Places, cities, towns, villages are derived from [Europa Technologies](#), London.
- Sprawls for USA are taken from TIGER, [U.S. Census Bureau](#).
- Additional topographic data are used from “ESRI data and maps” for small scale representation only.
- NatCat data: various sources, the manual stored in the Interactive Hazard Atlas gives information to that.
- Additional data CRESTA Zones and Sub Zones derived from Macon administrative data sets according to [CRESTA](#) organization definitions.

Data Maintenance Tasks – why are data updates necessary?

The demand for data updates is driven by the clients of the GEOdatabase. The user-/application specific needs have to be fulfilled.

As Swiss Re operates worldwide also the geographic data needs to have global coverage. Therefore the data is stored in geographic coordinates (WGS84). Before new data (hazard or administrative) may be added to the geographic database it has to be assured the data fit together with the already existing data (different scales, projections, datum, and data providers).

Locations/place data often contain duplicates, wrong spelling, missing data, imprecise coordinates and unequally distributed places which results in quite a time effort to adjust.

In addition to that the political correctness (country names, borderlines, etc.) has to be maintained.

One to two times a year new data is delivered by the data providers. This also has to be added to the GEOdatabase.

Database updates

While data updates and maintenance are the essential basis for ongoing quality improvement, they may not affect the normal course of business of the enterprise. To ensure smooth operation, Swiss Re has therefore implemented a set of clearly defined data update workflows which are characterized by regular information and feedback processes.

Change requests

The GEOservices team collects all proposed changes from its clients and publishes those changes monthly in the company internal newsletter (SDL Newsletter). The application owners (Business and IT) have some 2 weeks' time to determine whether or not those changes will be implemented in the next GEOdatabase update. Excepting in the renewal period (October-January), monthly GEOdatabase updates are the general rule; the scheduled dates are published in the newsletter as well.

In case proposed changes are causing problems, application owners should contact the SDL team. The SDL team will inform the GEOservices team who, in turn, will solicit new solutions proposals from clients and publish results in the SDL newsletter.

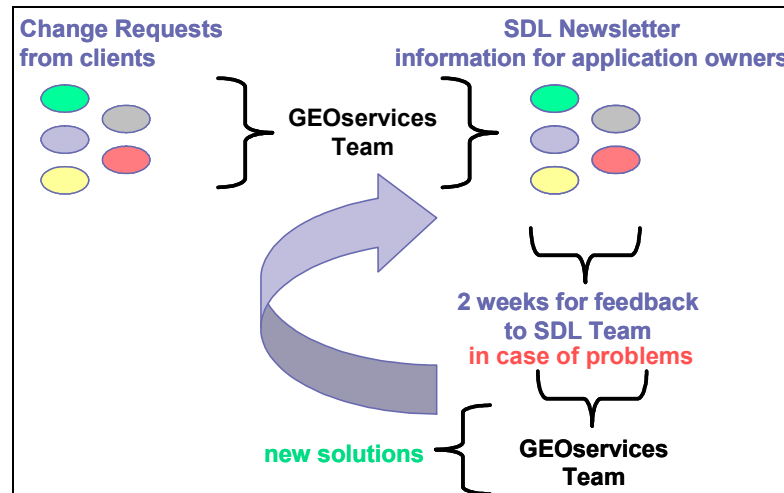


Figure 4 Change requests I

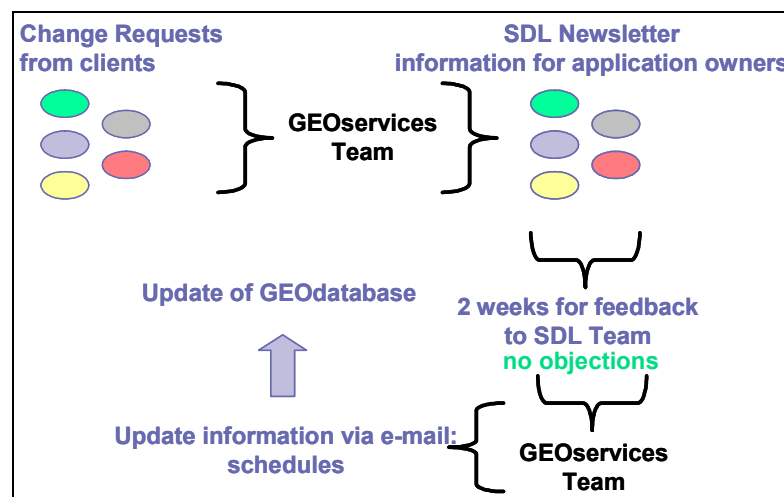


Figure 5 Change requests II

In addition to that the clients are informed via e-mail about interdependencies, availability and software-related updates of development, training and production environments both in Oracle and DB2. Sign-off processes ensure that changes are only implemented when applications are ready.

Data Update Challenges

The data quality should be unique on a global range but different perils have different requirements on scales and visibilities. That means that various data sources have to be considered and added to the GEOdatabase.

A major challenge within Swiss Re's GEOdatabase is political correctness (country names and borderlines). There is quite a gap between politically correct mapped country-information and the reinsurance-relevant business needs. Best example are Hong Kong as well as Macao and China. Politically correct these two entities represent special administrative regions (SAR) of China and therefore should be found on admin1 level, i.e. one step below country level. Business requirements are differently seated. To assess a risk properly and to satisfy Hong Kong based clients (mail addresses!) some applications need Hong Kong as a country in the database. To suit both needs a business view will be established.

The numerous dependencies of other systems with different needs have to be considered very well. As the requirements of one application concerning data changes could lead to problems within another.

Updates and tool roll-outs have to be clearly coordinated to ensure smooth transfer from an old data set to a new one. Therefore data updates are conducted in several steps if there's no veto from application owners.

There are two schemata in the Oracle environment: GIS and GISCODES. And both are available in 3 environments Development, Training and Production.

GIS infrastructure at Swiss Re

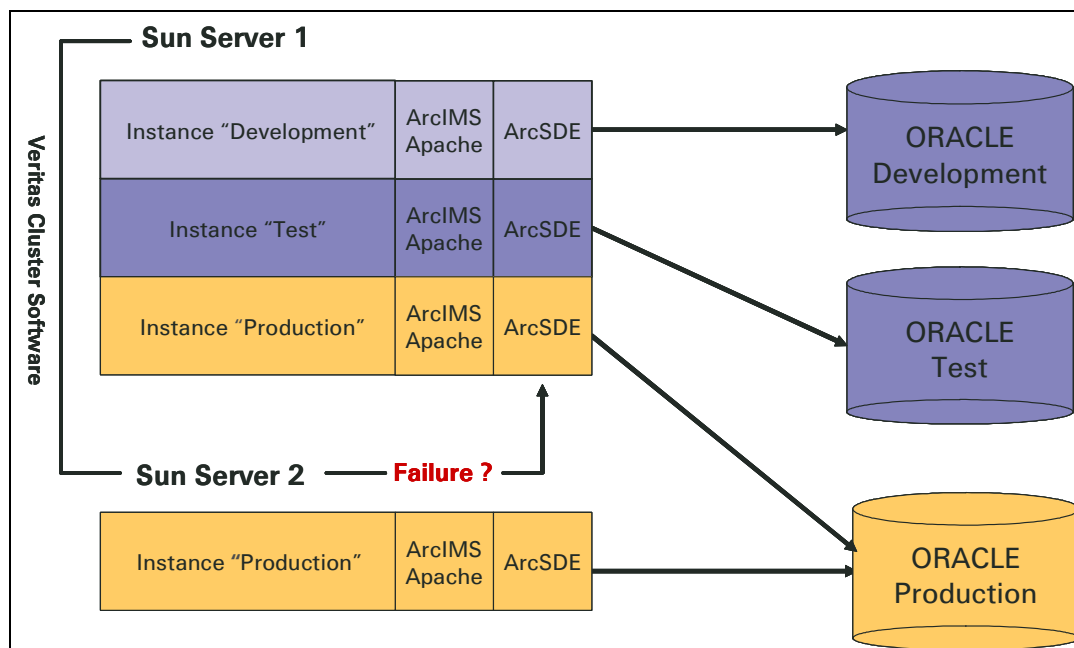


Figure 6 The three environments for geographic data

Schema GIS contains geographic and business data while schema GISCODES is only filled with business information which is also replicated to DB2 via PowerCenter.

Changes in GISCODES schema (Oracle) are conducted via update scripts, DB2 will then be automatically updated following the weekly data replication from Oracle to DB2.

Changes in schema GIS are implemented via single layer update. If only attribute information is affected, this is carried out via SQL Update Scripts. If geometries are affected the changes will be implemented through Unix Shell scripts containing the SDE commands.

The first step is to update the Development environment. If this was successful after testing the Training environment will be updated. Earlier this was done via schema copy but as the dataset increased rapidly the decision was taken to operate via SDE export/import for geometry changes and via Oracle table dumps and import respectively. Thus the expenditure of time for the update process is minimized.

After the updates in training environment have been tested successfully the Production environment will be updated. If the testing there was also successful the data will be replicated to the DB2 environment via PowerCenter.

**Summary**

A company-wide geographic database has numerous advantages. Unique IDs are available throughout the enterprise and geographic names match the company standard. The data level across the enterprise is the same and information can be easily exchanged and shared between different applications/tools/systems. Data migration is no longer necessary.

Besides the advantages there are some challenges that have to be considered. As there are numerous dependencies to other systems and tools data updates have to be clearly communicated and coordinated. Tool rollouts and applications' needs have to be considered.

As the maintenance work may not interrupt business applications the data update workflows have to be clearly defined. This requires regular information as well as feedback processes. The GEOservices team at Swiss Re uses the company internal newsletter to publish change requests and gather feedback regarding proposed changes. Schedules for GEOdatabase updates are communicated via this newsletter and in addition to that via e-mail.

Acronyms:

CRESTA: Catastrophe Risk Evaluating and Standardizing Target Accumulation

FIPS: Federal Information Processing Standards

NatCat: Natural Catastrophe

RATOS: Rating Online System

SDL: Swiss Re Data Language

SIS: Schaden Informations System (Claims Information System)

Swiss Re: Swiss Reinsurance Company

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