Geographical underwriting – A central component of risk management

Geoinformatics is a discipline that Munich Re has pursued for more than ten years. Originally a piece of visionary thinking, it has developed over recent years into applications that are now an indispensable part of risk management.

Even in the mid-1990s, Geographical Information Systems (GIS) were still used at most as standalone solutions to support geo experts. Nowadays, complex GIS applications are an integral part of the IT environment at insurance companies and are widely used by underwriters in their daily business. The potential fields of application include virtually all phases of the underwriting process, ranging from data capture and geocoding of insured risks to risk analysis (accumulation issues and the identification of concentrations and patterns of values), risk modelling, and the visualisation of results. Our clients also benefit from this array of uses in the form of portfolio and claims analyses.

Success with address-based geocoding of risks

High-quality geocoding of portfolio and claims data is crucial for risk management and portfolio optimisation in lines of business involving natural hazards and man-made risks like terrorism. More than ten million risks have been geocoded with their streets and house numbers in 18 European core markets and the US market – an important step towards more risk transparency in the underwriting process (Fig. 4).

Munich Re’s innovative web technologies provide underwriters with access to the Geo Data Service (GDS) and thus to the address-based geocoding of risks. Portfolio and claims data may be georeferenced in unlimited numbers and used for detailed simulations and analyses.

Thanks to the excellent performance, large treaty portfolios with over a million risk addresses can now be processed. In countries with no address-based data, coarser geocoding is carried out on the basis of the known CRESTA zones and a global city database.

Fig. 1 Identification of risks affected in flooded New Orleans after Hurricane Katrina on 29 August 2005.

- Flooded areas
  - Severe damage
  - Moderately affected
- Risks in the affected area
  - Major damage
  - Slight damage
  - No damage
- City centre
  - New Orleans

Sources:
Google Earth.com, fema.gov, digitalglobe.com
These functions are also used in our products NATHAN and CatLossEstimation. The latter system is still being tested. Taking liability data and the latest information on wind-storms and severe weather events as a basis, it provides a quick estimate of the losses to be expected and their focal areas. The aim is to optimise loss management in the medium term.

As many primary insurers make little use of address-based geocoded portfolio data, Munich Re offers its clients a special service: MRGAP (Geographical Analysis of Portfolios), which is based on anonymised portfolio and claims data. The spatial analyses of property insurance portfolios make it possible to identify unknown accumulation situations (hot spots) and potential accumulation effects of multi-location policies. Primary insurers are using this information more and more not only in traditional hazard-related analyses but also for the purposes of managing their sales operations and client acquisition.

Crucial test following Hurricane Katrina

In the aftermath of Hurricane Katrina, a team of Munich Re staff planned and performed a loss inspection using for the first time ever a mobile GIS unit (Fig. 2). These mobile systems make it possible to link up the damage identified during the inspection with the liability data stored at the company. This kind of unit is usually made up of a robust Personal Digital Assistant (PDA) and a powerful GPS receiver. The apparatus is fed with the geo data and software it needs for a specific situation. Before the team left for its loss inspection in August 2005, the section of the portfolio for the region affected was projected onto maps and satellite images stored in the system. Street data were used to plan the best possible route, and risks were soon identified. The incorporation of preliminary loss maps provided by the Federal Emergency Management Agency (FEMA) permitted speedy identification and assessment of significant individual losses. The team’s impressions from the inspection of numerous individual losses and the different levels of damage to residential, commercial, and industrial buildings made it possible to make a preliminary estimate of the overall loss (Fig. 1).
Geodatabases were also set up last year for the oil rigs in the Gulf of Mexico. A good estimate of the losses caused by the hurricanes in 2005 was possible on the basis of wind speed data. Firstly, liability values and the scope of cover had to be specified for all the rigs. This information forms the basis for simulating historical events, which is necessary in order to calibrate the loss estimation model. Approaching storms can also be examined in terms of their loss potential for offshore business (Fig. 3).

**Options far from being exhausted**

These examples demonstrate only some of the methods that are already in use today, and represent only a fraction of the complete range of applications. Internet-based tools like Google Earth (http://earth.google.com/) are a striking illustration of how Geographical Information Systems can be made available to new target groups. Because once every point on earth can be accessed with just a few mouse clicks on satellite images, this technology represents an efficient and practical tool for risk managers and underwriters. What is more, all kinds of cartographic data, such as risk locations, can be superimposed on the images (Fig. 5). If these techniques can be integrated in operative processes in the coming years, they will mark the beginning of a new era in risk transparency.

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Global risk assessment of natural hazards – NATHAN (NATural Hazards Assessment Network):

NATHAN is based on “World of Natural Hazards”, a CD-ROM originally published in 2000, which has continuously been updated since then. More than 100,000 copies have now been produced, making it the most widely distributed media product in Munich Re’s 125-year history.

Our aim is to share our knowledge with the public. A free version of NATHAN can be accessed on the internet:

>> http://mrnathan.munichre.com

These are the features offered by NATHAN.

NATHAN is composed of three modules:

In the Natural Hazard Maps module, you place the Hazard Pointer on any desired point on the earth’s land surface and immediately get a qualitative estimate of the natural-hazard situation there.

The Major Disasters module provides information on economic and human losses from current and historical natural catastrophes worldwide.

The Country Profiles module provides an overview of the selected country’s geography, population, and economy, and shows its overall natural hazard situation.

Our clients can also access an extended version of NATHAN at connect.munichre, which provides exclusive use of additional functions:

>> http://connect.munichre.com