GRIBS2: An Interactive GIS Tool for Mapping Industrial Facilities with Dangerous Substances and Microorganisms in an Urban Environment

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Abstract
The Swiss law on the protection of the environment requires the companies handling dangerous substances and microorganisms to give specific information about hazards, risks and safety measures to the inspectorates enforcing the regulations. In the Canton of Basel-Stadt the inspectorate KCB of the Cantonal Laboratory summaries this information into a SQL-database called RIKA (Risk Information Register). For the visualisation and geographical referencing of risk data from facilities with dangerous substances and microorganisms, GRIBS2, an Intranet-GIS-based and browser-supported software, was created. GRIBS2 reads and interpretes risk data through a direct interaction with our SQL-database and links this information into the local geographical context. Furthermore, specific queries allow the search of information in different map layers of environmental and technological topics. GRIBS2 as an interactive tool supports the preparation of inspections by the KCB authorities and serves as an information platform in case of a major accident to support the emergency services such as fire brigades or police. Furthermore, a web-based version of GRIBS2 will soon be implemented and made available for other cantonal administration units involved e.g. in land use planning. The cantonal law on the protection of the environment which specifies the national legislation gives the public the right to know about the risk situation in their neighbourhood. Therefore, the use of a GRIBS2-based Internet solution for an active information of the public is currently in preparation.

1. Background on the collection and use of hazard information

In Switzerland, the federal law on the protection of the environment requires the companies handling dangerous substances and microorganisms to give specific information about hazards, risks and safety measures to the authorities enforcing the regulations. Within certain limits, the public has the right to know about such hazards and the results of the control activities of the authorities. Finally, the cantonal law on the protection of the environment which specifies the national legislation gives the public the right to know about the risk situation in their neighbourhood.

The law is stipulated in a number of ordinances which are mainly enforced by the authorities in the Cantons. Namely, the ordinance on the protection of the population against major accidents and the ordinance on the contained use of organisms regulate the use of dangerous chemicals and microorganisms in production plants and research or diagnostic laboratories. In the Canton of Basel-Stadt, the inspectorate of Chemical and Biological Safety (KCB) of the Cantonal Laboratory (KL) is responsible to assess the safety measures taken by the operators of such facilities. As part of its activity, the KCB collects all hazard-related information provided by the operators and other sources and maintains a database of hazard information.

In addition, the emergency advice task force of the KL (which includes the chemists and biologists from the KCB) provides its advice to the different emergency services in the Canton (e.g. fire brigade, police,

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to assure the fast and efficient handling of incidents and to serve as a support in case of a major industrial accident.

2. Architecture of GRIBS2 within the risk information platform

The main hazard information database, called RIKA², was already in use by the KCB as a powerful relational SQL-database which provides the possibility for rapid searching and reporting e.g. in case of an emergency (its software was created for the KCB from Maurhofer Informatik AG, Switzerland). To visualize hazards as industrial sites in a geographical context, the database was extended with a GIS-module, and linked to a street map of Basel in the form of GRIBS2³ which was adopted from a proprietary GIS-IT solution by the company GeoTask AG.

As shown in figure 1, the two databases RIKA (SQL) and g.business server (DB2) are connected through a federated system. The information from RIKA is processed with geographical and additional data feeded through FME⁴ technology (such as maps and other vector data) and integrated into a web-application server, the g.business integrator. One main advantage of GRIBS2 is that its client runs in a browser (Internet Explorer from Microsoft) causing no need for the installation of additional software or plug ins. Furthermore, the Java technology allows a simple implementation of tailored queries, reports and print-ready maps in the commonly used formats (PDF, PNG, csv).

Future prospects envision the addition of a module for the integration of explosion scenarios and the export of data into a centralized GIS platform for broader accessibility (e.g. for urban planning, information of the public).

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2 RIKA = Risk Information Register of the KCB: client runs in Windows environment
3 GRIBS2 = Geographical Risk Information System Basel-Stadt: client runs in Browser
4 FME = Feature Manipulation Engine: a software for import/export of vector data