

## The RiskMan project

As part of an applied science assignment commissioned by the State Agency for Information Technologies and Communications (SAITC), since 2008 a team of the Mathematics and Informatics Department at the St Kliment Ohridski University of Sofia has been developing, together with the Agency for Sustainable Development and Euro-integration (ASDE) and several other research and civil organizations, a web-based system for registration, visualisation and application of data and analyses of risk using the R<sup>k</sup>FMEA method for monitoring and preventive resource management of disaster risk called *Risk Manager*, or *RiskMan* for short.

Since June 2008 the system has been implemented for pilot usage in the St Kliment Ohridski University of Sofia and in December 2008 it was deployed in SAITC. So far the system has been used for pilot registration, monitoring and preventive resource management of disaster risk in mayor's offices in municipalities in the regions of Rousse and Gotse Delchev, Bulgaria.

Thanks to the web-based system it is possible to collect data in a decentralised way by mayoralties in the municipalities of the Republic of Bulgaria whereby the administration of the process in mayoralties is performed in the respective municipality. For this purpose, privileges to administer the process within the municipality are granted by the system administrators. Thus, at mayoralty level authorised system users are able to insert information about risk event, regularity, severity, impact and many other risk parameters regarding zones and objects of injury, as far as about technical facilities to prevent the risk. The collected information is used to formulate integrated risk assessments for the different types of disaster events, as well as the tendency for risk change. Geographical risk maps and risk tendency maps are then automatically generated for mayoralties, municipalities and regions, which can be used by both the state administration in the planning of measures to reduce existing risks and monitor their implementation, as well as by private entities in implementing their investment plans.

The RiskMan system is part of Bulgaria's operational capacity built at the moment for data collection and management and

provision of services under the European programme for Earth observation - Global Monitoring for Environment and Security (GMES). At the level of the state administration the application of the system and the co-ordination with the municipalities is expected to be performed by the Ministry of Transport, Information Technologies and Communications through the Executive Agency for Electronic Communication Networks and Information Systems, the Spatial Databases Department of the Information and Communication Systems Department. &

## Risk assessment and management by R<sup>k</sup>FMEA

R<sup>k</sup>FMEA is a method for risk assessment and risk management in general and disaster risk in particular, and of the measures and resources for risk mitigation and their effective planning and management. The method is also used for managing the maintenance and control of the equipment for the protection against disaster risk. R<sup>k</sup>FMEA is intended for the primary administrative and management units which have a bearing on the collection of data and the formulation of measures for risk assessment and risk management, and offers an interactive and simplified approach and language that are easy to understand and use even by ordinary people. R<sup>k</sup>FMEA deals with the management of risk and the resources for prevention against future events before an emergency or a disaster occurs, and only provides information for crisis management without being involved in the management itself. The data collected and collated with R<sup>k</sup>FMEA and RiskMan may be used in the evaluation and planning of investments in measures and facilities for protection against natural disasters in project financing at the local, municipal or regional level.

The key elements for risk assessment and approach to risk are based on FMEA (Failure Mode Effects Analysis) methodology and the application developed for the management of risk and preventive measures R<sup>k</sup>FMEA. Risks are measured by four parameters: vulnerability (R), probability (P), measure or control (action) effect (N), whereby these four parameters provide an overall risk factor RPN, according to the FMEA standard. The (F) parameter of R<sup>k</sup>FMEA is an indicator of the effectiveness or urgency of a proposed new measure or a series of measures for prevention and control. The

four parameters therefore provide the complex risk factor (F), as the product of the multiplication of the four factors, (R), (P), (N), and (F). Separately, a factor of social vulnerability is calculated as a function of the above parameters, the age dependence and the gross domestic product of the mayoralty/municipality. All risk parameters are rated in a scale of 1 to 10, with 1 as the most favourable and 10, the least favourable, and are selected from tables adjusted to the respective risk cause. &

## About the system

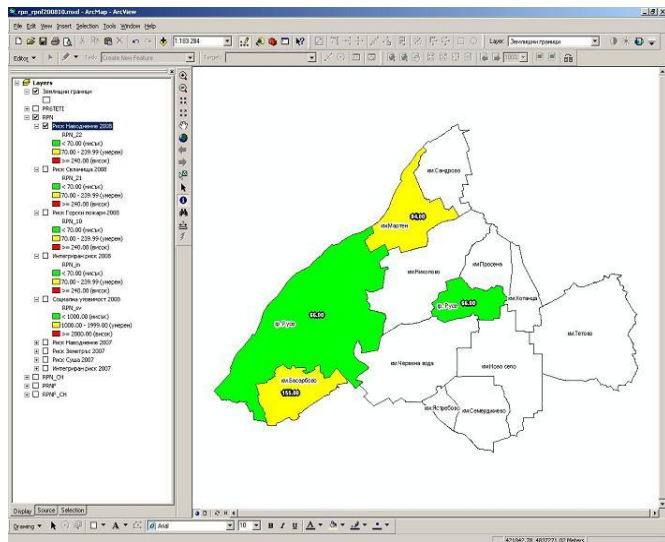
RiskMan is a multi-user web-based system with different access levels enabling registration, visualisation, and use of data and analyses provided through the R<sup>k</sup>FMEA method for monitoring and preventive resource management of disaster risk. The system has been designed as a client-server application accessible to end users by means of Microsoft's Internet browser. To enable portability, RiskMan was developed using PHP and JavaScript, under Windows XP operating system. The product was tested on Apache servers. MySQL database is used for data storage and access. The software technologies and applications used in RiskMan enable the easy migration of the system to other platforms.

The access to the RiskMan system provides an opportunity for entering, supervising and correcting data at the level of mayoralty and the level of municipality. Four different user roles have been defined with authorised access in the system, e.g. system administrator, administrator of municipality, operator in mayoralty and visitor, each with their own fixed rights. While a visitor can only review the data input for all municipalities, mayoralties, crisis events and technical facilities, the operator in the respective mayoralty can, in addition to this, enter and edit data about the mayoralty he/she has been assigned with, and data about both crisis events and technical facilities. The operator is required to provide a description of the crisis event and the damage area through assigning means of identification and cause of occurrence. The creation and administration of operators in mayoralties is performed by the administrator in the respective municipality, who in his/her turn is governed by the system administrator. &

## Generation of risk maps

The RiskMan system calculates, using the R<sup>F</sup>FMEA method, risk factors for a given crisis event on the territory of a given mayoralty by means of the data input for area, objects likely to be damaged in the area and, as well, technical facilities. By means of integrating the risk assessments by mayoralties, the risk factors for a given event are calculated for the territory of the respective municipality and, thus, geographic maps of risks by mayoralties and by municipalities are generated.

The example of a risk map of Rouse Municipality shown below uses colour coding in green, yellow and red to designate the risk for a crisis event, flooding, for each mayoralty in reference to which information was collected using the RiskMan system. The green, yellow and red colours mean respectively low, moderate and high risk, calculated as an integrated assessment for the respective crisis event in the respective mayoralty; the values and the crisis event are given on the left-hand column next to each of the figures. The low risk has a RPN factor value of zero to 70, the moderate, from and including 70 to 240, and the high, from and including 240 and greater. Similar maps were also developed for Gotse Delchev Municipality. &



**RiskMan**

**Добре дошли в Интернет сайта на проект RiskMan!**

Начало	
За проекта	
R <sup>F</sup> FMEA	RiskMan представлява Интернет-базирана система за регистрация, визуализация и ползване на данни и анализи с R <sup>F</sup> FMEA метода за мониторинг и превантивно ресурсно управление на риска от природни бедствия и се разработва по проект, иницииран от Държавната агенция за информационни технологии и съобщения (ДАИТС) - сега Изпълнителна агенция „Електронни съобщителни мрежи и информационни системи“ към Министерството на транспорта, информационните технологии и съобщения. Системата е разработена от група експерти от различни организации под координацията на Агенцията за устойчиво развитие и евроинтеграция - АУРЕ с участието на няколко партньора. Системата RiskMan позволява събирането и обобщаването по райони на данни за риска и тенденцията за промяната на риска от различни кризисни събития, като напр. природни бедствия - наводнения, горски пожари, земетресения, свлачища, засушаване, диги, укрепвания и др.) се обобщават и автоматично се изчисляват факторите на риска от определено природно бедствие за дадено кметство, община и област. Получените резултати се използват за изготвяне на географски карти на риска от това бедствие за съответната територия.
За системата	
Генерация на карти	
Партньори	
Новини	
Ресурси и връзки	
Контакти	

Използването на Интернет-базираната система RiskMan дава възможност за децентрализирано набиране на данни по кметства за общините в Република България, като управлението на процеса по кметства се извършва в съответната община. От събраната информация се изчисляват интегрираните оценки на риска за различните видове кризисни събития и автоматизирано се изграждат карти на риска и промяната на риска по кметства, общини и области, които могат да се използват както от държавната администрация за планиране на мерки за намаляване на съществуващия риск, тяхната ефективност и следене на изпълнението им, така и от частни организации при намерения за инвестиране.

На сайта ще намерите информация за проекта и партньорите по него, за системата RiskMan, както и полезни връзки, ресурси и контакти. За достъп до последната версия на RiskMan щракнете тук.

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АГЕНЦИЯ ЗА УСТОЙЧИВО РАЗВИТИЕ И ЕВРОИНТЕГРАЦИЯ - ЕКОРЕГИОНИ (АУРЕ)



**European Programme for Earth Observation -  
Global Monitoring for Environment and Security  
(GMES)**

**State Agency for Information Technologies and  
Communications (SAITC)**

**Agency for Sustainable Development and Euro-  
integration (ASDE)**

**WEB-BASED  
SYSTEM FOR REGISTRATION, MONITORING  
AND PREVENTIVE RESOURCE MANAGEMENT  
OF DISASTER RISK**

# RiskMan

## Where to find us

Lilyana Tournalieva, Roumen Berberov  
Executive Agency for Electronic Communication Networks and  
Information Systems, Ministry of Transport, Information Technologies  
and Communications

**Address:** 5, Gourko Street  
Sofia 1000  
**Tel./Fax:** (+359 2) 949 28 05  
**E-mail:** ltournalieva@daits.government.bg,  
rberberov@daits.government.bg

Agency for Sustainable Development and Euro-integration (ASDE)  
**Address:** 9, Kokiche Street  
Sofia 1164

**Tel./Fax:** (+359 2) 470 90 75  
**E-mail:** info@riskbg.org, help@riskbg.org

**Web:** <http://riskbg.org>



<http://riskbg.org/>

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