CRITICAL INFRASTRUCTURE PROTECTION IN THE EUROPEAN SECURITY RESEARCH

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ABSTRAKT
Článok sa zaoberá problematikou výskumu ochrany kritickej infraštruktúry v rámci Európskeho programu pre výskum bezpečnosti a stručne prezentuje aktivity Európskej Únie z hľadiska ochrany kritickej infraštruktúry. V ďalšej časti sa zaoberá negatívnymi dopadmi extrémne nepriaznivého počasia na kritickú infraštruktúru, uvádza niekoľko konkrétnych príkladov a zdôrazňuje potrebu pripravenosti na takéto krízové situácie, nakoľko sa očakáva, že prírodné katastrofy spôsobené extrémnym počasím sa budú vyskytovať stále častejšie. Predstavuje projekty RAIN, POSEIDON a PRO-ADRIAS zamerané na ochranu infraštruktúr. V závere zdôrazňuje nevyhnutnosť ďalšieho výskumu, najmä z hľadiska nových prístupov a kvantitatívnych metód na ochranu kritickej infraštruktúry.

Kľúčové slová:
kritická infraštruktúra, ochrana, bezpečnosť, výskum

ABSTRACT
The paper is dealing with research of critical infrastructure protection within the European Security Research Programme and briefly presents the European Union activities in the Critical Infrastructure Protection. Further it is dealing with negative impacts of extreme weather events on critical infrastructure, presents several specific examples and stress the necessity to be prepared for such crisis situations since it is expected that the frequency of natural catastrophes caused by the extreme weather conditions will increase. It presents projects RAIN, POSEIDON and PRO-ADRIAS aimed at infrastructures protection. In conclusion the necessity of next research oriented especially on new approaches and quantitative methods in critical infrastructure protection is emphasized.

Key words:
critical infrastructure, protection, security, research

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1 INTRODUCTION

Security of infrastructures and utilities is a part of security research activities of the FP7 Security Research Work Programme 2013 issued by the European Commission on 09 July 2012. Within this activity, the research is to be concentrated on targets of an incident or disaster of transnational importance. Infrastructures include e.g. large-scale event sites, significant sites of political (e.g. parliament buildings) or symbolic (e.g. particular monuments) value and utilities being those for energy (including oil, electricity, gas), water, transport (including air, sea, land), communication (including broadcasting), financial, administrative, public health, etc. Within the research, a series of capabilities are required to cope with this mission area, many of which primarily relate to the phases "protect" but also "prepare". The ambition is both to avoid an incident and to mitigate its potential consequences. To build up the required capabilities, the European Commission put emphasis on issues such as:

- analysing, modelling and assessing vulnerabilities of physical infrastructures and their operations,
- securing existing and future public and private critical networked infrastructures, systems and services with respect to their physical, logical and functional side,
- control and alert systems to allow for quick response in case of an incident,
- protection against cascading effects of an incident,
- defining and designing criteria to build new secure infrastructures and utilities (European Commission, 2012).

Concerning the critical infrastructure protection this activity has included topics for the project proposals such as „Impact of extreme weather on critical infrastructure“, “A research agenda for security issues on land transport“, “Security of ground based infrastructure and assets operating space systems”, “Pan European detection and management of incidents/attacks on critical infrastructures in sectors other than the ICT sector (i.e. energy, transport, finance, etc.)” and others.

2 EUROPEAN UNION ACTIVITIES IN CRITICAL INFRASTRUCTURE PROTECTION

On 17-18 June 2004, the European Council asked the Commission to prepare an overall strategy to enhance the protection of critical infrastructures. In response, the Commission transmitted on 22 October 2004 a Communication entitled "Critical Infrastructure Protection in the Fight against Terrorism" putting forward suggestions to enhance European prevention, preparedness and response to terrorist attacks involving critical infrastructures.

The Commission's intention to propose a European Programme for Critical Infrastructure Protection (EPCIP) and a Critical Infrastructure Warning Information Network (CIWIN) was accepted by the European Council in the Council conclusions

on prevention, preparedness and response to terrorist attacks and in the Solidarity Programme, both adopted by the Council on 2 December 2004.

Throughout 2005, intensive work was done on the elaboration of EPCIP. Two European seminars on critical infrastructure protection and a number of informal meetings were held bringing together experts from all EU Member States. This work culminated in the adoption by the Commission on 17 November 2005 of the Green Paper on a European Programme for Critical Infrastructure Protection.

The Green Paper exercise was followed by a detailed impact assessment and the adoption on 12 December 2006 of a policy package on EPCIP composed of a communication and a proposed Directive. The communication deals with general policy in connection with EPCIP (CIWIN, work-streams to develop EPCIP, sectorial interdependencies, annual work planning and the residual work on National Critical Infrastructure) whereas the Directive focuses on the designation of critical infrastructure of a European dimension (European Critical Infrastructure or "ECI").

On 5-6 June 2008, the Justice and Home Affairs Council reached political agreement on the Commission proposal for a Directive on the identification and designation of European Critical Infrastructure (ECI) and the assessment of the need to improve their protection. The Council of the European Union adopted the Council Directive 2008/114/EC on 8 December 2008. The Directive establishes the procedure for the identification and designation of ECI.

3 IMPACT OF EXTREME WEATHER ON CRITICAL INFRASTRUCTURE

In last years, a variety of extreme weather events, including droughts, rain induced landslides, river floods, winter storms, wildfire, and hurricanes, have threatened and damaged many different regions across Europe and worldwide. These events can have a devastating impact also on critical infrastructure systems. At present critical infrastructures (power plants, dams, dikes transport infrastructure, etc.) are more and more threatened because of the changing weather conditions. It is expected that the frequency of natural catastrophes caused by the extreme weather conditions will increase. Therefore preparing for these events is vital.

In this context, in the year 2012, the Faculty of Special Engineering of the Zilina University became a member of consortium that has prepared and submitted project proposal titled Risk Analysis of Infrastructure Networks in response to extreme weather - **RAIN** that achieved a very good evaluation and is well above the funding threshold. The project RAIN was elaborated within the above mentioned activity “Security of infrastructures and utilities” and within its topic “Impact of extreme weather on critical infrastructure“. The aim of this project is to develop a systematic risk management framework that explicitly considers the impacts of extreme weather events on critical infrastructure and develops a series of mitigation tools to enhance the security of the pan-European infrastructure network. Now we are waiting for final decision about funding.

The driver for the project were the complex interdependencies of the infrastructure networks that in recent years have been highlighted through multiple

failures during extreme weather events. Examples of such failures include, e.g. (RAIN, 2012)÷.

New York Hurricane and Severe Storm damage

The largest Atlantic storm on record, hurricane Sandy, devastated portions of the Caribbean, Mid-Atlantic and North Eastern United States in late October 2012. Sandy was estimated to have caused damage of at least $20 billion USD and further estimates of losses (including business interruption) surpassed $50 billion. At least 193 people were killed along the path of the storm in seven countries. In Jamaica, winds left 70% of residents without electricity, blew roofs off buildings, killed one, and caused about $55.23 million in damage. In Haiti, Sandy's outer bands brought flooding that killed at least 54, caused food shortages, and left about 200,000 homeless. In the Dominican Republic, two died. In Puerto Rico, one man was swept away by a swollen river. In Cuba, there was extensive coastal flooding and wind damage inland, destroying some 15,000 homes, killing 11, and causing $2 billion in damage. In the United States, Hurricane Sandy affected area at least 24 states, from Florida to Maine and west to Michigan and Wisconsin, with particularly severe damage in New Jersey and New York. Its storm surge hit New York City on October 29, flooding streets, tunnels and subway lines, Figure 1, and cutting power in and around the city.

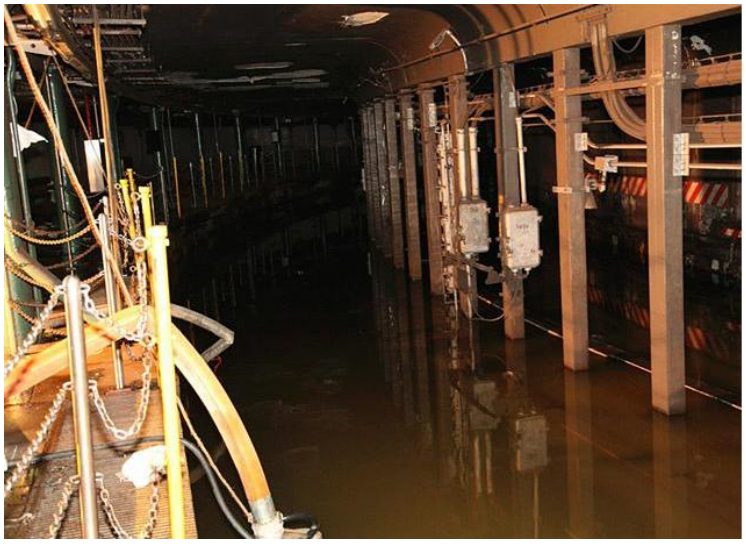

Figure 1 Flooding in New York Subway following Hurricane Sandy (Donohu, 2012)

Seven subway tunnels under the East River were flooded, which the Metropolitan Transportation Authority stated early on October 30 “that the destruction caused by the storm was the worst disaster in the 108-year history of the New York City subway system”. Gas shortages throughout the region led to an effort by the U.S. federal government to bring in gasoline and set up mobile truck distribution at which people could receive up to 10 gallons of gas, free of charge. This caused queues of up to 20 blocks long and was quickly suspended. The full extent of the infrastructure damage may not be quantified for some time yet but it is clear from preliminary reports that the hurricane had a devastating impact on a wide variety of infrastructure networks.

Flood damages

In September 2012, twelve people died and hundreds had to be evacuated as a result of the flash floods in Andalusia and Murcia in the south of Spain. This single event caused by torrential rain resulted in damage to infrastructure networks and building alike, including the collapse of two bridges on two motorways. The cascading effects and interdependencies of these infrastructure failures are yet to be determined.

In the period from 30th July to 8th August 2010, Finland was hit with severe storms, particularly 'downbursts' following an unusually period of high temperatures. Falling trees cut off roads, destroyed buildings and caused devastation to property. The water and electricity networks were cut off in wide areas in Central and South-East Finland. Forest damage represented some 8.1 million m^3 and 240, 000 hectares. As a result of the storms, a total of approximately 35,000 kilometres of the electricity net-work was destroyed or damaged. Consequently, nearly 9,000 distribution substations were left with-out electricity, leaving 480,000 households in the dark. Repair work to the damaged networks amounted to nearly 200,000 hours (over 120 man-years).

The floods experienced in Central Europe in August 2002, resulted in the deaths of approximately 150 people and an estimated €150 billion worth of damage. In Germany and the Czech Republic, the worst affected areas, the effects on infrastructure consisted of electricity failures, disconnected telecommunication links, damage to approximately 250 roads and 256 bridge structures, disruption to the Gas service due to damaged pipelines and contamination of clean water with flood water. Restoration of important services to full capacity took approximately 1 month for electricity, 2 months for Gas and 3 months for telephone communications.

Cascading power failure in Western Europe

In November 2006, unscheduled shutdown of a high voltage electricity line in Germany resulted in massive power failures across the Western European grids, extending through France, Italy, Spain, Portugal, Belgium and Austria. This single event, which adversely affected millions of people, reinforces the necessity for a Pan-European cross border approach to assessing infrastructure risks.

The list of potential negative weather events that could impact Europe’s land based infrastructure networks is extensive. However, in many cases the measures that are required to prepare for, and respond to, such events are common.

4 EXAMPLES OF THE EUROPEAN PROJECTS DEALING WITH INFRASTRUCTURE PROTECTION

Critical Infrastructures Protection is something that usually overlaps national territories and goes beyond territorial delimitation. For their connecting roles, critical infrastructures are better framed in regional or trans-regional perspectives than purely national ones.

The project **POSEIDON** was co-funded by the European Commission DG JHL (funding 70%) 2008-2009 and the participating entities. This was a one year project, which combined applied research and assessment, governmental table top exercises and dissemination activities. The project was selected and introduced by the

Commission as a successful example for the Council of the European Union (ENFOPOL), Working Party on Terrorism on 15.4.09 in Brussels.

Project Poseidon's added value towards executing a table-top exercise of a terrorist attack on a passenger ferry in the Baltic Sea area which is not considered as a potential target area for terrorists but instead as an environment of cooperation and confidence. This type of exercise challenged the decision makers and especially the decision making capacity of the European Union when facing multinational conflict situation.

In addition it rendered concretely how the private-public cooperation would work in the situation described which is explicitly considered essential in the Critical Infrastructure Protection according to the EU-documents on the CIP (COM (2005) 576 and COM (2006) 787 (Hellenberg International, 2012).

The project **PRO-ADRIAS** – Protecting the Adriatic Seaways underlined the importance of a comprehensive risk assessment system both in political and operative decision-making. The project is based on the notion that Adriatic seaways, with their commercial and civil maritime routes, are being considered as one of the crucial infrastructural and logistic foundations for the wider European development. The aim of the project is to contribute to the development of a common framework for the protection of the Adriatic Sea as a whole and its maritime infrastructures in particular through identifying SWOT variables necessary to successfully manage emergency situation in Adriatic Sea. Implementation of the project was focused especially on these tasks:

- Contribution to the conceptual development of context specific notions of threats and communication strategies in Albania.
- Background research and data collection focused on identification of existing Operational-Strategic Plans in Albania and identification of the Critical Infrastructure and its protection (CIP).
- Preparation of the acquired data as a prerequisite for definition of the model for risk analysis (IDM, 2012).

5 CONCLUSION

The legislative process of the critical infrastructure on both international and national levels is in continual development. Experts are coming to the conclusion that qualitative methods are not satisfactory and there are still many deficiencies in current procedures, e.g. difficulties in managing crises which have inter-sector and international effects, if the national crisis management systems should be based on centralized or specialized model, deficiencies in coordination, communication, information, teambuilding, etc. It is necessary to find new approaches and look for quantitative methods, mathematical dependences with the use of probability theory and probability distribution of evaluated risk factors occurrence. According to the specific methods, the respective characteristics of position, variability, dependences, estimations and trends should be defined.

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