

Integrating nowcasting with crisis management and risk prevention in a transnational framework

Yong Wang, Benedikt Bica, Ingo Meiold-Mauter, Franziska Strauss, Thomas Haiden
Central Institute for Meteorology and Geodynamics, Vienna, Austria

1. Introduction

Weather and especially severe weather is responsible for many natural disasters causing damage and loss of life. Weather forecasts are an essential part of early warning systems and consecutive actions within crisis management and risk prevention. In the last years, nowcasting, which is the forecast for the next few hours, has improved significantly. Disasters at small time and space scales like hail or flash floods etc. as well as sub events within large scale catastrophes like flooding and storms can be detected and managed. Nowcasting plays an increasing role in crisis management and risk prevention, but its realization is a highly complex and integrated task.

The WWRP/WMO Forecast Demonstration Project INCA-CE (INtegrating nowCAsting with Crisis management and risk prEvention in a transnational framework) aims at reducing risks and impact of weather-related natural disasters (e.g. windstorms, flooding, mudflows, icing, and drought) by integrating nowcasting with crisis management and risk prevention. Main purpose is the improvement of risk management standards and methodology in order to enable management institutions and public authorities to issue more detailed risk assessments and warnings. Within INCA-CE, a state-of-the-art, very high-resolution in time and space, application-oriented, real-time analysis and nowcasting system INCA (Integrated Nowcasting through Comprehensive Analysis) will be developed and implemented at the partner weather services, providing analyses and nowcasting to end-users in crisis management and risk prevention. A web-based platform for outreach to related socioeconomic sectors will initiate and foster a dialogue between weather services and further stakeholders like tourism or the insurance sector, flood authorities for disaster management, and the construction industry for cost-efficient scheduling and planning.

The INCA-CE project idea will be applied in three application areas: operational hydrology, civil protection and road safety. Severe weather does not stop at national borders. Therefore the INCA-CE activities are carried out in a trans-national framework. Three transnational working groups including weather services and national stakeholders in those three application areas will be established and will provide the thematic backbone of the project.

The INCA-CE activities can be attributed to the following three key features:

- Integration of nowcasting with crisis management and risk prevention.
- Multidisciplinary collaborative research on severe weather prediction and its application.
- Development of transnational strategy and cooperation on severe weather warning

The INCA-CE project will be conducted in 2012-13 over Central Europe (CE); four implementation phases are planned:

1. Development of transnational strategy in road safety, civil protection and operational hydrology (Jan. 2012 – May. 2012).

- Compilation and evaluation of regional methods currently in use.
- Provide solution strategies for optimal use of nowcasting and weather warnings in crisis management and risk prevention.

2. Optimization of nowcasting system (Jan. 2012 – Jun. 2013)

- INCA development towards to the need of crisis management and risk prevention.
- Algorithmic extension; standard input and output interfaces.
- Improvement in data flow, quality control, computational efficiency.
- Observational data exchange in real time.

3. Forecast Demonstration of the developed strategy and optimized nowcasting system through pilot implementations (Jun. 2012 – Sept. 2013)

- National-scale application and testing of the nowcasting system and warning strategies at user level.
- Establishment of structured feedback channels for final evaluation

4. Evaluation and feedback (Jun. 2012 – Sept. 2013)

- Elaboration and compilation of transnational results, guidelines and recommendations
- Evaluation, feedback circle between nowcasting provider and crisis management and risk prevention
- Training for better understanding the warning strategies and nowcasting system

The INCA-CE project is a cooperation of 24 international partners, among which 16 partners are from 8 Central European countries. The CE partnership includes 7 national and regional weather services, one research institute, and 10 governmental and regional authorities in the fields of hydrology, civil protection, and road safety. The other 8 partners are national or regional weather services from Europe, China, Israel and Turkey. Project Lead partner is the Central Institute for Meteorology and Geodynamics in Austria.

The project implementation over Central Europe is funded by the European Union through the Central Europe program (Project budget 3.3 million Euro from 2010 to 2013).

2. Project concept

The project concept for INCA-CE is based on the requirements for an effective combination of nowcasting with crisis management and risk prevention. The concept is shown schematically in Figure 1. The concept consists 4 stages: **1: Communication and development:** To make the nowcasting more valuable to users at the application side it requires a very close collaboration between nowcasting information providers and end-users in the crisis management, in which understanding and communicating the capacities and limitation of the nowcast information and its utilities in the application are essential; the corresponding transnational strategy for severe weather warning will be developed. **2: Optimization and translation:** Based on the needs of the application side, the nowcasting system should be optimized, and the weather forecast information can be

translated into the user relevant information for the application in the crisis management and risk prevention. **3: Implementation and integration:** The optimized nowcasting system will be implemented in the operation and the relevant forecast information is then integrated in practices in crisis management and risk prevention. **4 Evaluation and training:** After evaluation of the forecasting and decision making processes, the strength and weakness of the integrated nowcast and application will be fed back to nowcasting information providers and end-users. This enables further improvement of the integrated system of nowcasting and its application.

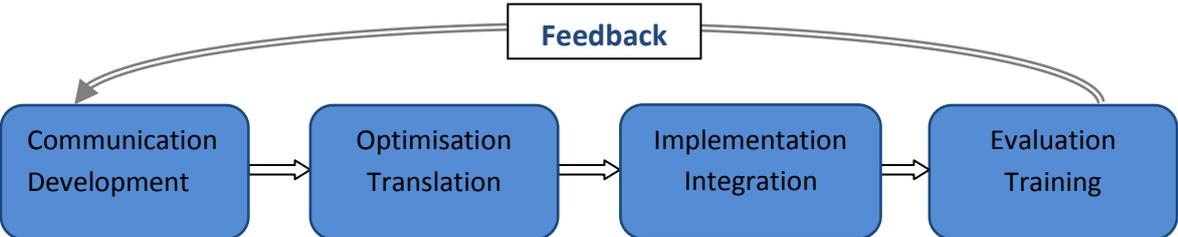


Figure 1 Schematic description of the proposed project concept.

3. Work breakdown

The INCA-CE project is divided into 6 work packages, two of which are committed to project management and communication/knowledge management respectively. This management strategy ensures a strong coordination and control over the projects activities as well as dedicated mechanisms for internal and external communication. Both work packages are depicted in light blue boxes of Figure 2 which indicate the framework of the project.

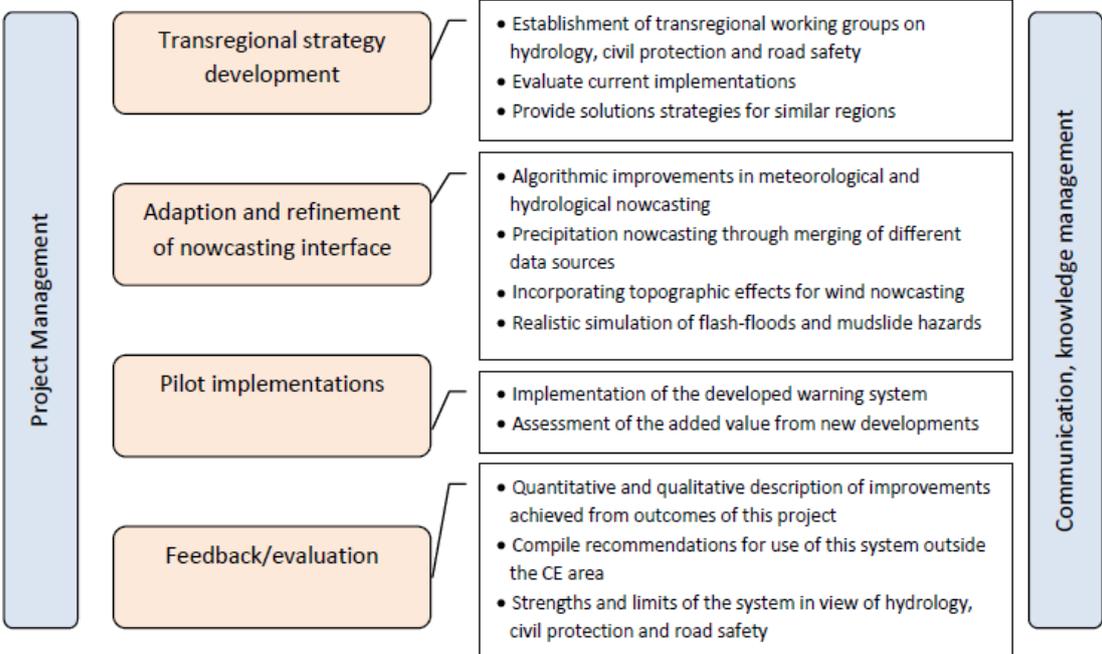


Figure 2: High level description of the work packages

Four work packages (in light orange) are dedicated to the actual development and set-up of an integrated warning system for hydrological, civil protection and road safety purposes. The major points to be tackled by these work packages are described in the text boxes.

4. Project organisation

National and regional weather and hydrological services from Austria, Belgium, China, Croatia, Czech Republic, Hungary, Italy, Israel, Poland, Slovakia, Slovenia, Switzerland and Turkey joined the project partnership. Nine central European partners from research institute and public authorities responsible for crisis management and risk prevention of 8 Central European countries (Austria, Czech Republic, Germany, Hungary, Italy, Poland, Slovakia, Slovenia), are represented in the project. The role of those application partners is to establish a good connection to the practical application side of nowcasting. Table 1 gives an overview of the project including a list of the participating partners.

The project governance and management are built up by steering committee, project coordinator and scientific advisory board. Figure 3 shows the governance and project management structure.

5. Project agenda

Table 1 lists the upcoming deadlines for major actions of all work packages as well as important deadlines concerning the project implementation. Reporting takes place each half year with deadlines at the end of March and the end of September respectively

Title	Integrating nowcasting with crisis management and risk prevention within a transnational framework
Website	www.inca-ce.eu
Duration	January 2012 – December 2013 (24 months)
Lead Partner	Central Institute for Meteorology and Geodynamics (ZAMG), Vienna, Austria
Project coordinator	Yong Wang
Partners	
Austria (AT)	Central Institute for Meteorology and Geodynamics (ZAMG)
	Ministry of the Interior, National Crisis and Disaster Management and Civil Protection (BMI)
	Provincial Government of Lower Austria, Department for Road Maintenance (NOEL-RM)
	Provincial Government of Lower Austria, Section for Fire Brigade and Civil Protection (NOEL-CP)
	Safety Centre Burgenland (LSZB)
China (CN)	Hebei Meteorological Bureau (HMB)
	Anhui Meteorological Bureau (AMB)
	Suzhou Meteorological Bureau (SMB)
Czech Republic (CZ)	Czech Hydrometeorological Institute (CHMI)
Germany (DE)	Fraunhofer Institute of Optronics, System Technologies and Image Exploitation (IOSB)
Hungary (HU)	Disaster Management Directorate of Somogy County (DMDSC)
	Hungarian Meteorological Service (HMS)
Italy (IT)	Regional Agency for Environmental Protection (ARPA)
Poland (PL)	Department of Crisis Management (DCMP)
	Institute of Meteorology and Water Management (IMWM)
Slovenia (SI)	CGS plus d.o.o., Innovative IT and Environmental Technologies (CGS)
	Environmental Agency of the Republic of Slovenia (EARS)
Slovakia (SK)	Ministry of Interior of the Slovak Republic (MINV)
	Slovak Hydrometeorological Institute (SHMI)
Turkey (TR)	Turkish State Meteorological Office (DMI)
Croatia (HR)	Meteorological and Hydrological Service of Croatia (DHMZ)
Belgium (BE)	Royal Meteorological Institute of Belgium (RMI)
Switzerland (CH)	Meteo Swiss
Israel (IL)	Israel Meteorological Service (IMS)

Table 1 Project partnership

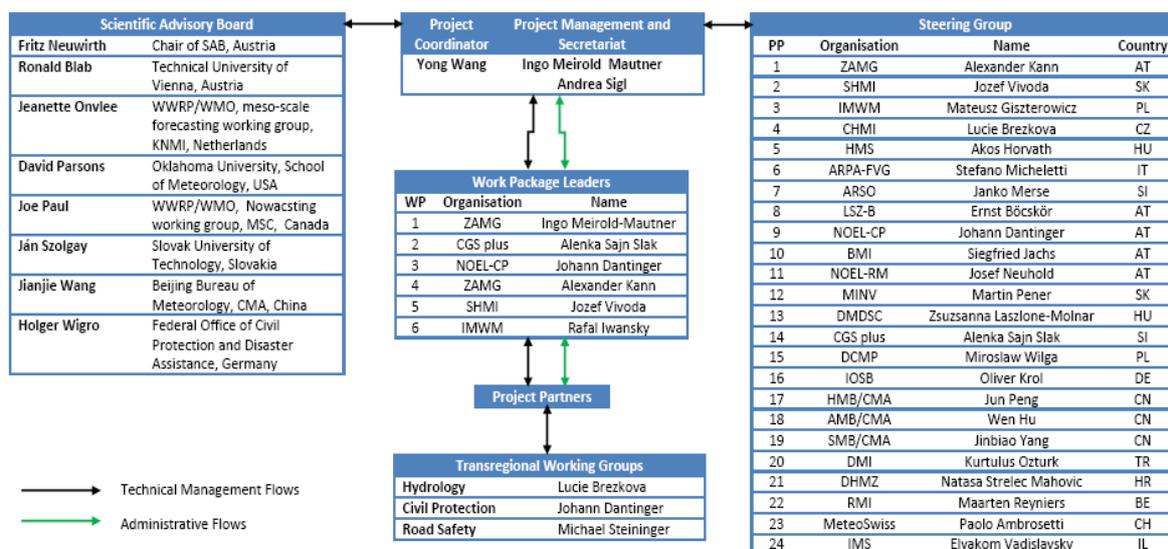


Figure 3 Governance and project management structure

Deadline	Action	Title
01.04.2012	2.1.1	Newsletter
		PP submit technical contribution for PR to the LP
	3.1-3.3	Transnational strategies
01.04.2012	2.2.7	INCA-CE Video
16.04.2012		Progress meeting in Poland
01.10.2012	2.1.1	Newsletter
		PP submit technical contribution for PR to the LP
		Web-portal
15.10.2012		Progress meeting in Hungary
01.04.2013	2.1.1	Newsletter
01.04.2013	4.3.3	Warning system modules
		PP submit technical contribution for PR to the LP
01.04.2013	6.1.1	Implementation manual
01.04.2013	6.2.2	End-user experience
15.04.2013		Progress meeting in Italy
01.07.2013	5.1.3	Evaluation
01.09.2013	2.1.1	Newsletter
		PP submit technical contribution for PR to the LP
2 nd half of 2013		Closing conference in Slovakia
01.01.2014		Official closing of project

Table 1 Deadlines of major actions

6. Acknowledgement

The implementation of INCA-CE project funded by the European Union through the Central Europe program, whose major contribution is gratefully acknowledged.

