A Product developed within the framework of the GIDRM.

Customized solutions for effective early warning provided by a network of experienced partners from Germany.
Global Initiative on Disaster Risk Management

Systemic solution approaches and innovative products for a more effective disaster risk management worldwide

The Global Initiative on Disaster Risk Management (GIDRM) was founded by the German Government and is led by the Federal Ministry for Economic Cooperation and Development (BMZ) to strengthen the German contribution to improved disaster risk management worldwide.

In cooperation with its partners from the public and private sector, academia and civil society, GIDRM co-creates innovative solutions to meet the challenges posed by disaster risks. By fostering partnerships and providing a forum for new and innovative ways of collaboration in disaster risk management, Germany contributes to the global efforts of minimizing losses and damages caused by disasters. To effectively reduce the impacts of disasters, risk factors have to be identified and tailor-made solutions developed. To achieve this it is important to raise risk awareness, to encourage knowledge-sharing between experts and decision makers and to create space for innovations across regions.

GIDRM offers a networking forum for German and international experts and service providers to match the global demand with sustainable solutions and innovative technologies in disaster risk management, combining well-proven national and international disaster risk management approaches with German services, products and technologies.

The Global Initiative has three priority areas:
Strengthening Disaster Response Preparedness and Civil Protection
Resilient Critical Infrastructure and Risk-sensitive Economic Cycles
Effective Early Warning Systems

Network on Early Warning

Customized solutions for effective early warning by a network of experienced partners from Germany

In order to pool German expertise in the field of early warning and to develop joint products to cater to global demand for solutions in this topic, the Global Initiative on Disaster Risk Management (GIDRM) facilitated the formation of a network of experts and institutions from the scientific community, the public and private sector, and the civil society in Germany related to early warning. During a series of meetings and conversations, areas of interest, competencies and target regions of the individual organisations were presented, and it was discussed, how common interests and existing expertise can be incorporated into coherent solutions in partner countries. Furthermore, the network partners outlined an integrated approach to develop and strengthen early warning systems by systematically linking technologies, processes, and actors for effective early warning.

Based on this, the network can now offer its partners tailor-made and integrated solutions that meet the individual problems and, depending on their needs, strengthen the overall system or just individual system components and their interaction.
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Acknowledgements

This information brochure provides information on a novel multi-actor approach to strengthen early warning systems (EWS), which has been developed by a network of experts and institutions from the scientific community, the public and private sector, and the civil society in Germany involved in international cooperation in the field of EWS for natural hazards. It builds on the insight that a more systemic approach, which systematically links technologies, processes and actors, is required to build and operate effective EWS successfully. On this basis, the network offers a broad range of services to support our partners worldwide in the implementation of EWS.

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The Challenge

Early warning has been recognized as an effective approach for reducing disaster risk and the loss of life. Its importance and effectiveness in this respect were highlighted at the Third United Nations World Conference on Disaster Risk Reduction held in Sendai, Japan in March 2015, as well as at the 2015 Climate Conference in Paris.

The Sendai Framework for Disaster Risk Reduction (SFDRR 2015-2030) Target 7 calls to substantially increase the availability of, and popular access to, multi-hazard early warning systems (MHEWS) and disaster risk information and assessments. To achieve this, national and local levels are challenged to invest in, develop, maintain and strengthen people-centred multi-hazard forecasting and early warning systems.

Developing, operating and maintaining early warning systems (EWS) is a complex task. Although there are generally valid guiding principles, the development of an EWS must always be adapted to the specific circumstances, which are essentially determined by the characteristics of specific hazards and risks settings and the respective institutional and cultural framework conditions in an increasingly complex globalized world with a high level of human mobility. Early warning technologies, processes and products must be adapted to this. This requires a broad spectrum of expertise that provides technical solutions and supports organisational and capacity development and good coordination between the involved implementers. Furthermore, it is considered important to develop such systems through a participatory process and tailor them to the needs of users in the communities at risk.

In recent years, there has been a paradigm shift from single-hazard to multi-hazard early warning to increase the effectiveness of EWS. Furthermore, efforts are made to move towards more impact-based forecast and warning services and connecting it to decision making on local level to increase the utility and applicability of warnings for the communities at risk. In addition, there are dynamic and rapid developments in the field of information and warning dissemination technologies. Modern communication tools such as smartphones, flat-panel digital signage, and Global Positioning System (GPS) are changing the way in which people are informed about emergencies. In addition to these innovations, which have to be taken into account, there are still a number of known challenges that have to be solved in many existing systems.

Experiences show that EWS are often designed and operated without sufficient consideration of an end-to-end perspective and user orientation at the community level. Partly, this is due to the lack of overall steering mechanisms in the respective systems, which would allow guiding the development of the EWS with a more systemic view. In connection with different system understandings and institutionally-driven particular interests, this leads to asymmetric development of the individual EWS elements and consequently weakens the effectiveness of the systems.

System evaluations have revealed that, while good progress has largely been achieved in the development of the monitoring and warning service elements, there are still considerable gaps
concerning the so-called last mile as to establish well-functioning warning chains and decision making processes, provide meaningful guidance to the communities at risk and tailor warning messages to the needs of users, considering cross-cutting social and cultural requirements.

As technical aspects are often in the foreground, it is important to remember that EW is primarily about people. The objective of people-centred early warning systems is to empower individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner to reduce the possibility of personal injury and illness, loss of life and damage to property and the environment. EWS involve numerous actors from the national to the local levels; thus, roles and responsibilities of these should be clarified and reflected in the national to local regulatory frameworks, planning, budgetary, coordination, and operational mechanisms.

**Our Objective**

Provision of customized support and tailor-made solutions for our partners in the design, implementation and further development of effective and people-centred, multi-hazard EWS founded on a broad range of experiences acquired through decades of committed and successful engagement in the development and promotion of EWS for various hazards and risks, both in Germany and internationally.

**Our Approach**

To address the complexity of EWS and the need for a more systemic perspective a network of German experts from science, academia, the public and private sector, has developed an integrated approach to develop and strengthen EWS by systematically linking technologies, processes, and actors for effective early warning (see Fig. 1). This integrative approach builds upon the EWS concept proposed by the United Nations Office for Disaster Risk Reduction (UNISDR) and includes a range of services to analyse and design end-to-end EWS, develop and implement technical solutions, provide organizational consulting as well as capacity development and training throughout the four elements of EWS.

The principle “Innovation through Partnership” is pursued through a customer-oriented and participative approach based on close collaboration between the network partners, the integration in international early warning initiatives (e.g. Indian Ocean Tsunami Warning and Mitigation System, World Meteorological Organization) and in trustful cooperation with the partners in the target countries.

Figure 1: System approach to secure functionality of EWS on all levels (end-to-end)
Our Services
Based on longstanding experiences and up-to-date technical know-how combined with a systemic and integrative approach the German network partners provide tailor-made and specific services, technologies, and capacity development measures to develop, strengthen and maintain EWS ensuring their functionality and effectiveness.

These services comprise:

- Analysis & conception: implementation of / consulting for systemic analyses and evaluations as well as concept development of EWS with an end-to-end perspective.
- Technical solutions: monitoring, data analysis and integration, decision support, communication technologies.
- Organizational consulting: actors’ landscape, multi-stakeholder processes, roles & responsibilities, interfaces, warning chains, processes & procedures, standard operation procedures (SOPs).
- Education & Training: academic qualification, development and implementation of technical training courses, management training, strengthening of planning capacities, training on the job, simulation exercises, public knowledge and awareness.

Support services include the design, accompaniment and facilitation of multi-stakeholder working processes to ensure the necessary cooperation between actors involved, promote joint learning and a common understanding of the respective systems and their challenges.

For these services, the network can rely on a comprehensive resource base, including a pool of experienced specialists, tried and tested technologies, software solutions, guidelines, tool-boxes, training courses and manuals as well as research initiatives in this field.

Your Benefits
Solutions for effective early warning systems tailored to your needs:
Within our integrated approach, a broad range of support services is available to address your specific needs in the design, set-up or further development of EWS at regional, national or local levels in the context of natural hazards. Based on an end-to-end perspective, tailor-made solutions will be developed in close cooperation with the concerned stakeholder. Depending on the requirements, this ranges from system design and implementation to the overall evaluation of existing systems and specific problem solving.

By applying a participatory and customer oriented approach it is assured that institutional and official mandates are respected and operative capacities are enhanced. Our innovative, participatory assessment and working processes contribute to improve effectiveness and sustainability of the system.
In our role as external supporters, we can help you to stimulate necessary changes or reactivate stagnating processes to further develop existing systems, overcome acute or underlying problems and remove institutional barriers that often hinder the necessary joint engagement. Through a professionally facilitated system review process with active involvement of all relevant stakeholder a better understanding of the system can be achieved, allowing to identify needs and options for improvements and to create the necessary momentum for implementation. In our experience, such a process offers unique opportunities to bring together a wider range of actors and thus open up new perspectives, strengthen user orientation and further clarify the different roles and responsibilities.

For the design and practical implementation of identified solutions, we can draw on the broad range of expertise and experiences of our network members in providing technical solutions, organizational development as well as capacity development and training. Regardless of the scope, the focus on an integrated end-to-end approach will always be maintained.

Annex
- Concept Note: Integrated Development of Early Warning Systems – Innovation through Partnership
- Fact Sheet: German Expertise in Early Warning Systems
- Reference Project: Hydrometeorological Early Warning
- Reference Project: Tsunami Early Warning in Indonesia
- Reference Project: Local Flood Early Warning System
- Reference Project: Public Warnings on Mobile Phones

Reference
German Network Partners
University of Wuppertal
Deutsche Gesellschaft für Internationale Zusammenarbeit
Deutscher Wetterdienst (German National Meteorological Service)
Disaster Research Unit
Eurac Research
Federal Office of Civil Protection and Disaster Assistance
Fraunhofer Institute for High Frequency Physics and Radar Techniques
Fraunhofer Institute for Open Communication Systems
Fraunhofer Institute of Optronics, System Technologies and Image Exploitation
German Aerospace Center (DLR)
German Research Centre for Geosciences
IQ wireless GmbH
OTT Hydromet GmbH
Potsdam Institute for Climate Impact Research
steep GmbH
Technische Hochschule Köln – Institute of Rescue Engineering and Civil Protection
Technische Universität Berlin – Chair of Engineering Technology
Technische Universität München – Landslide Research, Engineering Geology and Geodesy
University of Bonn – Department of Geography
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Global Initiative on Disaster Risk Management / Network on Early Warning
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