UNISDR
The United Nations Office for Disaster Risk Reduction

GAR
Global Assessment Report on Disaster Risk Reduction
2015

BACKGROUND PAPER

Prepared for the 2015 Global Assessment Report on Disaster Risk Reduction

HFA THEMATIC REVIEW: RESEARCH AREA 2
PRIORITY FOR ACTION 3 - CORE INDICATOR 1

Relevant information on disasters is available and accessible at all levels, to all stakeholders
(through networks, development of information sharing systems etc.)

Craig Duncan
Sophia Scherer
Sarah Wade-Apicella

30 November

Table of Contents

List of abbreviations

ADB – Asian Development Bank

ADPC – Asian Disaster Preparedness Center

ADRC - Asian Disaster Reduction Center

ANDROID - Academic Network for Disaster Resilience to Optimize educational Development

API - Application Programming Interface

CAPRA – Probabilistic Risk Assessment Program

CCA – Climate Change Adaptation

CENEPRED - Centro Nacional de Estimación, Prevención y Reducción del Riesgo de Desastres

CEPREDENAC - Coordination Center for Natural Disaster Prevention in Central America

CKB - Climate Knowledge Brokers group

CNE - Costa Rica National Risk Prevention and Emergency Commission

CODATA- Committee on Data for Science and Technology (ICSU)

COP 19 – Conference of the Parties, Warsaw meeting 2012 (IPCC)

CRED - Centre for Research on the Epidemiology of Disasters

CRID - Regional Disaster Information Centre

DDC - Disaster Documentation Center (now CRID)

DHA – United Nations Department of Humanitarian Affairs (now UNOCHA)

DPPI-SEE - Disaster Preparedness and Prevention Initiative for South Eastern Europe

DRH - Disaster Reduction Hyperbase

DRR – Disaster Risk Reduction

DRR-IM – Mailing group: Information Management for Disaster Risk Reduction

ESCAP - United Nations Economic and Social Commission for Asia and the Pacific

FAO – United Nations Food and Agriculture Organization

GAR – Global Assessment Report (UNISDR)

GDACS - Global Disaster Alert and Coordination System

GFDRR - Global Facility for Disaster Reduction and Recovery (World Bank)

GLIDE – Global Identifier Number for Disasters

GPL V3 - GNU General Public License, Version 3

GRIP - Global Risk Identification Programme (UNDP)

HEI - Higher Education Institution

HFA - Hyogo Framework for Action

IADB – Inter-American Development Bank

IAP – UNISDR Asia Partnership on Disaster Reduction

ICSU - International Council for Science

ICT – Information and Communication Technology

IDNDR – International Decade for Natural Disaster Reduction

IDRiM - Integrated Disaster Risk Management Society

IDS - Institute of Development Studies

IFRC - International Federation of Red Cross and Red Crescent Societies

IIASA-DPRI - International Institute for Applied Systems Analysis, Disaster Prevention Research Institute

IKM - Information and Knowledge Management

IKM4DRR – Community of practice: Information and Knowledge Management for DRR

IPCC - Intergovernmental Panel on Climate Change

IRDR - Integrated Research on Disaster Risk

MEXT – Ministry of Education, Culture, Sports, Science and Technology (Japan)

NDMA – National Disaster Management Authority

NGRD – National Agency for Risk and Disaster Management (Colombia)

NIED - Japan National Research Institute for Earth Science and Disaster Prevention

OFDA-USAID – Office of U.S. Foreign Disaster Assistance, U.S. Agency for International Development

OSSO - Corporacion Observatorio Sismológico del Sur Occidente

PDN - Pacific Disaster Net

PFA3/CI1 - HFA Priority for Action 3, Core Indicator 2

PREDECAN - Disaster Prevention in the Andean Community project

RIMMA - Risk Information Management, Risk Models and Applications (workshop)

RMSI - Risk Management Software, Inc

SAARC - South Asian Association for Regional Cooperation

SADKN - South Asia Disaster Knowledge Network

SIAPAD - Andean Information System for Disaster Prevention and Response

SIDS - Small Island Developing States

SIGRID - Sistema de Información para la Gestión del Riesgo de Desastres

SINAGER - Sistema Nacional de Gestion de Riesgos (Honduras)

SOPAC/SPC - Applied Geoscience and Technology Division, Secretariat of the Pacific Community

SRDP - Strategy for Climate and Disaster Resilient Development in the Pacific

UNDP – United Nations Development Programme

UNDRO – Office of the United Nations Disaster Relief Coordinator (now UNOCHA)

UNEP-GRID - United Nations Environment Programme - Global Resource Information Database

UNESCO - United Nations Education and Scientific Cultural Organization

UNOCHA - United Nations Office for the Coordination of Humanitarian Affairs

WCDR - World Conference for Disaster Reduction (Kobe 2005)

WCDRR - World Conference for Disaster Risk Reduction (Sendai 2015)

WGDD - Working Group on Disaster Data

WMO - World Meteorological Organization

Introduction

Information and knowledge are clearly essential for both decision making and coordinated action all levels of disaster risk reduction (DRR).

The requirement for dedicated information systems in the DRR domain was recognized in the earliest international meetings and conferences. The report of the UNDRO expert group meeting on Natural Disasters and Vulnerability Analysis outlines the basic requirements for the collection of information on hazards, vulnerability and elements at risk, (UNDRO, 1980) and the initial International Decade for Natural Disaster Reduction (IDNDR) Framework Programme for the Decade had clear references to the need to develop information systems for DRR, including disaster loss databases and a listing of research projects, vulnerability studies and risk analysis, national preparedness plans, as well as existing and new knowledge for disaster management (IDNDR STC, 1991).

One of the main functions mandated to the ISDR Secretariat by UN General Assembly resolution A/RES/56/195 of 2002 was to develop an information clearing house for disaster risk reduction. The project was under discussion in 2001 and 2002, and after an initial feasibility study (Butler, 2003), UNISDR made a clear commitment to develop an information system "designed to fully incorporate the diverse interests and needs of its partners in disaster risk reduction" (UNISDR, 2003)

While Knowledge management (KM) in DRR is recognised as a complex undertaking it is generally recognised that knowledge is simply actionable information. Since 2005 and the adoption of the Hyogo Framework for Action (HFA), there has been a huge increase in the amount of information available in the domain of disaster risk reduction. Largely facilitated by the Internet, the production, dissemination and access to information is cheaper and easier than ever before.

There has also been a significant effort to identify and assess disaster risk, collect disaster loss data and make this data accessible to all. Since 2005 there has been significant progress in the use and translation of a standard terminology for DRR as well as an increased use of de-facto standards for the classification of DRR information.

In spite of this significant progress in information and knowledge management, progress towards the full realization of HFA Priority 3, "Use knowledge, education and innovation to build a culture of safety and resilience at all levels" is still in an early stage of achievement.

Loss data remains incomplete and inconsistent, national coordination is often hampered by a range of issues including: lack of information sharing, scientific knowledge not being used effectively, inconsistent terminology and information exchange, especially between the related DRR and climate change adaptation (CCA) communities. In addition, risk data is often not

available as needed at the local or even national level. There has been an emphasis on the development of supply-driven information platforms, and DRR actors are now often overwhelmed by the amount of available information. Practical guidance to the most relevant information is often lacking.

This review of HFA Priority 3.1 aims to describe both the progress and challenges in the indicator: *"Relevant information on disasters is available and accessible at all levels to all stakeholders (through networks, development of information sharing systems)"*, with the intention of providing some guidance to a post-2015 framework that will address the provision of more actionable information, more effective monitoring of progress, and better knowledge management in the DRR domain.

Part 1 of this report includes an analysis of this HFA indicator based on the study of 263 national progress reports, and includes a discussion of how the indicator has been interpreted at the national level. Part 2 includes a discussion of knowledge management, and a review of major DRR networks and communities of practice. Part 3 reviews the major regional international information management platforms that have emerged since 2005, as well as issues and standards related to information management for DRR. Part 4 discusses some of the challenges to information and knowledge management for DRR. Part 5 explores the use and potential of powerful new technologies such as crowdsourcing and social media. 20 recommendations are included in the text, and summarized at the end of this report.

Methodology

The HFA thematic review process included a call for input papers to this research area between August and October 2013. Five background papers were received in this research area and are referenced as: Amaratunga et al 2014, Gaetani et al 2014, Lee 2014, Menoni et al 2014, and Stal 2014. In addition, three input papers submitted to other research areas were reviewed and used. References include: Dufty 2014, Gall et al 2014, and Gamper 2014.

For the purpose of this study, 263 national progress reports from 141 countries participating in the three HFA reporting cycles of 2007-2009, 2009-2011, and 2011–2013 as reported through the HFA Monitor system (HFA Monitor) were used for the analysis of the level of progress and the narrative responses. Responses to the associated key questions and means of verification were obtained from the online query builder tool (HFA Query Builder).

In addition to these sources, research included a review of the UNISDR document archives, and the extensive use of the Internet. A complete bibliography and list of web links is included.

In May 2014, a draft report was submitted for peer review and also circulated to a broad community of over 200 information and knowledge management professionals through the DRR-IM mailing list and the IKM4DRR network. Substantive comments from the peer review

committee and five IKM and DRR experts were received and incorporated into the final draft in November 2014.

While every effort has been made to include a balanced range of sources, as UNISDR staff members, the authors acknowledge a potential bias towards UNISDR led processes and reports

HFA Priority 3

The Hyogo Framework for Action, adopted at the World Conference on Disaster Risk Reduction in 2005, specifically addresses the use of knowledge and information in HFA Priority 3. "*Use knowledge, education and innovation to build a culture of safety and resilience at all levels"*

Key activities in part (i) of this priority, which is the scope of this report, include the provision of:

- Easily understandable information on disaster risks and protection options, especially to citizens in high risk areas
- Incorporation of relevant traditional knowledge*
- Information tailored to different target audiences
- Strengthened networks among disaster experts
- Strengthened procedures for using available expertise when agencies develop local risk reduction plans
- Improved dialogue among scientific communities and practitioners
- Promotion and use of new ICT and space based technologies** – particularly for training and dissemination of information
- Development of local, national and international directories, inventories and national information sharing systems
- Exchange of good practices, lessons learned on policies, plans and measures for DRR.
- Information to be made available to the public prior to construction, land purchase or land sale
- Updating of standard terminology related to disaster risk reduction in at least six languages

* While recognized as an important element, the examination of the use traditional knowledge in DRR is not included within the scope of this report due to time constraints. It is referred to in only 13 of the 263 national HFA progress reports.

** As a highly specialized and technical area of work, the use of space-based technologies is only minimally referred to in this report.

References to the concepts of Priority 3 in other HFA indicators

The premise of HFA Priority 3 - Core Indicator 1 is that disaster risk can be substantially reduced if people are well informed and motivated to adopt a culture of disaster prevention and resilience. This in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities, actual losses and capacities.

The notion that relevant information on disasters is available and accessible at all levels, to all stakeholders, is clearly not an isolated concept, and issues related to knowledge are relevant to the entire Hyogo Framework (Menoni, et al., 2014)

Specifically, the HFA Priority 2 - Core Indicator 2: "*Systems are in place to monitor, archive and disseminate data on key hazards and vulnerabilities*" includes the direct reference "Such information, disseminated in an appropriate and timely manner, allows communities to take effective action to reduce risk."

Equally, HFA Priority 2 - Core Indicator 3: "*Early warning systems are in place for all major hazards, with outreach to communities"* includes four elements of early warning (risk knowledge, monitoring and warning services, dissemination and communication, and response capabilities) which are essentially based on the provision of timely and reliable information.

Other direct references to information and knowledge management in the scope of the current HFA Thematic Review include:

- PFA1/CI3 – promoting knowledge networks at community level
- PFA1 CI4 – sharing of structure and good practice for multi-stakeholder national coordination
- PFA2/CI14 – information shared on trans-boundary risks
- PFA3/CI2 – inventory of knowledge and training materials for education and curriculum development as well as university level and professional education opportunities
- PFA3/CI3 – dissemination of tools and methods for multi-risk assessment and determination of ROI
- PFA4/CI2 – improved public awareness to help reduce underlying risk factors – resilience of information systems and Internet as part of social communication
- PFA4/CI4 – guidance on the use of risk data in land use planning

- PFA5/CI1 – translation of HFA/HFA2 into local languages

- PFA5/CI4 – communication to affected populations – inclusion of DRR in post-disaster reviews – knowledge transfer of 'collective memory'

The new research areas in the HFA thematic review also reference the effective use of information and knowledge:

- Thematic research area 14: Private investment – refers to increasing the reach of DRR information to the private sector

- Thematic research area 15: Standards – will necessarily include information exchange standards

- Thematic research area 16: Interconnected risk – addresses the challenge of communicating complexity and uncertainty in clear language

The role and use of information and knowledge for disaster risk reduction is therefore a pervasive concept in the Hyogo Framework, and can be considered a cross-cutting issue.

Part 1: Country self-assessment

National level progress on HFA Indicator 3.1

The majority of countries reporting on HFA Indicator 3.1 through the HFA monitoring system have expressed a good level of progress for this indicator. Of 141 countries reporting in the HFA Monitor system 65 countries (46%) have reported a high level of progress with a score of 4 or 5 out of 5; 54 countries (38%) have reported a medium level of progress with a score of 3 out of 5; and 22 countries (16%) have reported a low level of progress with a score of 1 or 2 out of 5.

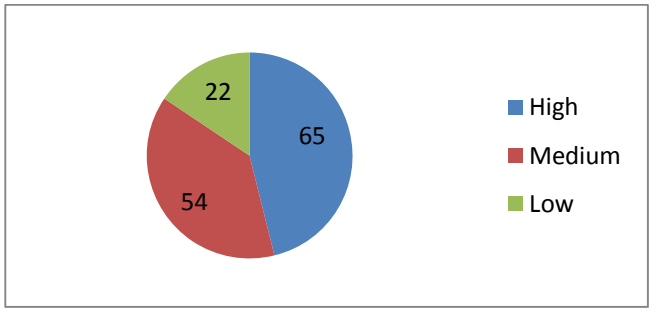


Fig. 1 Level of progress reported on PFA3/CI1 - all countries, all cycles

A review of country reports over three monitoring cycles indicates the number of countries reporting medium or high levels of achievement has increased in each cycle. However, longitudinal data available from countries that have reported in more than one cycle is more limited. Analysis of 88 countries that have reported in more than one cycle indicates that a majority of countries - 56% have reported a stable level of progress, 33% report an increase in the level of progress, and 11% report a decrease. Global data can be found in Annex 1.

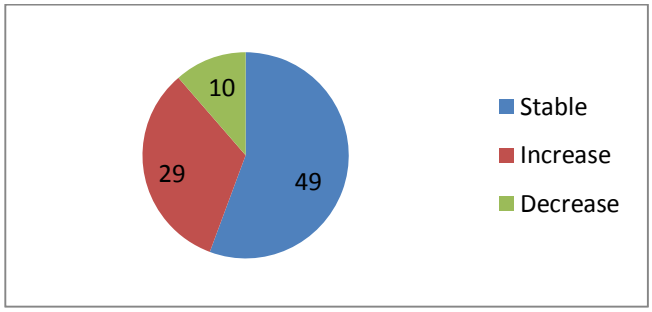


Fig. 2 Change in level of progress reported on PFA3/CI1 – countries that have reported in more than one cycle

Reporting by Region

Africa

In Africa, a total of 33 countries have reported in at least one cycle. Of these, 12 have reported a high level of progress (H), 14 a medium level of progress (M) and 7 have reported a low level (L).

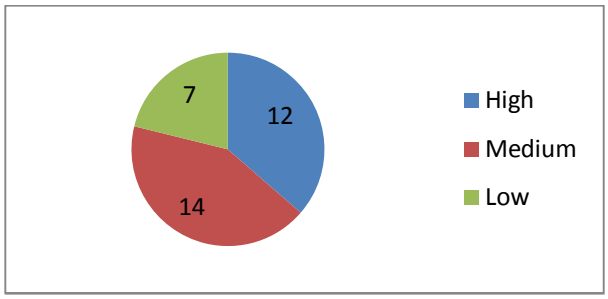


Fig. 3 Level of progress reported on PFA3/CI1 – all African countries, all cycles

Only 19 of the 33 countries have reported in more than one cycle. Of these, 10 have reported a stable level of progress, 6 have reported improvements, and 3 have reported a decrease in progress against this indicator. See the tables in Annex 1 for a further breakdown of these data.

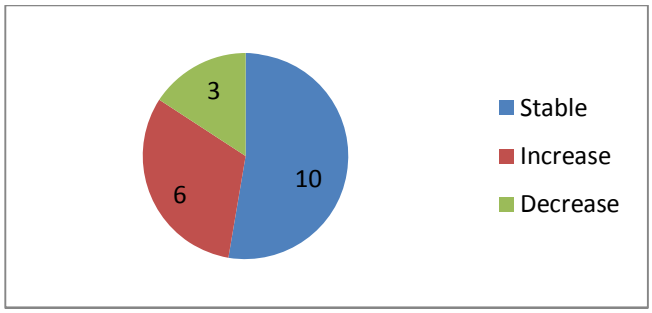


Fig. 4 Change in level of progress reported on PFA3/CI1 – African countries that have reported in more than one cycle

Observations: Almost all countries report an awareness of the need for organized and efficient information systems for DRR, but many cite lack of capacity or funding as a major constraint. In some cases, information systems set up with the help of international organizations have shown promise but failed to be sustainable in the longer term. Many countries in Africa cite lack of Internet connectivity as a barrier to better dissemination of information. However, the wording of the indicator question may be partially responsible for this type of interpretation and response, also perhaps resulting in a limited amount of reporting on traditional communication

methods such as print and face-to-face meetings. Radio is cited as an important communication tool in many countries, and translation to local languages is also cited as a constraint.

Nigeria presents an interesting example. In spite of the announcement of a national information system, the announced website has been replaced by an active Facebook page instead. https://www.facebook.com/nemanigeria

Data:

Africa - 33 countries have reported:

Progress level	Number of Countries
High	12
Medium	14
Low	7

Of 19 countries that have reported in more than one cycle:

6 have reported improvements: 5 to a High level, and 1 to a Medium level

10 have reported stable progress: 3 at a High level, 5 at a Medium level and 2 at a Low level

3 have reported decreasing progress : 1 at a High level, 1 at a Medium level and 1 at a Low level

Americas

In the Americas, a total of 33 countries have reported in at least one cycle. Of these, 20 have reported a high level of progress (H), 12 a medium level of progress (M) and 1 have reported a low level (L).

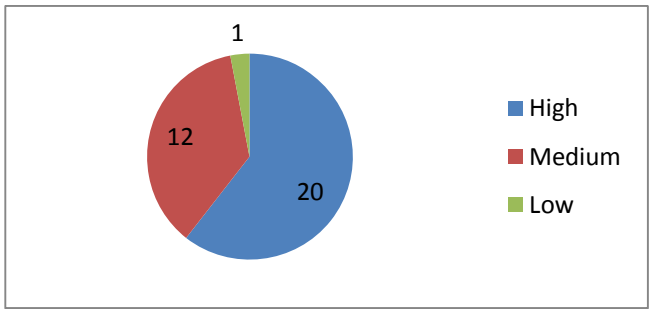


Fig. 5 Level of progress reported on PFA3/CI1 – all Americas countries, all cycles

26 of the 33 countries have reported in more than one cycle. Of these, 14 have reported a stable level of progress, 9 have reported improvements, and 3 have reported a decrease in progress against this indicator. See the tables in Annex 1 for a further breakdown of these data.

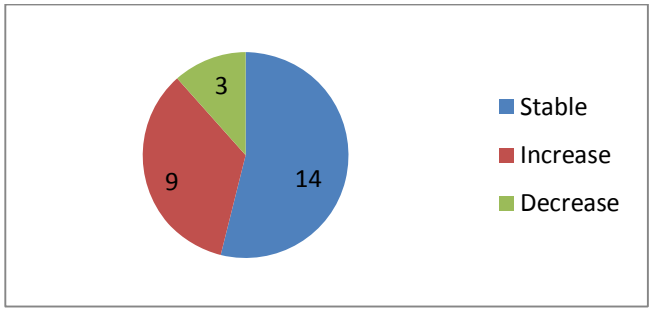


Fig. 6 Change in level of progress reported on PFA3/CI1 – Americas - countries that have reported in more than one cycle

Observations: Many countries in the Americas report a strong tradition of information collection and dissemination, including the use of social media. Several countries have e-libraries of DRR documents, but many still cite a lack of centralization and fragmented data, as well as lack of data standards and a need to improve the culture of national information sharing as a constraint.

Lack of resources, connectivity and access to local populations is still a problem in many countries, and countries with a high level of tourism report a challenge in communication due to the high turnover of visitors.

A notable example is the DRR legislation in Colombia which includes a strong section on the provision of risk information in the Law 1523 of 2012 (see box on p. 18).

Data:

Americas – 33 countries have reported:

Progress level	Number of Countries
High	20
Medium	12
Low	1

Of 26 countries that have reported in more than one cycle:

9 have reported improvements: 6 to a High level, and 3 to a Medium level

14 have reported stable progress: 8 at a High level, and 6 at a Medium level

3 have reported decreasing progress : 2 at a High level, and 1 at a Low level

Asia

In Asia, a total of 34 countries have reported in at least one cycle. Of these, 12 have reported a high level of progress (H), 15 a medium level of progress (M) and 7 have reported a low level (L).

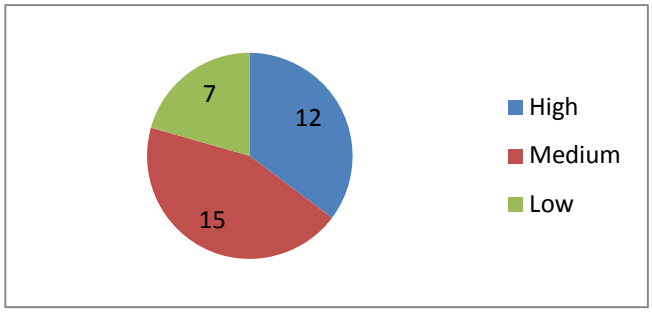


Fig. 7 Level of progress reported on PFA3/CI1 – all Asian countries, all cycles

18 of the 34 countries have reported in more than one cycle. Of these, 10 have reported a stable level of progress, 7 have reported improvements, and 1 has reported a decrease in progress against this indicator. See the tables in Annex 1 for a further breakdown of these data.

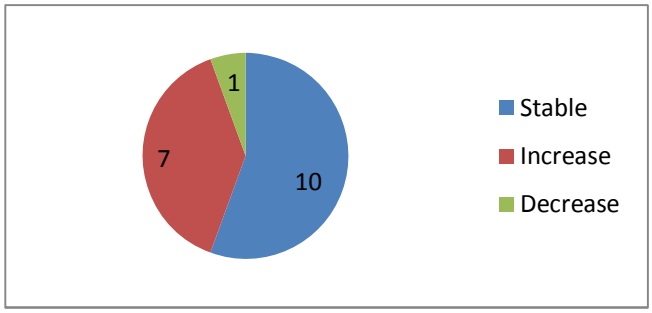


Fig. 8 Change in level of progress reported on PFA3/CI1 – Asian countries that have reported in more than one cycle

Observations: The level of progress on HFA Indicator 3.1 in Asia is highly varied, and ranges from extremely high to barely developed. This is not necessarily tied to income level as many lower income countries report more advanced systems than middle income countries. Regional cooperation through inter-governmental processes has been cited as highly beneficial. As in all

regions, the challenge of information and data integration and lack of data standards remains a constraint to better information sharing. Many Asian countries have existing or emerging policy frameworks that strengthen the use of DRR information.

Data:

Asia - 34 countries have reported:

Progress level	Number of Countries
High	12
Medium	15
Low	7

Of 18 countries that have reported in more than one cycle:

7 have reported improvements: 3 to a High level, 3 to a Medium level, and 1 to a low level

10 have reported stable progress: 4 at a High level, 5 at a Medium level and 1 at a Low level

1 has reported decreasing progress : 1 at a Medium level

Oceania

In Oceania, a total of 16 countries have reported in at least one cycle. Of these, 2 have reported a high level of progress (H), 9 a medium level of progress (M) and 5 have reported a low level (L).

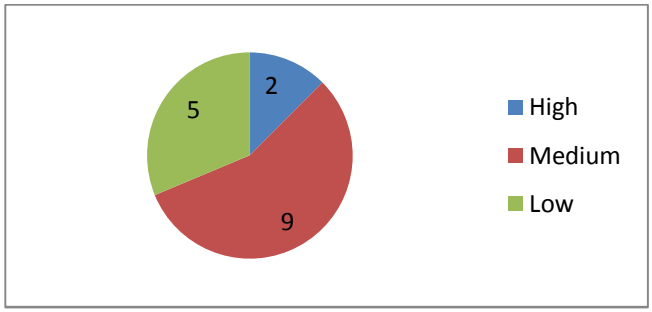


Fig. 9 Level of progress reported on PFA3/CI1 – all Oceania countries, all cycles

Only 8 of the 16 countries have reported in more than one cycle. Of these, 5 have reported a stable level of progress, 2 improving and 1 decreasing. See the tables in Annex 1 for a further breakdown of these data.

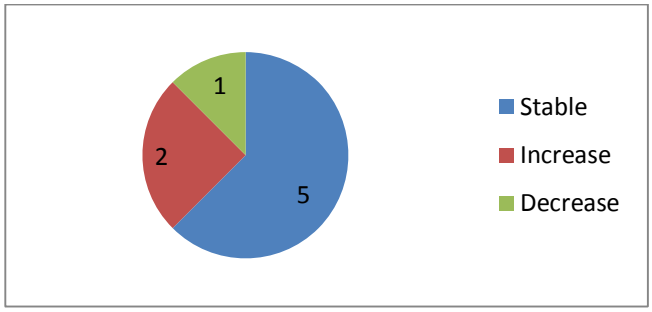


Fig. 10 Change in level of progress reported on PFA3/CI1 – Oceania countries that have reported in more than one cycle

Observations: Pacific island states often cite a need for better coordination and information sharing among both government and civil society organizations. Radio is used extensively, but more for warning and alerts rather than for preparedness and DRR.

Data:

Pacific - 16 countries have reported:

Progress level	Number of Countries
High	2
Medium	9
Low	5

Of 8 countries that have reported in more than one cycle:

2 have reported improvements: 1 to a Medium level, and 1 to a low level

10 have reported stable progress: 2 at a High level, and 3 at a Medium level

1 has reported decreasing progress : 1 at a Low level

Europe:

In Europe, a total of 25 countries have reported in at least one cycle. Of these, 19 have reported a high level of progress (H), 4 a medium level of progress (M) and 2 have reported a low level (L).

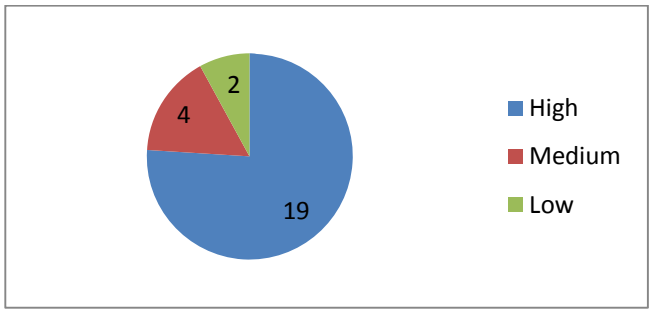


Fig. 11 Level of progress reported on PFA3/CI1 – all European countries, all cycles

18 of the 24 countries have reported in more than one cycle. Of these, 11 have reported a stable level of progress, 4 have reported improvements, and 1 decreasing levels of progress. See the tables in Annex 1 for a further breakdown of these data.

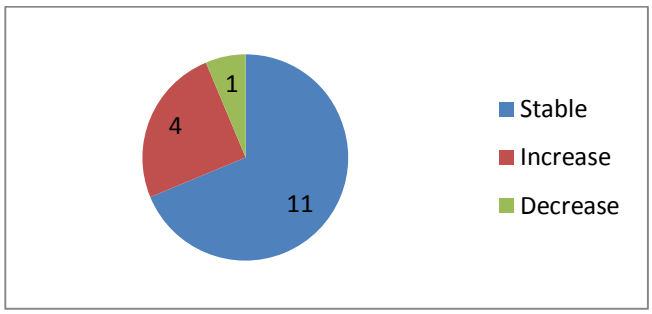


Fig. 12 Change in level of progress reported on PFA3/CI1 – European countries that have reported in more than one cycle

Observations: Most countries in western Europe have highly developed information systems and demonstrate excellent use of all media channels, including social media.

Notable examples include France, which while having sophisticated IT systems, maintains a people-centred approach. Risk information is obligatory for land transfer or rental, local authorities convene meetings about risk at least once every two years, and high water marks are displayed in all flood prone areas. Norway makes information and training available in easy to access and understandable formats, and demonstrates a sophisticated use of ICT including mobile and social media as well as a training college. In the U.K, the Natural Hazard Partnership consortium is playing an important role in improving the quality of the information and enabling

more coordinated and coherent scientific and technical advice for the Government and the resilience community

Data:

Europe - 25 countries have reported:

Progress level	Number of Countries
High	19
Medium	4
Low	2

Of 18 countries that have reported in more than one cycle

4 have reported improvements: 3 to a High level, and 1 to a Medium level

13 have reported stable progress: 12 at a High level, and 1 at a Medium level level

1 has reported decreasing progress : 1 at a Low level

Responses to Key Questions and Means of Verification

In addition to the Core Indicator, a key question and three means of verification points were added to the HFA Monitor in the 2009-2011 and 2011-2013 reporting cycles.

The longitudinal data available for the key questions and means of verification from the 64 countries that reported in both the 2009-2011 and 2011-2013 reporting cycles where these questions were introduced is encouraging.

Key Question: *Is there a national disaster information system publicly available?*

Results of all national progress reports:

2009-2011 cycle	58 yes	47 no
2011-2013 cycle	70 yes	31 no

Countries reporting in both 2009-2011 and 2011-2013 cycles (64):

2009-2011 cycle	39 yes	25 no
2011-2013 cycle	52 yes	12 no

The key question *Is there a national disaster information system publicly available?* shows a significant increase from 72% to 81% of countries replying Yes to this question over the two cycles. However, the narrative reports appear to indicate that this question was widely interpreted to indicate whether the National Disaster Management Authority (NDMA) has a web page. While this is an important information channel, it can potentially distract from the dialogue necessary for national coordination including an effective, people-centred approach, and effective networking and knowledge brokering. This is observed in responses from both developed and least developed countries.

In spite of the fact that the guidance to the HFA Monitor indicates that "The 'Key Question' in each indicator is only one of the important areas that need to be emphasized, and that other areas of the core indicator carry equal importance", the choice of key questions appears to directly influence the direction of the narrative responses in the HFA Monitor. As mentioned above, and example is the use of the word Internet in the means of verification 3.1.2 has possibly caused an under-reporting in the use of traditional communication channels.

Recommendation 1:

In order to minimize the potential for misinterpretation, careful user testing of the wording of key questions is recommended before being included in a future monitoring system.

Means of Verification 3.1.1: *Information is proactively disseminated*

Results of all national progress reports:

2009-2011 cycle	57 yes	48 no
2011-2013 cycle	62 yes	39 no

Countries reporting in both 2009-2011 and 2011-2013 cycles (64):

2009-2011 cycle	37 yes	27 no
2011-2013 cycle	40 yes	24 no

The Means of Verification 3.1.1: *Information is proactively disseminated* shows limited progress with a stable number of countries (60%) responding Yes to this question in both reporting cycles. However, the reports contain little reference to the communication of actual disaster risk, or systems that provide proactive guidance to manage or mitigate disaster risk. A significant evolution is therefore required to transform these information systems into actual agents of disaster risk reduction.

Means of Verification 3.1.2: *Established mechanisms for access / dissemination (internet, public information broadcasts - radio, TV)*

Results of all national progress reports:

2009-2011 cycle	46 yes	59 no
2011-2013 cycle	77 yes	24 no

Countries reporting in both 2009-2011 and 2011-2013 cycles (64):

2009-2011 cycle	32 yes	32 no
2011-2013 cycle	47 yes	17 no

The Means of Verification 3.1.2: *Established mechanisms for access / dissemination (Internet, public information broadcasts - radio, TV)* shows a good level of success with a majority of countries 76% reporting Yes to this question. In many cases, the use of social media is also included as a dissemination channel. Longitudinal data also shows a strong increase from 50% to 73% of countries reporting Yes over the two reporting cycles. However narrative reports indicate that in most cases the media is used for warnings and alerts, and it remains challenging to interest media in the dissemination of information on how disaster risks can be proactively reduced.

Means of Verification 3.1.3: *Information is provided with proactive guidance to manage disaster risk*

Results of all national progress reports:

2009-2011 cycle	3 yes	102 no
2011-2013 cycle	61 yes	40 no

Countries reporting in both 2009-2011 and 2011-2013 cycles (64):

2009-2011 cycle	2 yes	62 no
2011-2013 cycle	38 yes	26 no

The Means of Verification 3.1.3: *Information is provided with proactive guidance to manage disaster risk* shows the highest overall increase over the two reporting cycles. Overall, country reporting shows a strong increase from only 3% answering Yes in the 2009-2011 cycle to 61%

responding Yes in the 2011-2013 cycle. The longitudinal data from countries that have reported in both cycles supports this increase as well, suggesting a strong improvement in the proactive dissemination of information, but as noted above, this appears to be mainly related to warnings and alerts being disseminated through multiple channels. Few countries report on the specific communication of disaster risk, and only the U.S. and Sweden report on information systems for the promotion of risk reduction beyond emergency preparedness. This trend follows the global increase in the use of the Internet for information dissemination by national governments.

Observations on national self-assessment of HFA Indicator 3.1

Interpretation of the Indicator

As mentioned above, information and knowledge is a concept that is present throughout the Hyogo Framework. Based on careful reading of the narrative inputs in the 263 national self-assessment reports, HFA Priority 3 and Indicator 3.1 have been broadly interpreted by national level DRR actors to include:

- Dissemination and access to regional and global DRR information, usually through the Internet
- Information collected and used internally by national governments
- Information disseminated to local populations to sensitize them to disaster risk and advocate for behavioural change
- Collection of disaster loss and data and determination of disaster risk
- Development of DRR information systems, information repositories and libraries

In addition, frequent references in the reporting narratives include the following elements which are more specifically related to other HFA indicators:

- Public availability of information on national civil defence efforts and services – PFA1/CI3
- National disaster loss data collection – PFA2/CI2
- Use of mainstream media for public early warning – PFA2/CI3
- Education and advocacy for disaster preparedness – PFA3/CI2

Other issues and constraints

In both reporting cycles a number of common constraints to achievement of this HFA Indicator were often repeated. These include:

- Difficulties in national coordination and lack of a culture of information sharing (both among government agencies and NGOs)
- Lack of standards for information sharing among government agencies
- Difficulty communicating to community level including remote populations
- TV and radio used for warning, but not for capacity development or preparedness
- Lack of Internet connectivity and digital divide in remote communities
- Lack of qualified staff for data collection and information management

Countries with high turnover of tourists or other migrants face a special challenge, and report that the communication of risk and preparedness is difficult.

In general, media is used effectively to focus on early warning for predictable and seasonal hazards such as tropical cyclones, but countries report a difficulty in the interest of the media to raise awareness on low frequency events such as earthquakes and tsunamis.

Sustainability of DRR information systems is a serious issue. National information systems are often launched with enthusiasm, but maintenance is often under-resourced and systems are eventually not maintained. This is often due to a post-disaster wave of support, which due to lack of new events gets a lower priority, and qualified staff members are often reassigned to other projects. While reporting countries regularly report on assistance provided by international development agencies and NGOs, information systems or platforms set up by international organizations are often not maintained due to the lack of a dedicated national budget.

National information systems are often multi-purpose, providing weather bulletins and early warning alerts in addition to awareness-raising and risk education, advocacy for behavioural change, and coordination of national actors. In general, the effective use of DRR information and the level of dialogue appear increase in proportion to the availability, quality, and specificity of disaster risk data. The use of national information mechanisms in support of capacity development, organization, and culture change appears as a second priority in most instances, but remains a huge and untapped resource.

As indicated in the HFA, 3.1a, information is encouraged to incorporate indigenous and traditional knowledge. In the 2007-2009 reporting cycle, none of the narrative reports of the 61 countries with published progress reports referred to this. In the 2009-2011 cycle, only two Pacific island countries referred to it. In the 2011-2013 cycle only 11 countries from Asia, Africa, and the Pacific made reference, reflecting a deepening awareness of this important element, but perhaps an under-reporting of its use.

Good practices

Countries with a high level of sustained achievement in HFA Indicator 3.1 often refer to the following success factors:

Full use of all media channels for information dissemination including radio, television, print, films, Internet and social media. This is often a result of national agreements with major media outlets, including the use of these channels for awareness, preparedness and prevention, not simply for warnings and alerts.

A people-centred approach is cited as a successful means of knowledge transfer to the general public. This includes systematic local level meetings, testimony and witness of survivors, and public display of risks such as high water marks in highly frequented locations.

Successful implementation requires sustainable financing, and disaster management plans should be designed and followed through in the long term. For example, information systems in Norway were planned for 2008, launched in 2009 and updated in 2010, followed by sophisticated use of ICT including mobile and community training centres, clearly showing a long-term vision and commitment.

Countries using online communication for DRR can effectively use two-way communications including social media channels to help correct misperceptions or inaccurate information about risks.

The inclusion of obligations to share information on disaster risks in legal frameworks is often cited as a key element in the development of successful information systems. In addition this obligation creates a culture of information sharing and ensures the sustainability of the effort.

COLOMBIA

DRR legislation in Colombia which includes a strong section on information in the Law 1523 of 2012, significantly places accountability on the communication of disaster risk, rather than simply disaster preparedness or response:

15. Principle of timely information: For all purposes of this Act, it is the duty of the authorities in charge of National Disaster Risk Management to keep all citizens and residents fully informed on: level of disaster risk, disaster management, rehabilitation and construction as well as on all donations received, managed and delivered.

Original Spanish:

15. Principio de oportuna información: Para todos los efectos de esta ley, es obligación de las autoridades del Sistema Nacional de Gestión del Riesgo de Desastres, mantener debidamente informadas a todas las personas naturales y jurídicas sobre: Posibilidades de riesgo, gestión de desastres, acciones de rehabilitación y construcción así como también sobre las donaciones recibidas, las donaciones administradas y las donaciones entregadas.

(Alcaldía Mayor de Bogotá, 2012)

Recommendation 2:

UNISDR should extract good practices and creative approaches from HFA progress reports and develop a mecahnism to circulate them for discussion among relevant focal points and the broader DRR community.

Has progress been achieved on HFA 3.1 at the national level?

While countries have generally assessed themselves with a relatively high level of achievement, any objective assessment of actual progress against HFA 3.1 is limited by the varied interpretation of the indicator, the subjectivity of self-assessment as well as the limited amount of longitudinal data. The direct overlap in the reporting narratives with HFA Core Indicator 2.2 (Systems are in place to monitor, archive and disseminate data on key hazards and vulnerabilities) and essential connection to HFA Core Indicator 2.3 (Early warning systems are in place for all major hazards, with outreach to communities) as discussed above also make a discreet analysis difficult. While 69% of countries that have reported in more than one cycle have reported a stable level of progress, 23% report an increase in the level of progress, and 5% report a decrease, the narratives often reflect an initial enthusiasm when new information systems or coordination mechanisms are introduced followed in a subsequent reporting cycle by a deeper understanding of the challenges of both coordination, culture change and sustainability.

An overall implied metric of success appears to be the very existence of information and communication systems where there previously were none. While this clearly constitutes an improvement, this metric may be biased by an enthusiasm for new communication opportunities provided by the Internet and social media, as discussed later in this paper. It is much more challenging to determine the extent to which any of the systems reported have directly contributed to the reduction of disaster risk or directly affected the amount of disaster loss. While these are long-term issues, it is clear that there is a need to develop more mature metrics for the success and impact of DRR information systems.

While the role and use of information and knowledge for disaster risk reduction is a pervasive concept in the Hyogo Framework, and can be considered a cross-cutting issue, The current formulation of HFA Priority 3, Core indicator 1 has led to the tendency to over-generalize the topic with the acceptance of multiple interpretations of what constitutes success or progress. With this in mind, a series of more, measurable and comparable indicators must be developed.

Recommendation 3:

Each specific core indicator of the HFA or its successor framework should include specific success indicators relating to effective information and knowledge management.

Recommendation 4:

The following indicators which may be answered Yes/No should be considered to improve the precision of measurement of national information and knowledge management systems in a future version of the current HFA Indicator 3.1:

- Use of multiple media channels– radio, TV, social media etc. is of based on a standing agreement which includes the dissemination of information on disaster risks as well as alerts and warnings.
- National information systems are systematically connected to regional authorities and regional information systems
- Legal or policy frameworks include directives on the use of DRR information, including the obligation to convey information on risks
- Funding for DRR information systems is sustainable and included in the regular budget for disaster risk management
- Information platforms allow for active two-way communication with the public
- Data is shared in standard formats among national and regional actors

Part 2: Knowledge management, knowledge brokering and K*

Knowledge management (KM) in DRR is recognised as a complex undertaking due to both the broad range of actors involved, and the different goals of the organizations involved in various aspects of DRR, which influences both the design and the success criteria for a KM system (Menoni, et al., 2014).

In its simplest from, KM is often referred to as "knowing what you know" which implies an equitable, appropriate, and even distribution of knowledge where needed for effective action. While there is a long history of debate in the KM community, knowledge is often referred to as actionable information, so decisions should be made with the fullest available knowledge.

In the DRR domain as in other domains such as public health and agriculture there are notable knowledge gaps including the application of scientific research to practice, gaps between knowledge at the national, urban and rural levels, lack of cross-sectoral information sharing - especially when dealing with complex inter-related events, and a digital divide in developing countries, which especially affects remote communities.

Early efforts to share knowledge were often dominated by technical experts who simply sought to transfer what they knew to others, with little interaction with the recipients to check that they understood and were able to apply it (Shaxon, et al., 2013).

Based on close observation of case studies (Menoni, et al., 2014) states that knowledge is not a "commodity that can be transferred from one community to another", and rather than simple knowledge transfer, an ecosystem based approach of co-creation of knowledge is required for knowledge to be effectively transferred. This implies a requirement to understand how organizations function within themselves, as a precursor to the change required to make them more effective.

The mitigation of interconnected, complex risks such as the great East Japan earthquake require more and more effective co-creation of knowledge that involves the synthesis and integration of information across sectors, across levels of government, and across boundaries (Gamper, 2014).

The KM field has evolved significantly over the past 10 years, and a variety of terms have been used to describe different aspects of knowledge sharing, including: Knowledge Mobilization, Knowledge Brokering, Knowledge Translation, Knowledge Exchange and Intermediation (Shaxon, et al., 2013).

The term K* (pronounced K Star) was coined as an overarching concept to collectively describe the various aforementioned terms. K* describes the brokering functions that need to occur to share knowledge between different groups of people, to enable change to happen (Shaxon, et al., 2013).

Knowledge Brokers

Studies indicate that the failure of information systems and new knowledge to effectively influence the decision making process is often attributed to an essential but missing brokering function (Hammill, et al., 2013). To counter this problem, a new profession is now emerging and organizations are beginning to employ specialists with the explicit job title of 'Knowledge Broker' to facilitate the creation, sharing, and use of knowledge. Brokers consider science and practice as different parts of the same world, write for users using plain language, and exert every effort to make publications and other technical information accessible to end users (Holgate, 2012; Meyer, 2010).

Knowledge brokering has also been used to address the language and cultural barriers between the worlds of research and decision making by translating research and other evidence into different vocabularies (Sin, 2008 referenced in Ward, et al., 2011).

Roles of the knowledge broker include knowledge management, including work associated with the difficulties of navigating, managing and sharing a large body of research and other evidence; linkage and exchange for the development of positive relationships between researchers and decision makers; and capacity building, which seeks to address shortcomings in the ability of decision makers to interpret and use research evidence (Ward, et al., 2011). This has been further developed by (Fisher, 2011) into a list of seven functions of knowledge brokering including:

1. Enabling and maintaining access to information
2. Making information more credible for audiences
3. Creating demand for information/generating cultures of information use
4. Supporting marginalized voices to be heard
5. Creating alternative framings of issues
6. Connecting spheres of action
7. Enabling accountability, e.g. enabling groups to hold decision makers to account

While knowledge brokering is considered an effective methodology, significant challenges inhibit wider use including: the time and resources required for effective brokering, the lack of distinction between brokering roles, and the range of skills which are required to fulfil the different roles of a knowledge broker. In addition to domain specific skill sets, good interpersonal skills and personal attributes such as flexibility, curiosity and self-confidence are the key to successful knowledge brokering (Ward et al., 2011), (Fisher, 2012).

As an interdisciplinary domain, there are certainly many DRR professionals that would describe themselves as knowledge brokers, and the success of knowledge brokering strategies is often assisted by an assessment and identification of the likely facilitators in order to leverage existing credibility and trust relationships (Grimshaw, et al., 2012), (Mansfield, et al., 2013).

Recommendation 5:

DRR actors should support the development of the core competencies of knowledge brokering and recognition must be given to both the value of the KB function, and the resource implications of brokering knowledge effectively. The identification of knowledge brokers should take into account existing trust relationships.

DRR networks and communities

Networks and communities of practice are considered essential to the evolution of complex, emerging domains (Fischer, 1997) and are important catalysts for knowledge transfer between professional groups (Tagliaventi, et al., 2006).

The importance of networks and communities is recognized in the HFA Priority 3, and has also been a major theme in the knowledge management domain over the past 15 years. Often used interchangeably, the terms networks and communities share some of the same characteristics. A convenient working level distinction divides networks into three categories: epistemic networks based on shared belief, structural networks based on affiliation with a particular organization or inter-organizational mechanism, and communities of practice, which are based on a shared personal or professional interest. Many other classification have been proposed and the categories described are often not mutually exclusive (Amina, et al., 2008).

The concept of the community of practice was developed by Wenger and is based on the premise that we are social beings and that social interaction is a central aspect of learning. (Wenger, 1997) This term was adopted immediately by the broader knowledge management community as an essential component of knowledge transfer, and has often been considered a key element of knowledge management strategies.

The largest community of KM practitioners in the development sphere is the KM4DEV community which was started in 2000, and now has over 1800 members. More recent groups such as the Knowledge Brokers Forum have emerged to discuss specific aspects (KM4DEV website).

In 2008, 2010, and 2012, staff of the UNISDR administered networking questionnaires to the DRR community using the convenient sample of attendees of the International Disaster and Risk Conferences in Davos Switzerland (IDRC website). The objective of the surveys was to understand the scope and perceptions of networking among DRR actors, and to promote access to open communities. With the assistance of the Cohort project of Penn State University a preliminary analysis was made (COHORT website).

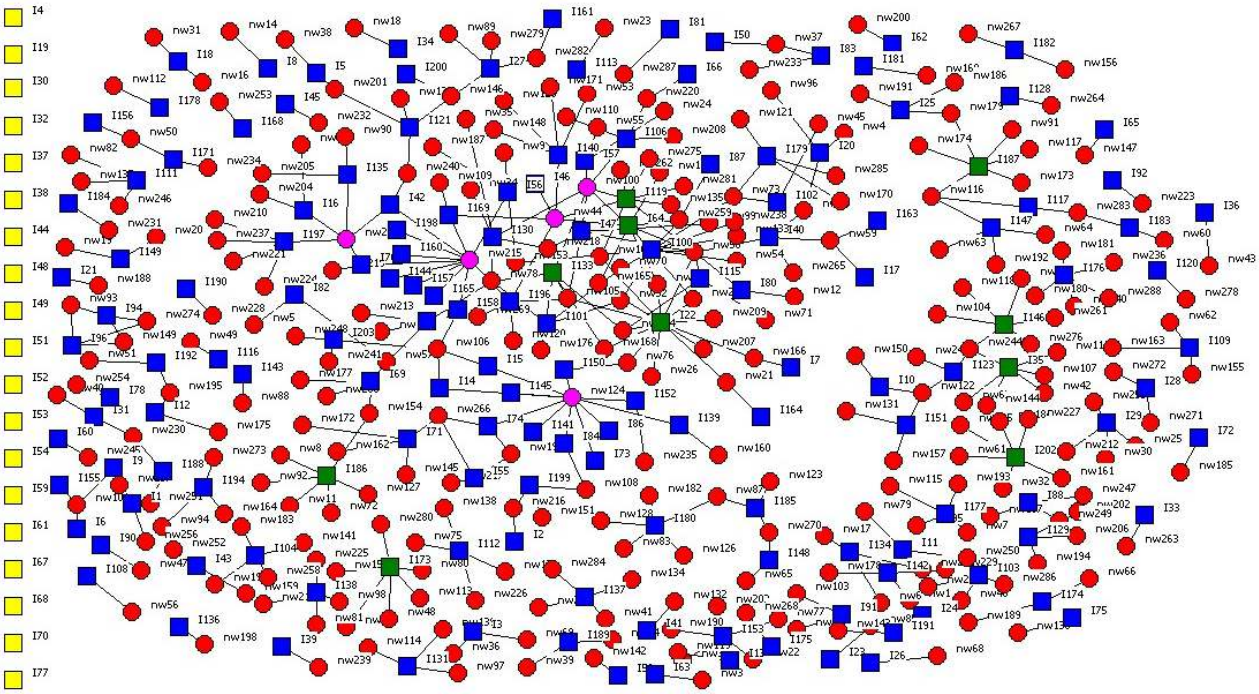
Conference attendees revealed both a broad perception of professional networking as well as a large number of relatively unconnected networks (see diagram p. 33). Participants listed a large number of professional networks such as the Community of Catastrophic Risk Managers in the insurance industry, to more traditional professional engineering associations. Structural networks such as inter-agency groups were noted, as were communities of practice such as the Gender and Disaster Network (GDN).

A total of 536 persons representing an average of 18% of the total possible IDRC conference population in 2008, 2010 and 2012 answered the questionnaire. 288 networks were mentioned by participants in 2008, 256 in 2010, and 194 in 2012. In addition to networks with regular

meetings, dialogues or events, the IDRC conference itself, as well as other mechanisms for exchange and collaboration in disaster risk reduction were identified as networks, including the Global Platform for DRR (GP website) as well as some National Platforms for DRR.

Most of the available analysis to date compares the results of the 2008 and 2010 surveys. 214 of the networks listed in 2010 were not mentioned in 2008 and only 16% of networks were mentioned in both years. Only 38% of new conference attendees were connected to any other participants through common networks, versus 57% of returnees.

Interestingly, one of the most connected persons in 2008 was a staff member of one of the most mentioned 'networks': the ProVention Consortium. ProVention was a global coalition of governments, international organizations, academic institutions, the private sector, and civil society organizations which functioned as a network to share knowledge, connect and leverage resources to reduce disaster risk. In spite of the fact that the ProVention Consortium ceased to exist in January 2010, it was still cited by survey respondents in late 2010 and early 2012 as a powerful network.



Map of the connectivity between IDRC 2008 participants (blue) and networks (red)

In 2010, when asked to share a story about how involvement in one of the networks identified had helped the respondent in his or her work, references were largely made to information acquisition, experience sharing, connections being made and finding people with specific expertise. Success stories included having gained funding, established multi-stakeholder and multi-sectoral rehabilitation or risk management programmes, and forming alliances for risk

reduction. One respondent specifically referred to the HFA as having helped his/her work due to its recognition of "external events as a very function" [of multi-stakeholder engagement via networks] (UNISDR unpublished research, available upon demand).

Given the multi-stakeholder nature of disaster risk reduction and the influx of newcomers due to an increasing interest in the "disaster risk reduction domain", it is not surprising that so few individuals, even within the context of a conference dedicated to disaster and risk discussions, were connected through common networks. However, there is evidence to support that those who have worked in the domain longer as well as those who returned to the conference for a second time have become more aware of the availability of networks or communities of practice and are participating in them for their work.

Prior to the networking survey at IDRC Davos 2008, 46 open DRR networks or communities of practice had been identified and promoted on PreventionWeb. Following the IDRC questionnaires, a resulting list of over 100 open networks is available on the PreventionWeb site (PreventionWeb website 3).

Recommendation 6:

The DRR community should develop mechanisms to promote networking and raise awareness of existing DRR networks at all major DRR conferences.

Effective use of scientific knowledge

The effective use of scientific knowledge in DRR practice has long been recognized as a major challenge (UNISDR, 2001). Through the use of practical case studies, the 2013 UNISDR Scientific and Technical Committee report demonstrates that science can help identify a problem, develop understanding from research, inform policy and practice and make a difference that can be objectively demonstrated when evaluated (UNISDR STC, 2013).

The style, language and complexity of scientific writings are well-recognised stumbling blocks for the implementation of scientific knowledge by a lay audience. To overcome this difficulty, the onus is largely on the scientific community to take steps to communicate results and guidance in the form of simplified, feasible, affordable and socially acceptable solutions that respond to people's needs. The uptake of guidelines will remain low if users cannot understand the information or perceive its relevance to their own situation (UNISDR STC, 2011).

The traditional publication of results in scientific journals is also not designed to reach a wide audience. There needs to be further engagement of scientific and technical experts into policy-making bodies, so that strategic planning may directly benefit from the latest knowledge. This may require a shift in perception and priorities for scientists, and efforts to develop specialist

intermediaries or interlocutors, with training and support to acquire new sets of communication and advocacy skills. (UNISDR STC, 2011).

The translation of scientific knowledge into applied practice has been studied extensively in the agriculture and health sectors. Given the volume of work, it is suggested that the basic unit for knowledge translation should be systematic reviews or other synthesis of global evidence (Grimshaw, et al., 2012).

Recommendation 7:

The DRR scientific community should produce a quarterly DRR research compendium, summarizing the newest research in plain language and targeting specific sectoral audiences with appropriate updates.

Recommendation 8:

The DRR scientific community should support and develop knowledge brokers with the specific ability to translate scientific knowledge into plain language.

DRR academic networks

The complex and multidisciplinary nature of disaster management education poses a challenge to higher education institutions to work both across disciplines and with other relevant actors such as the private sector, NGOs, communities, humanitarian agencies and industry (Amaratunga, et al., 2014). To this end, several important academic networks have been formed:

Academic Network for Disaster Resilience to Optimize educational Development (ANDROID)

ANDROID is an Erasmus academic network that includes 67 member organizations from 31 countries. Though the consortium is represented largely by European universities, it also includes major international organizations as partners, including UNISDR. ANDROID was formed for disaster resilience mainly to optimize educational development by influencing the higher education policy in Europe. Its objective is to increase inter-disciplinary and inter-sectoral cooperation to develop innovative European education that can increase societal resilience. (ANDROID website)

The network's teaching and research is concerned with what resilience is, what it means to society, and how societies might achieve greater resilience in the face of increasing threats from natural and human induced hazards.

Among the projects of the ANDROID network, a survey on interdisciplinary work in the field of disaster resilience highlights the current status of research and education programmes and promoting best practices and innovative approaches in the field. The outcomes of the survey have highlighted that a major barrier in interdisciplinary work on resilience is the lack of a common framework and common language. The survey on interdisciplinary projects on disaster resilience revealed the disciplines that register the highest occurrences (technology, geography, earth and space, and sociology), moderate occurrences (political science, life science and economics), and low occurrences (law and juridical science, ethics, philosophy, and history) (ibid.).

Integrated Disaster Risk Management (IDRiM) Society

The Integrated Disaster Risk Management (IDRiM) Society was launched in October 2009 at the 9th IIASA-DPRI Conference on Integrated Disaster Risk Management in Kyoto, Japan, with the participation of over 100 international experts, practitioners, and individuals from more than 20 different countries working in the disaster risk management field.

Network activities include annual conferences. The 4th Conference of the International Society for Integrated Disaster Risk Management (IDRiM 2013) together with the Dealing with Disasters International Conference (DwD 2013) was hosted by Northumbria University in Newcastle upon Tyne, UK, in September 2013 with the theme of "From Opportunity to Action: Bridging the Gap between Disaster Reduction and Development through Science(s), Technology and People-Centred Actions."

The 5th Conference of the International Society for Integrated Disaster Risk Management (IDRiM 2014) was hosted by Western University, Ontario, Canada in October 2014 (IDRiM website).

Periperi U

Periperi U is a partnership of African higher education institutions (HEI) supported by USAID since 2006 to develop sustainable capabilities in disaster risk related capacity building, specifically through formal education, short course training, research and policy advocacy. (Periperi website)

Periperi U supports the development of a new, potentially trans-disciplinary, knowledge domain with a disaster risk focus in 10 African HEIs where academics have already orientated their specialist research and teaching towards the disaster agenda. A key feature of Periperi U is the

diversity of the specialist disciplines of the academics involved in it, which tend to reflect the hazard profiles of the countries in which they are based. The partnership is conceived as a peer network, and networking and collaboration – exchange – is at the heart of the programme.

DRR networks specific to information and knowledge management

IPDR - Information Platforms for Disaster Reduction

One of the first sponsored networks for information management in DRR was formed as an offshoot of the Disaster Reduction Hyperbase project (http://drh.edm.bosai.go.jp/). An International Workshop on Information Platforms for Disaster Reduction, sponsored by the Japan National Research Institute for Earth Science and Disaster Prevention (NIED) and the Japan Science and Technology Agency in October 2007, brought together a total of 22 disaster related information platforms, and resulted in the Tsukuba report which recommended the creation of a network of information providers, platforms and users, supported via regular meetings and communications. The network was unsuccessful in gaining further funding and in spite of a promising start, ended with the termination of the DRH project in 2012 (NIED, et al., 2007).

Caribbean Open Data Management Community

Formed as a result of discussions at the Eastern Caribbean Regional Open-Source Geospatial Data Sharing and Management Workshop 2011 in Grenada, a community of practice and online forum, the 'Caribbean Open Data Management Community' has grown to more than 150 members of data and risk management practitioners – creating a network that is promoting a culture of open data and informed decision making in their own countries, agencies and communities. This community is open to all practitioners to improve open data for disaster risk management in the Caribbean.

CKB - Climate Knowledge Brokers

The Climate Knowledge Brokers (CKB) Group formed in 2011 is an alliance of over 40 of the leading global, regional and national websites specializing in climate and development information, and was developed to explore the scope for closer collaboration between online knowledge brokers working in the climate and development sectors. It brings together a diverse set of actors from international organizations to research institutes, NGOs and good practice networks, and covers the full breadth of climate related themes. The focus is primarily on online

initiatives which play an explicit knowledge brokerage role, rather than being simply institutional websites.

Annual CKB workshops have been held in 2011, 2012 and 2013, and the CKB group has developed several successful projects including the Knowledge Navigator and the Reegle tagging API. In 2014, CKB created a dedicated coordination hub to act as both a catalyst for collaboration among climate knowledge brokers as well as to lead a fundraising effort to support CKB activities (CKB website).

Information and Knowledge Management for Disaster Risk Reduction (IKM4DRR)

The elaboration of an Information and Knowledge Management for Disaster Risk Reduction (IKM4DRR) network in 2013 was inspired by both the CKB as well as a 2012 workshop in Bangkok entitled "Enhancing linkages between DRR Project Portal and DRR related knowledge management/information management systems in Asia and the Pacific Region." Discussions at the Bangkok workshop revealed that many countries and regional organizations were beginning to develop national DRR information portals as well as CCA information portals, and that there was a clear need to improve the coordination, efficiency and effectiveness of information and knowledge management in the DRR and CCA domains.

In advance of the 2013 Global Platform for DRR, UNISDR engaged members of its Information and Knowledge Management for DRR group (DRRIM-L) to comment on the development of a framework for implementing IKM for DRR and participate in its validation at the first 'IKM4DRR' workshop at the Global Platform. The community also began taking stock of IKM systems. An advisory group was formed to guide the discussions and activities of the community. Online discussions were held on the following topics: (i) essentials of a successful national or regional information and knowledge management system; (ii) what explicit guiding principles, required definitions or other relevant points should be included in an IKM4DRR Framework.

The online discussions. provided essential input to a draft IKM4DRR Framework and were used to design the workshop. 60 participants representing 31 countries including 19 government representatives and five intergovernmental organizations from all regions attended the workshop. In addition to improving participants' understanding of IM, KM and KB, the workshop aimed to test and advance a final draft of the IKM4DRR Framework, foster an IKM4DRR community of practice, and develop an IKM4DRR Action Plan with the aim of ensuring inclusion of IKM4DRR in the post-2015 framework for DRR.

The "Information and Knowledge Management for Disaster Risk Reduction (IKM4DRR) Framework and Scorecard" was published in the fall of 2013 (UNISDR, 2013b).

Since the IKM4DRR workshop, the community has lacked resources for concerted facilitation and leadership to implement its action. Nonetheless, the IKM4DRR framework concepts are

being actively tested. Consultations and presentations on the subject have been led by members of the French National Platform at the IDRiM/DwD conference; the framework has been considered in the draft Pacific Disaster Net monitoring and evaluation framework; CODATA-Germany, the German National Committee for the ICSU Committee on Data for Science and Technology has made IKM4DRR a core component of its RIMMA 2014 workshop. Discussions with the intention of developing interoperable IKM services are continuing among the main global and regional platforms for DRR and CCA, and a second IKM4DRR workshop is planned at the WCDRR 2015 conference.

Observations

In spite of the broad recognition of the important roles of networks in the DRR domain, and the tangible and valued outputs, which also generally include inventories of IM and KM initiatives, most DRR networks have struggled to find adequate resources. While communities of practice tend to form naturally, a formal network sponsor is often necessary to ensure the sustainability and effective development of the network. Network leaders and champions are often self-motivated, but recognition of this effort through a sponsored meeting of DRR network leaders as part of a Share Fair could be an effective mechanism to share knowledge, help develop a common language and therefore strengthen and advance the maturity of the broader DRR domain.

IKM events at major DRR meetings

Although the topics of information and knowledge come up frequently in DRR discussions, there have been relatively few events at major DRR meetings that have been dedicated specifically to the subject.

Small side events were held at the IDRC conferences in 2008 and 2010. A pre-platform event hosted by SAARC at the 2011 Global Platform meeting invited platform presentations on PreventionWeb, ReliefWeb, Pacific Disaster Net, the ADPC DRR Projects Portal as well as from GFDRR Labs, ESCAP, South Asia Disaster Knowledge Network (SADKN) and RMSI. It sparked an early discussion among platform leads and sub-regional intergovernmental bodies, notably DPPI-SEE, SAARC and SOPAC/SPC, on the importance and sustainability of addressing IKM issues in implementing the HFA.

While there was only one specific information management session at the third session of the Global Platform for Disaster Risk Reduction (UNISDR, 2011b) the proceedings of the meeting reference 28 calls and commitments to enhanced access to information, exchange of information, and improved coherence among information management systems from Regional

and National Platforms, mayors and private sector to statements from children and vulnerable groups, to actors in preparedness, health, and climate change.

The IKM4DRR workshop at the 2013 Global Platform was the first workshop to include a global representation of DRR information systems, and several information related presentations were made on the Ignite stage. After three successful workshops held in the margins of IPCC meetings, a successful side event was also held by Climate Knowledge Brokers Group at the 2013 COP 19 meeting in Warsaw, and a second event is planned for the COP 20 meetings in late 2014.

Over the past five years, the concept of a Knowledge Share Fair has been used successfully in the agricultural and health domains (IFAD website). Share fairs are specifically designed to facilitate the open exchange of ideas, knowledge, good practices and lessons learned as well as improve professional networking and build trust between stakeholders. Typically Share Fairs focus on the study of networks and network facilitation, knowledge transfer and communication, use of new technology and social media, and innovation.

Recommendation 9:

The global IKM4DRR community should seek sponsorship to hold annual or biennial knowledge Share Fairs for DRR in collaboration with the CKB group.

Part 3: Information management for disaster risk reduction

Target audiences

HFA Priority 3 indicates that "Information [should be] tailored to different target audiences" without being more specific about which audiences are the most important. Documentation and 'about' sections of DRR information systems often broadly refers to the target audience as "decision makers" but rarely define this more precisely.

While key stakeholders have been identified by most information providers, there remains a gap in our understanding of what information, and what presentation format can be effective to specific actors at specific times. Most traditional DRR domain actors such as national governments, international organizations, and NGOs have learned over time how to access DRR information, and information demand studies have focused on their needs.

Since the development and subsequent evaluation of PreventionWeb, UNISDR has undertaken additional research to better define and understand its target audiences and their corresponding information and knowledge needs (UNISDR, Redesigning the next 'PreventionWeb' 2012b). This research revealed a broad set of stakeholders including national governments, the UN system, NGO and civil society actors, IGOs, local governments and the general public.

In spite of a long debate on how to stimulate the use of data and information on disaster risk, the appropriate packaging of risk data for specific audiences and specific situations remains a challenge. Proponents of geographical information systems promote the use of maps as an effective communications tool, but experience shows that while maps may be an effective way to communicate risk to urban planners, other decision makers such as finance officials are unimpressed with them, and prefer raw numbers. Gameified applications such as the GAR for Tangible Earth – GfT (GfT website) also have the potential to invite the discovery and exploration of risk in a non-threatening way, and therefore have the potential to reach new audiences.

DRR target audiences often cite common needs, including how to implement DRR, understand international and regional processes, accessing to risk data, cost-benefit analysis for DRR, contact with appropriate experts and peers, and information in local language materials

However, in spite of these common needs, DRR information must still developed for the needs of specific target audiences such as city mayors, or private sector companies.

Supply driven vs. demand driven information systems

The expansion of the Internet and the ease of developing a basic online presence has resulted in a plethora of websites, sometimes referred to as "portal proliferation syndrome" (CDKN, 2013) and has led to a supply driven proliferation of "one-stop-shop" portals, with the assumption that making more knowledge available online will result in evidence based policy and practice.

A 2013 study of online knowledge platforms related to climate change found that while 88% of respondents use the Internet to seek information, but most do not start directly on an information portal and 51% of all queries start on Google (Hammill, et al., 2013) The study found that user expectations focus primarily on information retrieval, and suggests that knowledge brokers may gain greater value from building on their social skills rather than their technical ones. This is confirmed by research following the evaluation of PreventionWeb which 88% of respondents cited access to documents as the most important service (UNISDR, 2012a).

Following the independent evaluation of PreventionWeb in 2012, a user needs survey received over 800 replies. In addition interviews were held with 30 UNISDR staff and 30 external stakeholders to assess perceptions and current needs.

In order of importance, respondents listed their most important information needs as: how to implement DRR - examples and guidance; risk data; DRR in simple language; translation to local languages; contacts; understanding international and regional processes; and DRR policy and legislation.

The Forensic Investigations of Disasters (FORIN) project states that "the considerable amounts of information that are available are not being adequately deployed, nor effectively used and implemented" The knowledge that exists about disaster risk reduction has not been communicated effectively. Intended recipients may be unaware of the insights, or alternatively, resistant to the knowledge and information which may be considered threatening (IRDR, 2011a).

As discussed above in the reporting of national progress against HFA Indicator 3.1, the effective use of information is also tightly linked and influenced by national coordination mechanisms, legal frameworks, and the presence or absence of an information sharing culture.

Stakeholder interviews in the follow-up to the PreventionWeb evaluation also often reflected a demand for data and information which may not yet exist. Frequent requests were heard for local level risk data, specific cost-benefit information for project planning and requests for examples of "policy that works". Providers of information systems have the obligation to focus on these specific user needs and build systems that help answer specific question to support decision making.

Several initiatives such as the Peoples First Initiative in Kenya, sponsored by the FAO, have shown that community involvement in the preparation and evaluation of information systems improves their impact, and both leverages and strengthens the work of local governments (FAO, 2012). When communities are given the opportunity to formulate and develop their own communication strategies, this results in improved risk governance (Stal, 2014; UNISDR, 2013a).

Recommendation 10:

A consortium of major DRR information platforms should seek sponsorship for a common user needs analysis and the development of information demand profiles for specific target audiences, and the analysis of current gaps between information supply and demand.

Major regional and international DRR information platforms

As noted in the introduction, the demand for access to information on disaster events has long been recognised (UNDRO, 1980). As early as the mid-1990s, the demand for appropriate information to support an understanding of disasters for mitigation and preventive action was

articulated, and parts of this discussion eventually evolved into the HFA Priority 3 "*Use knowledge, education and innovation to build a culture of safety and resilience at all levels"*

In an effort to respond to the need for improved information access, hubs for information collection, compilation and dissemination have emerged. The following pages describe the major international and regional portals that have substantive information collections, important history and/or participation of major DRR stakeholder groups either globally or regionally.

CRID – Centro Regional de Información sobre Desastres

The Regional Disaster Information Center (CRID) was established in 1990 by the Pan American Health Organization as the Disaster Documentation Center (DDC) in Costa Rica. When established, its purpose was to facilitate access to technical documentation on disasters to professionals in Latin America and the Caribbean.

In 1994, the UN International Decade for Natural Disaster Reduction (IDNDR) became a sponsor of the DDC through its Latin America and the Caribbean Regional Secretariat. The DDC then broadened its scope to include other sectors and disaster-related disciplines. During the "Regional Strategy for Disaster Information Meeting", hosted by the Costa Rica National Risk Prevention and Emergency Commission in February 1997, several organizations committed to expand the DDC and established CRID as a coordination and inter-sectoral collaborative platform for disaster information management.

Since its origin, CRID has been the major source of Spanish language resources for DRR. Today it aims to "promote a culture of disaster risk reduction in the nations of Latin American and the Caribbean" and address its users' needs by providing the systematic collection, analysis and distribution of risk management information, and promoting strengthened information centres through cooperation with key players. CRID's core products and services are: project management, information management, information technologies, and communication and dissemination. The site permits user submissions.

CRID is currently sponsored by six organizations that joined efforts to ensure the compilation and dissemination of disaster-related information and to facilitate access to technical documentation on disasters to professionals in Latin America and the Caribbean. These include the Pan American Health Organization - Regional Office of the World Health Organization (PAHO/WHO), the UN Office for Disaster Risk Reduction (UNISDR), the Costa Rica National Risk Prevention and Emergency Commission (CNE), the International Federation of Red Cross and Red Crescent Societies (IFRC), and the Coordination Center for Natural Disaster Prevention in Central America (CEPREDENAC).

PreventionWeb

One of the main functions mandated to the ISDR Secretariat by UN General Assembly resolution A/RES/56/195 of 2002 was to perform as an information clearing house for disaster risk reduction, as referenced in paragraphs 14, 19, 21 and 22.

While the IDNDR had intentions to use the networking and information dissemination of UNIENET (IDNDR 1993) this project was never officially launched and its successor, ReliefWeb focused strictly on humanitarian response.

The information clearing house project was under discussion in 2001 and 2002 and by 2003, after an initial feasibility study (Butler 2003), the UNISDR had made a clear commitment to the development of an information system "designed to fully incorporate the diverse interests and needs of its partners in disaster risk reduction" (UN/ISDR 2003). In late 2003 and early 2004, an ISDR project supported by SDC developed a detailed outline of an inter-agency web portal known as PreventionWeb.

After the World Conference for Disaster Reduction (WCDR) in 2005 (WCDR website), a dedicated UNISDR team was formed to support the PreventionWeb project. After detailed user research, and an architecture and design phase the beta version of PreventionWeb was launched at the Global Platform meeting in May 2007, with a full site launch in November 2007.

Since then, PreventionWeb has aimed to serve the information needs of the disaster risk reduction community by helping disaster risk reduction stakeholders find and share information, and connect on disaster risk reduction issues. In addition to its content collection and dissemination service, the PreventionWeb platform provides the monitoring systems for HFA implementation at regional, national and local level, search and query tools that facilitate analysis, and online collaboration tools that support participation in communities of practice, online consultations, and project collaboration. It further hosts the online components of the UNISDR multi-stakeholder mechanisms including national, regional and global platforms for DRR and the dialogues leading to the development of a the post-2015 framework for DRR.

In 2012, UNISDR called for an external evaluation of the effectiveness and impact of PreventionWeb. The evaluation found that PreventionWeb had established itself as the 'go-to' information repository for the DRR domain, [over 40,000 DRR professionals use the site more than once per week]. It further credited PreventionWeb with having led the 'mapping' of the DRR domain, defining the key themes and concepts, and to a large extent framing the key priorities for domain stakeholders. The evaluation questioned to what extent the site was addressing the emerging demand of its global audience for more tailored knowledge products for specific groups. Its main recommendation is that the site should evolve into a knowledge brokering platform (Gregorowski, et al., 2012).

As a response to the evaluation, and as a result of extensive evaluative and generative research on the demands of target audiences, PreventionWeb is currently undergoing a visual and technical redesign and repositioning itself to become a community-managed platform. New site sections are being developed to improve the understanding of disaster risk, synthesize information on 'how to do' DRR, strengthen the existing knowledge base, and improve stakeholder services by providing co-curated collections and analysis, as well as direct access to DRR experts. (PreventionWeb 1). These changes represent a shift from Web 1.0 - an aggregated, library-like model, to Web 2.0 - an open, social, conversational model.

Disaster Reduction Hyperbase

A significant effort to collect and disseminate information on technology for disaster reduction, including appropriate technology and indigenous knowledge was made by the Disaster Reduction Hyperbase (DRH) project between 2005 and 2009 (Kameda 2009). A team of global experts was formed and an international DRH consortium was created. The DRH was primarily sponsored by MEXT, and the Government of Japan as part of its policy-based disaster reduction portfolio for the implementation of the HFA (MEXT-NIED).

The initial motivation for the DRH came from a preceding five-year project on the Development of the Earthquake and Tsunami Disaster Mitigation Technologies and their Integration for the Asia-Pacific Region (DRH website 2) and the DRH successfully documented 41 technologies targeting practitioners, community leaders, policy makers and motivated researchers from 8 Asian countries and some in Africa and Latin America (PreventionWeb, 2007). The project established a DRH template as a common vehicle to present Implementation oriented technology (IOT): outputs from modern research and development (R&D) that are practiced under clear implementation strategies; Process technology (PT): know-how for implementation and practice, capacity building and social development for knowledge ownership; Transferable indigenous knowledge (TIK): Traditional art of disaster reduction that is indigenous to specific regions but having potential to be applied to other regions and having time-tested reliability.

The general criteria for DRH content was to be understandable to users, implementable (i.e. usable and doable), and shown to be useful (Kameda, 2009).

Although this project has been dormant due to lack of funding, its template and criteria are still current. Its web-based system was developed on an open platform that could be sustained and interoperable with other existing platforms.

As part of the HFA Thematic Review process in 2014, a concept paper for a database of DRR technologies was presented by Lee (2014) and shows promise as a potential successor to build upon the acquired knowledge and successes of the DRH project.

Recommendation 11:

Proponents of appropriate technology and indigenous knowledge for DRR should build upon the advancements made by the Disaster Reduction Hyperbase.

Pacific Disaster Net

Pacific Disaster Net (PDN) was launched in 2008 and designed to facilitate sharing disaster risk management information between countries and organizations in the Pacific. PDN grew rapidly and is now the leading portal and resource for all disaster risk management partners working in the Pacific region, and is cited in many national HFA progress reports from the region. It hosts a significant volume of records including documents, contacts, disaster alert information, calendar events and audio/visual files (PDN website).

PDN aims to support DRM and development decision making and provides in-country information for distribution. PDN is developed and maintained by the Secretariat of the Pacific Community (SPC) SOPAC and partners - IFRC, UNDP Pacific Centre, UNISDR and UNOCHA.

PDN is currently redesigning its platform to improve accessibility to its growing content collection. SPC has sought the support of PDN users and stakeholders to improve the usability and ease of navigation of the PDN. Its new design is currently progressing with the aim of allowing users easier access and sharing of its valuable DRM content across the Pacific.

PDN has also participated in the Information and Knowledge Management for DRR (IKM4DRR) advisory group, co-facilitates IKM4DRR network discussions and has expressed interest advancing actions towards building standards and interoperable systems - particularly between DRR and CCA platforms in the Pacific region where a Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP) is being prepared.

Recommendation 12:

Donors should sponsor a pilot project for the Pacific region to become a test bed for interoperability between PDN, the Pacific Climate Change Portal (PCCP), PreventionWeb and ReliefWeb.

The DRR Project Portal

The DRR Project Portal was launched at the fifth Pacific Disaster Risk Management Partnership Network meeting in August 2010 as a system for sharing information on all disaster risk reduction initiatives in Asia and the Pacific for effective coordination in the region. By showing who is doing what where, it aims to increase collaboration and cooperation on DRR programming between governments, donors and organizations in Asia and the Pacific. The Portal intends to expand to allow for the sharing of national and sub-national DRR projects as well.

The DRR Project Portal is an initiative of the UNISDR Asia Partnership on Disaster Reduction (IAP) with funding support from the Asian Development Bank (ADP) and executed by the Asian Disaster Preparedness Center (ADPC).

The portal is built on an open source data management platform, incorporates the Disaster Risk Reduction Themes and Issues developed by PreventionWeb as a controlled vocabulary.

SADKN – South Asian Disaster Knowledge Network

The South Asian Disaster Knowledge Network (SADKN), launched in May 2011 at the Global Platform for DRR, was developed as the common platform for sharing knowledge and information among the multiple stakeholders of the member countries of the South Asian Association for Regional Cooperation (SAARC) on the multi-disciplinary and multi-sectoral issues of disaster risk assessment, risk prevention, mitigation and preparedness and disaster response, relief, recovery and reconstruction. The platform was designed and developed by the SAARC Disaster Management Centre, New Delhi, India (SADKN website).

During its development, the SADKN team consulted with UNISDR on opportunities for information exchange and interoperability standards such as the use of the PreventionWeb Themes and Issues and the integration of direct login to the HFA Monitor for SAARC member states to report their progress on HFA implementation. Published HFA progress reports were also syndicated from PreventionWeb to SADKN country profiles. The integration of the Monitor is a good example of reducing duplication of effort by using a common API. Although the Themes and Issues were not fully integrated, the future development and integration of common controlled vocabularies continue to have potential, particularly within sub-regional platforms where main actors already participate.

Recommendation 13:

DRR and CCA information portals should develop and use automated information mechanisms (APIs) to exchange information and reduce the duplication of effort.

SIAPAD - Andean Information System for Disaster Prevention and Response

SIAPAD was conceived and implemented as part of the Disaster Prevention in the Andean Community project (PREDECAN), a five-year initiative of the Andean Community and the European Commission, 2005-2009. Its main purpose was to strengthen national and subregional capacities for effective and timely information management to support decision making. SIAPAD was developed using an integrated, distributed, standardized, and dynamic approach comprising three tools: the Biblioteca Virtual Andina para la Prevención y Atención de Desastres (Red BiVaPad) – a virtual network of disaster risk reduction libraries, GEORiesgo – a network of four national portals with mapping information, and DesInventar – a national disaster loss database and methodology (UNISDR, 2009a).

By the end of the project, PREDECAN had supported initiatives to train more than 550 staff and Red BiVaPad reported on the participation of 160 information management and disaster risk reduction professionals in four countries: Bolivia, Colombia, Ecuador and Peru, each with its coordinating centre, to maintain the system. In spite of these efforts, the BiVaPad virtual libraries were only fully implemented in Peru and Bolivia – systems that remain online with 1444 and 673 documents, and 249 and 94 national contacts, respectively dated since 2000 and primarily in Spanish.

The project represents a good example of shared information architecture and systems for shared information collection. The technical implementation of the project was initially managed by CRID under the supervision of the Pan-American Health Organization (PAHO), and incorporated the controlled vocabulary and tools for information management from CRID.

Although the systems in Peru and Bolivia remain online today, different websites and systems have since been developed by the national HFA focal institutions for disaster risk reduction independently: in Peru, CENEPRED promotes a national system for DRR information - el Sistema Nacional de Gestión del Riesgo de Desastres (SIGRID); in Bolivia, the Viceministerio de Defensa Civil has developed its second beta version of its national system - Sistema Nacional Integrado de Información para La Gestión del Riesgo (SINAGER); in Colombia, the Unidad Nacional para la Gestión del Riesgo de Desastres (NGRD) promotes public information on its website and has launched a citizen self-reporting (crowdsourcing) application on hazard events, "Yo reporto"; in Ecuador, the Secretaría Nacional de Gestión de Riesgos (SNGR) maintains a website that features public alerts and links to an online library.

Further studying and understanding the issues behind the sustainability of such efforts beyond their initial project lifetime would add value to future indicators.

Recommendation 14:

Regional information systems should be developed with common information architecture and mechanisms for shared information collection.

GRIPWeb – Global Risk Information Platform

The Global Risk Information Platform was launched by the UNDP in 2011 as a community-based online knowledge management centre designed for professionals and practitioners in the fields of disaster risk assessment to support decision making for both disaster risk management and development planning. It aims to provide risk assessment professionals with an open platform to share and exchange their experience and knowledge, disseminate and generate knowledge, and develop their skills in risk assessment.

The platform features data, information and methodologies as well as tools and services for communities. Developed by the Global Risk Identification Programme (GRIP) which was launched in 2007, the GRIPWeb contains detailed information on assistance to 40 countries in understanding their risks by supporting the establishment of National Disaster Observatories (NDO) and National Risk Information Systems (NRIS). Among its content collections, GRIPWeb features an inventory of national databases and information systems, early warning systems, global datasets and training programmes (GRIPWeb website).

Note: After an external evaluation of its first five years, the future development of GRIPWeb remains uncertain.

Disaster Risk Reduction Net

The Disaster Risk Reduction platform is coordinated and maintained by the FAO Sub-Regional Emergency Office for Central and East Africa and aims to promote the disaster risk reduction agenda in Central and East Africa, especially in the area of drought. The site was launched with support from the European Commission and the governments of France and Finland.

Disaster Risk Reduction Net is a user-driven knowledge-sharing platform that develops partner channels based on partner demand of those working to build the resilience of local communities in Central and East Africa. Current channels support five thematic networks working in drought and food security, and the national food security cluster in Djibouti. Users can browse through or upload relevant documents, reports, events and news updates – both with technical and policy angles.

The platform is designed in a modular way that allows for some flexibility in customization. The site maximizes the use of existing information by integrating automated feeds of relevant content from partner sites and is a good model for integrated content syndication.

Geo-spatial information platforms

The spatial representation of data and information is gaining ground as a powerful tool for the understanding and visualization of the magnitude and distribution of global risks. Geo-spatial analysis is an essential part of risk modelling. Crowdsourcing geo-spatial data and information also adds to new possibilities for layering, visualizing and sharing risk information more widely

The following programmes demonstrate some of the latest applications:

PREVIEW

Hosted by UNEP-GRID and initially developed in 2000, the current PREVIEW Global Risk Data Platform was developed as a support to the Global Assessment Report on Disaster Risk Reduction (GAR). It supports the ability to share spatial data and information on global risk from natural hazards, and makes risk more visible. Users can visualize, download or extract data on past hazard events, human and economical exposure and risk data. Methodologies on hazard modelling were reviewed by a team of 24 independent experts selected by the World Meteorological Organization (WMO) and the United Nations Education and Scientific Cultural Organization (UNESCO).

The PREVIEW platform covers tropical cyclones and related storm surges, drought, earthquakes, biomass fires, floods, landslides, tsunamis and volcanic eruptions and has been embedded in DRR platforms such as PreventionWeb to enable easier access to understanding and visualizing risk. (PREVIEW website).

CAPRA

CAPRA is a platform to support probabilistic risk analysis that was first launched in January 2008 as a partnership between the Center for Coordination of National Disaster Prevention in Central America (CEPREDENAC), the UN Office for Disaster Risk Reduction (UNISDR), the Inter-American Development Bank (IADB) and The World Bank. CAPRA was initially tested as a means to raise disaster risk awareness among stakeholders in Central America.

CAPRA aims to support decision making based on a unified methodology and tools for evaluating and expressing disaster risk. Building on existing initiatives, CAPRA was developed by experts to consolidate hazard and risk assessment methodologies, and raise awareness of risk management (CAPRA website).

It offers a modular and free software platform to support experts and practitioners in probabilistic risk analysis related to natural hazards such as earthquakes and hurricanes. It also supports the design of risk-financing strategies.

The CAPRA-GIS platform, a risk modelling tool of the CAPRA suite, was used to calculate the risk for the development of the Global Risk Update as a contribution to the 2013 Global Assessment Report (GAR). The CAPRA Viewer has been integrated as the the Risk Data Viewer, which is the primary tool for visualizing the risk data of the GAR (Risk Data Viewer website).

DesInventar

DesInventar is a conceptual and methodological tool built on open source products for the generation of National Disaster Inventories and the construction of databases of damage, losses and the effects of disasters. It helps make disasters visible at a local scale, and aims to facilitate dialogue for risk management for actors across sectors and at different levels of government.

Created in 1994, the project was initiated in Latin America by researchers, academics, and institutional actors linked to the Network of Social Studies in the Prevention of Disasters in Latin America (Red de Estudios Sociales en Prevención de Desastres en América Latina - LA RED). Among them, Corporacion Observatorio Sismológico del Sur Occidente (OSSO) is credited for having incubated the project at inception.

Further development of the concept, methodology and software has led to the current Disaster Inventory System, or DesInventar (Sistema de Inventario de Desastres, in Spanish) (DesInventar website). Following these efforts, a growing number of national disaster loss databases were developed, a majority using the DesInventar methodology and open source tools, with support from primarily from UNDP and UNISDR in the Caribbean, Asia and Africa. (UNDP/BCPR, 2013)

Today, the DesInventar software is used in 84 countries. The system has has two main modules: one for administration and data entry of disaster loss data including temporal data, event types, causes and sources; and the other to support analysis and queries including tables, graphics and thematic maps. DesInventar is the only tool that currently supports the display of regional maps per country with breakdown by province and municipality.

Disaster loss data

While disaster loss data is the subject of HFA Priority 2 and outside the scope of this report, loss and damage data constitute a principal outcome indicator for disaster risk reduction (DRR) and are often referred to as an important part of information management under the HFA Indicator 3.1 (UNDP/BCPR 2013).

IRDR (2014) states that "there are three global loss databases (CRED's EM-DAT, MunichRe's NatCatSERVICE, and SwissRe's Sigma) of which the latter two have limited public accessibility At the national level there are currently more than 84 loss databases, mostly using the DesInventar system referred to above. In spite of best efforts, these databases vary in data quality, temporal coverage, loss indicators, and update frequency. About 35 national databases that offer loss data through 2010 could only do so through financial and/or technical support provided by donor funding through the GAR 2011 and GAR 2013 projects (UNDP/BCPR 2013). Thus, database sustainability and long-term maintenance are critical needs for many database operators (Wirtz, et al., 2014; Gall, et al., 2014). The current expansion of the DesInventar system is supported by the European Commission.

Recommendation 15:

To improve the comparability of existing loss databases, event classifications must be standardized, and loss data must be incorporated into relevant contexts in order to provide a stable baseline on which to measure disaster reduction efforts.

Information exchange standards for DRR

In addition to an agreed upon set of definitions for standard DRR terminology, several other controlled vocabularies are regularly used as metadata for the classification of information for disaster reduction. These constitute de-facto information exchange standards, and are essential in the development and interoperability of information systems for DRR and CCA.

DRR Terminology

A shared language and shared concepts are crucial stepping-stones to widening the understanding and effectiveness of disaster reduction (Thywissen, 2005) and HFA Priority 3 specifically references the development of a standard DRR terminology.

Early efforts at defining basic terminology for DRR included the report of the UNDRO expert group meeting on Natural Disasters and Vulnerability Analysis in 1979 which proposed initial standard definitions for basic terms including natural hazard, vulnerability, elements at risk, specific risk and risk. Additional suggestions included Resistance, Estimated level of risk, and locally acceptable risk. (UNDRO, 1980) The Scientific and Technical Committee of the IDNDR in 1992 endorsed the endeavour of UNDRO to establish an internationally agreed terminology and prioritized the project in the information and communication strategy for the IDNDR (UNDHA, 1992; IDNDR, 1993).

In 1992, the UN Department of Humanitarian Affairs (DHA), supported by the IDNDR published an internationally agreed glossary of basic terms related to disaster management and noted that: "there is a divergence of opinions on definitions of some of the basic terms like 'mitigation', 'prevention', 'preparedness' etc." (UNDHA, 1992).

In 2004, a listing of 43 basic definitions was included as Annex 1 of the International Strategy for Disaster Reduction publication entitled *Living with Risk: A Global Review of Disaster Reduction Initiatives* (also in Spanish, and released for comment in 2002). The aim of this glossary was to promote greater understanding of DRR among members of the public, government officials, and practitioners. The definitions presented were therefore less technical than those found in other glossaries (UNISDR 2004a, UNISDR 2004b).

The 2005, the Hyogo Framework for Action specifically requested the UNISDR secretariat to "update and widely disseminate international standard terminology related to disaster risk reduction, at least in all official United Nations languages, for use in programme and institutional development, operations, research, training curricula and public information programmes" (UNISDR, 2007a).

A new version of UNISDR terminology was published in 2009, and included 53 terms. This version also acknowledges new terms which were not in common use, such as extensive risk, and whose definition may evolve (UNISDR, 2009b).

While the UNISDR 2009 terminology has been the most widely adopted set of definitions, there remains a significant amount of debate in the definition of core concepts such as vulnerability Thywissen (2006) lists 36 different definitions and resilience which is currently perceived in a slightly different manner by all DRR actors.

Translation: The UNISDR terminology of 2009 used the English version as the basis for the preparation of other language versions. UNISDR subsequently released this publication in the six official UN languages, with a specific encouragement for translation included in its introduction.

This Disaster Risk Reduction Terminology Kit, developed by Asian Disaster Reduction and Response Network (ADRRN), translated the 2009 ISDR terminology into nine Asian languages. Each was vetted by various ADRRN members post translation to ensure maximum relevancy within the local setting. At the same time, in some editions, simple illustrations have been added along with each term to make the terminology accessible to a larger audience (Mercy Malaysia, 2010).

Japanese and Korean versions were subsequently published jointly with the UNISDR and included the original English text in parallel.

Turnbull et al. (2013) contains an extended glossary of terms, including many from UNISDR 2009, but also references extensively the IPCC and other sources.

Coherence between climate change adaptation and DRR terminology

Mercer (2010) notes that CCA strategies at the community level are similar to, if not the same as DRR strategies yet the terminology used by the UNISDR and the IPCC remain divergent.

In 2006, the UNDP, ISDR and IDS collaborated on a short publication entitled *On Better Terms: a Glance at Key Climate Change and Disaster Risk Reduction Concepts*. The selection of key concepts discussed include vulnerability, risk and disaster risk reduction, risk assessment and climate change impact assessment, and cites the definitions listed by the Intergovernmental Panel on Climate Change (IPCC) glossary of terms used by Working Group II: Impacts, Adaptation, and Vulnerability in its Third Assessment Report and the International Strategy for Disaster Reduction (ISDR) Terminology of Disaster Reduction (IATF/DR, 2006).

While this effort is commendable, there has since been a proliferation of information systems related to climate change adaptation, with little harmonization in the terminology used in the DRR and CCA domains.

At the 2013 Climate Knowledge Brokers workshop, the subject of coherence between the CCA and DRR information systems was discussed in a clinic format. Recommendations of this clinic, as reflected in the CKB workshop outcome document include:

- Meetings and integration of DRR and CCA communities and network leaders
- Identification of key actors who are prominent in both communities
- Suggest harmonized terminology, or map differences
- Focus on common results of both sectors' work – the differences should melt away
- Circulate outputs from DRR and adaptation work to each other

- Hold workshop to bring adaptation & DRR communities together
- Push for information sharing to be included in project requirements
- Integrate the CKB and DRR communities offline

(CKB, 2013b)

GLIDE – Global Identifier Number

One of the first initiatives designed to link the available information on disaster events was the GLIDE initiative which is a globally common unique ID code for disasters.

Initially proposed by the Asian Disaster Reduction Center (ADRC) this idea was initially shared and promoted by the Centre for Research on the Epidemiology of Disasters (CRED) of the University of Louvain in Brussels (Belgium), OCHA/ReliefWeb, OCHA/FSCC, ISDR, UNDP, WMO, IFRC, OFDA-USAID, FAO, La Red and the World Bank. While the GLIDE number has not been universally adopted, it is used by several major disaster related information systems including the ReliefWeb, GDACS, and DesInventar (GLIDEnumber website).

Hazard classification

To improve the comparability of DRR information and disaster loss data, event classifications must be standardized. If event categories diverge from each other any subsequent efforts to standardize human loss indicators will be futile (IRDR, 2014). As part of the GLIDE initiative, a standard classification scheme was developed for hazards. Initially based on input from CRED and WMO, the classification was further developed by the UNDP GRIP project under the Working Group on Disaster Data (WGDD) which consisted of the Asian Disaster Reduction Center (ADPC), Centre for Research on the Epidemiology of Disasters (CRED), Global Risk identification Programme (GRIP), Red de Estudios Sociales en Prevención de Desastres en América Latina (Network of Social Studies in the Prevention of Disasters in Latin America - LA RED), Munich Re, and United Nations Development Programme (UNDP, 2008).

In a separate initiative, the Centre for Research on the Epidemiology of Disasters and Munich Reinsurance Company released a working paper listing the data standards specific to their own loss databases (Below, et al., 2009; Wirtz, et al., 2014).

In early 2014, the IRDR released a new publication (IRDR, 2014) which summarizes an agreement on peril classifications. This new classification is an output of the IRDR programme's Disaster Loss (DATA) Project Working Group, consisting of the University of South Carolina, EU Joint Research Center, Delft University, Columbia University, Centre for Research on the

Epidemiology of Disasters (CRED) - Université Catholique de Louvain, Swiss Re, Munich Re, United Nations International Strategy for Disaster Reduction (UNISDR), United Nations Development Programme (UNDP), U.S. National Climatic Data Center/NOAA, Taiwan National Science and Technology Center for Disaster Reduction (NCDR), Austrian Government, International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Economic Commission for Latin America (UNECLAC) and the World Bank (ibid.).

While all of the hazard classification initiatives have aimed to improve collaboration and interoperability of DRR and humanitarian information systems at the working level, it must be noted that they present a potential conflict with more formal intergovernmental processes, such as those managed by the World Meteorological Organization, which also seek to set international standards for the exchange of data and information.

The Warsaw international mechanism for loss and damage associated with climate change impacts of the UNFCCC will clearly play a role in the future as well, as noted in Report of the Conference of the Parties on its nineteenth session, which includes functions of "collection, sharing, management and use of relevant data and information, including gender-disaggregated data; and fostering dialogue, coordination, coherence and synergies among all relevant stakeholders, institutions, bodies, processes and initiatives outside the Convention, with a view to promoting cooperation and collaboration across relevant work and activities at all levels" (UNFCCC, 2014).

Loss data guidelines

In addition to hazard classification, human loss and economic loss standards are currently being developed by the IRDR and the EU Loss Data Standard initiative. (De Groeve, et al., 2013) A new initiative of the United Nations Data Revolution Group proposes a World Forum on Sustainable Development Data which may help support the further development of global standards (UNDRG,2014).

DRR Themes and Issues

As a result of thorough user research performed at the start of the PreventionWeb project (UNISDR, 2007b) it was concluded that disaster risk reduction information had no internationally accepted classification standards. While the most obvious facets of disaster related information are both geographical and hazard-based, there is also a broad set of thematic areas which represent the practical working architecture of the DRR domain.

Based on and initial set of interviews followed by the classification of over 14,000 content items, the UNISDR PreventionWeb team developed a list of 29 thematic categories (UNISDR, 2011a). The methodology behind the development of these themes and issues was based on evidence

or activity. If DRR professionals were specializing in an area, writing about it, meeting on the topic, and the theme was not a sub domain of another working area, it became a unique theme or issue. On the other hand themes that were proposed but had no significant evidence base were not included. Several surveys of DRR professionals have confirmed the validity of these thematic categories which reflect how the self-identified DRR domain actors currently describe their work (UNISDR, 2011a).

While these thematic terms have not been adopted as a global standard, some international efforts to adopt the terminology have been made including the integration of themes by the SAARC SADKN site and the ADPC-led DRR Project Portal. Additionally, steps have been taken to harmonize the categorization of information across several major portals, but while some discussions are still in progress, others have been halted due to lack of resources or incentives.

Countries and regions

With little ambiguity, country classification has been the most common aggregation method for DRR data. Existing ISO country codes have been widely used, and bilateral agreements often made for the exchange of data on countries or territories that do not yet have an ISO reference.

Comparing regional data for disaster risk reduction however, is specifically problematic, as there are no internationally agreed upon regional classifications. Most organizations, including the United Nations agencies, either group countries conveniently according to their own internal structure, group countries by membership in regional political entities such as the African Union or League of Arab states, or declare convenient groupings based on other criteria. UNICEF for example, maintains a region called industrialized countries.

Results of the research for the Global Assessment Reports for DRR (GAR) also indicate that the comparison of risk levels and the appropriate DRR actions can often be more closely correlated to income level, with lower or middle income countries facing similar challenges across all regions. The group of small island developing states (SIDS) is a relevant example.

Efforts to harmonize DRR data and information

As noted above, there are no globally recognised standards for information and knowledge management in the DRR domain, and efforts to create them have often lacked sufficient authority or a sufficiently rigorous process to be universally accepted. Each database that is developed has a unique architecture tailored to the needs of the owner, with little consideration of data compatibility with other systems (Gall et al. 2014). Notable efforts to consolidate and harmonize information on DRR include:

CKB Knowledge Navigator

Conceived by the Climate Knowledge Brokers Group, the Knowledge Navigator provides easy access to over 100 other climate change focused knowledge platforms. The Knowledge Navigator tool gives online users a clearer picture of who is posting what type of information on climate change. While the navigator is a useful tool to navigate among sites related to climate change, little effort has yet been made to harmonize or standardize the terminology, or classification systems used by the participating portals (CDKN website).

PreventionWeb – Search all DRR sites

As part of the PreventionWeb project, an attempt has been made to develop a search engine to specifically limit searches to the websites of main DRR actors. The rationale behind this project was to provide a search scope that could provide a more relevant result set for queries in the DRR domain based on a common language. For example, an open Google search for terms such as adaptation or safe schools are unlikely to surface the most relevant DRR results first, while a search among major DRR websites will provide a more specific and relevant result set. In 2011, a mapping exercise began with CRID in Costa Rica with the aim of improved interoperability and the development of a common search interface. Unfortunately, a lack of sufficient resources has resulted in an incomplete pilot study.

Reegle Thesaurus

The reegle.info clean energy and climate glossary provides plain language definitions for terminology used in the climate change domain. A climate-compatible thesaurus supports the glossary, providing mapped links to synonyms and related terms in the broad fields of climate change mitigation, adaptation, development and sustainability. The service is available in five different languages: English, French, German Portuguese and Spanish.

In addition, an automatic tagging engine has been developed to add relevant metadata to documents through an API (application programming interface) which will automatically tag documents and web content that cover renewable energy, energy efficiency and climate-relevant topics. In addition to the tagging process itself, the Reegle tagging API can also make suggestions for related reading from the web resources already indexed, thus enriching the content of any website. While coming from the renewable energy and environmental side of climate change, the thesaurus already includes terms used in climate change adaptation and with partners such as SOPAC and UNISDR is working to extend it to the words and concepts in disaster risk reduction (unpublished Reeep proposal, 2014, available upon demand).

PreventionWeb API

In collaboration with partners such as UNEP, the World Bank, and the World Food Programme, PreventionWeb has offered the syndication of information through a customizable API (see information exchange standards document in the About section of the PreventionWevb site). In spite of this effort, no durable solutions have been formed as the redesign of partner websites did not include resources for the re-development of information feeds.

GEOSS System of Systems

The GEOSS System of Systems common infrastructure (GCI) allows Earth Observations users to search and use data, information, tools and services through a single Internet portal (GEOSS website). A components and services registry as well as a standards and interoperability registry provides a listing of all earth observation systems, datasets, tools, and other GEOSS services.

Observations

While the managers of information platforms often see the advantages and see the efficiency gains in developing interoperable systems which share information rather than duplicating it, common measurements of the success of web platforms does not usually include a metric related to the efficiency gains from sharing information (Fong, 2014).

The IKM4DRR and CKB communities clearly note that most information systems for DRR and CCA have little sustainable funding (IKM4DRR, 2013; CKB, 2013a). The need to continually raise funds results in a competition for visibility among platforms, which in turn leads to duplication of effort rather than improvements to efficiency and interoperability of the systems.

As there is currently no pressure to combine efforts the end result may be a war of attrition among platforms to the detriment of the broader DRR and CCA communities.

Recommendation 16:

Donors should include the development of interoperable information systems, and collaboration among information providers in DRR funding conditions.

Recommendation 17:

The international process leading to post-2015 framework for DRR should call for the revision and harmonization of DRR and CCA terminology, including the controlled vocabularies in common use for information management, as well as the translation of

these concepts into as many local languages as feasible. Due to a necessary overlap, these efforts should be made in close collaboration with all working groups for the development of DRR or CCA standards.

Recommendation 18:

UNISDR should seek sponsorship for a crowd sourcing initiative for the translation of DRR to local languages (a reasonable objective is to have 100 terms in the 100 most spoken languages) and provide an access point for this information.

Part 4: Challenges and future outlook

The IKM4DRR workshop of 2013 listed a long set of challenges to effective information and knowledge management systems for DRR, including: the need for clear and shared definitions and terms, the need for incentives, accountabilities and political backing, the need to consider culture and local knowledge, and issues of power and competition at institutional and other levels (UNISDR, 2013a). On a broader scale there is also a challenge to put disaster risk in an appropriate relation to other interrelated forms of risk.

Use of the Internet to communicate DRR data

As referenced several times in this paper, the Internet has enabled an unprecedented opportunity for information sharing and dissemination at a very low cost. Studies have shown that as early as 2001, people turned to the Internet to find information about current risks (Roth et al., 2013). However, in spite of the opportunities, a word of caution must also apply.

Information relating to risk and the behavioural change associated with risk reduction must be based on trust. The ease of creating an online presence can also have negative consequences, such as the ease of presenting information from dubious sources in very professional and convincing ways. Several realistic looking online DRR job postings and training courses have been discovered to be monetary scams. The speed of transmission of information on the Internet means that hard earned trust can also be lost very quickly (ibid.).

Unlike disasters which are publicly visible, disaster risk is largely invisible. While there is a global movement towards open data, the online dissemination of risk and exposure data can also be considered by some countries to be a security risk.

In the case of complex, interconnected risk such as NaTech events, caution should be used to avoid an over-reliance on technology which may be fragile and subject to political manipulation if it is perceived as a threat to traditional authority and power structures.

The evolution of online information systems can be described in terms of Web 1.0, 2.0 and 3.0.

Web 1.0 refers to the first phase of the World Wide Web with flat data, where there is only limited interaction between sites and web users. Web 1.0 sites are simply information portals where users passively receive information without being given the opportunity to post reviews, comments, and feedback. Most current DRR websites fit this category.

Web 2.0 refers to the "writable" phase of the World Wide Web which facilitates interaction between web users and sites. Web 2.0 encourages participation, collaboration, and information sharing. Examples of Web 2.0 applications are Facebook, Wikipedia, and YouTube. Very few DRR websites have made the transition to Web 2.0 platforms.

Web 3.0 refers to the "executable" phase of the Word Wide Web with dynamic applications, interactive services, and "machine-to-machine" interaction. In Web 3.0, computers can interpret information like humans and intelligently generate and distribute useful content tailored to the needs of users. The development and use of linked open data in the DRR domain is an essential precursor for information systems to evolve to the Web 3.0 level.

When described in the K* literature, a parallel to this online evolution is reflected in a set of nested ovals where Web 1.0 efforts could be described as an infomediary role, and more participatory and social efforts of Web 2.0 can be described as knowledge brokering or even innovation brokering (Shaxon, et al., 2013).

Communicating Risk

The measure of any information system is its ability to effectively communicate in clear language. The disaster risk reduction domain represents a specific challenge as DRR information systems are necessarily concerned with the communication and perceptions of risk. Apart from information simply reaching its target, there is still an incomplete understanding of why and when ordinary citizens' evaluations of risk may appear to diverge from scientific forecasts (IRDR, 2011b).

There is an incomplete understanding of why and when people's actual behaviour may appear to diverge from their expressed evaluations of risk. Uncertainty concerning the likelihood of an

event is at least as important is uncertainty over of the consequences. Examples of this include the 2013 cyclone Haiyan in the Philippines (Yates, 2013) as well as hurricane Sandy in New York city.

Information systems must make scenarios locally relevant – stories, examples and case studies bring adaptation planning to life. In addition, people have different ways of learning new information and information systems must explore new tools such as visualizations to provide a range of opportunities for diverse audiences. The U.K. National Hazard Partnership, cited above is an example of good practice in this area.

Risk, when defined as the combination of the probability of an event and its negative consequences has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in "the risk of an accident"; whereas in technical settings the emphasis is usually placed on the consequences, or "potential losses" for some particular cause, place and period. It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.

In addition, there is a general assumption that risk is probabilistically determined and known, but climate change and its related levels of uncertainty and possibilities of 'surprise events' challenge risk and exposure calculation exercises, and M&E approaches to DRR (Silva Villanueva, 2011).

There is a general lack of knowledge and confidence about the way in which positive communication results can be achieved, such as fostering a shared sense of ownership of the problem and effectively communicating the notion of manageable risk (de Boer, 2010). Resistance or denial can also be expected, when the analysis of effective risk reduction either implies failure or when the recipients of this information are powerless to take action (IRDR, 2011a).

Roth (Roth, et al, 2013) shows several examples of how risk can be effectively communicated by the development of Internet sites which take into account the social and demographic nature of target audiences but the challenge of communicating complexity and uncertainty in clear language remains a major obstacle to effective risk management.

Part 5: New technologies for DRR

"The future is already here, it is just unevenly distributed"

William Gibson

While the technologies listed below are not particularly new, they are listed here because they are considered to have an enormous and largely untapped potential to assist in the reduction of disaster risk.

Satellite based earth observation

Satellite based earth observation is being increasingly used to compliment the in-situ observations and disaster loss data collection, and can provide a reliable source of unbiased data for risk assessment. This is an effort that no single country can complete on its own, and the Group on Earth Observations (GEO) now consists of 89 governments, and 77 inter-governmental, international and regional organizations.

The Geohazards supersites project aims to improve hazard assessment and preparedness for geologic disasters by establishing an open-access data infrastructure of in-situ and space based observations (GSNL website). A Geonetcase service is also available for users without high speed Internet access.

Technical end economic barriers persist however, and the development of federated data infrastructures is a work in progress (Gaetani, et al., 2014).

Linked Open Data

The Web has evolved from a global information space of linked documents to one where both documents and data are linked. Underpinning this evolution is a set of best practices for publishing and connecting structured data on the Web known as Linked Data.

Berners-Lee (Berners-Lee, 2006) outlined a set of 'rules' for publishing data on the Web in a way that all published data becomes part of a single global data space.

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names

3. When someone looks up a URI, provide useful information, using standards (RDF, SPARQL)
4. Include links to other URIs, so that they can discover more things

These have become known as the 'Linked Data Principles', and provide a basic recipe for publishing and connecting data using the infrastructure of the Web while adhering to its architecture and standards (Bizer, et al., 2009).

This has additionally evolved into a five star model which can be used to judge the relative level of openness:

* Information is available on the Web (any format) under an open license

** Information is available as structured data (e.g. Excel instead of an image scan of a table)

*** Non-proprietary formats are used (e.g. CSV instead of Excel)

**** URI identification is used so that people can point at individual data

***** Data is linked to other data to provide context

(Bauer, et al., 2012)

The Open Government Declaration of 2011 has now been endorsed by 54 countries which promote transparency, and open data sharing (Open Government Declaration website).

Notable initiatives in open data for DRR include the World Bank Open Data for Resilience Initiative (OpenDRI) which works with governments to harness the value of Open Data practices in service of more effective disaster risk management and climate change adaptation. OpenDRI is neither a methodology or nor a toolset, but rather an evolving set of practices that can be configured to meet specific needs (Crowley, 2014).

The OpenDRI project asserts that to alter the perceptions of risk across a whole population, data needs to be available to everyone, and knowledge of how to analyze and apply those data needs to be widespread. Data must be open – legally open, in terms of intellectual property licenses that permit them to be reused, repurposed, and redistributed without cost. They must also be technically open, so that any software can open them, manipulate them, and save new analyses in open formats. Data needs to be collected, analyzed, and curated by the people facing the risks. Only through this process of having the data available to all and curated by those who are potentially affected can behaviour fully change (ibid.).

Experience in the Caribbean has shown that open data policies and open source tools are increasing the access, harmonization and use of geospatial data for risk analysis across the region (Pandey, et al., 2013).

The development of open source applications, coupled with open government data have the potential to multiply the DRR efforts and efficiency through empowerment of affected

communities and the effective distribution and democratization of knowledge generation and knowledge brokering for DRR.

Community mapping and crowdsourcing initiatives are directly applicable to the collection of exposure data, especially in rapidly changing urban environments. The use of open tools such as Open Street Map Geonode and Ushahidi has tremendous potential.

The International Network of Crisis Mappers is the largest and most active international community of experts, practitioners, policymakers, technologists, researchers, journalists, scholars, hackers and skilled volunteers engaged at the intersection of humanitarian crises, new technology, crowd-sourcing, and crisis mapping. With over 6000 members and affiliations with over 300 institutions, the potential use of this community in disaster reduction activities is a largely untapped resource (Crisis Mappers website).

Another open data initiative touching the DRR domain is the Reegle Thesaurus (Reegle glossary). The Open Thesaurus is beginning to bridge the gaps between climate change and disaster risk reduction. It is an RDF compatible map of concepts, and while coming from the renewable energy and environmental side of climate change, it is already including terms used in climate change adaptation and DRR.

While there are strong arguments for the benefits of Open Data, several questions remain. Firstly, the maintenance of data sets is typically resource intensive, and the sustainability of these data may be called into question when resources and data usage is limited. The development of open data ecosystems can be the answer to unsustainable centralized systems, but the time and effort for the development of these may exceed the patience of fiscal policy makers.

There also remains a tension between the idea of data as a power source, data as an income generator, or data as a social good. Legal questions remain unsolved as to how much proprietary data need to be transformed to become free and open.

InaSAFE

With the aim of helping communities prepare for floods earthquakes and tsunamis, Indonesia and Australia together with the Global Facility for Disaster Reduction and Recovery (GFDRR) developed a free, open-source software that produces realistic natural hazard impact scenarios for better planning, preparedness and response activities. The software was launched at the 5th Asian Ministerial Conference on Disaster Risk Reduction in 2012 and has been downloaded over 1,000 times.

Published under the GPL V3 license, it may be freely downloaded, shared and the software modified. It aims to provide a simple but rigorous way to combine data from scientists, local governments and communities to provide insights into the likely impacts of future disaster events. The software has been used to produce a real-time estimation of the impact of earthquakes in Yogyakarta, a tsunami in Padang, and for community-level flood scenarios during the 2012 Jakarta flood contingency planning (GFDRR, 2012), (InaSAFE website).

Recommendation 19:

The post 2015 DRR framework for disaster risk reduction should encourage the Open Source, Open data and Crowd Sourced DRR movements.

Social media

The rise of social media was stimulated largely by the launch of Facebook in 2004, and provides significant opportunities for both the collection and dissemination of DRR information. Currently, one in four people on earth has started using some form of social media and over the past five years, and most emergency agencies around the world have started to use social media as an additional communication channel for warnings and alerts (Dufty, 2014).

Social media presents opportunities to leverage the trust relationships inherent in personal networks, and immediately make projects more participatory. When combined with mobile devices, social media can also be an extremely powerful source of real-time geo-localized data and information.

Roth et al. (Roth, et al., 2013) note that many government institutions use social media for easy access to young citizens and also notes that a question and answer functionality can be an effective measures to counter rumours, and thereby build trust between the public and government institutions, especially in the delicate question of which risk can be accepted or tolerated by society. The speed of micro-blogging such as Twitter can be used to quickly disseminate a warning, or dispel any false information.

While the DRR network surveys in 2008 and 2010 noted above revealed very little use of social media for networking in the DRR domain, the 2012 survey revealed a much greater use of social platforms such as LinkedIn for DRR networking (data available for analysis). The combination of social media with communities of practice can also multiply the ability use tacit knowledge.

Despite the growing use of social media the demand for online information is still largely targeting printable products rather than social media. Despite this finding, there is a strong demand for connecting to others professional through online platforms (Hammill, et al., 2013).

Public authorities are also still coming to grips with the fact that they do not control the public discourse, and the discussion of disaster risk is no exception. DRR coordination bodies will have to engage new talent and specifically re-think their relationship with newly empowered stakeholders and ensure the most effective use of this new media channel.

Crowdsourcing is not dependent on the use of social media tools but can be greatly facilitated by its speed and trust relationships.

Social media is still evolving rapidly and it can be considered and emerging technology for DRR. (Dufty, 2014) In spite of the widespread use of social media generally, and the emergence of its use as a strong tool for disaster response (Crisis Mappers website) , its use and potential for disaster risk reduction has yet to be developed. There is still a huge unexploited potential for social media in DRR (Stal, 2014)

Recommendation 20:

The post 2015 framework for disaster risk reduction and should explicitly mention to power of social media and include indicators that reflect its effective use.

Internet of Things

In addition to the active social engagement in crowd sourcing initiatives, a steady increase in the number of devices and appliances that are connected to the Internet, referred to as the Internet of Things has the potential to provide masses of passive data that can be used as a sensor network (known as community remote sensing) for early warning and other aspects of disaster management. For example, every automobile could use its existing sensors and GPS system to create millions of new mobile weather stations.

Big data

Snoad (Snoad, 2013) remarks that the cloud and big data has an incredible potential to either in an open way or a commercial way to provide affordable, online on-demand risk modelling based on a probabilistic model. Uses of big data potentially include real time manipulation of global spatial data as is available through the Google Earth Engine, correlation of new datasets with existing data or use of a wide spectrum survey analysis tool.

Use of big data for disaster risk reduction may depend on the use of alternate data as a proxy for coping mechanisms (Fong 2014) but as yet, no significant efforts have been identified by the authors.

Summary

Information and knowledge transfer are clearly essential to all areas of DRR. While the HFA called out this issue in HFA Priority 3, the nature of information and knowledge management could be considered a crosscutting theme in a post-2015 framework for DRR. Given the importance of effective information and knowledge management, as well as the specific technical nature of these work areas, a specific set of related success indicators should be maintained.

National HFA progress reports have reflected a relatively high level of self-reported achievement against HFA Indicator 3.1. However, the accompanying narrative reports often reflect an initial enthusiasm when new information systems or coordination mechanisms are introduced followed in a subsequent reporting cycle by a deeper understanding of the challenges of both coordination, cultural change and sustainability.

The very existence of information and communication systems where there previously were none, appears to be an implied metric of success.

While there has been tremendous progress in the availability of DRR information and data since the HFA was introduced, the overall goal of reducing disaster risk through the "use of knowledge, education and innovation to build a culture of safety and resilience at all levels" as stated in HFA Priority 3, remains a distant yet achievable objective.

While the debate on the precise definition of common DRR terminology will likely continue for some time, especially across the DRR and CCA domains, a common understanding and language is essential for efficient action. Translation of DRR terminology, concepts and metadata to local languages is essential to the effective use of information at the community level.

Millions of dollars are spent annually on the development of DRR information and knowledge management systems, yet there is a lack of incentive from either donors or organizations to promote the harmonization, interoperability, coherence and overall efficiency of DRR and CCA IKM platforms for sustainable knowledge transfer. The IKM4DRR community calls for IKM processes and systems that support information standards and are demand-driven, collaborative, sustainable, transparent and monitored. These principles and elements as presented within the scorecard could support the development of IKM indicators for DRR progress in the post-2015 framework for DRR.

In addition, knowledge must reach the appropriate audiences to be effective, and numerous barriers to effective knowledge transfer exist.

Knowledge networks play an essential role in DRR knowledge transfer but lack support and sponsorship.

The evolution of the Internet towards a model of open social collaboration and open data sharing provides a great opportunity to leveraging social input and to crowd-source and distribute data collection and analysis.

New technology for information and knowledge management continues to emerge, and there is still a huge unexploited potential for social media in DRR (Stal 2014) and this fact should be directly acknowledged in the Post-2015 framework for DRR.

Summary of Recommendations

Recommendation 1:

In order to minimize the potential for misinterpretation, careful testing of the wording of key questions is recommended before being included in a future monitoring system.

Recommendation 2:

UNISDR should extract good practices and creative approaches from HFA progress reports and develop a mecahnism to circulate them for discussion among relevant focal points and the broader DRR community.

Recommendation 3:

Each specific core indicator of the HFA or its successor framework should include specific success indicators relating to effective information and knowledge management.

Recommendation 4:

The following indicators which may be answered Yes/No may be considered to improve the precision of measurement of national information and knowledge management systems in a future version of the current HFA Indicator 3.1

- Use of multiple media channels– radio, TV, social media etc. is of based on a standing agreement which includes the dissemination of information on disaster risks as well as alerts and warnings.
- National information systems are systematically connected to regional authorities and regional information systems
- Legal or policy frameworks include directives on the use of DRR information, including the obligation to convey information on risks
- Funding for DRR information systems is sustainable and included in the regular budget for disaster risk management
- Information platforms allow for active two-way communication with the public

- Data is shared in standard formats among national and regional actors

Recommendation 5:

DRR actors should support the development of the core competencies of knowledge brokering and recognize the value of the KB function, and the resource implications of brokering knowledge effectively.

Recommendation 6:

The DRR community should develop mechanisms to promote networking and raise awareness of existing DRR networks at all major DRR conferences.

Recommendation 7:

The DRR scientific community should produce a quarterly DRR research compendium, summarizing the newest research in plain language and targeting specific sectoral audiences with appropriate updates.

Recommendation 8:

The DRR scientific community should support and develop knowledge brokers with the specific ability to translate scientific knowledge into plain language.

Recommendation 9:

The global IKM4DRR community should seek sponsorship to hold annual or biennial knowledge Share Fairs for DRR in collaboration with the CKB group.

Recommendation 10:

A consortium of major DRR information platforms should seek sponsorship for a common user needs analysis and the development of information demand profiles for specific target audiences, and the analysis of current gaps between information supply and demand.

Recommendation 11:

Proponents of appropriate technology and indigenous knowledge for DRR should build upon the advancements made by the Disaster Reduction Hyperbase.

Recommendation 12:

Donors should sponsor a pilot project for the Pacific region to become a test bed for interoperability between PDN, the Pacific Climate Change Portal (PCCP), PreventionWeb and ReliefWeb.

Recommendation 13:

DRR and CCA information portals should develop and use automated information mechanisms (APIs) to exchange information and reduce the duplication of effort.

Recommendation 14:

Regional information systems should be developed with common information architecture and mechanisms for shared information collection.

Recommendation 15:

To improve the comparability of existing loss databases, event classifications must be standardized, and loss data must be incorporated into relevant contexts in order to provide a stable baseline on which to measure disaster reduction efforts.

Recommendation 16:

Donors should include the development of interoperable information systems, and collaboration among information providers in DRR funding conditions.

Recommendation 17:

The international process leading to post-2015 framework for DRR should call for the revision and harmonization of DRR and CCA terminology, including the controlled vocabularies in common use for information management, as well as the translation of these concepts into as many local languages as feasible. Due to a necessary overlap, these efforts should be made in close collaboration with all working groups for the development of DRR or CCA standards.

Recommendation 18:

UNISDR should seek sponsorship for a crowd sourcing initiative for the translation of DRR to local languages (a reasonable objective is to have 100 terms in the 100 most spoken languages) and provide an access point for this information.

Recommendation 19:

The post 2015 DRR framework for disaster risk reduction should encourage the Open Source, Open data and Crowd Sourced DRR movements.

Recommendation 20:

The post 2015 framework for disaster risk reduction should explicitly mention to power of social media and include indicators that reflect its effective use.

Conclusions

During the development of the HFA, DRR was in early stages of evolution, and dedicated information systems were almost non-existent. The gradual maturity of the DRR domain has seen more sophisticated use of information as well as the expansion of the Internet and social media into the lives of people around the planet. The efficiency in which information can now be exchanged is unprecedented and represents a paradigm shift for the use of knowledge for informed decision making.

Better information is now expected at every point in planning and decision making processes, but in spite of the great promise, the level of detail and accessibility of available knowledge is still a limiting factor.

The rapid growth of online information and the ease of developing basic websites have led to a supply driven proliferation of one-stop portals, duplication of effort and a potential shift away from a people-centred approach to knowledge transfer.

The direct effect of the HFA on the development of information systems is difficult to determine, as the rise of the Internet and the Open Government movement has resulted in an "everything online" policy. However, the effects of the HFA in the stimulation of national, regional and international coordination of DRR efforts has clearly benefitted the development of DRR information platforms, which have often been promoted as support to the implementation of the HFA.

Information systems for DRR have little sustainable funding, resulting in competition for visibility and duplication of effort rather than efficiency and interoperability. There is therefore a clear need to recognize and institutionalize information systems as core elements in relevant organizations.

Emerging open data initiatives and social media have the potential to multiply the rate of advancement of DRR knowledge through their ability to create a two-way conversation, leverage distributed social assets, and extend limited central resources. Open data projects have the potential to develop the capacity of national actors, and point the way towards open access to risk data for construction, land purchase or land sale.

Resources are still required for development and promotion of information standards, supported by appropriate incentives, as well as the sponsorship training and support to knowledge brokers to act as liaisons between the scientific and practitioner communities.

As the DRR domain evolves, information systems are becoming essential elements of almost all activities. Rather than a single specific reference, information and knowledge should be considered an essential part of all priorities and indicators in a future framework for DRR.

Bibliography

Alcaldía Mayor de Bogotá. 2012. *Ley 1523 de 2012. Por la cual se adopta la política nacional de gestión del riesgo de desastres y se establece el Sistema Nacional de Gestión del Riesgo de Desastres y se dictan otras disposiciones.* Bogotá, Colombia. http://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=47141 (accessed 8 April 2014).

Amaratunga, D., R. Haigh and M. Thayaparan. 2014. *Academic Network for Disaster Resilience to Optimise Educational Development*. Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Salford, United Kingdom: Centre for Disaster Resilience, University of Salford.

Amina, A. and J. Roberts. 2008. Knowing in Action: Beyond Communities of Practice. *Research Policy* 37 (2008): 353–369. http://www.cvik.name/managing_knowledge/managing%20knowledge/knowing%20in%20action.pdf (accessed 24 April 2014)

Bauer, F. and M. Kaltenböck. 2012. *Linked Open Data: The Essentials. A Quick Start Guide for Decision Makers*. Vienna, Austria: edition mono / monochrome. http://www.reeep.org/sites/default/files/LOD-the-Essentials.pdf (accessed 24 April 2014)

Below, R., A. Wirtz and D. Guha-Sapir. 2009. *Disaster Category Classification and Peril Terminology for Operational Purposes.* Louvain-la-Neuve, Belgium: Centre for Research on the Epidemiology of Disasters and Munich Reinsurance Company. http://www.cred.be/publication/disaster-category-classification-and-peril-terminologyoperational-purposes (accessed 8 April 2014).

Berners-Lee, T. 2006. *Linked Open Data – Design Issues*. http://www.w3.org/DesignIssues/LinkedData.html (accessed 8 April 2014).

Bizer, C., T. Heath and T. Berners-Lee. 2009. Linked Data - The Story So Far. In: Heath, T., Hepp, M. and Bizer, C. (eds.). 2009. *Special Issue on Linked Data, International Journal on Semantic Web and Information Systems (IJSWIS)*. http://linkeddata.org/docs/ijswis-special-issue and http://tomheath.com/papers/bizer-heath-berners-lee-ijswis-linked-data.pdf (accessed 8 April 2014)

Butler, D. 2003. *The World Disaster Risk Reduction Center*. ISDR consultancy report.

Climate and Development Knowledge Network (CDKN). 2013. *Feature: Portal Proliferation Syndrome Responding to Treatment.* http://cdkn.org/2013/08/feature-portal-proliferation-syndrome-responding-to-treatment/ (accessed 29 April 2014)

Climate Knowledge Brokers. 2013a. *3rd Annual Climate Knowledge Brokers Workshop.* Bonn, Germany, 8-9 June 2013. GIZ, CDKN and REEEP
http://en.openei.org/wiki/Knowledge_Brokers_Workshop
(accessed 8 April 2014).

Climate Knowledge Brokers. 2013b. *3rd Annual Climate Knowledge Brokers Workshop Report.* Bonn, Germany, 8-9 June 2013. GIZ, CDKN and REEEP.
http://cdkn.org/wp-content/uploads/2013/08/2013-CKB-Workshop-Report-Final.pdf and
http://en.openei.org/wiki/File:2013_CKB_Workshop_Report.pdf
(accessed 8 April 2014).

Crowley, J. 2014. *Open Data for Resilience Initiative. Field Guide.* Washington D.C., USA: Global Facility for Disaster Risk Reduction (GFDRR), World Bank.
https://www.gfdrr.org/sites/gfdrr.org/files/publication/OPENDRI_fieldGuide_WEB_0.pdf
(accessed 24 April 2014)

Cummings, S. and A. van Zee. 2005. Communities of Practice and Networks: Reviewing Two Perspectives on Social Learning. *KM4D Journal* 1(1): 8-22.
http://journal.km4dev.org/index.php/km4dj/article/viewFile/9/4
(accessed 24 April 2014)

De Boer, J. 2010. *On the Relationship Between Risk Perception and Climate Proofing.* Knowledge for Climate Report Number KfC 013/10. Dutch National Research Programme Knowledge for Climate. Utrecht, Netherlands: Knowledge for Climate Programme Office, Secretariat c/o Utrecht University.

De Groeve, T. Ehrlich, D. and Poljansek K. 2013 *Recording Disaster Losses: Recommendations for a European approach.* European Commission Joint Research Centre Institute for the Protection and the Security of the Citizen.
http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/29296/1/lbna26111enn.pdf
(accessed 16 November 2014)

Dufty, Neil. 2014. *A Review of the Value of Social Media in Country-Wide Disaster Risk Reduction Public Awareness Strategies.* Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Parramatta, NSW, Australia: Molino Stewart Pty Ltd.

Fischer, G. 1997. *Evolution of Complex Systems by Supporting Collaborating Communities of Practice*. ICCE Conference 1997. Boulder, Colorado, USA: University of Colorado, Center for Life Long Learning and Design. http://l3d.cs.colorado.edu/~gerhard/papers/AACE-97.pdf
(accessed 8 April 2014).

Fisher, C. 2011. *Knowledge Brokering and Intermediary Concepts. Analysis of an e-Discussion on the Knowledge Brokers Forum*. Brighton, United Kingdom: Impact and Learning Team, Institute of Development Studies.
http://www.preventionweb.net/files/workspace/33381_knowledgebrokeringandintermediaryco.pdf (accessed 28 April 2014)

Fisher, C. 2012. *Evaluating the Impact of Knowledge Brokering Work: Analysis of an e-Discussion on the Knowledge Brokers' Forum*. Brighton, United Kingdom: Impact and Learning Team, Institute of Development Studies. http://r4d.dfid.gov.uk/pdf/outputs/ids/Evaluating_the_impact_of_knowledge_brokering_work_discussion_summary_2012.pdf (accessed 24 April 2014)

Food and Agricultural Organization of the United Nations (FAO), Regional Office Nairobi and Trocaire. 2012. *People First Impact Method. Giving Voice to Disaster Affected Communities in East Africa.* Mwingi District Exercise, Eastern Province, Kenya. Nairobi, Kenya: FAO and Trocaire. http://www.alnap.org/resource/6496 (accessed 28 April 2014)

Fong, Phil (2014). *Personal Correspondence*.

Gaetani, F., F. Amelung, B. de Groot, S. Frye, F. Lindsay, S. Marsh, I. Petiteville, H. P. Plag, G. Seguin. 2014. *GEO Disaster Task DI-01*. Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. GEO Secretariat, University of Miami, NRCan-Canadian Forest Service, NASA, GHCP, ESA.

Gall, M., C. T. Emrich and S. L. Cutter. 2014. *Who needs loss data?* Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Columbia, USA: Hazards & Vulnerability Research Institute, Department of Geography, University of South Carolina.

Gamper, C. D. 2014. *Interconnected and Inter-dependent Risks.* Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Organisation for Economic Co-operation and Development (OECD), Public Governance and Territorial Development Directorate.

Global Facility for Disaster Reduction and Recovery (GFDRR). 2012. *Project Highlights: Preparing Communities through Understanding Risk - Utilizing the Indonesia Scenario Assessment for Emergencies.* Washington, DC, USA: GFDRR. http://www.gfdrr.org/sites/gfdrr.org/files/Pillar_1_Preparing_Communities_through_Understanding_Risk_0.pdf (accessed 28 April 2014)

Gregorowski, R., D. MacDonald, G. Flatters, P. Spaven, D. Pulgar, I. Vogel, and J. Barr. 2012. *Evaluation of PreventionWeb and Related UNISDR Information Services for Disaster Risk Reduction, Final Report*. Commissioned by UNISDR and prepared by ITAD Ltd., United Kingdom. http://www.unisdr.org/who-we-are/evaluations/pweval2012 (accessed 25 April 2014)

Grimshaw, J. M., Eccles, M. P., Navis, J. N., Hill, S. and J. E. Squires. 2012. Knowledge Transition of Research Findings. *Implementation Science 2012*, 7:50. http://www.implementationscience.com/content/pdf/1748-5908-7-50.pdf (accessed 28 April 2014)

Hammill, A., B. Harvey and D. Echeverria. 2013. *Understanding Needs, Meeting Demands: A User-Oriented Analysis of Online Knowledge Brokering Platforms for Climate Change and Development*. Winnipeg, Canada: International Institute for Sustainable Development (IISD).

Holgate, S. A. 2012. Emerging Professions: Knowledge Broker. *Science Careers*. June 8, 2012. http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2012_06_08/caredit.a1200064 (accessed 28 April 2014)

Integrated Research on Disaster Risk (IRDR). 2011a. *Forensic Investigations of Disasters: The FORIN Project* (IRDR FORIN Publication No. 1). China, Beijing: Integrated Research on Disaster Risk. http://www.irdrinternational.org/wp-content/uploads/2012/06/FORIN-REPORT_web.pdf (accessed 24 April 2014)

Integrated Research on Disaster Risk (IRDR). 2011b. *Risk Interpretation and Action: A Conceptual Framework for Research in the Context of Natural Hazards* (IRDR RIA Publication No. 1). China, Beijing: Integrated Research on Disaster Risk. http://www.irdrinternational.org/wp-content/uploads/2013/01/RIA_Project_Report_No.-1_2011_web.pdf (accessed 24 April 2014)

Integrated Research on Disaster Reduction (IRDR). 2014. *Peril Classification and Hazard Glossary*. IRDR DATA Publication No. 1. Beijing, China: Integrated Research on Disaster Risk.

Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR). 2003. *Information Note. On the Work of the Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR). For the Period October 2002 to March 2003.*

International Decade for Natural Disaster Reduction (IDNDR). 1993. *Information Paper 13. IDNDR Strategy and Marketing.* Geneva, Switzerland.

Kameda, H. 2009. *Disaster Reduction Hyperbase (DRH) and DRH Consortium*. http://nexus-idrim.net/idrim09/Kyoto/091012_DRH_Consortium_WS_Kameda1_P.pdf (accessed 8 April 2014)

Lee, Y. J. 2014. *Developing a Platform for DRR Technology Product Dealings.* Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Seoul, Korea: School of Business, Dongguk University.

Mansfield, W. and P. Grunewald. 2013. *The Use of Indicators for the Monitoring and Evaluation of Knowledge Management and Knowledge Brokering in International Development. Report of a Workshop Held at the Institute for Development Studies, 8th March 2013.* Brighton, United Kingdom: Institute for Development Studies. http://www.ids.ac.uk/files/dmfile/Knowledgeindicatorsworkshopreport8thMarch2013.pdf (accessed 24 April 2014)

Menoni, S., J. Weichselgartner, M. Dandoulaki, N. Valkanou, M. J. Jimenez, M. Garcia Fernandez, S. Kienberger, R. Spiekermann, P. Pigeon, F. Briones, J. Norton and R. Nussbaum. 2014. *Enabling Knowledge for Disaster Risk Reduction and its Integration into Climate Change Adaptation.* Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Partners of the Know-4-DRR 7 FP EU funded Project.

Mercer, J. 2010. Disaster Risk Reduction or Climate Change Adaptation: Are We Reinventing the Wheel? *Journal of International Development J. Int. Dev.* 22 (2010): 247–264. http://web.mit.edu/jcarmin/Public/For%20Nina/Mercer-DRR-CC-Reinventing%20the%20Wheel.pdf (accessed 24 April 2014)

Mercy Malaysia. 2013. *Art of Giving - Annual Report 2012.* Kuala Lumpur, Malaysia. http://www.mercy.org.my/upload/MERCY_AR_2012.pdf (accessed 8 April 2014)

MEXT-NIED. *Disaster Reduction Hyperbase - Asian Application. Project Summary, v20: 080830* http://drh.edm.bosai.go.jp/Project/Phase2/1Documents/1_summary20.pdf (accessed 25 April 2014)¨

Meyer, M. 2010. The Rise of the Knowledge Broker. *Science Communication*, March 2010, Vol. 32, No. 1: 118-127. http://hal.archives-ouvertes.fr/docs/00/49/37/94/PDF/Rise_of_Broker.pdf (accessed 24 April 2014)

National Research Institute for Earth Science and Disaster Prevention (NIED) and Japan Science and Technology Agency (JST). *Asian Science and Technology Forum Tsukuba Seminar. International Workshop on Information Platforms for Disaster Reduction. IPDR Workshop*. 2007. Tsukuba, Japan.

National Research Institute for Earth Science and Disaster Prevention (NIED) and Japan Science and Technology Agency (JST). *Asian Science and Technology Forum Tsukuba Seminar. International Workshop on Information Platforms for Disaster Reduction. IPDR Workshop. Tsukuba IPDR Report 2007. Information Platforms for Disaster Reduction.* 2007. Tsukuba, Japan. http://www.jst.go.jp/asts/asts_tsukuba/files/Tsukuba_IPDR_Report.pdf (accessed 24 April 2014)

Office of the United Nations Disaster Relief Coordinator (UNDRO). 1980. *Natural Disasters and Vulnerability Analysis Report of Expert Group Meeting (9-12 July 1979)*. Geneva, Switzerland: UNDRO.

Pandey, B. and B. Lyon. 2013. Open Data for Resilience. *Insights in DRM. A Practitioner's Perspective on Disaster Risk Management in Latin America & the Caribbean*. Issue # 1, September 2013. Washington D.C., USA: World Bank.

PreventionWeb. 2007. *People in DRR. Podcast with Dr. Hiroyuki Kameda.* http://www.preventionweb.net/files/964_kameda_clip.mp3 (accessed 25 April 2014)

Reeep – Renewable Energy & Energy Efficiency Partnership. *Proposal: Reegle Thesaurus. Extension for Disaster Risk Management.* 2014. Unpublished.

Roth, F. and G. Brönnimann. 2013. *Focal Report 8: Risk Analysis. Using the Internet for Public Risk Communication*. 3RG Report. Zürich, Switzerland: Risk and Resilience Research Group, Center for Security Studies (CSS), ETH Zürich.

http://www.css.ethz.ch/publications/pdfs/Focal-Report_-8_Using_the_Internet_for_Public_Risk_Communication.pdf (accessed 24 April 2014)

Shaxon, L. with Bielak A. et al. 2013. *Expanding Our Understanding of K* (KT, KE, KTT, KMb, KB, KM, etc.). A concept paper emerging from the K* conference held in Hamilton, Ontario, Canada, April 2012.* Hamilton, Canada: Overseas Development Institute (ODI), United Nations University – Institute for Water, Environment and Health (UNU-INWEH), World Bank (WB). http://inweh.unu.edu/wp-content/uploads/2013/05/KStar_ConceptPaper_FINAL_Oct29_WEB.pdf (accessed 24 April 2014)

Silva Villanueva, P. 2011. *Learning to Adapt: Monitoring and Evaluation Approaches in Climate Change Adaptation and Disaster Risk Reduction – Challenges, Gaps and Ways Forward*. SCR Discussion Paper 9. http://community.eldis.org/.5a093c0d (accessed 8 April)

Snoad, Nigel. 2013. *Big Data*. Google Crisis Response. Presentation at American Meteorological Society (AMS) Conference 2013. https://ams.confex.com/ams/93Annual/flvgateway.cgi/id/24469?recordingid=24469 (accessed 24 April 2014)

Stal, M. 2014. *Disaster an Crisis Communication: Trend Analysis of Technologies and Approaches.* Based on a review of contributions to the International Disaster and Risk Conferences IDRC Davos 2006, 2008, 2010, and 2012, which are organized by the Global Risk Forum GRF Davos. Input paper prepared for the Global Assessment Report on Disaster Risk Reduction 2015. Davos, Switzerland: Global Risk Forum (GRF) Davos.

Tagliaventi, M. R. and E. Mattarelli. 2006. The Role of Networks of Practice, Value Sharing, and Operational Proximity in Knowledge Flows Between Professional Groups. *Human Relations*. 2006, Vol. 59, No. 3: 291-319. London, Thousand Oaks, New Delhi: Sage Publications. http://hum.sagepub.com/content/59/3/291.full.pdf+html (accessed 8 April 2014)

Thywissen, K. 2005. *Core Terminology of Disaster Reduction*. Bonn, Germany: United Nations University – Institute for Environment and Human Security (UNU-EHS). http://www.eird.org/cd/on-better-terms/docs/UNU-EHS-Core-terminology-of-disaster-reduction.pdf (accessed 8 April 2014)

Thywissen, K. 2006. Components of Risk. A Comparative Glossary. *SOURCE. Studies of the University: Research, Counsel, Education. Publication Series of UNU-EHS*. No. 2/2006. Bonn, Germany: United Nations University - Institute for Environment and Human Security (UNU-EHS).

Turnbull, M., C. L. Sterrett, A. Hilleboe. 2013. *Toward Resilience: A Guide to Disaster Risk Reduction and Climate Change Adaptation.* Catholic Relief Services. Rugby, United Kingdom: Practical Action Publishing Ltd.

United Nations Data Revolution Group (UNDRG). 2014. *A World that Counts*. New York, U.S.A. http://www.undatarevolution.org/report/ (accessed 15 November 2014)

United Nations Department of Humanitarian Affairs (UNDHA). 1992. *Internationally Agreed Glossary of Basic Terms Related to Disaster Management.* Geneva, Switzerland. http://reliefweb.int/sites/reliefweb.int/files/resources/004DFD3E15B69A67C1256C4C006225C2-dha-glossary-1992.pdf (accessed 8 April 2014).

United Nations Development Programme (UNDP). 2008. *Disaster Loss Database Standards: Methodology and Tools.* Geneva, Switzerland: Global Risk Identification Programme (GRIP), Bureau for Crisis Prevention and Recovery (BCPR) and United Nations Development Programme (UNDP).
http://www.gripweb.org/gripweb/sites/default/files/methodologies_tools/Disaster%20database%20standards_black.pdf (accessed 8 April 2014)

United Nations Development Programme, Bureau for Crisis Prevention and Recovery (UNDP/ BCPR). 2013. *A Comparative Review of Country-Level and Regional Disaster Loss and Damage Databases*. New York, USA.
http://www.sasparm.ps/en/Uploads/file/Disaster%20Loss%20and%20Damage%20Database.pdf (accessed 8 April 2014)

United Nations Framework Convention on Climate Change (UNFCCC). 2014. *Report of the Conference of the Parties on its Nineteenth Session, held in Warsaw from 11 to 23 November 2013. Addendum. Part two: Action taken by the Conference of the Parties at Its Nineteenth Session*, FCCC/CP/2013/10/Add.1. Poland, Warsaw.
http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf
(accessed 28 April 2014)

United Nations International Decade for Natural Disaster Reduction (IDNDR). 1993. *Information Paper 13. IDNDR Strategy and Marketing*. Geneva, Switzerland.

United Nations International Decade for Natural Disaster Reduction (IDNDR) / Scientific and Technical Committee (STC). 1991. *A Framework Programme for the Decade*. Annex V – VIII.

United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR). 2004a. *Living with Risk: A Global Review of Disaster Reduction Initiatives*, Vol. II, Annex 1, 1-7. Geneva, Switzerland.
http://www.unisdr.org/files/657_lwr21.pdf (accessed 8 April 2014)

United Nations International Strategy for Disaster Reduction (UNISDR). 2004b. *Terminology – Basic Terms of Disaster Risk Reduction*. Geneva, Switzerland.
http://www.unisdr.org/files/7817_7819isdrterminology11.pdf
(accessed 8 April 2014)

United Nations International Strategy for Disaster Reduction (UNISDR). 2007a. *Hyogo Framework for Action 2005 - 2015. Building the Resilience of Nations and Communities to Disasters.* Extract from the final report of the World Conference on Disaster Reduction (A/CONF.206/6). Geneva, Switzerland.

United Nations International Strategy for Disaster Reduction (UNISDR). 2007b. *PreventionWeb User Research – National Platforms, HFA Focal Points and Practitioners. Mental Model Diagrams.* Geneva, Switzerland. http://www.preventionweb.net/english/documents/about/01_User_Research/PW_Alignment%20Diagrams.pdf (accessed 8 April 2014)

United Nations International Strategy for Disaster Reduction (UNISDR). 2009a. *ISDR Informs, The Americas*. Issue 16, 2009. Panama City, Panama: UNISDR Regional Office for the Americas. http://www.eird.org/eng/revista/no-16-2009/art24.html (accessed 26 April 2014)

United Nations International Strategy for Disaster Reduction (UNISDR). 2009b. *2009 UNISDR Terminology on Disaster Risk Reduction*. Geneva, Switzerland. http://www.preventionweb.net/files/7817_UNISDRTerminologyEnglish.pdf (accessed 8 April 2014)

United Nations International Strategy for Disaster Reduction (UNISDR), Inter-Agency Task Force on Disaster Reduction. 2001. *The Application of Research, Science and Technology to Disaster Prevention*. Third meeting, Geneva, 3 - 4 May 2001. Geneva, Switzerland.

United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat. 2004d. *Strengthening of ISDR Information Management System and Website on Disaster Reduction. Project Report. Period November 2003 – June 2004*. Geneva, Switzerland.

United Nations Office for Disaster Risk Reduction (UNISDR). 2011a. *Disaster Risk Reduction Themes and Issues: A Schema for the Categorization of DRR Knowledge and Action.* Geneva, Switzerland. http://www.unisdr.org/files/23647_themesandissuesindisasterriskreduct.pdf (accessed 8 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR). 2011b. *Proceedings of the Third Session of the Global Platform for Disaster Risk Reduction and World Reconstruction Conference*. Global Platform for Disaster Risk Reduction, Third Session, 8 – 13 May 2011. Geneva, Switzerland. http://www.preventionweb.net/globalplatform/2011/documents/GP2011-Proceedings.pdf (accessed 8 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR). 2012a. *Redesigning the Next PreventionWeb.* Geneva, Switzerland. http://www.preventionweb.net/english/documents/about/PreventionWeb_Redesign_public.pdf (accessed 8 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR). 2012b. *Redesigning the Next 'PreventionWeb': Research and Findings.* Geneva, Switzerland. http://www.preventionweb.net/english/documents/about/PreventionWeb_Redesign_User_Research.pdf (accessed 25 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR). 2013a. *Concept Note. Information and Knowledge Management for Disaster Risk Reduction (IKM4DRR) Workshop at Global Platform 2013 and Development of an IKM4DRR Network.* Geneva, Switzerland.

http://www.preventionweb.net/files/globalplatform/entry_bg_paper~31691ikm4drrconceptnotefinal1.pdf (accessed 8 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR). 2013b. *Information and Knowledge Management for Disaster Risk Reduction (IKM4DRR) Framework and Scorecard*. Geneva, Switzerland.
http://www.unisdr.org/we/inform/publications/35238 (accessed 27 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR), Scientific and Technical Committee. 2011. *Statement on Science and Technology for the Third Session of the Global Platform for Disaster Risk Reduction*. Geneva, Switzerland.
http://www.preventionweb.net/files/29924_globalplatformsciencestatementfinal.pdf
(accessed 24 April 2014)

United Nations Office for Disaster Risk Reduction (UNISDR), Scientific and Technical Committee. 2013. *Using Science for Disaster Risk Reduction.* Report of the UNISDR Scientific and Technical Advisory Group. Geneva, Switzerland.
http://www.preventionweb.net/files/32609_stagreport2013assembled.pdf
(accessed 24 April 2014)

United Nations, Working Group on Climate Change and Disaster Risk Reduction on the Inter-Agency Task Force on Disaster Reduction (IATF/DR). Consultation version 2006. *On Better Terms. A Glance at Key Climate Change and Disaster Risk Reduction Concepts*. Geneva, Switzerland.

Ward, V., A. House and S. Hamer. 2011. Knowledge Brokering: The missing Link in the Evidence to Action Chain? *Evidence & Policy: A Journal of Research, Debate and Practice.* Volume 5, No. 3. August 2009 , pp. 267-279. University of Bristol, United Kingdom: Policy Press.
http://www.ingentaconnect.com/content/tpp/ep/2009/00000005/00000003/art00005
(accessed 24 April 2014)

Wenger, E. 1997. *Communities of Practice: Learning, Meaning and Identity*. Cambridge, United Kingdom: Cambridge University Press.

Wirtz, A., W. Kron, P. Löw and M. Steuer. 2014. The Need for Data: Natural Disasters and the Challenges of Database Management. *Natural Hazards,* Vol. 70, Issue 1: 135–157.

Yates, R. 2013. When Words Save Lives; "Storm Tsunami" vs. "Storm Surge". London, United Kingdom: Plan International.
http://plan-international.org/about-plan/resources/news/when-words-save-lives-storm-tsunami-v-storm-surge/ (accessed 28 April 2014)

List of Web Links:

ANDROID – Disaster Resilience Network
http://www.disaster-resilience.net/ (accessed 8 April 2014)

Cabinet Information and Decision Support Center, Crisis Management and DRR Sector (IDSC), Egypt
www.crisismanagement.idsc.gov.eg (in Arabic) (accessed 8 April 2014)

CAPRA
http://www.ecapra.org/ (accessed 25 April 2015)

Climate Adapt – European Climate Adaptation Platform
http://climate-adapt.eea.europa.eu/glossary (accessed 8 April 2014)

Climate Adapt – European Climate Adaptation Platform. *Uncertainty*.
http://climate-adapt.eea.europa.eu/glossary#linkUncertainty
(accessed 8 April 2014)

Climate and Development Knowledge Network (CDKN). *Knowledge Navigator*.
http://cdkn.org/tools-2/ (accessed 8 April 2014)

CKB - Climate Knowledge Brokers Group
http://en.openei.org/wiki/Knowledge_Brokers_Workshop
(accessed 24 April 2014)

COHORT – Coordination of Humanitarian Organizations in Relief Using Technology
http://cohort.ist.psu.edu/ (accessed 8 April 2014)

Collaboration for Development (C4D) – World Bank
https://collaboration.worldbank.org/groups/caribbean-opendata-management

CRID – Regional Disaster Information Center. Latin America and the Caribbean
http://www.cridlac.org/ing_que_es_el_crid.shtml#sthash.pTX6LtvB.dpuf
(accessed 8 April 2014)

Crisis Mappers – The Humanitarian Technology Network
http://crisismappers.net/ (accessed 8 April 2014)

Department of Disaster Management, British Virgin Islands
http://bviddm.com/ (accessed 8 April 2014)

DesInventar
http://www.desinventar.net/ (accessed 25 April 2014)

Disaster Reduction Hyperbase Project (1)
http://drh.edm.bosai.go.jp/ (accessed 8 April 2014)

Disaster Reduction Hyperbase. *EqTAP description* (2).
http://drh.edm.bosai.go.jp/Project/EqTAP.htm (accessed 25 April 2014)

Disaster Risk Reduction Net

http://www.disasterriskreduction.net (accessed 25 April 2014)

DRRIM – Information Management for Disaster Risk Reduction. Listserv.
http://groups.preventionweb.net/scripts/wa-PREVENTIONWEB.exe?A0=DRRIM-L
(accessed 8 April 2014)

DRR Project Portal – Asia Pacific's Tool for Effective DRR Planning
www.drrprojects.net (accessed 8 April 2014)

GfT – GAR for Tangible Earth
http://www.preventionweb.net/english/hyogo/gar/2013/en/home/gft.html
(accessed 28 April 2014)

GP – Global Platform for Disaster Risk Reduction
http://www.preventionweb.net/english/hyogo/GP/ (accessed 30 November 2014)

GSNL – Geohazard Supersites and Natural Laboratories
http://www.earthobservations.org/gsnl.php (accessed 28 April 2014)

GEOSS Portal
www.geoportal.org (accessed 28 April 2014)

GLIDEnumber
www.glidenumber.net (accessed 8 April 2014)

GFDRR. *Preparing Nations to Be One Step Ahead (InaSAFE).*
https://www.gfdrr.org/node/1416 (accessed 28 April 2014)

GRIPWeb
http://www.gripweb.org/ (accessed 25 April 2014)

GRIPWeb. *Services We Offer, Services to the Countries.*
http://www.gripweb.org/gripweb/?q=services (accessed 25 April 2014)

HFA Monitor
http://www.preventionweb.net/english/hyogo/hfa-monitoring/national/
(accessed 28 April 2014)

HFA Query Builder
http://www.preventionweb.net/applications/hfa/qbnhfa/ (accessed 28 April 2014)

IDRC - International Disaster and Risk Conference
http://idrc.info/home/ (accessed 30 November 2014)

IFAD
http://www.ifad.org/events/sharefair/ (accessed 28 April 2014)

InaSAFE
http://inasafe.org/en/ (accessed 25 April 2014)

International Society for Integrated Disaster Risk Management (IDRiM)
http://idrim.org/ (accessed 8 April 2014)

Integrated Research on Disaster Risk (IRDR). *Forensic Investigation of Disasters (FORIN).*
http://www.irdrinternational.org/projects/forin/ (accessed 24 April 2014)

KM4DEV
http://www.km4dev.org/ (accessed 27 April 2014)

Knowledge for Climate
http://www.knowledgeforclimate.nl/ (accessed 8 April 2014)

National Emergency Management Agency (NEMA), Nigeria
https://www.facebook.com/nemanigeria sept 2010 (accessed on 28 April 2014)

Open Government Declaration
http://www.opengovpartnership.org/about/open-government-declaration
(accessed 8 April 2014)

Pacific Disaster Net (PDN).
http://www.pacificdisaster.net (accessed 8 April 2014)

Pacific Risk Assessment Financing Initiative (PCRAFI)
http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTFINANCIALSECTOR/EXTDISASTER/0,,contentMDK:23093927~menuPK:8707838~pagePK:64168445~piPK:64168309~theSitePK:8308421,00.html (accessed 28 April)

Periperi U
http://www.riskreductionafrica.org/ (accessed 25 April 2014)

PreventionWeb (1). *About PreventionWeb*.
http://www.preventionweb.net/english/about/ (accessed 25 April 2014)

PreventionWeb (2). *Countries & Regions.*
http://www.preventionweb.net/english/countries/ (accessed 24 April 2014)

PreventionWeb (3). *Networks & Communities.*
http://www.preventionweb.net/english/professional/networks/
(accessed 24 April 2014)

PREVIEW
http://preview.grid.unep.ch/ (accessed 25 April 2015)

Reegle. *Glossary*.
http://www.reegle.info/glossary (accessed 8 April 2014)

Risk Data Viewer
http://risk.preventionweb.net/ (accessed 28 April 2014)

South Asian Disaster Knowledge Network (SADKN)
http://www.saarc-sadkn.org (accessed 27 April 2014)

UNICEF. *Industrialized Countries*.
http://www.unicef.org/infobycountry/industrialized.html (accessed 8 April 2014)

United Nations. *Standard Country or Area Codes for Statistical Use*.
http://unstats.un.org/unsd/methods/m49/m49.htm (accessed 8 April 2014)

WCDR – World Conference on Disaster Reduction – Kobe 2005
http://www.unisdr.org/2005/wcdr/wcdr-index.htm (accessed 8 April 2014)

WCDRR – World Conference on Disaster Risk Reduction – Kobe 2015
http://www.wcdrr.org (accessed 8 April 2014)

We ADAPT – Adaptation Planning, Research and Practice.
http://weadapt.org/ (accessed 8 April 2014)

ANNEX 1

National HFA progress data used in this study

List of countries reporting per cycle and their score for Core Indicator 3.1

Relevant information on disasters is available and accessible at all levels, to all stakeholders (through networks, development of information sharing systems etc.)

Region	Country	2007 - 2009	2009 -2011	2011 - 2013
Africa	Algeria	3	3	3
	Angola	3		
	Botswana		3	
	Burkina Faso	3		3
	Burundi	2	2	
	Cabo Verde		4	
	Comoros		2	2
	Cote d'Ivoire	1	1	3
	Djibouti			3
	Egypt	3		3
	Ethiopia			3
	Ghana	4	4	4
	Guinea Bissau		1	
	Kenya	4	5	3
	Lesotho		2	1
	Madagascar	4	4	

	Malawi	3	2	4
	Mauritania			3
	Mauritius	4	4	4
	Morocco		4	3
	Mozambique	2	3	4
	Niger			3
	Nigeria		3	
	Rwanda			3
	Senegal	2	4	4
	Sierra Leone	4	4	
	Sudan			4
	Swaziland	2		
	Tanzania	3	3	4
	Togo	1		4
	Tunisia			2
	Uganda			2
	Zambia	4	4	
	Total Africa	18	20	23
Americas	Anguilla	5	4	4
	Antigua and Barbuda		4	
	Argentina	3	3	3
	Barbados		2	3
	Bolivia	3	3	3
	Brazil		5	4
	British Virgin Islands	4	4	4

Canada		4	4
Cayman Islands	4	4	
Chile		3	4
Colombia	3	3	4
Costa Rica	4	4	4
Cuba		4	4
Dominican Republic	2	2	3
Ecuador	2	4	4
El Salvador	3	3	
Grenada			4
Guatemala		3	4
Haiti			2
Honduras		3	3
Jamaica	4	4	4
Mexico		4	4
Nicaragua		3	
Panama	2	3	3
Paraguay		4	
Peru	3	4	4
Saint Kitts and Nevis		4	4
Saint Lucia	3	3	
Trinidad and Tobago			3
Turks and Caicos		3	4
United States	4	3	3
Uruguay			4

	Venezuela	3	3	
	Total Americas	16	29	26
Asia	Afghanistan			2
	Bahrain	2		3
	Bangladesh	3	3	4
	Bhutan			3
	Brunei Darussalam		2	
	Cambodia	2		
	China			4
	Georgia		3	3
	India	4	4	4
	Indonesia	4	4	4
	Iran	5		3
	Japan	5	5	5
	Jordan			1
	Kazakhstan	3		3
	Korea, Republic of	4		5
	Kyrgyzstan	3		
	Lao People's Democratic Republic	3	3	
	Lebanon		3	3
	Malaysia		4	4
	Maldives	2	3	3
	Mongolia		2	
	Myanmar			3

	Nepal	2	2	
	Pakistan	3	3	3
	Palestine, State of			3
	Philippines	3		
	Singapore	5		
	Sri Lanka	3	3	4
	Syrian Arab Republic	2	3	
	Tajikistan	3		
	Thailand		4	
	Uzbekistan	4		
	Vietnam	4		
	Yemen	1	2	2
	Total Asia	22	17	21
Europe	Armenia	3	3	2
	Belarus			4
	Bulgaria	4	4	4
	Croatia	3		4
	Czech Republic	4	4	4
	Finland		3	4
	France	4		4
	Germany	4	4	4
	Greece			4
	Hungary			5
	Italy	4	4	4

	Macedonia, The Former Yugoslav Republic of	4	4	4
	Monaco			4
	Montenegro	3		
	Netherlands			2
	Norway	4	4	4
	Poland		3	3
	Portugal			3
	Romania		4	4
	Serbia	2		3
	Slovenia	5		5
	Sweden	4	3	4
	Switzerland	4	4	4
	Turkey	4		4
	United Kingdom	4		4
	Total Europe	16	12	24
Oceania	Australia	4	4	4
	Cook Islands		3	3
	Fiji		3	3
	Kiribati			2
	Marshall Islands	1	2	2
	Micronesia			3
	Nauru			2
	New Zealand	4	4	4

Niue			3
Palau			3
Papua New Guinea			3
Samoa		2	3
Solomon Islands		3	2
Tonga			2
Tuvalu			3
Vanuatu	3	3	3
Total Oceania	4	8	16

TOTAL ALL COUNTRIES	76	88	110

Level of progress:

1 - Minor progress with few signs of forward action in plans or policy
2 - Some progress, but without systematic policy and/ or institutional commitment
3 - Institutional commitment attained, but achievements are neither comprehensive nor substantial
4 - Substantial achievement attained but with recognized limitations in key aspects, such as financial resources and/ or operational capacities
5 - Comprehensive achievement with sustained commitment and capacities at all levels

Sources: Compilation of National Progress Reports on the Implementation of the HFA (2007 - 2009) and (2009 - 2011); HFA Monitor (2011 - 2013)

List of countries and their answers to Key Question 3.1
Is there a national disaster information system publicly available?

HFA progress reporting cycle 2009 - 2011

Summary - Key Question for Priority 3
(Education, information and public awareness)

	KQ 3.1 Is there a national disaster information system publicly available?
Countries that answered Yes	58
Countries that answered No	47
Total countries	105

KQ 3.1 Is there a national disaster information system publicly available?

Region	Country	Answer
Africa	Algeria	Yes
	Botswana	No
	Burkina Faso	No
	Burundi	No
	Cabo Verde	Yes
	Comoros	No
	Cote d'Ivoire	No
	Egypt	Yes
	Ghana	Yes

	Guinea-Bissau	No
	Kenya	Yes
	Lesotho	No
	Madagascar	Yes
	Mali	Yes
	Mauritius	No
	Morocco	Yes
	Mozambique	Yes
	Namibia	Yes
	Nigeria	Yes
	Senegal	Yes
	Seychelles	No
	Sierra Leone	Yes
	Tanzania, United Republic of	No
	Togo	No
	Zambia	No
Asia	Bahrain	Yes
	Bangladesh	Yes
	Bhutan	No
	Brunei Darussalam	No
	Georgia	Yes
	India	Yes
	Indonesia	Yes
	Japan	Yes
	Kazakhstan	Yes

	Kyrgyzstan	Yes
	Lebanon	No
	Malaysia	No
	Maldives	Yes
	Mongolia	No
	Myanmar	No
	Nepal	No
	Pakistan	No
	Palestine, State of	Yes
	Philippines	Yes
	Sri Lanka	Yes
	Syrian Arab Republic	Yes
	Tajikistan	Yes
	Thailand	No
	Timor-Leste	No
	Viet Nam	Yes
	Yemen	No
Oceania	Australia	Yes
	Fiji	No
	Marshall Islands	No
	New Zealand	Yes
	Samoa	No
	Solomon Islands	No
	Vanuatu	Yes
Americas	Anguilla	No

Antigua and Barbuda	Yes
Argentina	No
Barbados	No
Bolivia	Yes
Brazil	No
British Virgin Islands	Yes
Canada	Yes
Cayman Islands	Yes
Chile	Yes
Colombia	Yes
Costa Rica	Yes
Cuba	Yes
Dominican Republic	No
Ecuador	Yes
El Salvador	No
Guatemala	Yes
Honduras	Yes
Jamaica	Yes
Mexico	Yes
Nicaragua	Yes
Panama	No
Paraguay	No
Peru	Yes
Saint Kitts and Nevis	Yes
Saint Lucia	No

	Turks and Caicos	No
	United States of America	Yes
	Uruguay	No
Europe	Armenia	Yes
	Bulgaria	No
	Croatia	Yes
	Czech Republic	No
	Finland	No
	France	Yes
	Germany	Yes
	Italy	No
	Moldova	No
	Monaco	Yes
	Norway	No
	Poland	No
	Portugal	Yes
	Romania	No
	Sweden	Yes
	Switzerland	No
	The former Yugoslav Republic of Macedonia	Yes
	Turkey	Yes

Summary Means of Verification for Priority 3
(Education, information and public awareness)

	MoV 3.1.1 Information is proactively disseminated	MoV 3.1.2 Established mechanisms for access / dissemination (internet, public information broadcasts - radio, TV)	MoV 3.1.3 Information is provided with proactive guidance to manage disaster risk
Means of Verification: *Yes	57	46	3
Means of Verification: *No	48	59	102
Total countries	105	105	105

Breakdown by country

Region	Country	MoV 3.1.1 Information is proactively disseminated	MoV 3.1.2 Established mechanisms for access / dissemination (internet, public information broadcasts - radio, TV)	MoV 3.1.3 Information is provided with proactive guidance to manage disaster risk
Africa	Algeria	Yes	No	No
	Botswana	No	No	No
	Burkina Faso	No	No	No
	Burundi	No	No	No

	Cabo Verde	Yes	Yes	No
	Comoros	No	No	No
	Cote d'Ivoire	No	No	No
	Egypt	Yes	Yes	No
	Ghana	Yes	Yes	No
	Guinea-Bissau	No	No	No
	Kenya	No	Yes	No
	Lesotho	No	No	No
	Madagascar	Yes	Yes	No
	Mali	Yes	Yes	No
	Mauritius	No	No	No
	Morocco	No	No	No
	Mozambique	Yes	Yes	No
	Namibia	Yes	Yes	No
	Nigeria	Yes	No	No
	Senegal	Yes	Yes	No
	Seychelles	Yes	Yes	No
	Sierra Leone	No	Yes	No
	Tanzania, United Republic of	No	No	No
	Togo	No	No	No
	Zambia	No	No	No
Asia	Bahrain	No	Yes	No
	Bangladesh	Yes	Yes	No

Bhutan	No	No	No
Brunei Darussalam	No	No	No
Georgia	No	Yes	No
India	Yes	Yes	No
Indonesia	Yes	No	No
Japan	Yes	Yes	No
Kazakhstan	Yes	No	No
Kyrgyzstan	Yes	Yes	No
Lebanon	No	Yes	No
Malaysia	No	No	No
Maldives	Yes	No	No
Mongolia	Yes	No	No
Myanmar	No	No	No
Nepal	No	No	No
Pakistan	Yes	No	No
Palestine, State of	Yes	No	No
Philippines	Yes	No	No
Sri Lanka	Yes	Yes	No
Syrian Arab Republic	No	Yes	No
Tajikistan	Yes	Yes	No
Thailand	No	No	No
Timor-Leste	No	No	No
Viet Nam	Yes	No	No

	Yemen	No	No	No
Oceania	Australia	Yes	Yes	No
	Fiji	Yes	No	No
	Marshall Islands	No	No	No
	New Zealand	Yes	Yes	No
	Samoa	No	No	No
	Solomon Islands	No	No	No
	Vanuatu	Yes	Yes	No
Americas	Anguilla	No	Yes	No
	Antigua and Barbuda	Yes	No	No
	Argentina	No	No	No
	Barbados	No	No	No
	Bolivia	Yes	No	No
	Brazil	No	No	No
	British Virgin Islands	Yes	No	No
	Canada	Yes	No	No
	Cayman Islands	Yes	Yes	Yes
	Chile	Yes	No	No
	Colombia	Yes	Yes	No
	Costa Rica	Yes	Yes	Yes
	Cuba	No	Yes	No
	Dominican Republic	No	No	No
	Ecuador	Yes	Yes	No

	El Salvador	No	No	No
	Guatemala	Yes	Yes	No
	Honduras	No	Yes	No
	Jamaica	Yes	Yes	No
	Mexico	Yes	Yes	No
	Nicaragua	Yes	Yes	No
	Panama	Yes	Yes	No
	Paraguay	No	No	No
	Peru	Yes	Yes	No
	Saint Kitts and Nevis	No	No	No
	Saint Lucia	Yes	No	No
	Turks and Caicos	No	No	No
	United States of America	Yes	Yes	No
	Uruguay	Yes	Yes	No
Europe	Armenia	Yes	Yes	No
	Bulgaria	No	No	No
	Croatia	Yes	Yes	No
	Czech Republic	Yes	Yes	No
	Finland	No	No	No
	France	Yes	Yes	No
	Germany	Yes	Yes	Yes
	Italy	No	Yes	No
	Moldova	No	No	No

	Monaco	Yes	No	No
	Norway	No	No	No
	Poland	No	No	No
	Portugal	Yes	No	No
	Romania	No	No	No
	Sweden	Yes	Yes	No
	Switzerland	No	No	No
	The former Yugoslav Republic of Macedonia	Yes	No	No
	Turkey	Yes	No	No

HFA progress reporting cycle 2011 - 2013

Summary - Key Question for Priority 3
(Education, information and public awareness)

	KQ 3.1 Is there a national disaster information system publicly available?
Countries that answered Yes	70
Countries that answered No	31
Total countries	101

KQ 3.1 Is there a national disaster information system publicly available?

Region	Country	Answer
Africa	Algeria	Yes
	Burkina Faso	No
	Cote d'Ivoire	No
	Djibouti	No
	Egypt	Yes
	Ethiopia	No
	Ghana	Yes
	Kenya	Yes
	Malawi	No
	Mauritania	No
	Mauritius	No
	Morocco	Yes
	Mozambique	Yes
	Niger	Yes
	Rwanda	Yes
	Sudan	No
	Tanzania, United Republic of	Yes
	Tunisia	No
Asia	Afghanistan	No
	Bahrain	Yes
	Bangladesh	Yes
	Bhutan	Yes

	China	Yes
	Georgia	Yes
	India	Yes
	Indonesia	Yes
	Iran, Islamic Republic of	Yes
	Japan	Yes
	Jordan	Yes
	Kazakhstan	Yes
	Korea, Republic of	Yes
	Lebanon	Yes
	Malaysia	Yes
	Maldives	No
	Pakistan	Yes
	Palestine, State of	Yes
	Sri Lanka	Yes
	Yemen	Yes
Oceania	Australia	Yes
	Cook Islands	No
	Fiji	Yes
	Marshall Islands	No
	Micronesia, Federal States of	No
	Nauru	No
	New Zealand	Yes
	Niue	No
	Palau	No

	Papua New Guinea	No
	Samoa	No
	Tonga	No
	Vanuatu	Yes
Americas	Anguilla	No
	Argentina	Yes
	Barbados	No
	Bolivia	Yes
	Brazil	Yes
	British Virgin Islands	Yes
	Canada	Yes
	Chile	Yes
	Colombia	Yes
	Costa Rica	Yes
	Cuba	Yes
	Dominican Republic	No
	Ecuador	Yes
	Grenada	Yes
	Guatemala	Yes
	Haiti	Yes
	Honduras	Yes
	Jamaica	Yes
	Mexico	Yes
	Panama	No
	Peru	Yes

	Saint Kitts and Nevis	Yes
	Trinidad and Tobago	No
	Turks and Caicos	No
	United States of America	Yes
	Uruguay	Yes
Europe	Armenia	Yes
	Belarus	Yes
	Bulgaria	No
	Croatia	Yes
	Czech Republic	Yes
	Finland	Yes
	France	Yes
	Germany	Yes
	Greece	Yes
	Hungary	Yes
	Italy	No
	Monaco	Yes
	Netherlands, The	No
	Norway	Yes
	Poland	Yes
	Portugal	Yes
	Romania	No
	Serbia	No
	Slovenia	Yes
	Sweden	Yes

	Switzerland	Yes
	The former Yugoslav Republic of Macedonia	Yes
	Turkey	Yes
	United Kingdom	Yes

Summary Means of Verification for Priority 3
(Education, information and public awareness)

	MoV 3.1.1 Information is proactively disseminated	MoV 3.1.2 Established mechanisms for access / dissemination (internet, public information broadcasts - radio, TV)	MoV 3.1.3 Information is provided with proactive guidance to manage disaster risk
Means of Verification: *Yes	62	77	61
Means of Verification: *No	39	24	40
Total countries	101	101	101

Breakdown by country

Region	Country	MoV 3.1.1 Information is proactively disseminated	MoV 3.1.2 Established mechanisms for access / dissemination (internet, public information broadcasts - radio, TV)	MoV 3.1.3 Information is provided with proactive guidance to manage disaster risk
Africa	Algeria	No	Yes	No
	Burkina Faso	No	No	No
	Cote d'Ivoire	No	No	No
	Djibouti	No	Yes	Yes
	Egypt	Yes	Yes	Yes
	Ghana	Yes	Yes	Yes
	Kenya	No	Yes	No
	Malawi	Yes	Yes	Yes
	Mauritania	No	No	No
	Mauritius	No	No	No
	Morocco	No	Yes	No
	Mozambique	Yes	Yes	Yes
	Niger	Yes	Yes	Yes
	Rwanda	No	Yes	No
	Sudan	No	No	No
	Tanzania, United Republic of	Yes	Yes	No
	Tunisia	No	No	No
Asia	Afghanistan	No	Yes	No

	Bahrain	No	No	Yes
	Bangladesh	Yes	Yes	Yes
	Bhutan	Yes	Yes	Yes
	China	Yes	Yes	Yes
	Georgia	Yes	Yes	Yes
	India	Yes	Yes	Yes
	Indonesia	Yes	Yes	Yes
	Iran, Islamic Republic of	Yes	Yes	No
	Japan	Yes	Yes	Yes
	Jordan	No	Yes	No
	Kazakhstan	Yes	Yes	No
	Korea, Republic of	Yes	Yes	Yes
	Lebanon	Yes	Yes	Yes
	Malaysia	Yes	Yes	Yes
	Maldives	No	Yes	No
	Pakistan	Yes	Yes	Yes
	Palestine, State of	Yes	Yes	Yes
	Sri Lanka	Yes	Yes	Yes
	Yemen	No	No	No
Oceania	Australia	Yes	Yes	Yes
	Cook Islands	No	Yes	No
	Fiji	Yes	No	Yes
	Marshall Islands	Yes	Yes	Yes

	Micronesia, Federal States of	No	Yes	No
	Nauru	Yes	No	Yes
	New Zealand	Yes	Yes	Yes
	Niue	Yes	Yes	Yes
	Palau	No	Yes	No
	Papua New Guinea	No	Yes	Yes
	Samoa	Yes	Yes	Yes
	Tonga	Yes	Yes	Yes
	Vanuatu	No	Yes	Yes
Americas	Anguilla	Yes	No	Yes
	Argentina	No	No	Yes
	Barbados	Yes	Yes	Yes
	Bolivia	Yes	No	No
	Brazil	Yes	Yes	Yes
	British Virgin Islands	Yes	Yes	Yes
	Canada	No	Yes	Yes
	Chile	No	No	No
	Colombia	Yes	Yes	No
	Costa Rica	No	Yes	Yes
	Cuba	Yes	Yes	Yes
	Dominican Republic	No	Yes	No
	Ecuador	Yes	Yes	Yes

	Grenada	Yes	Yes	Yes
	Haiti	No	Yes	No
	Guatemala	No	Yes	No
	Honduras	No	Yes	No
	Jamaica	Yes	Yes	Yes
	Mexico	Yes	Yes	Yes
	Panama	No	No	Yes
	Peru	Yes	Yes	Yes
	Saint Kitts and Nevis	No	No	No
	Trinidad and Tobago	Yes	Yes	Yes
	Turks and Caicos	Yes	Yes	No
	United States of America	Yes	Yes	Yes
	Uruguay	Yes	Yes	Yes
Europe	Armenia	No	Yes	No
	Belarus	Yes	Yes	Yes
	Bulgaria	No	No	No
	Croatia	Yes	No	Yes
	Czech Republic	Yes	Yes	Yes
	Finland	Yes	Yes	Yes
	France	Yes	Yes	Yes
	Germany	No	No	No
	Greece	Yes	Yes	Yes
	Hungary	Yes	Yes	Yes

	Italy	Yes	Yes	Yes
	Monaco	Yes	No	No
	Netherlands, The	No	No	No
	Norway	No	No	No
	Poland	Yes	Yes	No
	Portugal	No	No	No
	Romania	Yes	Yes	Yes
	Serbia	No	No	Yes
	Slovenia	Yes	Yes	Yes
	Sweden	Yes	Yes	Yes
	Switzerland	Yes	Yes	Yes
	The former Yugoslav Republic of Macedonia	Yes	Yes	No
	Turkey	No	Yes	No
	United Kingdom	Yes	Yes	Yes

Source: HFA Query Builder – accessed in April 2014

END