

1. Introduction

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The present volume, Disaster Reduction Technology List on Implementation Strategies, was prepared as a contribution from Japan to a Thematic Session in the United Nations World Conference on Disaster Reduction, Kobe-Hyogo, January 18-22, 2005. This chapter will describe the outline of the Thematic Session, and the purpose and the guidelines for development of the List.

1.1 The Thematic Session on Implementation Strategies in the UN World Conference on Disaster Reduction

Natural disasters are constant threats for both developing and developed countries. It is well accepted that while we cannot reduce the natural hazards, appropriate interventions can reduce risk and vulnerability of natural disasters. In both developed and developing countries, tremendous efforts on the research and development (R&D) have been exercised. However, recent experiences, including that of the Great Hanshin Awaji (Kobe) Earthquake Disaster of 1995, demonstrated that only research development for disaster reduction is not effective, as long as these are not implemented and used in practice. Thus, there is an urgent need to focus on how R&D on disaster reduction should be conducted so that their results will be effectively brought into practice. For this, certain strategies and involvement are essential, which are termed as "Implementation Strategies" and "Stakeholder Involvement".

The reality tells that even developed countries that have accomplished high standard of disaster reduction technologies also suffer from severe disasters. Based on the past experiences in both developed and developing countries, following important and relevant lessons should be learned:

- 1) A huge gap between the high technological caliber and level of social safety should be recognized.
- 2) An effective mechanism is needed for application of research outputs to practice.
- 3) The research & development programs should incorporate "implementation strategies" within themselves. Innovation of researchers and research communities is needed.
- 4) Science policy should be enhanced from the viewpoint of implementation strategies.
- 5) The above issue is a common agenda for both developed and developing countries. Therefore, it should be a key factor in the international collaboration.

With these notions of the problem, A Thematic Session entitled "Implementation Strategies for Application of Research and Development on Disaster Reduction" (Thematic Session 3.6) was planned as part of Thematic Cluster 3 "Knowledge, innovation and education to build a culture of safety and resilience" in the United Nations World Conference on Disaster Reduction. The Session has been organized by the Ministry of Education, Sports, Culture, Science and Technology (MEXT),

Government of Japan in cooperation with National Research Institute for Earth Science and Disaster Prevention, Japan (NIED), World Seismic Safety Initiative (WSSI), International Institute for Applied Systems Analysis (IIASA), United Nations Education, Science and Culture Organization (UNESCO), and The Regional Disaster Information Centre, Latin America and the Caribbean (CRID).

The Session will focus on how effectively to bring results of R&D on disaster reduction into practice. It will be emphasized that "Implementation Strategy" and "Stakeholder Involvement" should be incorporated in R&D planning and activities. Discussion will be conducted on how to realize these concepts in R&D, innovate research communities, and enhance relevant science policies. Development of an implementation oriented disaster reduction technology list is also proposed as a practical action. On this basis, strategic orientations will be clarified and action plans be proposed for effective international collaboration in disaster reduction R&D.

The outcome of the session will be

- 1) Guidelines for implementation oriented R&D policy and planning;
- 2) Catalogue of knowledge and technologies for disaster reduction (with "Disaster Reduction Technology List on Implementation Strategies" as a first step volume compiled by Japanese WG and a proposal for development of a World List)
- 3) Proposal for development of a strategic roadmap by combining contributions from member countries, and
- 4) Proposal for inter-governmental policy meetings

The agenda and the program of the session will be:

- 1) Briefing by Chair: Tsuneo Katayama (NIED)
- 2) Message to the Session: Walter Erdelen (UNESCO)
- 3) Best Practice Presentations:
 - * Highlight pertinent activities by researchers
 - * Identify common recognition and specific challenges.
 - * Develop a roadmap on proposed actions and international collaboration.+ Speakers: i) Hiroyuki Kameda (NIED), ii) Haresh Shah (WSSI), and iii) Joanne Bayer (IIASA)
- 4) Disaster Reduction Technology List on Implementation Strategies
 - * Proposal for compilation of R&D outputs incorporating implementation strategies.
 - * Japanese list will be presented as a typical contribution (MEXT Working Group).
 - * Discussion for developing a World List.+ Speakers: 1) Takayuki Nakamura(MEXT), and 2) Hiroshi Arai (EDM-NIED)
- 5) Panel Discussion:
 - * Comments by the stakeholders
 - * Proposal and elaboration of the outcomes of the Session+ Moderator: Hiroyuki Kameda (NIED)
+ Rapporteur: Rajib Shaw (Kyoto University)
+ Panelists: i) Wang Zhenyao (Ministry of Civil Affairs, Government of China),
ii) Lourdes C. Fernando (Mayor of Marikina City, Philippines), and
iii) Dave Zervaas (CRID)

1.2 Purpose of the Disaster Reduction Technology List on Implementation Strategies

In the course of discussion toward effective planning of the Thematic Session 3.6, an agenda was raised by the officials at the Cabinet Office of Japan, in charge of overall coordination of WCDR for the Japan side, regarding possibility of preparing a catalog type document that offers information on available technologies that are capable of making international contributions to disaster reduction, particularly in developing countries. Based upon this initiating proposal, the MEXT group decided to develop a "Disaster Reduction Technology List on Implementation Strategies" (hereafter referred to as Technology List) that may work as a specific contribution from Japan to the Thematic Session 3.6.

As the period of time permitted for preparation was limited to six months, it was decided to make it a list of technologies developed under the leadership of Japanese researchers. While the resources are limited to Japan-based activities, it is hoped that it will be a good start of discussing the development of a more comprehensive and enhanced international list. With this notion, the design of the Technology List was intended so that it may be readily extended to a "World List."

The Technology List shall not be a simple catalogue of technologies that researchers want to advertise. Its primary target must be to compile technologies that were developed in international frameworks that are useful for practical applications in the multilateral environments, namely those developed under implementation strategies..

The Working Group for Development of Disaster Reduction Technology List (Chair: H. Kameda) was organized under the auspices of the Office for Disaster Reduction Research, MEXT (Director: T. Nakamura). The Working Group conducted necessary works for the development. To obtain substantial resources for the Technology List, information was solicited from approximately 250 Japanese research institutions and associations who are engaged in disaster reduction technology development.

The Working Group discussion decided that the Technology List shall primarily be a collection of technologies that have been developed under international efforts with clear notions of implementation strategies and stakeholder involvement. In addition, it was also decided that information should be collected on disaster reduction technologies that have been indigenous to Japanese disaster situations but can be effectively transferred for disaster reduction in developing countries.

It has been recognized through the Working Group discussion that in many countries, both developing and developed, there are big gaps between the high demands for investment on disaster reduction vs. relatively low policy priority actually practiced. A major reason for these gaps is attributed to high cost of the technologies developed for disaster reduction. Regardless they may use high-technologies or local-technologies, it is essential to realize low-cost technologies. At the same time, it is critically important that the research and development for the low-cost technologies should be conducted with high quality of research methodologies so that the products from the development

have high reliability. These observations were also a basis of the procedure for the development of the Technology List.

1.3 Guidelines for the Development

A clear definition was stated on research & development conducted under implementation strategies in the questionnaire letter to the research institutions soliciting information resources for development of the Technology List.

Implementation Strategies for R&D herein are defined as:

- (1) Researchers' originality remains essential element.
- (2) Problem identification and methodology development should involve direct communication with stakeholders and end-users.
- (3) It is essential that stakeholders will have recognition and ownership toward the research outputs that they have participated in the process of developments.
- (4) Regional characteristic should be properly incorporated, so that the technologies suit the local context in terms of available materials, cost and workmanship.
- (5) Proper quality control of R&D should be maintained, so that most advanced research methodologies and processes are mobilized to generate high-quality products, and meet the actual demands of the region.
- (6) Implementation strategies should be discussed substantially in the planning stage of R&D projects.

All information sets offered by the research institutions were carefully reviewed by the Working Group, and those that meet all of these requirements were adopted as "Technologies Developed under Implementation Strategies (Category A)" in the Technology List. (There is a subdivision into Categories A1 and A2: see next chapter).

In addition, a group of technologies that were developed purely for Japanese situations but have international feasibility was also collected. The criteria for their usefulness were specified as:

- (1) Technologies and/or management systems whose application and maintenance are simple and low-cost.
- (2) Traditional technologies and/or management systems that are based on site characteristics in terms of workmanship, materials as well as their natural environments, and can be maintained by using regional resources (natural, human and economic resources).
- (3) Software resources such as disaster response volunteer activity manuals that were developed through direct communication between experts and local community citizens.

Those information sets that meet any of these three criteria were adopted as "Transferable Technologies (Category B)".

There were a total of 86 proposals. The Working Group conducted a careful screening on them from the view points of the above mentioned criteria. The Technology List thus compiled consists of 42 information sets of individual technologies.

1.4 Significance of the Technology List

The Technology List compiled herein provides systematic sets of disaster reduction technologies presented in a unified and consistent format. Many of them have been developed with a keen recognition of implementation strategies particularly on the basis of stakeholder involvements. Remaining items are also products of research and developments where their effective applications are sought in their planning stage.

For example, there are technologies on the enhancement of masonry building design and those for low-cost seismic strengthening of adobe buildings. The Technology List does not contain expensive technologies like dynamic structural control devices. Yet the outputs for low-cost buildings contained herein have been produced as results of highly qualified research processes based on advanced research methodologies, including well controlled cyclic and pseudo-dynamic testing, development of reliable mechanical models, and thorough review of design and construction procedures. These features of the individual technologies assure the overall quality of the Technology List.

It should also be emphasized that the technologies incorporated herein are not confined to engineering products. Disaster mitigation technologies must cover wide methodological areas including (1) structural and geotechnical mitigation, (2) crisis management, and (3) systems approach for sustainable developments. They should contain a comprehensive spectrum of "hard" and "soft" technologies. Indeed, the Technology List contains what we may call "process technologies", or "operational technologies" that include disaster reduction planning process for local governments, a framework of training system for earthquake engineers under an international collaboration, etc.

On this basis, the concept of technology should be viewed in a wide sense; i.e., the terminology "technology" is defined herein as¹⁾:

Technology = "A set of rational means and knowledge pertinent to realizing specific objectives that have solid logical bases and stability"

In many conventional cases, disaster reduction technologies meant just engineering products. But when we consider implementation strategies, technologies should involve not only products but processes as well. This requires innovation of research activities²⁾ to reform from "product focused research" to "process oriented research", or "product-process linked research". The Technology List has been designed to pursue this notion of the problem.

1.5 Enhancement, Future Development and Proposed Actions

Despite the various important features as described in the previous section, it should be pointed out that the Technology List at this time is a first-step document which is to be enhanced in many ways to constitute a more comprehensive set of knowledge. The List had to be prepared within six months. This did not necessarily provide time for enough access to individual researchers, to have more hazards besides earthquake-tsunami and flood-debris be incorporated.

More importantly, the Technology List should evolve to a "World List". Its current status is in a stage to demonstrate its usefulness in a substantial form. It has been prepared as a Japanese contribution to the UN World Conference on Disaster Reduction with an intention to propose to internationalize it.

It is strongly proposed that a coordination mechanism will be developed under the ISDR auspices, hopefully in cooperation with UNESCO. As MEXT took initiative to develop the present volume of the Technology List, it is expected that it will take efforts of funding a next step project and take leadership in its operation. These issues are subject to discussion during the UN World Conference as well as efforts in the post-conference period. It will be highly valuable as well as important to move situations in this direction.

Any constructive opinions from those who are interested in this issue are welcome. They may be sent to the Thematic Session 3.6 Conveners: Takayuki Nakamura, MEXT (nakamura@mext.go.jp) and Hiroyuki Kameda, NIED (kameda@bosai.go.jp).

1.6 Acknowledgments

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