IMPLEMENTATION TECHNOLOGY AND NETWORKING - A KEY TO DISASTER REDUCTION -

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ABSTRACT :
Useful technology and knowledge for disaster reduction is conceptualized in "implementation technology". It consists of three elements "implementation oriented technology (IOT)", "Process technology (PT)", and Transferable indigenous knowledge (TIK)". Their criteria are presented. Next as a vehicle for compiling and disseminating implementation technology, an international initiative on "Disaster Reduction Hyperbase (DRH)" is presented. Its context framework and features are addressed.

KEYWORDS:
implementation technology, international networking, Disaster Reduction Hyperbase (DRH), implementation oriented technology (IOT), process technology (PT), transferable indigenous knowledge (TIK)

1. INTRODUCTION - A ROADWAY TO "IMPLEMENTATION TECHNOLGY"

An international initiative Disaster Reduction Hyperbase is progressing under a project entitled "Disaster Reduction Hyperbase - Asian Application (DRH-Asia)" (project period: July 2006-March 2009). The DRH-Asia will be a web-based facility to disseminate information on appropriate disaster reduction technology and knowledge to aid disaster reduction policy. They will incorporate not only products from modern research and development but also time-tested indigenous knowledge. It will be a two-way communication tool among developing and industrial countries, not be a one-sided technology transfer. **Figure 1** shows the current status of DRH web-site top page.

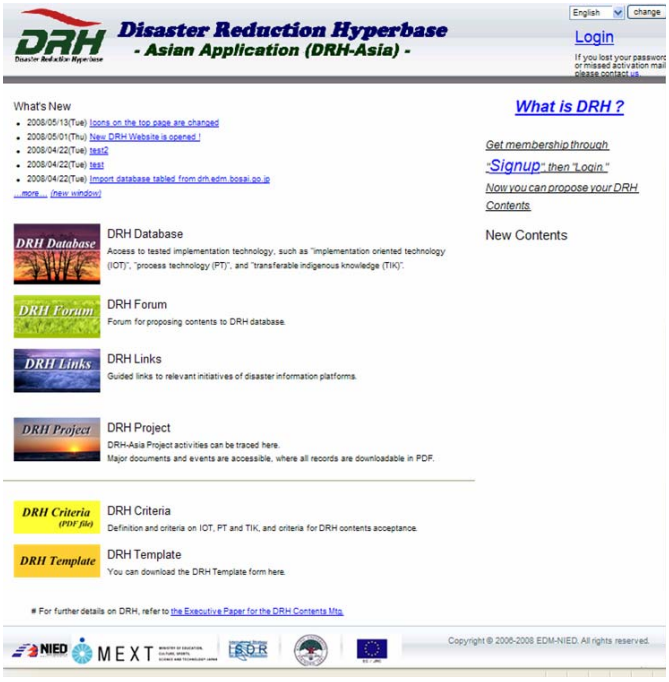

Figure 1 Top Page of DRH (as of May 2008)
http://drh.edm.bosai.go.jp/

"What is useful technology and knowledge for disaster reduction ?" This simple question was a basic motivation to the DRH-Asia project. The question is simple but to answer it appropriately is complex. There was a roadway of many international activities and earnest efforts in research and development to answer the question. The roadway incorporates projects such as EqTAP Project (April 1999-March 2004), "Pilot Project"

conducted for to the World Conference on Disaster Reduction (WCDR: January 2005), and International Framework for Development of Disaster Reduction Technology List on Implementation Strategies (DRH Project - Phase I: April 2005-March 2006).

The EqTAP project (Development of Earthquake and Tsunami Disaster Mitigation Technologies and Their Integration for the Asia-Pacific Region: multilateral, multi-disciplinary research project) clarified a concept of "Implementation Strategy in research and development" through its R&D efforts[1), 2)] (see also the EqTAP website: http://eqtap.edm.bosai.go.jp/). The next step was a set of 42 disaster reduction technologies with implementation strategy that were compiled in a catalogue document[3)]. It was incorporated in the Japanese government's proposal of "Portfolios for Disaster Reduction" at WCDR. The document has served as a pilot project toward "Disaster Reduction Hyperbase (DRH)." A one-year project, DRH Project Phase-I, was an occasion for establishing an international network that clearly defined the mission, proposed attributes of DRH, and a scheme of international collaboration[4)]. All these efforts converged to the there-year DRH-Asia project, or DRH Project Phase-II, whose task is actually realizing the DRH, making it useful, and disseminate it.

It may be noted that the starting point of this project orientation for the Japanese research community was the Great Hanshin-Awaji (Kobe) Earthquake Disaster of 1995, which devastated a modern urban region of western Japan with death of over 6,400 people. The most serious lesson the research community had to learn from Kobe 1995 was that "Having good technology does not immediately equal safe society". We need a more generic mechanism of implementation. It should be an integration of "physical issues" (natural world), "societal issues" (social world), and "information issues" (interface and logistics between the natural and social worlds)[5)]**.** We should recognize that unless a disaster reduction study is directed to fill this gap, the study can not be said to contribute to its mission, Disaster Reduction.

This notion has been shared with international DRH members. They have their own critical experiences such as many tropical cyclone and flood disasters in Bangladesh, catastrophic earthquake disasters including Gujarat (India) 2001, Bam (Iran) 2003, Sumatra (Indonesia) earthquake and Indian Ocean tsunami 2004, Kashmir (Pakistan) 2005, etc. In-depth discussion among the DRH members led to a consensus on the importance of multi-disciplinary aspects in defining useful disaster reduction technology and knowledge. It has led to conceptual developments and establishment of criteria for "Implementation technology", a key concept in the DRH activity.

2. PROPOSAL OF "IMPLEMENTATION TECHNOLOGY"

2.1. Conceptual Development

Efforts in the EqTAP project for pursuing research and developments of useful disaster reduction technology led to a proposition to re-define the concept of "technology" in the context of implementation strategy, particularly in terms of regional perspective and stakeholder involvements.

Among a variety of R&D outputs from EqTAP, they include enhancement of masonry building design and practice. It does not involve expensive technologies like dynamic structural control devices. Yet the outputs for low-cost buildings dealt with herein have been produced as results of highly qualified research processes based on advanced research methodologies with well controlled cyclic and pseudo-dynamic testing, development of reliable mechanical models, and thorough review of design and construction procedures.

It should also be emphasized that the technologies incorporated are not confined to engineering products. Disaster reduction 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, some of the methodologies developed in the EqTAP include what we may call "process technology", that include, for example, disaster reduction planning process for local governments.

On this basis, it has been proposed[2), 6)] that:

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

In a conventional recognition, technology 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 community to reform from "product focused research" to "process oriented research", or "product-process linked research". These notions of a paradigm shift in disaster reduction research and development were discussed as the main subject of Thematic Session 3.6 "Implementation Strategies for Application of Research and Development on Disaster Reduction" at the UN World Conference on Disaster Reduction (WCDR), 18-22 January 2005, Hyogo-Kobe, Japan [7)].

Through the DRH Phase-I project, this concept was elaborated in a wider scope with multi-hazard issues and with a longer time span and cultural backgrounds. The three Core Member Meetings[8)] provided valuable opportunities for elaboration based on various real-world information. It is important to note that the DRH project members are comprised of not only researchers but also NGO practitioners who stand on links to connect research and practice. Their contributions in the discussion were key to conceptual development.

Particularly, in-depth discussion on implementation process issues have led us to distinguish between Implementation Oriented Technology (IOT: product) and Process Technology (PT: procedure). It was also recognized that various time-tested indigenous knowledge or wisdom play important roles in disaster reduction in specific localities that can be transferred to other regions, which may be referred to as Transferable Indigenous Knowledge (TIK). Then the terminology **"Implementation Technology"** emerged to mean a comprehensive set of IOT, PT and TIK, and it was endorsed in the final workshop of the DRH Phase-I project and was incorporated in the Tsukuba Resolution 2006 [4)].

2.2 Components of Implementation Technology

Efforts for conceptual enhancement of implementation technology have been pursued in the DRH Project Phase-II. Elaboration is possible with ample practical examples. Such occasions include Idea Workshop on Indigenous Technology For the Contents Development of Disaster Reduction Hyperbase (DRH) <Conceptual enhancement and case clarification of "Transferable Indigenous Knowledge">, Delhi, 19-20 February 2007, Disaster Reduction Hyperbase (DRH) Contents Meeting, Kobe, 12-13 March 2007, Mini Workshop on School Safety for DRH-Asia Contents Development, Kobe, 4 July 2007, Publication of the DRH Contents Meeting Proceedings, November 2007, Second DRH-Asia Annual Workshop, Beijing, 21-22 February 2008, etc.[8)]. Based on these experiences that were shared by many DRH members, conceptualization of implementation technology has been concluded as follows:

Implementation Technology to be compiled in DRH-Asia, consisting of

+***Implementation oriented technology*** **(IOT)**: Products from modern research and development 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 region (s) but having potential to be applied to other regions and having time-tested reliability

2.3 Criteria for Implementation Technology

Besides generic features of implementation technology as discussed in the previous section, more specific criteria for each of its three components were discussed. While a baseline for characterizing the IOT had been laid in the activities of the EqTAP Project[2)], extensive discussion was needed for PT and TIK, and then to look at all of the three comprehensively. The Disaster Reduction Hyperbase First Facilitators Meeting (DRH-Asia FM1), Kobe, 2-3 July 2007 was the first trial for a holistic view conducted by the DRH Facilitators and other leading DRH members from EDM-NIED and Kyoto University, which generated the first version of the criteria for IOT, PT and TIK together. The document was elaborated at DRH-CASiFiCA Coordination Session, Stresa, Italy, Sep. 2007 and other occasions when the DRH Facilitators met. These discussions converged to the following set of criteria, and was announced on the DRH project web-site:

Criteria for Implementation Oriented Technology (IOT)

- Technically or scientifically acceptable

- Problem identification and methodology development practiced in direct communication with stakeholders and end-users to create incentive for their participation and ownership
- Regional characteristics properly incorporated in terms of local context including available materials, cost, and workmanship
- Most advanced research methodologies mobilized to generate high-quality products and meet the actual demands of the region

Criteria for Process Technology (PT)

- With emphasis on "practical use" of research
- A tested methodology with social, cultural, economic, ecological, and technical feasibilities, developed through an implementation/ testing process ensuring results in disaster reduction
- Demonstrated stakeholders' participation and enhanced ownership
    - of the process
    - of results and lessons
- Amenable/adaptable to local context, and with institutionalization potential
- In-depth knowledge and insight gained through experience with disasters and mitigation

Criteria for Transferable Indigenous Knowledge (TIK)

- Originated within communities, based on local needs, and specific to culture and context (environment and economy)
- Provides core knowledge with flexibility for local adaptation for implementation
- Uses local knowledge and skills, and materials based on local ecology
- Has been proven to be time tested and useful in disasters
- Is applied or applicable in other communities or generations

These criteria are serving as an important guideline in compilation of the DRH contents.

Illustrative examples of implementation technology are found in the DRH Contents Meeting Proceedings) and many other presentations at various events under the DRH Project[9].

3. INTERNATIONAL NETWORKING BY DISASTER REDUCTION HYPERBASE (DRH)

Along with clarification of "implementation technology" that we achieved in Chapter **2**, a good mechanism must be established in order to compile good DRH Contents and disseminate them effectively. For this purpose, the DRH Phase II Project has missions to construct DRH as a web-based vehicle for international networking. The major tasks are:

(1) Context clarification of DRH,
(2) Compilation of DRH contents, and
(3) Construction of DRH web-site

All these items require creative ways of development. These aspects are discussed in this chapter.

3.1. Context Clarification of DRH

3.1.1 Attributes of the DRH system

By incorporating "implementation technology" (set of IOT, PT and TIK), the Disaster Reduction Hyperbase (DRH) will be a resource of knowledge and wisdom that will benefit two-way communications among developing countries and industrial countries. It will deal with multi-hazard disaster risk reduction.

The issue was discussed extensively throughout the DRH Project Phase-I. The conclusion was consolidated in the Tsukuba Resolution 2006 [4] that consists of Mission, Proposed DRH Attributes, and Resolution for international collaboration. The Tsukuba Resolution has been a solid guideline to the DRH Project Phase-II. The activities in DRH development have been conducted on this basis.

Proposed DRH Attributes, which specifies the DRH system development states that:

Proposed DRH Attributes (from Tsukuba Resolution 2006) :

- *Open and Interactive* access and participation
- access to tested *implementation technology database*, such as implementation oriented technology, process technology, transferable indigenous knowledge (DRH Database)

- *Forum* for facilitating collation, testing and dissemination of mitigation models (DRH Forum)
- Link with *relevant initiatives* (DRH Links)

Thus, ***DRH Database***, ***DRH Forum***, and ***DRH Links*** are the three major functional components of the DRH-Asia system. There are some elaboration and enhancements that came later, but this basic format of DRH remains unchanged.

3.1.2 Expected users of DRH

The expected users of DRH have been proposed as

(1) Practitioners,
(2) Community leaders,
(3) Policy makers, and
(4) Motivated researchers

The implications of the expected DRH users are illustrated in. They may be categorized as i) direct users of the technology/knowledge provided by the DRH, and ii) users of information in the DRH. The terminology *motivated researchers* is used to mean those researchers who clearly recognize implementation strategy in their research activities. The relations with DRH users should be cultivated further in the course of development as well as in the course of efforts for dissemination.

3.1.3 DRH Template

The DRH contents are compiled according to the DRH Template, a format that was established through ample discussion among DRH members. Currently, DRH Template ver.7.1 is used The version was at the Second DRH Annual Workshop, Beijing, February 2008, It incorporates the following items:

I. Heading,
II Categories,
III. Contact Information,
IV. Background,
V. Descriptions,
VI. Resources Required,
VII Message from the proposer (if any)
VIII Self evaluation in relation to applicability,
IX. Application examples,
X. Other related parallel initiatives (if any), and
XI. Remarks for version upgrade

There still is a room for further revision of the DRH Template in future. But a possible revision will be limited to minor changes in order to maintain stability of the context.

3.2. Compilation of DRH Contents

A mechanism for compiling the DRH contents is an important subject. For this purpose, DRH Facilitators were nominated, general criteria for DRH contents were decided, and discussion mechanism was incorporated in the DRH Forum.

3.2.1 DRH Facilitators for discussion of proposed DRH contents

The DRH Facilitators who were nominated at the First DRH-Asia Annual Workshop, Kobe, March 2007, are in charge of facilitating discussion on proposed DRH contents for elaboration by other DRH members, and enhancement by the proposers. Currently, the roster of the Facilitators is:

(IOT) Mohsen Ghafory-Ashtiany (IIEES) and Hiroyuki Kameda (NIED)
(PT) Amod Dixit (NSET Nepal) and Norio Okada (Kyoto Univ.)
(TIK) Anshu Sharma (SEEDS India) and Rajib Shaw (Kyoto Univ.)

The general management of the DRH contents are conducted by the DRH Manager (currently, Hiroyuki Kameda, DRH Project PI).

The Facilitators constitute a group of academics and NGO practitioners. In this way, it is intended that the

realized DRH contents will conform with the following general criteria for the DRH contents.

General Criteria for DRH Contents Acceptance

- Understandable to users
- Implementable (Usable, Doable)
- Shown to be useful
  Plus
- Criteria for each category (IOT, PT, TIK)

Note that these general criteria are different from those for scientific journals. This is a special feature of DRH which is aimed at compiling the contents under the implementation strategy.

3.2.2 Procedure of facilitation and registration in DRH Database

Proposed DRH Contents are discussed at the DRH Forum by registered DRH members for possible enhancements with a lead of DRH Facilitators. When discussion converges, the proposals are registered in the DRH Database. The DRH Manager makes initial judgment on acceptance for discussion and final confirmation for registration in the DRH Database. The procedure consists of the following steps.

(1) Manager's acceptance for discussion at DRH-Asia with appointment of Facilitators depending on the categories of Implementation Technology; i.e., IOT, PT, or TIK
(2) Facilitator-Proposer discussion and possible enhancement of the manuscript
(3) Discussion among registered DRH members (lead by Facilitators) and possible enhancement of the manuscript
(4) Facilitators' judgment for finalizing discussion
(5) Manager's confirmation and automatic registration in DRH Database

All these discussion processes can be done on DRH Forum site.

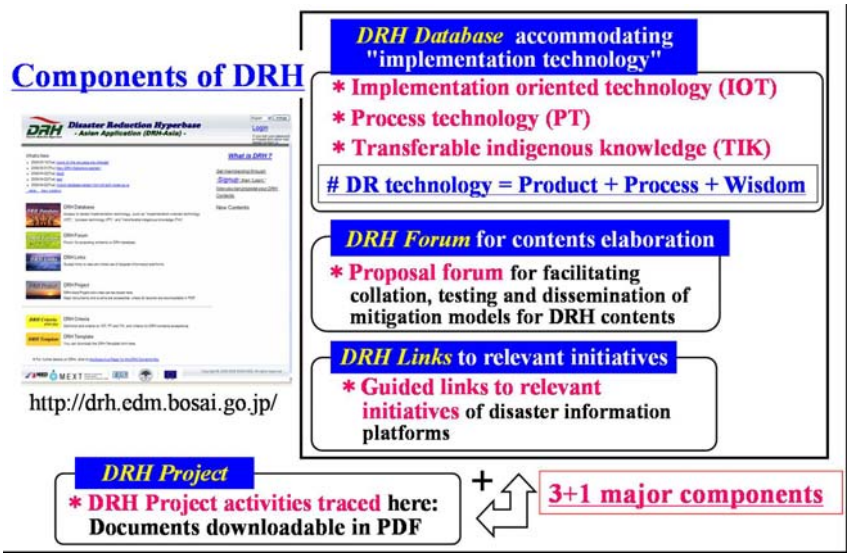

Figure 2 Major Component of DRH System

3.3. Construction of DRH Web-Site

3.3.1 Current status of DRH web-site

The DRH web-site was opened on 14 December 2008 as its ver.1. Further improvements were conducted, and upgraded on 1 May 2008 (ver.1.1) and on 1 September 2008 (ver.2). Basic functions of DRH attributes discussed in 3.1.1 have been realized. The contents facilitation has been practiced, and some of the proposed DRH contents have been registered in the DRH Database. **Figure 2** indicates the major components of DRH. The set of DRH Database, DRH Forum, and DRH Links (three components) plus DRH Project page constitute "3+1" major component of DRH.

3.3.2 DRH Database and DRH Forum

The DRH Database and DRH Forum constitute the core part of DRH Contents management (acceptance, facilitation, discussion, and registration) as well as DRH membership management. Construction of the core part of the DRH web system has been conducted by the EDM International Team (Team Leader: H. Negishi) as a part of EDM's research project on disaster reduction information database. Its research output is being applied to substantiate DRH web system.

3.3.3 DRH Links

The DRH Links was developed as a component of DRH system in order to realize effective links to other relevant initiatives. While DRH-Asia will serve as a resource base on implementation technology for disaster reduction, we should recognize that DRH does not solve everything. There are various initiatives in information platforms for disaster reduction, including many excellent fore-runners as well as some emerging initiatives. It is important for us to establish links to such platforms in a systematic way so that users can make their judgments regarding which sites to access depending on their purposes. To realize such conditions, the links should be organized in a synergetic manner among the initiatives. With this notion, the International Workshop on Information Platforms for Disaster Reduction (IPDR-WS) was held on 3-4 October 2007 at NIED, Tsukuba. On the basis of the output from the IPDR-WS, the DRH Links has been established.

Figure 3 DRH Project Top Page (July 2008)
http://drh.edm.bosai.go.jp/Project/Project_top.htm)

3.3.4 DRH Project Page

This page describes the framework and detailed outcome of the DRH Projects that were major framework of activities to realize the web-based facility Disaster Reduction Hyperbase (DRH). From this page, you can draw exhaustive information on DRH Phase I and Phase II Projects and EqTAP Project. Information availabe include major documents and records of various important events such as workshops and strategic meetings that have led to diverse conceptual as well as practical developments. Its top page is shown in **Figure 3**. The readers are encouraged to visit the site for further information on every element discussed in this paper.

4. EFFORTS FOR DISSEMINATION AND INTERNATIONAL TIES

The pursuit for implementation technology and DRH system development are being conducted with a close international collaboration illustrated in **Figure 4**. Efforts for dissemination are taken through bottom-up approach by the DRH members as well as top-down approach using inter-governmental mechanism including APEC, ASEAN+3, ets.

5. CONCLUDING REMARKS

This article discussed the issue of useful technology for disaster reduction in the framework of "Implementation technology". Jointly, how to make information on useful technology sent to stakeholders was discussed with an on-going project Disaster Reduction Hyperbase (DRH). This initiative is being practiced by many champions in the subject matter who are all prominent researchers and NGO leaders. It is hoped that the article will motivate discussion on "useful technology and dissemination" for disaster reduction.

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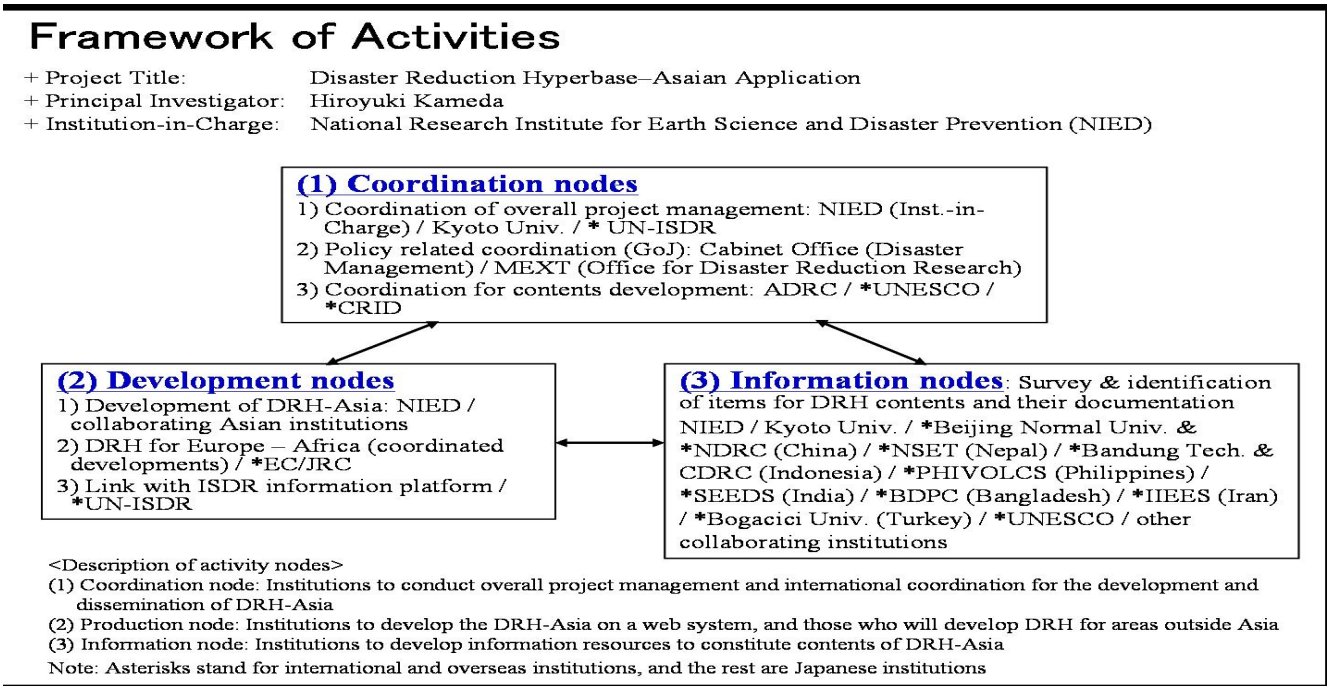

Figure 4 Organizational Framework of DRH