Development of National Disaster Management Information Platform for Research and Decision-support Applications in Taiwan

Executive Secretary, Project Office for Applying Science and Technology for Disaster Reduction, Ministry of Science and Technology, Taiwan

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Outline

1. Executive Summary of the MOST Program on Applying Science and Technology for Disaster Reduction (ASTDR) (2011-2014).

2. Development of National Disaster Management Information Platform for Research and Decision-support Applications in Taiwan.
Background

In the wake of Typhoon Morakot, on March 4, 2010, the Executive Yuan approved the four-year project:

“MOST Program on Applying Science and Technology for Disaster Reduction” (2011-2014).

in order to provide urgently needed integrated solutions for key disaster issues.
The MOST Program on ASTDR

- **Project Objectives**
  - Enhance the effectiveness of disaster response operations.
  - Improve disaster risk assessment and disaster management systems.
  - Strengthen disaster management information integration and implement resource sharing.
  - Strengthen the exchange and dissemination of disaster reduction and prevention knowledge.
<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>MOST Program on ASTDR</td>
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<tr>
<td>内政部消防署</td>
<td>National Fire Agency, Ministry of the Interior</td>
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<tr>
<td>原子能委员会</td>
<td>Atomic Energy Council</td>
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<tr>
<td>農業委員會林務局農林航空測量所</td>
<td>Aerial Survey Office, forestry Bureau</td>
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<tr>
<td>內政部地政司</td>
<td>Department of Land Administration, M.O.I.</td>
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<tr>
<td>內政部國土測繪中心</td>
<td>National Land Surveying and Mapping Center</td>
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<tr>
<td>教育部</td>
<td>Ministry of Education</td>
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<tr>
<td>科技部</td>
<td>Ministry of Science and Technology</td>
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<tr>
<td>經濟部中央地質調查所</td>
<td>Central Geological Survey MOEA, Ministry of Economic Affairs</td>
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<tr>
<td>經濟部水利署</td>
<td>Water Resources Agency, Ministry of Economic Affairs</td>
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<td>農業委員會水土保持局</td>
<td>Soil &amp; Water Conservation Bureau</td>
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<td>農業委員會林務局</td>
<td>Forestry Bureau</td>
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<td>交通部中央氣象局</td>
<td>Central Weather Bureau</td>
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<tr>
<td>交通部運輸研究所港灣技術研究中心</td>
<td>Center for Harbor Technology, IOT, MOTC</td>
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<td>台灣颱風洪水研究中心</td>
<td>Taiwan Typhoon and Flood Research Institute</td>
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<tr>
<td>國家地震工程研究中心</td>
<td>National Center for Research on Earthquake Engineering</td>
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<tr>
<td>台灣海洋科技研究中心</td>
<td>Taiwan Ocean Research Institute</td>
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<td>農業委員會林務局</td>
<td>Forestry Bureau</td>
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<tr>
<td>經濟部國營事業委員會</td>
<td>State-owned Enterprise Commission (SEC), Ministry of Economic Affairs</td>
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<td>經濟部能源局</td>
<td>Bureau of Energy, Ministry of Economic Affairs</td>
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<tr>
<td>交通部公路總局</td>
<td>Directorate General of Highways, M.O.T.C</td>
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<tr>
<td>内政部建築研究所</td>
<td>Architecture and Building Research Institute, MOI</td>
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<tr>
<td>農業委員會林務局農林航空測量所</td>
<td>Aerial Survey Office, forestry Bureau</td>
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<td>內政部營建署</td>
<td>Construction and Planning Agency, Ministry of the Interior</td>
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<td>教育部</td>
<td>Ministry of Education</td>
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Issues in Disaster Reduction Information Management

- Disaster reduction databases require a unified architecture, ensuring that disaster response operations, agencies, and staff at different levels can make more effective use of the data;

- The integration of real-time monitoring data requires further strengthening;

- Standards for the exchange of map data for disaster reduction should be implemented to strengthen the acquisition and application of information;
Issues in Disaster Reduction Information Management

- Disaster reduction information systems should be designed around the tasks of related government agencies, and must consider overall needs at each stage of disaster management;

- Effective information management tools are required to integrate different management tasks and provide communication platforms.
Need for a common platform for sharing and integration of information as well as for developing models and tools so the effectiveness of disaster reduction can be enhanced.
Disaster Management Information Platform

Data Models Toolbox

IT
Disaster Management Information Platform

- Database
- Model base
- Management toolbox
- DMIPRDA
- Outcomes delivering services
- Data services
- Map services
- Visualization services
- Application services
- Central government
- Local government
- Cooperation team
- Academic institutions
- Industry
- General public
- Value-added R&D

Disaster Reduction Information from various Government Agencies

- Issue 1: Large scale landslides
- Issue 2: Flood disasters
- Issue 3: Climate change
- Issue 4: Drought and water resources
- Issue 5: Earthquake disasters
- Issue 6: Assessment of essential infrastructure
- Issue 7: Disaster information platform
- Issue 8: Nuclear disasters
- Issue 9: Emerging issues

Integrated application management, Infrastructure building, technology value-added

Technology value-added

Disaster Reduction Information from various Government Agencies
The MOST Program on ASTDR statistics up to 2013 shows a total of 508 outcomes across different disaster reduction/prevention topics.

<table>
<thead>
<tr>
<th>R &amp; D topic</th>
<th>Large scale landslides</th>
<th>Flooding</th>
<th>Climate change</th>
<th>Drought and water resources</th>
<th>Earthquake disaster prevention</th>
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<tbody>
<tr>
<td>Number of substantive outcomes</td>
<td>44</td>
<td>129</td>
<td>61</td>
<td>10</td>
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<thead>
<tr>
<th></th>
<th>Essential infrastructure</th>
<th>Information platform</th>
<th>Nuclear disasters</th>
<th>Volcanic and emerging issues</th>
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<tr>
<td></td>
<td>24</td>
<td>67</td>
<td>27</td>
<td>7</td>
</tr>
</tbody>
</table>
Project Outcomes

- Outcomes in 2013, for example.

271 R & D outcomes

- 70 Item
  - Data
  - Models
  - Management

- 102 Item
- 99 Item
- Preliminary research
- Technology development
- Implementation and application
Project Outcomes

- Monitoring and Early Warning for Key Disaster Issues in Taiwan
  Automatic disaster monitoring system for landslide, tsunami, volcano, typhoon and flooding disasters, as well as early warning and forecasting models.

- Interagency Communication and Integration of Disaster Prevention Efforts
  Coordination and communication mechanisms, integration of research budgets and resources, and a platform for the management, exchange, sharing and application of disaster management information.
Project Outcomes

- **Application and Promotion of Disaster Reduction R&D**
  Also, promote disaster prevention education and improve disaster prevention awareness.

- **Enhancement and Sharing of Disaster Prevention Information**
  A disaster management information platform for providing disaster warning information, and development of disaster response decision making and value-added applications.
Example of Project Outcomes

http://140.110.27.125/dmip_2014/index.aspx
Example of Project Outcomes

Retrofit of School Buildings after the 921 earthquake

March 4, 2010
M = 6.4
Focus of Future Work

- Efficient and intelligent massive data processing and management
- Development of more efficient and accurate simulation and prediction models to enhance operational effectiveness of disaster reduction
- Establishment of information exchange and integration standards
- Establishment of a more stable and reliable disaster reduction information delivery network.
Conclusions

• The disaster management information platform for the research and decision-support applications is being established for cross-disciplinary and cross-departmental work, and has had a major impact on the outcome and implementation of disaster reduction research and decision-support applications in Taiwan.

• Development on the platform is continuing and a sustainable maintenance and operation management plan is being developed.
Thank you for your attention!