

International Disaster Resilience Leaders Forum Incheon 2022

효과적 재난안전관리를 위한 과학기술 정책방향
Science & Technology Policy for Effective Disaster Management

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I . The Role of Science & Technology in Disaster Management

➤ S&T in responding to Covid-19

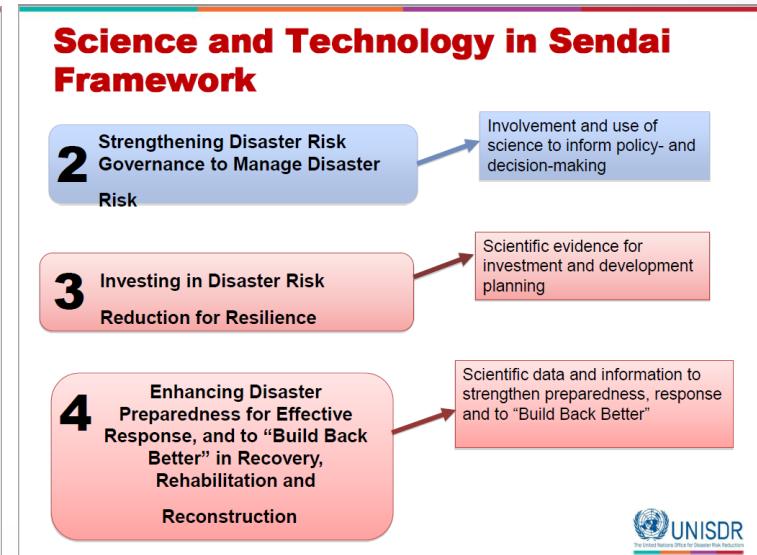
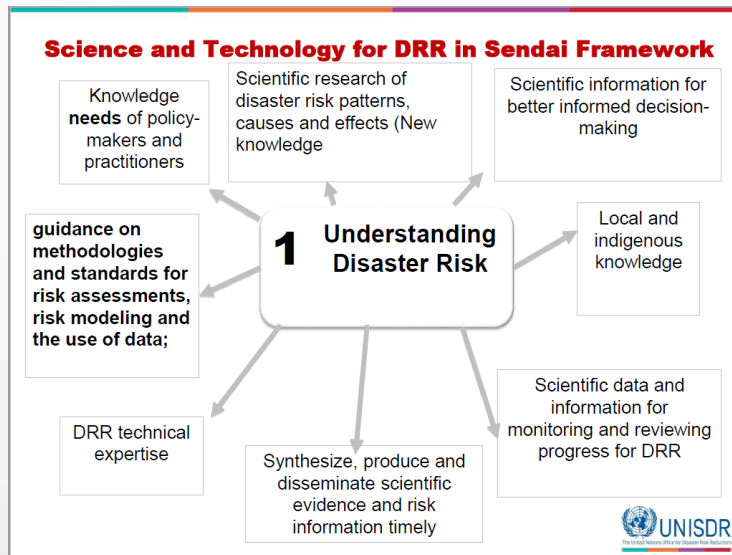
- Assess & Evaluate the unknown risk
 - Modeling to anticipate the patterns of dispersion
- Tracing & Self-quarantine
 - Data integration for efficient tracing
 - Mobile Application for assisting self-quarantine
- Timely distribution of mask
 - Web & app Mask distribution information service with open data



I . The Role of Science & Technology in Disaster Management

➤ The opportunities of S&T based disaster management

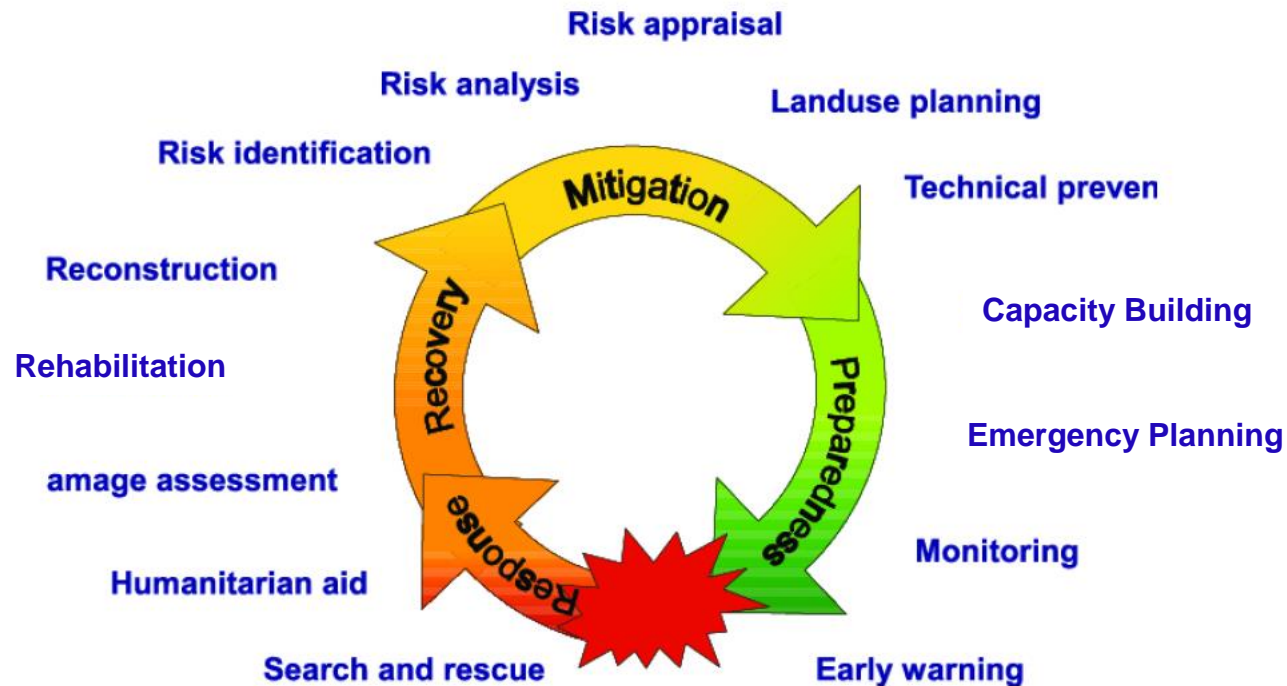
- Facing national emergency situation, innovative and timely usage of S&T increased the effectiveness of disaster response
- Since the mid 2000s, integration of S&T in disaster management has been emphasized.
 - Sendai Framework also highlights the role of the S&T in disaster risk reduction



I . The Role of Science & Technology in Disaster Management

➤ S&T in Disaster Management Framework

Science, Technology & Innovation



Source: Sinha (2022) Role of Technology & Innovation for Disaster Management, Workshop for the Nodal Officers of Disaster Management in all Ministries/ Department of Government of India (March, 2, 2022)

I . The Role of Science & Technology in Disaster Management

➤ “What S&T provides for Response”

Decision Support Information	Relevant Questions
Hazard Detection, Characterization, and Situational Awareness	<ul style="list-style-type: none">• What has happened?• What are the hazards and potential risks?• What are the uncertainties in what is known?
Forecasts and Anticipated Consequences	<ul style="list-style-type: none">• How will the hazards and risks evolve over time and over a given geographic area?• How does the situation compare to historical analogs?• What are the potential scenarios?• What information needs to be shared with emergency managers to support critical decisions?
Risk Assessment	<ul style="list-style-type: none">• What or who might be affected?• How do socioeconomic vulnerabilities affect the distribution of risk and impacts?• What are the potential cascading consequences?• What is the range of challenges that should be prepared for?
Risk Communication	<ul style="list-style-type: none">• What are the most effective means of communicating with impacted diverse populations?• Why do people respond differently to different hazards and/or to warnings/directives given during a response?• How do emergency managers want information delivered to them in order to make timely, critical decisions?

Source: Integrating Science and Technology with Disaster Response,
Science for Disaster Reduction Interagency Coordination Group, 2021, pp.10

I . The Role of Science & Technology in Disaster Management

➤ Digital Transformation as a trend

- Not only in Disaster Management, but also in various policy areas, knowledge based planning & decision making with IT has been promoted.

	Digitization	Digitalization	Digital Transformation
Focus	Data Transformation	Information Process	Knowledge utilization
Objective	Transformation from analog to digital	Automation of work process	Transformation of working environment & ways of thinking
Limitation	Volume (materials)	Monetary value (Finance)	Resistance to change (human resource)

	E-government	Digital government
Core Value	Streaming Optimizing Efficiency & Productivity in personalized service	Transforming Governance (Openness, Transparency, Civic Engagement)
Objective	IT utilization for better governmental service	Transformation of a whole government based on digital tech & demand of users
Approach	Service-based	Data-based
People	Service Target Participation in service provision	Service creator & leaders Policy making based upon public opinion
Technology	Web	Cloud, Mobile, SNS etc.
Implementation	Inter-operatability Integrated supporting units	Change in management system Governance

Source: Savic(2019), adapted in Chung et al. (2020:39); revised & translated

Source: Kim et al. (2017:22), adapted in Chung et al. (2020:39); revised & translated



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II . Korean Cases of S&T utilization in Disaster Management

➤ Digital government strategy in Korea

- Korea has been top ranked in UN e-government survey for more than a decade



Source: Policy News (2020.7.13) <https://www.korea.kr/news/policyNewsView.do?newsId=148874634>

- Disaster management is one of the core projects in digital government strategy.
 - Public value (High responsibility in public sector)
 - Effective Participation & Coordination
 - Rapid & Accurate Information gathering & dissemination

II . Korean Cases of S&T utilization in Disaster Management

➤ **Best Practices** *(adapted from UNDRR, 2021)*

1. Flood Forecasting and Warning System

- Analyzes real-time data observations of vulnerable areas
- Triggers a warning siren according to the level of precipitation

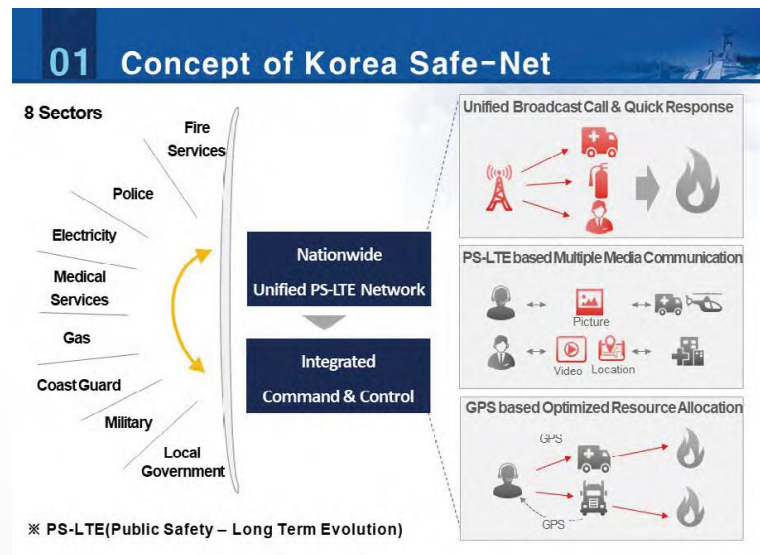


II . Korean Cases of S&T utilization in Disaster Management

➤ Best Practices *(adapted from UNDRR, 2021)*

2. Safe-Net (disaster and safety communication network)

- A unified network that connects and provides information simultaneously to disaster-related institutions
- A single, national-scale communication network that supports one channel of command and control & integrated response (powered by PS-LTE)



Source: Trilateral Best Practices: Application of Technology for Reducing Disaster Risk in China, Japan and Korea, Trilateral Cooperation Secretariat (TCS), 2021

II . Korean Cases of S&T utilization in Disaster Management

➤ Best Practices *(adapted from TCS, 2021)*

3. Public-private partnered emergency drone operation

- 'Emergency Drone Operation Team for Disaster Response'
 - Private drone operators participate in disaster response
- Investigates damages in the affected areas



Source: Trilateral Best Practices: Application of Technology for Reducing Disaster Risk in China, Japan and Korea, Trilateral Cooperation Secretariat (TCS), 2021

II . Korean Cases of S&T utilization in Disaster Management

- R&D in Disaster & Safety Management
 - 2021: ₩1,796,400,000,000 (US\$1.3billion)
 - 26.9% increase from 2020
 - 6.6% of the entire R&D investment



- R&D projects in 2018-2022 (searched in NTIS, keywords: "disaster")

Year	# of Projects
2022	156
2021	269
2020	289
2019	297
2018	277

Budget (won)	# of Projects
5,000 below	303
5,000-10,000	218
10,000-30,000	356
30,000-50,000	124
50,000-100,000	165
100,000 above	122

II . Korean Cases of S&T utilization in Disaster Management

➤ R&D projects in 2018-2022 (searched in NTIS, keywords: "disaster")

Standard Classification of S&T	# of Projects
Information Management System in Disaster Management	67
Decision Making System in Disaster Response	53
Other Disaster Information Management	33
Emergency & Disaster Communication Network	32
Technology for Natural Disaster Risk Reduction	31
Artificial Intelligence	29
Other S&T and Social Science	27
Integrated Disaster Management	27
Inspection Technology for infrastructure	26
Equipment for disaster and safety management	23

Core Classification of S&T	# of Projects
Disaster and Safety Management	518
Smart Technology for Systemic risk anticipation and response	312
Others	248
Construction & Transportation	138
Rescue system and equipment in the affected area	116
ICT/SW	107
Information & Communication system in disaster management	79



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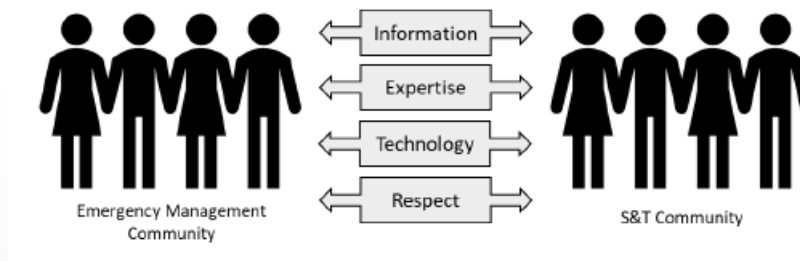
➤ Implication from Korean case

- Strengths
 - Experience & Infrastructure of digitization & digitalization
 - Availability & familiarity with IT
 - Increasing attention & investment in R&D
- Limitation
 - Does the strength listed above actually contribute to increase the effectiveness of disaster management?
 - Lack of linkage between development/application of Technology and transformation of process
 - Low rate of application of R&D results in real-world disaster management
 - Less attention in resources for digital transformation in disaster management, i.e. data, human resources, governance etc.

III. Policy Direction for S&T driven Disaster Management

➤ “Integrating S&T Support into Existing Response Structure”

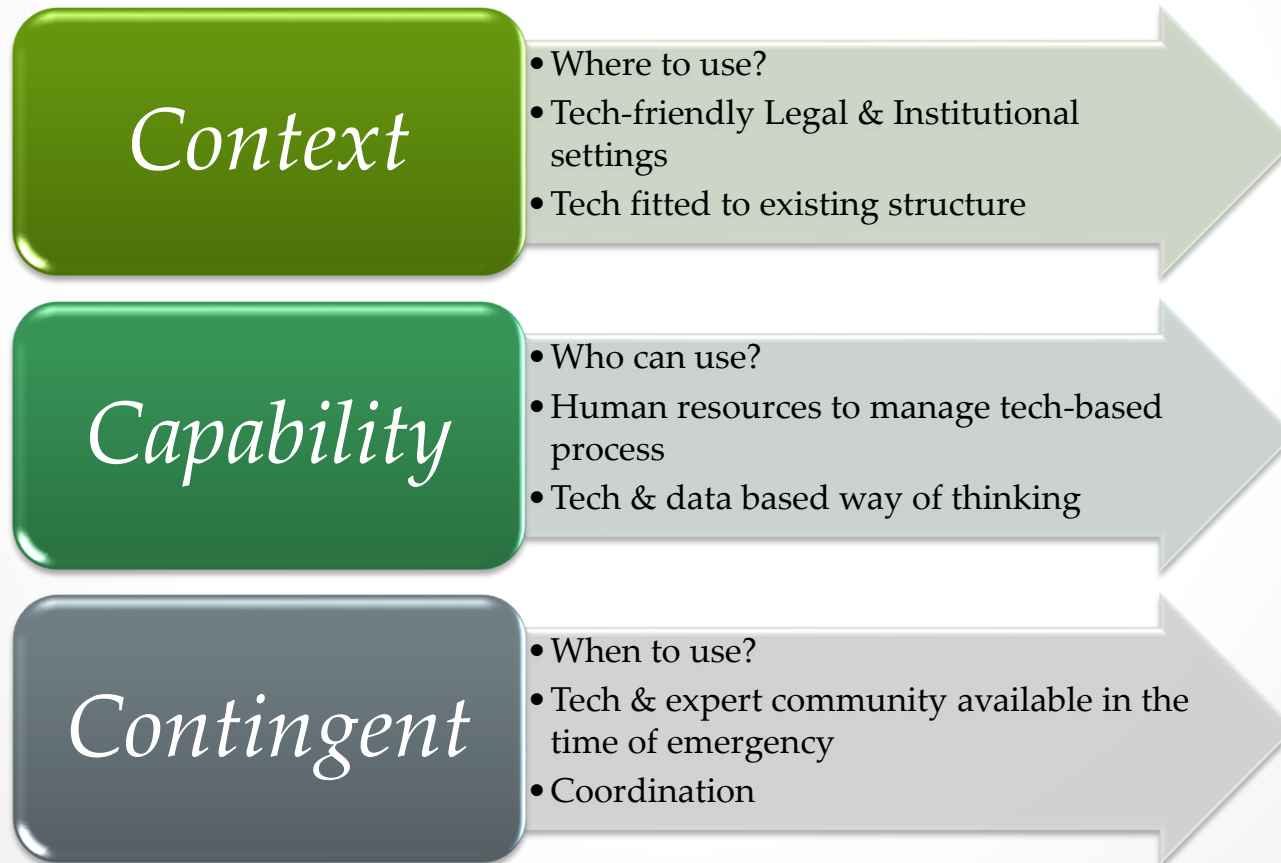
1. Communicating S & T Information: S & T Advisors
2. Integrating S&T into the Incident Command System
3. Collecting S&T information: S&T Advice Units
4. Coordinating S&T Beyond the National Response Framework
 1. Formal Interagency Coordinating Bodies
 2. Coordination Calls
5. Funding S&T for Response: Pre-scripted Mission Assignments
6. Funding S&T for Response: “Ordering” S&T experts to Incidents



Source: Integrating Science and Technology with Disaster Response,
Science for Disaster Reduction Interagency Coordination Group, 2021

III. Policy Direction for S&T driven Disaster Management

- Our goal is “Effective Disaster Management”, not just “Application of Technology”



III. Policy Direction for S&T driven Disaster Management

➤ Strategies for S&T driven Disaster Management

1. Understanding the nature of Disaster Management when applying technology
 - Mostly used in public sector
 - market mechanism hardly works for technology utilization
 - target & users should be considered in the process of development
 - Inter-related to various policy areas
 - the impact of disaster is not limited to the direct damage
 - S&T driven disaster management should deal with systemic disaster risk
 - Coordination & Cooperation among various policy areas is required
2. Process Transformation in Disaster Management
 - Applying S&T is not just one-time trial or experimental process.
 - Official guidelines of disaster management reflects data-based or S&T driven process
 - A whole process including development, modification & advancement of technology should be considered

III. Policy Direction for S&T driven Disaster Management

➤ Strategies for S&T driven Disaster Management

3. Organizational structure & Governance

- Governance including relevant agencies
 - expert communities ready for co-working in emergency
 - mutual understanding using S&T among the governmental agencies responsible to disaster management
 - civic engagement in disaster management
- Transformation of organization, not just establishment of supporting unit
 - we're pursuing not digitization, digitalization, but digital transformation
 - training & rearrangement of human resources

Thank you