Identification of Indonesian Technology Readiness in Disaster Risk Reduction

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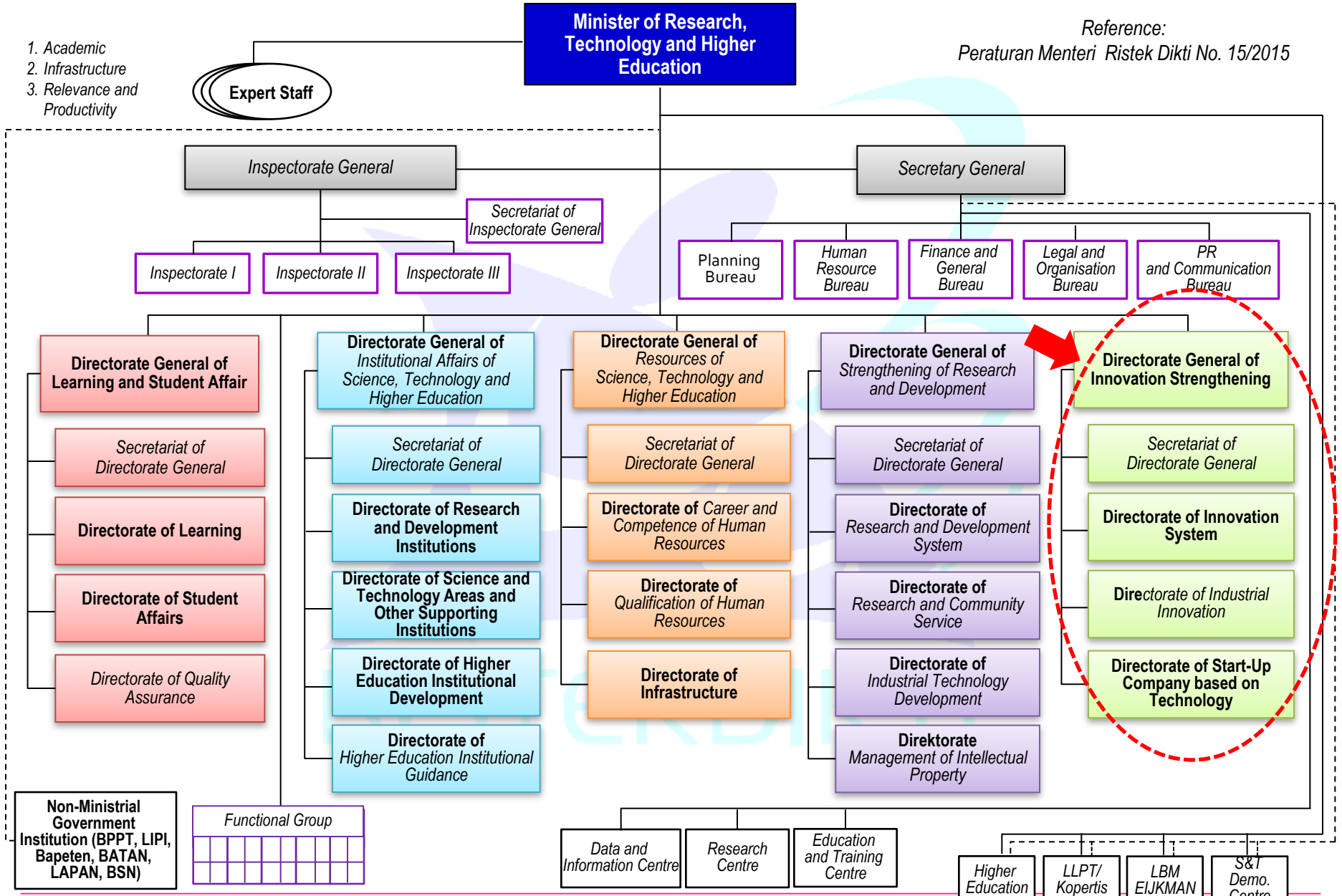
Organization Structure

Ministry of Research, Technology and Higher Education



Disaster Prone Areas in Indonesia

Source: BNPB, 2015. *Data dan Informasi Bencana Indonesia*. http://dibi.bnpb.go.id/ diakses pada 21 Desember 2015.

Preface

- Based on the factors of geography, geology, climatology, and demography, Indonesia is prone to disaster risks.
- The 2015-2019 of Indonesian National Medium-Term Development stressed the importance of enhancing the capacity to reduce disaster risk index.

Disasters in Indonesia

1. Terror/Sabotage
2. Flood
3. Flood and Landslide
4. Tidal Wave/Abrasion
5. Earthquake
6. Earthquake and Tsunami
7. Pest
8. Fire
9. Land and Forest Fire
10. Industrial Disasters
11. Transportation Accident
12. Drought
13. Famine
14. Extraordinary Events
15. Conflict/Social Unrest
16. Volcanic Eruption
17. Climate Change
18. Storm/Hurricane
19. Landslide
20. Tsunami

Source: BNPB (The National Disaster Mitigation Agency)

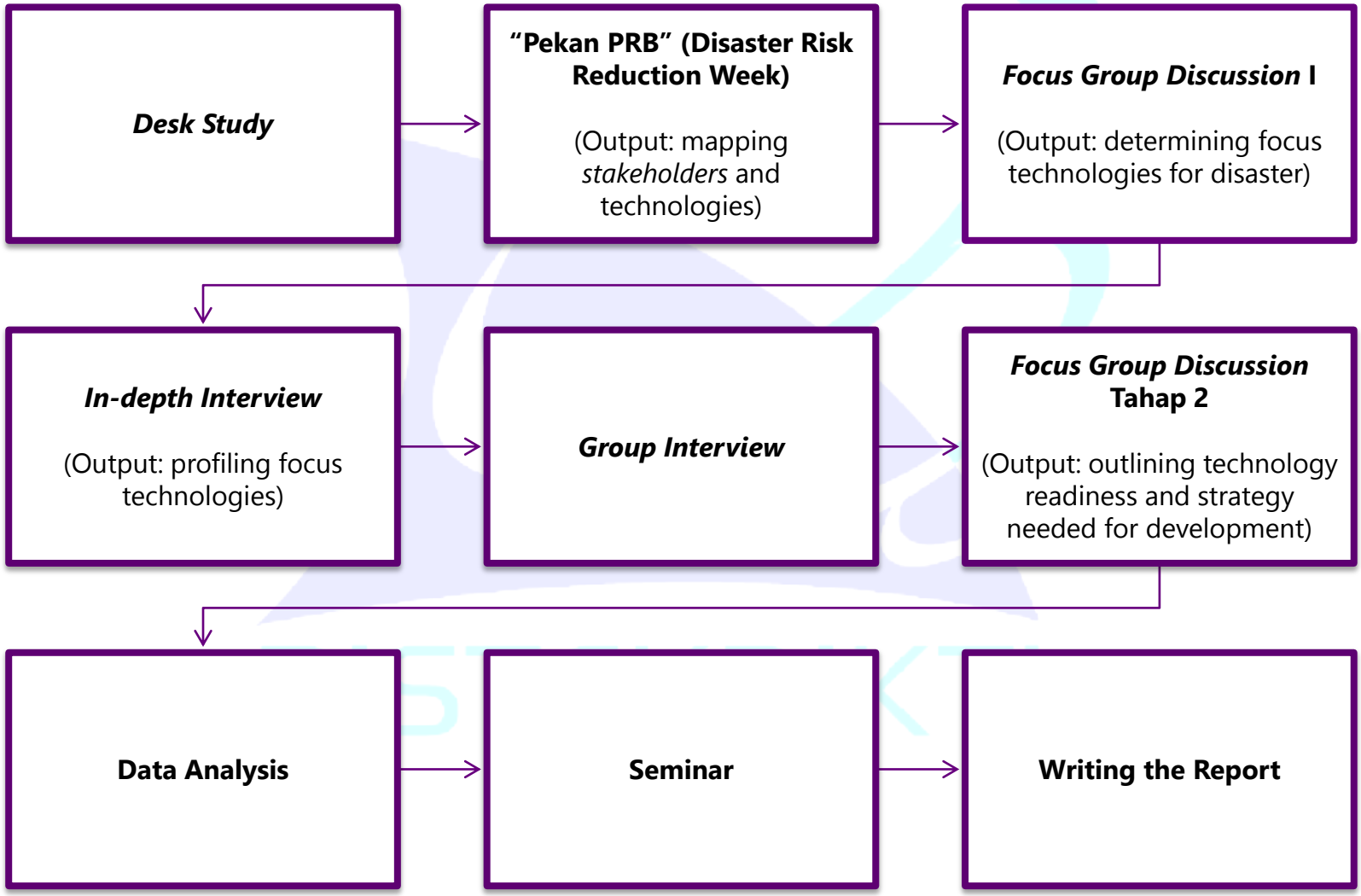
Mapping technology for disaster

- This study serves as an initial attempt to map the need of technology for disaster in Indonesia.
- This study aims to:
  - Map the needs and the use of technology for disaster in Indonesia
  - Determine the focus of technology needed
  - Analyse the technology profiles
  - Recommendation to support the use of technology

Methodology

No	Output	Research Questions Undertaken	Area of Investigation	Instrument	Chapter
1	**Disaster focus**	*Which disasters are the focus of this study? Why?*	*Statistic data on the number of disaster events and impact in Indonesia*	*Literature review*	*2*
2	**The map of technology needed for disaster**	*What technologies are needed for disaster in Indonesia?*	*Mapping technologies for disaster which have been developed by research institutions and universities/higher education*	*Literarture review* *Interview* *FGD*	*4*
3	**Focus of technology for disaster**	*What technology needs to be prioritised by the technology providers?* *Who would be able to provide the technology mentioned above?* *How is the readiness of technology for disaster that is being developed by technology providers in Indonesia?*	*Finding list of technologies for disaster that have been developed in Indonesia along with the providers and the TRL (technology readiness level) of each technology*	*FGD* *Interview* *Literature review* *Table of technologies*	*4*
4	**Policies needed to support the use of technologies for disaster**	*What strategy is needed to support the develoment of technology for disaster in Indonesia?* *How does each stakeholder contribute to the diffusion of technology for disaster?* *What policies are needed according to this framework?*	▪ *Formulation of general strategy for the development and diffusion of technologies for disaster , along with the stakeholders who could contribute in the implementation of this strategy* ▪ *Identify policies which are potential to support the development and diffusion of technology*	*FGD* *Interview*	*5 & 6*

The Flow of the Study



Focus of Disasters Profile

Earthquake and Tsunami

- *Indonesia is at the meeting point of three diffferent tectonic plates: Indo-Australian Plate, Eurasian Plate, and Philipine-Pacific Plate.*
- *Eathquake that triggered tsunami was rare, but once it happened, the amount of casualties (death) was extremely high.*
- *During 2000-2015, Indonesia experienced 200 earthquakes.*

Flood and Landslide

- *Average precipitation in Indonesia is 2000-3000 mm/year.*
- *Flood often triggers landslide.*
- *Many people live in flood and landslide prone areas.*

Volcanic Erruptin

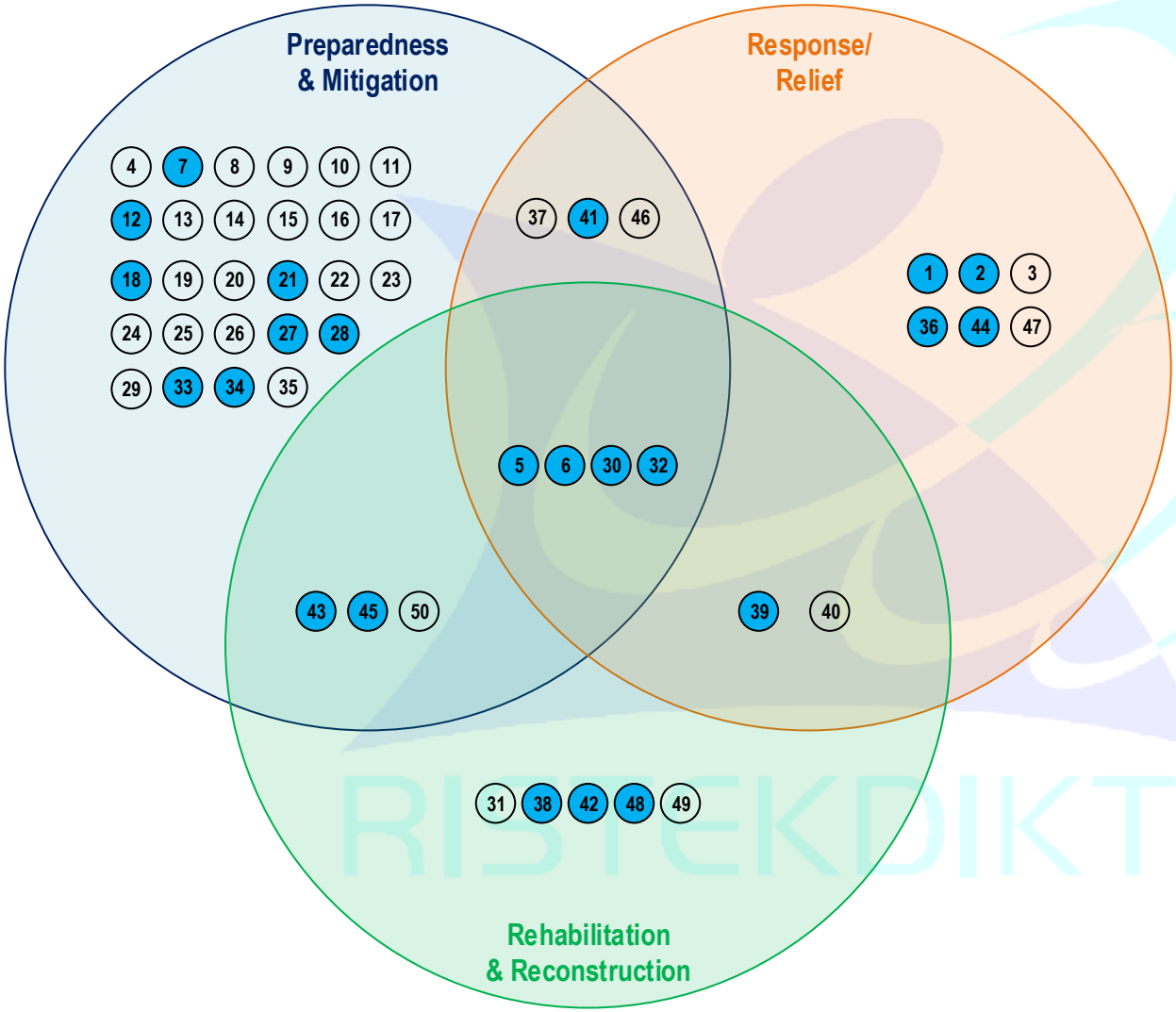
- *Indonesia has 142 active volcanoes.*
- *There are 68.9 million people (2 per 3 of the world population) live in the radius of 30 km from the active volcanoes, putting themselves as vulnerable communities.*
- *Two historic erruptions that greatly affected the world: Tambora in1815 (60.000 casualties) and Krakatoa in 1883 (36.417 casualties).*

Forest and Land Fire

- *The haze from forest and land fires raises major concern on environmental and health issues.*
- *Indonesia has (finally) ratified Asean Agreement On Transboundary Haze Pollution in September 2014.*
- *In 2015, Indonesia bore aproximately Rp 150 billion financial loss due to forest and land fires.*

TRL (Technology Readiness Levels)

Technology for Disasters in Indonesia



- Total: 50 products, detailed list is provided in the table
- Most of the products (37 products) are technology for prevention and preparedness stage 23 products are predicted having TRL 8-9 (see the blue circles)

- Prevention and Mitigation (BNPB Pencegahan dan Kesiapsiagaan)
- Response/Relief (BNPB Tanggap Darurat)
- Rehabilitation and Reconstruction (BNPB Rehabilitasi dan Rekonstruksi)

Focus Technology (1)

No.	Technology Products	Provider(s)	TRL	Earthquake and Tsunami			Volcanic Erruption			Flood and Landslide			Forest and Land Fire		
				01PM	01 ER	01 RR	02PM	02 ER	02 RR	03PM	03 ER	03 RR	04PM	04 ER	04 RR
1	*"Pengolah air cepat mandiri"*	*Pusair PU*	*8-9*		*x*			*x*			*x*			*x*	
2	*Sadewa - Satellite Disaster Early Warning System*	*LAPAN*	*6-7*	*x*			*x*			*x*			*x*		
3	*Lanslide EWS with extensometer, tiltmeter, rain gauge, sirine and repeater*	*UGM*	*8-9*							*x*					
4	*GEULIS (Geo-scince Early Warning Landslide and Information System)*	*Puslit Geoteknologi LIPI dan Japan Radio Co. Ltd (JRC)*	*6-7*							*x*					
5	*Digital Seismograph Short Period*	*BMKG*	*6-7*	*x*			*x*			*x*					
6	*Ina-TEWS (Indonesia Tsunami Early Warning System) with Buoy, sea level monitoring (satellite altimetry), tide gauge/mareograph/ marigraph*	*Ristek (koordinator)*	*8-9*	*x*											

Notes: *PM: Preparedness & Mitigation| ER: Response/Relief | RR: Rehabilitation & Reconsruction| Blue Shading: TRL 8-9*

Focus Technology (2)

No	Technology Products	Provider		Earthquake and Tsunami			Volcanic Erruption			Flood and Landslide			Forest and Land Fire		
			TRL	01PM	01 ER	01 RR	02PM	02 ER	02 RR	03PM	03 ER	03 RR	04 P	04 ER	04 RR
7	*RISHA - Rumah Instan Sederhana Sehat ("Instant House")*	*Pusperkim PU*	*8-9*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*			
8	*Rumah ringan tahan gempa (earthquake resistant house)*	*Universitas Syiah Kuala Aceh*	*3-5*			*x*									
9	*SIMBA - Sistem Informasi untuk Mitigasi Bencana (Disaster Mitigation Information System)*	*LAPAN*	*8-9*	*x*	*x*		*x*	*x*		*x*	*x*		*x*	*x*	
10	*Teknologi Modifikasi Cuaca (weather modification tech.)*	*BPPT*	*8-9*								*x*			*x*	
11	*Saluran pengelak lahar*	*PU*	*8-9*				*x*		*x*						
12	*Peatland fertiliser (e.g. Bio-charging, konsorsia mirob, pugas)*	*BPPT*	*3-5*										*x*		*x*

Notes: *PP: Prevention & Preperedness| ER: Emergency Response| RR: Rehabilitation & Reconstruction | Blue Shading: TRL 8-9*

Strategy for Technology Development

Strategy for Technology Diffusion

Government

- Pre-commercial procurement
- Multi-stakeholders
- Capacity building for community
- Data quality and quantity improvement
- Dissemination of information

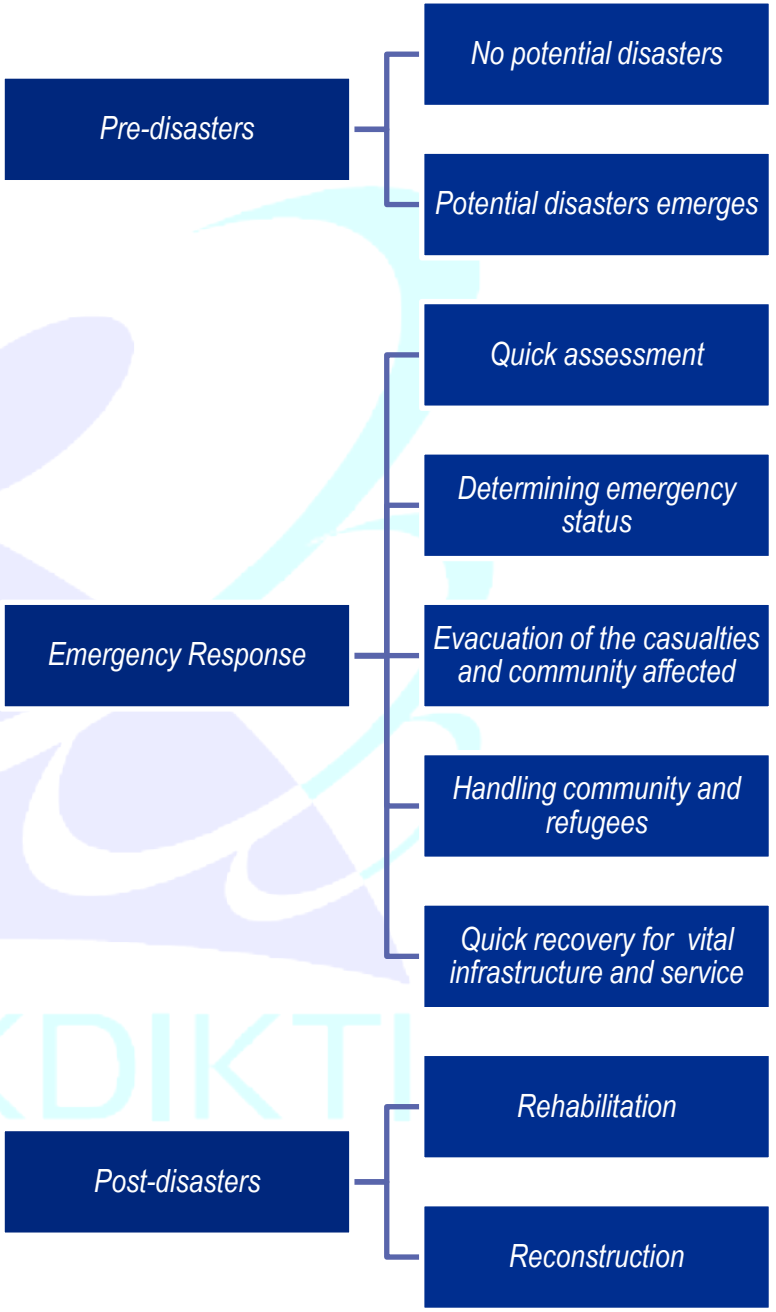
Technology Providers

- Commitment
- Engagement with potential users
- User-friendly technology
- Research and development dissemination
- Regular training
- Standardisation/certified products

Technology Users

- Enhancing capacity to utilise various technology for disasters
- Being responsive to the information given by the authorised

Science and Technology Based



Recommendation: Kemenristekdikti (2)

- **Creating good climate and environment** for technology for disaster to flourish:
  - **Mainstreaming** disasters issue into R&D (ARIN, incentive, etc.)
  - **Coordinate** with other stakeholders in order to improve the innovation of technology for disasters, e.g. BNPB (The National Disaster Mitigation Agency), Ministry of Industry, Ministry of Finance, etc.
  - Improving the **quality** and **quantity** of the data
  - Technology products s**tandardisation**
  - Facilitate **research collaboration** among technology providers
  - Technology diffusion and becoming **mediator** between **technology providers and the industry**
  - **Harmonising science and technology policy** with the technical policy in disaster

Recommendation: Technology Providers

- **User assessment** → especially on the social, economic, politic, and cultural aspects of the community
- **Social analysis** → encouraging the vulnerable community to adopt and use technology
- **Collaboration** among technology providers
- The development of technology has to include **capacity and capability building** for the technology users