

Development of disaster management support system for better decision-making



The University of Tokyo, JAPAN
Associate Professor

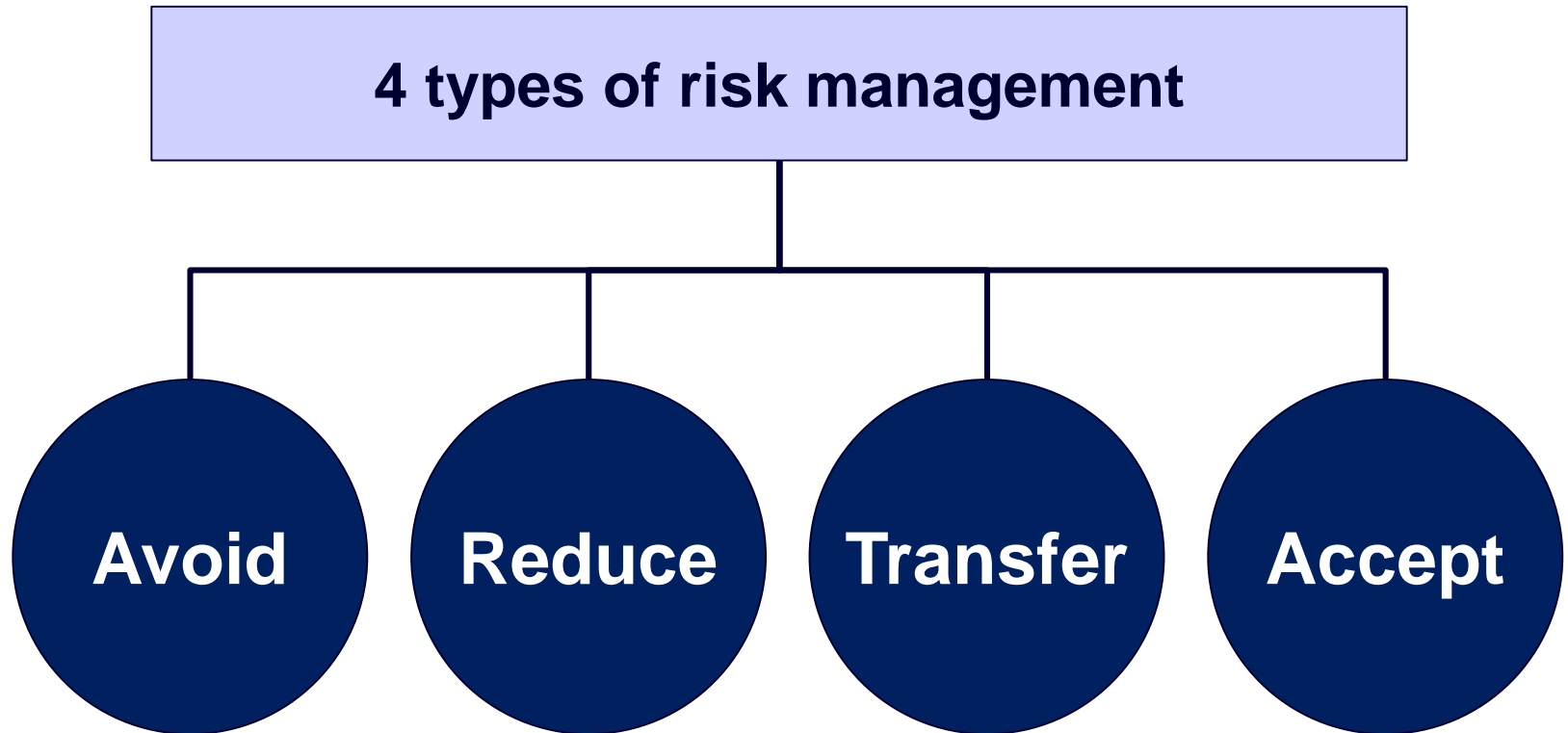
Muneyoshi NUMADA



Save Life, Save Our Future

Academic knowledge structure

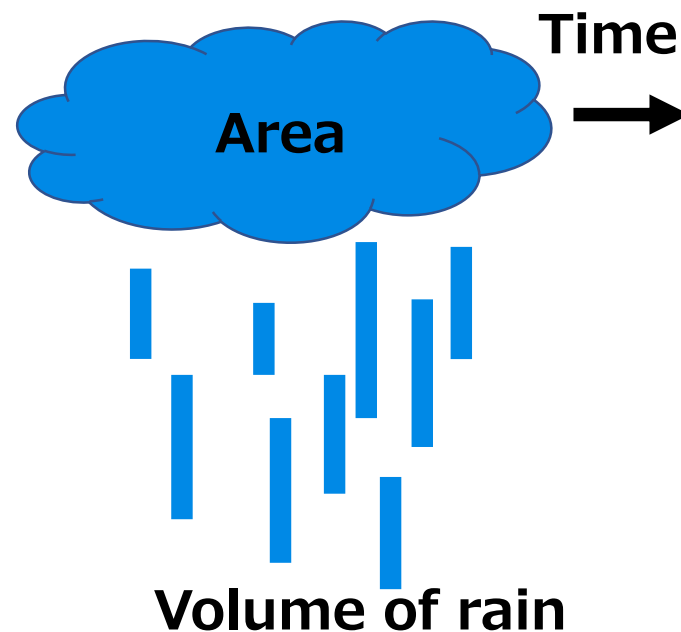
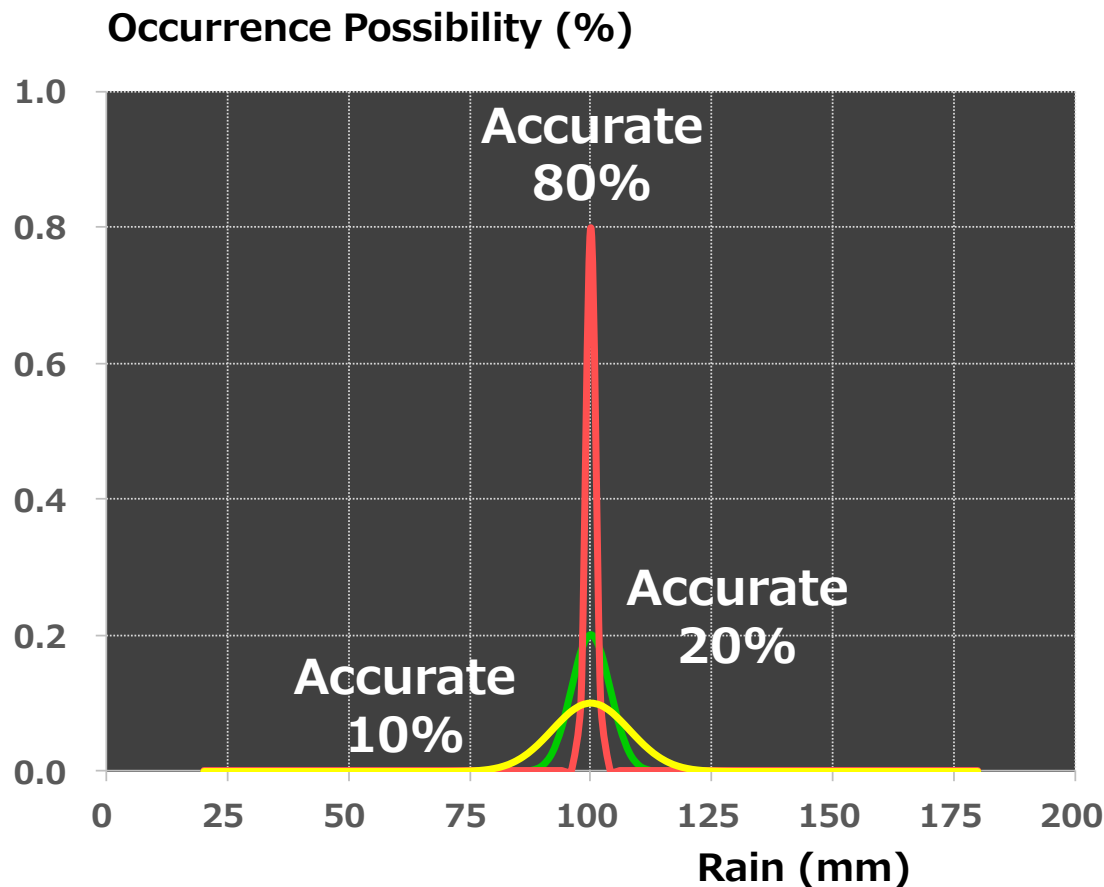




Retrofit, Land use management, Insurance, No countermeasure

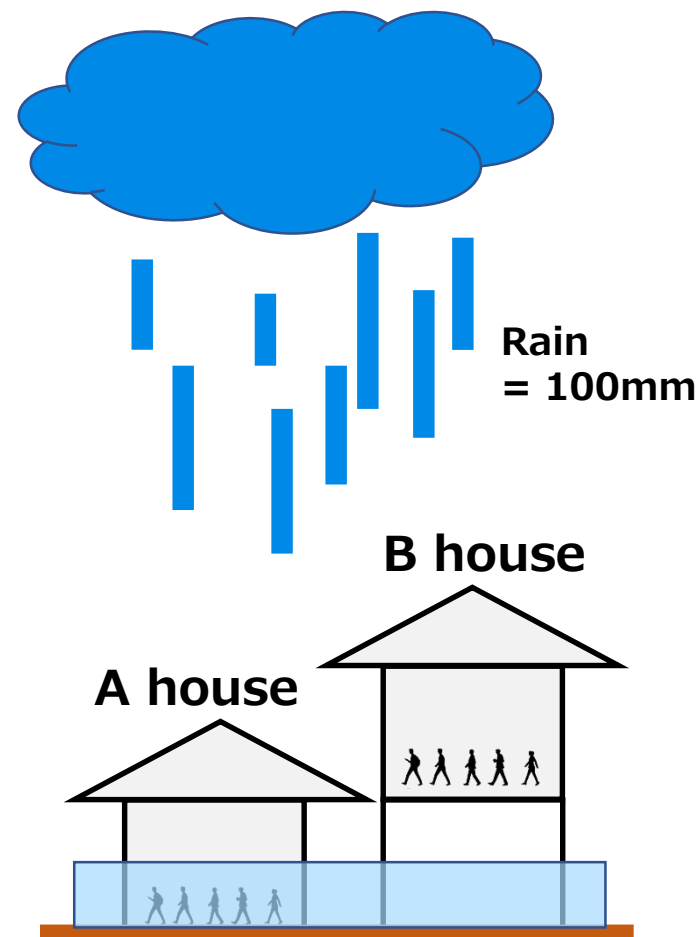
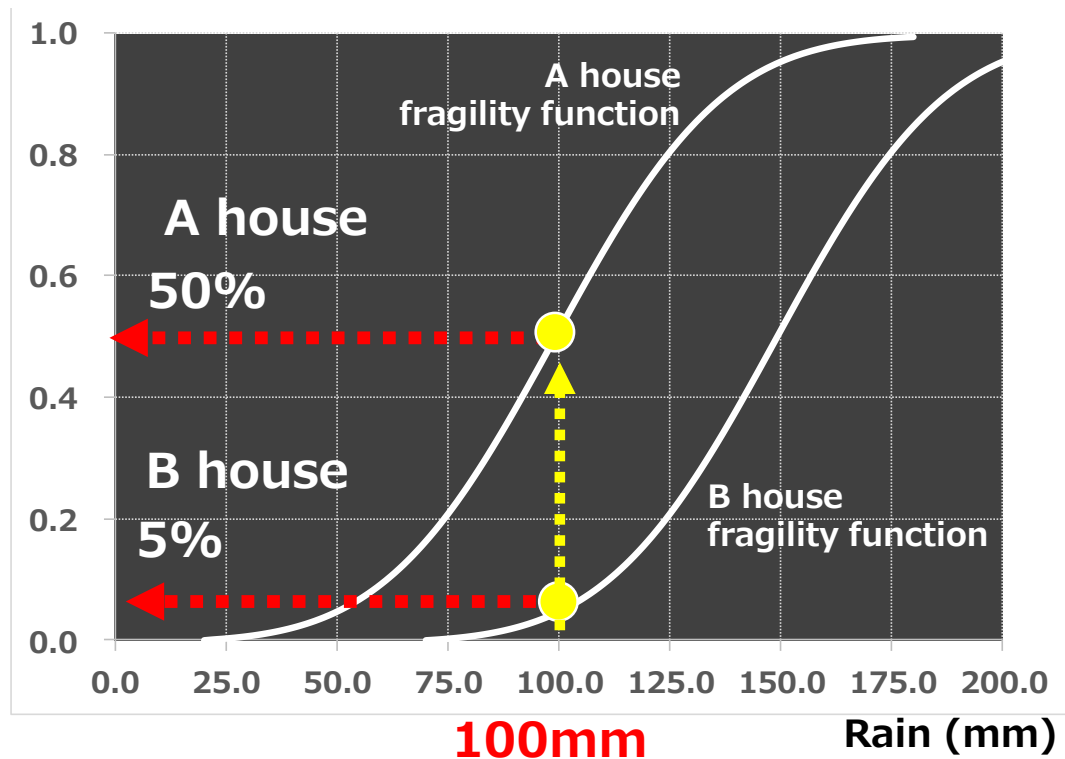
Accuracy of hazard = Volume of rain * Area * Time

Volume of rain



Accuracy of impact = Building vulnerability

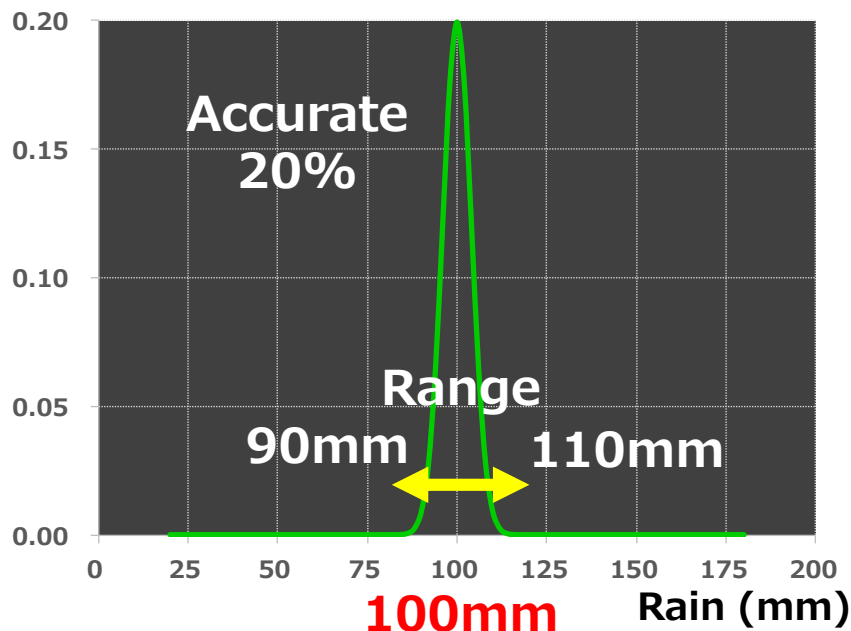
Affected Possibility, AP (%)



$$\text{Impact} = \text{Hazard} * \text{Fragility} * \text{Number of target}$$

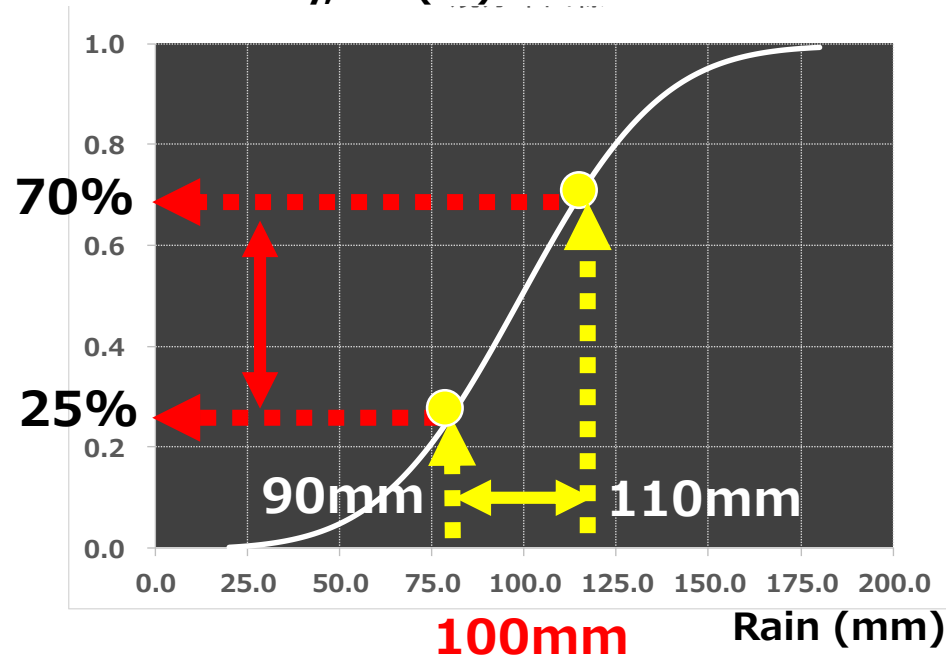
Hazard curve

Occurrence Possibility (%)



Impact (Fragility) curve

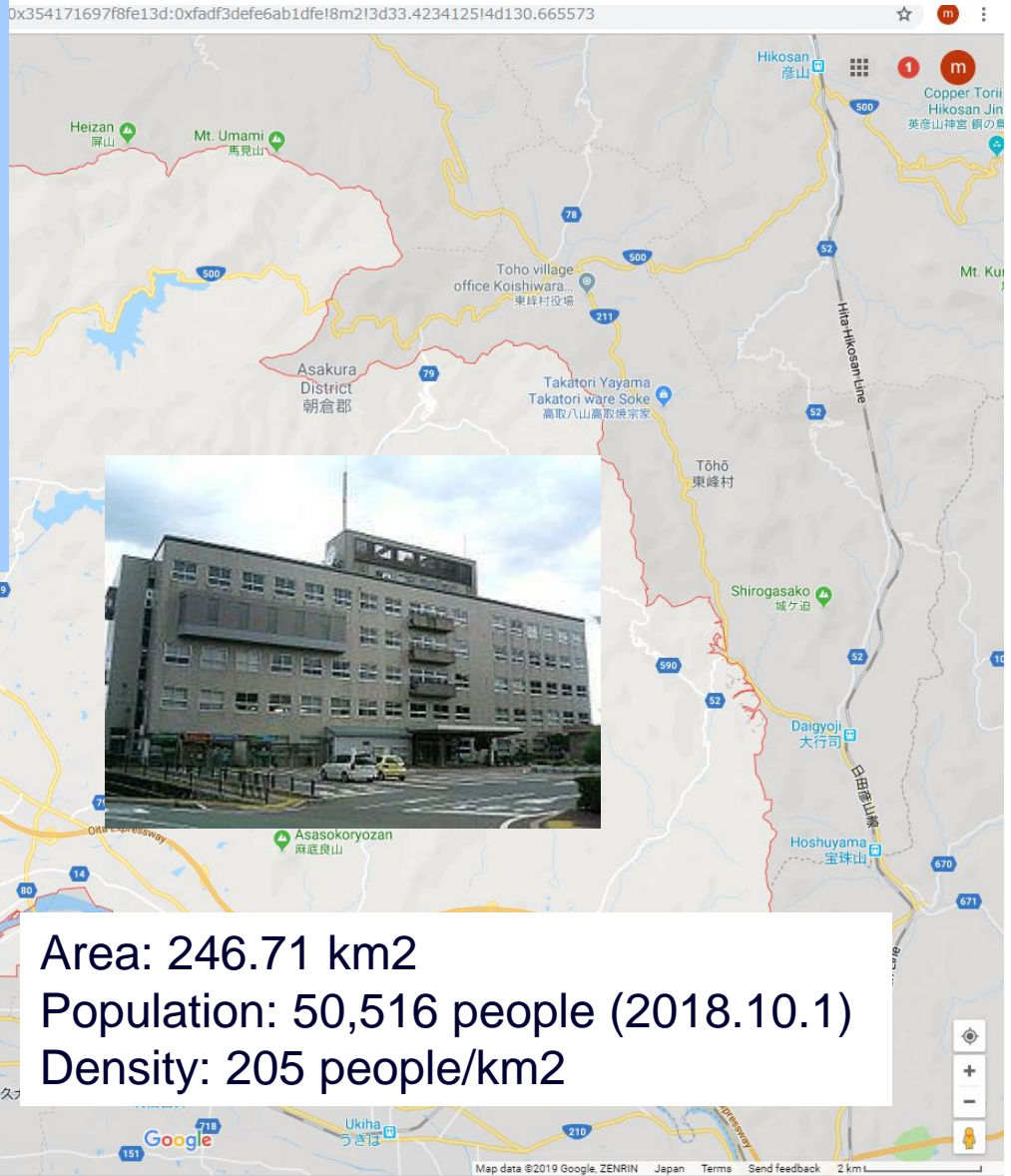
Affected Possibility, AP (%)



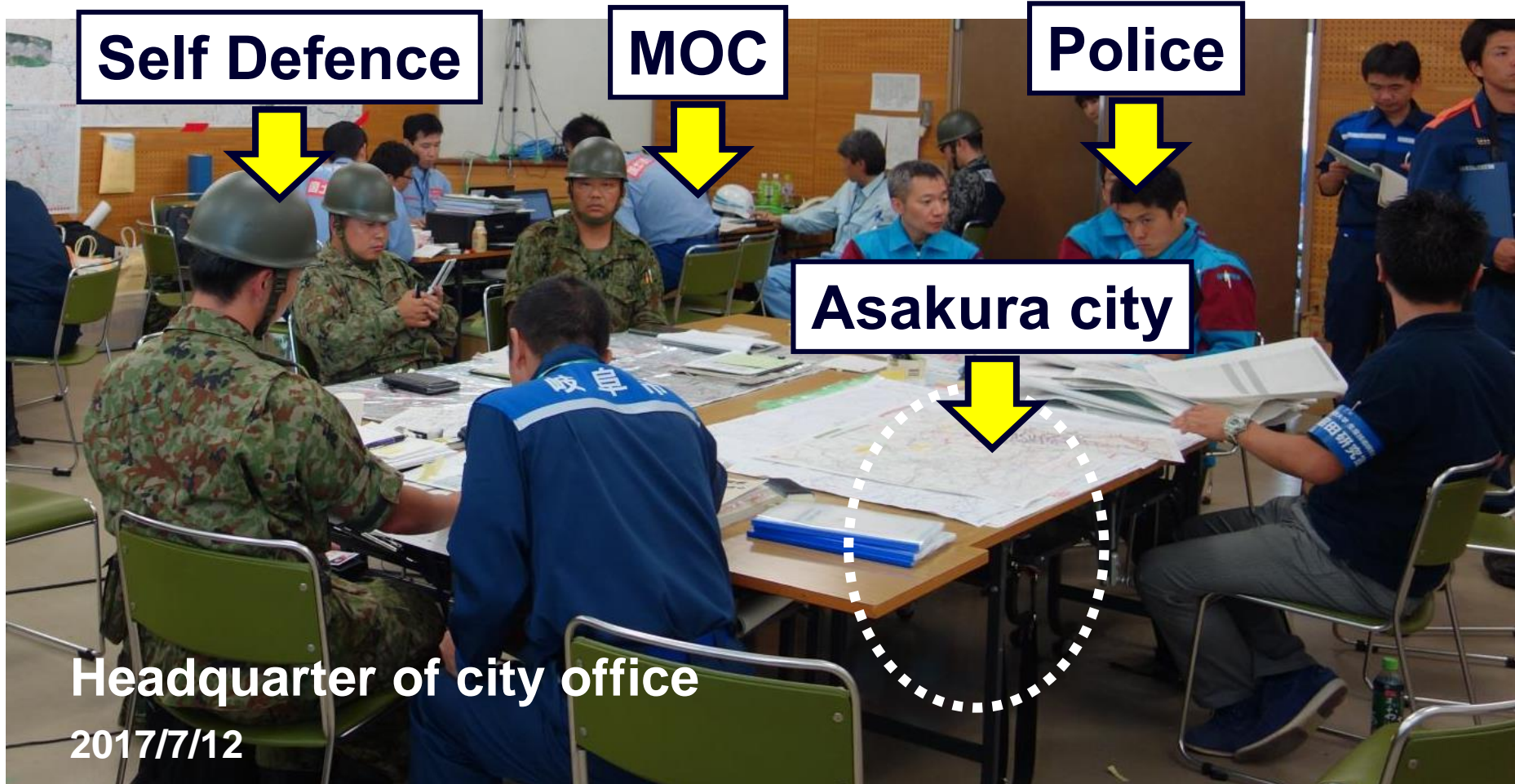
$$\text{Impact} = \text{Affected Possibility} * \text{Num of Buildings}$$

$$= [25\% \sim 50\% \sim 70\%] * 500 \text{ buildings (in A GN)}$$

Location



Nobody understand the roles of each stakeholder
- No management -



2017/7/13(Thu) 9:30~10:00

After changed layout of Headquarter



2017/7/13(Thu)

Understand the total disaster responses



Mayor

Disaster Response Process

朝倉市の災害対策本部
写真：沼田研究室

1. Background

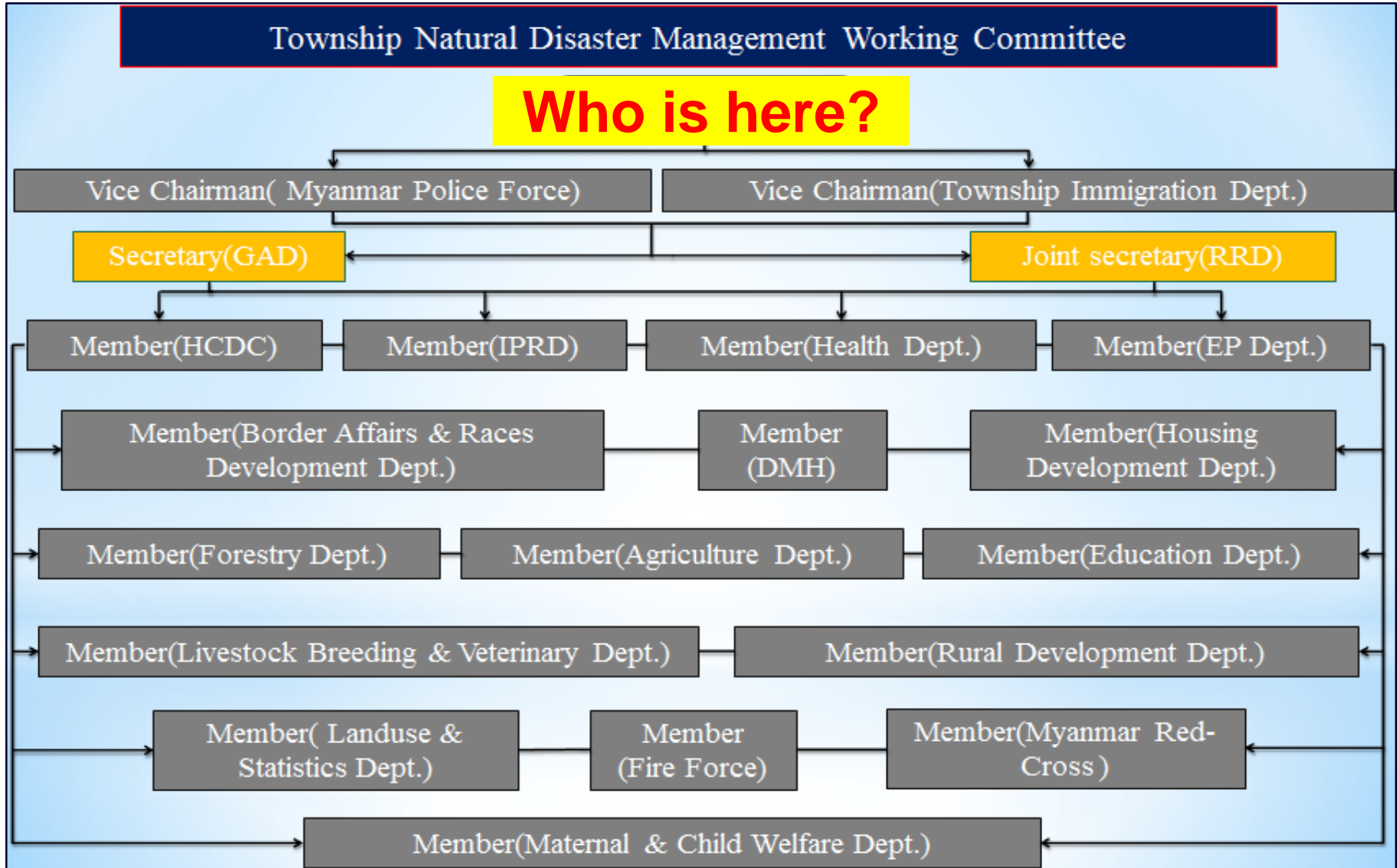
Nobody understand what we should respond



Township Natural Disaster Management Working Committee

Township Natural Disaster Management Working Committee

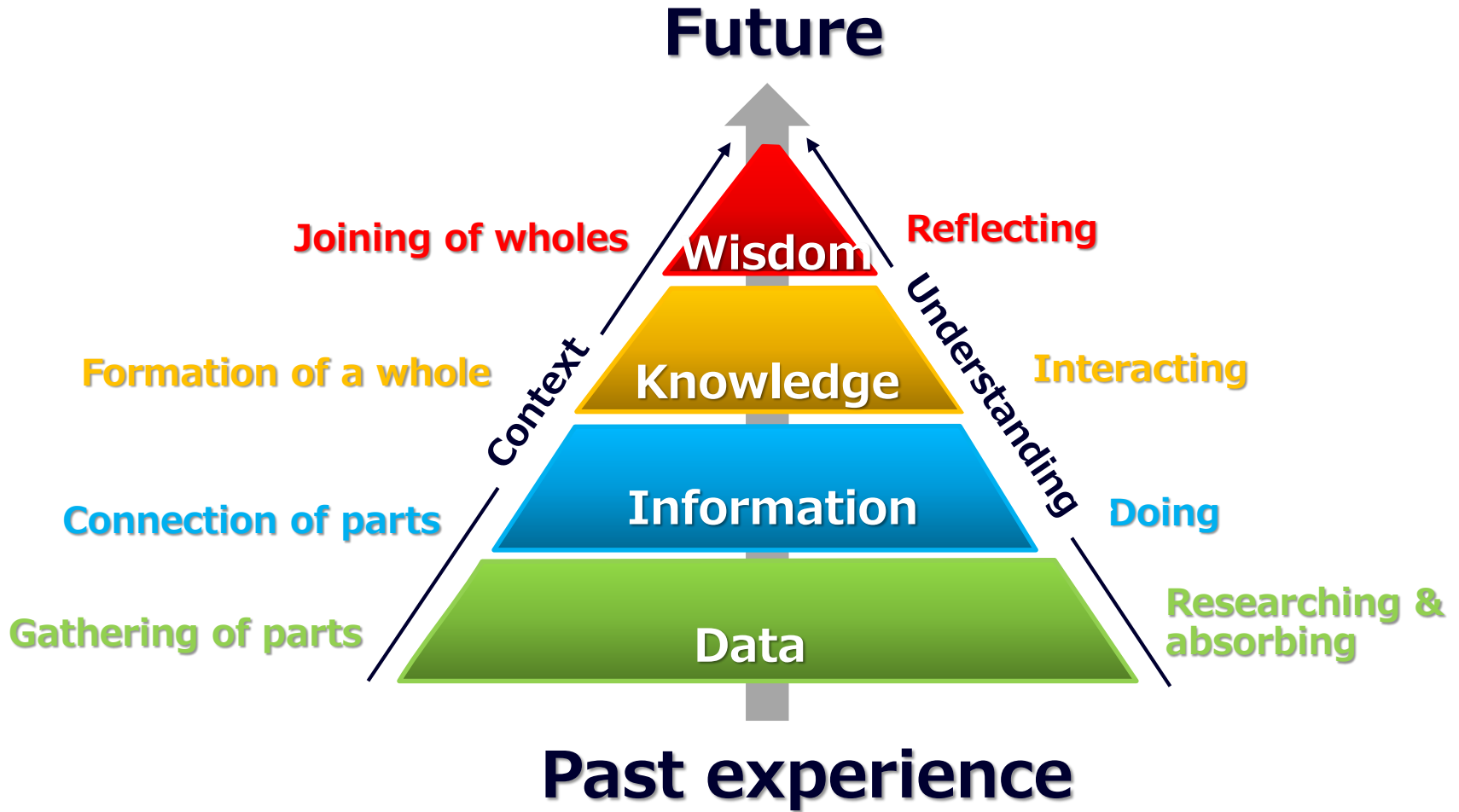
Who is here?



GAD training for directors
6 February 2019.
Total about 350 GAD staffs are trained.

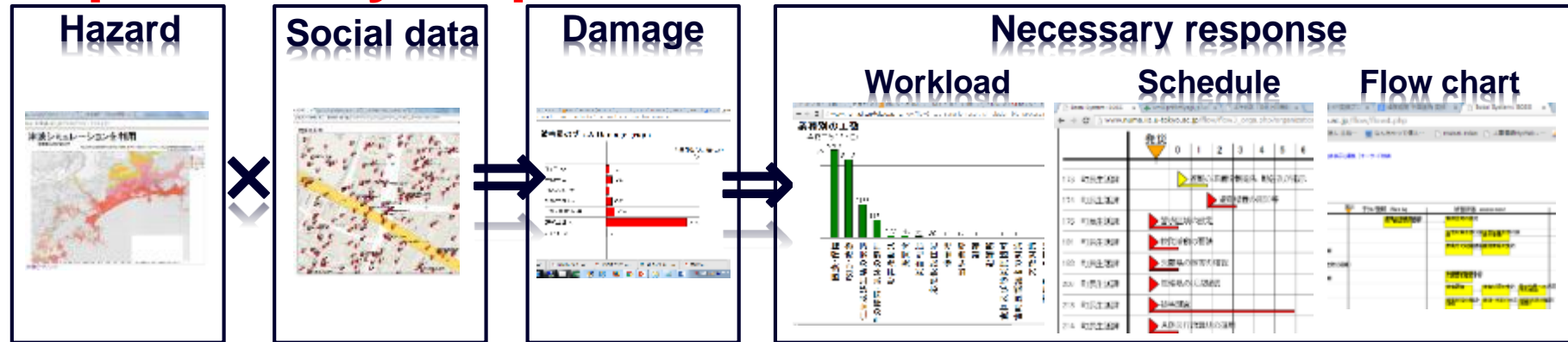


Past knowledge management and sharing



What is the effective responses?

Impact analysis process



Governance/ Team building

Functional location

Evacuation

Shelter

Self- defense

Material
logistics

Volunteer

Debris

Temporary
house

Dead body

Public house

Integration analysis of route network

Information management

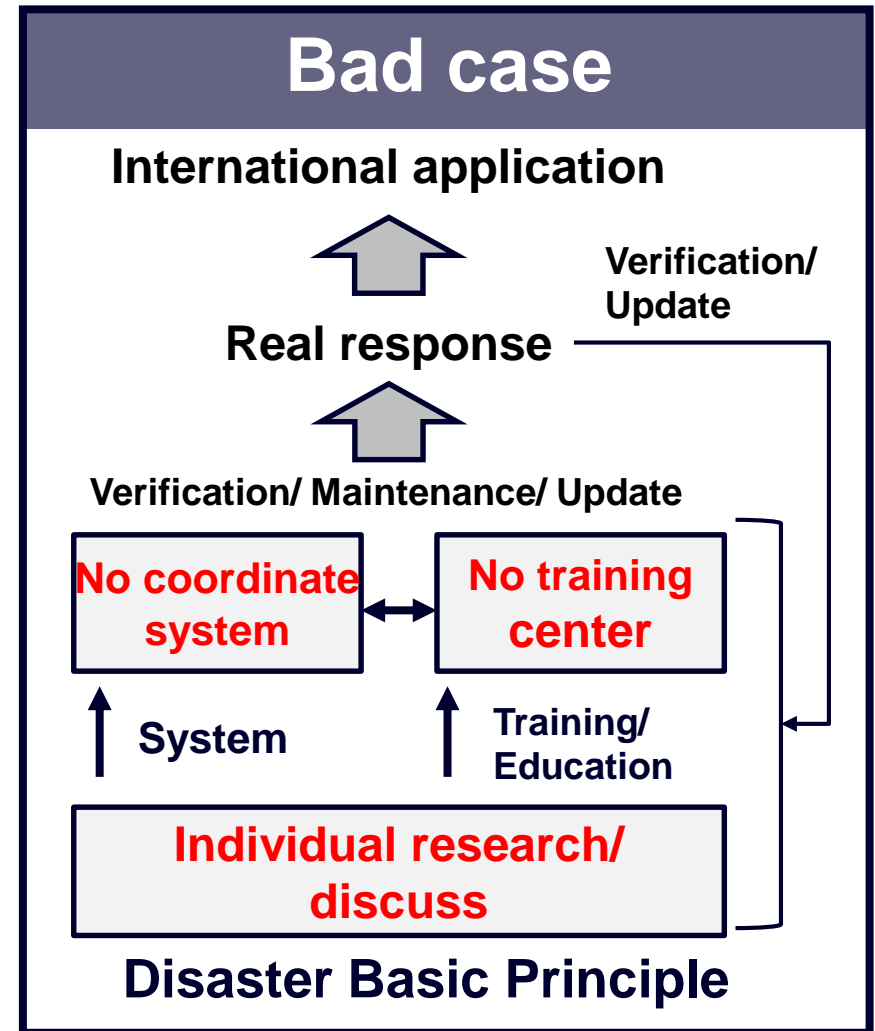
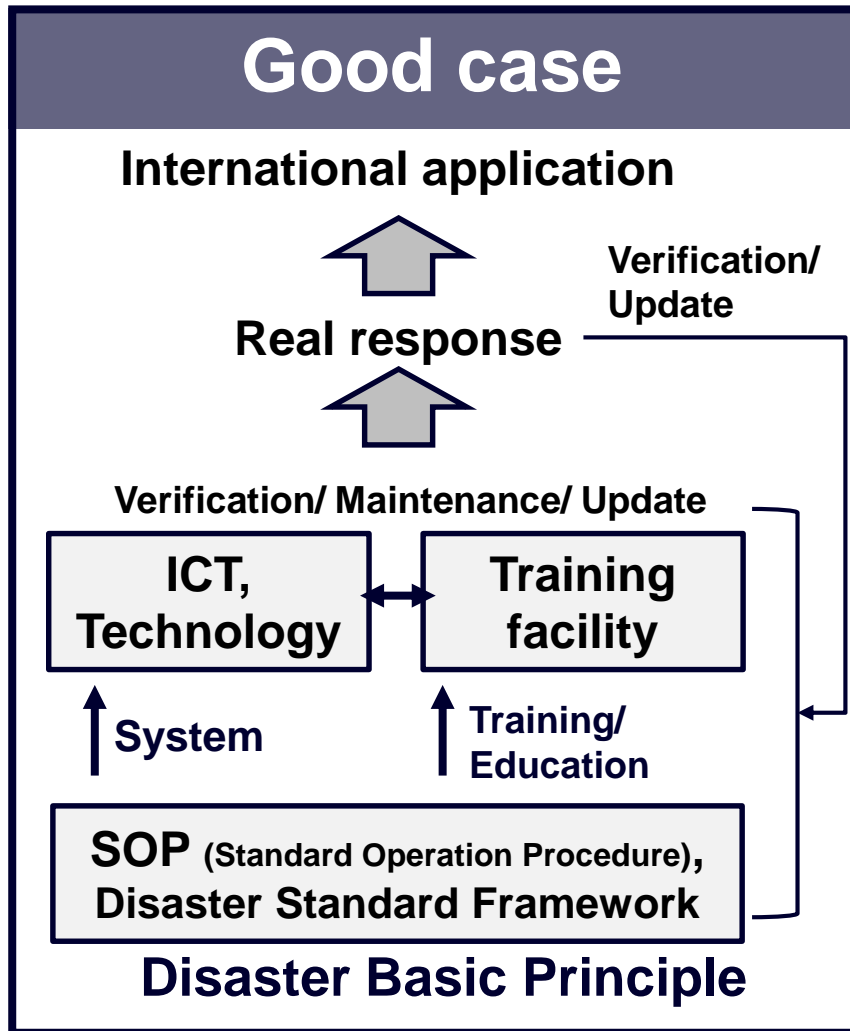
Kinds:

- Hazard information
- Damage information
- Response information

Description: GIS, List, Route

Dissemination: Last mile

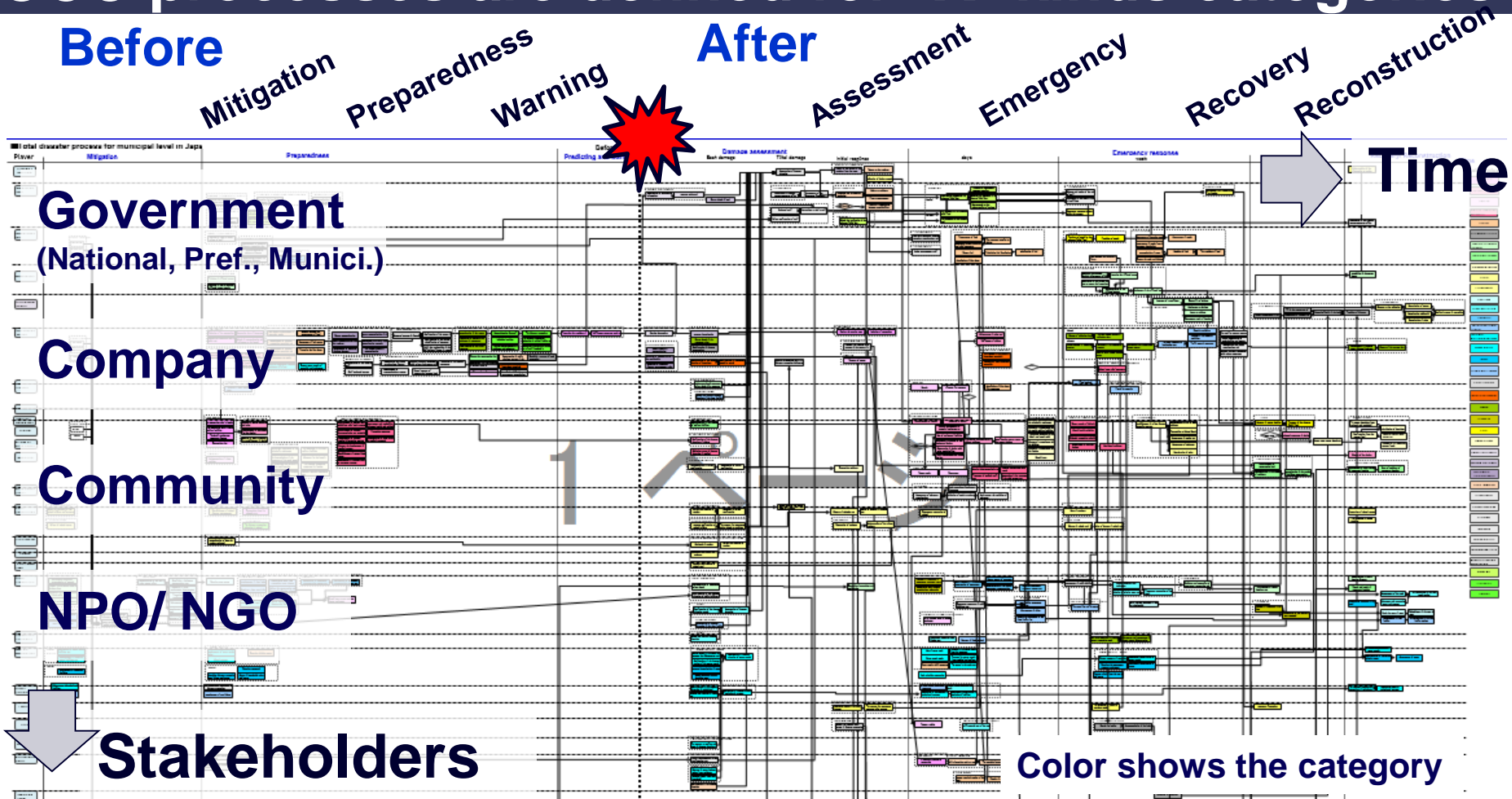
Disaster Basic Principle for ASEAN



1. Background

Process based disaster management

500 processes are defined for 47 kinds categories



Standard Operational Process should be developed in ASEAN

STB 47 (Disaster response model)

People

- Evacuation
- Medical
- Search and Rescue
- Goods (Food, material)
- Processing of body
- Stability of life
- Temporary
- Vulnerable people
- Education
- Consultation

Shelter

Logistics

Dead body

Asset

- Land use
- Road
- Transport
- Security and Traffic
- Agriculture facilities
- Water supply
- Sewer
- Electricity
- Gas
- Telecommunications
- Rivers and coastal
- Public building
- Hazardous materials
- Waste
- Obstacle

Money/ Law

- Fund
- Finance
- Accounting
- Relief money

Organization

- Organization
- Volunteer
- Voluntary disaster prevention organization
- Mutual support
- Self-Defense Forces
- Residents
- Aviation Emergency Management
- Relief Act

Information

- Hazard
- Damage
- Communication
- Mass media

Training

- Disaster drill
- Disaster education

47 responses

How do you recognize your family and yourself ?



Country	Deaths	Missing
Indonesia	167,736	37,063
Sri Lanka	35,322	6,700
India	18,045	5,640
Thailand	8,212	2,817
Myanmar	500	500



Deaths	Missing	Injured
15,893	2,553	6,152

2017/3/10

You are “Unidentified as you”.

DNA bank for your family and yourself to be recognized as ASEAN platform

2. DNA

Correct religious ceremony of your death is important for your next happy life

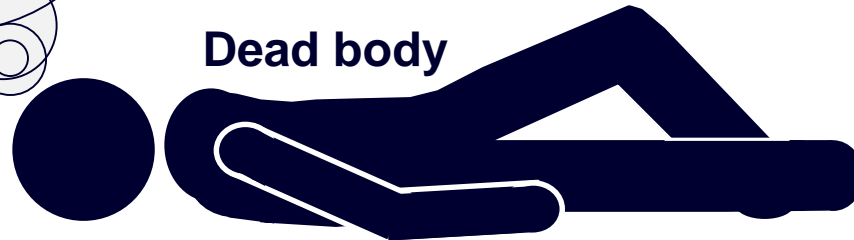
Without DNA bank

No!!!!
I am a **Islam**.
Don't **cremate**,

What is his religious?
May be, he is **Buda**.
So Let's **cremate**.

Actually, 7 years has passed from the 2011 Great East Japan Earthquake. Now police is working for identify the dead body in Japan.

If we can interview him, what he say?



Police

2. DNA

Correct religious ceremony of your death is important for your next happy life

With DNA bank



Result



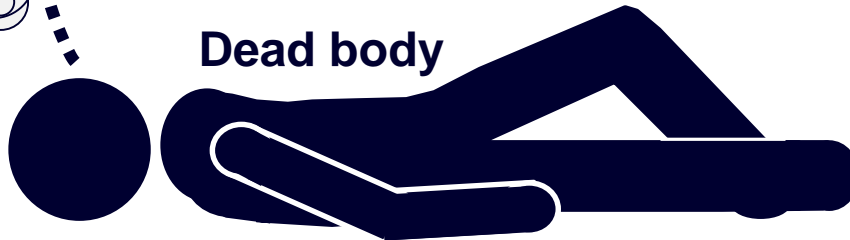
You are Mr. Kuroda.
He is a **Islam**.
So Let's **bury**.

Yes!!!!
I am a Islam.
Please bury (interment) me.
Then I can be a happy
in next life, **Thank you!!!!**



Police

Dead body



If we can interview him,
what he say?

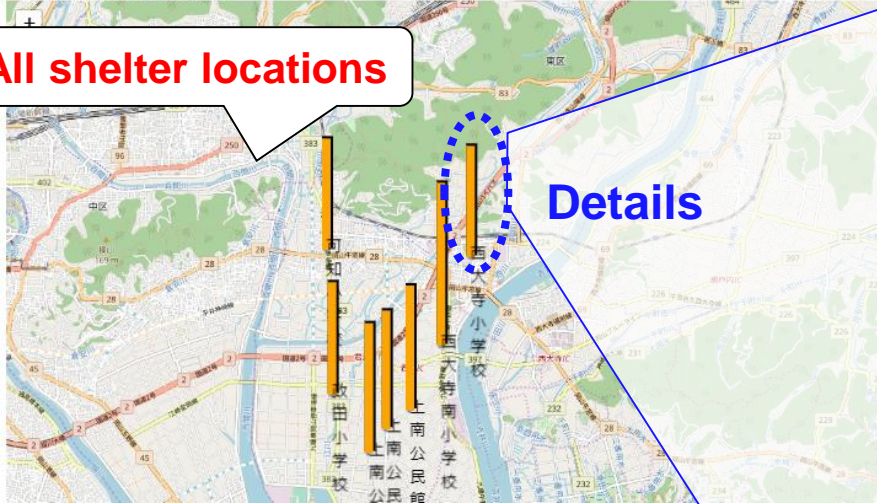
3. Evacuation

Evacuee information platform in ASEAN

Imagine if your drugs cannot be provided...

避難所情報共有システム **COCOA**

All shelter locations



Details

Register new evacuee (Initial input)

Name list of this shelter

List of all evacuee

Search name : SEARCH

Next page 1/6visualize

Search word: no 261people

First page Last page all

ID	Name	Age	Sex	Baby	Elder	Pregnant	Single	Handicap	Care	Infection	Others	Necessary of care	Update	Delete
1504355609	櫻村 陽介	69	男性	-	-	●	-	●	-	-	-		update	delete
1504356054	吉屋 志ん太	20	男性	-	-	-	●	-	●	-	-		update	delete
1504356096	ほし 悠		男性	-	-	-	-	-	-	-	-		update	delete
1504356001	近藤 隆		男性	-	-	-	-	-	-	-	-		update	delete
1504356105	長田 久美子		女性	-	-	-	-	-	-	-	-		update	delete
150435626	高橋 隆		男性	-	-	-	-	-	-	-	-		update	delete
1504356087	菅原 隆	6	男性	-	-	-	-	-	-	-	-		update	delete
1504356081	玉木 隆太		男性	-	-	-	-	-	-	-	-		update	delete
150435604	藤山 勝久		男性	-	-	-	-	-	-	-	-		update	delete
150435626	吉澤 雅功		男性	-	-	-	-	-	-	-	-		update	delete
1504356135	神谷 賢治		男性	-	-	-	-	-	-	-	-		update	delete
150435638	柳田 光		男性	-	-	-	-	-	-	-	-		update	delete
1504356271	田尻 明		男性	-	-	-	-	-	-	-	-		update	delete

ASEAN ID

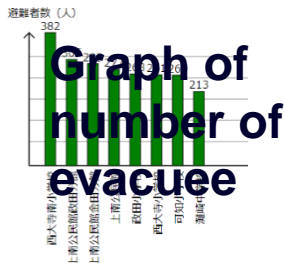
Age

Sex

Special assistant

Necessary drugs

避難者数 (避難者名簿の集計)



Graph of number of evacuee

All list of shelter

ID	避難所名	市町村	避難所名	避難者数 (名簿上)
2990	西山町	西山市	西大寺小学校	382
2997	西山町	西山市	上南公民館分館	305
2996	西山町	西山市	上南公民館分館	293
2994	西山町	西山市	上南公民館	227
2993	西山町	西山市	西大寺小学校	262
2992	西山町	西山市	西大寺小学校	213
3105	西山町	西山市	西大寺小学校	21
3094	西山町	西山市	西大寺小学校	20
11371	西山町	西山市	西大寺小学校	10

Photo

Conditions



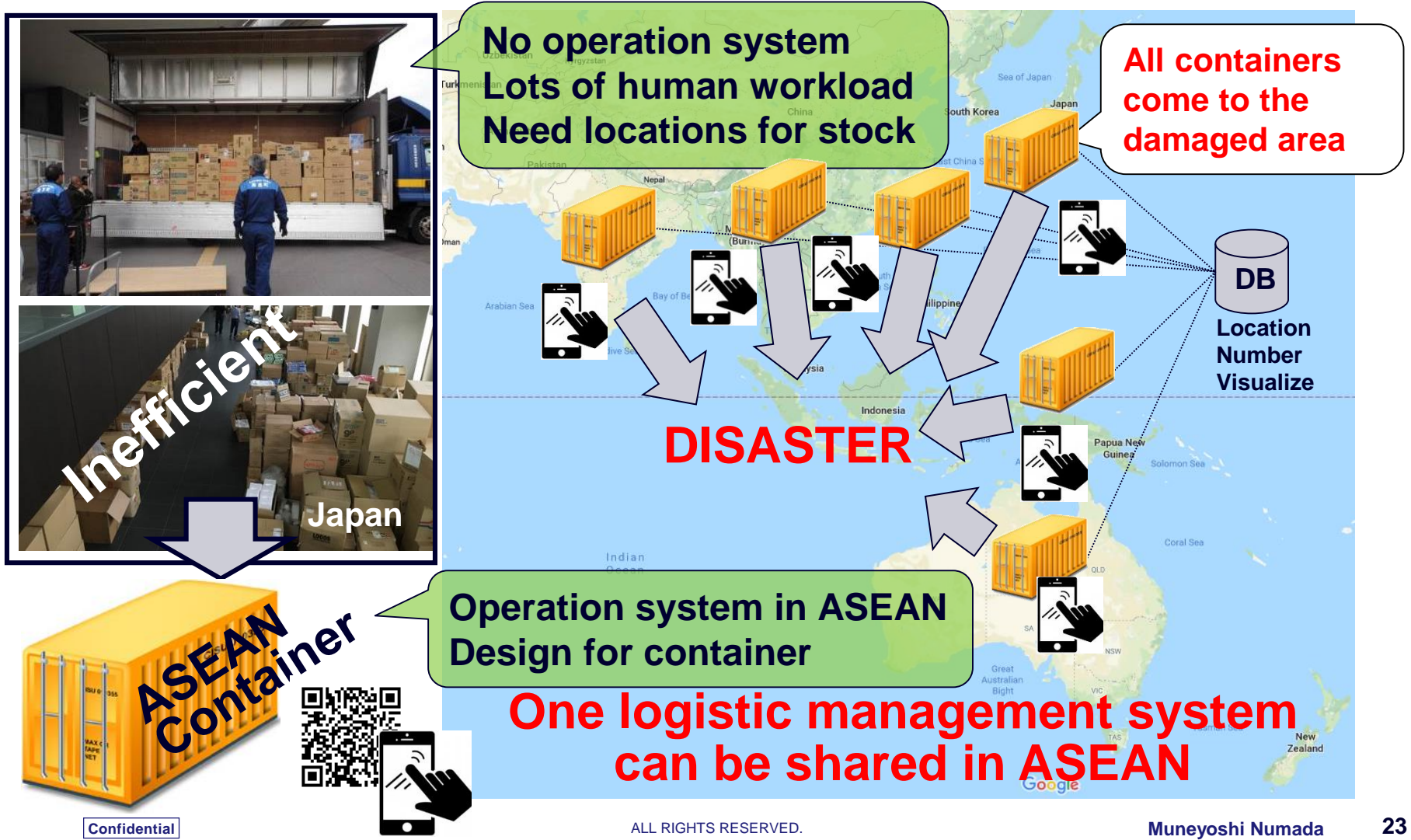
Food, water, material

One shelter management system can be shared in ASEAN.
No need to develop by each country.

4. Logistics

ASEAN emergency logistics platform for disasters

People community can join the move and info.



5. Training

Thunderbird concept: International platform for disaster management



Indonesia, BNPB



Japan, The University of Tokyo



Civil protection in Italy



Bangladesh, Department of
Disaster Management



Myanmar Disaster Management
Training Center - Hinthada



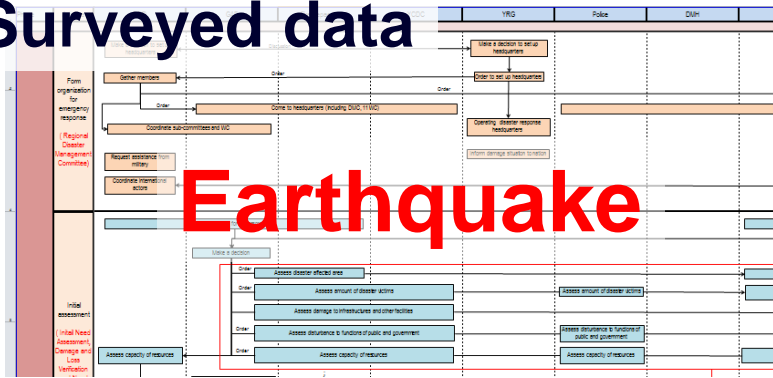
America, University of Hawaii

Disaster training program network
We can share the standard
responses, tools, etc.

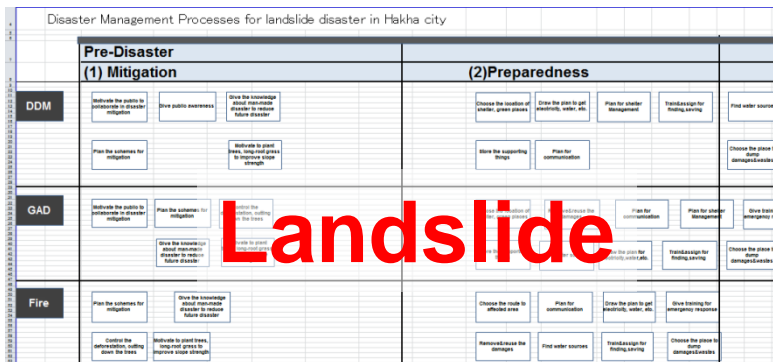
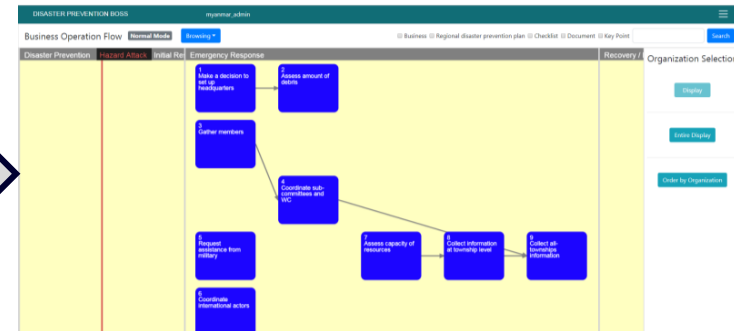
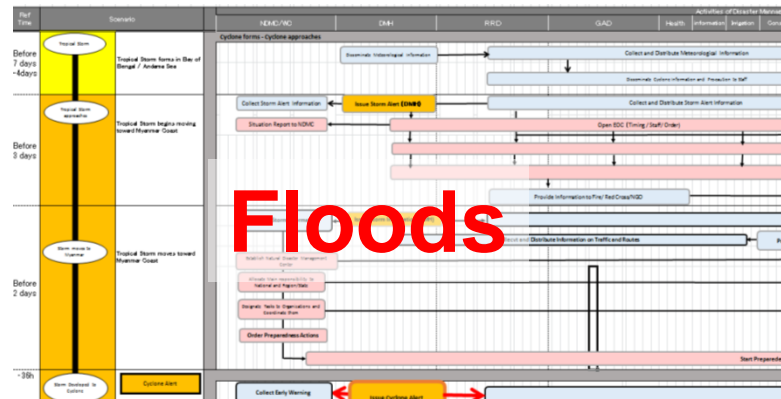
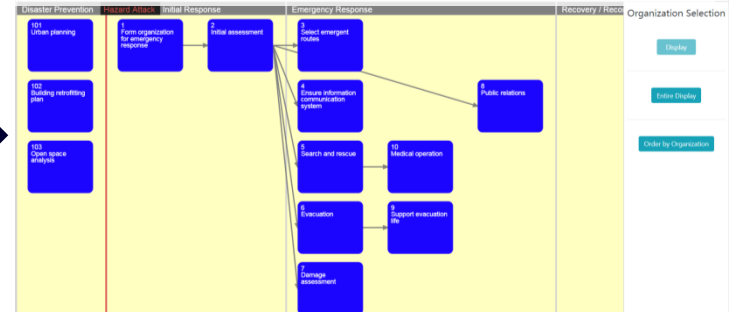
**Thunderbird team will go to the disaster area and
support the local governments.**

Response flow charts for three hazard were completed

Surveyed data



Imported to the system



Business Operation Support System: BOSS

The screenshot displays the BOSS (Business Operation Support System) interface for disaster response. The main area shows a workflowchart divided into three stages: 災害予防 (Disaster Prevention), 応急対応 (Emergency Response), and 復旧・復興 (Recovery/Reconstruction). The workflow starts with '1 災害対策本部の設置・運営' (Establishment and operation of the disaster response headquarters) and proceeds through various steps including communication assurance, information collection, and damage assessment. A central node '42 廃棄物の処理' (Waste disposal) receives input from multiple steps in the emergency response phase. The right sidebar shows a '組織選択' (Organization Selection) menu with various departments like '総務課総務係' (General Affairs Section) and '総務課財政係' (General Affairs Section - Finance).

災害対応工程管理システム 地震 minamiizucho_admin

業務フロー 通常モード

災害予防 | 発災 初動対応 | 応急対応 | 復旧・復興

1 災害対策本部の設置・運営

4 通信機能の確保・復旧

6 ハザード情報の収集・伝達

5 被害情報の収集・報告

8 相互応援要請・受入れ・活動調整

2 職員の動員・管理

9 自衛隊・広域消防の応援要請・受入れ

10 住民への全庁的広報・マスメディア対応

47 災害救助法等災害関連法令の事務

43 財政・金融関連の措置

45 財源の確保・基金の活用

46 災害関連の出納

21 道路施設の被害状況把握・復旧

22 警備・交通規制対応

23 鉄道施設の被害・運行状況把握

31 障害物の除去

25 上水道施設の被害状況把握・復旧及び応急給水

26 下水道施設の被害状況把握・復旧

27 電力・ガス・通信の被害・復旧状況把握

28 河川・海岸施設の被害状況把握・復旧

29 公共建物・施設の被害状況把握・復旧

30 危険物施設の状況把握・安全確保措置

24 農地・農業施設の被害状況把握・復旧

17 文教施設の対応、応急教育

42 廃棄物の処理

組織選択

- 総務課総務係
- 総務課財政係
- 総務課防災係
- 議事事務局
- 企画課企画係
- 企画課情報政策係
- 地方創生室地方創生係
- 商工観光課観光推進係
- 商工観光課商工振興係
- 地域整備課公共管理係
- 地域整備課農林水産振興係
- 生活環境課水道係
- 生活環境課下水道係
- 生活環境課生活環境係
- 健康増進課健康増進係
- 健康増進課国民健康保険係
- 福祉介護課介護保険係
- 福祉介護課福祉係
- 福祉介護課子育て支援係
- 会計室会計係
- 町長課課税係
- 町長課納税係
- 町長課住民年金係
- 教育委員会学校教育係
- 教育委員会社会教育係

表示

全体表示

組織順

2月20日(木)_村....doc

DM policy english.pdf

DM Act English.pdf

BOSS活用訓練開....doc

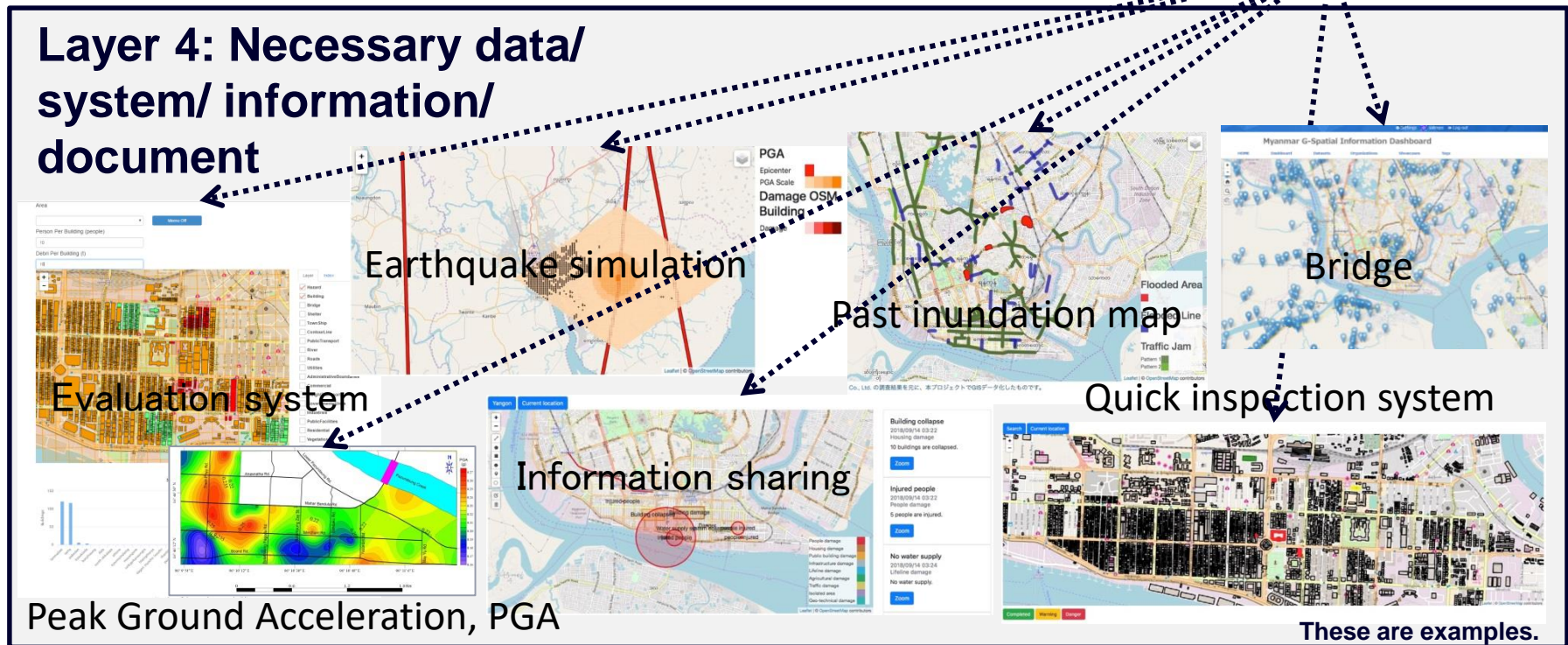
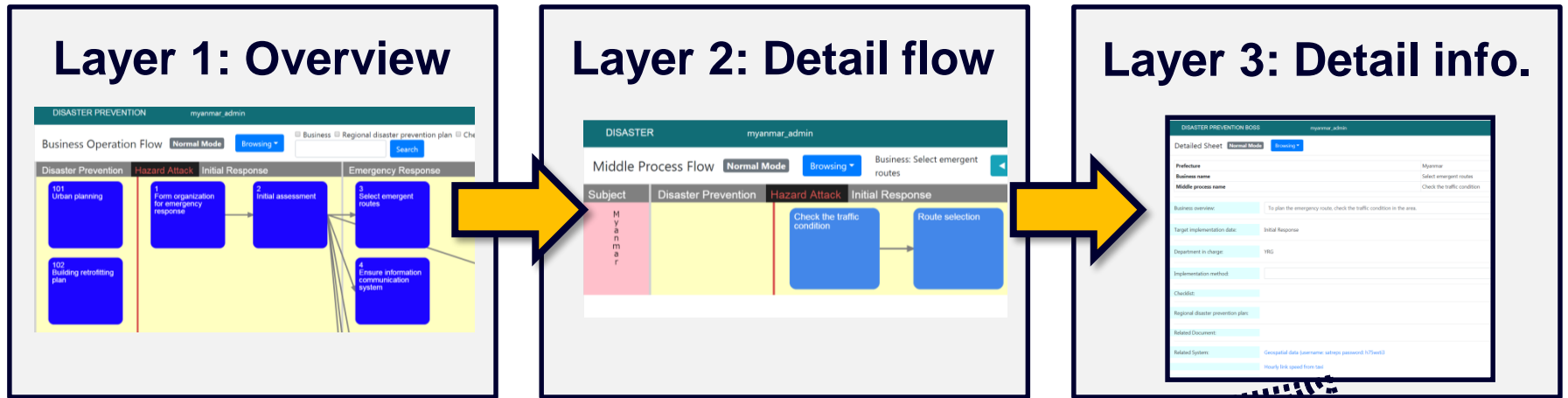
FR JP ABSTRACT 2....pdf

すべて表示

ここに入力して検索

14:53 2019/12/26

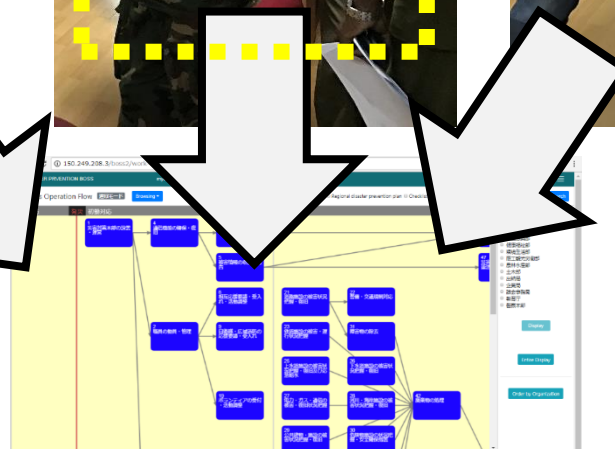
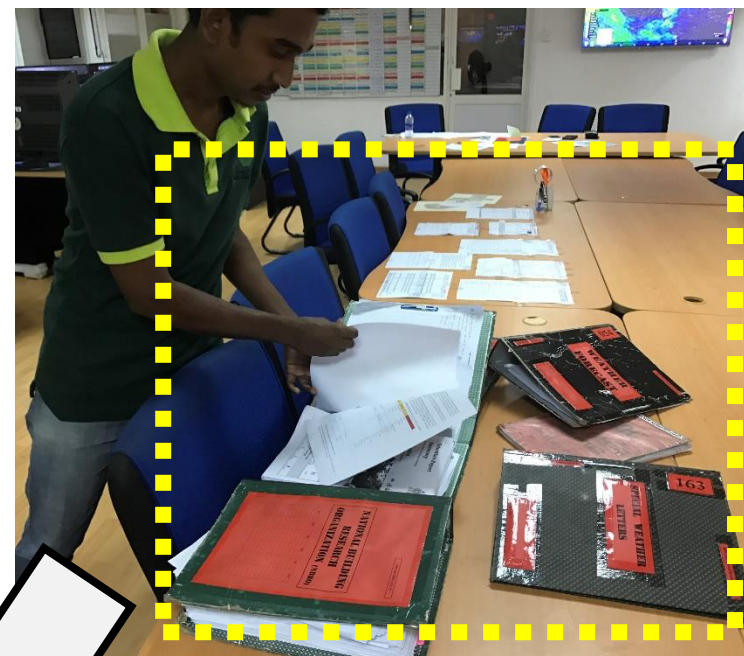
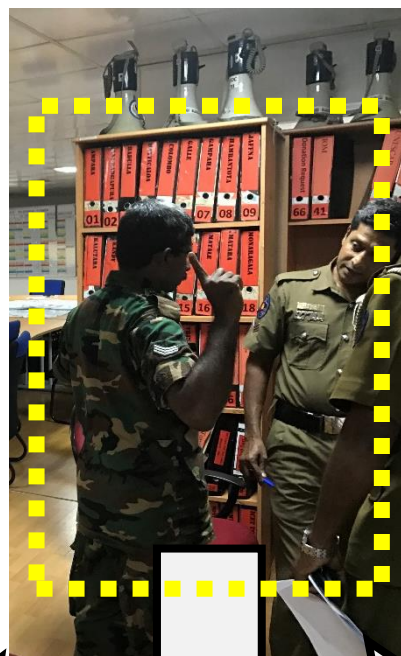
Structure of the disaster management support system



Update the ideal processes/ flowchart



Data Archive of documents for knowledge sharing



**Data Archive/
Data base**

Workshop: Update the contents of BOSS

<http://eng.iis-boss.com/users/login>

Id: yangon_admin

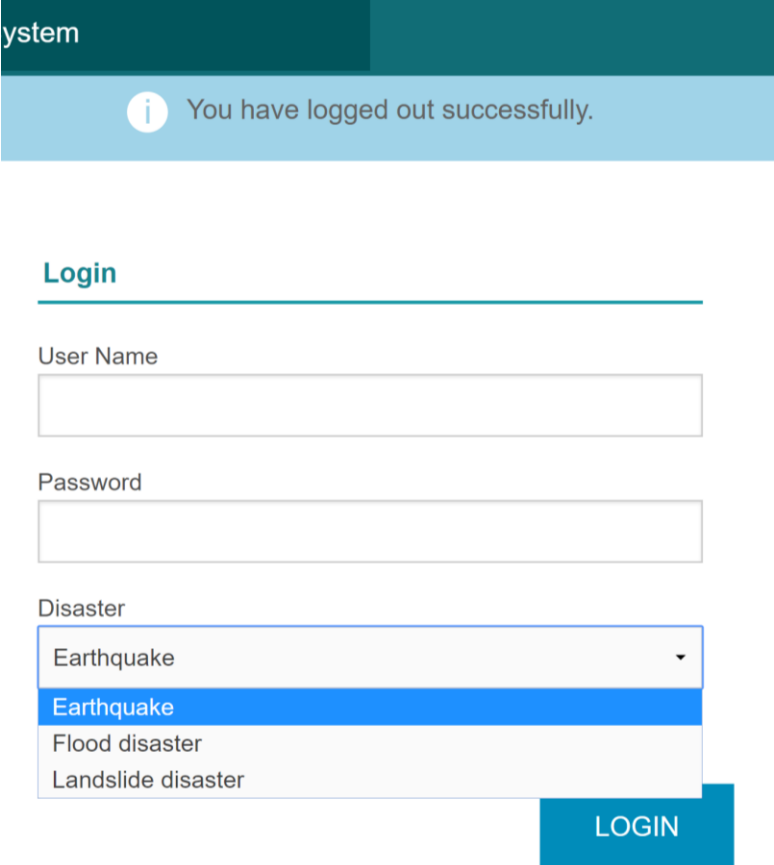
Pa: kumamon

Group 1:

Login as: **Earthquake**

Group 2:

Login as: **Flood**



ystem

i You have logged out successfully.

Login

User Name

Password

Disaster

- Earthquake
- Earthquake**
- Flood disaster
- Landslide disaster

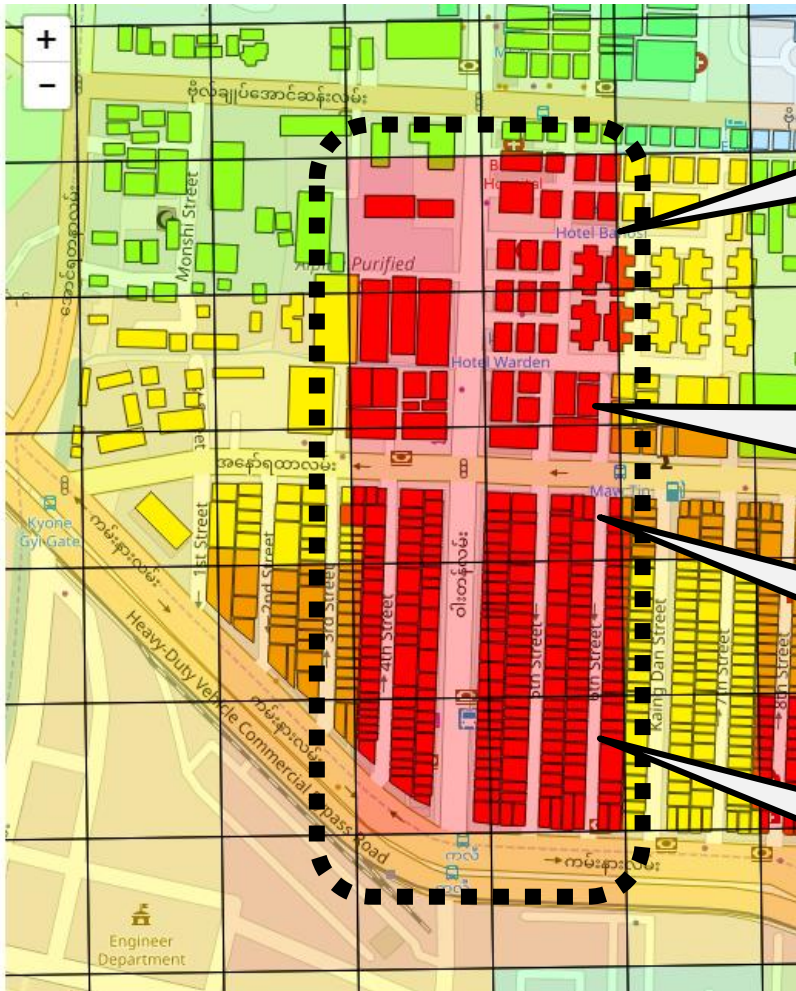
LOGIN

Mission: Update the followings

Group 1: **Earthquake**

- 5. Collection and reporting of damage information
- 12. Emergency evacuation and rescue activities by government staffs
- 15. Setting up and management of shelters
- 21. Grasp and repair of road facilities
- 22. Security and traffic regulation
- 24. Grasp of damage to farmland and agricultural facilities and recovery
- 29. Grasp of damage to public buildings and facilities and recovery

Simple concept



1. Affected area

2. How many people are affected?
> 100 people

3. Send EW message to the 100 people

4. Understand who are evacuated

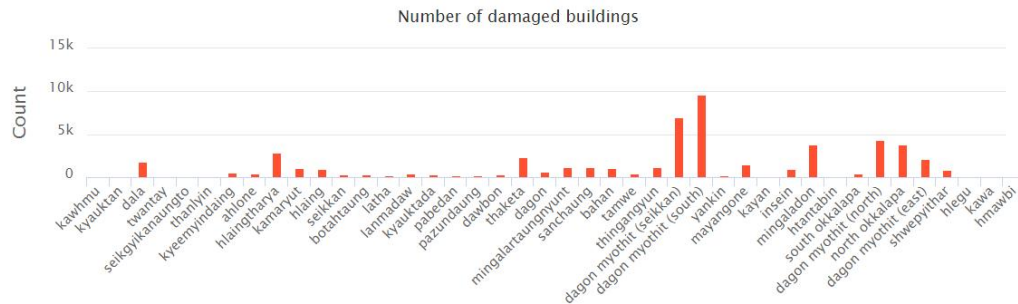
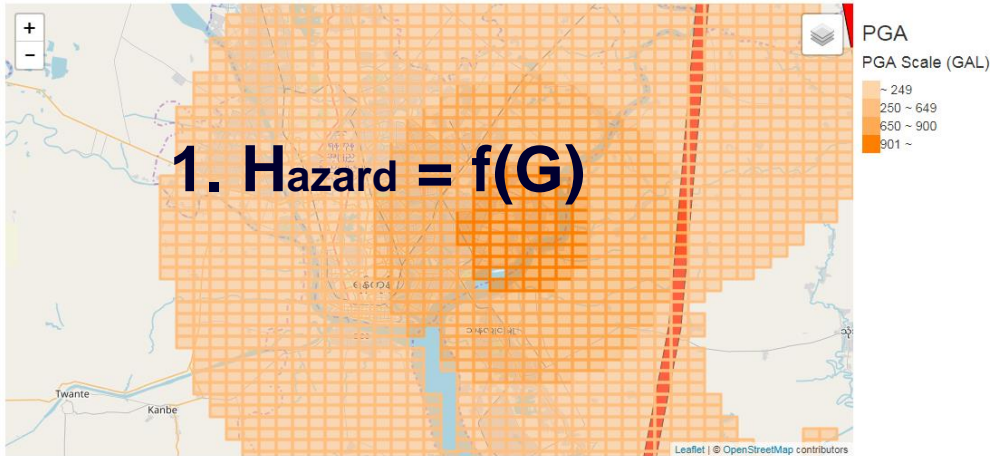
Earthquake simulation

How many damages ?
How many workload ?

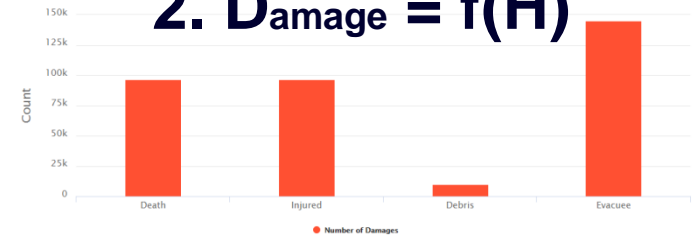
Earthquake Simulation

Moment magnitude (Mw)

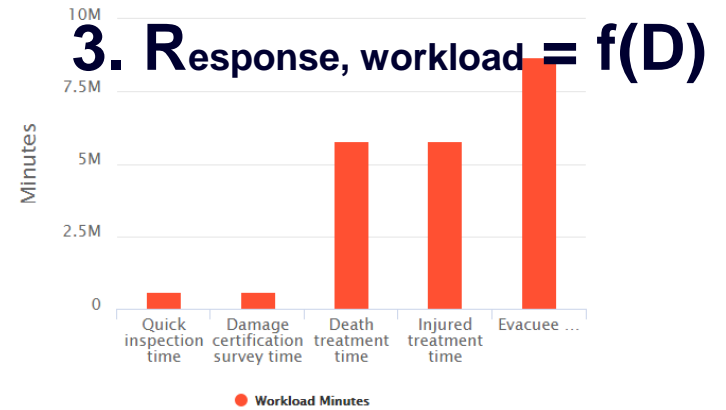
Focal depth [Km]



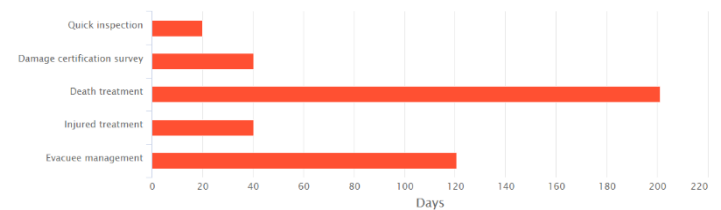
2. Damage = f(H)



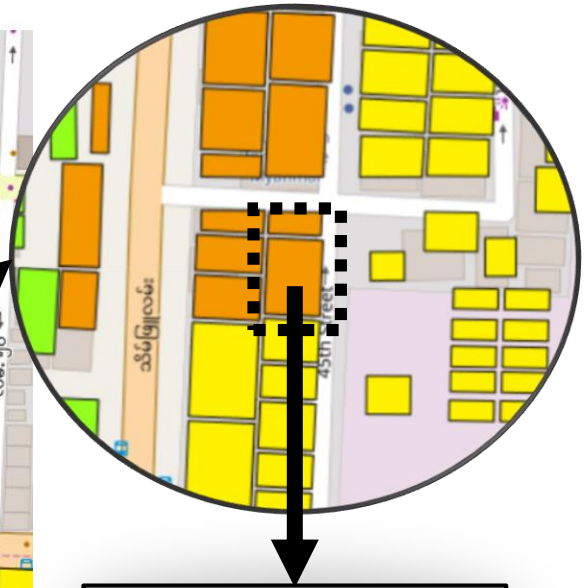
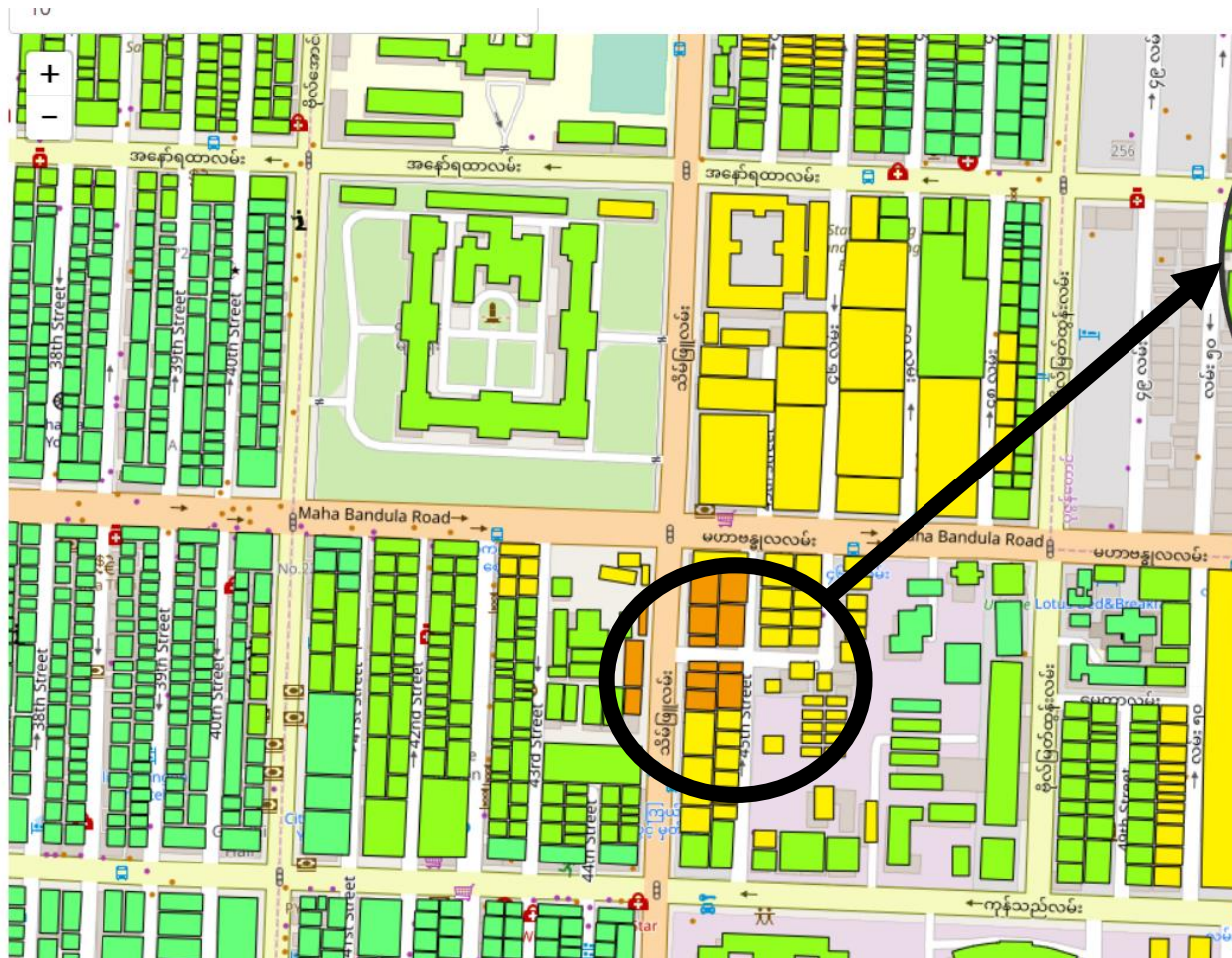
3. Response, workload = f(D)



4. Response, schedule = f(D)



All Building Data set



Building details

Building ID:644

Population:

Building_H:24

Damage Situation

Damage Images

Quick inspection of buildings / Damage assessment of buildings



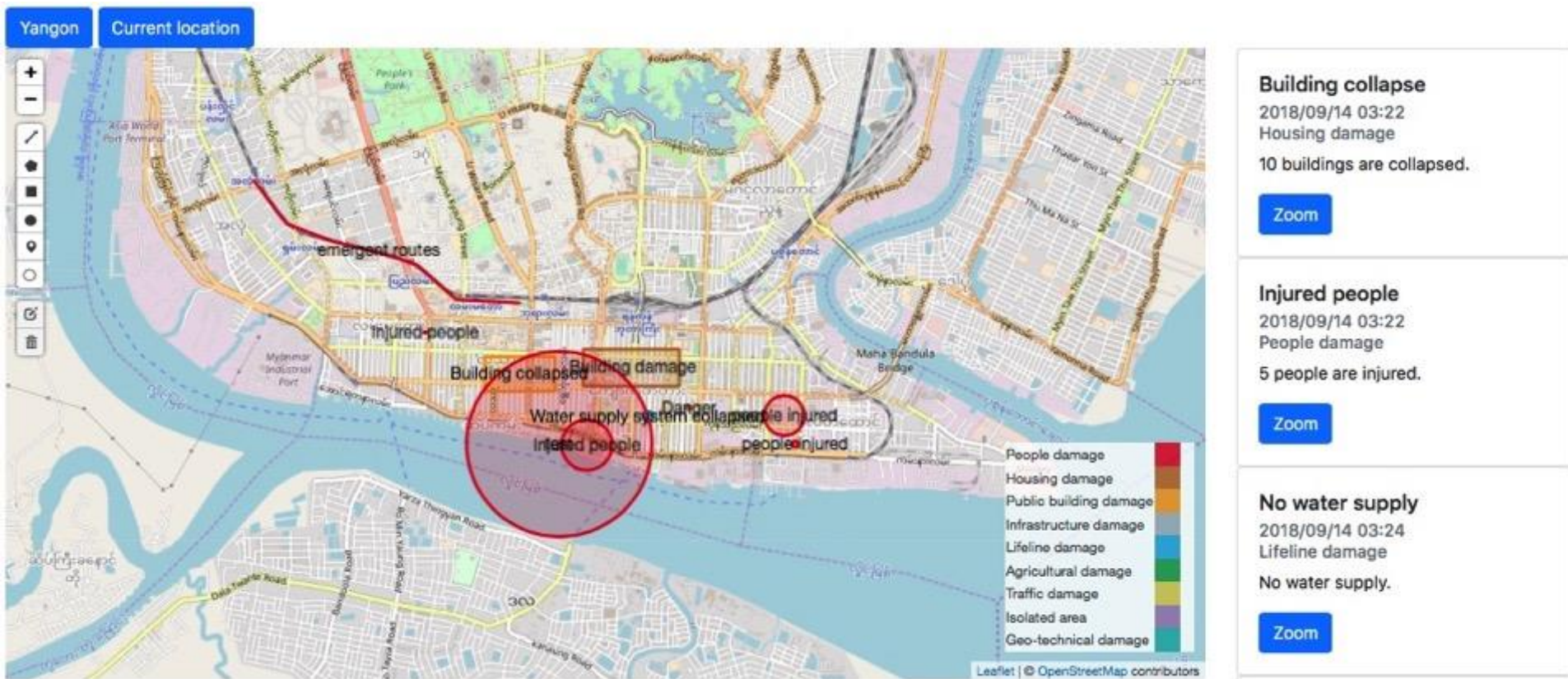
- Select a building, and give an attribute from Smart phone.



- The information will be sent to server.

Information sharing

- Sharing damage information on WebGIS
- Make a vector data, and input some attributes



Menu



災害対策トレーニングセンター
東京大学大学院情報学環総合防災情報研究センター
生産技術研究所都市基盤安全工学国際研究センター
Disaster Management Training Center, CIDIR, III/ ICUS, IIS,
The University of Tokyo

📖 ストアを表示

👤 ログイン

👤+無料で会員登録する



👉 ログイン

ログイン

>>新規会員登録はこちら

>>パスワードを忘れた方はこちら

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E-Learning system



DMTC
Disaster Management Training center

Thank you

Muneyoshi Numada
numa@iis.u-tokyo.ac.jp

<http://tdmtc.tokyo/>

