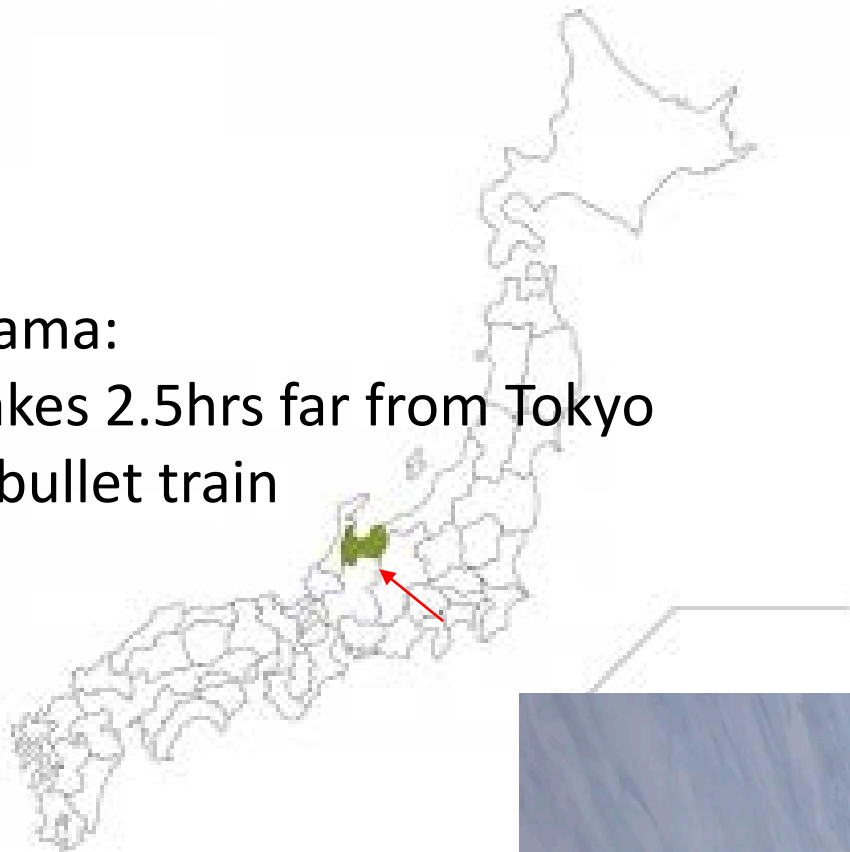


What should we do for effective Common Operational Picture by taking advantage of Big-Data?

Faculty of Sustainable Design,
University of Toyama, JAPAN

Munenari INOGUCHI

Toyama:
It takes 2.5hrs far from Tokyo
by bullet train



Tateyama Kurobe Alpine Route

A lot of foreigners visit
here every year.



Today's topic

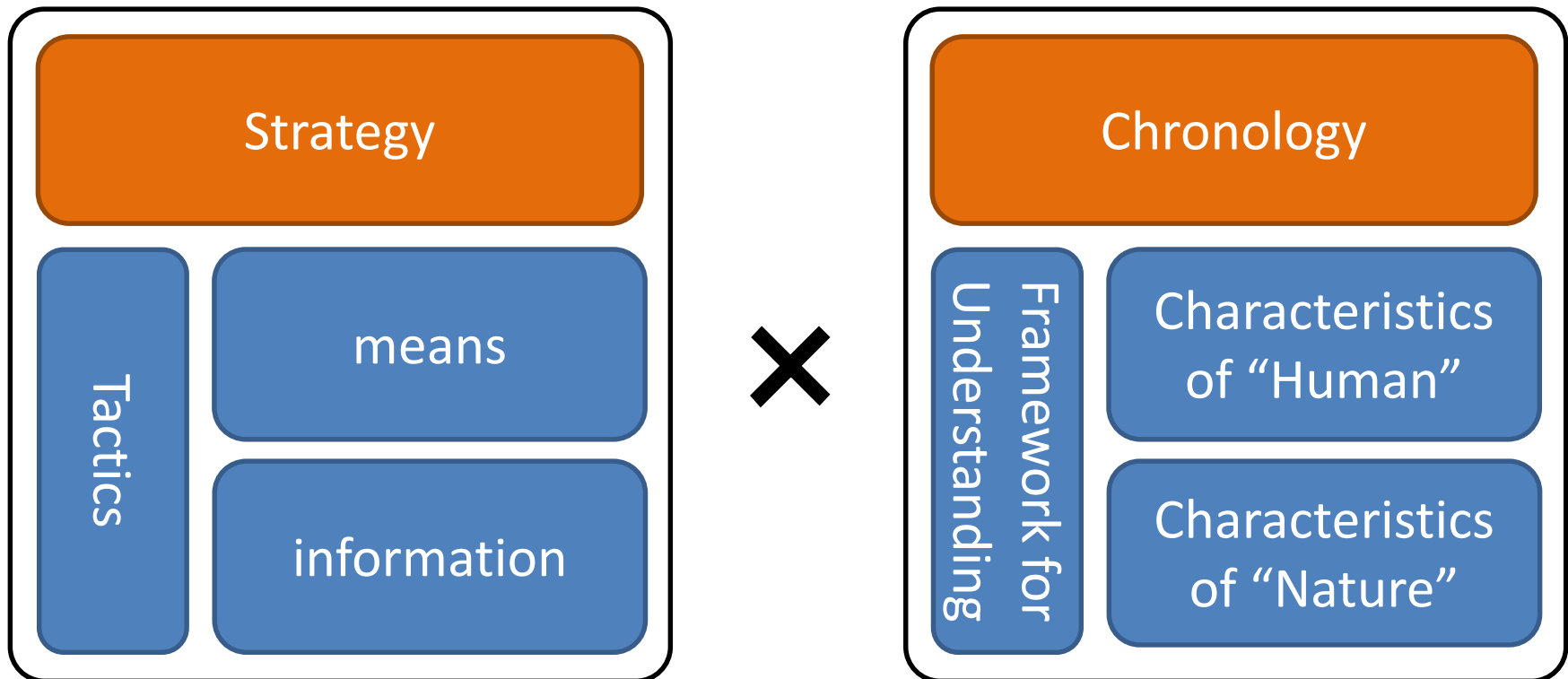
- Background and Framework for Bigdata Management
- Common Operational Picture as Situation Awareness in Urgent Response Phase
- Clarification of Information Management Process and Work Issues for struggling with BigData
 - Data use and application council for Resilience
 - CyborgCrowd (Harmonious Collaboration between Human & AI)

Keywords related with ICT in disaster response

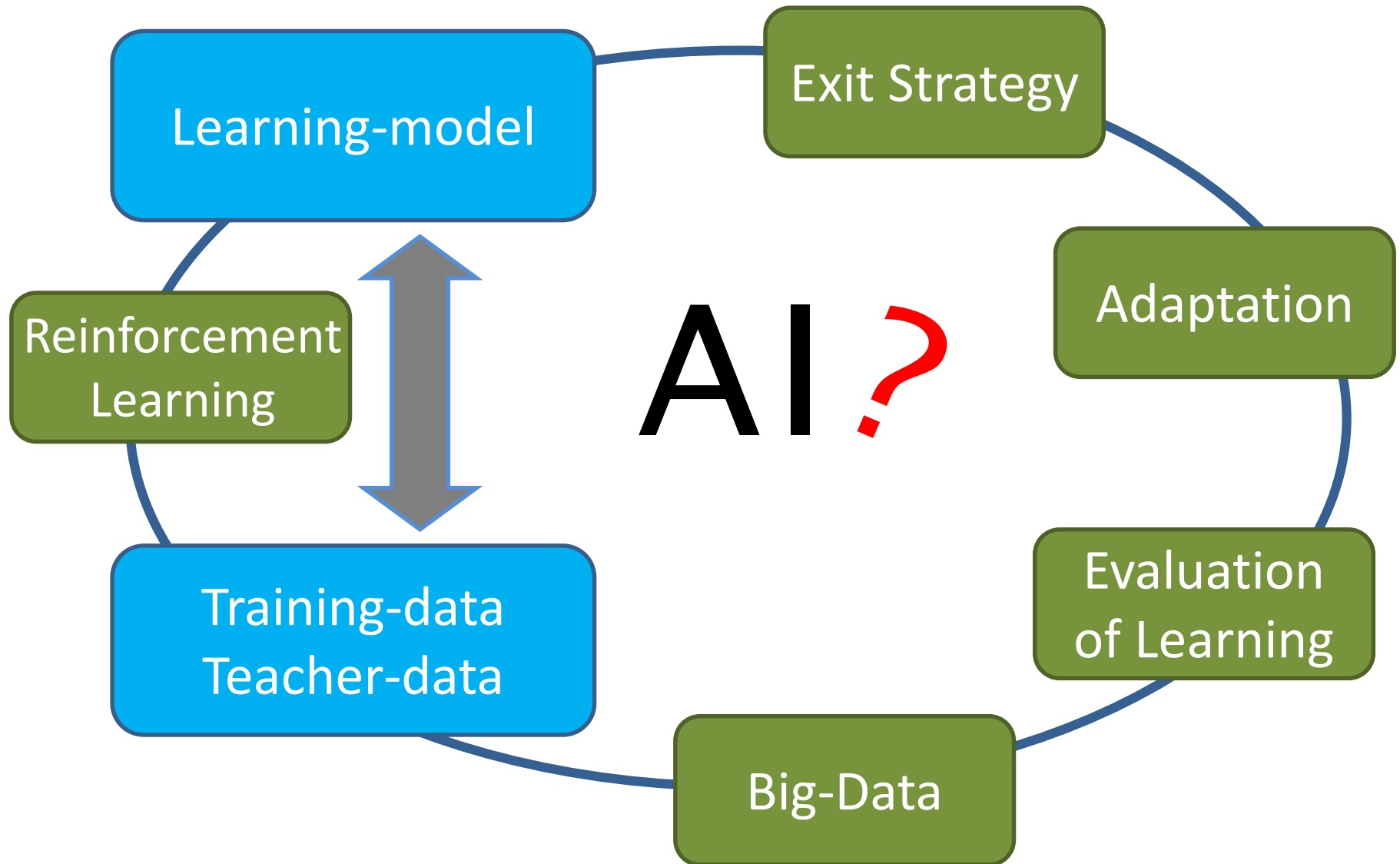
- 10 - 20 years ago
 - Non-structural measures
 - Rescue robots
 - Information Integration System
etc.
- In these 10 years
 - Society 5.0
 - Drone (UAV: Unmanned Aerial Vehicle)
 - AI (Artificial Intelligence)
 - SNS (Line / Facebook / Twitter ...)
etc.

How to handle AI and SNS

- Are AI and SNS useful for disaster response actually? -> probably YES
- However, AI and SNS are just “tool”.



How should we utilize AI?

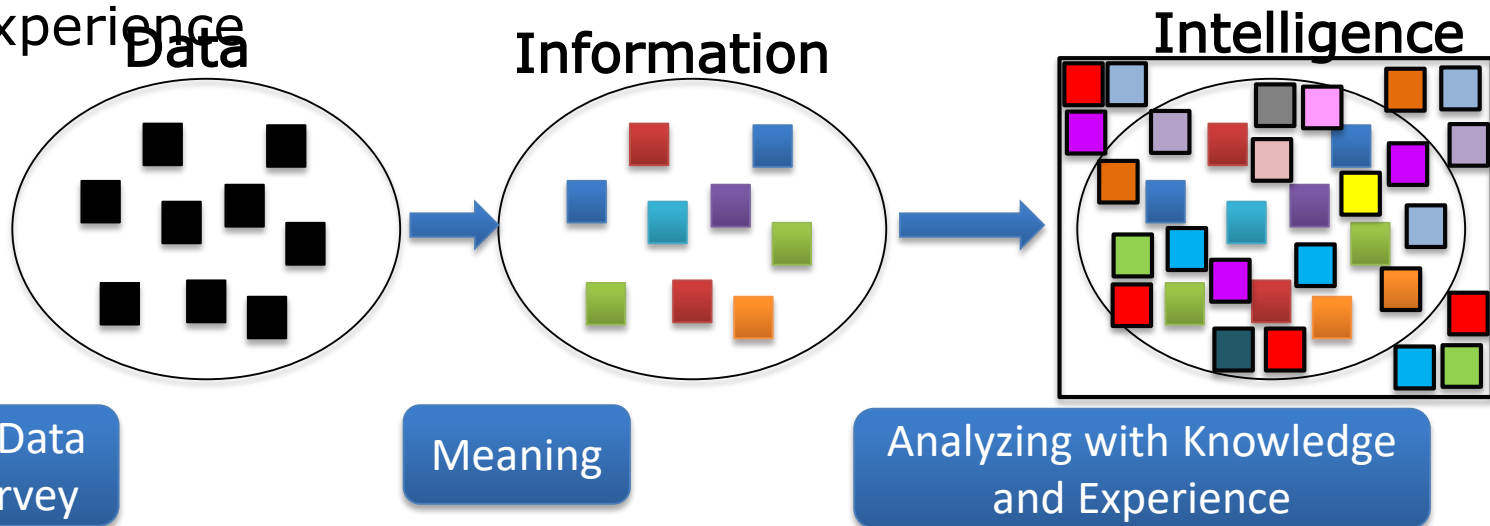


How should we design and judge effective strategy?

1. Define “Goal” to be realized
2. Clarify necessary matters for understanding and analyzing situation at disaster
3. Detect matters to be judged
4. Enumerate proposed measures (options you can do)
5. Design evaluation axes for each proposed measure
6. Detect merits/demerits by evaluation of measures

Information Strategy: From Information to Intelligence

- **Data**
 - Aggregation of Numeric/Text data retrieved from sensor or field survey
- **Information**
 - Understanding of the meaning of Data
- **Intelligence**
 - Understanding unrecognized situation by guessing background of information provision with knowledge or experience



History of ICT Utilization for Disaster Response

Hanshin-Awaji EQ in 1995



From 1995 to 2018



Media for Information Diffusion

Analog-TV



Data Broadcast System on TV



Web-page



Search by Google



Contribution-type Video



Real-time Streaming



Contribution-type Image



Social Media



Radio



Disaster Message Phone Service



1995: Public Telephone



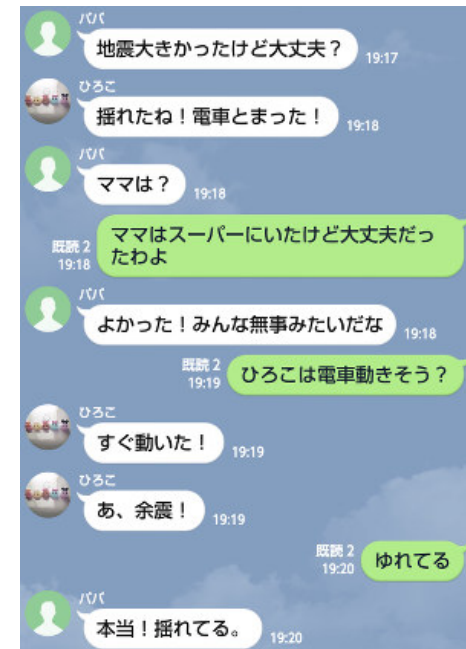
After 1995: “Disaster Message Phone Service” was started

penetration of
cell-phones ->
E-mail is a way
for confirmation
of the safety of
family or friends

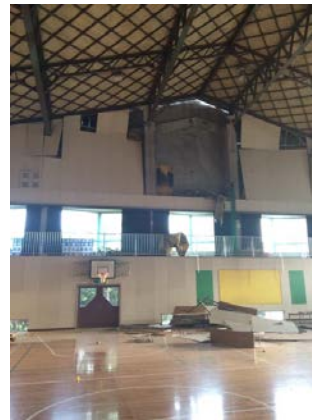
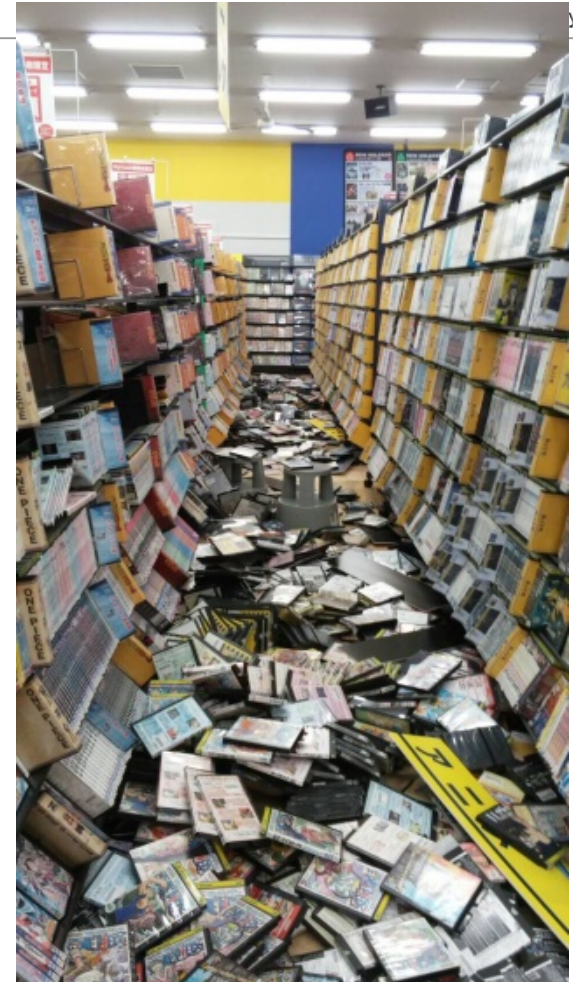


2011: Social media
supported to confirm the
safety of family or friends

Now: LINE is enough!



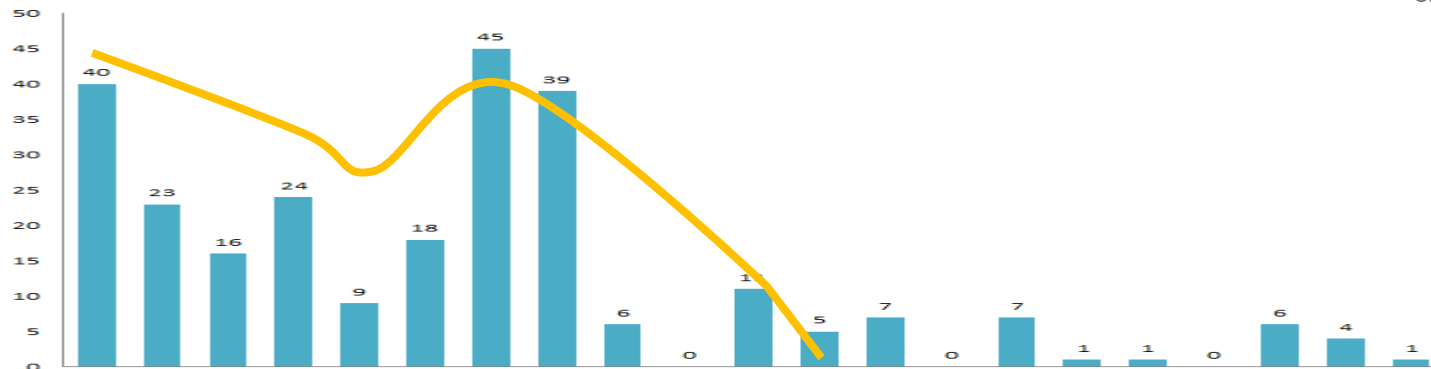
Precious Information: Posted Image into Social Media



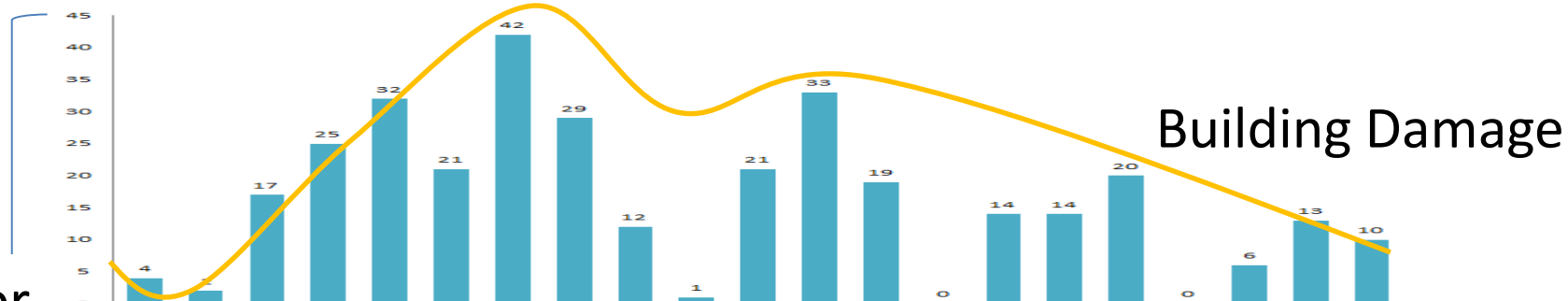
**Pictures related to Inside Buildings Damage
-> Only residents have those information**

Images were posted immediately after disaster occurrence in Social Media

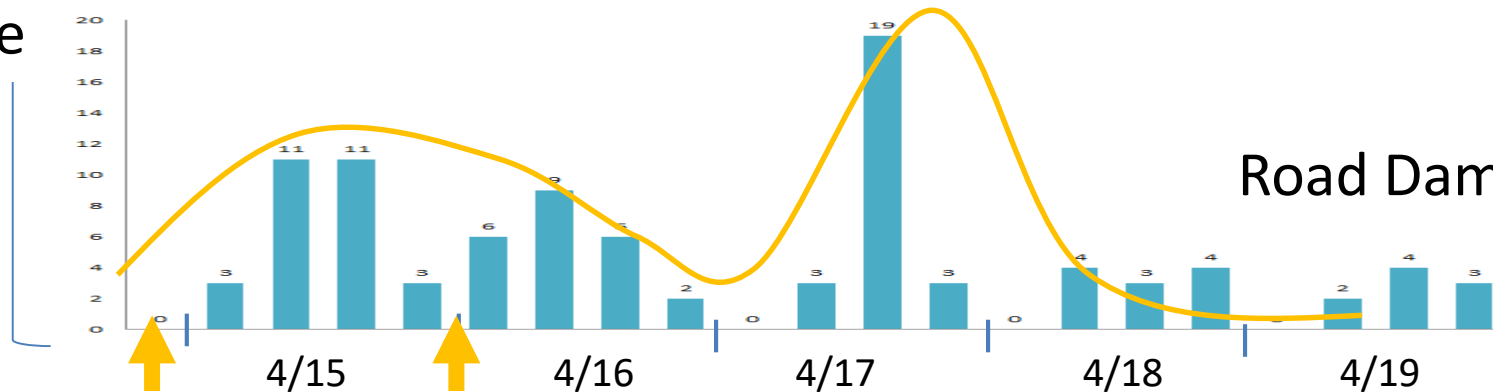
Indoor
Damage



Outdoor
Damage



Building Damage



Fore-Shock

Main-Shock

Fear of False Rumor

Lion



Boar (East Japan EQ, 2011)



Conflict: Rapidity vs Reliability

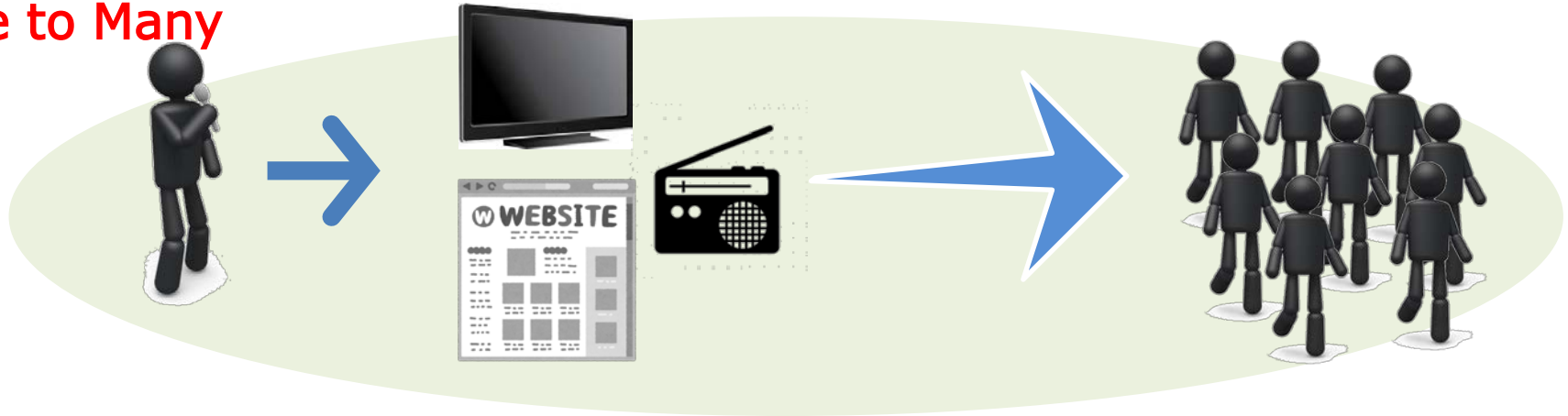
Residents could broadcast much info by themselves



Huge/Mega data could be collected and scattered

Measures to Collect / Broadcast Information have change

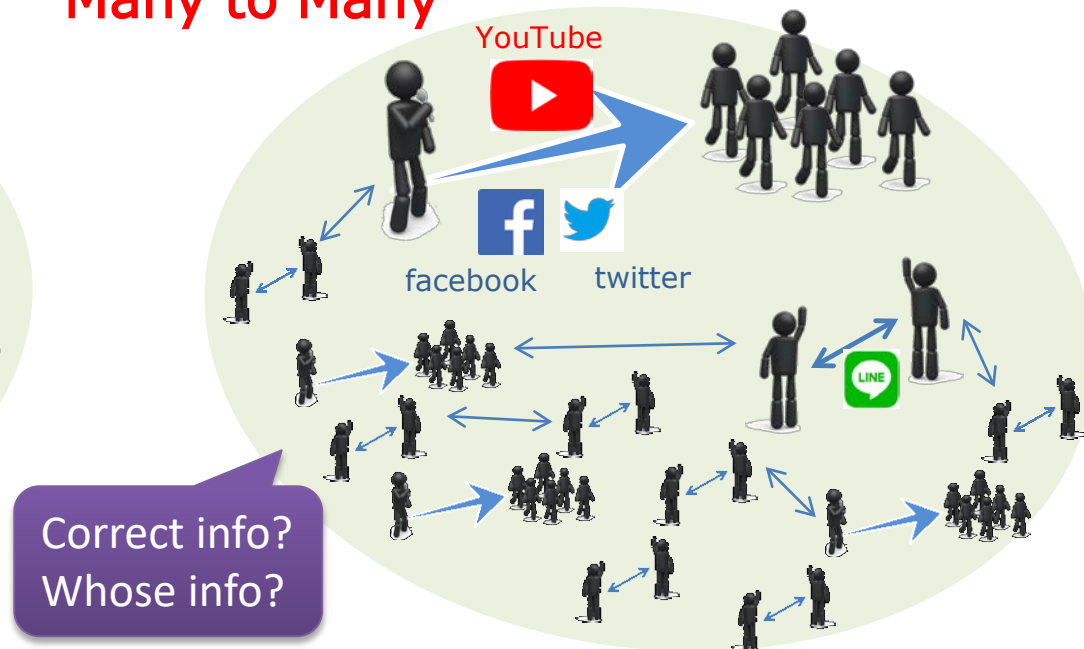
One to Many



One to One

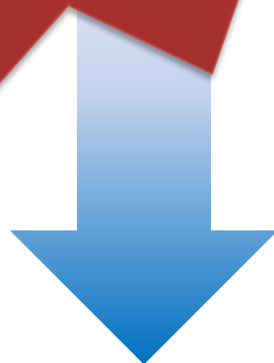


Many to Many



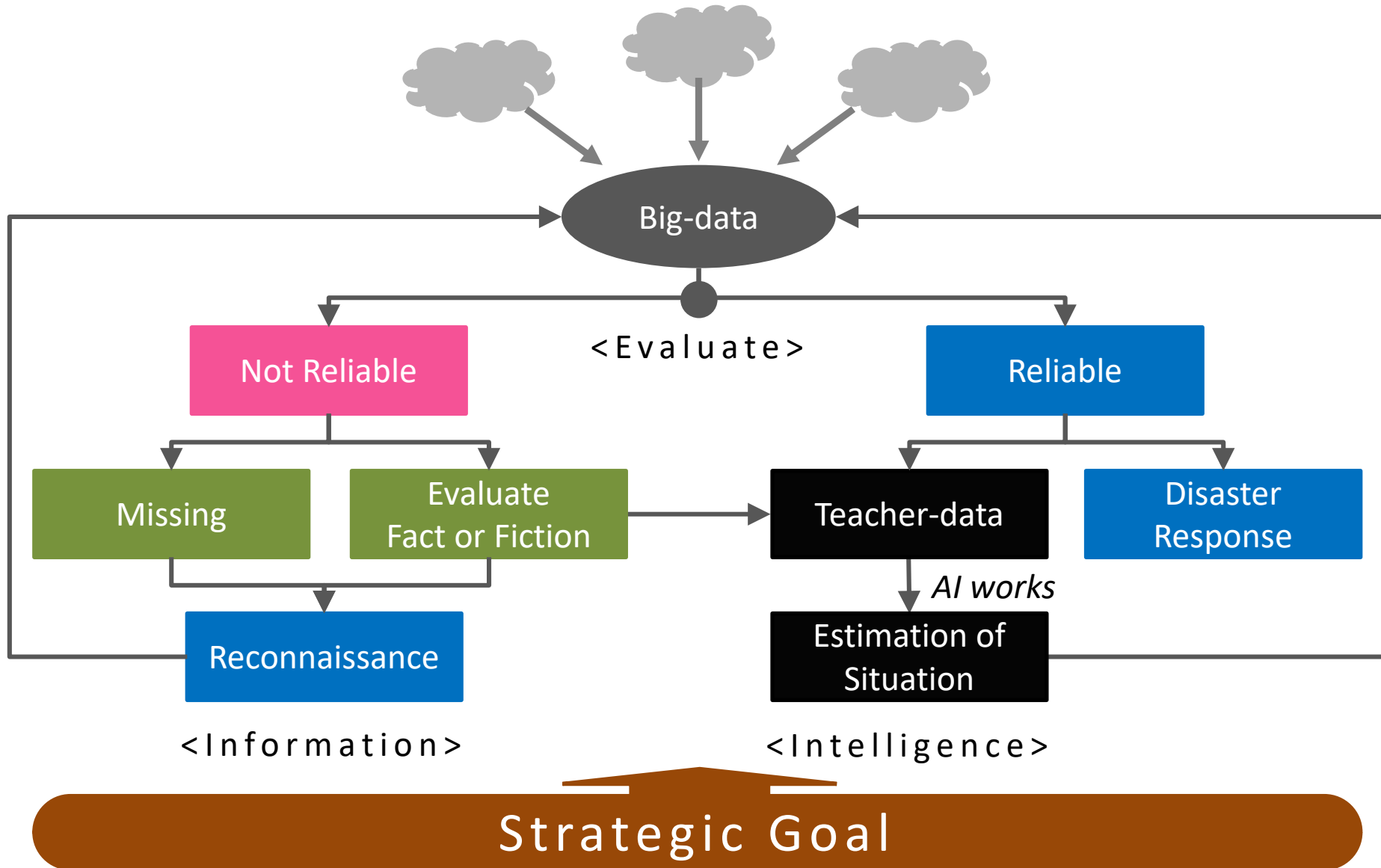


~~Big-Data~~
Huge-Data



How should we treat them?

How to Create Intelligence from Big-Data



Why should we manage Big-Data?
For Effective Disaster Response!
For Effective Decision Making!



**To do so, we have to develop
“Common Operational Picture”**

Disaster can not be prevented completely

→ Improve Emergency Preparedness to “build back better”

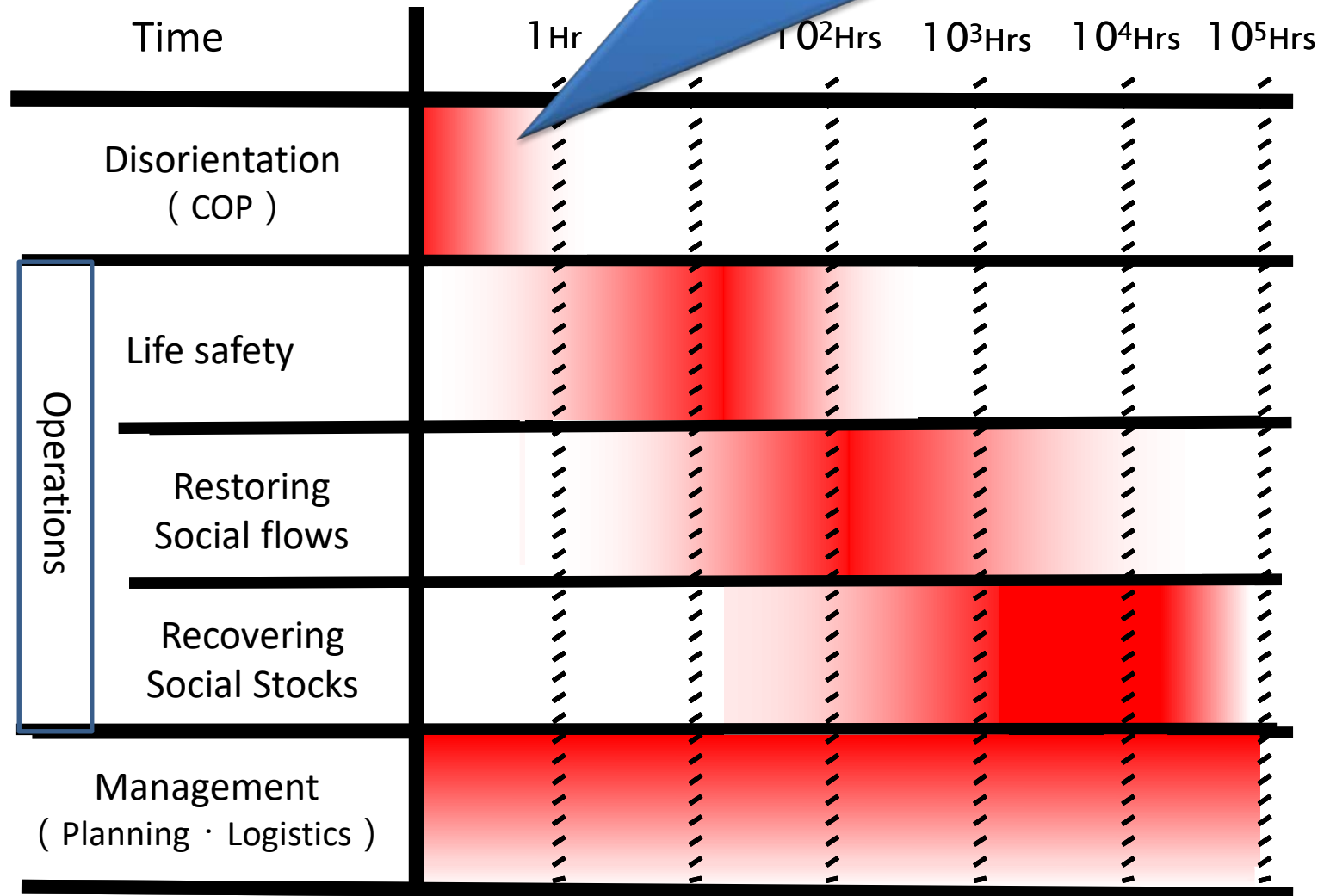
By Understanding Disaster Response and Recovery Process Better

- To do so

- By Focusing of Human Activities and Time Factors (Who does What at When)
- Only on those recurrent disaster problems

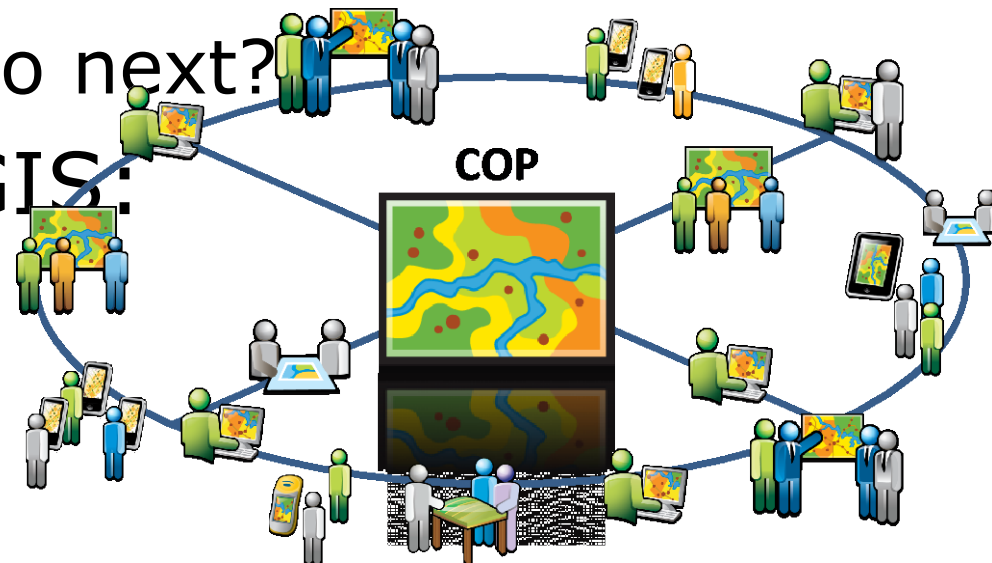
Disaster Response & Recovery Process (What/When)

To shorten Disorientation phase by creating Common Operational Picture (COP)



Common Operational Picture (COP)

- At all phases of disaster management
- For better situational awareness
 - What is happening?
 - How are we doing?
 - What should we do next?
- Visualization by GIS:
Power of Maps



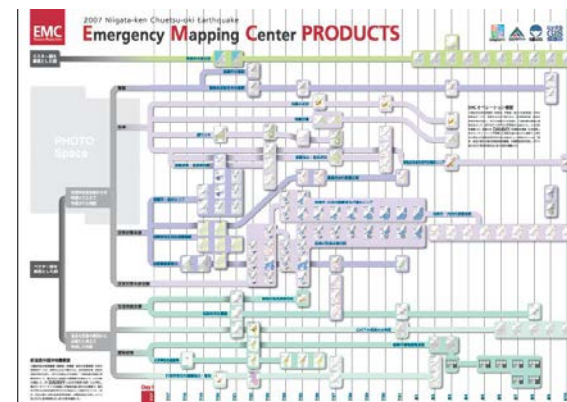
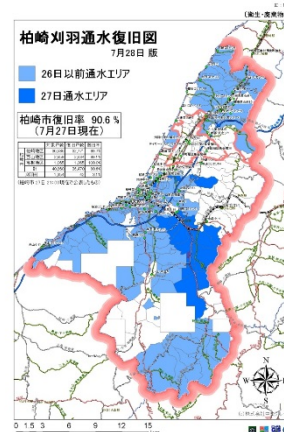
Aggregation

2004
Niigata Chuetsu
GIS Project



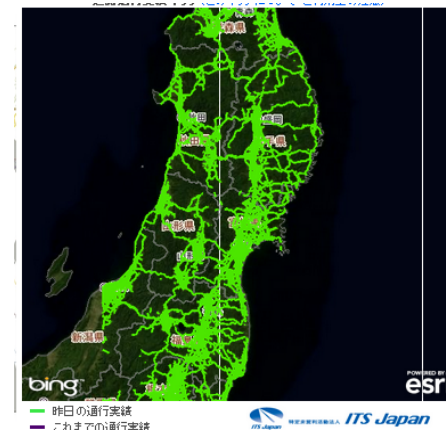
On-Demand

2007
Niigata Chuetsu-oki
EMC Project



Dynamic Sharing

2011
Tohoku EQ & Tsunami
EMT Project

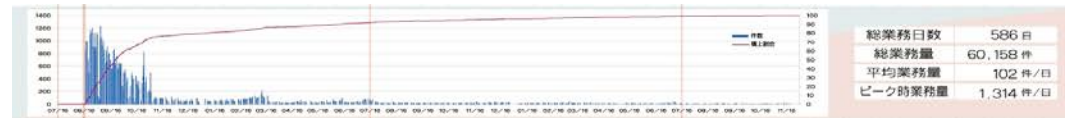


We did not know how much work volume occurred in which day Actually (especially in long-term life recovery process)

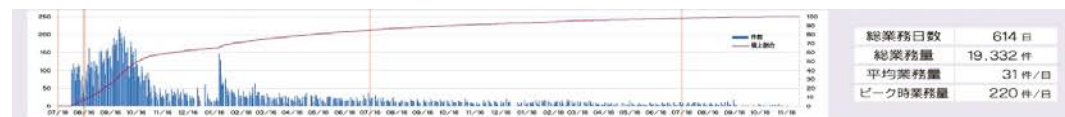
Case study of Chuetsu-oki EQ in 2007 (for 2 half years after disaster occurrence)

- Certification of Building Damages : 586 days
- Consultation for Reconstruction : 634 days
- Support for Applying for Temporary Housing : 421 days
- Reconstruction Support for Residents in Temporary Housings : 362 days

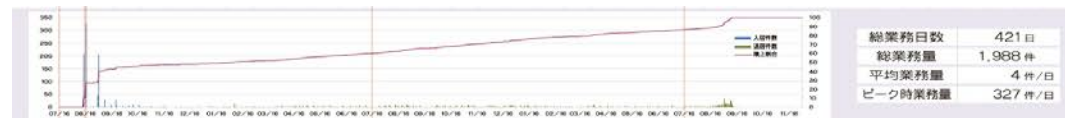
Certification of Building Damages



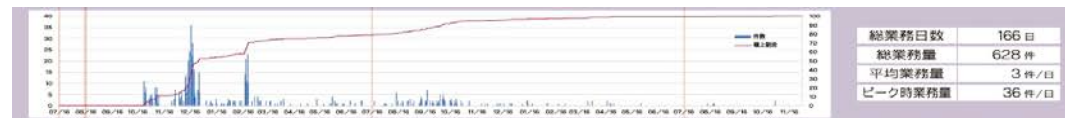
Consultation for Reconstruction



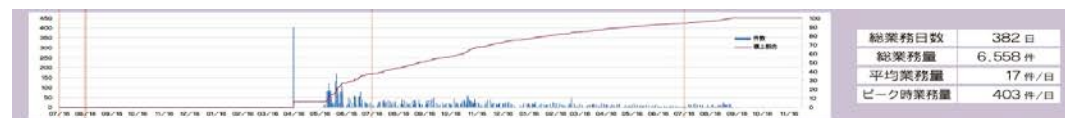
Support for Applying for Temporary Housing



Review Requirement of Each Survivor to Support Programs



Reconstruction Support for Residents in Temporary Housings



1 mon

1 yr

2 yrs

***Latest Case Study for
Developing COP and
Clarifying Work-Volume
(Work Pressure)***

Development and Implementation of Cloud-based “Standardized Operating System” of Disaster Response

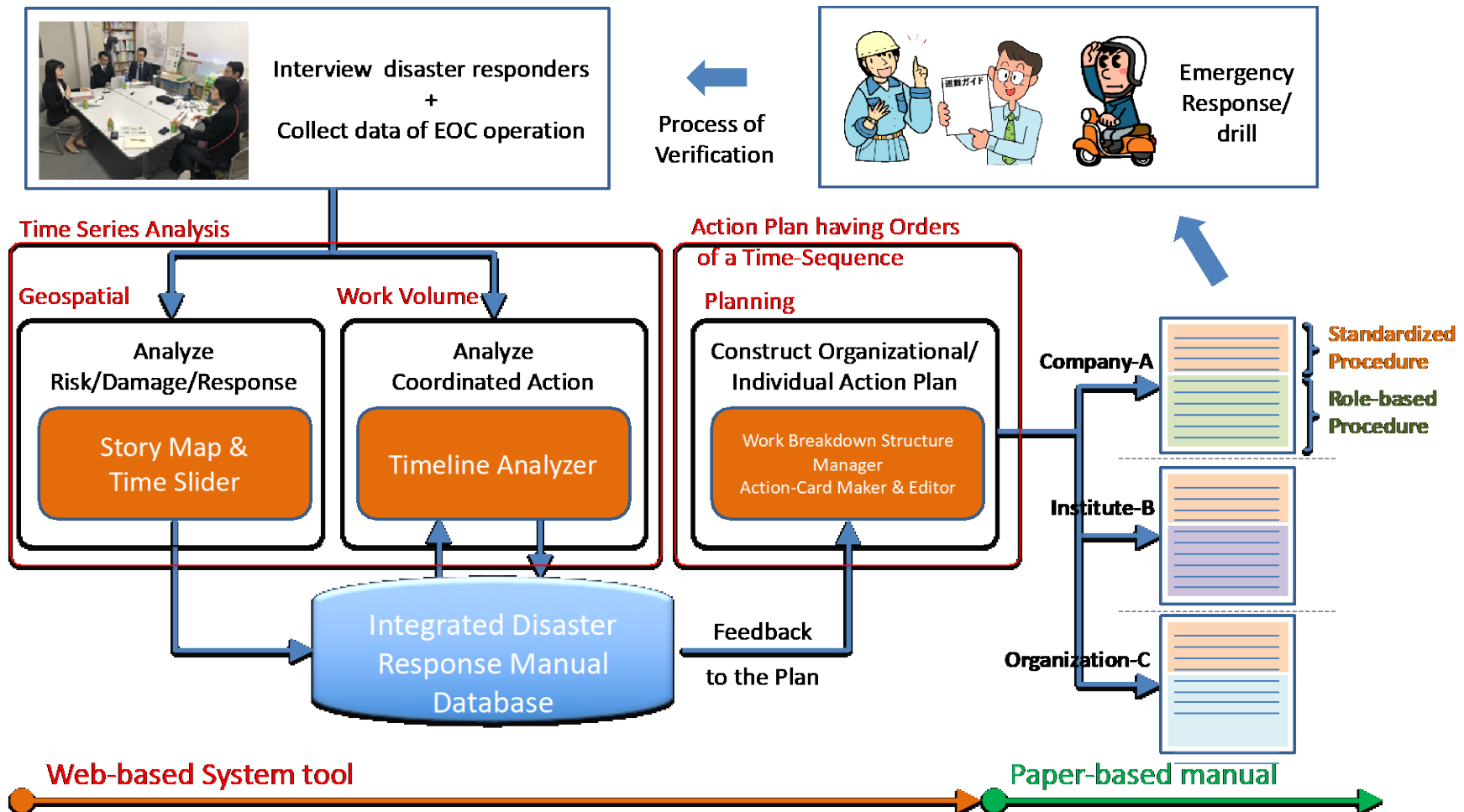
Background

The standard operation processing procedure of constructing the common operational picture (COP) at the time of disasters has not been organized and established.

Project Goal

Designing the system tool which let responders realize the optimum action based on the common operational picture (COP) and the strategic decision.

Project Outline



The Analyzed Data

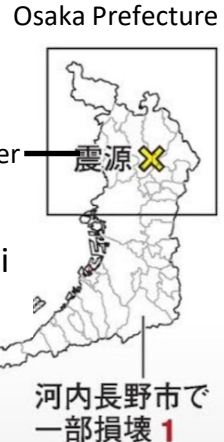
- Provided by Ibaraki City in the affected area of 2018 Osaka Northern EQ
- Data required for the activities of Ibaraki City EOC
 - 19 folders 2,646files

Partially Damaged Buildings
Osaka Northern EQ
 (each municipality)

| | 半壊 | 全壊 |
|-----|----|----|
| 豊中市 | 6 | 3 |
| 高槻市 | 1 | — |
| 枚方市 | 6 | — |
| 茨木市 | 1 | — |

Ibaraki City
3481

Takatsuki City
1560



河内長野市で一部損壊 1



North Osaka EQ
 Damage in
 Ibaraki City



The Asahi Shimbun Digital

| 名前 | 更新日時 | 種類 |
|------------------------------|------------------|-------------------|
| ★ コールセンター | 2019/02/05 21:44 | ファイル フォルダ |
| ★ ライフライン関係 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 応急危険度判定 | 2018/12/28 10:48 | ファイル フォルダ |
| ★ 各課活動報告 (途中まで) | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 議会関係 | 2018/12/07 8:14 | ファイル フォルダ |
| ★ 救援物資関係 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 災害救助法 | 2018/12/28 11:01 | ファイル フォルダ |
| ★ 災害対策本部会議記録 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 災害対策本部会議資料 | 2018/12/07 8:12 | ファイル フォルダ |
| ★ 市長決定 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 自衛隊関係 | 2018/12/28 11:09 | ファイル フォルダ |
| ★ 自主防関係 (ヒアリング資料・アンケート結果...) | 2018/12/07 8:14 | ファイル フォルダ |
| ★ 大阪府の地震 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 被害状況報告 (途中まで) | 2018/12/07 8:14 | ファイル フォルダ |
| ★ 被災者支援会議資料 | 2019/02/05 13:55 | ファイル フォルダ |
| ★ 被災者支援制度一覧 | 2018/12/07 8:14 | ファイル フォルダ |
| ★ 避難者数 | 2018/12/28 11:16 | ファイル フォルダ |
| ★ 予算関係 | 2018/12/07 8:11 | ファイル フォルダ |
| ★ 罹災証明件数 | 2018/12/07 8:13 | ファイル フォルダ |
| 【更新中】地震概要 (ヒアリング用) | 2018/12/07 8:11 | Microsoft Word... |

| File Format | #s of Files |
|--------------|-------------|
| EXCEL | 1077 |
| WORD | 526 |
| PDF | 243 |
| TEXT | 63 |
| IMAGE | 41 |
| PPT | 20 |
| VOICE | 11 |
| others | 161 |
| Related Data | 504 |
| total | 2646 |

3 output of the project in the Case of 2018 Osaka Northern Earthquake

1. Geo-spatial Analysis : Visualization of risk, damage and disaster response analysis results of the Osaka Northern Earthquake on GIS using the special functions, such as *street maps* and *time slider* function
2. Work Volume Analysis : time series visualization of the work volume of disaster response analysis
3. Action Plan: Publish the system tool for realizing standardized operating procedure “Work Breakdown Structure Manager Action-Card Maker & Editor

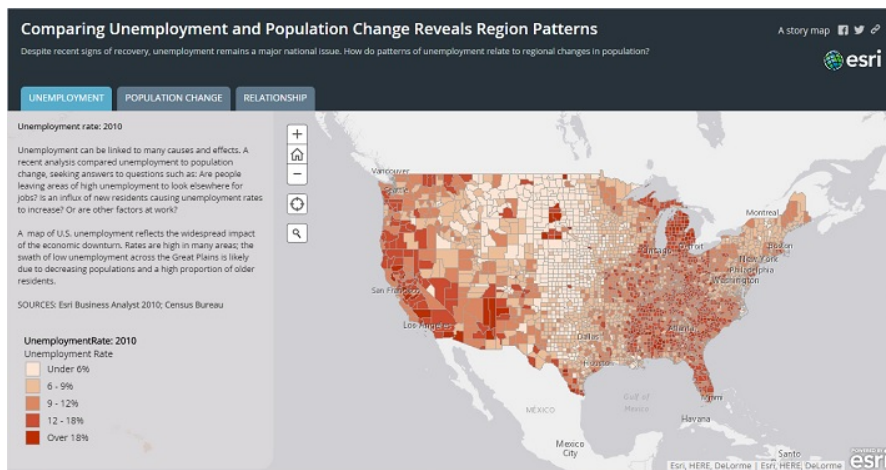
3 output of the project in the Case of 2018 Osaka Northern Earthquake

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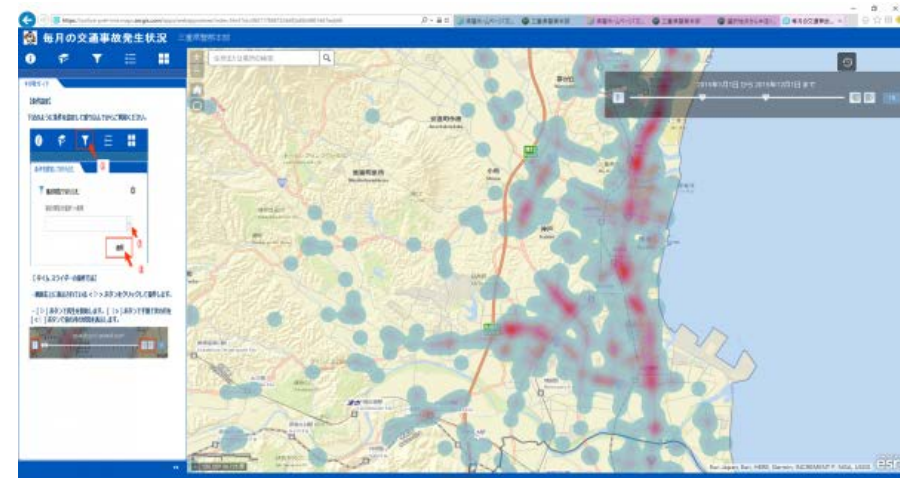
1. Geo-spatial Analysis :

Visualization of risk, damage and disaster response analysis results of the Osaka Northern Earthquake on GIS using the special functions, such as street maps and time slider function

- **Story Maps:** They let us combine authoritative maps with narrative text, images, and multimedia content, and they help us transmit the meanings of maps by story.
- **Time-Slider:** It lets us visualize seamlessly the chronological data in maps.
- **Operation Dashboard:** This is a configurable web app that provides location-aware data visualization and analytics for a real-time operational view of people, services, assets, and events. From a dynamic dashboard, view the activities and key performance indicators most vital to meeting your organization's objectives.
- **Insights:** This is analysis software that fuses location analytics with open data science and business intelligence workflows. Answer questions you didn't know to ask, analyze data completely, and unlock new insights



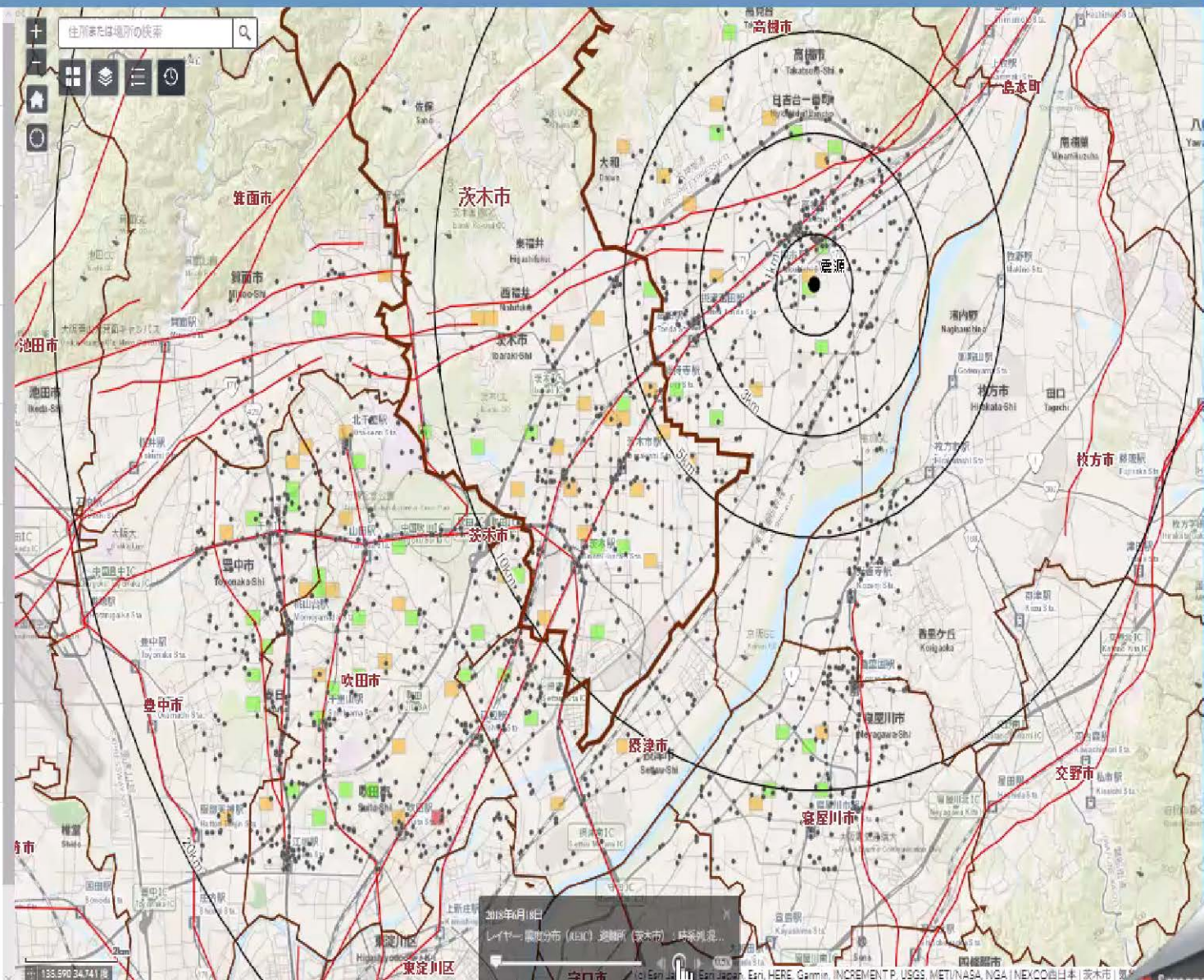
Story Maps



Insights

★平成30年大阪府北部の地震における時空間分析

- 1 ハザード
- 2 緊急通報
- 3 公共施設
- 4 建物
- 5 ライフライン
- 6 交通流
- 7 人流
- 8 避難所
- 9 統合マップ



すべてのレイヤを含む統合マップです。マップ左上のレイヤリストツールで表示したいレイヤを絞った上で、その右の(タイムスライダー)ツールで自動または手動で再生してください。

★平成30年大阪府北部の地震における時空間分析

1 ハザード

2 緊急通報

茨木市消防に入った緊急通報、他部署が収集した被害情報を示します。

タイムスライダーは、2018/06/18 7:00から15分ずつ表示時間枠を拡大して通報を累積再生しています。

緊急通報 (消防)

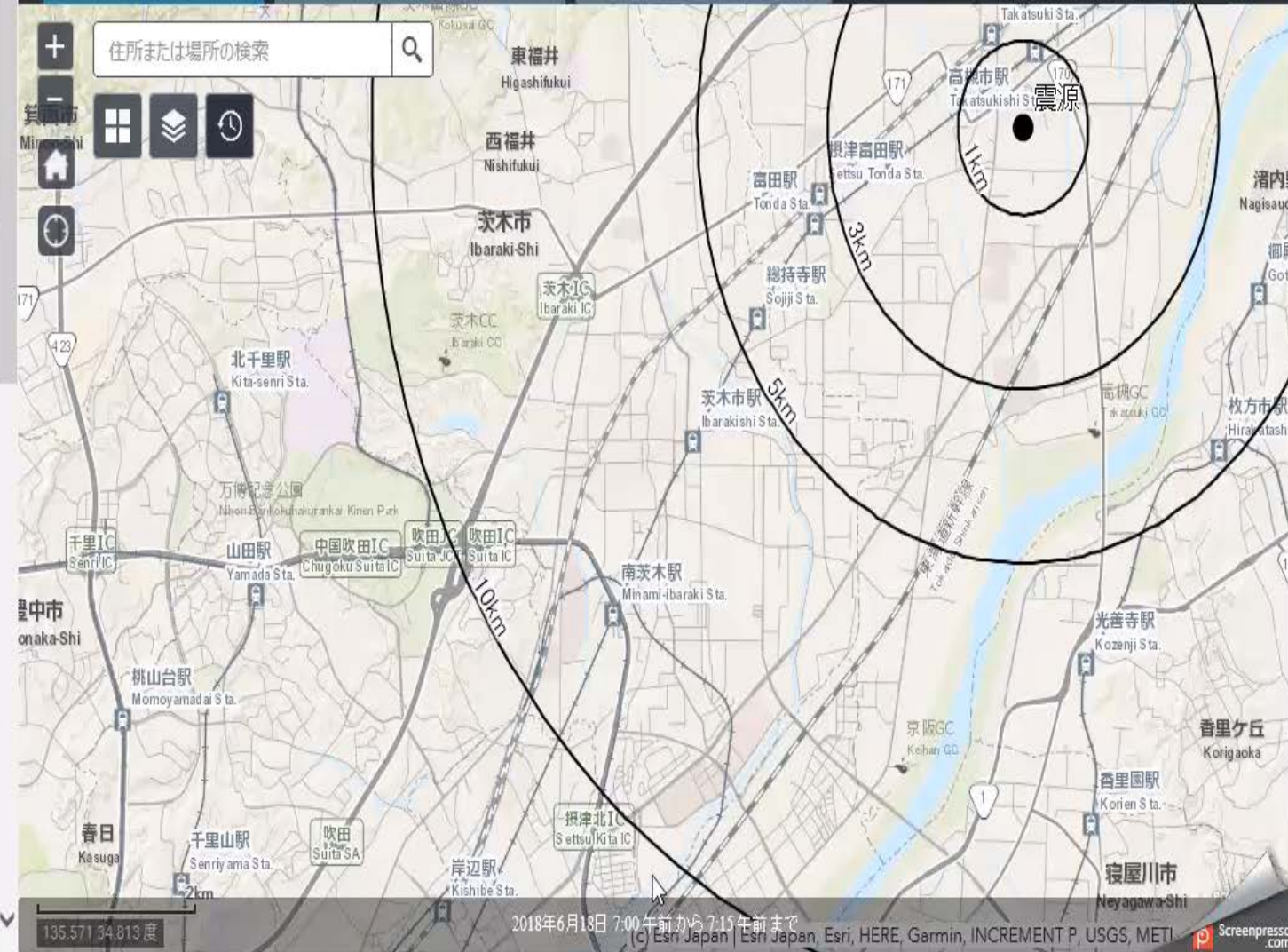
- 一般負傷
- 急病
- 火災
- 火災 (誤報)
- 救助
- 救急支援
- その他

緊急通報 (消防)

緊急通報 (茨木市消防)

緊急通報分析 (ダッシュボード)

緊急通報分析 (インサイト)



北部の地震における時空間分析

ストーリー マップ

ストーリー マップ

緊急通報 (消防)

緊急通報 (茨木市消防)

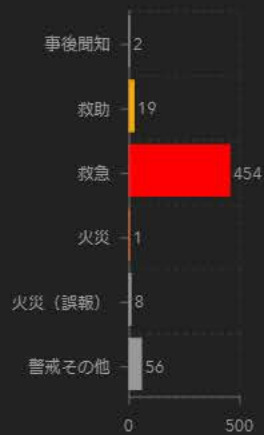
緊急通報分析 (ダッシュボード)

緊急通報分析 (インサイツ)

部署が収集した被害情報を示

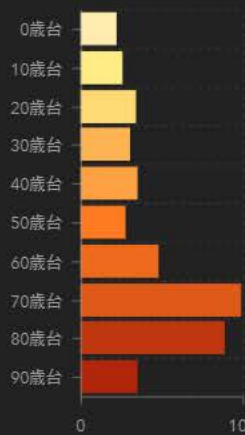
3 7:00から15分ずつ表示時間
います。

種別別通報数



最終更新: 2分前

年齢層別通報数



最終更新: 1分前

震度別通報数

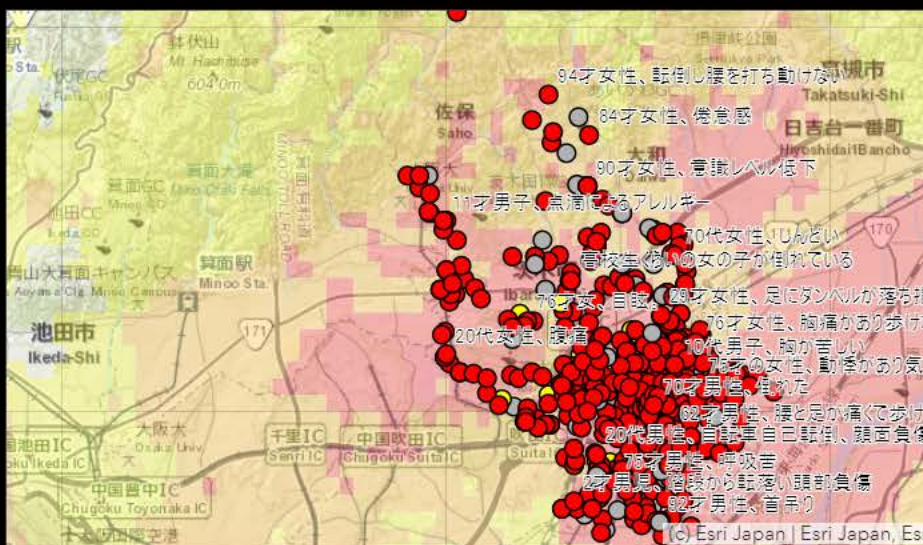


最終更新: 2分前

性別別通報数



最終更新: 2分前



日時別通報数



北部の地震における時空間分析

ストーリー マップ

緊急通報 (消防)

ストーリー マップ

緊急通報（茨木市消防）

緊急通報分析（ダッシュボード）

緊急通報分析（インサイツ）

部署が収集した被害情報を示

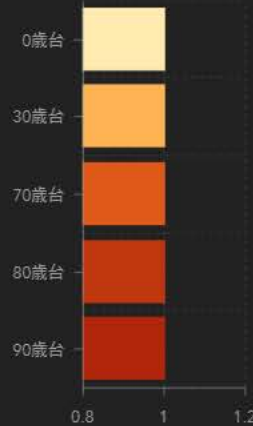
3 7:00から15分ずつ表示時間
います。

種別別通報数



最終更新: 数秒前

年齢層別通報数



最終更新: 数秒前

震度別通報数



最終更新: 数秒前

性別別通報数



最終更新: 数秒前



日時別通報数



北部の地震における時空間分析

ストーリー マップ

緊急通報 (消防)

ストーリー マップ

緊急通報（茨木市消防）

緊急通報分析（ダッシュボード）

緊急通報分析（インサイツ）

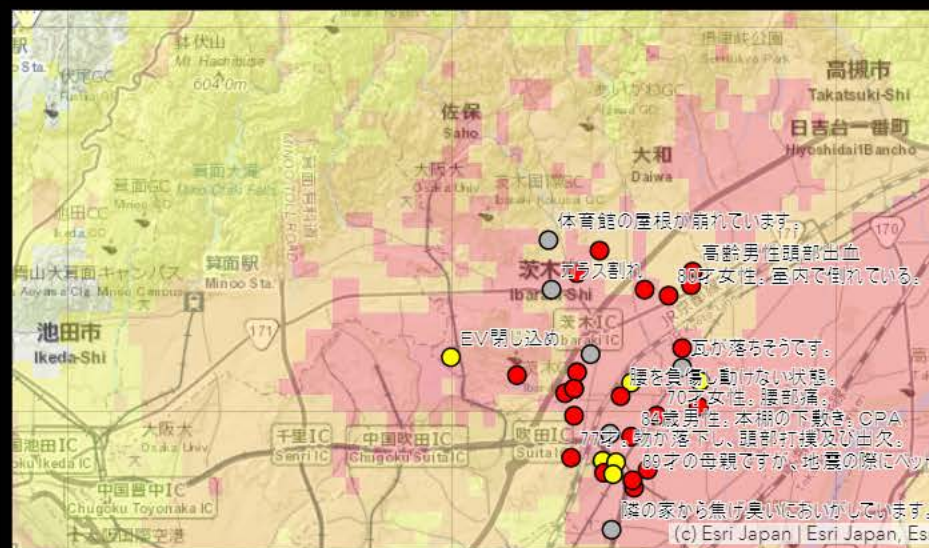
部署が収集した被害情報を示

3 7:00から15分ずつ表示時間
います。

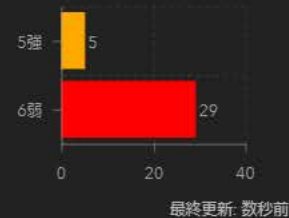
種別別通報数



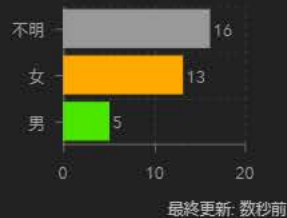
年齢層別通報数



震度別通報数



性別別通報数



日時別通報数



北部の地震における時空間分析

ストーリー マップ

緊急通報（消防）

ストーリー マップ

緊急通報（茨木市消防）

緊急通報分析（ダッシュボード）

緊急通報分析（インサイツ）

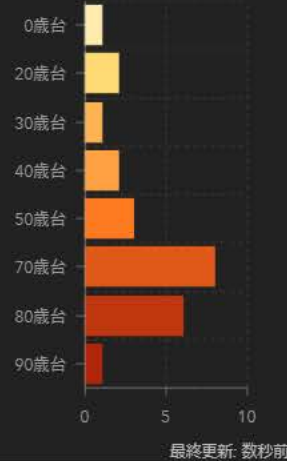
部署が収集した被害情報を示

3 7:00から15分ずつ表示時間
います。

種別別通報数



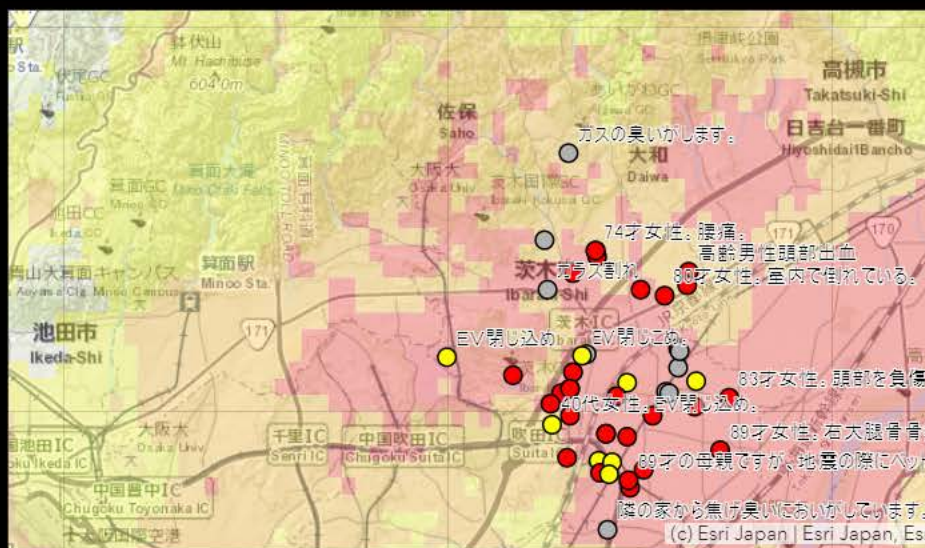
年齢層別通報数



震度別通報数



性別別通報数



日時別通報数



北部の地震における時空間分析

ストーリー マップ

緊急通報 (消防)

ストーリー マップ

緊急通報（茨木市消防）

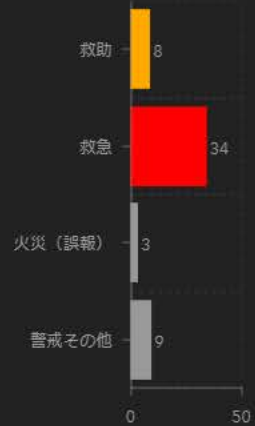
緊急通報分析（ダッシュボード）

緊急通報分析（インサイツ）

部署が収集した被害情報を示

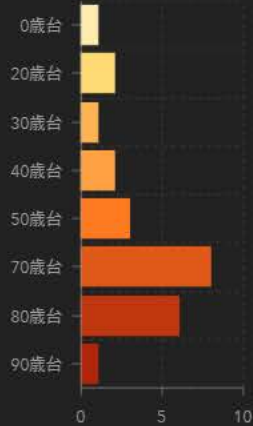
3 7:00から15分ずつ表示時間
います。

種別別通報数



最終更新: 数秒前

年齢層別通報数



最終更新: 数秒前

震度別通報数

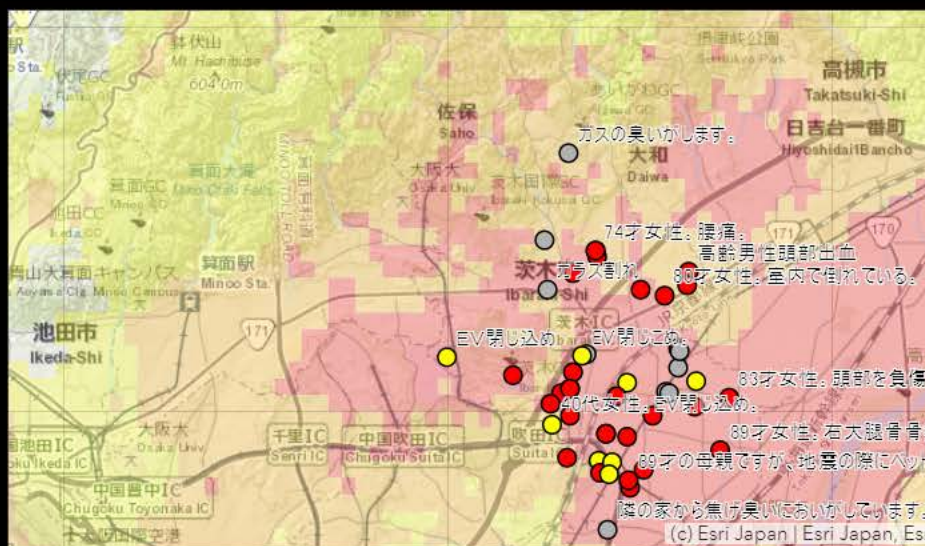


最終更新: 数秒前

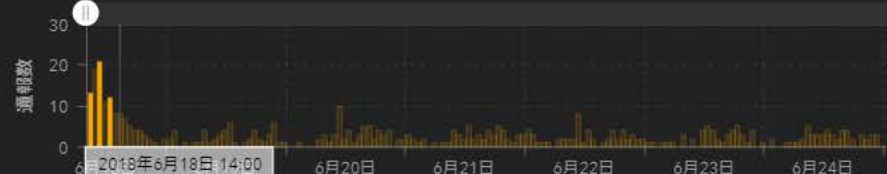
性別別通報数



最終更新: 数秒前



日時別通報数



地震における時空間分析

緊急通報（消防）

緊急通報（茨木市消防）

緊急通報分析（ダッシュボード）

緊急通報分析（インサイト）



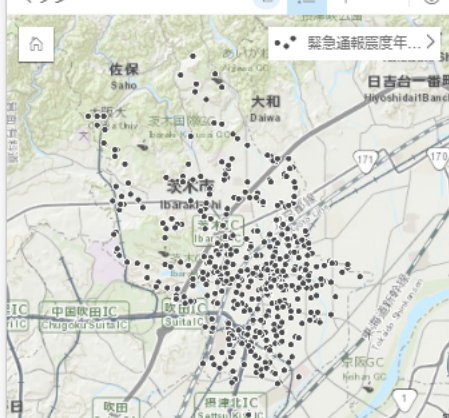
INSページ大阪府北部地震緊急通報分析

1 ページ

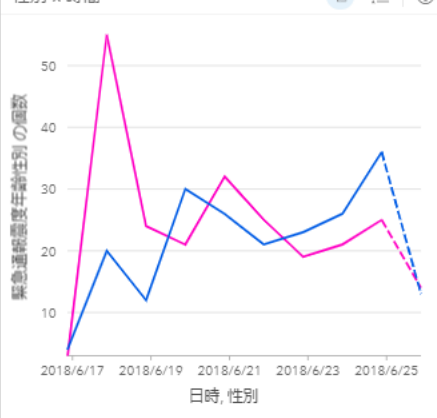
た被害情報を示します。

分ずつ表示時間枠を拡大して通報を累積再生

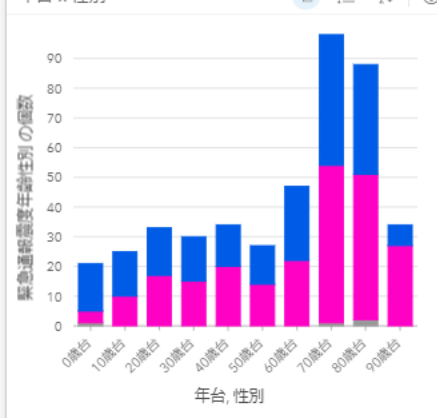
マップ



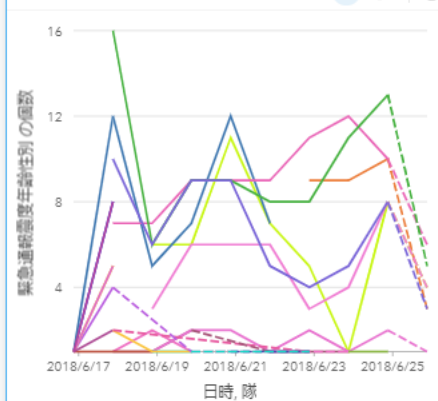
性別 x 時間



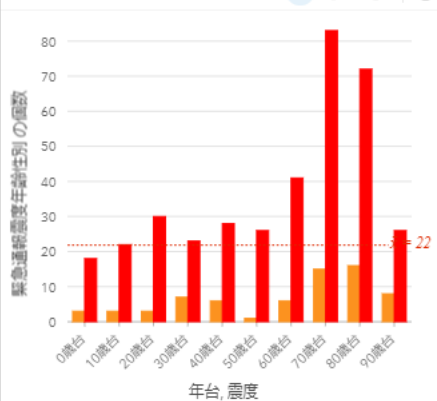
年台 x 性別



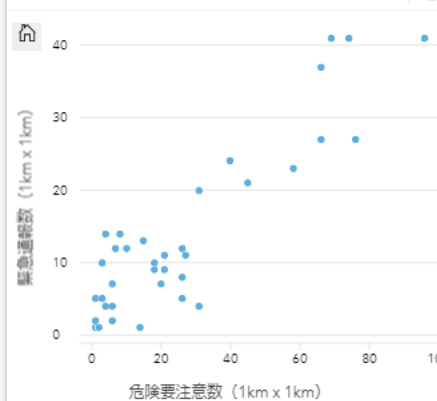
消防隊 x 時間



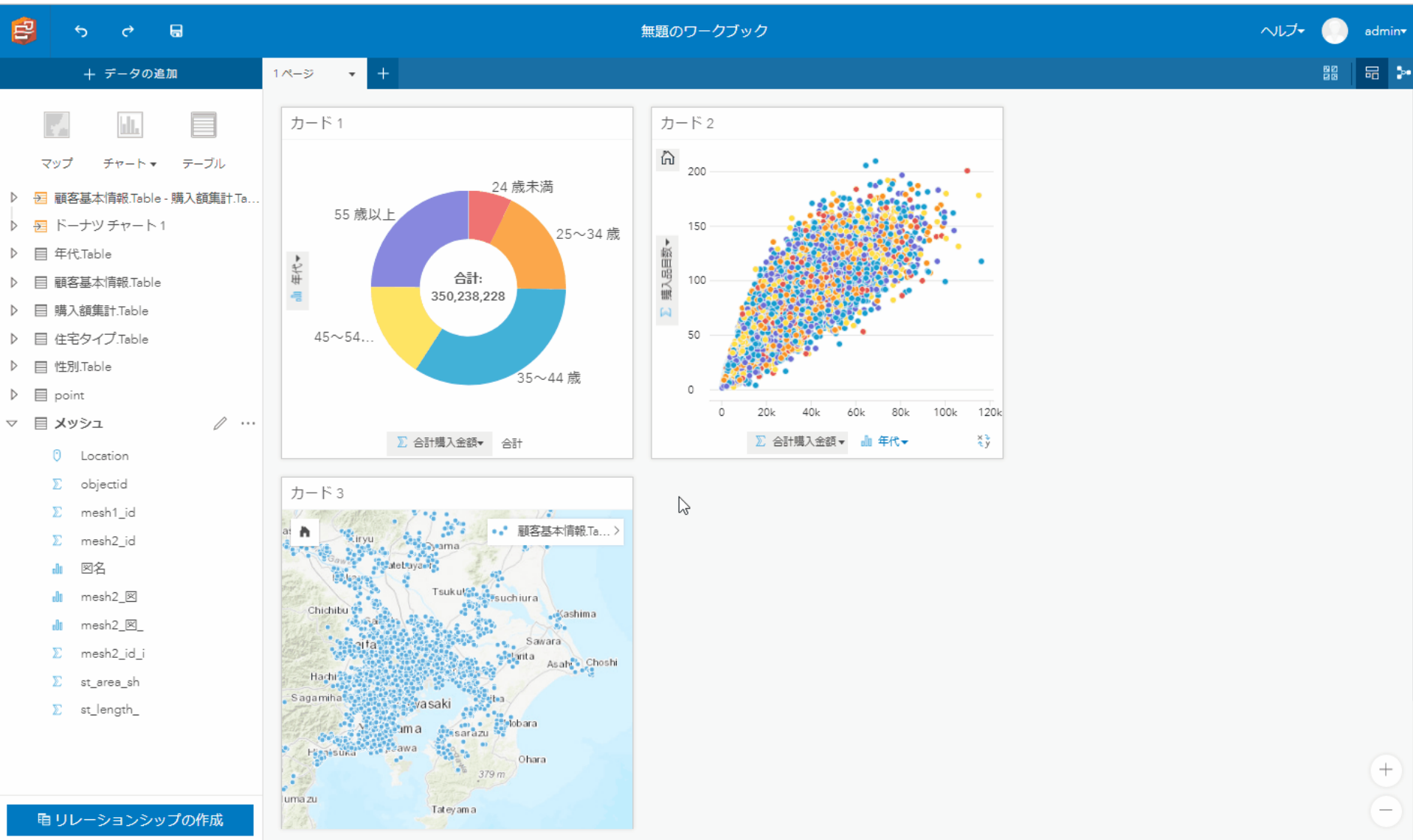
年台 x 震度



応急危険度判定と通報数



What is Insight?

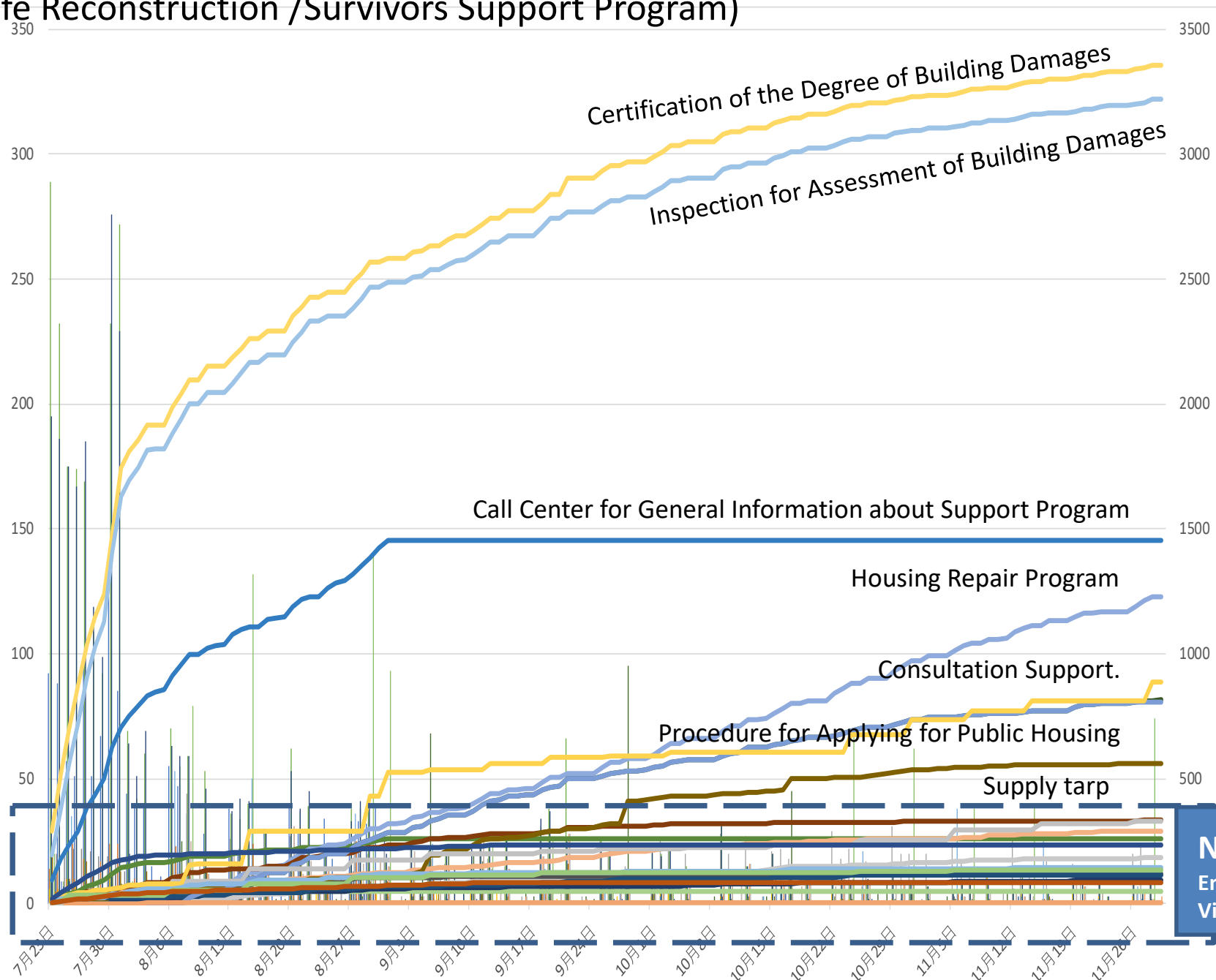


3 output of the project in the Case of 2018 Osaka Northern Earthquake

1. Geo-spatial Analysis : Visualization of risk, damage and disaster response analysis results of the Osaka Northern Earthquake on GIS using the special functions, such as *street maps* and *time slider* function
2. Work Volume Analysis : time series visualization of the work volume of disaster response analysis
3. Action Plan: Publish the system tool for realizing standardized operating procedure “Work Breakdown Structure Manager Action-Card Maker & Editor

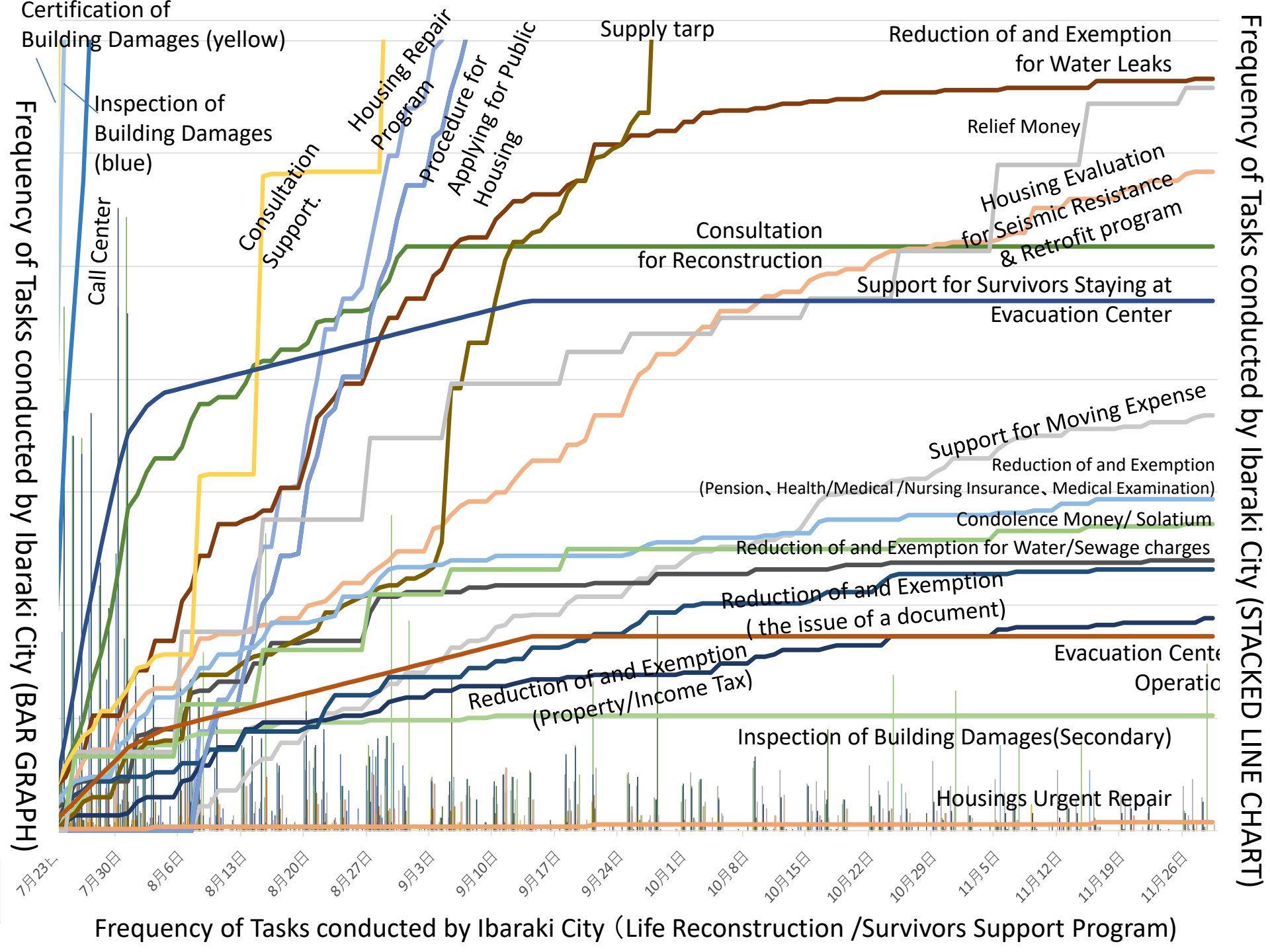
Frequency of Tasks conducted by Ibaraki City (Life Reconstruction /Survivors Support Program)

Frequency of Tasks conducted by Ibaraki City (BAR GRAPH)



Frequency of Tasks conducted by Ibaraki City
(STACKED LINE CHART)





Cluster Analysis:

the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense) to each other than to those in other groups (clusters)

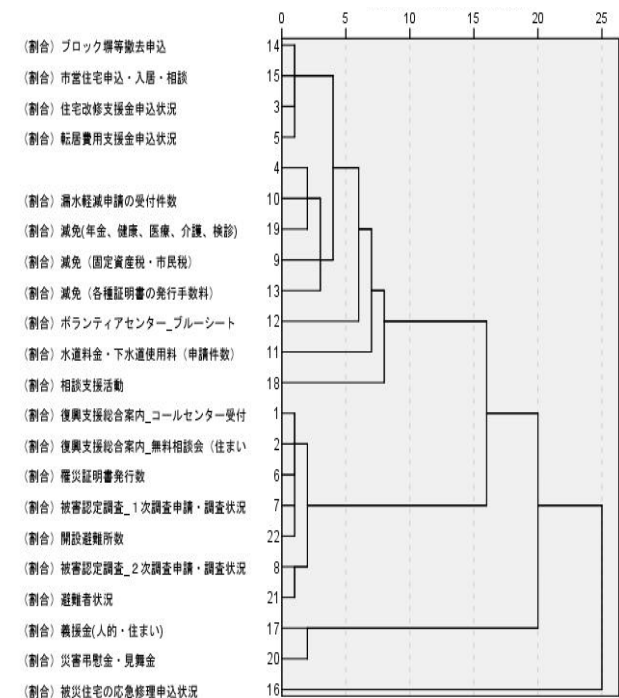
Analysis Period:

July 23th ~ Nov29th (130days)

Analysis Goal:

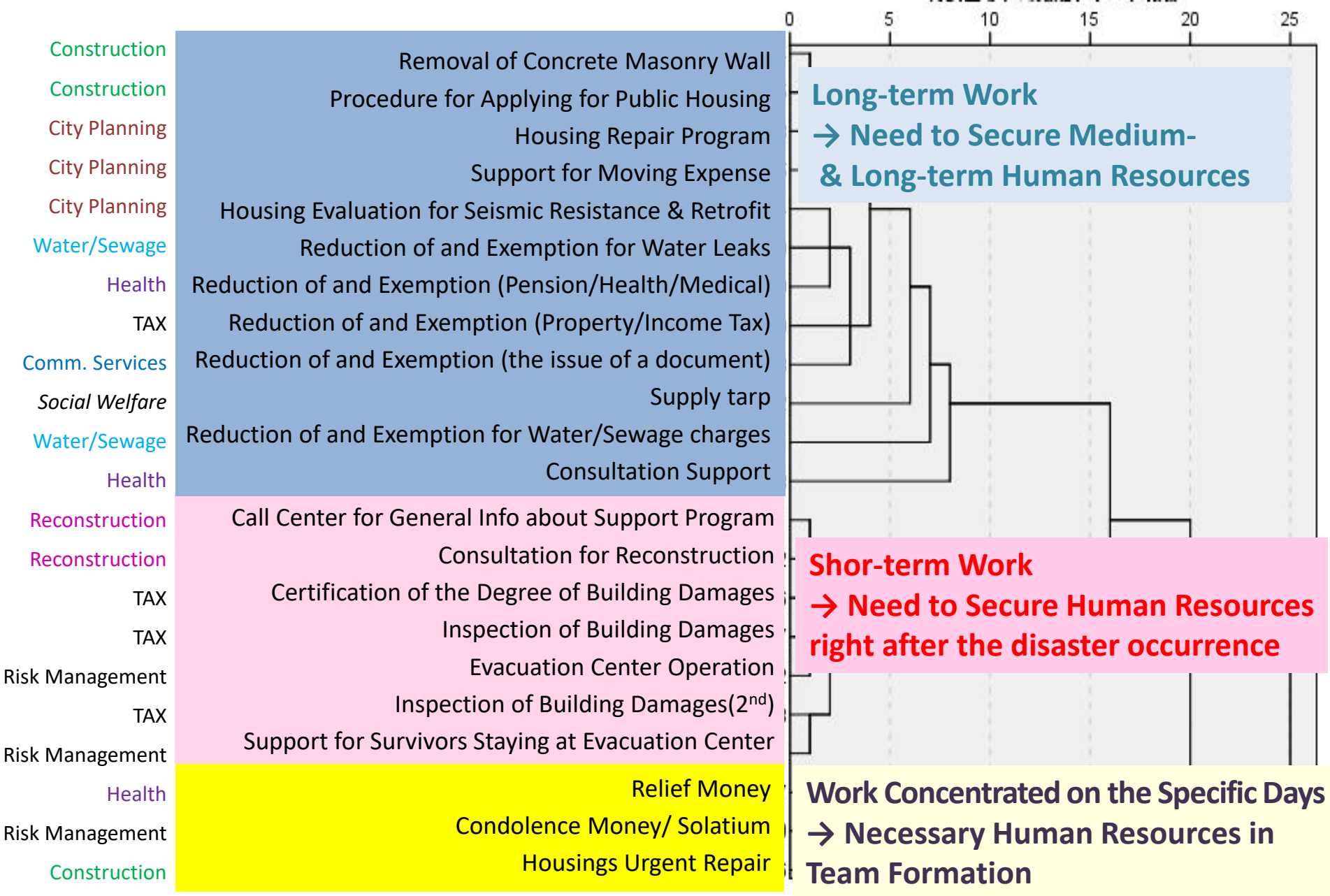
Analyze the patterns for work frequency and visualize the variation of the occurrence in Life Reconstruction /Survivors Support Program

Dendrogram: a diagram representing a tree. This diagrammatic representation is frequently used in different contexts: in hierarchical clustering



City Office Division

Dendrogram:



***Case Study of Utilizing AI
(Deep-Learning) in processing
Big-Data
for Understanding Situation***

2016 Kumamoto EQ

- Fore-Shock: M6.5 on Apr 14, 2016, 21:26.
- Main-Shock: M7.3 on Apr 16, 2016, 01:25.



Human Damage

-Casualties 264
-Heavy Injured 1,179
-Light Injured 1,553

Building Damage

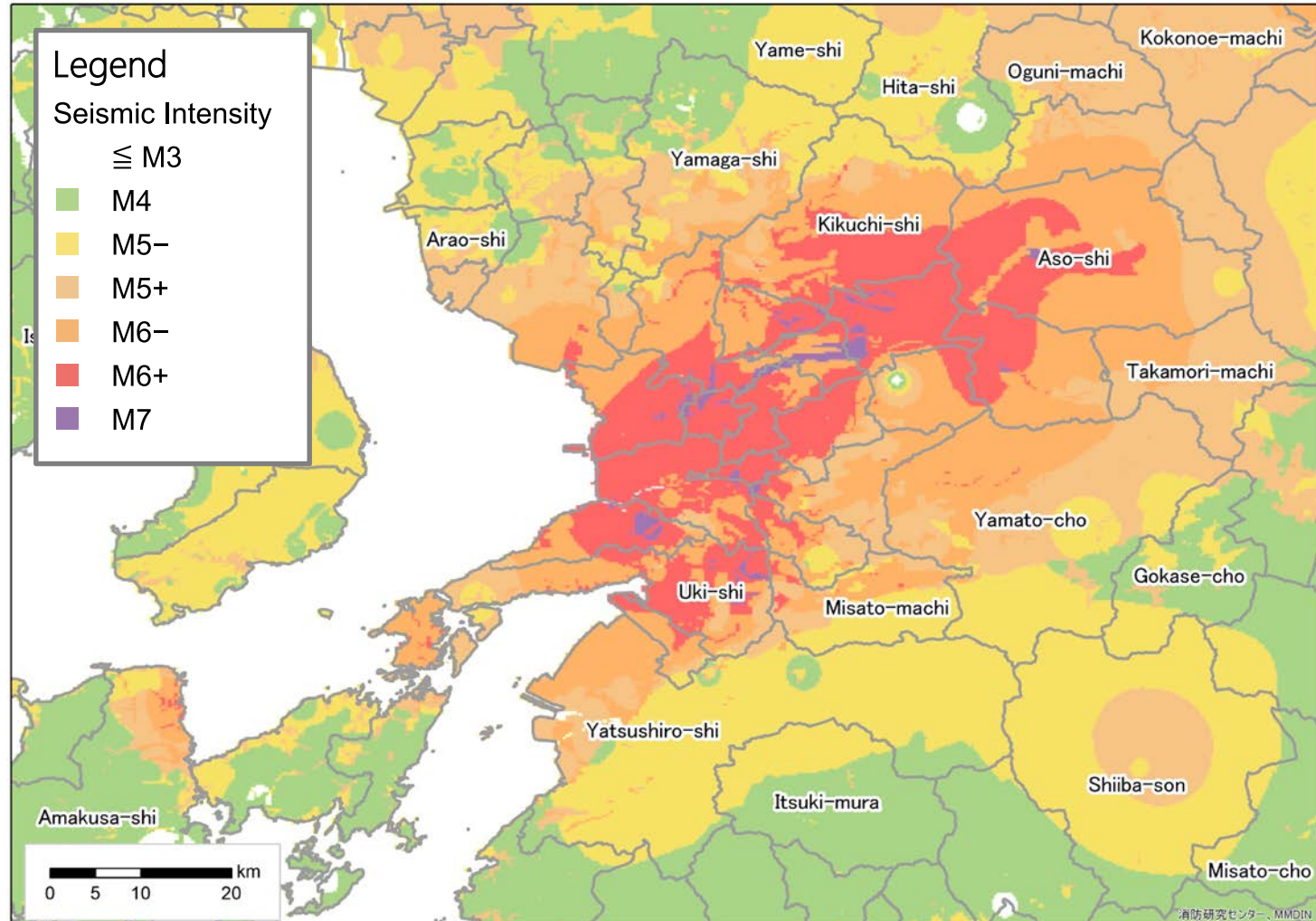
-Totally-Collapsed 8,663
-Half-Collapsed 34,498
-Partial-Collapsed 154,074

(Only in Kumamoto Pref. as of Apr 13, 2018)

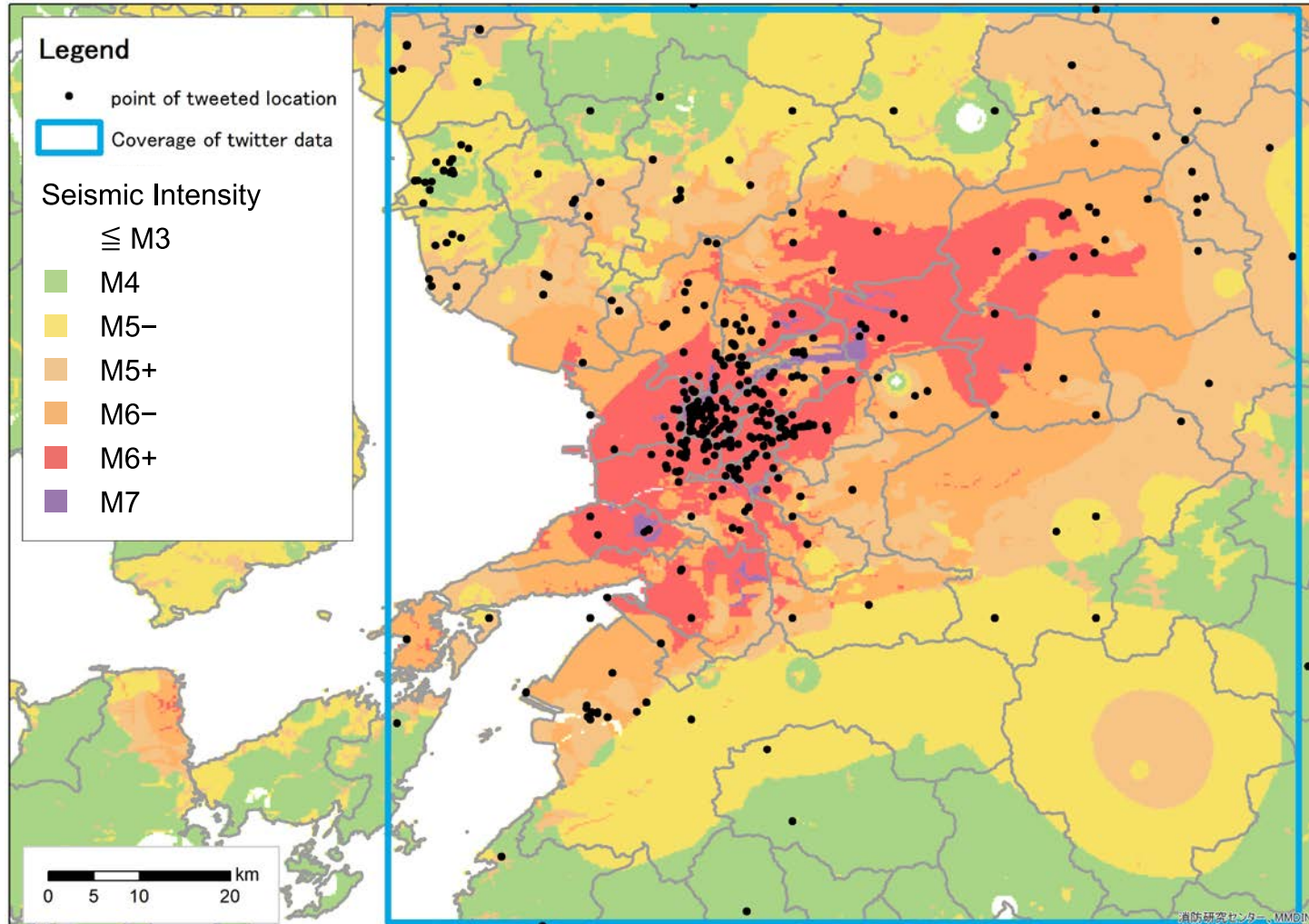


Seismic Intensity at Kumamoto EQ

(Apr 16, 2016)

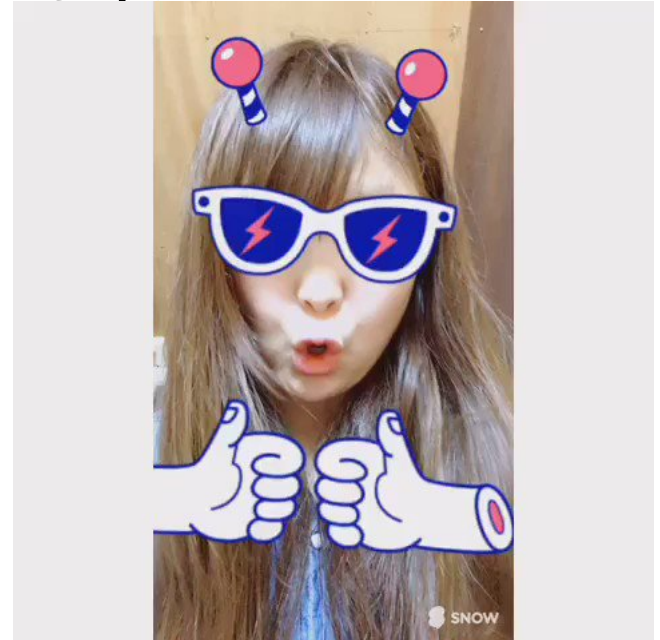


Area for retrieving tweeted data & Location of tweeted by survivors



Human Visual Classification of Tweeted Images

- 5,684 images retrieved from 5,853 tweets
- Even though tweeted location is in the severe impacted area, there are totally unrelated with disaster damage.



Samples of Images relating to Outdoor Damage

1) Damaged Roads: 99 images

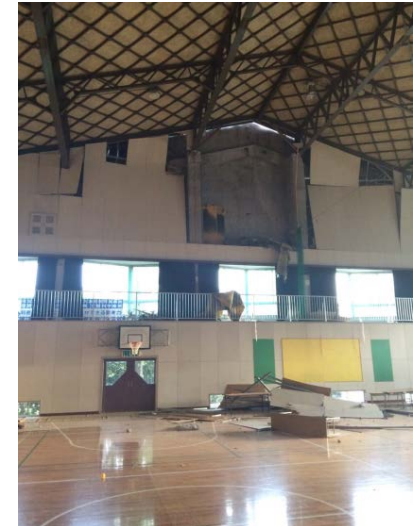
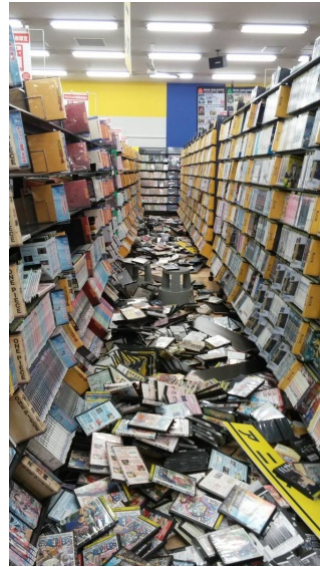


2) Damaged Buildings: 371 images



Samples of Images relating to Indoor Damage

3) Damage in the housings: 270 images

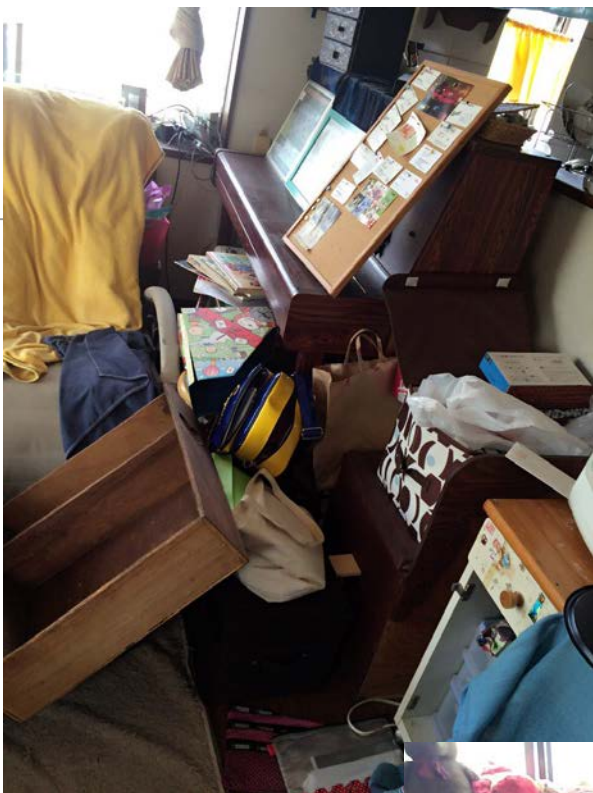


These images are much characteristics.
(These images cannot be taken by UAV,
Helicopter, Aircraft. Only survivors in
buildings can take these images.)

Hard to Classify to Indoor Damage (even by human)

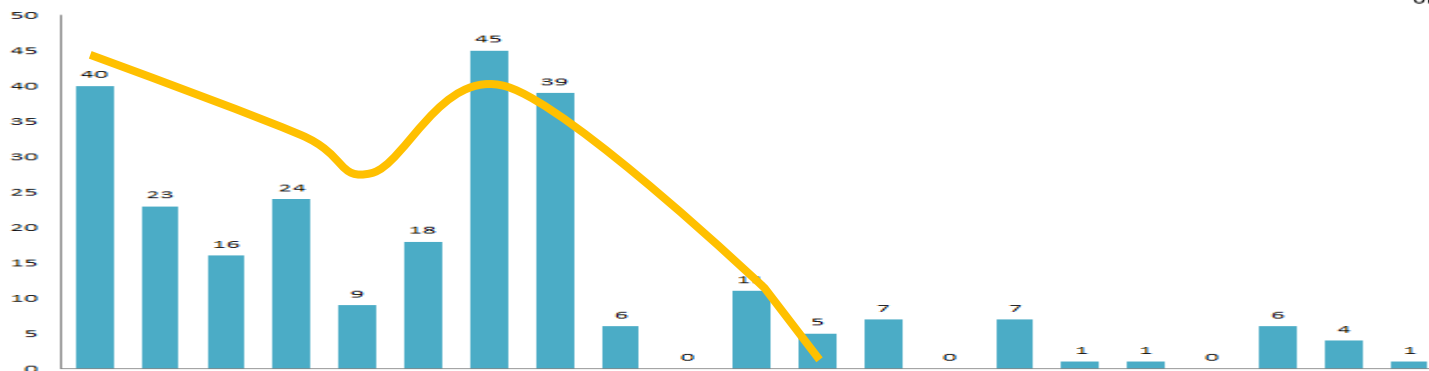
Damaged?

Scattered
Room?

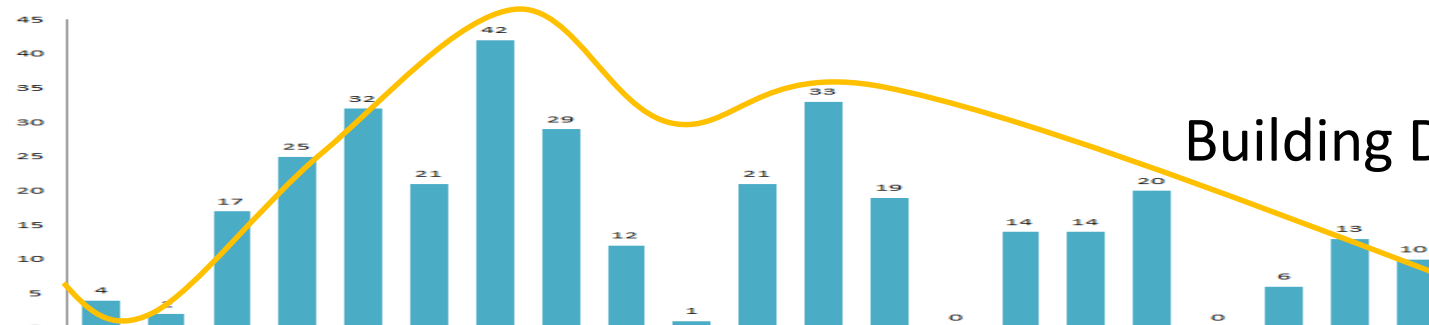


Chronological Analysis of Tweeted Images

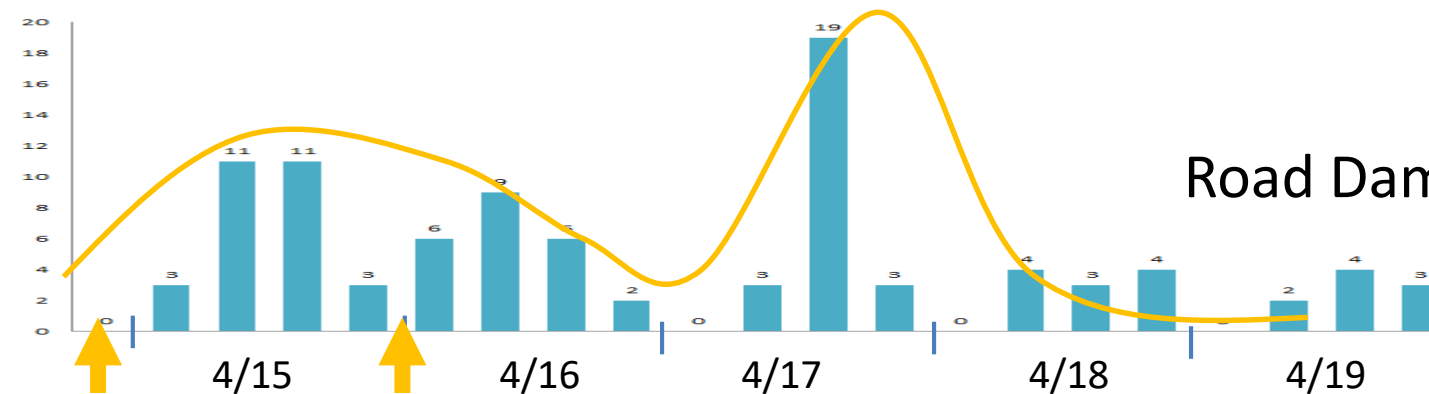
Indoor
Damage



Outdoor
Damage



Building Damage



Fore-Shock

Main-Shock

Machine Learning (Deep Learning)

- Preparing Lecture Data
 - Sampling Randomly from Tweeted Images: 231 as Indoor Damage, 441 as Outdoor Damage, 4,807 as Others (unrelating to disaster damage)
 - **Expand 10 times** of Lecture Data by inversion, changing color tone, adding noises and so on.
- Execute Machine Learning (Deep Learning)
 - Data Number per each learning (mini-batch size) is 16.
 - Learning times (Epoch Number) is 150.
 - Number of total learning case is **2,400 in each damage type**.
 - Utilizing the basic framework for deep learning such as Caffe, Theano, Torch etc.
 - Using Neural Network Model of RESNET with 96 layers.
 - **Time cost: 2 days** (by AI Specialized Machine launched with GPU of Quadro P6000 (24GB GPU-memory))

Verifying the Spec of Machine Classification

- The Educated Machine was tested with 224 images. (Indoor:43, Outdoor:29, Others:152)

| Category | Accuracy Rate (1) Ratio of Detecting Correct Images | Accuracy Rate (2) Ratio of Detecting Mismatched Images Correctly |
|--------------------|---|---|
| Indoor Damage | 83.70% | 87.80% |
| Outdoor Damage* | 93.10% | 73.80% |

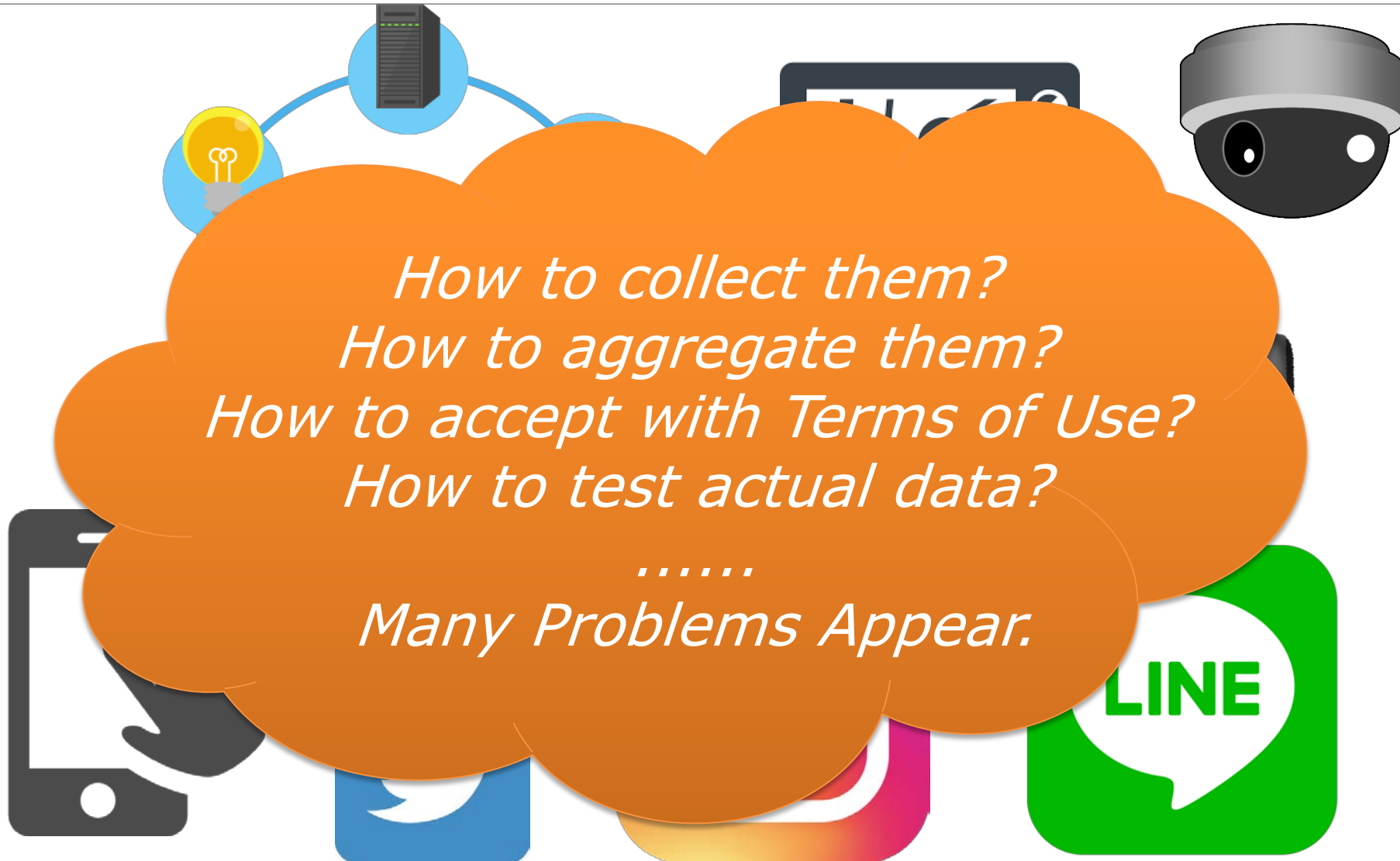
* Including Road Damage and Building Damage

Conclusion of this challenge

- Summary
 - We retrieve 5,684 images from 5,853 tweets posted at Kumamoto EQ.
 - From those images, we detected 470 images about outdoor damage and 270 images about indoor damage. Especially, we found that images about indoor damage were posted immediately after disaster.
 - We developed the machine knowledge for image classification by deep learning in 96 layers, and tested random sampled 224 images.
- Issues to solve
 - How to expand Effective Lecture Data
 - How to utilize chronological data for effective machine learning and evaluation for the result of machine classification
 - Try to adapt this machine knowledge to other disaster

How to manage Big-Data in future

We will have bigdata in our society potentially



2 challenges are about to implement

- **Data use and application council for Increasing the Resilience of Companies and the Tokyo Metropolitan Area**
- **CyborgCrowd (Harmonious Collaboration between Human & AI) for solving urgent problems in disaster response**

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首都圏レジリエンスプロジェクト
Tokyo Metropolitan Resilience Project

Increasing the Resilience of Companies and
the Tokyo Metropolitan Area

お問い合わせ

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電話:029-863-7794 FAX:029-851-1622 E-mail:info_for_r@bosai.go.jp

首都圏レジリエンスプロジェクト Website
<https://forr.cc.niigata-u.ac.jp/>



Transition from CSR to CSV

Establishing a mechanism to utilize observation equipment and data owned by companies and organizations
Corporate Social Responsibility ⇒ Creating Shared Value

DE KATSU
デ活
データ活用協議会
Data use and application council for Resilience

企業も強くなる
首都圏も強くなる

首都圏を中心としたレジリエンス総合力向上プロジェクト

※レジリエンス (Resilience) とは、外的な衝撃にも、折れることなく
「何かあっても立ち直れるしなやかな強さ」のことです。



“DEKATSU” = Data Use and Application Council

“DE” = Initial Character of “Data” in Japanese

“KATSU” = Initial Character of “Use and Application” in Japanese

Symposiums Organized by the Data Use and Application Council for Resilience



FY2017

1. **June 23: Kick-off meeting/
commemoration symposium
Kick-off declaration**
2. Sept 19: 2nd Data Use symposium
3. Jan 16: 3rd Data Use symposium
4. Mar 1: Results report meeting
(4th Data Use symposium)

FY2018

1. June 22: 1st Data Use symposium
2. Sep 19: 2nd Data Use symposium
3. Dec 5: 3rd Data Use symposium
4. Feb 28: Results report meeting
(4th Data Use symposium)



首都圏レジリエンスプロジェクト
Tokyo Metropolitan Resilience Project

Data use and application council for Resilience
Tokyo Metropolitan Resilience Project - 2017



首都圏レジリエンスプロジェクト・データ利活用協議会が発足
産学官民が連携し地震データを活用
250人が参加し感心の高さを示す

国立研究開発法人防災科学技術研究所（以下、防災科研）は6月23日、首都圏レジリエンスプロジェクト・データ利活用協議会の発足会・記念シンポジウムを都内にある時事通信ホールで開催しました。このプロジェクトは、首都直下地震などの巨大災害に備え、大学などの研究者や企業・組織とともにオールジャパン体制で首都のレジリエンス力を高めてこうというものです。当日は、プロジェクトに参画する研究者や地震観測データなどの防災情報を扱う専門機関、自治体や企業のBCP担当者ら約250人が参加しました。



写真：発足式の最後に行われたパネルディスカッションでは、参加者からもプロジェクトに対する期待の声が相次いだ



地震計データ・
防災技術共有
協議会発足
13社が参加

企業が持つ地震計などで観測した情報や防災に関する技術を共有し、事業継続計画（BCP）強化に役立てるための協議会「データ利活用協議会」が発足した。約4000カ所の地震計からなる観測システムを持つ東京ガスをはじめ、J-東日本や日東工業など13社が参加する。会長には東京大学地震研究所の平田直教授（写真）が就任した。

協議会にはそのほか62企業や3自治体、6研究機関が参加を検討している。協議会内で「データや技術の共有方法は今後詰める。参加企業は、他社のデータや技術をBCPや企業の社会的責任（CSR）活動などに役立てられる。防災科学技術研究所が大学などの研究者や企業・組織と進める「首都圏を中心としたレジリエンス総合力向上プロジェクト」（平田直総括）東大地震研教授の一環。

Kick-off Declaration of the Data Use and Application Council for Resilience

1. Promote activities that help improve community resilience (mainly in the Tokyo metropolitan area) through cooperation among industry, government, academia, and private sector
 - Academia produces research results that can be used to solve issues faced by companies and organizations in coping with disasters and implementing disaster management measures.
 - Industry provides information and data that help solve issues.
 - The government provides opportunities and information for solving issues.
 - The private sector provides information on needs in respective areas.
2. Strengthen communities and organizations and create solutions that ensure proper business continuity in the event of a disaster
3. Utilize digital data to help create a resilient society

Member Companies and Organizations of the Data Use and Application Council for Resilience under the Tokyo Metropolitan Resilience Project: 98

Private Company: 69

| | | | |
|----------------|----|--------------|---|
| IT system | 10 | Publishing | 1 |
| D&R Consultant | 7 | Inspection | 1 |
| Construction | 8 | Printing | 1 |
| Communication | 5 | Geology | 1 |
| Manufacturing | 1 | Distribution | 1 |
| Sensor | 6 | Insurance | 1 |
| Survey | 3 | Design | 1 |
| Mapping | 3 | Airline | 1 |
| Consultant | 3 | Chemical | 2 |
| Meteorology | 2 | Housing | 2 |
| Electronics | 5 | Architect | 1 |
| Law | 2 | | |
| Mechanic | 2 | | |

Public Sector
(Local Government: 3)

Academia: 8
(Research Institute: 8)

NPO/NGO
(Organization: 7)

Others: 11

2 challenges are about to implement

- Data use and application council for Increasing the Resilience of Companies and the Tokyo Metropolitan Area
- **CyborgCrowd** (Harmonious Collaboration between Human & AI) for solving urgent problems in disaster response

Crowd-Sourcing for Problem Solving

“The world is flat” by Thomas L. Friedman (2005)

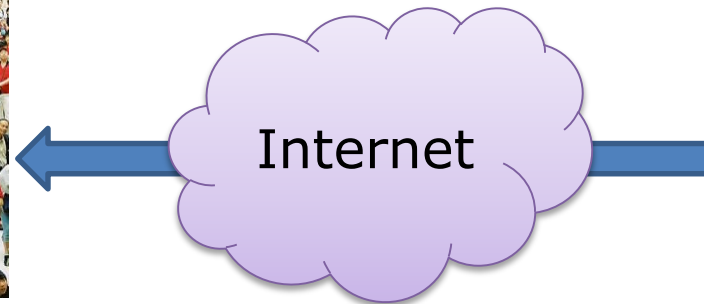
Our world is connected beyond country boundary border seamlessly due to the expansion of Internet



Crowd

+

Outsourcing

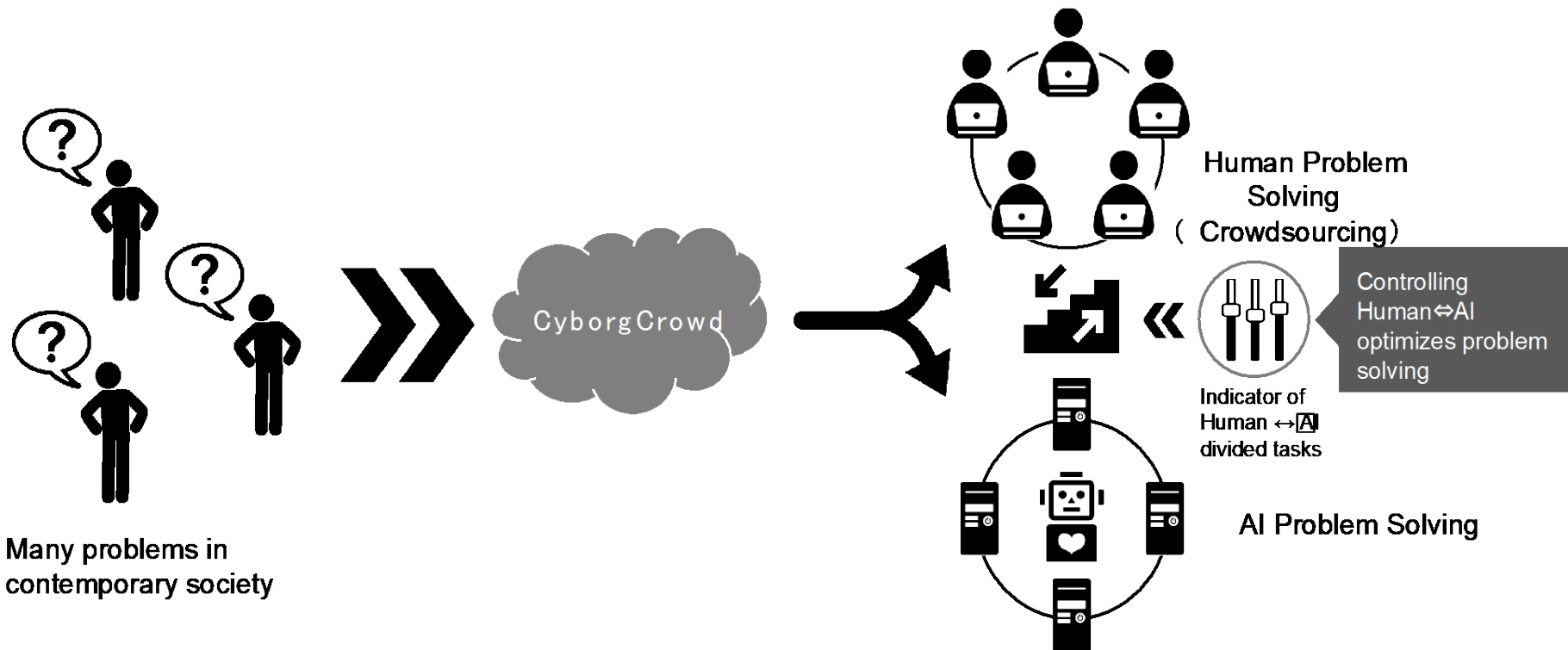


Problem Solving



If you have some problems, you can ask somebody to solve them through Internet.
However if the problem is so difficult, anybody cannot solve it.
So, it is important issue how to simplify the problem.
+ It could take much time when “crowd” is not so crowded.

CyborgCrowd: Harmonious Collaboration with Human and Crowd-Sourcing

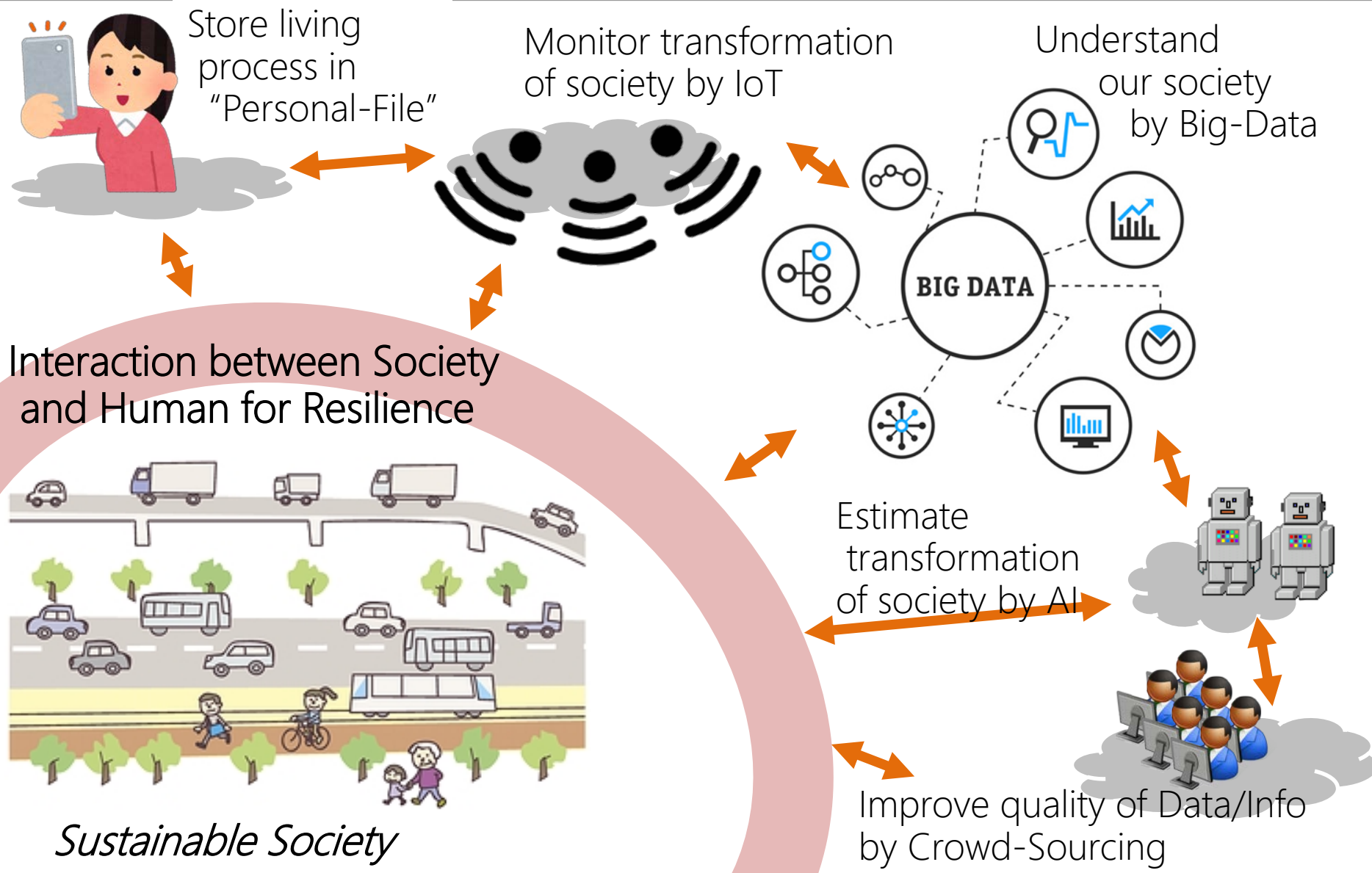


➡ Application of CyborgCrowd in Disaster Relief

***Cyber-physical disaster drill:
preliminary results and social
challenges of the first attempts to
unify Human, ICT and AI in
disaster response***

Resilient Society 2.0 (just an idea)

-Our society will be changed totally by ICT-



Conclusion: To Realize Actual ICT Disaster Preparedness wit Big-Data

Keyword: “Thinking by Strategic Design”

- Thinking collaboration Human & AI
 - Strategic assignment of AI in our society
 - Role sharing between Human and AI
- Thinking Power of Intelligence
 - Management of retrieved big-data from society
 - Retrieving Intelligence by information aggregation and evidence-based estimation of situation
- Thinking of Quality Control of Intelligence
 - Establishment of evaluation methodology for AI
 - Establishment of methodology for sharing AI