Creating Common Operating Picture for a Large-scale Earthquake Disasters

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EMT
東北地方太平洋沖地震
緊急地図作成チーム

Emergency Mapping Team

【Great Eastern Japan Earthquake】

14:46:23, 11 March 2011： 2011 Tōhoku earthquake and tsunami（M=9.0）

- ●Seismicity occurred serially at Miyagi coast, Fukushima coast, and Ibaraki coast of Pacific Ocean Sanriku coast
- ●Multiple prefectures devastated catastrophe
- ●Tsunami, shake, liquefaction, radiation leakage of complex disaster

→ 1. respond organization cross several prefectures
2. hard to obtain general picture of damage
3. various organizations and staffs associated with disaster response

【Necessity of mapping service at a national level】

Developing common operating picture at national-level disaster response

- ●necessary to generate different sorts of information (internet）
- ●necessary to visualize information for decision-makers（maps and so on)
- ●necessary to generate spatial information specialists' intelligence to estimate the situation

To make it possible for developing common operating picture at a national level, those who share same idea organized "Emergency Mapping Team" on March 12, 2011 and started mapping service with the Cabinet's support.

EMT 東北地方太平洋沖地震 緊急地図作成チーム

Activity and Contribution

March 12　10:00	•Explain the idea to Director for Disaster Prevention and Preparedness, Cabinet •Special meeting room provided for EMT activity •Members start mapping of EMT activity by owned computers (1)collection of buildings at evacuation zone of Fukushima 1 nuclear power plant
March 13 （activity in real earnest）	•Building database from ”Cabinet report” •Procuring base map from associated agencies 2005 Population census data/ administration boundary/ digital map/ building point data etc Hazards Tsunami：low elevation area/ satellite photo/ drainage area Seismicity：city-based /1km^2 mesh-based seismicity Fire：reports from each ministry Nuclear: estimation based on expansion model/ evacuation areas (count backwards) Liquefaction：estimation based ground ft. seismicity Vulnerability Population: population census data Building：building map/ address point data Lifeline

Activity and Contribution

March 23	•Constructed EMT homepage released the maps manufactured before March 23 and dynamic map, traffic recovery data provided by ITS-JAPAN (raster data only)
March 28	•Established “Tohoku Earthquake Emergency Mapping Conference” Necessity of “MashUp” Release rules for MashUp and so on
April 6	•Identified long-term evacuation area, a request from the Cabinet Creating new knowledge from MashUp Applying knowledge from researchers and previous as a model

(May 1, 2011)

Map Manufacture : **502 Maps**

Activity and Contribution

Activity Office of EMT
（Central joint Government building #5 special meeting room, Cabinet)

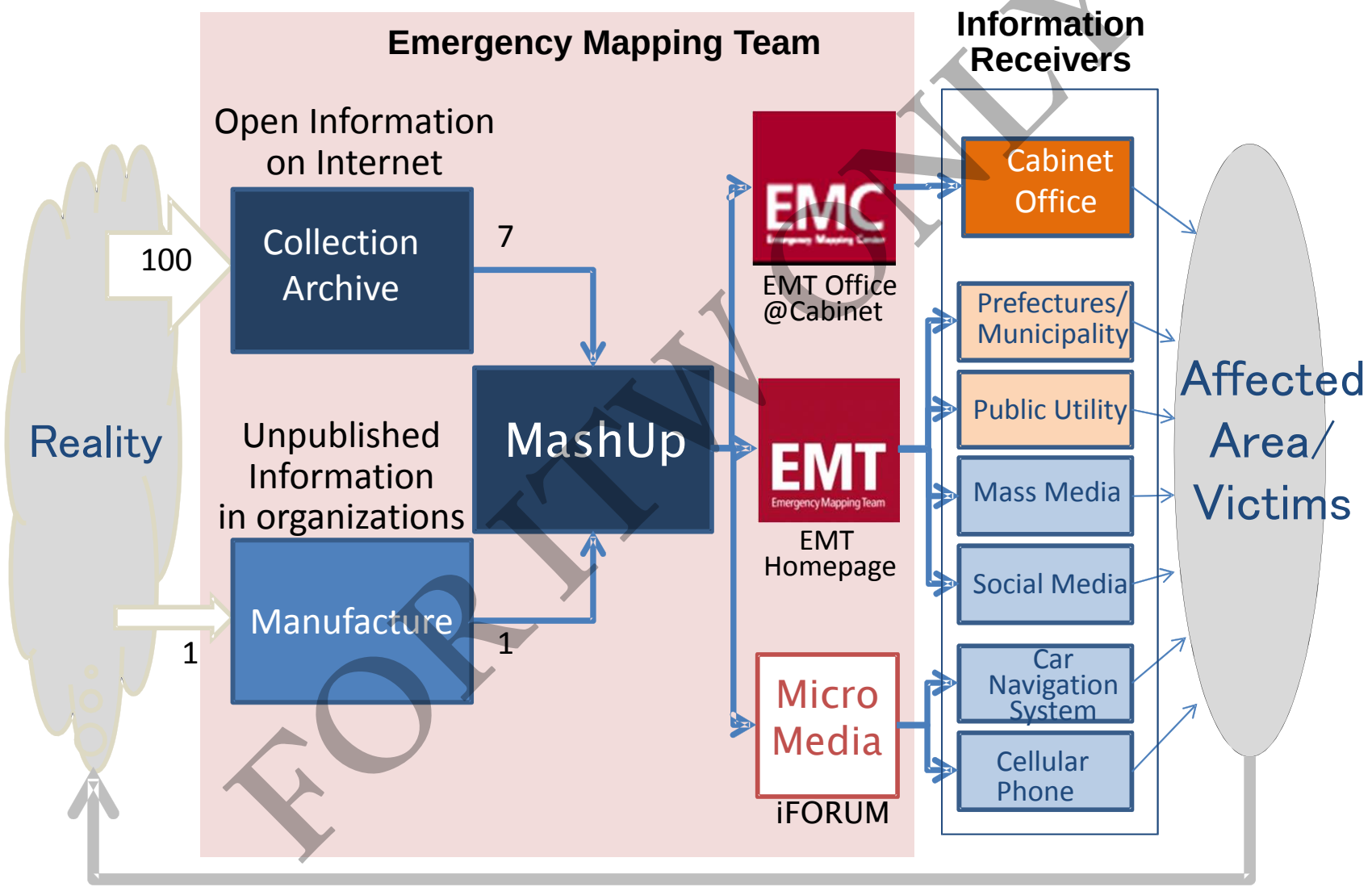
Captured the Cabinet office's movement to examine the possible needs of maps

Activity Organization Reinforcement

Initial Period

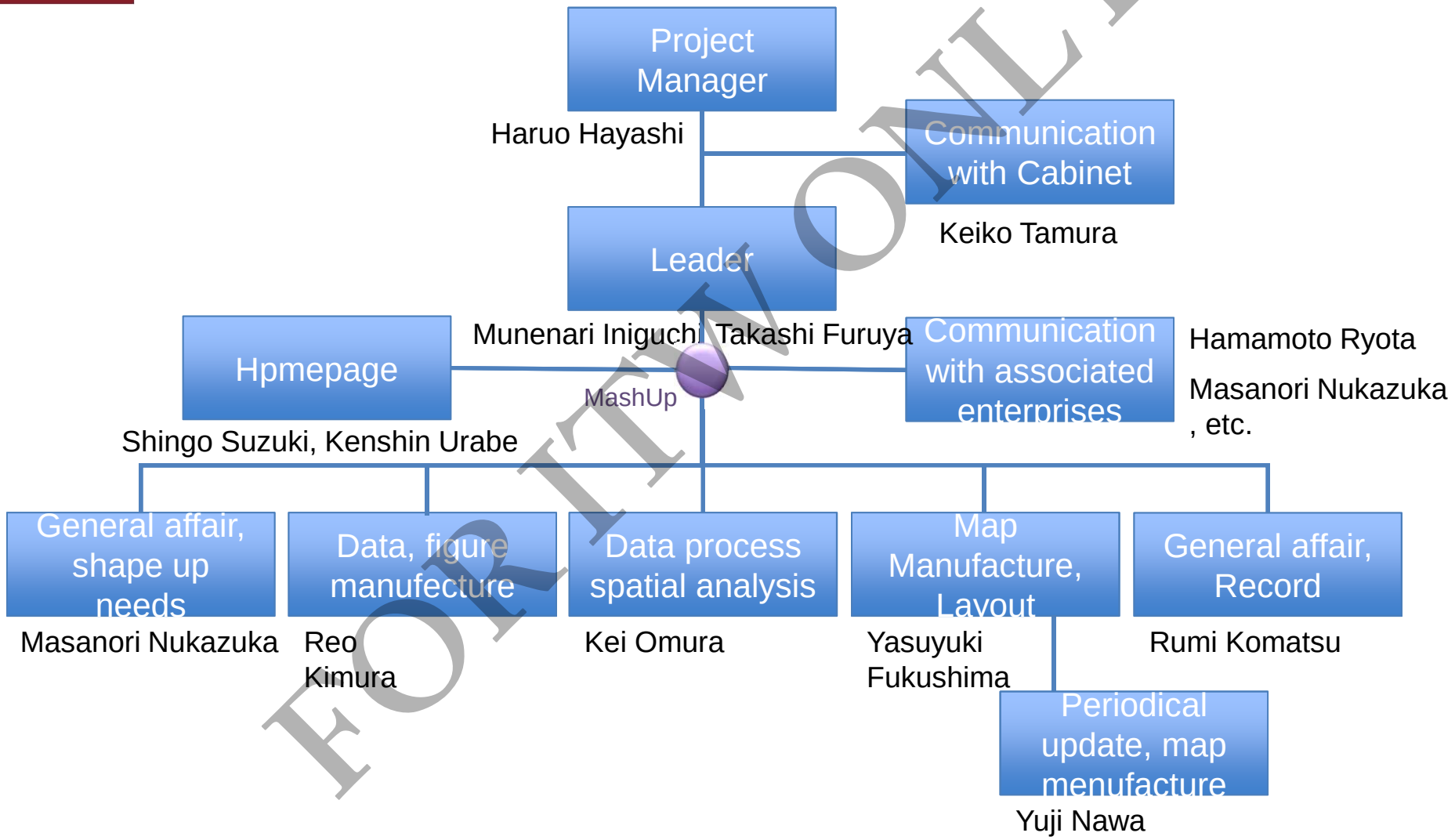
Developing Period

Allocating EMT in MashUp



Activity Organization in Field

March 17, 2011



Joint Organizations

- Developing organization framework as enterprise, administration, academy, civilization cooperating, supporting team

○ Haruo Hayashi (DPRI, Kyoto University)

【Administration】

•Director for Disaster Prevention and Preparedness, Cabinet

【Academy】

•Kyoto Univ., DPRI

•Niigata Univ., NHDR

•Yokohama National Univ., CRMSS

•Fuji-Tokoha Univ.

•Kansai Univ., Dept. of Safety Science

•Kyoto Univ., ISS

【Enterprise】

•ESRI (USA)

•ESRI(Japan)

•NTT Data CCS

•NTT-ME

- Insurance Group, Dept., of R&D
- Kajima Technical Research Institute
- Pasco Corp.
- Increment P Corp.
- JAXA
- ASTEM
- NTT, IS Lab.
- Science Craft
- GK Kyoto
- Xceed Co.
- Duplo Group
- Hyper Research Co.
- Arutsu Media Solution, etc.

•株式会社Agoop

•明宣G

•京都大学防災研究所巨大災害研究センター

•パシフィックコンサルタンツ株式会社

•ASTEM

•有限会社　アールツー・メディアソリューション

•株式会社サイエンスクラフト

•株式会社パスコ

•ESRI

•インクリメントP株式会社

•株式会社　ジイケイ京都

•兵庫県立大学

•ESRIジャパン株式会社

•株式会社インターリスク総研

•地理情報システム学会

•富士常葉大学

•NPO法人　地域自然情報ネットワーク（GCN）

•宇宙航空研究開発機構

•東北大学

•特定非営利活動法人　防災デザイン研究会

•iForum

•株式会社エクシード

•デュプロ株式会社

•本田技研工業株式会社

•特定非営利活動法人ITS Japan

•大阪産業大学

•奈良大学

•ヤフー株式会社

•株式会社NTT-ME

•鹿島建設株式会社鹿島技術研究所

•新潟大学

•横浜国立大学
（安心・安全の科学研究教育センター）

•株式会社NTTデータCCS

•関西大学

•バイオニア株式会社

•酪農学園大学

•株式会社NTTネオメイト

•岐阜大学

•ハイパーリサーチ株式会社

Static Maps and Dynamic Maps

- Static Maps（Paper, PDF）
  - Announced inside organization
    in a large-sized printing（ perspicuity）
  - Released by PDF（Easiness：GIS not required）

- Dynamic Maps（WebGIS）
  - Zoom-in/out, Layer display/hidden（Flexibility）
  - Other contents to MashUp（add-value creativity）
  - Application with GIS soft（analysis, advanced utilization）

Static Maps and Dynamic Maps

EMT Website

Static Maps

Dynamic Maps

Estimation of buildings at evacuation areas of Fukushima nuclear power plant

- Plant 1：evacuates if at 20 km radium
- Plant 2：takes shelter indoors if at 10km radium

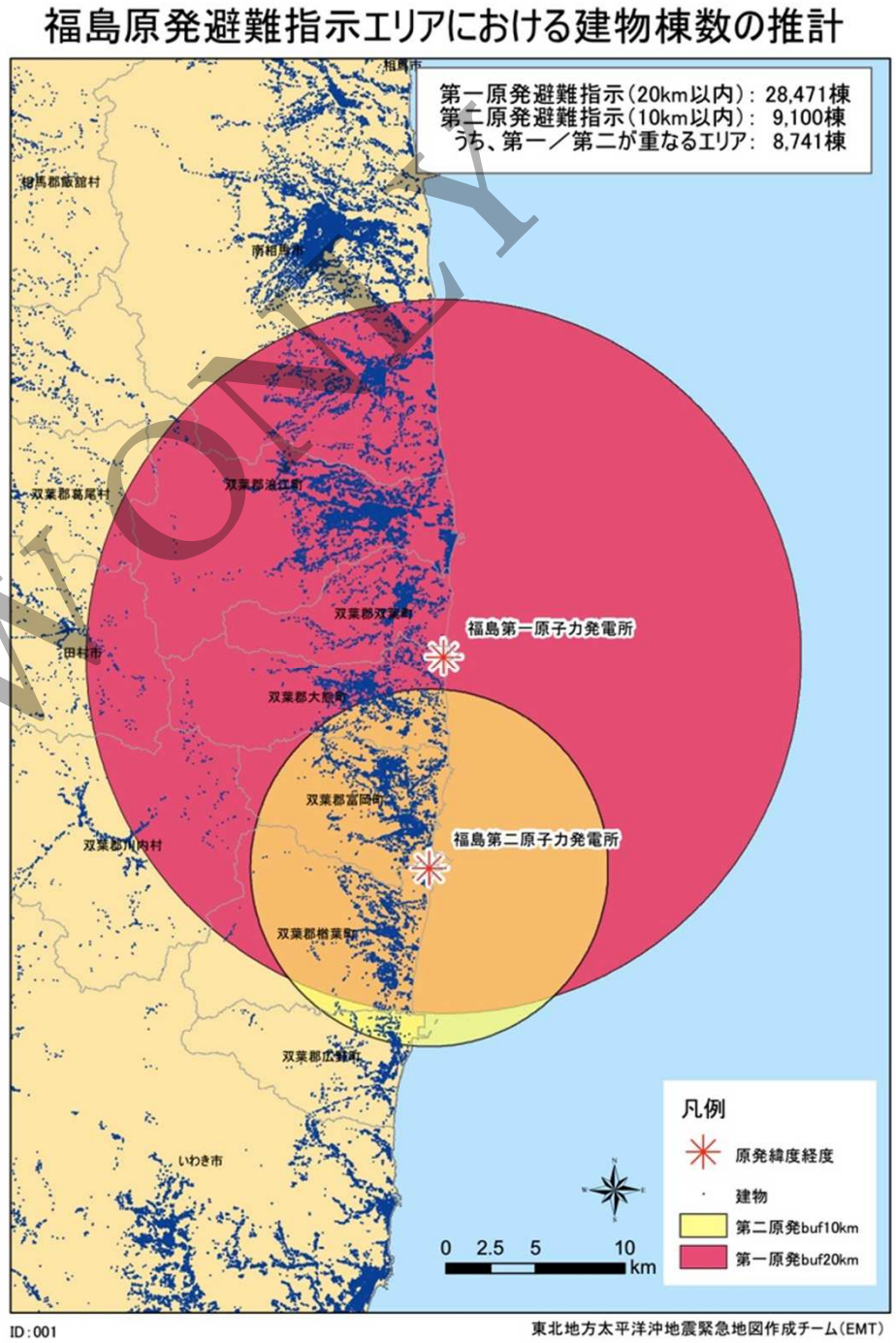
- Collected address points at announced areas to visualize possible impact

Plant 1 ： 28,471 buildings

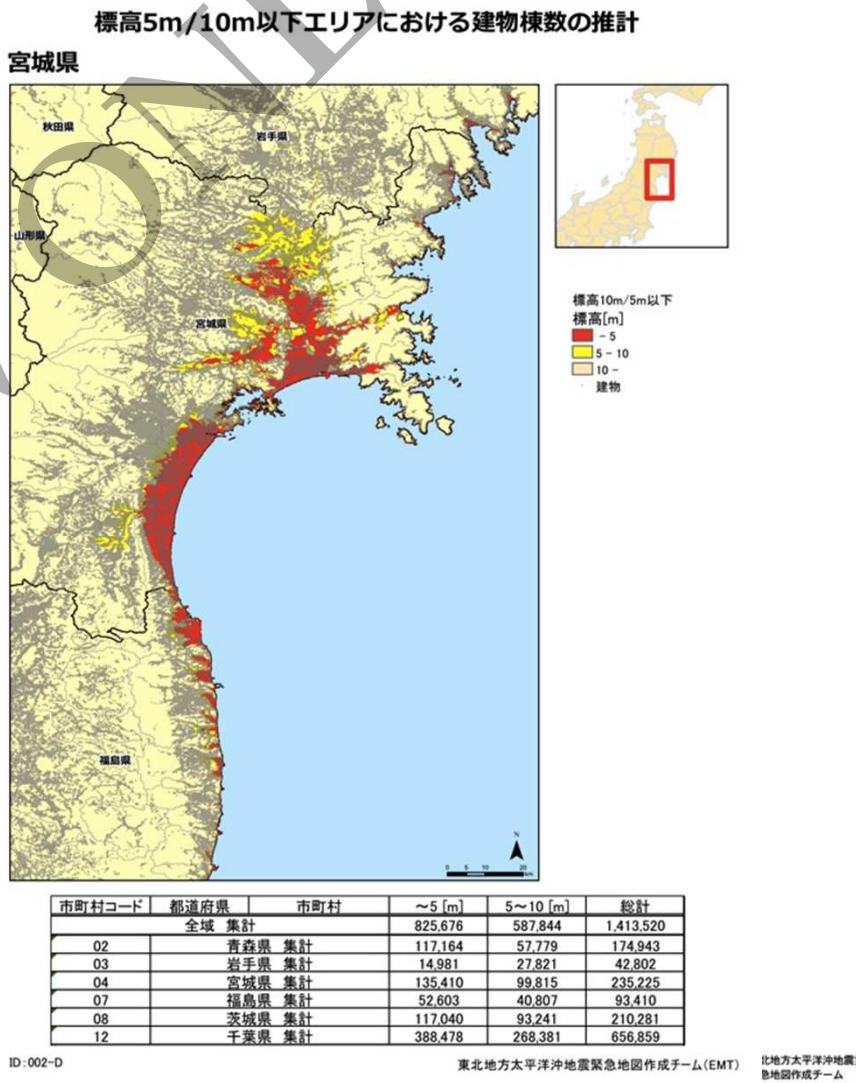
Plant 2 ： 9,100 buildings

Overlapped：8,741 buildings

Manufacture: March 12, 2011



MLIT：Map application need for estimating required households of disaster recovery public housings



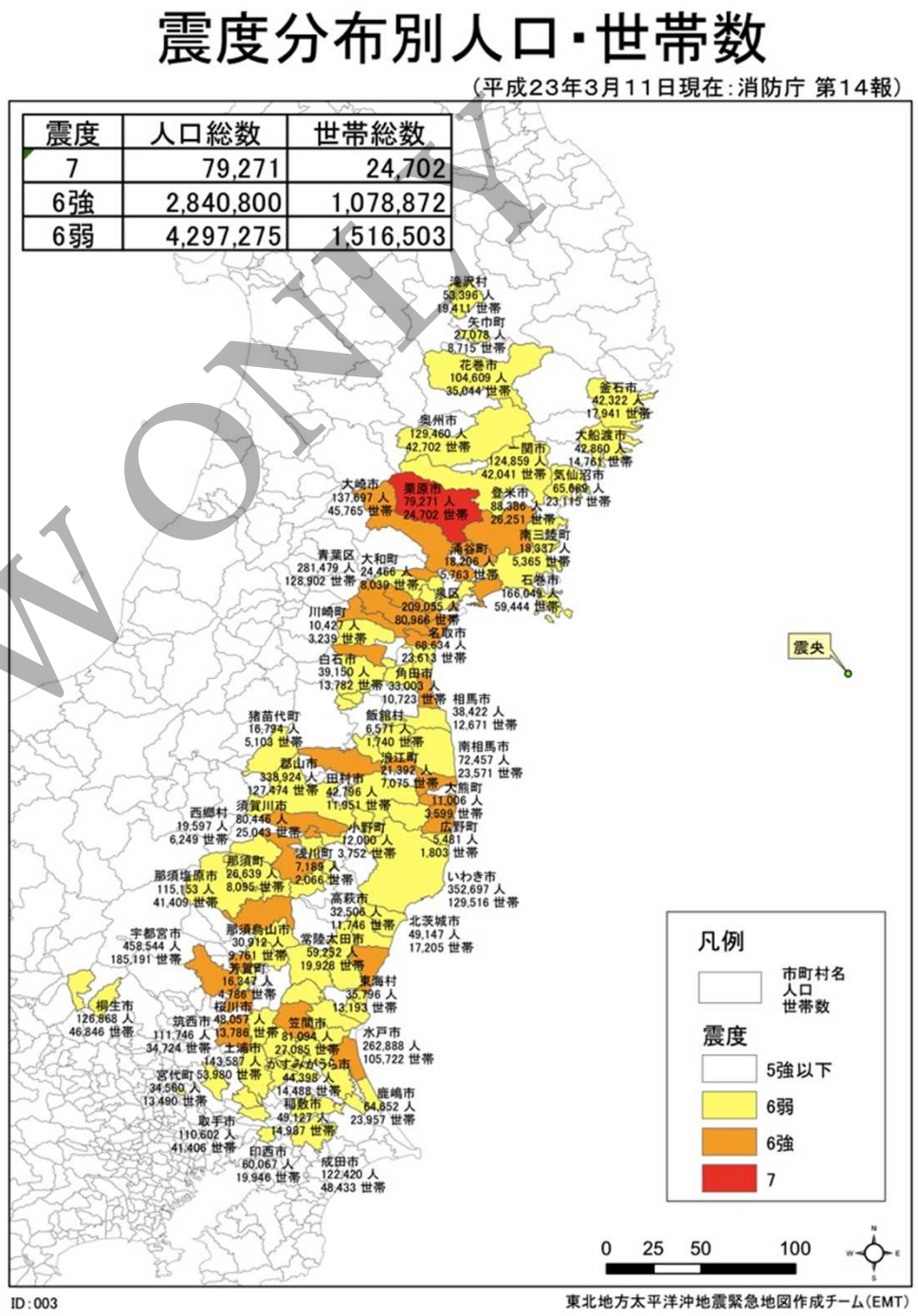
市町村コード	都道府県	市町村	～5 [m]	5～10 [m]	総計
全域 集計			825,676	587,844	1,413,520
02	青森県	集計	117,164	57,779	174,943
03	岩手県	集計	14,981	27,821	42,802
04	宮城県	集計	135,410	99,815	235,225
07	福島県	集計	52,603	40,807	93,410
08	茨城県	集計	117,040	93,241	210,281
12	千葉県	集計	388,478	268,381	656,859

ID：002-D

東北地方太平洋沖地震緊急地図作成チーム（EMT）

Population at seismic intensity levels

Population/ household at seismic intensity levels	
Hazard	
Seismic Intensity	Areas exposed to seismicity at 6-lower
Social Property	
Household/ Population	Population Census



Population Aged 65+ Rate(Disaster Relief Act declared cities)

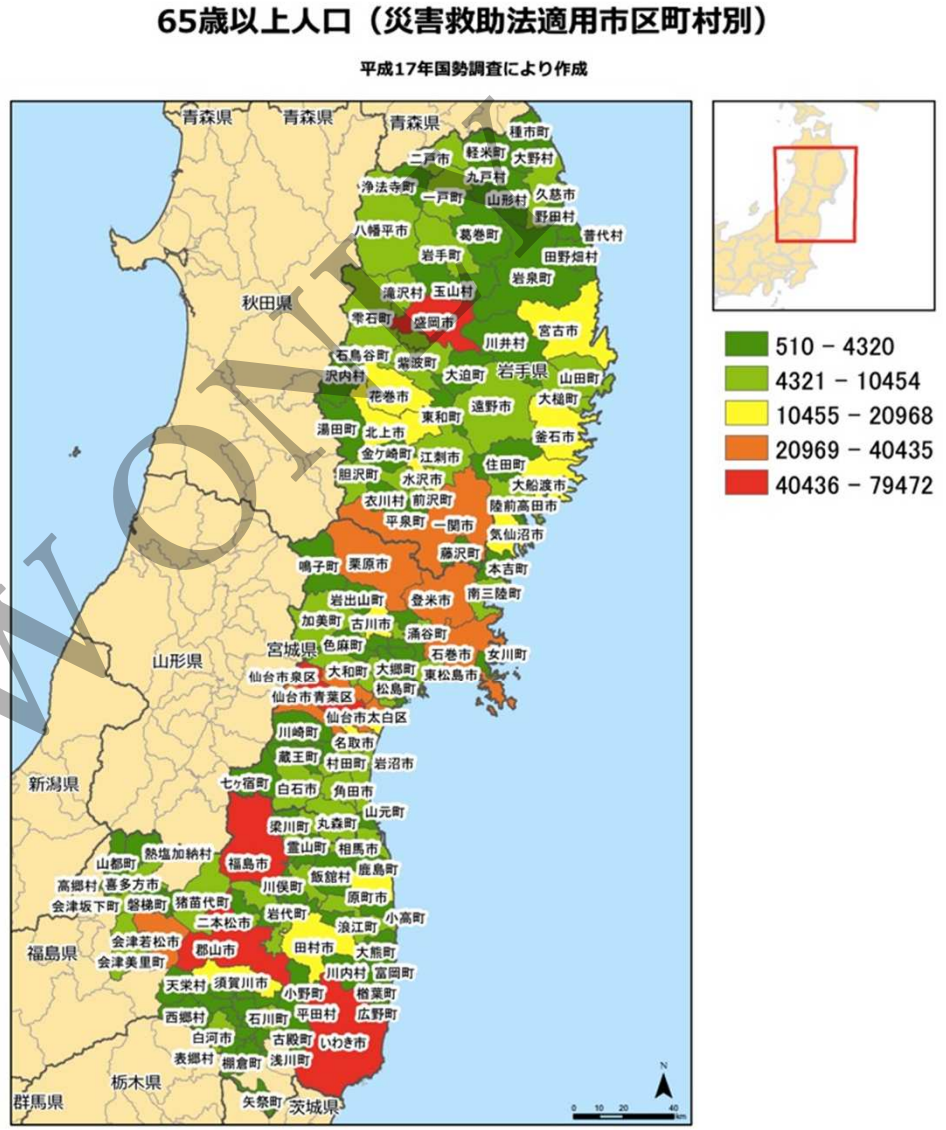
Population Aged 65+ Rate(Disaster Relief Act declared cities)

Grasp of damage

Disaster Relief Act declared areas

社会資産Social property

Population　Population Census



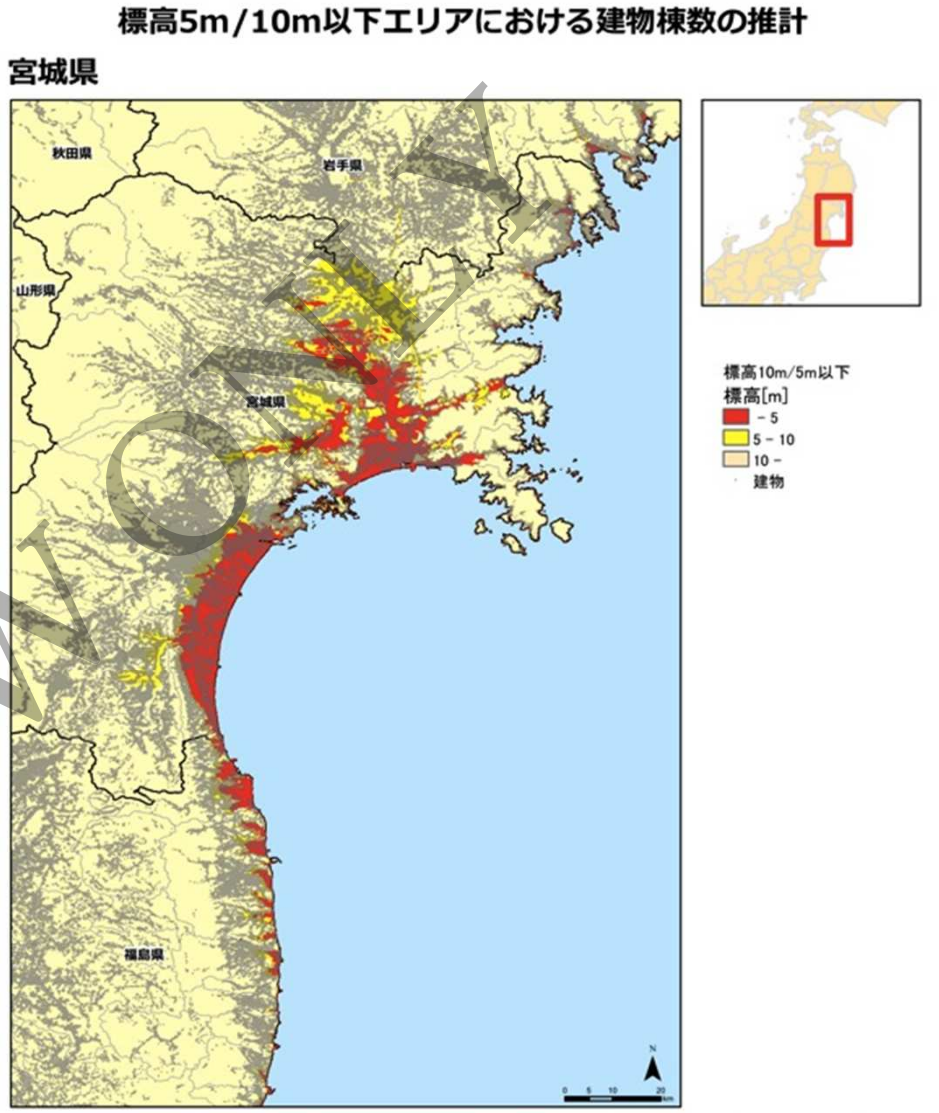
	総人口	65歳以上人口	65歳以上人口比率
岩手県	1,385,040	326,562	23.6%
宮城県	2,360,218	339,957	14.4%
福島県	2,091,319	474,860	22.7%

ID：010

東北地方太平洋沖地震緊急地図作成チーム（EMT）

Estimation of buildings at areas under 5m/10m elevation

Estimation of buildings at areas under 5m/10m elevation	
Hazard	
Tsunami	Low-elevation area
Social property	
Building	Address point



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東北地方太平洋沖地震緊急地図作成チーム（EMT）

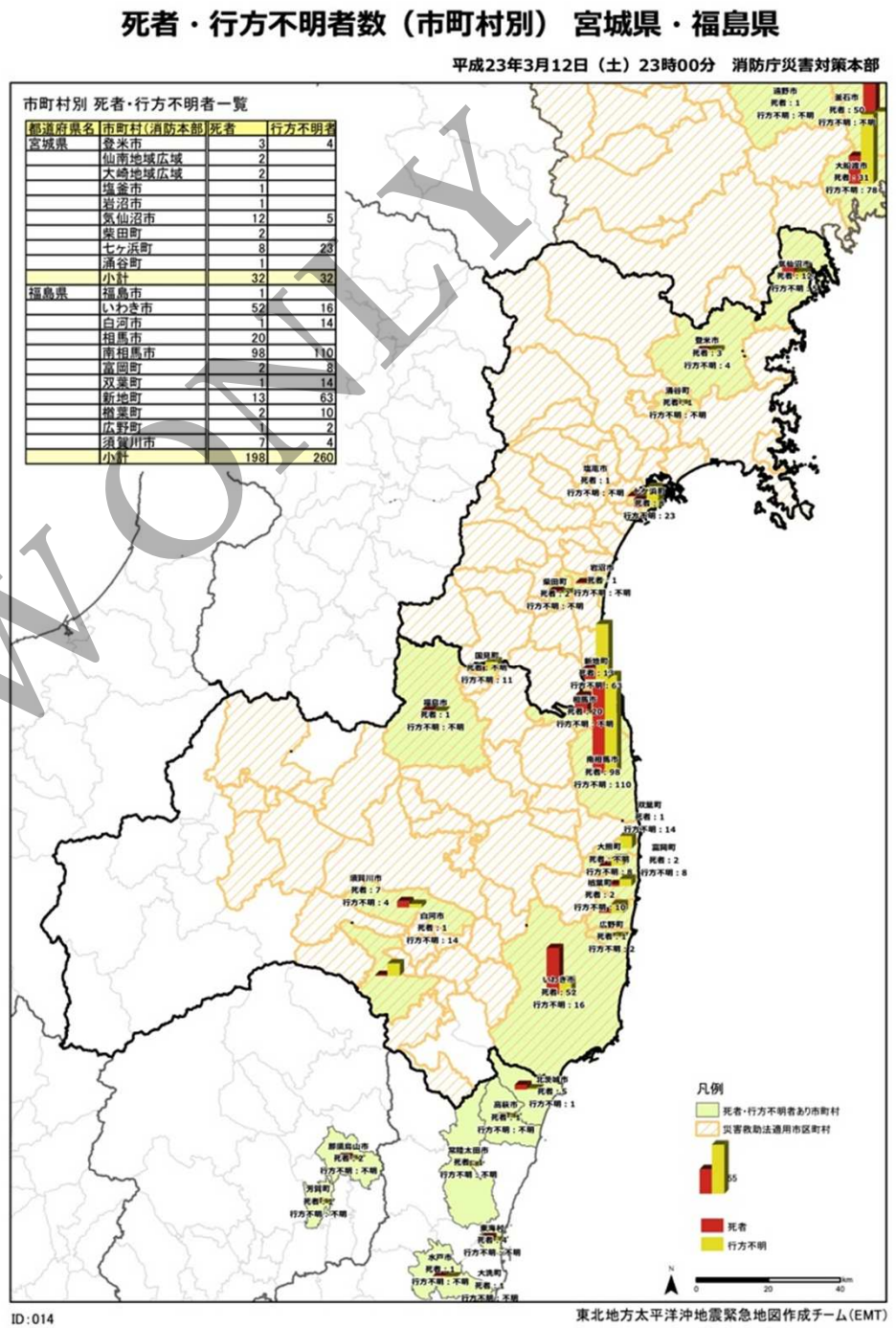
Injured People every city

Injured People every city

Grasp of damage

Human — Injured population every city

Disaster Relief Act declared areas

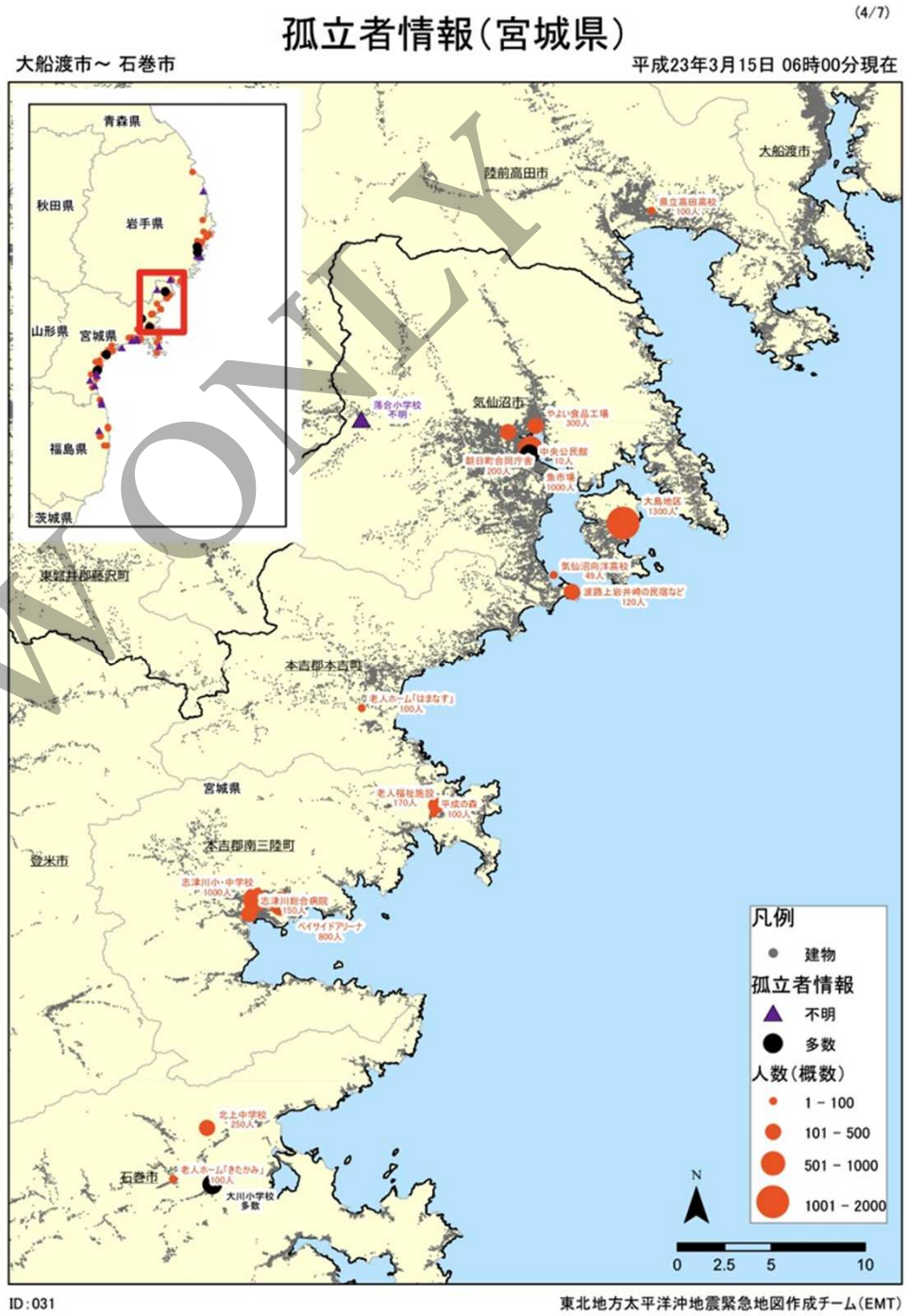


都道府県名	市町村(消防本部)	死者	行方不明者
宮城県	登米市	3	4
	仙南地域広域	2	
	大崎地域広域	2	
	塩釜市	1	
	岩沼市	1	
	気仙沼市	12	5
	柴田町	2	
	七ヶ浜町	8	23
	涌谷町	1	
	小計	32	32
福島県	福島市	1	
	いわき市	52	16
	白河市	1	14
	相馬市	20	
	南相馬市	98	110
	富岡町	2	8
	双葉町	1	14
	新地町	13	63
	楢葉町	2	10
	広野町	1	2
	須賀川市	7	4
	小計	198	260

EMT
Emergency Mapping Team

Isolated People
（Iwate Pref., Miyako city ～ Kamaishi city)

Isolated People （Iwate Pref., Miyako city ～ Kamaishi city)	
Grasp of damage	
Human	Isolated population information
Social property	
	Address point
Building	

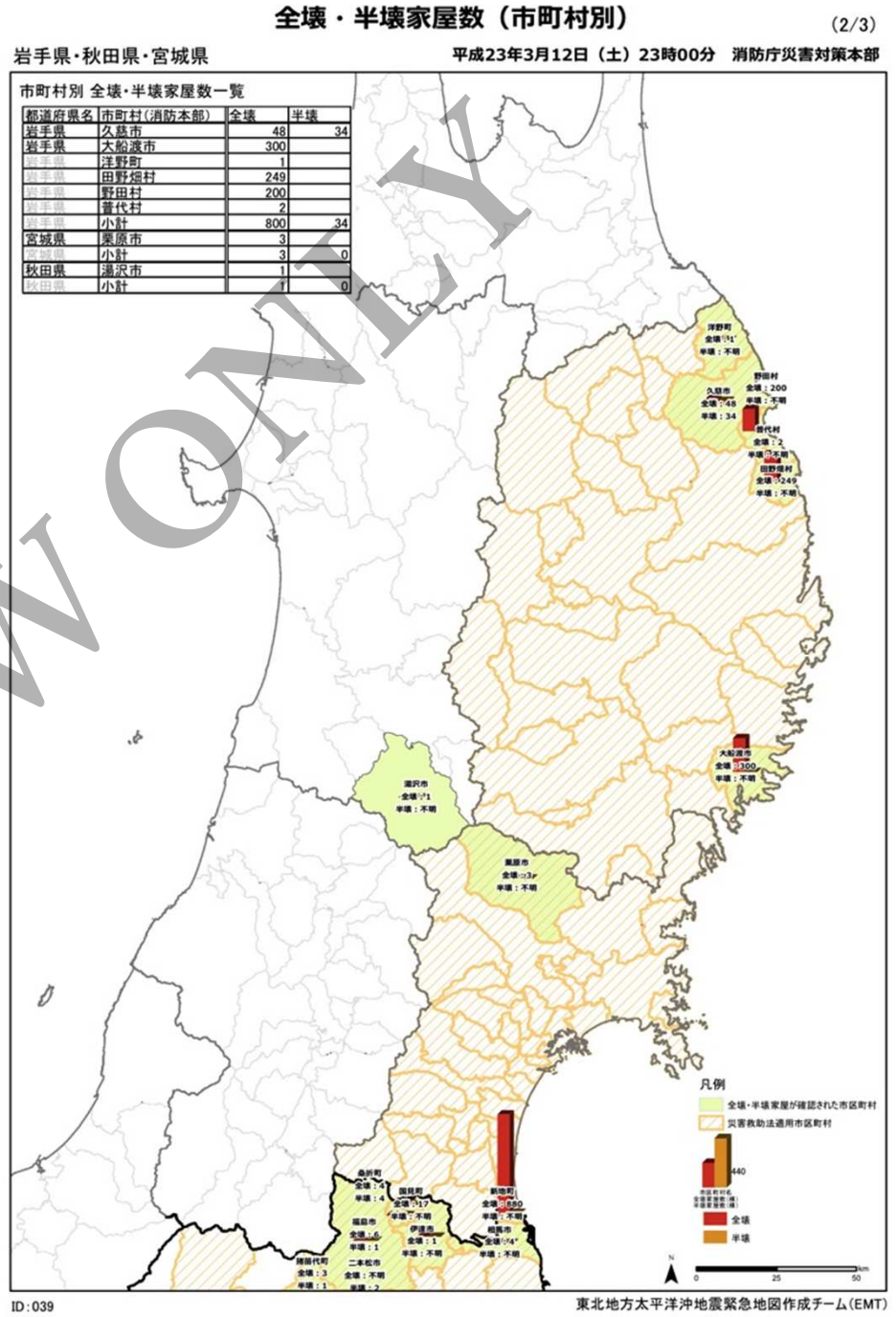


Completely/Half Destroyed Houses every city

Completely/half destroyed houses every city

Grasp of damage

Building	Completely/ Half destroyed houses



TEPCO Planned Outage

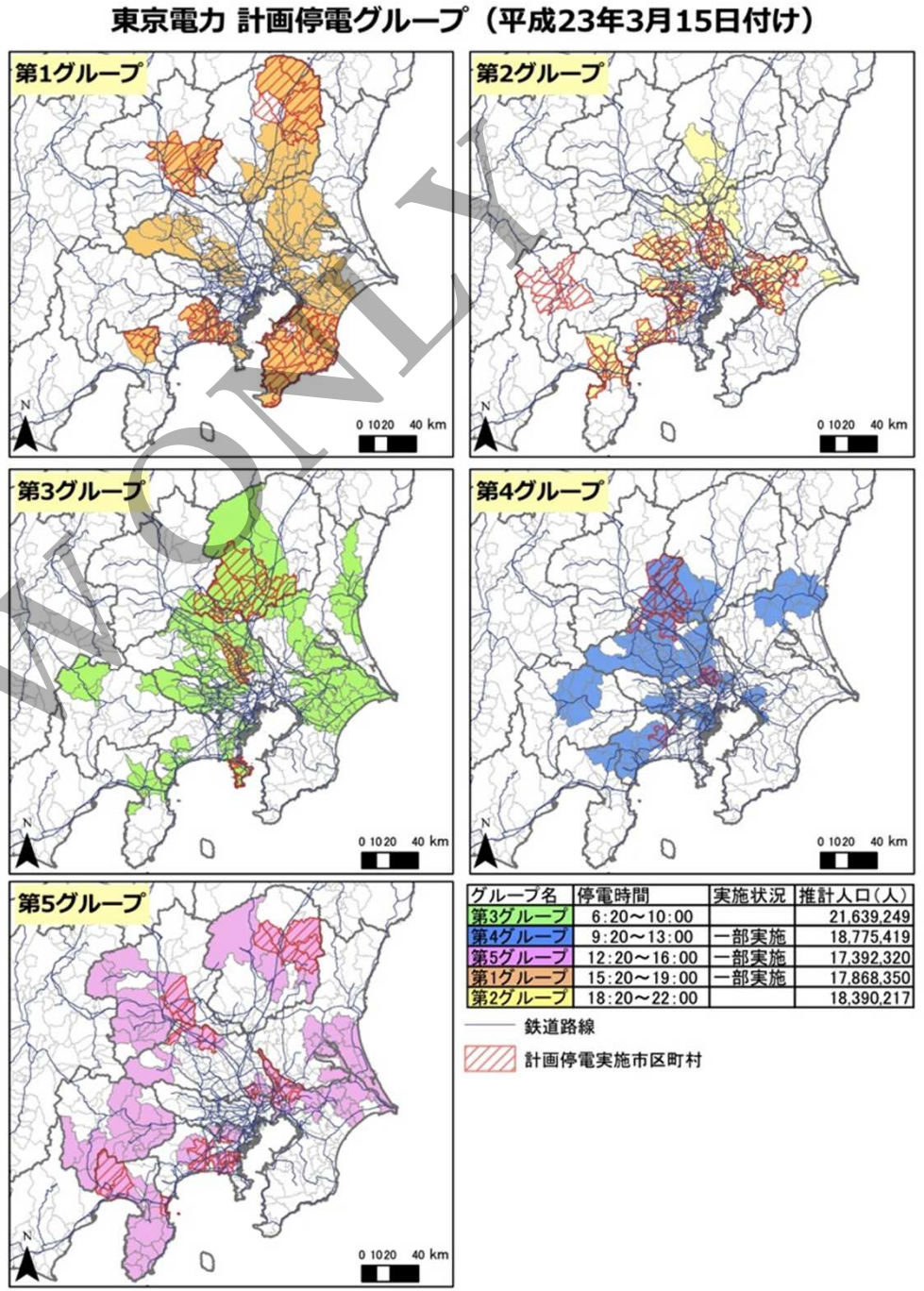
TEPCO Planned Outage

Hazard

Outage　Planned outage (TEPCO)

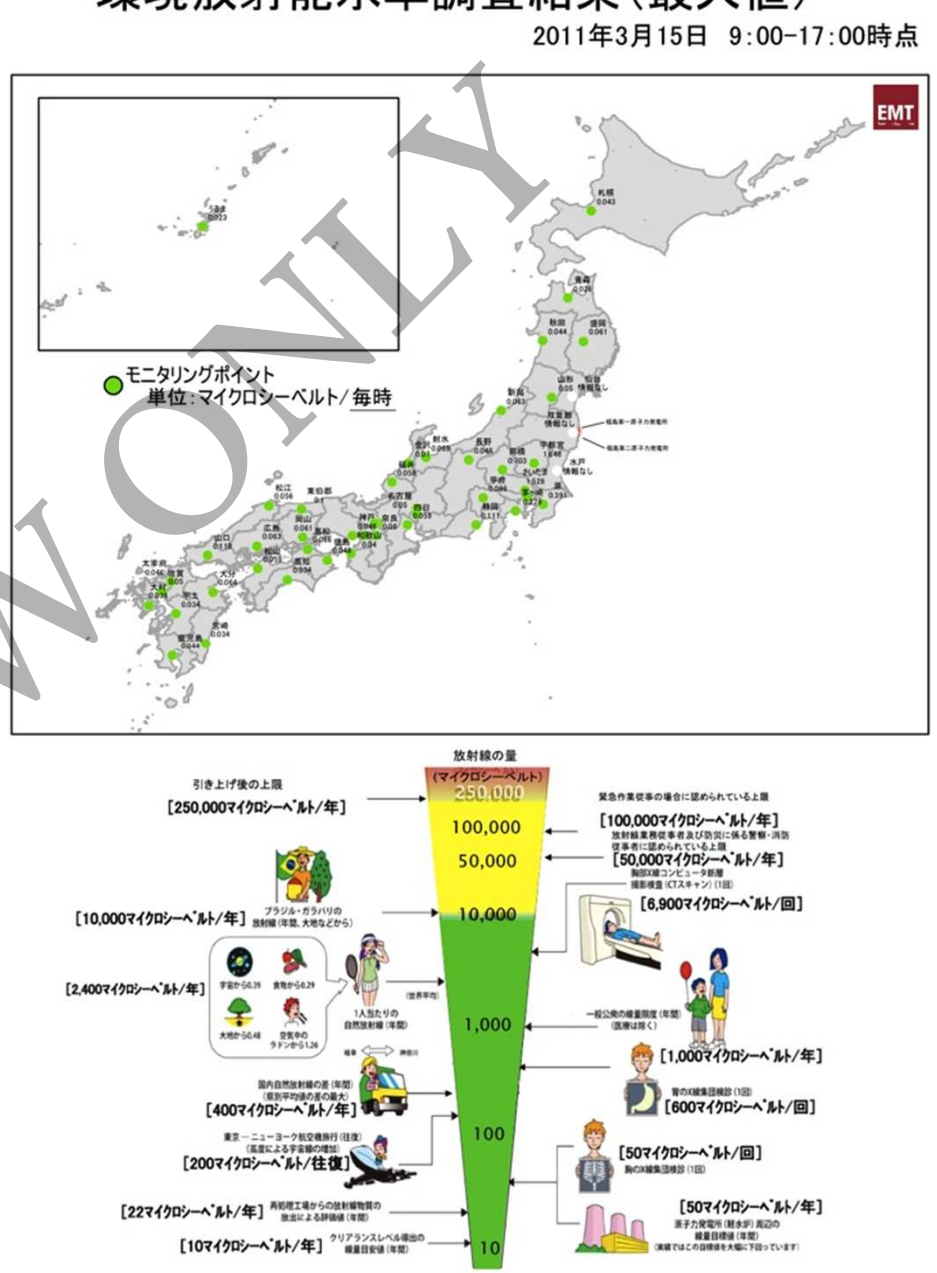
Social Property

Lifeline　鉄道ライン



Environmental Radiation Survey Result

Environmental Radiation Survey Result	
Hazard	
Radiation	Radiation Survey Volume



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Logistics and Shelters

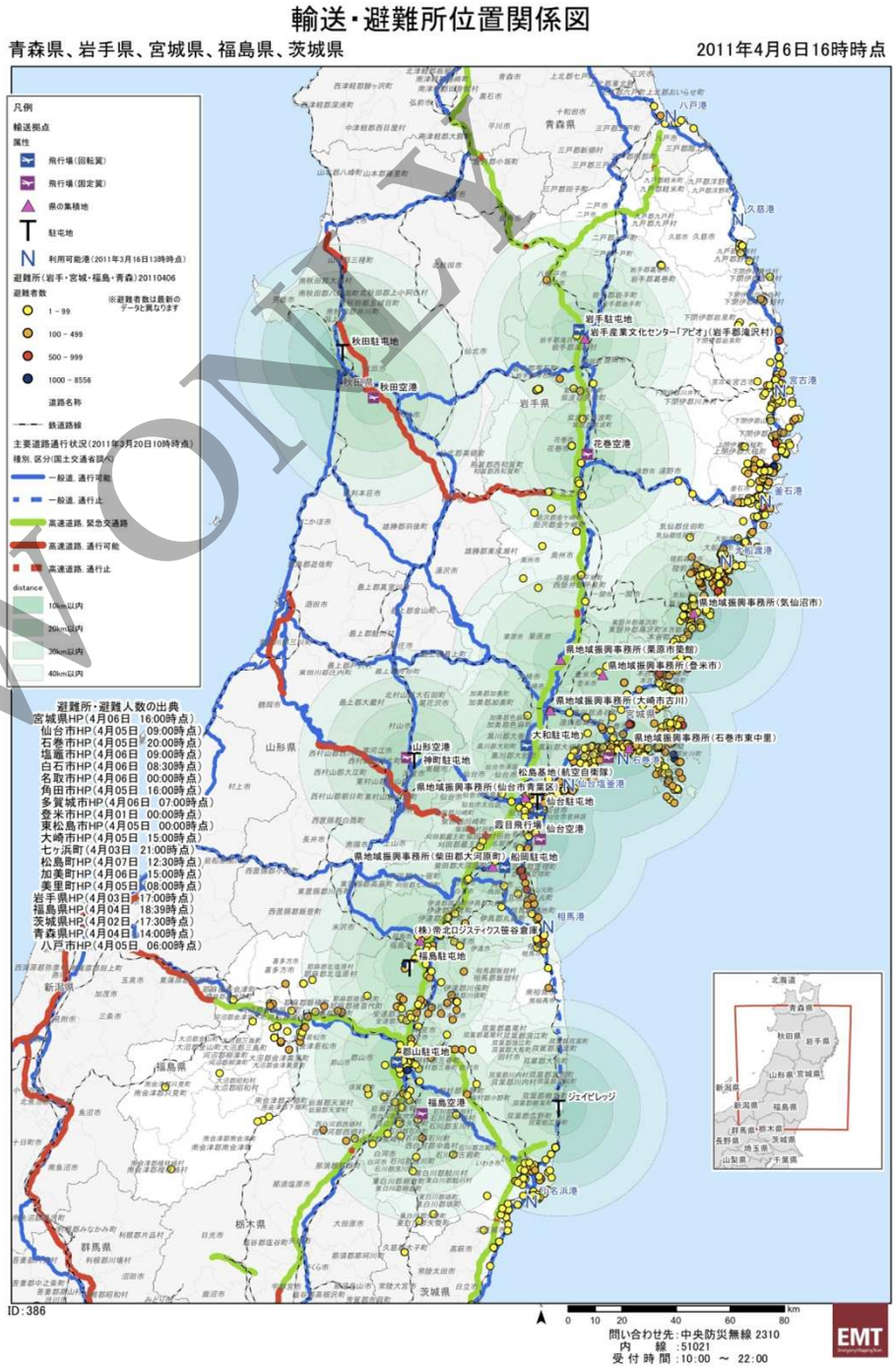
Logistics and Shelters

Organization Information

- Shelters
- Logistics bases
- Distance from logistics bases

Information from internet

- Traffic recovery



Dynamic Maps Catalog

Search by keywords

Click to open

MashUp is

- Divergent organizations take advantage of owned expertise and deliver information
- Information provided by a closed framework inside each organization only is represented in an individual aspect
- While the information is constructed, then new meaning is shown
- Yet, nonprofessional hardly knows where and what the information is, or how to the information
- MashUp themes, places, time based various information to create new value

MashUp
（Generating dynamic information on web)

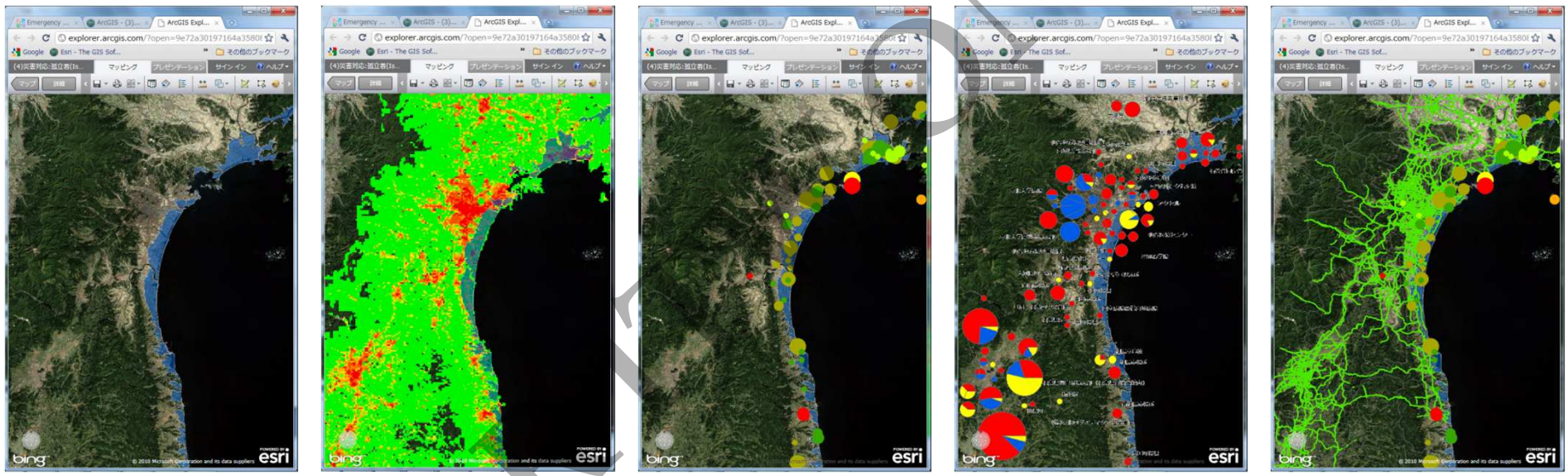
Where is tsunami damage？

What are insufficient materials？

How population distributes at 3 pm, weekday?

Where are isolated people?

Available route for logistics?



Estimated drainage areas

Floating population（Agoop）

Isolated victims (media, etc.)

Materials supply (municipality)

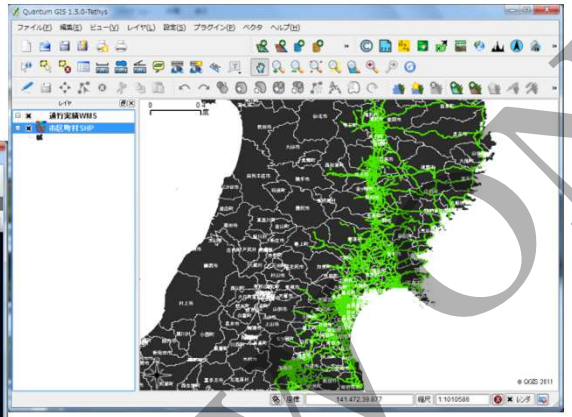
Traffic recovery（Honda, ITSJ）

MashUp: Terms of Use

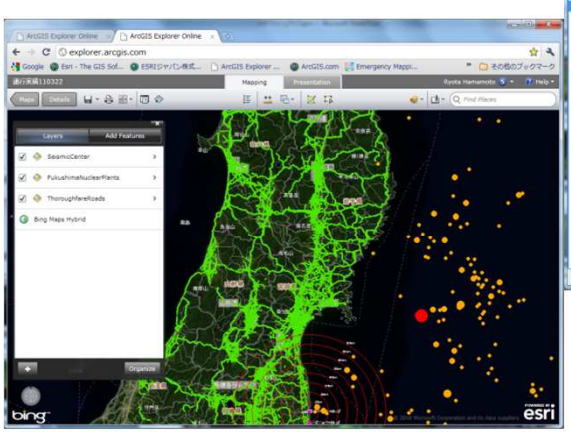
- **Extent of information as MeshUp object**
  - Each organization or person takes advantage of owned expertise to releases information useful to disaster response or recovery with responsibility as premise.
  - Following 3 situations might exist in MashUp, situation#1 and #2 are followed the terms of use.
    - #1 Mix up information from internet
    - #2 Mix up information from internet with information manufactured by organization itself
    - #3 Mix up information manufactured by organization itself
- **Open right to use**
  - To understand that when information is released on internet, consent of secondary right to use is given to society.
  - Therefore, anyone can use the information freely.
- **Maintain intelligence right**
  - For those who use the information obligate to always note the information source while the information is used
- **Self-responsibility principle**
  - Information users use the information by his free will.
  - Information users take responsibility to results accompanied with usage of information.
  - Information providers do not take any responsibility to results accompanied with usage of information.

Open Access

WMS support soft (QGIS)



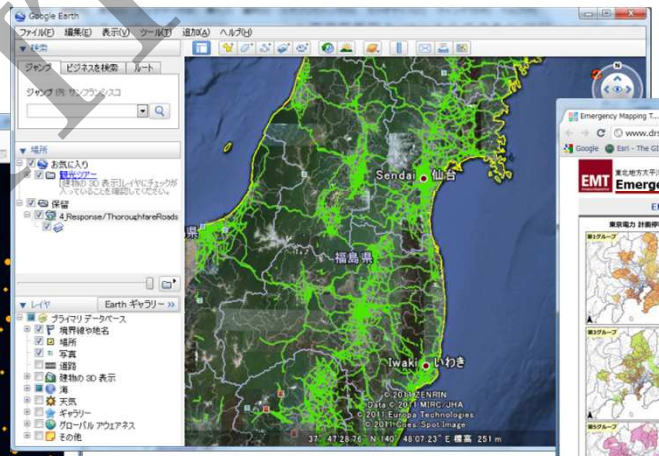
Web Browser



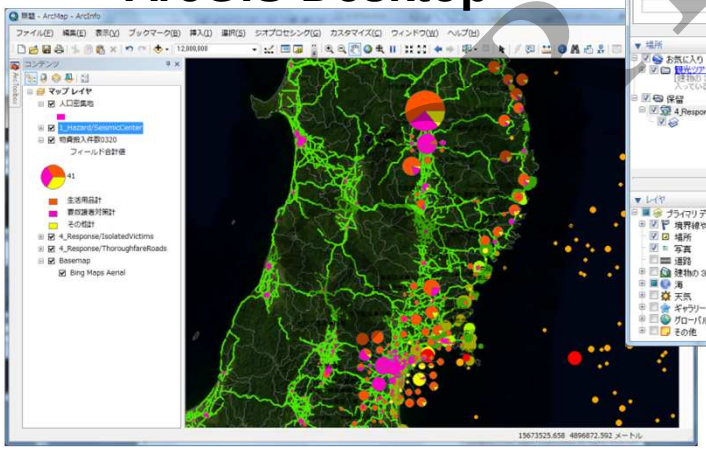
iPhone

iPad

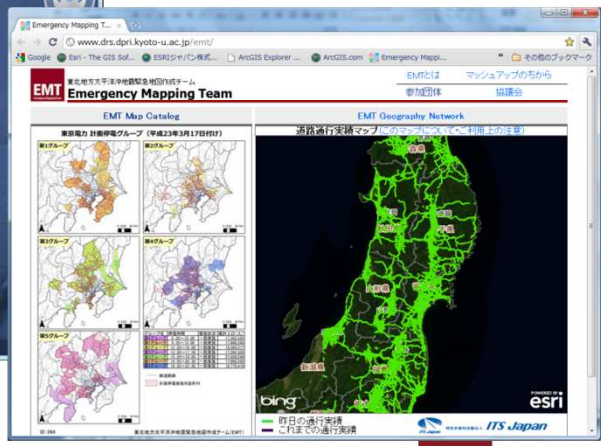
KML support soft (Google Earth)



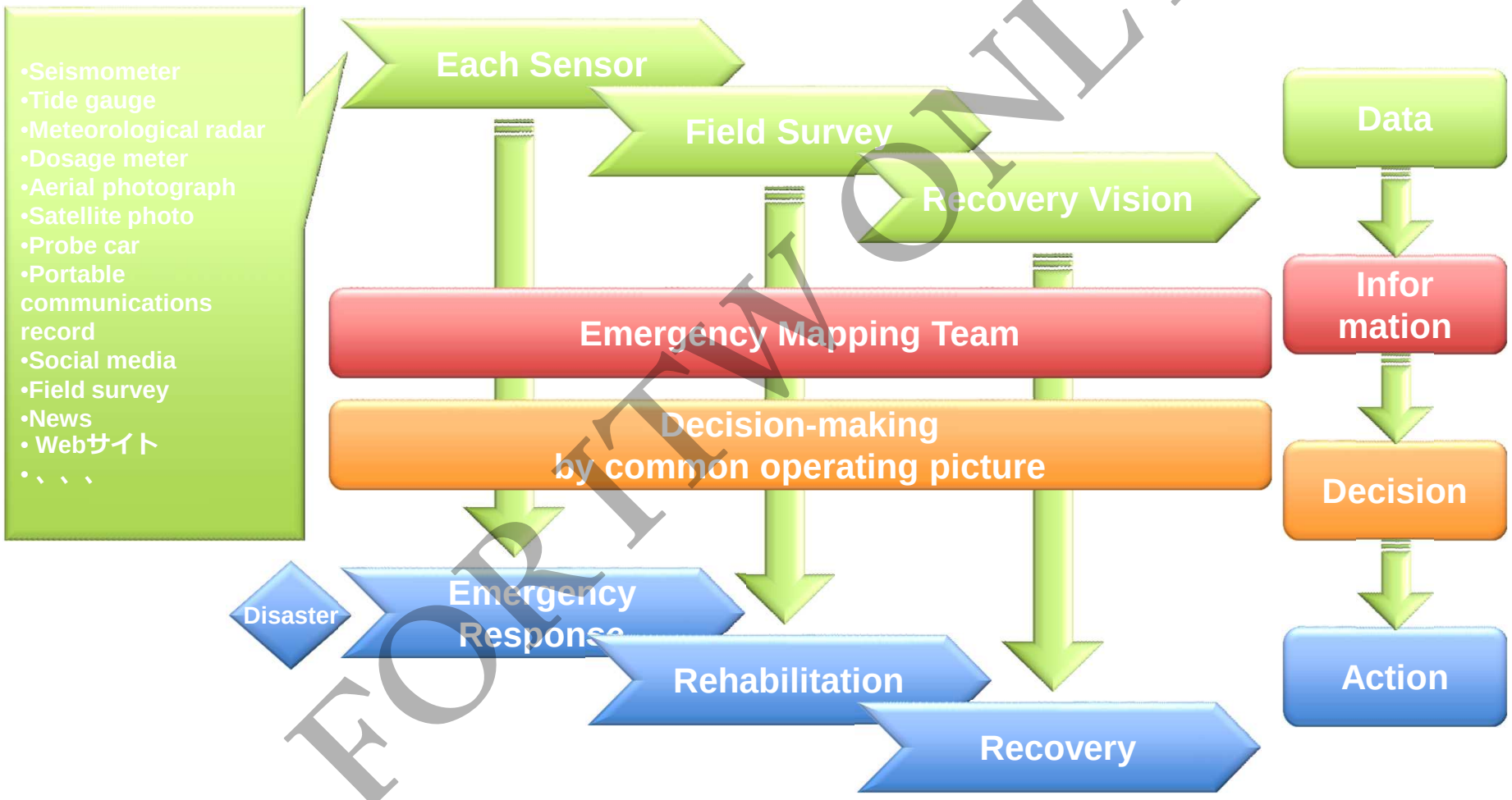
ArcGIS Desktop



Website



EMT's role in disaster response



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Thank You for Your Attention