The International Training course on
“Development of Plan for Business Continuity Management for Ports"

Business Continuity Management for ports in Japan

-Recent policy development and challenges-

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Topics

1. Background and Challenges

2. Starting line of preparing business continuity plans (BCPs) at ports.

3. New horizon of BCM challenges
   a. Storm surge
   b. Na-tech disaster
   c. Security for port automation/digitalization

5. Conclusions and further challenges

Background and Challenges

1. Great East Japan Earthquake caused long continued port shutdown, which caused delay in recovery of local economy and long continued declining or collapse of the local community.

2. The government policy under the Basic Law for Increasing National Resiliency in 2014 facilitated to prepare business continuity plan for port operation and management (port-BCP) at all Japanese major ports.

3. Storm serge disasters in 2018 and 2019 reminded Japanese port community of the importance of reinforcing port BCPs by considering a mega-typhoon and tropical depression.

4. Large-scale industrial accidents and cyber-attack at port are also considered newly arising port logistics disruption risks .

Our experiences of Great East Japan Earthquake and Tsunami

North Breakwater collapsed @ Kamaishi port

Demolished public shed @ Kamaishi port

Washing away of the backfill

@東北地方整備局

Scope of business continuity at ports

For maintaining port competitiveness and sustainable development, it is vital to manage continuity of:

I. public and private port logistics services,

II. administration functions of the authorities, and

III. area-wide and community-based emergency responding capacity.

Preparing BCP is a basic requirement requested for the port community to prepare, implement and continuously improve. BCP is an essential proactive measure for all private and public entities to sufficiently cope with a wide range of possible emergency situations and a best practice of managing local, regional and national economy through sound port operation and management.

Major requirements of BCP preparation

1. Reality and rationality

- Market/client oriented strategic thinking, and
- Workable risk management,

for the business continuity.

= availability of operation resources.

⇒ Missions of **BIA and RA exercises**.

2. Broad-based participation

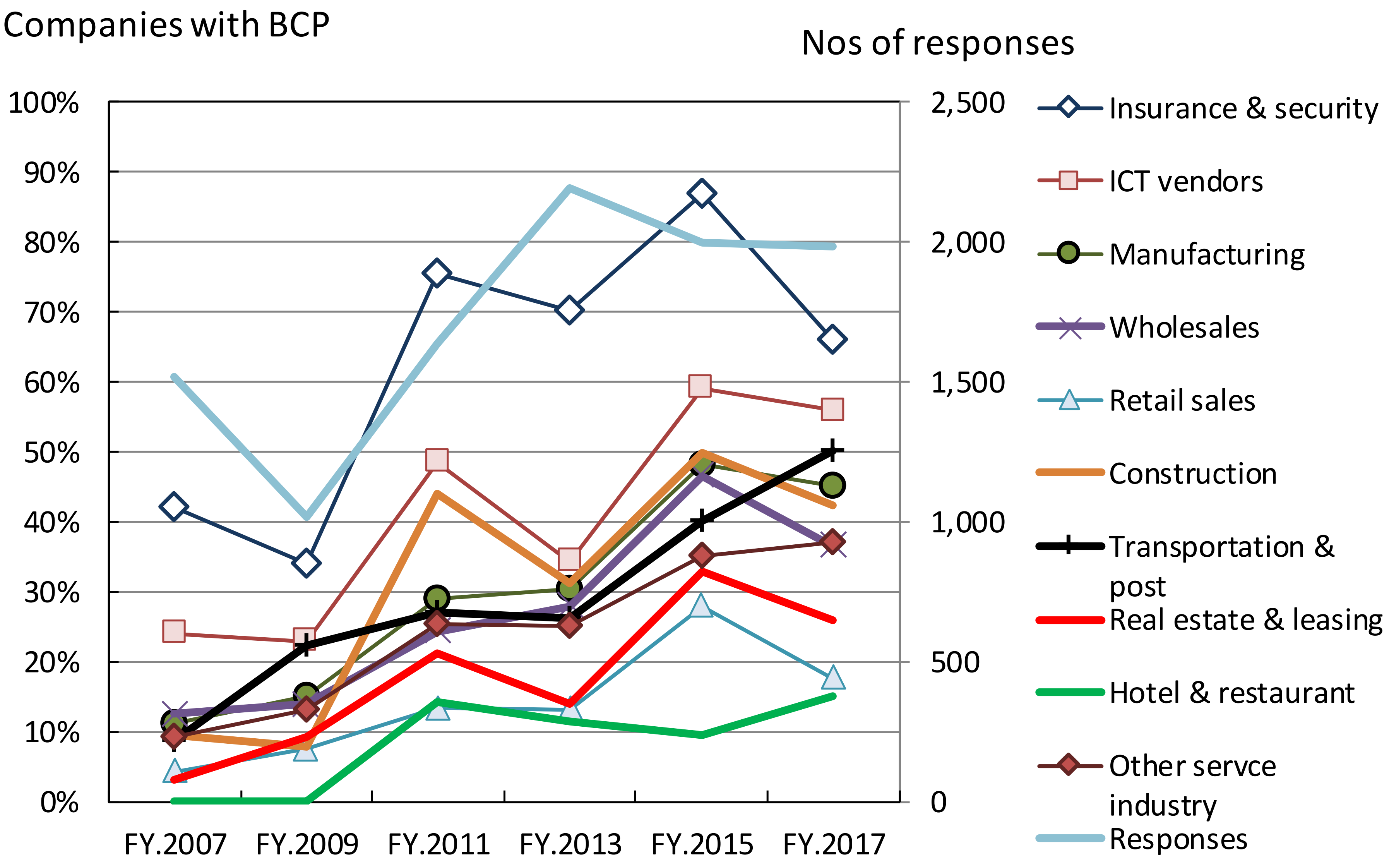
- Cross-sectorial inclusion, and
- Strong commitment of the top management.

for seeking broad based input from top management decision to the on-site expertize, knowledge and experiences.

3. Systematized process with transparency

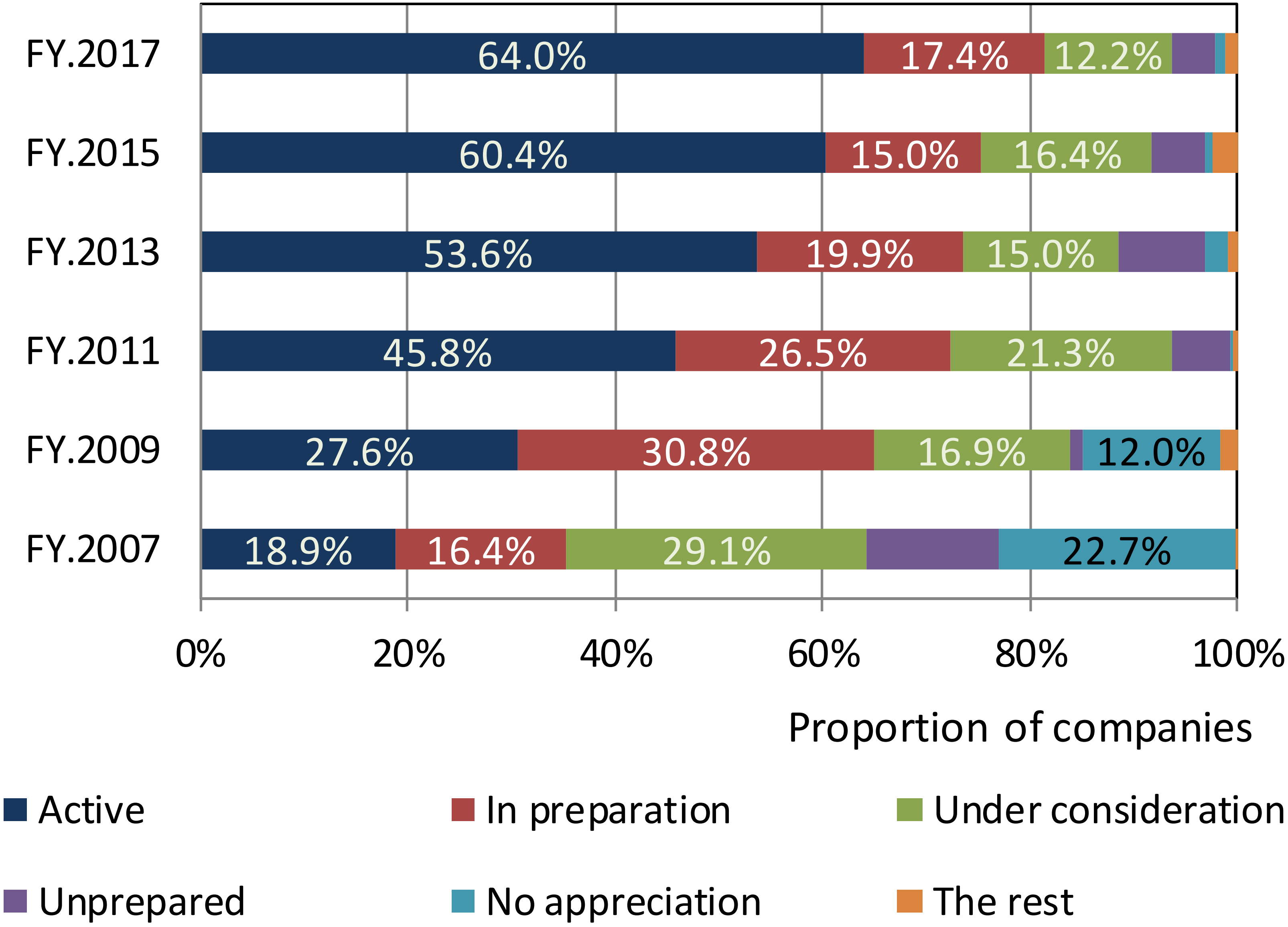
- Describing a business process: **Business flow analysis (BFA)**
- Visualizing analyzing and evaluating procedures: **Work-sheet system**.

BCP preparation situations in Japan



Data：Questionnaire survey undertaken by the Cabinet Office, Japanese government, March, 2018

BCP preparation situations of large companies in Japan



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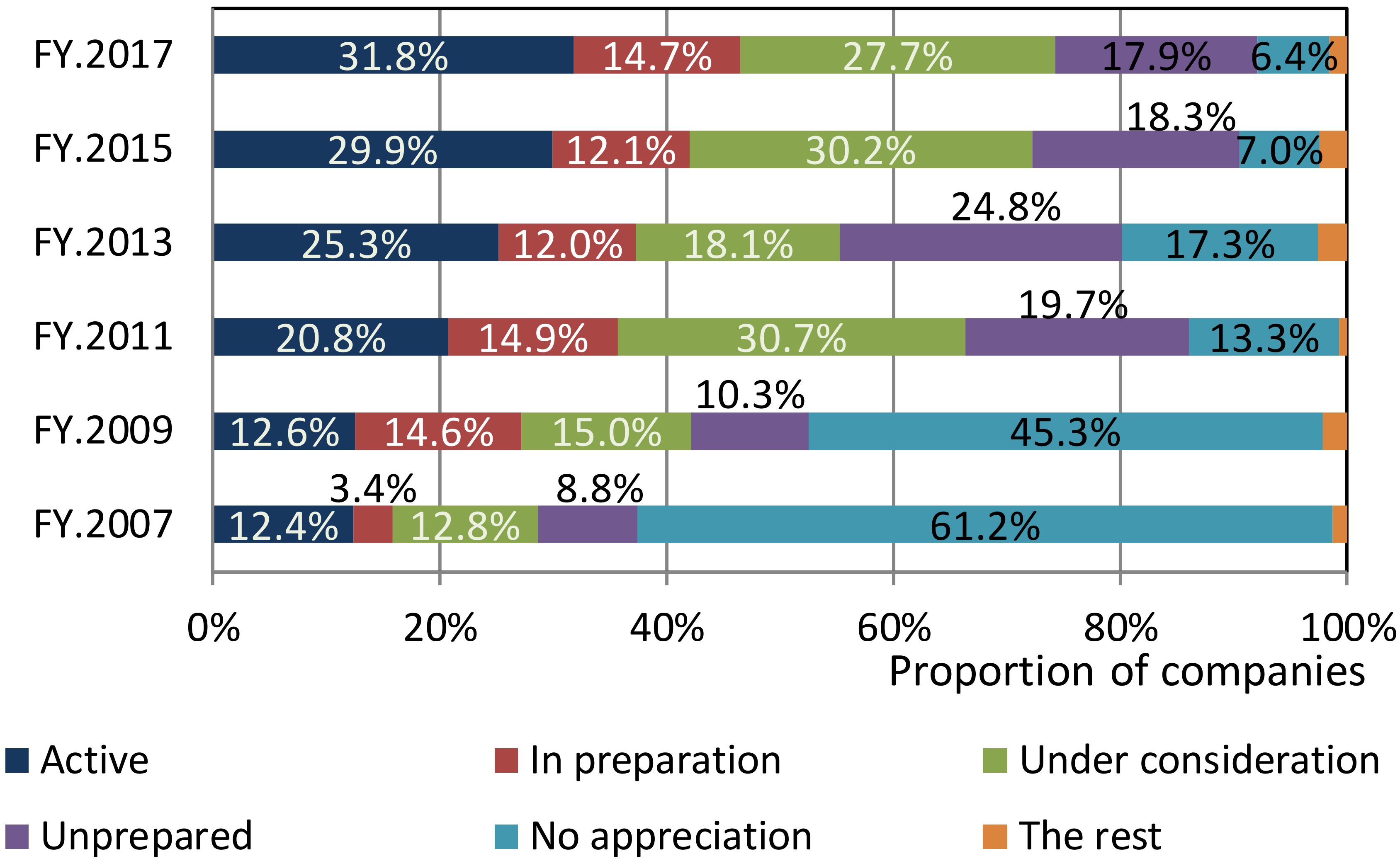
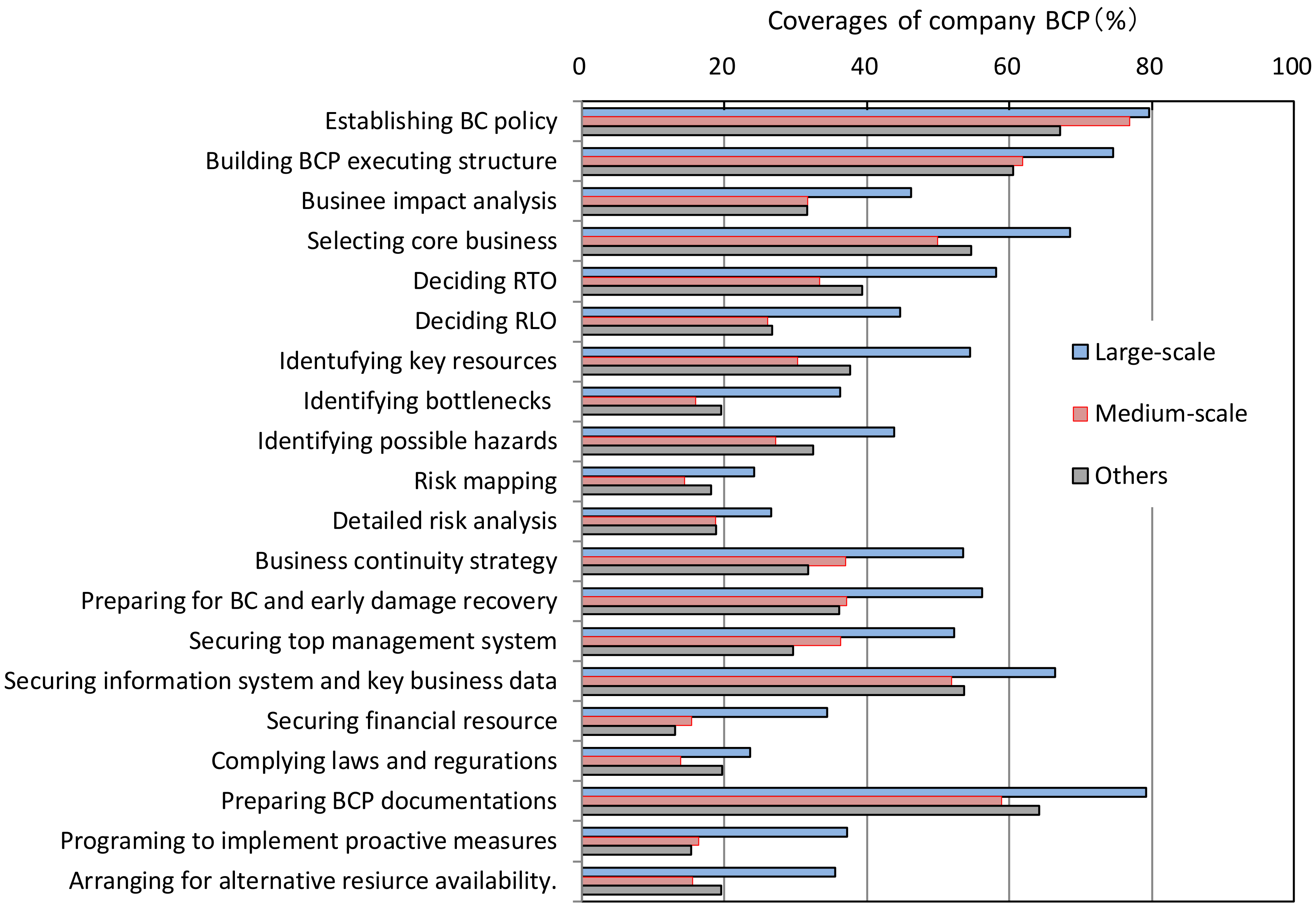
BCP preparation situations of mediam size companies in Japan



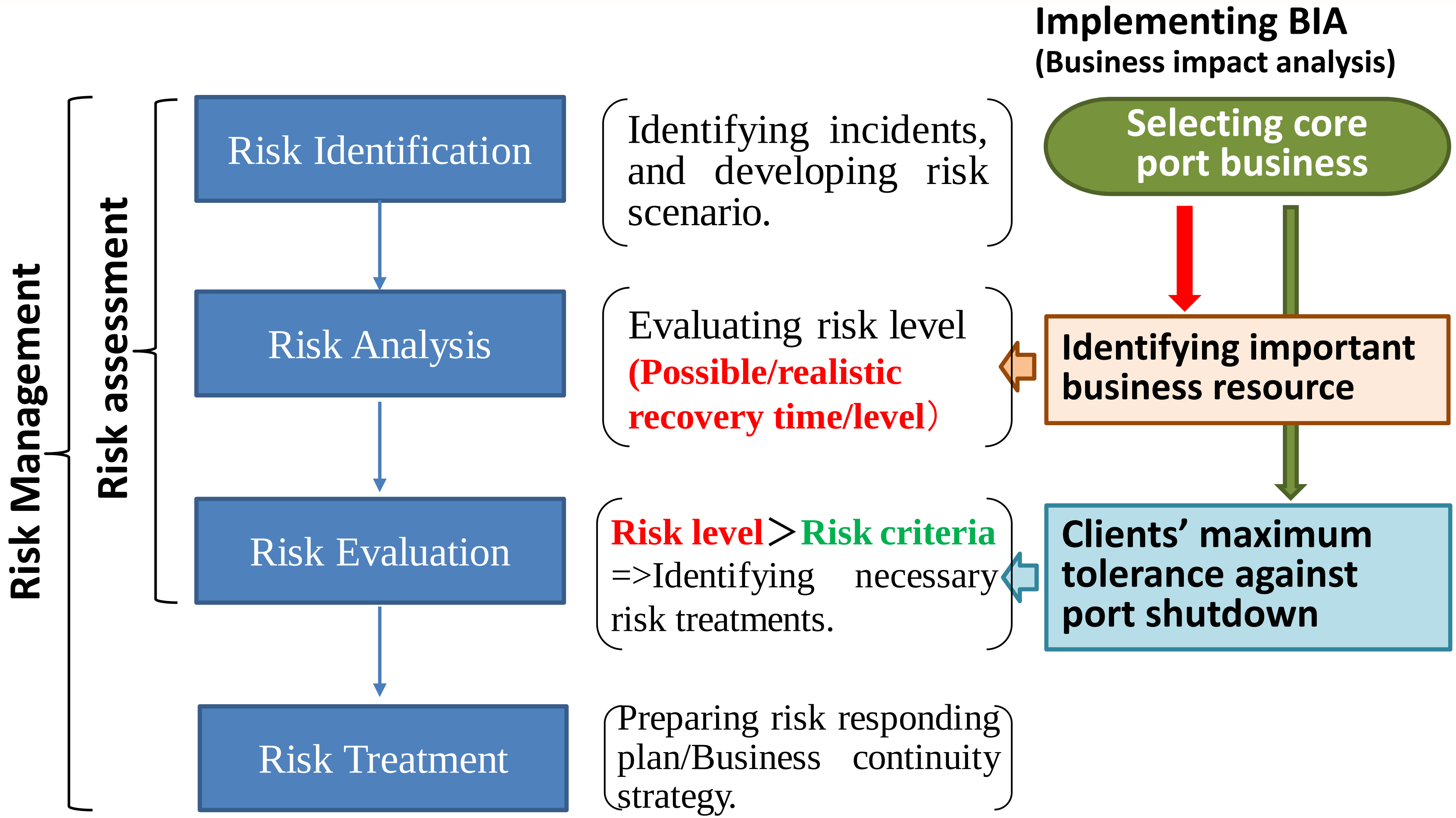
Data：Questionnaire survey undertaken by the Cabinet Office, Japanese government, March 2018

What are focused on the BCPs in Japan



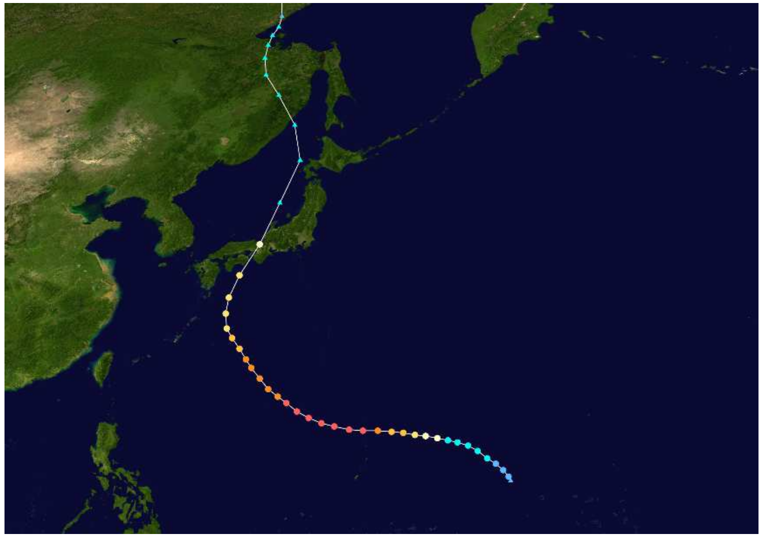
Data：Questionnaire survey undertaken by the Cabinet Office, Japanese government, March 2018

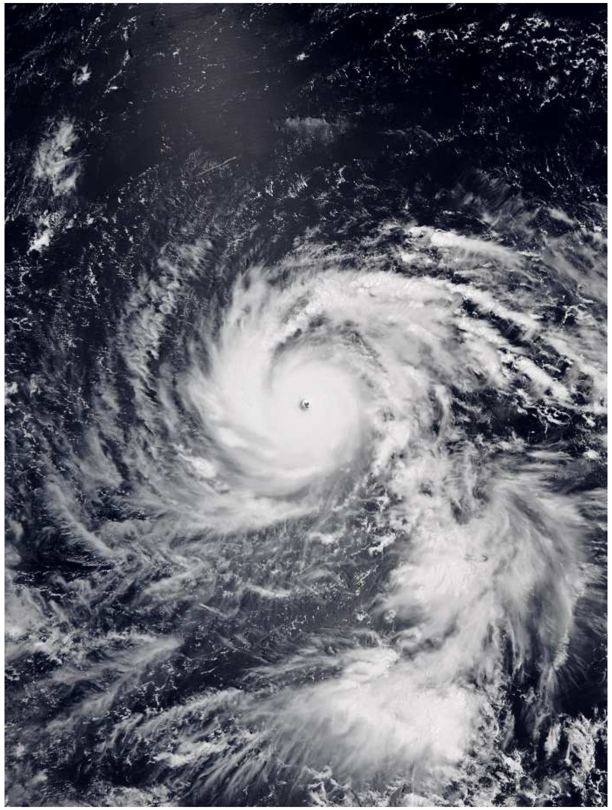
Context of the risk management at port



Storm surge, wind wave and gust (Typhoon Jebi)

1. Formed: August 26, 2018
2. Highest winds:
   10-minute sustained: 54.2 m/sec.
   1-minute sustained: 79.2 m/sec
3. Lowest pressure: 915 hPa (mbar)





Jebi crossed Osaka Bay and made its second landfall over Kobe, Hyōgo Prefecture at around 14:00, on September 4. In the center of Osaka, the exceptional maximum gust of 47.4 m/sec was recorded. Jebi produced a maximum storm surge of 3.29 m in Osaka, surpassing the previous record of 2.93 m from the 2nd Muroto Typhoon (Typhoon Nancy) in 1961.

Damages caused by Typhoon Jebi

1. Gust / strong wind：

a. **Damage of STS crane due to flying debris:** Crane cub window, sidewall, door, rudder, handrail damaged => operation suspended for repair works.

b. **Collapse of stacked empty container:** Damages of security fence, monitoring camera, infrared ray sensor, panel lights => failure of fulfilling SOLAS Convention requirements.

c. **Runaway of under repair RTG:** collateral damage to another transfer crane.

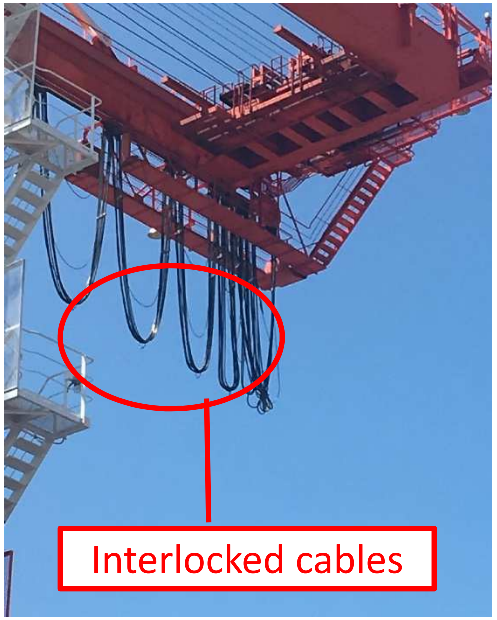
2. Storm surge and wind wave:

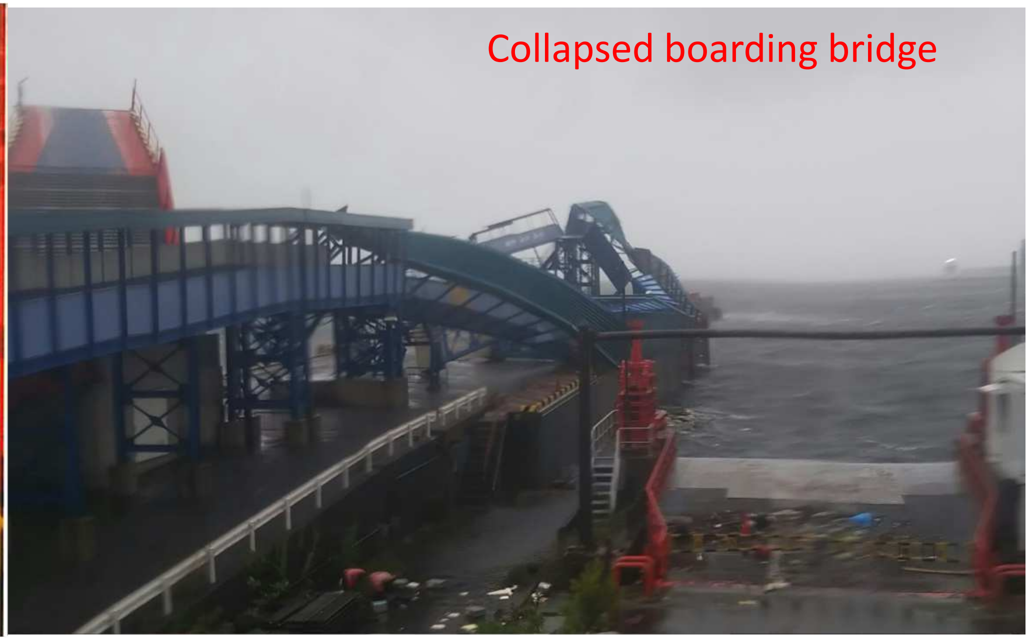
a. **Drifted containers:** Closure of port water => ship call suspended.

b. **Container fire:** fire spread, fire fighting operation => Closure of stacking yard, decrease in container stacking capacity.

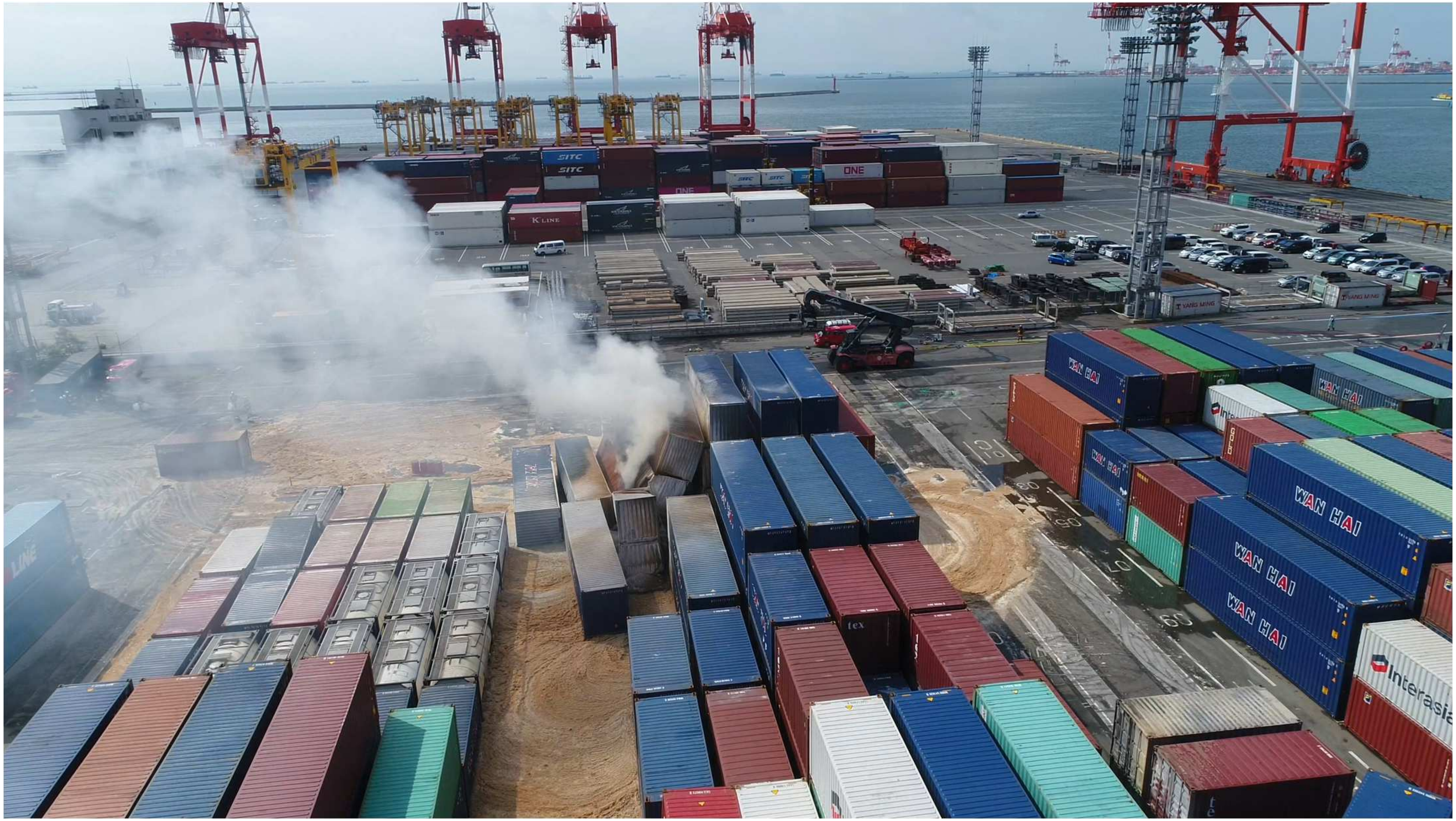
c. **Inundated extra high-voltage substation:** de-energization => terminal black out => loss of reefer cargo, terminal operation suspension.

Crane damage caused by the gust





Container fire due to the inundation



Energy industries in Tokyo bay area

The number of oil tanks: 5,660 (in Tokyo bay area) (Heavy oil, naphtha etc)

⇒Risks of oil spill and fire disaster in Tokyo Bay.

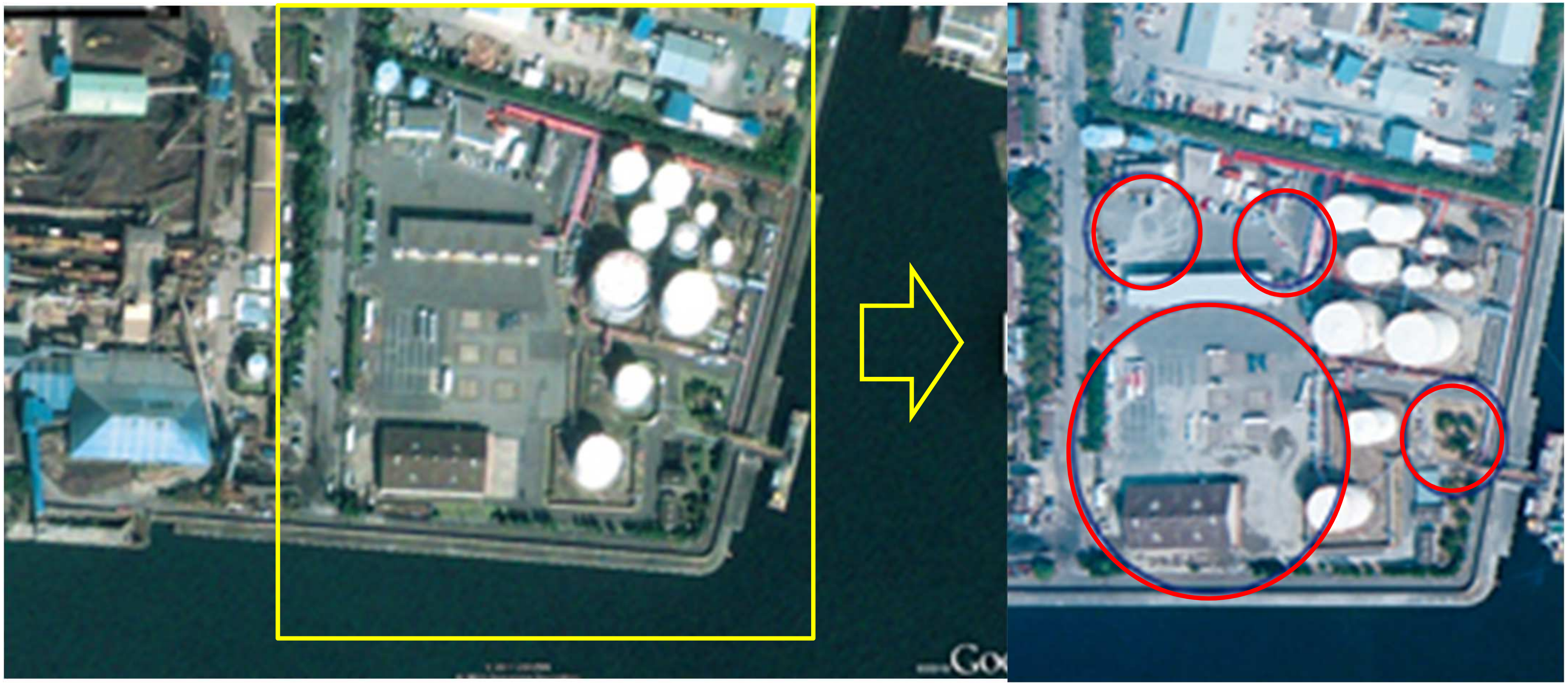
The number of thermal power plants: 12 (Heavy oil, Liquefied natural gas)

⇒Risks of blackout in Tokyo metropolitan area.

Risk of collapsing oil tanks

Liquefaction phenomenon of oil tank foundation.

- ✓ Petro-chemical complex built on the reclaimed land of Tokyo bay.
- ✓ Liquefaction of the ground caused by Long-period seismic movement.



Risk of oil spill and fire from oil tanks

Sloshing phenomenon of crude/heavy oil tanks.

- ✓ 1/3 of oil tanks in Tokyo bay: floating roof tank.
- ✓ Damage of tank roof, overflow of liquid and fire caused by Long-period seismic movement .

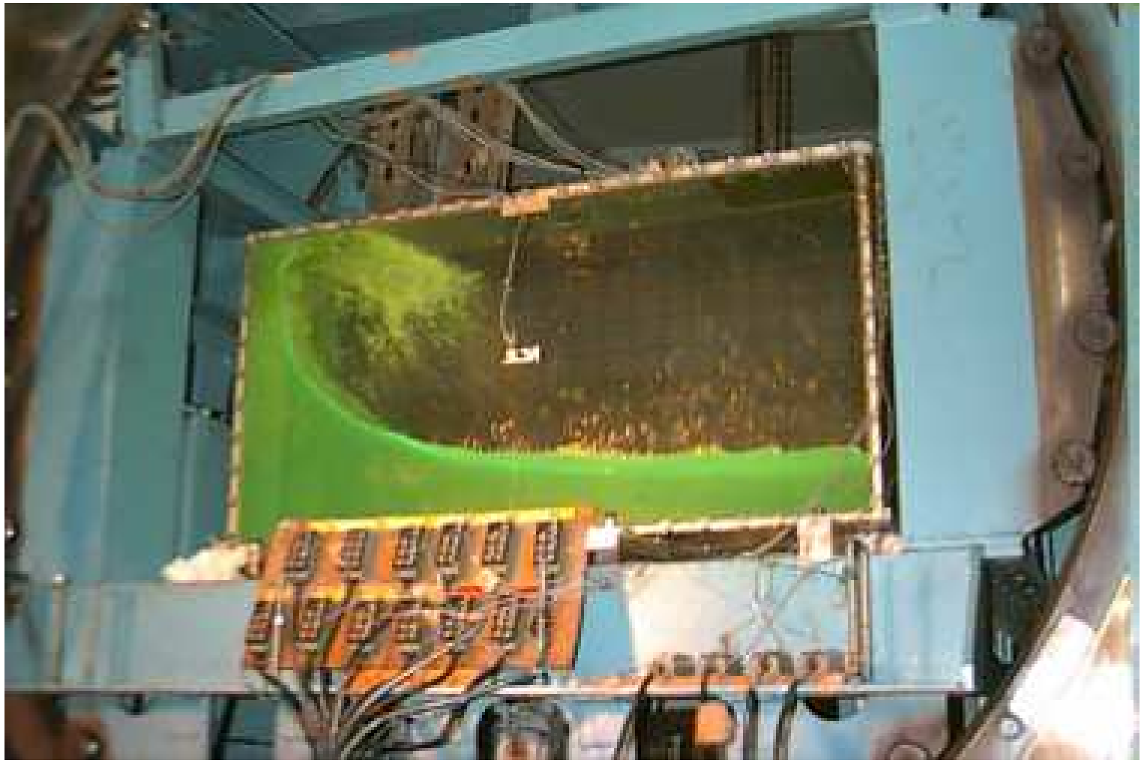


Photo: National Maritime Research Institute

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KAJIMA CORPORATION

http://www.kajima.co.jp/

Na –Tech Disaster in ports

"Na-Tech Disaster" is defined as a natural hazard triggered technological disaster. Recent examples in Japan include Fukushima No. 1 Nuclear Power Station accident and an Oil refinery fire accident in Chiba, both caused by the Great East Japan Earthquake.

Japan Coast Guard, Maritime Disaster Prevention Center and Tokyo Fire Department undertook cease fire operations by from sea (Cooling down operation), which was completed March 13, 2011, however final cease fire was the March 21.

Also fighting!

Source: Japan Coast Guard Report 2012

Na –Tech disaster in Tianjin, China

New technologies for port operation and management

Digitalization of port operations

Targets: modernization of port operation and management by mobilizing cutting-edge ICT such as artificial inteligence (AI)

Basic Ideas:

=> **Digital data collection** from daily business transaction/port procedures and sensors embedded in terminal facilities.

=> Big data creation by mobilizing **IoT** = Automated data transmission

=> **AI** assisting in terminal operation and management.

Recent topics:

a. **Online cargo information platform** : TradeLens (Maersk Line & IBM), Port Optimizer (LA Port), Calista (PSA) etc.

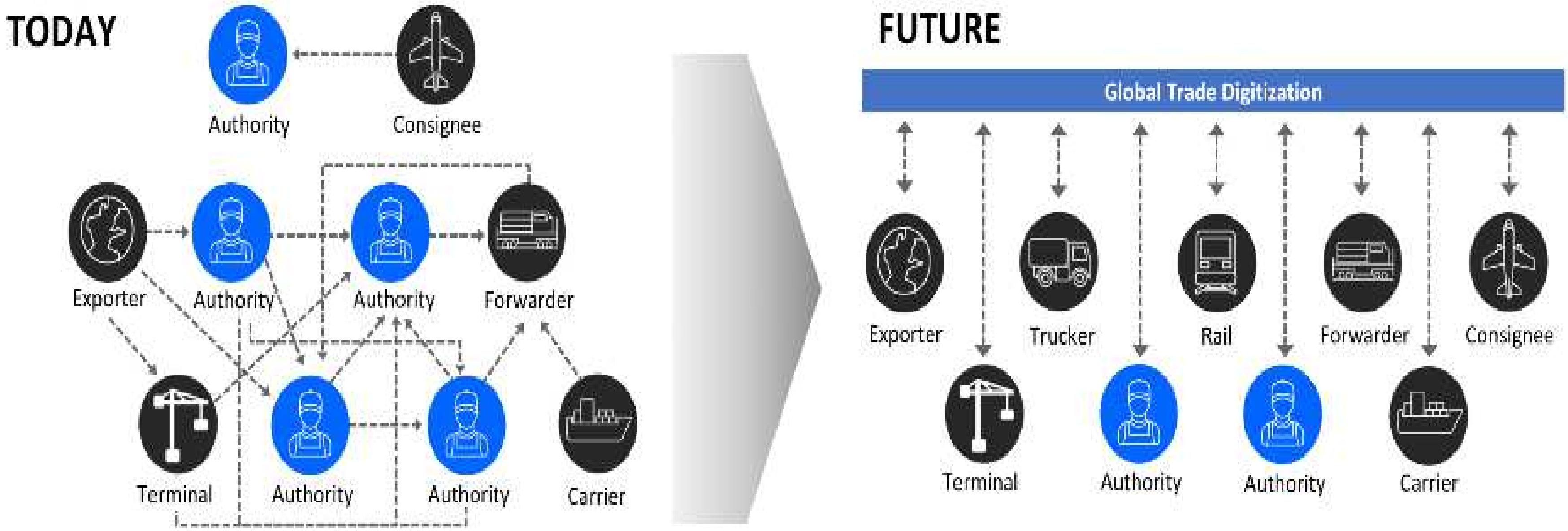
b. **ICT based port operation and management**: Smart-port logistics (Hamburg port), AI terminal initiatives (Japan) etc.

"TradeLens" developed by Maersk & IBM

TradeLens: *A global trade platform using blockchain technology. TradeLens aims at improving transportation cost, lack of visibility and inefficiencies with paper-based processes.*

Strength of TradeLens

- Neutral and open platform – connect existing systems of supply chain members
- Unpinned by blockchain technology – support secure, auditable and non-repudiable transactions
- Real time visibility – integrate member's system via API that enables seamless, real-time information sharing
- Innovation – deploy services through application marketplace

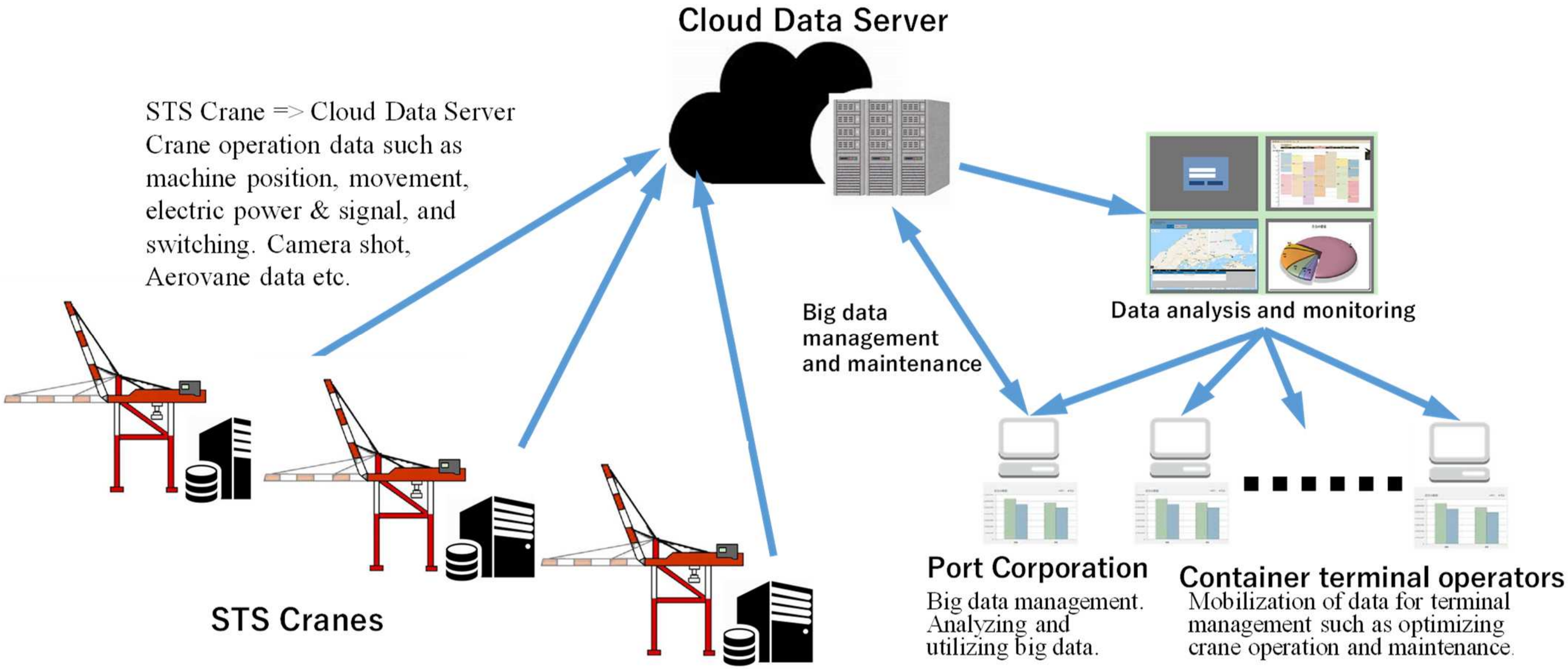


https://www.ibm.com/blogs/blockchain/2018/01/digitizing-global-trade-maersk-ibm/

ICT driven facility management

Big data creations have started in a variety of areas, among which data obtained from STS crane operations is expected to be desterilized for facility management of cranes such as the preventive machine maintenance.

Challenge of HPC



Port operation automation

Container Terminal Automations:

a. Port **development settings**: “Blue”, “Green” and “Brown” fields.

b. Terminal **automation levels**: semi-automated and fully automated.

c. Key element **integration**: STS crane, horizontal transporter and stacking crane. Synchronizing the machine movements is essential for efficient and safer cargo circulation, thus data collection and control system is vital.

d. Existing terminal **conversion**: Retrofitting of RTGs, introducing AutoStrad etc.

=> Shorter terminal close, minimizing disruption of operational revenues, partial commissioning, incremental technology implementation.

e. Current automation challenges: more than 65 terminals incl. ongoing projects, mostly semi-automated. Has Qingdao port been fully automated?

An example of semi-automated terminal.

a. Tobishima Terminal of Nagoya Port in Japan.
b. Terminal operation inaugurated in 2006.
c. Sea side transportation: Automated guided vehicle (AGV).
d. Stacking yard operation: Semi-automated RTG (Rubber Tired Gantry Crane).

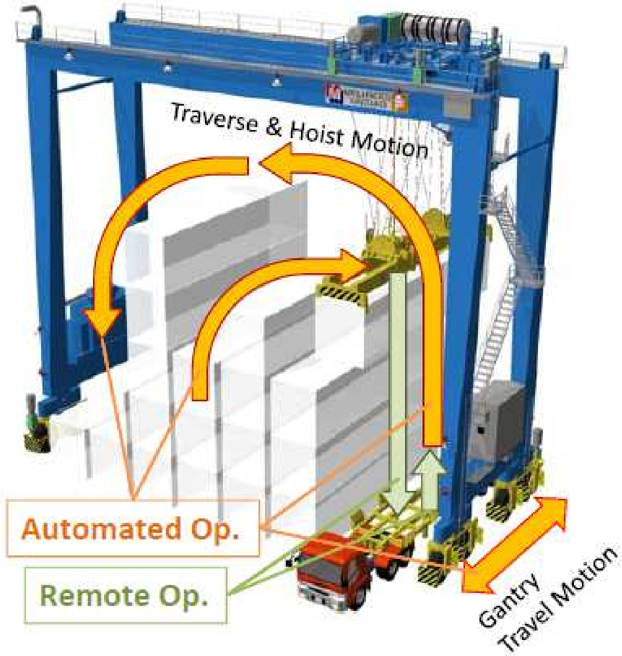
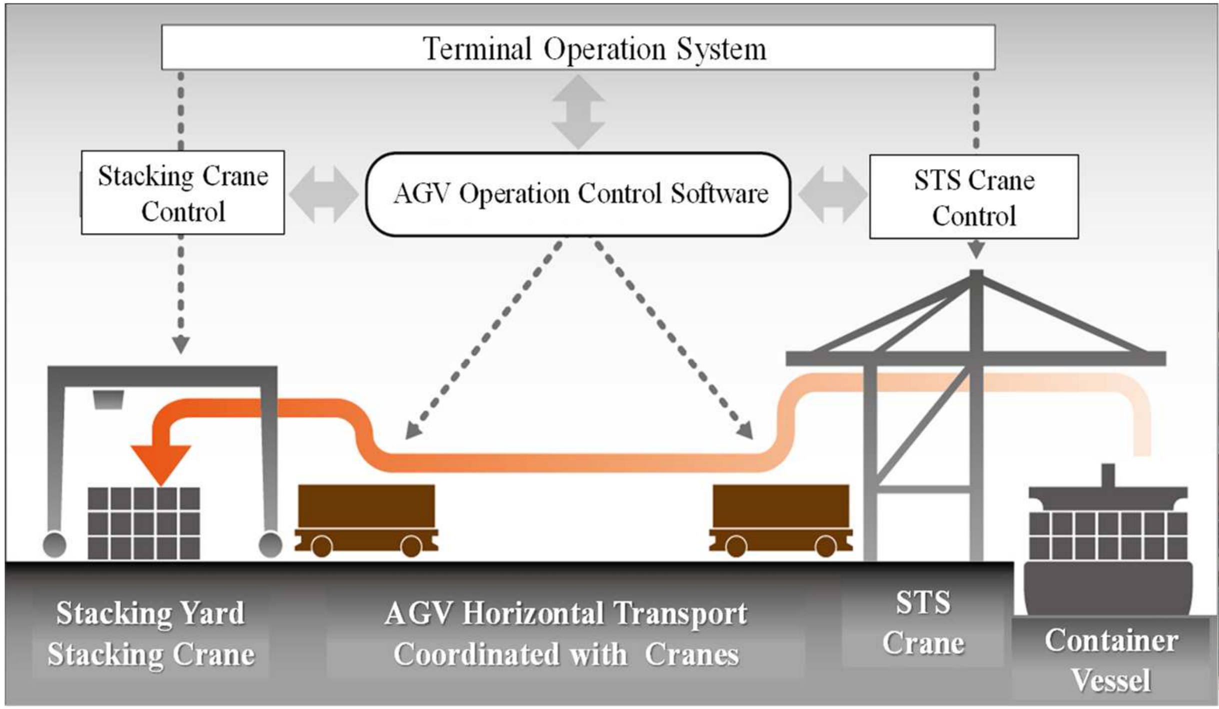


Fig: Mitsui E&S Machinery



Fig&Photo: Toyota industries Co

Conclusions and further challenges

1. As requested by *ISO22301*, proper **implementation of BIA and RA** is essential for preparing an effective BCPs, thus should be employed in the area of port operation and management.
2. **Typhoon** originated storm surge, wind wave and strong wind risks are now non-negligible events, which may cause manor disruption of port logistics function.
3. **Na-Tec disaster** at port such as flammable or hazardous material stockpile explosion and fire accidents may result in a large-scale disaster, to which it is likely impossible for a single business entity and authority properly to respond.
4. **Digitalization and automation** at ports are indispensable and inevitable, however negative impact of the IT system disruption or cyber attack on the port logistics is of great significance.
5. Port BCP must include proactive measures and emergency response plan for the typhoon disaster, Na-Tec disaster and ICT system disruption.