

Estimation of disaster recovery condition based on Web reservation data

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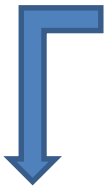
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17/3/2014 in Sendai, Japan

Background: Lessons from the Great East Japan Earthquake

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- Before the Great East Japan Earthquake
 - Goals of disaster prevention before the disaster:
 - Evacuation drills ⇒ Cause for failure to escape
 - **Emergency systems**
⇒ **Users don't understand usage procedures, are not used to the system, are unable to operate them (loss of power, etc.), do not know about their existence, etc.**
 - “Super-levees” ⇒ Reduce tsunami damage
- After the earthquake
 - Behavior of disaster victims: made use of available systems that they are used to using or have been using
 - E.g. Use SNS (Twitter, Mixi, etc.) for confirming safety and location
 - E.g. Use data for detecting traffic congestion in checking passable roads



Background: Lessons from the Great East Japan Earthquake

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- Issues that have come to the fore:
 - Information systems that activate only during emergencies
 - Since users do not know how to use them or are not used to them, the systems were not helpful.
 - Unable to operate due to loss of power, etc.
 - Breakdown of administrative functions
 - Unable to provide evacuation instructions
 - Difficult to monitor situation in disaster areas from outside
- The kind of information systems needed :
 - Social systems that are used also in normal times and are routinely available without having to change the methods for operation during emergencies.

Systems used in normal times

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- Target: Tourism

- Local governments implement tourism policies and have a grasp of tourist movements and **status of hotels**.

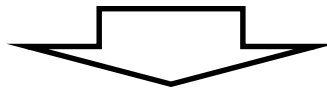
Hotels have beds and food and are useful as places for evacuation during disasters. If the above information can be collected, they will be useful in determining situations during occurrence of disasters.

- Data that serve as scientific basis for deciding policies are obtained through social surveys using questionnaires and other means.

Systems used in normal times

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- Problems with statistical data
 - Collecting data takes time and money
 - Collecting data prevents their use for grasp situations during emergencies.



Can Web data be used to enable grasping emergency situations at reduced cost and time?

- Collectible data
 - Web reservation data for hotels
 - Web reservation data for Shinkansen

Usefulness of Web reservation data

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- Hotels

- Business reopening information can be interpreted as information that business is restored.

- Areas where disaster damage has been checked and lifelines (water, gas, electricity) have been secured, or where their restoration is foreseen
- Possible that distribution channels have been secured
(Bed sheets are changed once every three days)
(Gasoline, food, and other supplies are secured)

- Base for disaster victims, volunteers

- Can be used as temporary evacuation shelter for disaster victims
- Number of volunteers that can be accommodated can be known

Usefulness of Web reservation data

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- Means for transportation
 - Business reopening information = **secured routes to disaster areas**
 - ⇒ For ensuring distribution channels, routes for transporting personnel, and road safety

Possibility of visualizing recovery situation in disaster areas based on Web reservation data for hotels and for Shinkansen

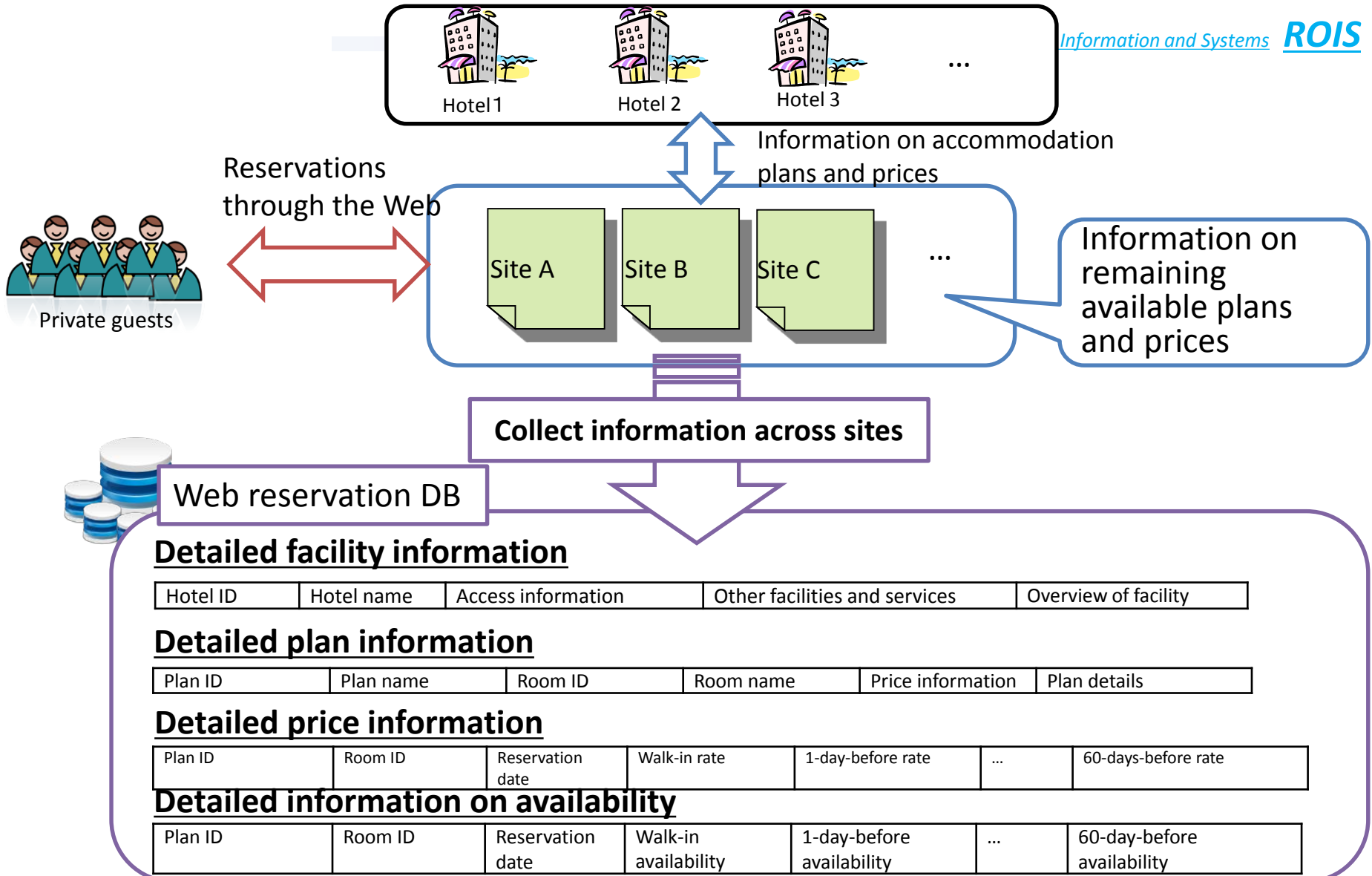
- Objective
 - Visualize situation in disaster areas and recovery situation in real time using Web reservation data

Contents of gathered data

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- For hotels (target: general Web reservation sites)
 - Hotel names
 - Plans available for reservation, number of available plans, number of available rooms, and details, for up to two months from the date of data collection
 - Rates for each plan, number of visitors
- For transportation means (target: Shinkansen)
 - Departure/arrival areas, departure/arrival stations
 - Departure time, arrival time
 - Names, class, seat availability for all trains up to one week ahead
 - E.g. Open, few seats available, full, etc.

Collection of Web reservation data and data items to collect



Advantages and problems of Web reservation data

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- Advantages of Web reservation data for hotels and Shinkansen
 - Data are updated in real time
 - Information-provider voluntarily uploads data
- Problems
 - As a feature of e-commerce, data are provided to multiple sites, making it difficult to ascertain actual situation
 - Unclear whether reservation data reflect the real world situation exactly in normal time and emergencies

There is a need to show that reliability of data has been ensured through comparison with the real world

Reliability of Web reservation data during and after disaster

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- Web reservation data in Sendai City
 - Reservation data for hotels
 - Reservation data for Shinkansen from Tokyo to Sendai
- Data collection period
 - Nov. 1, 2010 to May 31, 2011
- Data collection method
 - Obtain data from websites
 - **Web reservation system was available during and after disaster**
- Method for confirming reliability
 - Comparison with data from the real world

Reliability of Web reservation data during and after disaster

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- Real world data
 - Data corresponding to statistical data for tourism in normal times are not available during and after disaster occurrence.
⇒ Business reopening dates were determined manually through hotel **websites** and hotel **staff blogs**.

Example:

宿泊予約受付再開いたしました

2011.05.24 08:30

東日本大震災から3ヶ月が経過しようとしておりますが、被災された方々には心よりお見舞い申し上げます。震災による館内損傷に伴う復旧作業のため、ご利用のお客様には大変ご迷惑をお掛けいたしました。6月中の宿泊棟工事完了の目途が立ち、**7月1日からの宿泊予約受付を再開することとなりました。**当ホームページ又お電話でのご予約もお承り致します。今後とも仙台ガーデンパレスをご愛顧いただきますようお願いいたします。

Reservations for July 1 onwards are now accepted.

*From official website of a hotel in Sendai

Web reservation data during and after disaster

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- Web reservation data

- Information on available plans could not be obtained for some time for hotels that showed an available plan at least once after the earthquake.



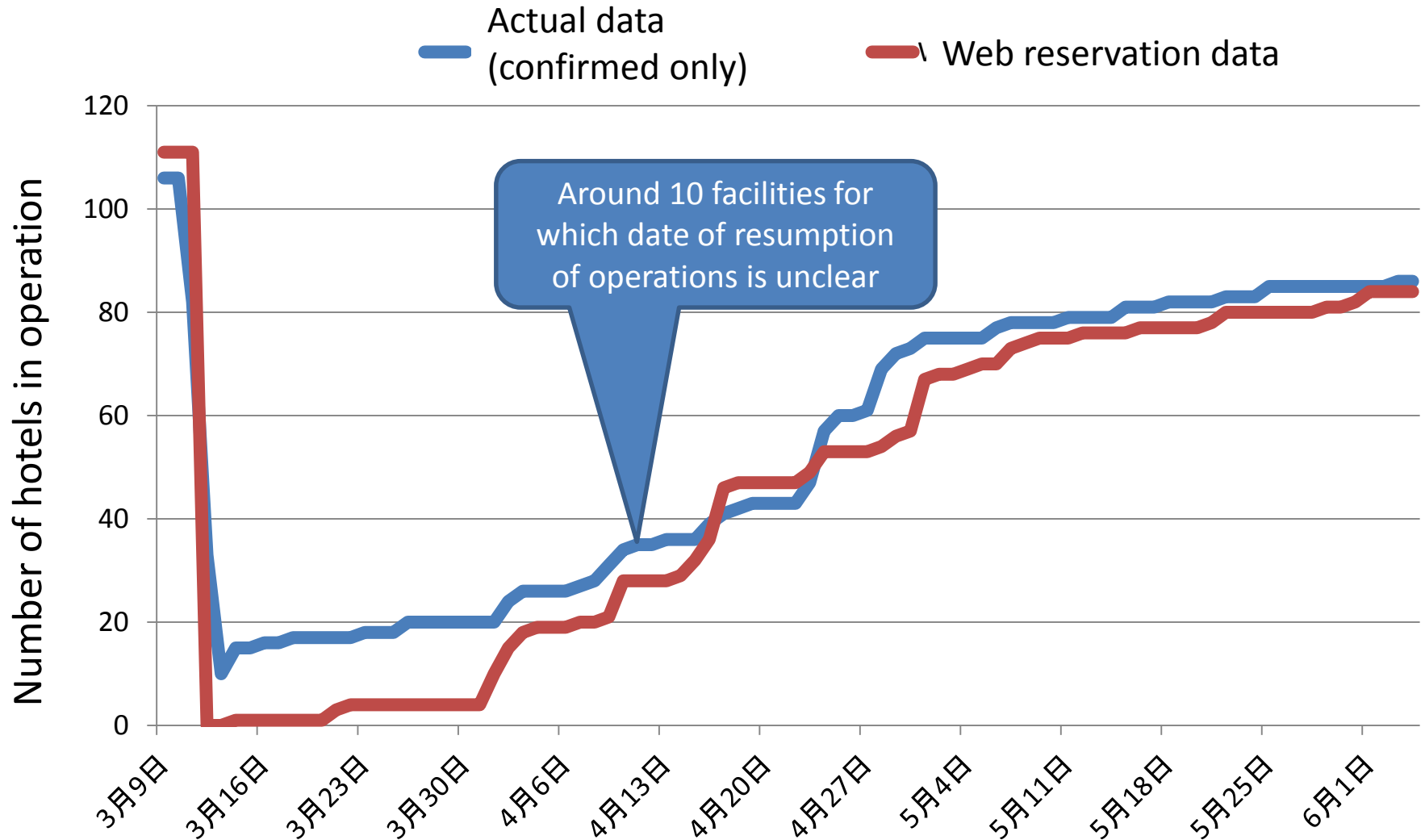
- Reasons:
Number of available rooms were few due to accommodation of disaster victims; there was an influx of reservations since the hotel was used as a base for volunteers

Actual situation cannot be determined using the same method and criteria as in normal times.

After the earthquake, if a reservation plan becomes available even at least once, consider the hotel to have resumed operations, as a means to visualize recovery situation.

Comparison of real-world data and Web reservation data for hotels

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Usefulness of reservation data for hotels during and after disaster

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- Advantages of visualization through Web reservation data
 - Possible to **determine** recovery situation of hotels; easy to collect information on recovery since information is uploaded by owner of facility
 - Possible to **infer** recovery situation from reservation data
 - Possible to determine whether there is delay in recovery



Indications of possible delay in recovery can be used as criteria for providing support and for prioritizing assignment of volunteers.

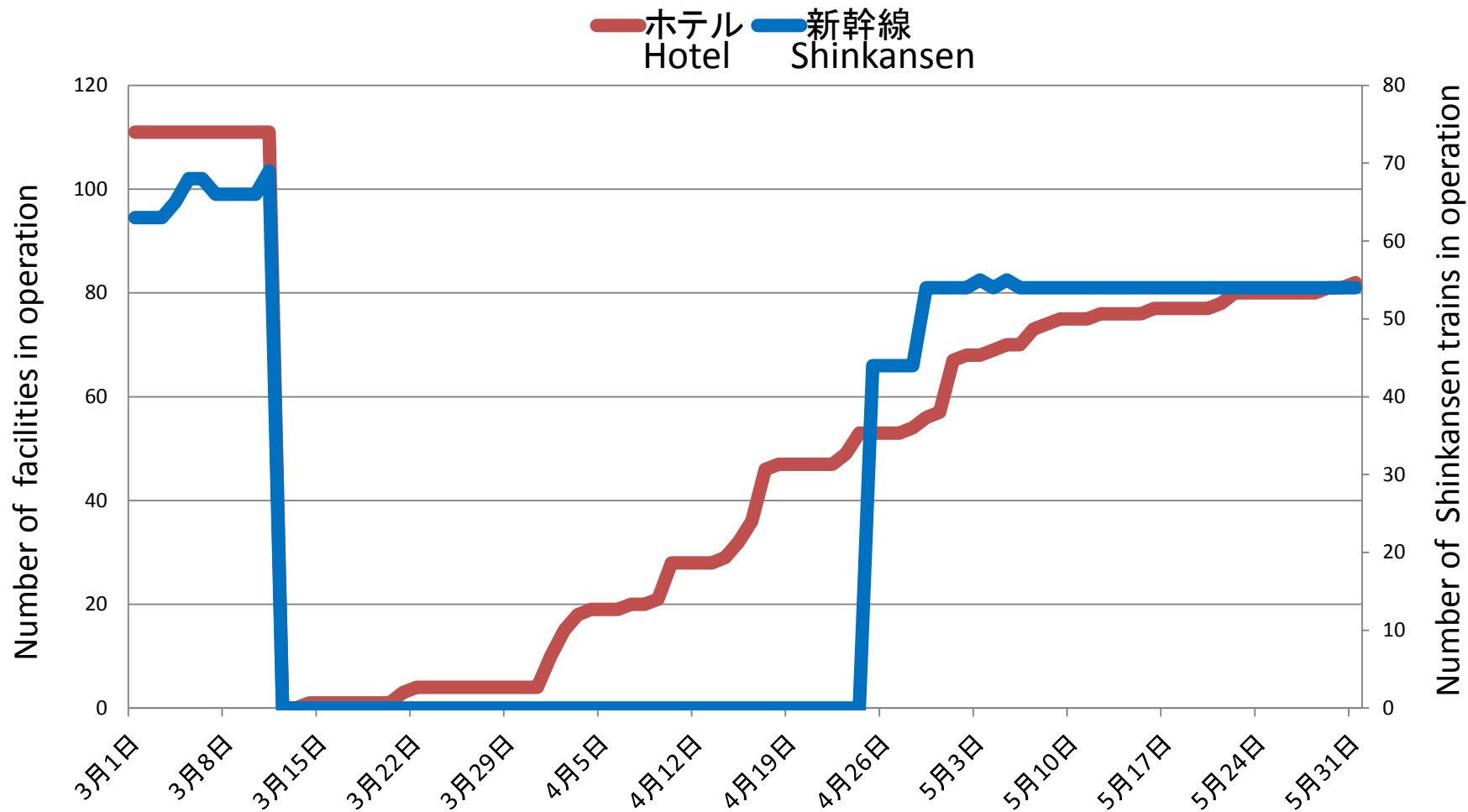
Recovery situation for Shinkansen operations

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- Real-world data
 - Check news reports and press releases
 - Reservations not possible from March 12 onwards
 - Reservations resumed for trains traveling from April 25
 - All lines for Tohoku Shinkansen reopened in April 29
 - Some areas had reduced-speed operations, reduced number of trains
- Web reservation data
 - **Complete match with the real-world data**
 - Reservations resumed starting April 23
 - Operated at 44 trains per day for one week from April 25
 - All lines for Tohoku Shinkansen reopened in April 29, operating at 54 trains per day

Recovery situation of hotels and Shinkansen operations based on Web reservation data

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Usefulness of online reservation data during and after disaster

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- **Web reservation systems operate during and even after disaster**
- Collecting and analyzing Web reservation data during and after disaster enable visualization of recovery situation.
- Since hotels are used as evacuation centers, and transportation means are essential for the transport of goods, the ability to determine current situation from Web data is an advantage.
- In particular, reservation data provide the advantage of **being able to determine future recovery situation.**
- Visualization of recovery situation is possible through the use of data used in normal times, without the need for building new systems, ensuring a system that is routinely available also during emergencies.

Summary

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Background

- There is a need for social systems that are routinely available and are used without having to significantly change the methods for operation, both in normal times and in emergencies.

Objective

- Visualize situation in disaster areas and recovery situation in real time using Web reservation data.

Results

- **Situation based on Web reservation data matches real-world situation.**
- **Possible to determine recovery situation from reservation data**
 - Possible to determine flow of persons, i.e. disaster victims and volunteers
 - Possible to ensure transportation routes and confirm safety

Future issues to address

- Construction of a system that takes use during emergencies into consideration.

THANK YOU FOR YOUR ATTENTION