

■ R&D Topics : Information and communications technology

■ R&D Theme : Development of Technologies on Wide Variety of Data Processing, Storage, Analysis and Application to Achieve Advanced Infrastructure Management

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■ Collaborative Research Groups: Social Capital Design (Inc.), Yokosuka Telecom Research Park, Inc



 Cross-ministerial Strategic Innovation Promotion Program

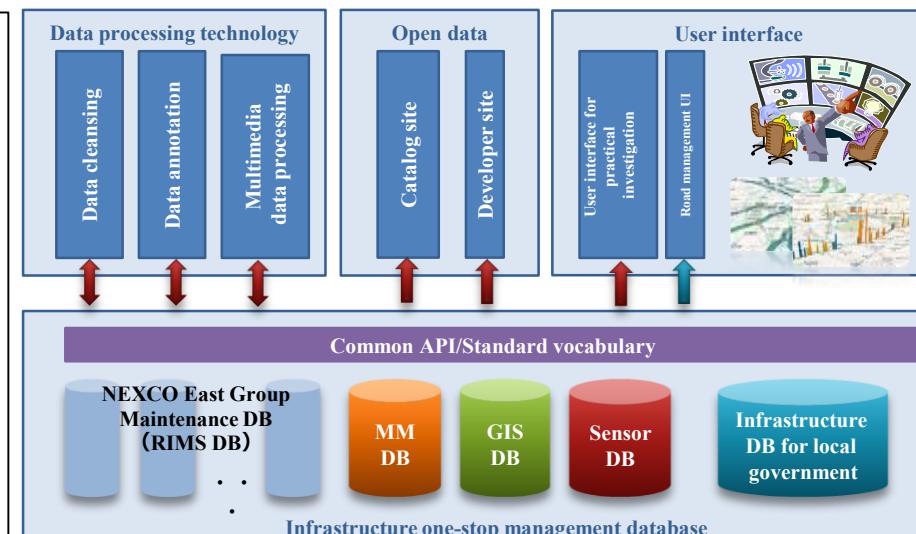
R&D Objectives and Subjects

Objectives

- 1) **Matching needs related to maintenance and technology development requirements:** With the NEXCO East Group maintenance operations as the field of evidence, set matching development conditions (seeds) after clarifying the work issues/needs.
- 2) **Development of formats for using new technology in the field:** In addition to effectively using existing assets, such as current systems and stored data, we will deploy the actual operation in stages while verifying and evaluating new technology in the field.
- 3) **Improve the standard of maintenance through preventive maintenance:** In order to use a wide variety of data effectively, owners, management, and the field should share information functionally, and develop a “user” environment for supporting accurate judgments and smooth enforcement.
- 4) **Achieve at a low cost:** Concentrate on the use of current systems and open data, as well as the adoption of standard technology, and utilize this for government bodies.

Subjects

- Visualize various information in an integrated way in accordance with the work of the administrator.
- Realize a circulation of information with external bodies, through open data, etc.
- Valid data for operations, analysis methods and expressions, etc., should be reflected in the DB.
- Grasp issues practically during DB use and set realistic policies
- Apply standardization from to infrastructure from all directions, reorganize and document
- Design data model/API, etc., while envisaging an actual method of use
- Based on site verification, process and correct data in stages
- Fully automate data cleansing and multimedia processing



Current Accomplishments (1/2)

Achievements ①: Data model, System Architecture, and DB Design for Infrastructure Maintenance, with IoT in Mind

■ Overview of Achievements

- (1) Develop a data model for managing infrastructure, from acquisition to the use of a wide variety of data. This includes data stored in the past and data envisaged in the future, such as sensor data, and organize this into “Road Information Specification (1st edition)”. This model can be applied to administrators of different infrastructures, such as expressways, national highways, and local roads, and it can be described in both the specifications of buildings and maintenance information.
- (2) Develop web-based “Road Information Database API Specification (1st edition)” that is not dependent on database software and can search across multiple databases.

■ Needs/issues and Effectiveness of Main Achievements

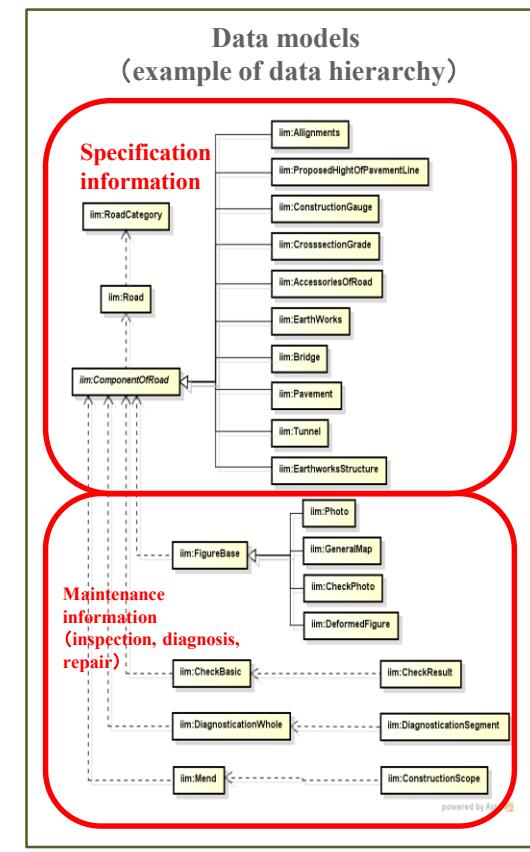
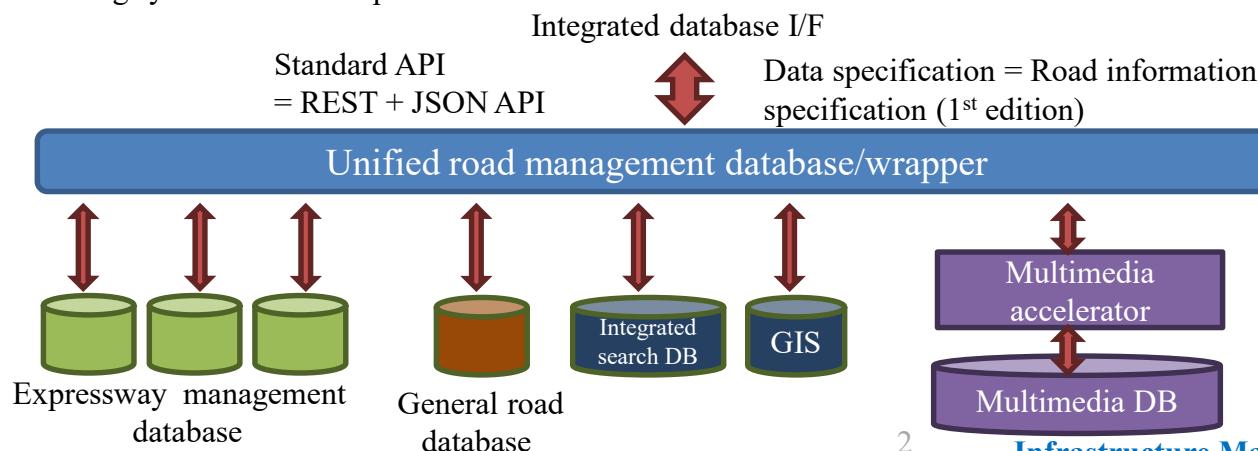
The infrastructure administrator has a wide variety of data and there are many issues, such as data format compatibility and data definitions. Therefore, circulating and using data has been difficult.

Through this achievement, through the linking and searching of geographical information located in multiple databases, effective utilization has become possible through data integration and linking.

■ Technical Novelty and Superiority

A data model is essential for circulating and using a variety of data across organizations and operations, but there is no data model in the road management field that can comprehensively express data for both expressways and ordinary roads.

Furthermore, it has become possible to integrate multiple databases, while maintaining existing systems in a short period at low cost.



Data model that can be described as both building “specifications” and “maintenance information”

Current Accomplishments (2/2)

Achievement ②: Develop dialog-based UI according to usage formats in the field

■ Achievement Overview

Our goal is to develop a dialog-type user interface, reflecting the format used in the field, to utilize the DB developed under “Current Achievements ①”. This can be achieved through API and messaging. Also, while verifying the DB functions, develop test applications that can be verified in the field.

■ Needs/Issues and Effectiveness of Main Achievements

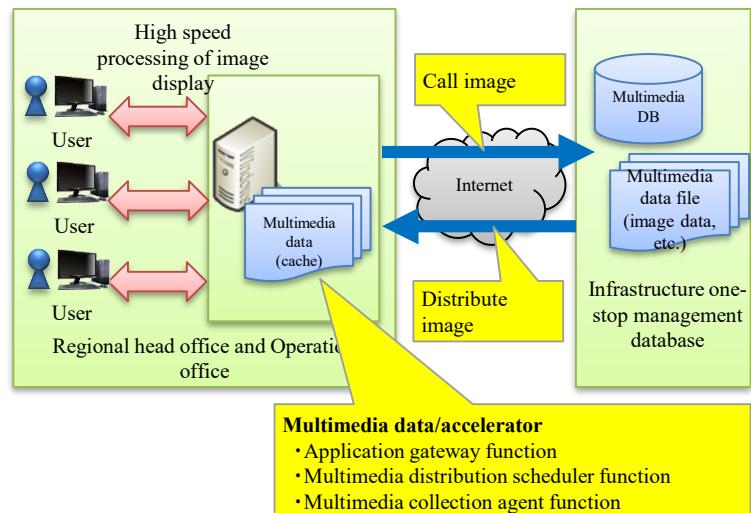
In the field of infrastructure management, by sharing the same information at the same time between the head office, regional head offices, business offices, and the field, and by grasping facility and position-related information from complex perspectives, it is possible to make accurate judgments. This achievement has made it possible due to links and display real-time data between different devices in multiple fields.

■ Technical Novelty and Superiority

Achieve multi-scale UI to meet the needs of a variety of maintenance fields. By linking and displaying managed objects in a variety of ways from multiple views, this has achieved comprehensive management and decision-making. Furthermore, to meet cases where maintenance is being operated in multiple bases, they have developed mechanisms to automatically collect and synchronize multimedia data managed in a distributed way.



Application for investigation



“Multimedia data accelerator” function to ensure real-time qualities

Goals

① Overview of Products and Services Using Achievements in SIP

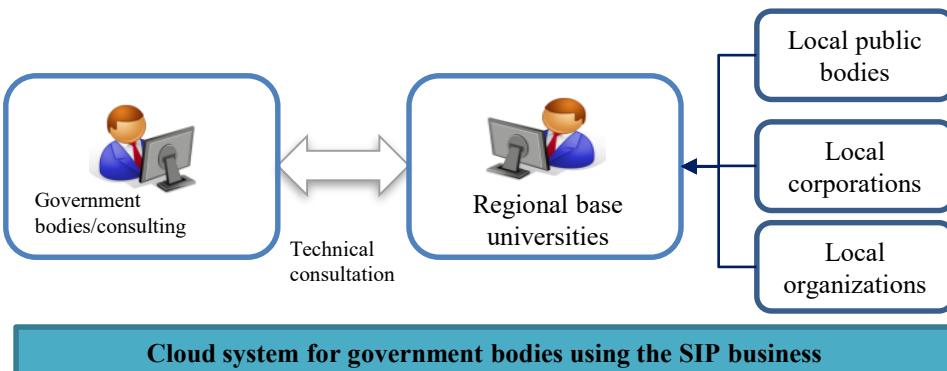
We will construct a framework for supporting infrastructure management in government bodies, in which data (text/images etc.) that is inspected and diagnosed by the infrastructure administrators of local public bodies, etc., is stored in the DB, and undergoes integrated analysis and evaluation. In order to respond flexibly to the scale and financial authority of the infrastructure administrator of the municipalities, ordinance-designated cities and prefectures, Social Capital Design, Inc., have provided this as a cloud system.

Based on a cloud system, they are providing technical support and data cleansing for inspection and diagnosis, in collaboration with regional universities, etc.

② Form of Implementation When Implemented in Society

Regional universities and technical centers, etc., provide services such as operational improvement and technical advice, and nurtures human resources using infrastructure maintenance data based on this cloud system to localize public bodies, etc. (this is planned for implementation at Tohoku University and in Yamagata Prefecture in 2017)

It is envisaged that construction consultants and IT companies, etc., shall use this system in various regions, and its services will be provided in regional units.



② System to “visualize” infrastructure management

- Enter past inspection data into a database, to visualize a state from multiple angles



One-stop management DB for government bodies

③ Damage diagnosis support system

- Possible to diagnose inspection results while looking at past damage cases



Multimedia DB for government bodies

③ Effect of this business (promoting employment, etc.)

Encourage the employment of consultants related to inspection and diagnosis, construction companies providing repair advice, IT companies developing and maintaining DB/UI, and university researchers providing technical advice and analysis.

