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D-01 | Artificial Intelligence for Preventive Road Management and Maintenance by Deterioration Predictions of Road Surface Performance

Social Issues that we have focused on

The aging of social infrastructure, including roads, is rapidly advancing, and the optimization of road operation and maintenance management is a pressing issue for local governments due to the shortage of qualified engineers and financial resources. Under such circumstances, preventive maintenance is important to keep roads in use for a long time in a cost-effective manner, and to achieve this, it is necessary to determine the optimal timing of repairs based on deterioration predictions.
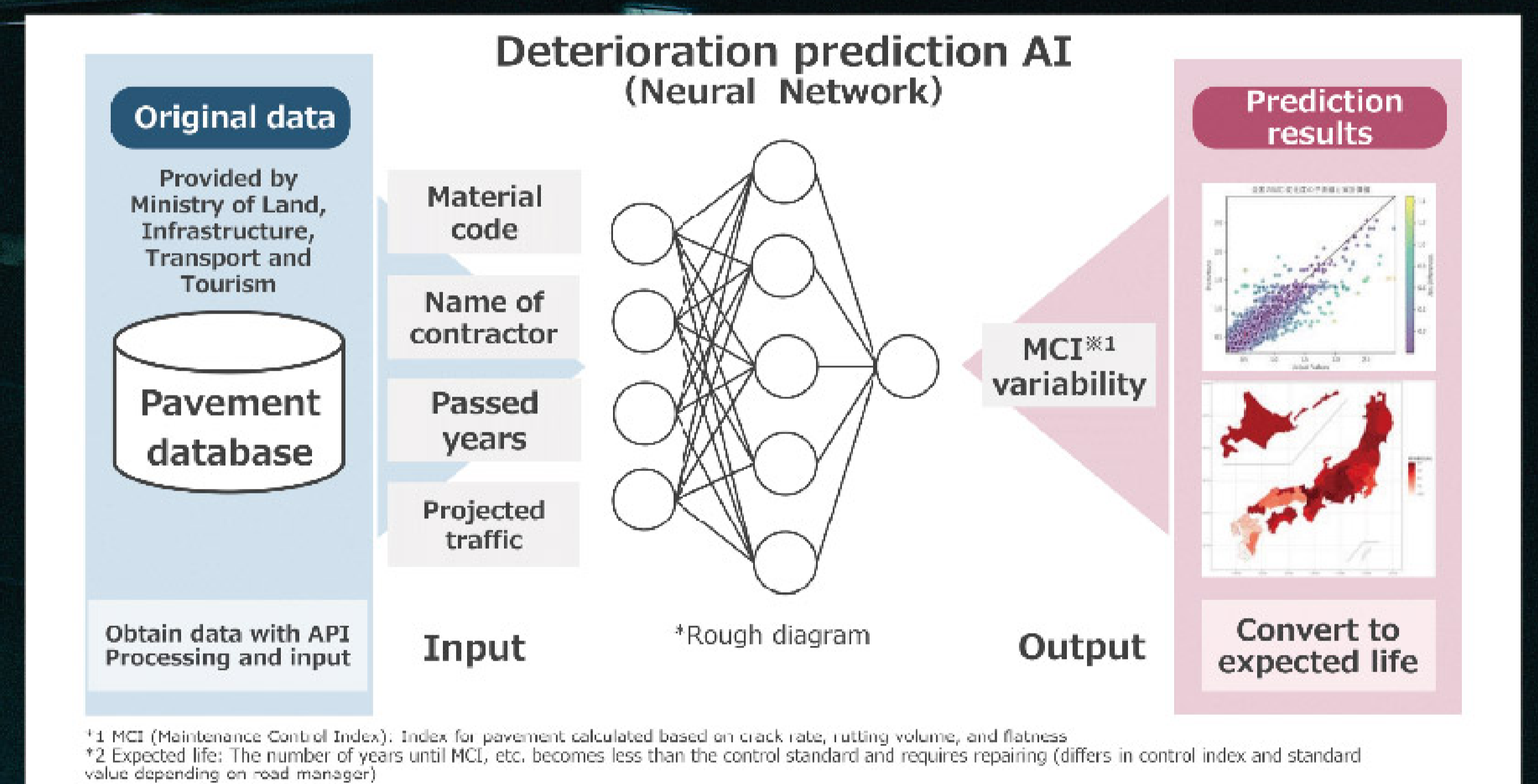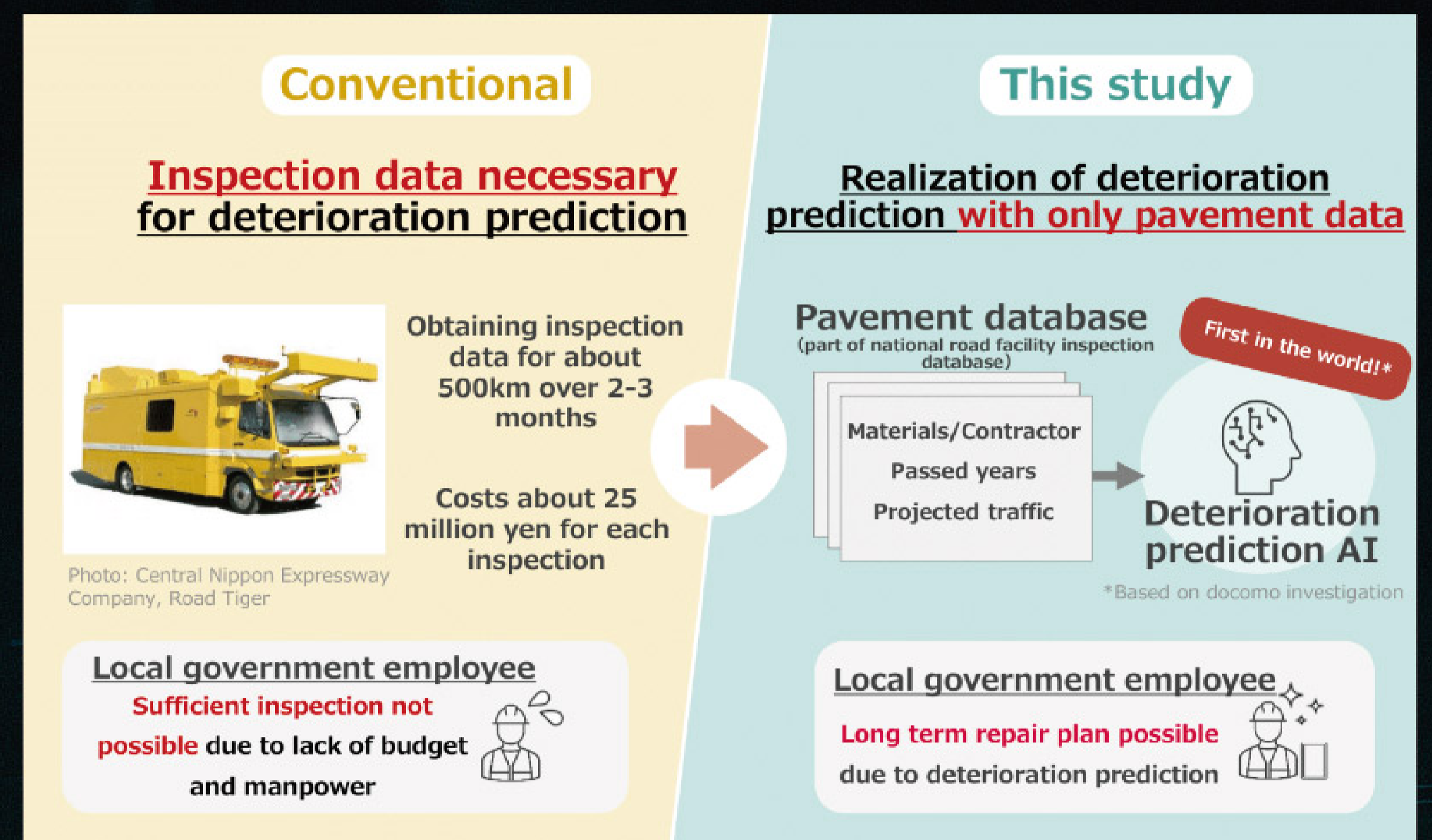
Initiatives to resolve issues

Overview

Conventional deterioration prediction requires inspection data, but the cost of acquiring data is high, and municipalities that do not have sufficient data due to lack of financial resources could not use it. To solve this problem, we have developed an AI that predicts road deterioration by using pavement data that includes information on materials, contractors, etc. even without inspection data, and we have patents pending for this technology. This makes it possible to estimate the expected life of the road.

Technology to Support Initiatives

AI, which has learned from the vast amount of data stored in the National Road Facility Inspection Database, can predict road deterioration using only pavement data. In the future, we plan to create unique value by combining this data with docomo data.

Conventional

Inspection data necessary for deterioration prediction

Obtaining inspection data for about 500km over 2-3 months

Costs about 25 million yen for each inspection

Photo: Central Nippon Expressway Company, Road Tiger

Local government employee
Sufficient inspection not possible due to lack of budget and manpower

This study

Realization of deterioration prediction with only pavement data

Pavement database
(part of national road facility inspection database)

First in the world!*

Materials/Contractor
Passed years
Projected traffic

Deterioration prediction AI

*Based on docomo investigation

Local government employee
Long term repair plan possible due to deterioration prediction

Deterioration prediction AI
(Neural Network)

Original data
Provided by Ministry of Land, Infrastructure, Transport and Tourism

Pavement database

Obtain data with API Processing and input

Input:
Material code
Name of contractor
Passed years
Projected traffic

*Rough diagram

Output

MCI※1 variability

Prediction results

Convert to expected life

*1 MCI (Maintenance Control Index): Index for pavement calculated based on crack rate, rutting volume, and flatness
*2 Expected life: The number of years until MCI, etc. becomes less than the control standard and requires repairing (differs in control index and standard value depending on road manager)

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SDGs
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES

Preventive maintenance based on deterioration prediction can be achieved with ease in a wide range of areas, contributing to road operation and maintenance management within a limited budget.

We will create communities where people can live in peace of mind and comfort for years to come.