

Collection and Utilization of Real-time Geographic Information for Road Management by Local Governments

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Abstract. Static geographic information on the environment is widely available to local governments in Japan, but the use of dynamic GIS is increasing. Furthermore, public institutions must demonstrate to residents accountability (transparency) of the efficiency of their operations. The policy of Open Government and Open Data in cooperation with citizens must be met. To do so, administrators have an increasing need for GIS methods and local geographic information. Real-time positioning information allows administrators to grasp the conditions of infrastructure (e.g., of roads and bridges) during disasters or any other situation. At present, data accessible to municipalities lying directly outside the range of environmental sensors in Japan is limited.

In this study, we have developed a simple measurable tool kit for use in official vehicles. Our experimental plan provided equipment for the purpose of monitoring real-time situations and relaying geographical data to governments. For our case study, we selected Muroran, a city in Hokkaido. Our purpose was to enable Hokkaido administrators to manage winter road conditions for the public in a timely manner. The nearby town of Tobetsu has particularly bad road conditions during the winter.

Twenty snow plowing vehicles were equipped with real-time monitors for collecting GIS data. Snow plowing activity was more intense in Tobetsu and in the suburbs than in Muroran. Software operating through android smartphones from BumpRecorder Co., Ltd., utilized an application for monitoring changing road conditions. An interlocking and automatic upload function for collecting information was linked to vehicle systems in order to minimize demands on the driver's attention. Additionally, a web interface enabled an administrator to grasp the status of road conditions at any time.

The results of this study, which sought to understand real-time road conditions and the efficiency of snow-plow operation, revealed the following. Utilization of the smartphone and Android application can be achieved at low cost and on different types of vehicles. On the other hand, problems were encountered with the short running time of the equipment battery.

Due to challenges of data integrity and continuity, it was not at this time possible to make real-time data publicly available. Originally, this information was intended to provide accountability (transparency) and reciprocity with regard to the policy of Open Government and Open Data for residents. Future goals also include adjusting the smartphone application so that reports from residents can be integrated, as has been accomplished in Minneapolis. In this way, we may achieve the desired cooperation between government and residents for collection and management of real-time geographical information.

Keywords. Real-time positioning information, Public car probe, Open Government, Bump Recorder