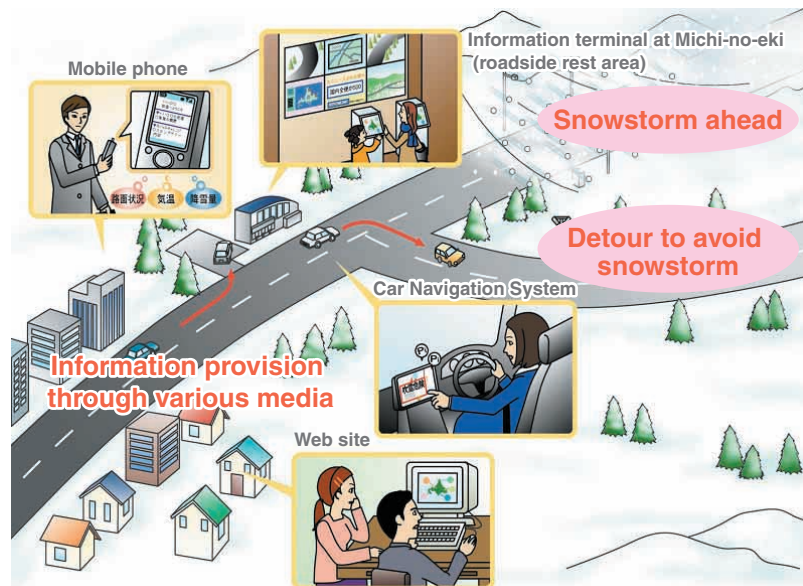


## Disaster Prevention & Snow Engineering Division (in charge of ITS), Road Department

In order to achieve safe and comfortable winter road driving in Hokkaido, the Disaster Prevention & Snow Engineering Division of the Civil Engineering Research Institute of Hokkaido has been conducting research on ITS in cold, snowy regions by utilizing advanced information communication technology, as well as conducting research on snowstorm or avalanche countermeasures.

### Research on Wide-area Information Provision Service

Weather conditions are prone to sudden change on winter roads in Hokkaido. If weather conditions are accurately known and forecast, and drivers are provided with information on those conditions, then the sense of security on drivers can be increased and the drivers can change their transportation behavior (e.g., departure time and transportation mode). The Disaster Prevention & Snow Engineering Division of CERI is conducting research and development of a service to provide drivers with information on roads and weather conditions in a wide area before they travel.



Wide-area Information Provision Service



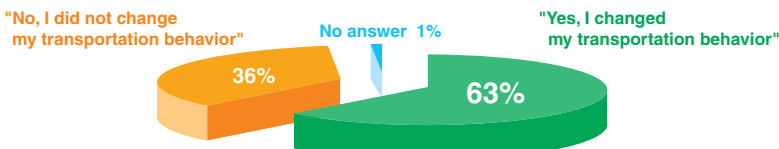
Snowfall and visibility conditions  
(Current conditions and forecast)



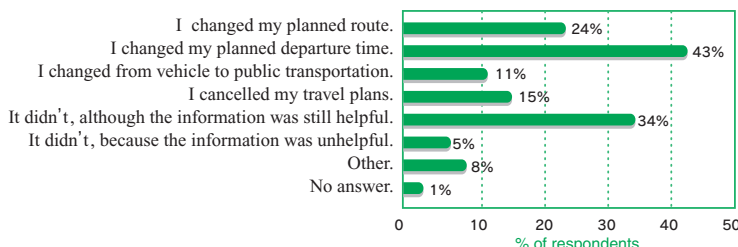
Web page used for setting e-mail options, and an example of a sent message



"Did receiving the information prompt you to change your transportation behavior?" (N=157)



"What kind of behavior did receiving the snowstorm information prompt you to take?" (N=157)

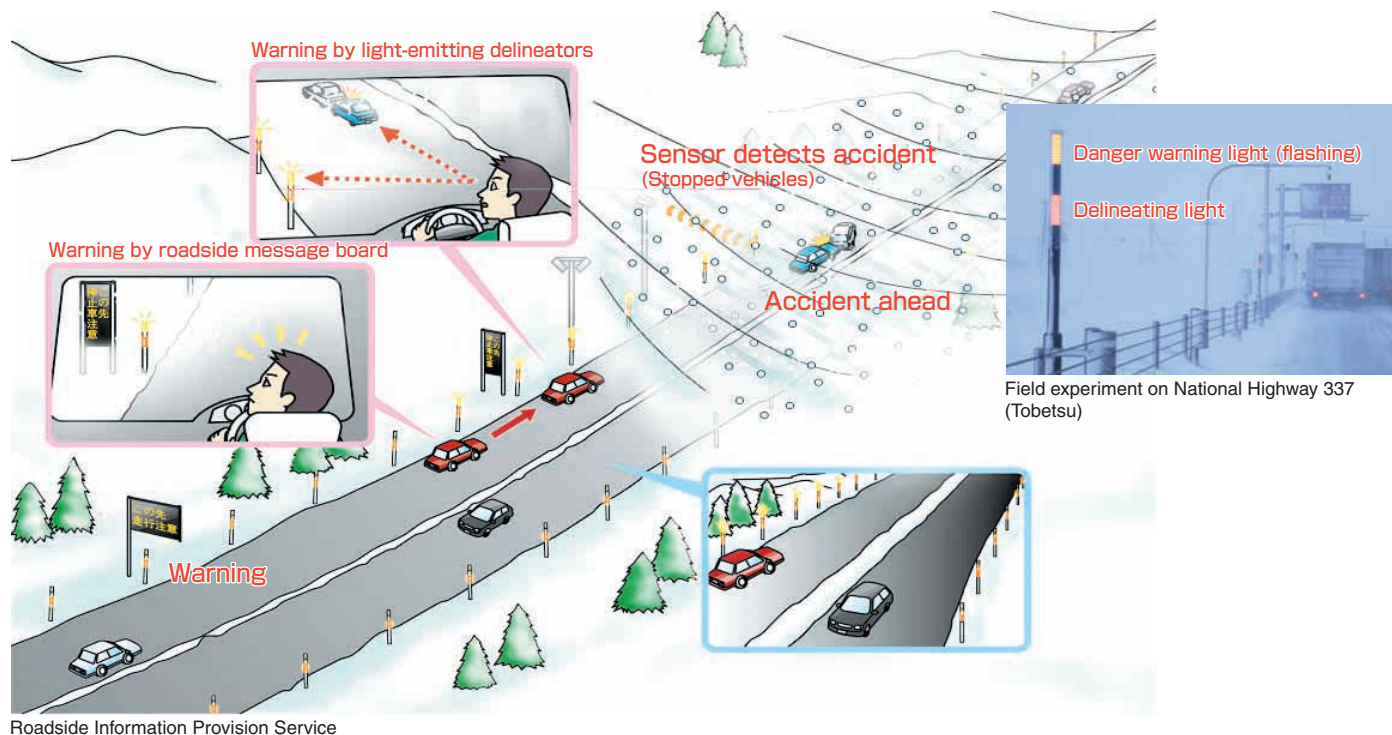


Change of transportation behavior prompted by information provision

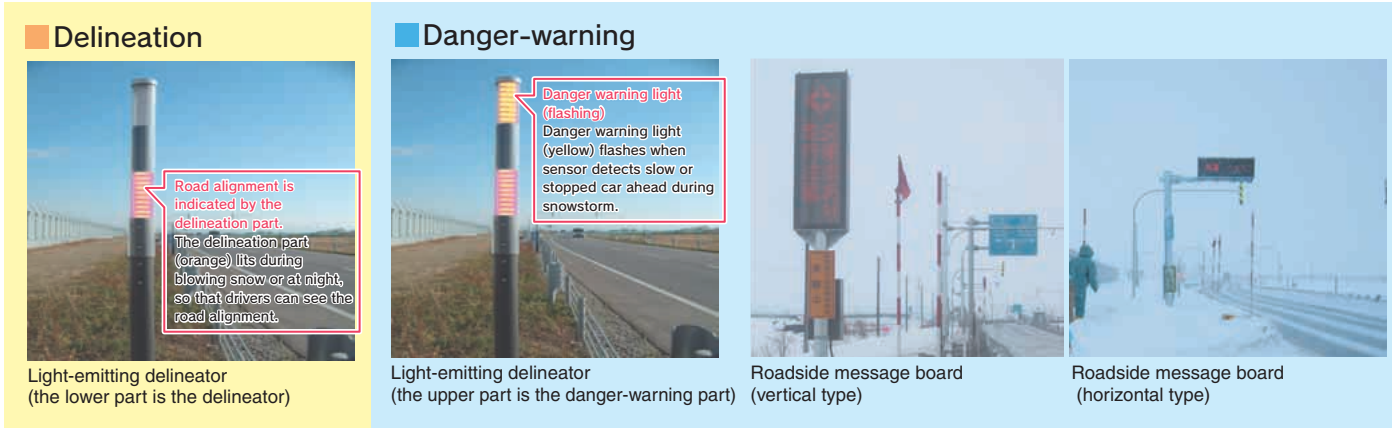
## Research on Roadside Information Provision Service

In winter during blowing snow, drivers tend to follow the preceding vehicle by watching its tail lamps, resulting in following distances becoming shorter. In addition, because the road surface is icy, even a small driver error can lead to a multi-vehicular collision.

The Disaster Prevention & Snow Engineering Division of CERI is conducting research and development on a roadside information provision service that uses road sensor and light-emitting delineators. The road sensor detects stopped or slowed vehicles, then the delineators warn drivers of danger by flashing, and roadside message boards. The objective of this service is to assure safe driving in poor visibility caused by snowstorms, to prevent rear-end collisions with tailing vehicles and to keep any accident from escalating.

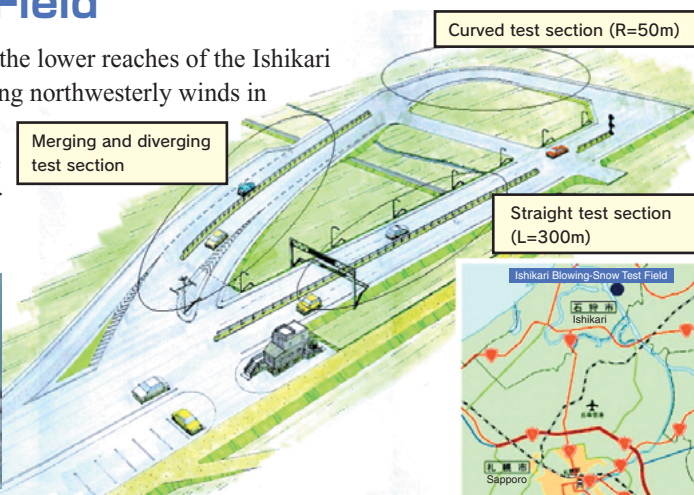


## Delineation and warning by light-emitting delineators



## Ishikari Blowing-Snow Test Field

The Ishikari Blowing-Snow Test Field is on a dry riverbed at the lower reaches of the Ishikari River north of Sapporo. This area frequently experiences strong northwesterly winds in winter. The frequency of snowstorm occurrence here is among the highest in Hokkaido. The natural conditions of the test field enable tests, including driving tests in snowstorms or poor visibility, that are difficult on roads in service.



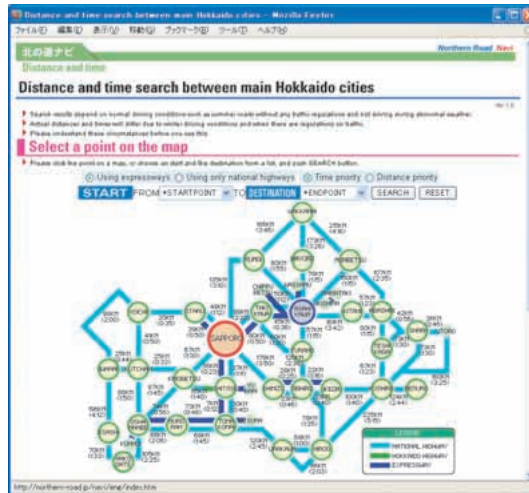


## The Northern Road Navi Web Site

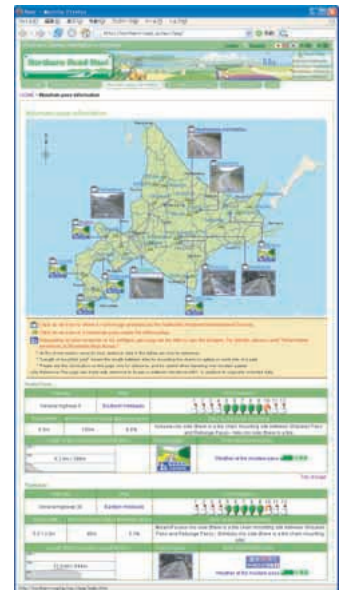
The "Northern Road Navi" portal Web site provides road information from various road administrators in Hokkaido. Information is provided in Japanese, English, Chinese and Korean.



Top page



Distance and time search page



Mountain pass information page

URL

English <http://www.northern-road.jp/navi/eng/>  
 Korean <http://www.northern-road.jp/navi/kor/>  
 Simplified Chinese <http://www.northern-road.jp/navi/chs/>  
 Traditional Chinese <http://www.northern-road.jp/navi/cht/>  
 Mobile phone <http://n-rd.jp/> (Japanese only)



## The Shiribeshi e-Route

The Shiribeshi e-Route is an experimental web site used for gathering and providing road information, based on a government-resident partnership. The site provides road closure information and road weather telemetry data from the Hokkaido Regional Development Bureau, weather and road surface information, road images and comments on road conditions provided by the Shiribeshi Tourist Association and volunteers, and weather advisories and warnings together with forecasts for the 20 individual municipalities in Shiribeshi Subprefecture provided by the Hokkaido Branch of the Japan Weather Association. Information gathering and provision was performed using Road Web Markup Language (RWML) in this experiment.

<http://www.e-kaido.jp/?shiribeshi/> (in Japanese)

URL



Top page



Route information page



Web page on which volunteers can input information

## Road Web Markup Language

Road Web Markup Language (RWML) applies Extensible Markup Language (XML) to road information. Data in RWML is easy to gather and to process, and can be used in structuring a system to provide useful information for users by combining it with other information such as weather and regional information. The specification of RWML version 1.0 has been published on the CERl Road Department web page.

URL

<http://www2.ceri.go.jp/eng/>



<http://rwml.its-win.gr.jp/eng/>

- <RWML>
  - Road information <road-info>
    - Road weather <road-weather>
    - Road surface <road-surface>
    - Live images <camera-image>
    - Traffic congestion <congestion>
    - Traffic control <regulation>
    - Traffic flow <traffic-flow>
    - Travel time <travel-time>
    - Location-specific <specific-place>
  - Weather information <weather-info>
    - Current weather <actual>
    - Weather forecast <forecast>
    - Warning <warnings>
    - Disaster information <disaster-info>
    - Earthquake <earthquake>
    - Basic information <basic-info>
    - Volcano <volcano>
    - Flood <flood>
  - Regional information <regional-info>
    - Messages from municipalities <country-message>
    - Local event <event-info>
    - Tourist information <tourist-info>
    - Scenic area information <scenic>

## What is XML

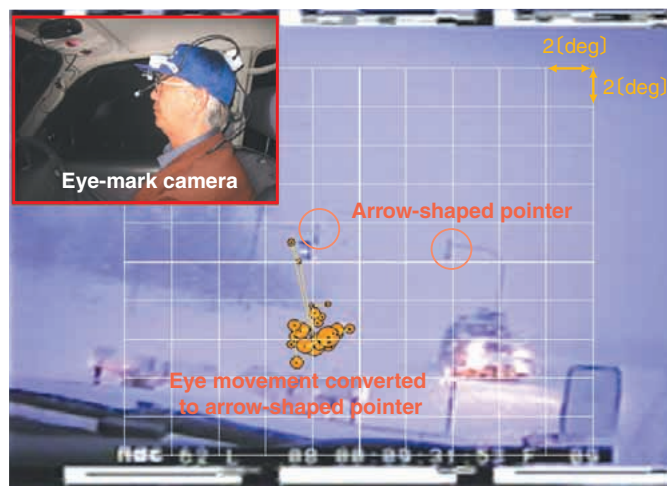
Whereas HTML supports only the representation and layout of documents and defines how documents will be displayed on a PC screen, XML can support a logical structure, permitting computers to directly handle information on the Internet as identifiable data.

## Research on Driving Behavior and Effective Delineating Facilities on Winter Roads

In Hokkaido, light-emitting delineators, snow poles and delineating trees are installed for delineation during snowstorms. Also, fixed poles with arrow-shaped pointers, which originally were installed to indicate the edge of the roadway for snow removal, are used as general-purpose delineators. Delineators vary in shape and in light emission. Therefore, it is necessary to examine their visibility and delineation performance. At the same time, it is important to improve safety and increase the sense of security on winter roads in light of rapid demographic aging. To achieve this, it is necessary to examine driving behavior and delineator recognition under such winter conditions as slippery, snowy or icy road surfaces, and snowstorm-induced poor visibility. The Disaster Prevention & Snow Engineering Division of CERI has been conducting research into human factors on winter roads by surveys utilizing a visibility-observation vehicle and eye-mark camera, and has been researching and developing the effective installation of delineators.



Delineator visibility test (Ishikari Blowing-Snow Test Field)



Optokinetic survey with an eye-mark camera on National Highway 276 (Kimobetsu)

### Visibility-observation vehicle

The visibility-observation vehicle is loaded with various meteorological instruments such as a visibility meter and wind gauge, and enables detailed snowstorm measurements to be made while driving.



Classification	Measurement item
Weather condition	Visibility, Wind direction and velocity, Temperature, Photographic image from inside the car
Driving condition	GPS location, Speed, Acceleration
Driver behavior	Steering angle, Acceleration pedalstroke rate, Brake pedal pressure
Eyemovement behavior	Eye-mark camera



Observation while driving



Video camera image

