



# Traffic Accident Analysis System Using GIS

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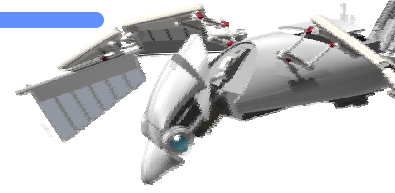
**We developed two systems which manage the data related to traffic accident.**

**One system conducts analyses using the information on accident, road, and weather, for example, calculation of the rate of the accident depending on road condition or weather condition.**

**Another analyzes using the information on safe facilities.**

**For example, extraction of the sites which have accidents repeatedly.**

**Using these functions, accident information is easily collectabled and road administrator's task to create document's on safety measures is supported.**



# 1.1 Traffic environment

- **Number of cars**

**89.72mil(approx)**

1 car / 1.2 persons eligible to get driver's license



- **Number of driving license holders**

**75.55mil(approx)**

1 person / 1.4 persons eligible to get driver's license

- **Number of driving license holders (Senior)**

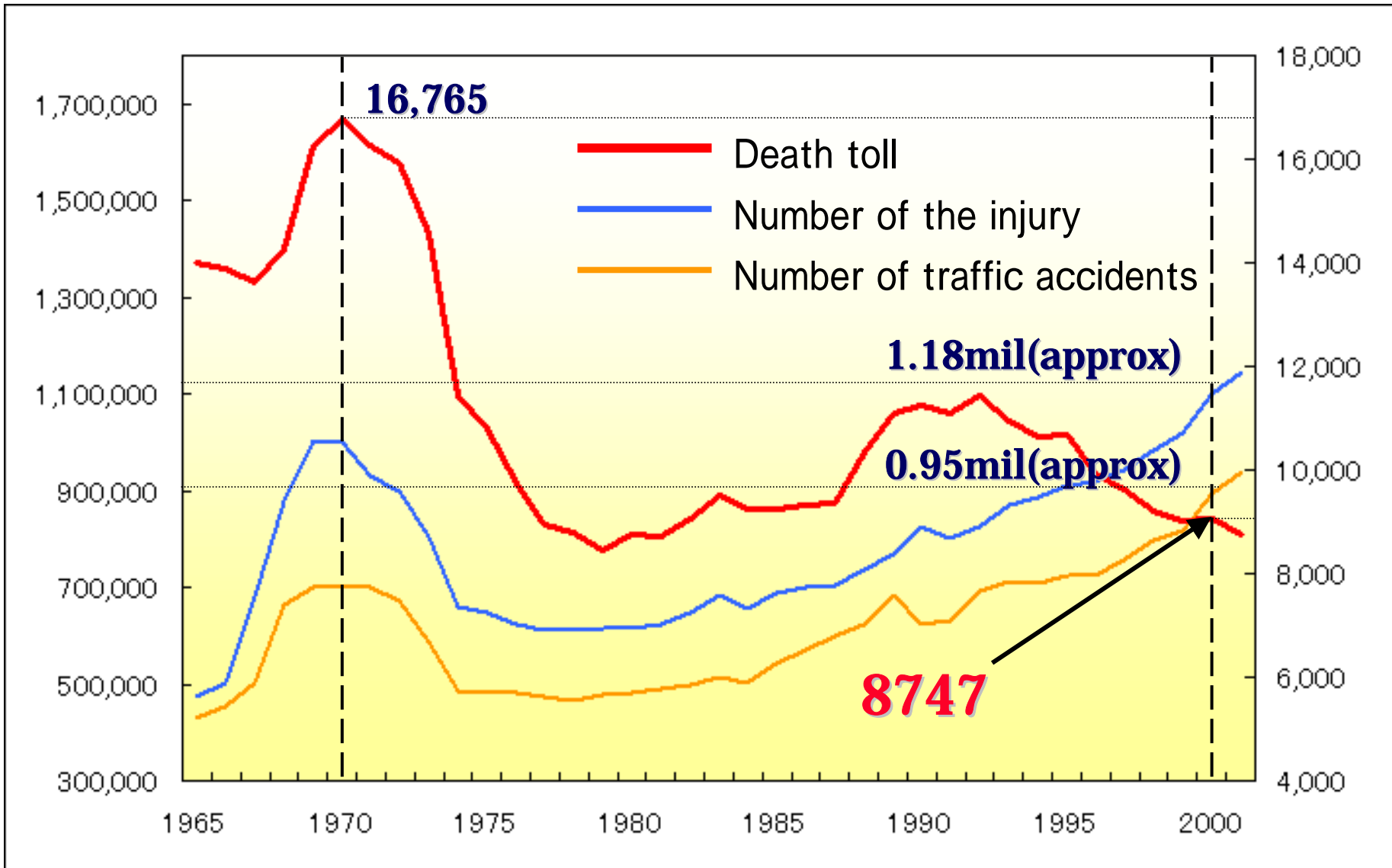
**7.65mil(approx)**

10% of drivers





# 1.2 Trend of Traffic Accident

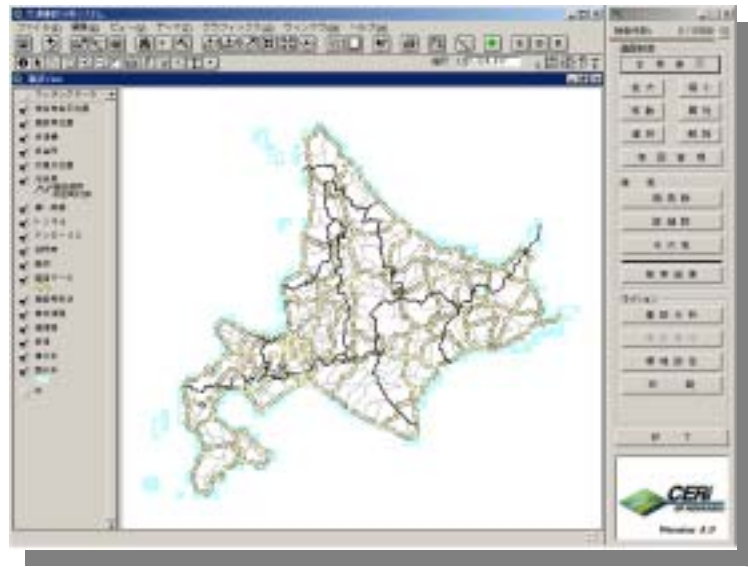




# 2.1 Case study and Purpose (1)

- **Organisation**

- **Civil Engineering Research Institute of Hokkaido (CERI)**



- **Purpose**

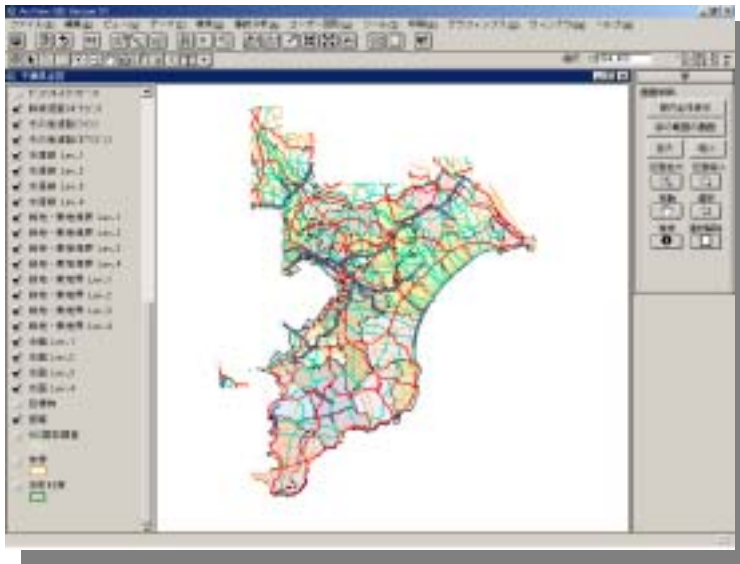
- **Analyse winter-specific accidents**
- **Take preventive action against winter-specific accidents**



# 2.2 Case study and Purpose (2)

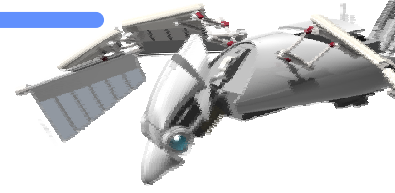
- **Organisation**

- **Chiba Prefectural Police Force**



- **Purpose**

- **Make advanced use of Traffic Information Management System**
- **Establish traffic safety measures for children and elderly people**



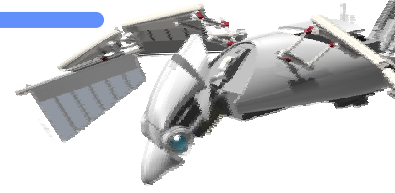
# 3.1 Data Use (Case1)

## ● Civil Engineering Research Institute of Hokkaido

ITEM	TYPE	USE	YEAR	NOTE
Matching data *1	POINT	Accident Information	1989 ~ 2001	Event data (Physical injury/Death)
MICHI *2	POINT	Road Information	1999	Event data
	LINE			Event data
AMEDAS *3	POINT	Weather Information	1989 ~ 2001	162 sites in the region
Meteorological observatory *3				22 sites in the region

Japan Digital Road Map Association's road map, and off-the-shelf map for the background.

- \*1 NPA's statistics on traffic accident is integrated with MLIT's traffic census data.
- \*2 MLIT's information on road facilities.
- \*3 JWA's weather information.



# 3.2 Data Use (Case2)

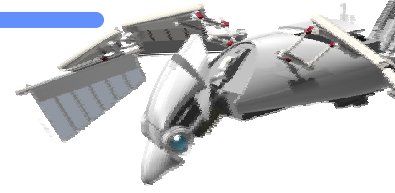
## ● Chiba Prefectural Police Force

ITEM	TYPE	USE	YEAR	NOTE
Accident site *1	POINT	Accident Information	1996 ~	
Census *2	POLYGON	Aged Population	2000	
Primary school *3	POINT	Location	2002	869 Schools in the region
	LINE	School Route		

Japan Digital Road Map Association's road map, and off-the-shelf map for the background.

- \*1 Data is registered using Traffic information management system.
- \*2 Statistics Bureau's population data.
- \*3 School routing maps managed by education committee are digitized.





# 4.1 Method of Analysis (Case1)

## Accident Information

Set Condition

- Accident information : date, type, etc.
- Road information : vertical slope, etc.
- Weather information : Air temperature, Rainfall, etc.

## Analysis Type

Census section or Arbitrary section  
Set Route and Area

Census section :

Traffic volume data is used.

Any section :

Traffic volume is calculated proportionately.

## Analysis

Calculate the number of accidents  
Accident rate, Fatality rate

$$\text{Accident Rate} = \frac{\text{Number of Accidents} * 100,000,000}{\text{Length} * \text{Period} * \text{Traffic volume}}$$

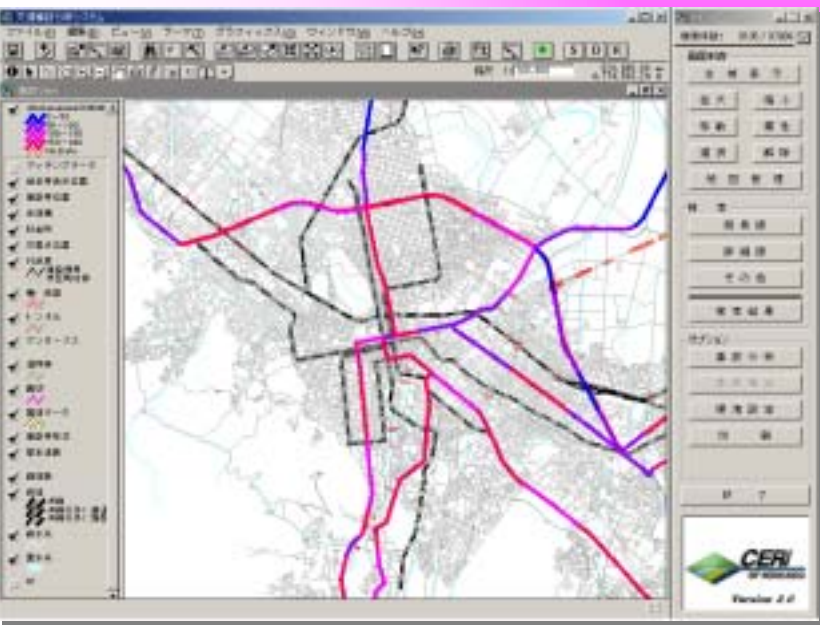
$$\text{Fatality Rate} = \frac{\text{Number of Fatalities} * 100,000,000}{\text{Length} * \text{Period} * \text{Traffic volume}}$$



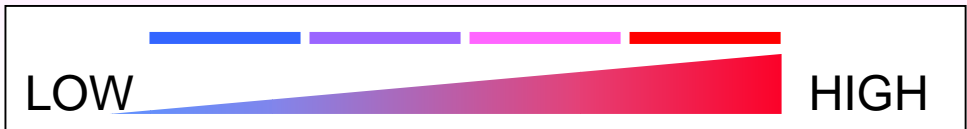
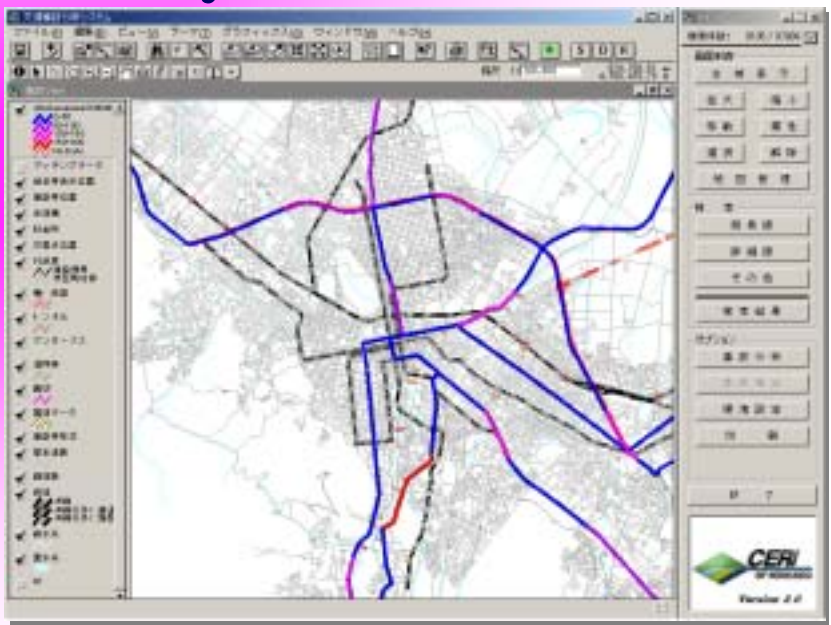
# 4.2 Visualization (Case1)

- ❑ Characteristics
  - ◆ Use traffic volume data.
  - ◆ Provide understandable presentation.

### Accident Rate



### Fatality Rate





### □ Effectiveness

- ◆ Time for analysis and inquiry was reduced by 70 – 80 %.
- ◆ Benefit analysis report is easily produced.
- ◆ Safety measures are established to prevent traffic accidents.



# 5.1 Method of Analysis (Case2)

## Accident Information

Set Condition

- Accidents involving children and aged people.
- Accidents when crossing road.



## Statistics Type

Set Zone

Creating a buffer :

Around each extracted accident.

Option :

Boundaries of neighboring polygons removed.



## Statistics

Sum up the number of accidents

Display the sites only where the number of accident exceeds the number of accident at freely specified places, as accident prone sites.

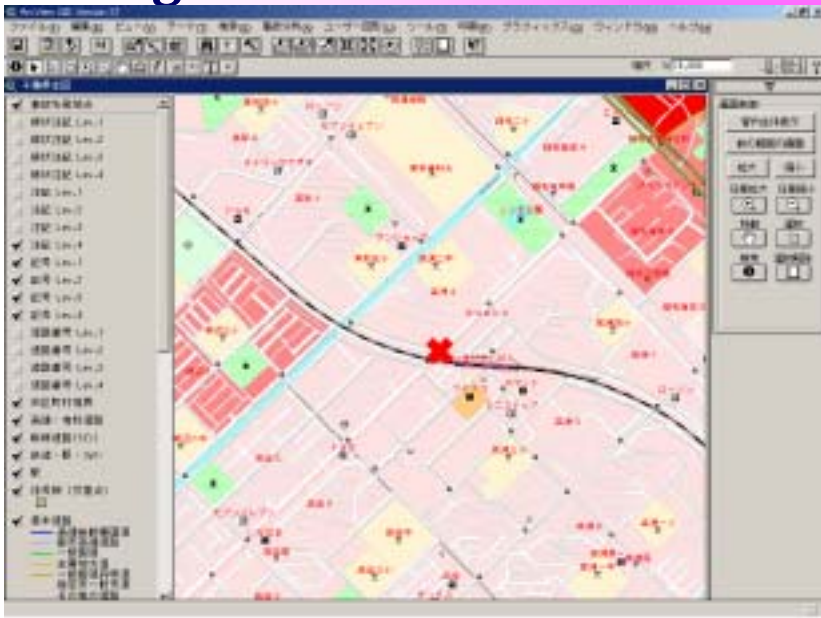


# 5.2 Repetitive Accidents (Case2)

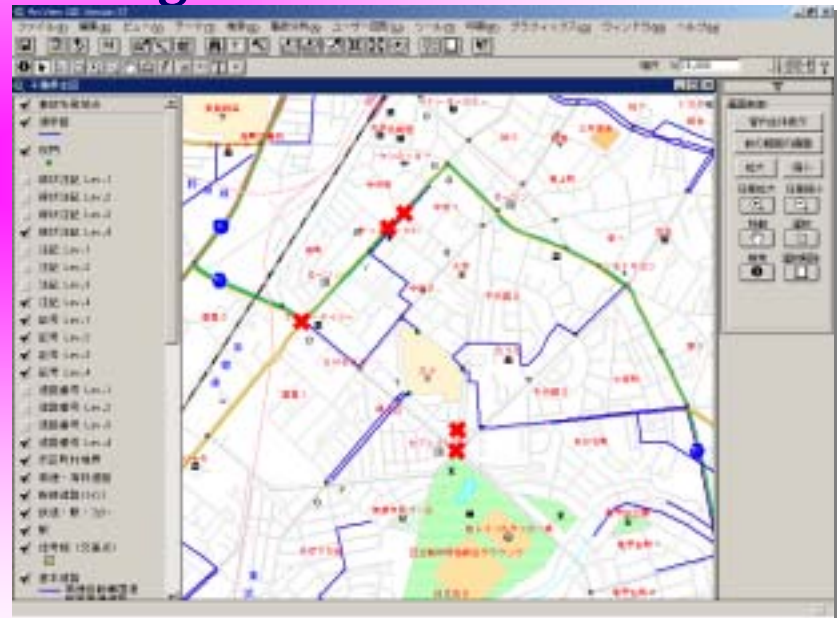
## □ Characteristics

- ◆ Share data for common use.
- ◆ Provide understandable presentation.

### Using Census Data



### Using School Route





### □ Effectiveness

- ◆ The system is useful for establishing traffic safety measures, as the trend of accidents is detected.
- ◆ Awareness of traffic safety is increased by using GIS.
  - The result of questionnaire
    - 70% of schools use the data for revising school route.
    - More than 90% of schools request data (in digital format)



# 6 Issues for Improvement

## Case1 for Hokkaido

- ❖ Adaptation to the change of national road construction plan and traffic volume.
- ❖ Use of DBMS and alternative operation method to deal with large volume data.

## Case2 for Chiba

- ❖ Accumulation of information on safety facilities and regulations.
- ❖ Disclosure methods for schools, and effective use of information.



## 7 Conclusion

**Disclosure method of the analyses result.**

**Data distribution method.**

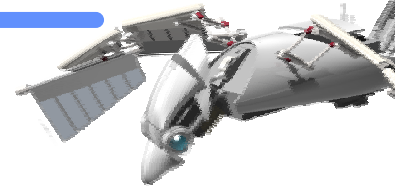
**Diffusion of knowledge on traffic accident.**

**Awareness of Traffic Safety.**

**Prevent traffic accident.**

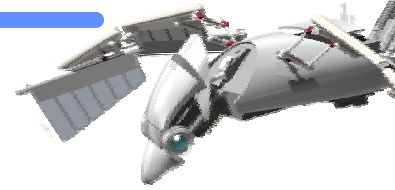
**Challenge to Achieve Secure Society**





## 8 References

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  - [http://www3.ceri.go.jp/monthly0205/02\\_05.htm](http://www3.ceri.go.jp/monthly0205/02_05.htm)
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**The 7th Traffic safety scheme**
  - [http://www.pref.chiba.jp/syozoku/e\\_kouan/anzen07-j.html](http://www.pref.chiba.jp/syozoku/e_kouan/anzen07-j.html)



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