

KEIJU - AN IT BASED CENTRAL INFORMATION COLLECTION SYSTEM

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1. Abstract

Finnish Road Enterprise (previously Finnish Road Administration) has collected information on winter roads maintenance operations on different forms and papers. The information has been verified several times and filed in different systems. Several overlapping filing and checking practices cause a lot of costs. At the same time, information consistency have suffered as there has been many information collectors.

With the Keiju –information collection system overlapping work is removed and technological possibilities to automate the information collection are utilised. Keiju has been developed to replace staff forms and unnecessary work that is caused by corrections, interpretation and filing. The information is collected with a simple routine and as consistently as possible. At the same time, the quality of customer reports can be increased (e.g. quality reporting).

Information collection process automatisation increases effective work-time, operation management and reduces information collection and distribution costs. Information is only produced once and relaying it takes less time. Information collection, filing and relaying became daily operations with the change of operations methods and developing IT tools.

2. What is Keiju?

Keiju is a basic information collection system that collects information on road operations. The collected information is:

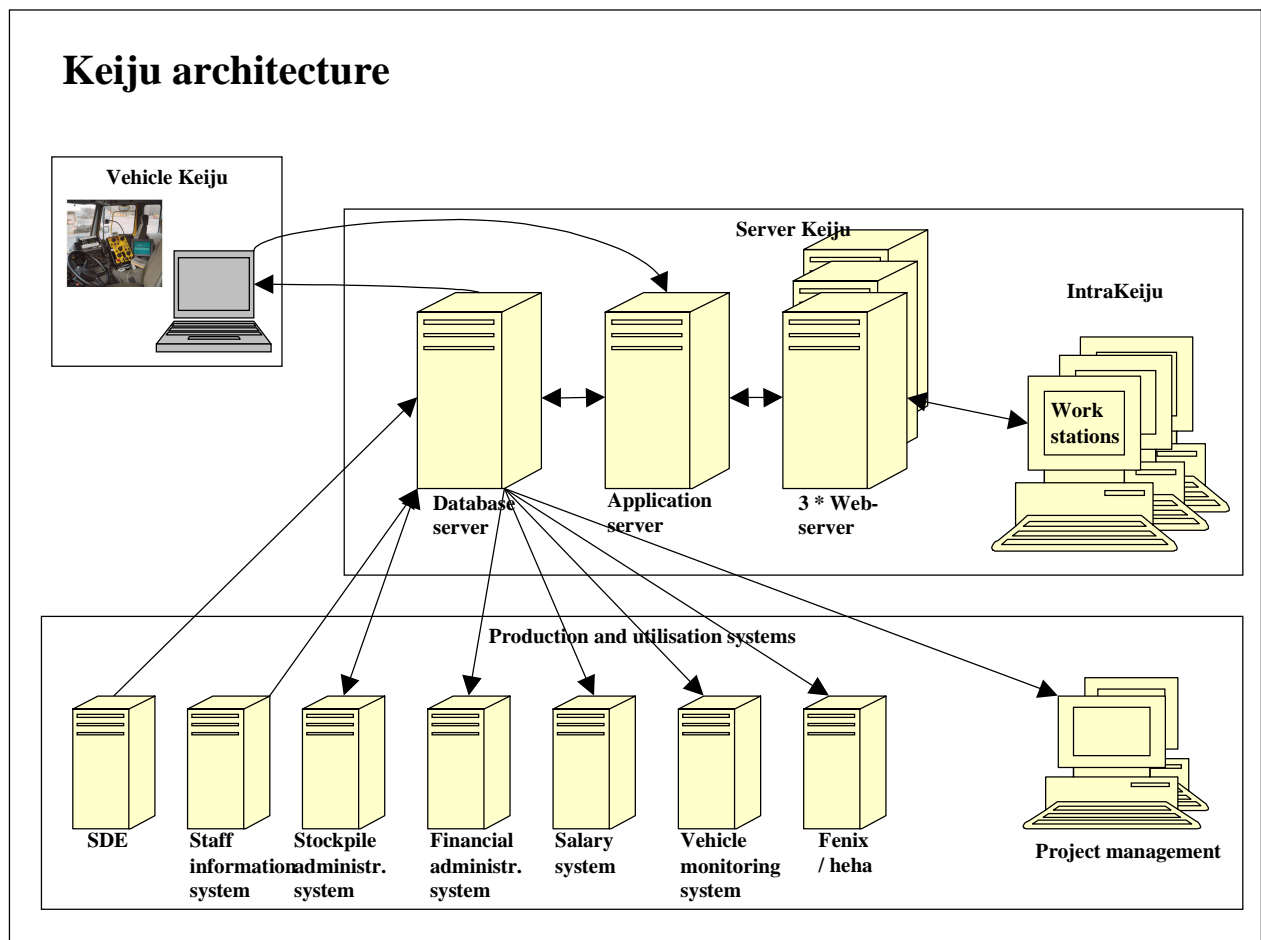
- who (person)
- what (vehicle)
- what (task)
- where (location)
- when (time)
- how much (distance, material quantity and so on)

Keiju makes information collection and distribution up-to-date, easy and flawless for all who need it. Ca. 900 drivers, 150 management representatives and 500 other staff members use the Keiju system.

3. Keiju parts

Keiju consists from the following parts:

- Vehicle Keiju
- Server Keiju
 - Intra Keiju
- Systems producing and utilising information

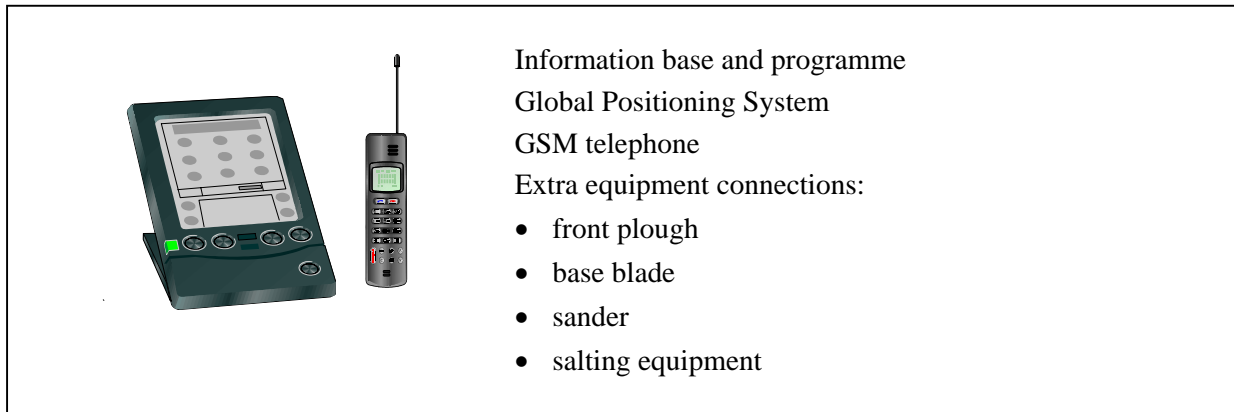


Picture 1. Keiju architecture.

3.1. Vehicle Keiju

Drivers use the Vehicle Keiju which includes a vehicle computer, extra vehicle computer equipment connections, global positioning system and GSM phone for relaying information. Extra equipment connections cover front plough, base blade and sprinklers (sander and salting tools).

The Vehicle Keiju contains its own information database, which makes a continuous information flow possible despite temporary connection problems. In relaying outcome information from the Vehicle Keiju to the server, an outcome queue is used. The Vehicle Keiju receives location information from a global positioning unit. The unit updates coordinates every two seconds.



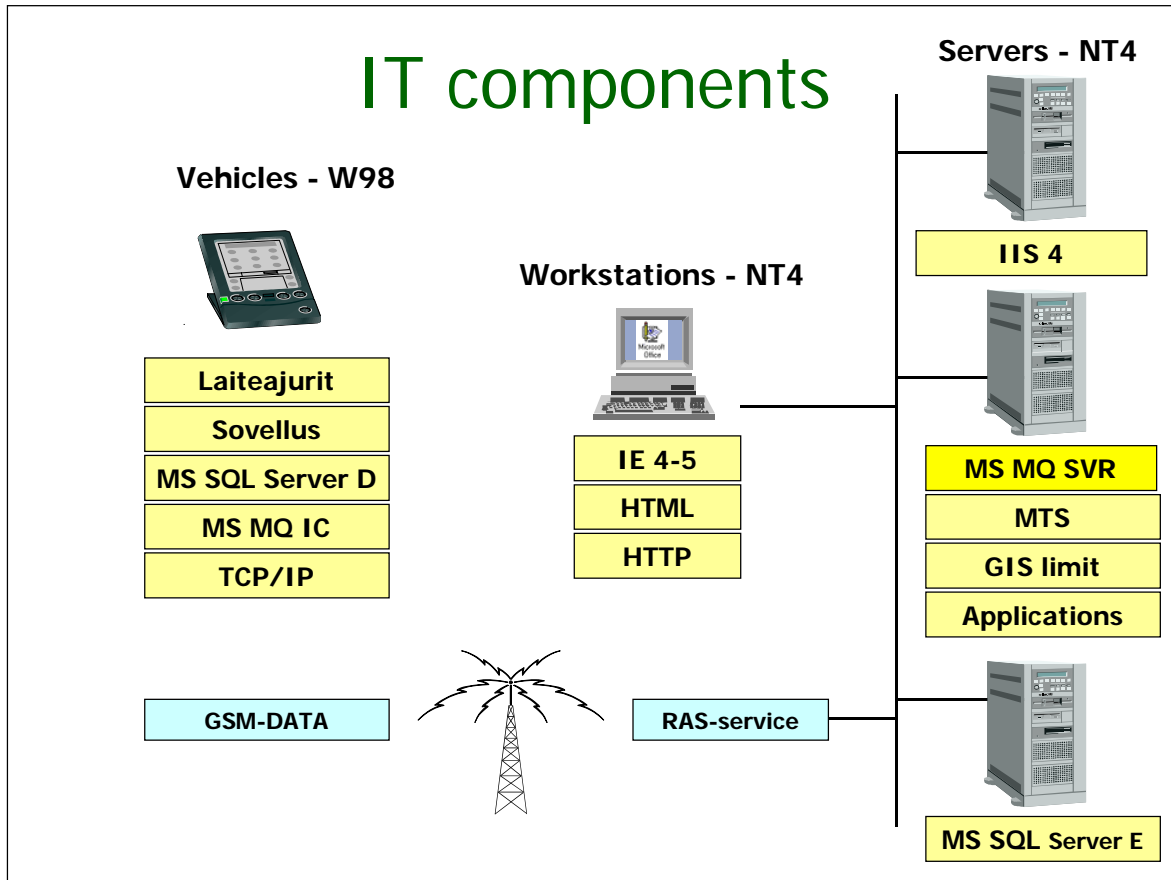
Picture 2. Vehicle Keiju.

3.2 Server Keiju

Server Keiju is the name used for the Keiju server environment, excluding the Vehicle Keiju. Server Keiju consists of **Intra Keiju**, which is mainly aimed at office users. The Intra Keiju application is implemented in accordance with a so-called three level architecture. This consists of a user interface, which is formed by web servers. Intra Keiju application logistics are located on an applications server. Intra Keiju is connected with the Keiju database through these components.

Intra Keiju is a browser application, which maintains and adds the system's basic information. Intra Keiju checks if the information is correct. Intra Keiju can be used for reporting Keiju information e.g. management inspection reports. Intra Keiju can collect information, for example when Vehicle Keiju is not working or when works are carried out at a location where no vehicle computers are available.

Intra Keiju is mainly used by management to check driver information. There is an Intra Keiju support person in units, whose task is to help drivers and management to use the Keiju-system. Intra Keiju has different user right levels. Some of the applications require wider user rights. Depending on users' rights own or other users' information can be accessed.



Picture 3. IT components.

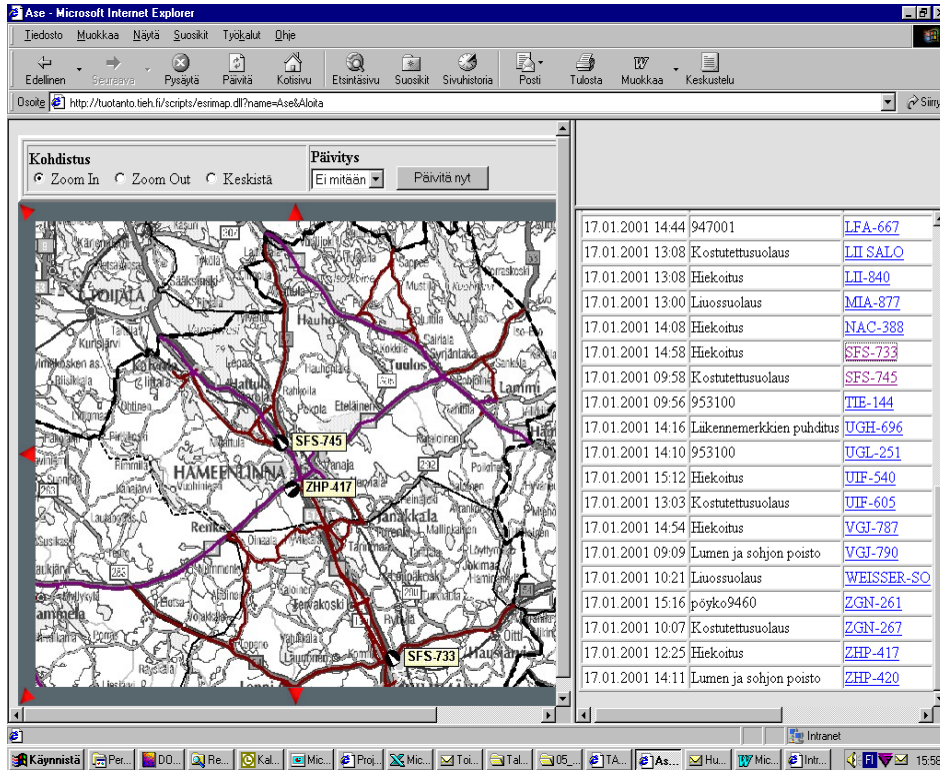
3.3 Systems producing and utilising information

Keiju verified information is available for other systems. Currently information is produced by Spatial Data Engine (SDE) and Staff information system. The information is utilised by payroll, finance, storage materials and vehicle monitoring.

The SDE database includes road network and maintenance property information and geometry what are used for Keiju system location determination. The maintenance area includes the winter maintenance area, the so-called contract area. These areas' geometry is included in the SDE database and can be used for location determination.

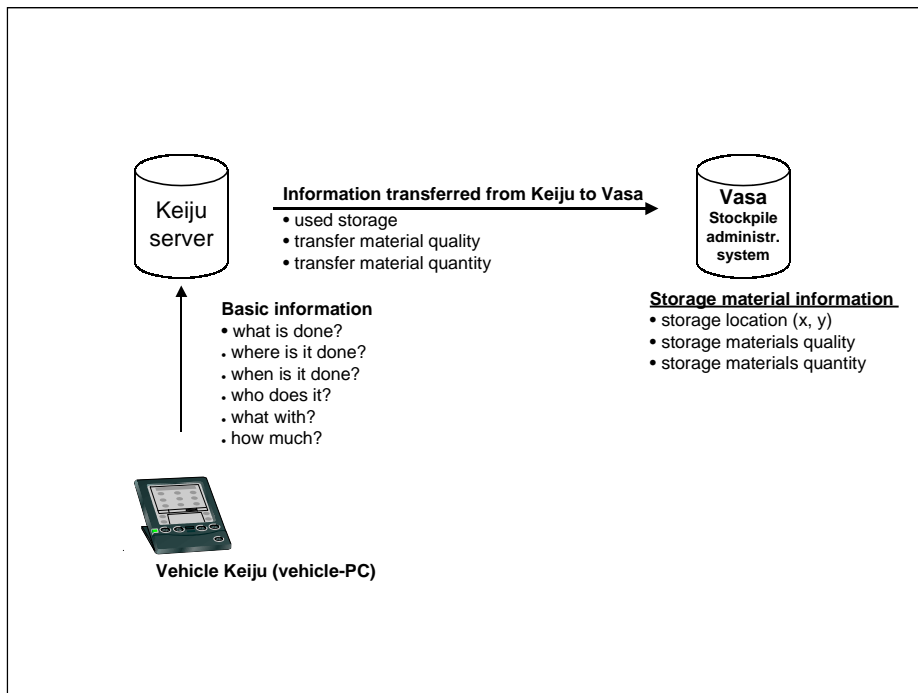
The vehicle monitoring system is a map programme on Finnish Road Enterprise's Intranet. It follows vehicles and operations in real time. Finnish Road Enterprise's Road Condition Centre mainly uses this information but management will also utilise this information in the future.

The vehicle monitoring system's information is relayed from server Keiju. Map images can be drawn from historic information.



Picture 4. A picture of the vehicle monitoring system.

Vasa is Finnish Road Enterprise's aggregate and salt storage management system. The Keiju system automatically reads material titles and places from the Vasa system. Information is transferred automatically from Vehicle Keiju via a server to Vasa.



Picture 5. Keiju / Vasa information transfer.

4. System problems and problem solutions

The system's implementation in practice has faced its biggest problems with system equipment operations and in reacting to repairs of faulty equipment. Non-functioning telephone cables, vehicle computer batteries' durability, information transfer to servers and location determination have also caused problems. The extensive amount of information has caused problems for Intra Keiju users. The server can be slow on large queries and sometimes does not even work. The largest amount of information entered into the server in one day is millions of lines of events and coordinates.

Extensive effort has been put into system consistency. The system is defined carefully and responsibilities and roles have been outlined around the system. This enables immediate intervention in case of problems. Keiju field implementation has been a priority. It is important to organise good training, support and management for a demanding environment. All Keiju documentation and other documentation are put on Finnish Road Enterprise's Intranet. This way up-to-date information is available.

5. Keiju producers and equipment suppliers

Customer: Finnish Road Enterprise

Application builder: SysOpen (www.sysopen.fi)

Vehicle database computers: Sunit (www.sunitmobile.fi)

Telephones: Nokia (www.nokia.com)