SLOVENSKI STANDARD
SIST ENV 12896:2003

01-oktober-2003

Cestna transportna in prometna telematika ï Javni prevoz ï Referenļ ni podatkovni model

Road Transport and Traffic Telematics - Public Transport - Reference Data Model

Telematik für den Straßentransport und Verkehr - Öffentlicher Verkehr - Referenzdatenmodell

Ta slovenski standard je istoveten z: ENV 12896:1997

ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade

SIST ENV 12896:2003 **en**

EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 12896

November 1997

ICS 35.240.60

Descriptors: teleprocessing, road transport, traffic, public utilities, information interchange, data transmission, data, models

English version

Road Transport and Traffic Telematics - Public Transport - Reference Data Model

Telematik für den Straßentransport und Verkehr - Öffentlicher Verkehr - Referenzdatenmodell

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. ENV 12896:1997 E

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1 FOREWORD

This European Prestandard has been prepared by Technical Committee CEN/TC 278 "Road transport and traffic telematics", the secretariat of which is held by NNI.

This prestandard was prepared by the work area Transmodel of the EuroBus project and by the DRIVE II task force HARPIST. The EuroBus/Transmodel and HARPIST kernel team is considered as a subgroup of Working Group 3 of CEN TC278.

It has been approved by Topic Group 6 (TG6, entitled "Public Transport Data Models") of the EC- Drive II programme and by two validation seminars open to participants in various DRIVE II projects, to European public transport operators and to other public transport experts.

It is based upon earlier results reached within the Drive I Cassiope project and the ÖPNV data model for public transport, a German national standard.

The different organisations that have technically contributed to the preparation of this prestandard are the partners of EuroBus/Transmodel and the HARPIST task force:

- Beachcroft Systems (UK),
- CETE-méditerranée (F),
- CTA Systems (NL),
- Ing. Conseil B. Bert (F),
- Koninklijk Nederlands Vervoer (NL),
- Leeds University (UK),
- Régie des Transports de Marseille (F),
- SNV Studiengesellschaft Verkehr (D),
- Stuttgarter Strassenbahnen AG (D),
- TransExpert (F),
- TransTeC (D),
- VSN Groep (NL).

The sponsors of the project are:

- European Communities (EC, DG XIII, F/5, Drive Programme, 1992-94),
- French Ministry of Transportation,
- Dutch Ministry of Transportation,
- German Federal Ministry of Research and Technology.

This prestandard reflects the contents of deliverable C1 of the HARPIST task force, published in May 1995, with modifications resulting from the discussion process in CEN TC278/WG3 between May and October 1995.

Annex A of this document is normative, annexes B and C are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

2 INTRODUCTION

2.1 An efficient public transport operation and operations management, as well as attractive and accurate passenger information are the main objectives sought by public transport companies. The solution to reach this goal goes through the integrated approach, i.e. the possibility of integrating more easily application systems developed by different suppliers into one system (interoperability). The need for the integration of systems and the benefit that emanates from the interoperability of applications was the starting point of the research in the field of data modelling for public transport.

2.2 The integrated approach enables, for instance, a reliable exchange of information between different software products. This approach has at the same time to allow for the choice of the best adapted software for each company, without being bound to one single supplier. The experience shows, however, that software products of different suppliers are often incompatible or difficult to integrate. The operators are therefore either forced to run several products separately, or to rely on one specific supplier and its range of products, that may not be well adapted as a whole to a given company.

2.3 This document presents a data model for public transport, i.e. a description of the data structure, that has to be considered as the basis for an integrated system within a public transport company.

2.4 The prestandard presented here is dedicated to provide a solution to operators and software suppliers that now want to proceed towards an integrated system. Its aim is also to be a support for future developments.

2.5 An informative annex C presents an executive summary of the model in order to allow to quickly understand the benefits of the model and its contents.

3 SCOPE

3.1 The prestandard proposed here has been developed independently from any specific application system. It takes into account expertise from the different existing practices of public transport operators throughout Europe.

3.2 It is designed to be a structure to enable interoperability between different commercial systems and thus to open the market.

3.3 The data model presented here has to be considered as a reference at the conceptual level. This means in particular, that no statement is being done about the logical level and thus about the way the model will be implemented.

3.4 This document presents the prestandard using the entity-relationship methodology, i.e. as a series of diagrams, composed of data (entities) and relationships between data (entity-relationship diagrams), and a data dictionary, i.e. a list of entity definitions together with main data attributes.

3.5 The methodology and the specific conventions used, should not be understood as a mandatory element of the standard, but as a tool for its representation.

3.6 The approach followed concentrated on the semantics of the Public Transport domain. It is not contradictory with the object - oriented approach that might be developed in future and represents a basis for the object - oriented developments. These object - oriented developments need a large amount of additional work and hence have not been taken into account in the present document.

3.7 The data model presented concerns the following domains:

- Scheduling
- Personnel disposition
- AVM
- Passenger information
- Fare collection
- MIS/Statistics.

An interface to the data model developed for the GDF standard is also described.

4 NORMATIVE REFERENCES

This European prestandard takes into account the work undertaken in CEN TC278/WG7.2 concerning the GDF-norm (version 2.2).

5 DEFINITIONS

Attribute:
Property of an entity.

AVM:
Automated Vehicle Monitoring: computer-aided control of the transportation process, in this document corresponding to the functional area "perform and control the driving process". Terms used as synonyms: VSCS (Vehicle Scheduling and Control System), AVLC (Automated Vehicle Location and Control).

AVM data model:
Data domain, describing the data structures needed for the control of the actual public transport operation.

Conceptual data model:
Description of a real world domain in terms of entities, relationships and attributes, in an implementation independent manner. It should provide a structure on which the rest of the development of the system can be based.

Conceptual level:
In the context of data modelling, the conceptual data model.

Database:
Collection of data; often used in the sense of the physical implementation of a data model.

Data domain:
Data structure (in this document, a part of the Reference Data Model for Public Transport) made up of data related to each other through the fact, that there is a functional area or group of functions using this data set as a whole.

Data model:
Description of a real world domain in terms of data.

Entity:
An object (data) that has its own existence (as opposed to an attribute).

Entity-relationship (E-R) methodology:
Methodology allowing for the representation of a data model in terms of entities and relationships.

Fare collection:
All activities related to the collection of money from passengers, composed

of the following functional areas: "define a fare policy", "organise sales", "operate sales", "validate/check and charge", "manage money transactions".

Fare collection data model:
Data domain supporting a subset of fare collection functions.

Function:
Activity. In this document, a subactivity of a functional area.

Functional area:
An arbitrarily defined set of activities, used, in this document, to define the objectives and limits of the data model. The definitions are given below.

Functional area "define a fare policy":
Definition of a specific fare system to be used (distance, time or area related etc).

Functional area "manage drivers":
Optimisation of the use of the available drivers. "Personnel management" makes available the required number of drivers according to the rosters. "Transportation" is responsible for the optimal use of the drivers.

Functional area "manage money transactions":
Activities related to the collecting of the money paid for the delivered service by passengers or organisations (clearing house, subsidizing authority) and distributing these revenues between the service suppliers.

Functional area "manage statistical results":
Administration of the data collected during the operational process, management of the database(s) in order to provide relevant data for the company processes, and issuing of reports on the operations for various levels of the management.

Functional area "operate sales":
Sale transactions of fare products and management of travel document issuing (retail shops, vending machines).

Functional area "organise sales":
Definition and management of the sales network including sales outlets and contracts with retailers (if any).

Functional area "perform and control the driving process":
Functions related to the driving and transportation of passengers according to given instructions (schedule), including all activities that support the driving process (traffic light priority, track switching, bay selection, advance/delay advice etc.). Monitoring of the driving process and its control in case of deviations.

Functional area "plan detailed timetables":
Translation of the broad service requirements (derived, for instance from the functional area "plan the service to be offered") into detailed timetables that give information on the exact timing of the service(s) on each type of day and for each time band.

Functional area "plan the service to be offered":
Take all global decisions regarding the quality of the service that has to be offered, within the limits of budgets and other guidelines from management (define minimum and maximum travel times, interchange points etc.)

Functional area "prepare driver rosters":
Composition of sequences of duty elements into duties (weeks, months) according to rules governing the number of hours worked in a period of several days, the allocation of rest days, the rotation of evening duties etc. and finally assignment of names of the drivers to the blocks.

Functional area "provide passenger information on actual service":
Functions providing passive and on-request information on the actual service and on the actual (traffic) conditions.

Functional area "provide passenger information on planned service":
Functions providing information on the planned service (i.e. information available before the 24 hours operational cycle) to passengers, either by display/video or audio (incl. phone desks). This information can be passive or delivered on request.

Functional area "(re)design the network":
Take all global decisions regarding the network structure, taking into account the defined quality of service that has to be offered and the guidelines from management (budgets, policy).

Functional area "schedule driver duties":
All activities necessary to define duty elements (parts of working days) that match the planned vehicle schedules, taking into account the general labour agreements.

Functional area "schedule vehicle blocks":
Chaining and assigning of journeys to (logical) vehicles, allocation of the type(s) of vehicles to journeys, and optimising the use of the vehicles by switching them between lines.

Functional area "validate/check and charge":
Activities related to the verification that the passenger is entitled to ride. Calculation of fare product prices, taking into account the given fare structure and the corresponding transport network and collection (and/or marking) of the travel document, or debiting of an amount of fare,