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Public transport — Interoperable fare management system

Part 2: Business practices

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Foreword

This document (CEN ISO/TR 24014-2:2013) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 “Intelligent transport systems” the secretariat of which is held by NEN.

Endorsement notice

The text of ISO/TR 24014-2:2013 has been approved by CEN as CEN ISO/TR 24014-2:2013 without any modification.

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Introduction

ISO 24014-1 defines the reference functional model of an Interoperable Fare Management System (hereafter IFM functional model). The scope of ISO 24014-1 excludes irrelevant aspects related to interoperability, particularly organizational and physical implementation.

Among the matters that are outside the scope and not clearly or concretely described in ISO 24014-1, this Technical Report provides a conceptual framework to guide the integration of such business practices, which is important when constructing an IFMS compliant with ISO 24014-1

For this purpose, this Technical Report provides a conceptual framework that is described below.

ISO 24014-1 states that a full IFMS is described by its functional model of IFMS and its Set of Rules. Therefore, Set of Rules is one of the necessary components to understand the full or whole IFMS environment. However, ISO 24014-1:2007 is limited in description, only addressing Set of Rules in addition to some security and identification rules specifically stated as "… regulations achieving IFM policies expressed as technical, commercial, security and legal requirements and standards relevant to only IFMS."

The objective of this Technical Report then is to aid readers in their understanding of the whole structure of Set of Rules by concretely clarifying the relationship with IFM functional model.

In the introduction of ISO 24014-1, it is noted that there may be cases where multiple existing IFMSs work together collaboratively while distributing their functions across the different IFMSs. Specifically, these cases that consider integrating/distributing functions between existing IFMSs are one of the most effective ways of implementing and expanding the interoperability of existing IFMSs. However, there are no concrete descriptions about the interoperability of multiple existing IFMSs, because, from the viewpoint of ISO 24014-1, multiple existing IFMSs that achieve interoperability are functionally considered as a single IFMS.

This Technical Report clarifies how interoperability that is realized among multiple existing IFMSs or expanded to them can be understood from both IFM functional model and Set of Rules viewpoints. Further, this Technical Report explains how cases of collaboration, in which IFM functional model and functional model of non public transport applications are involved, can be interpreted from the viewpoint of IFM functional model.

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Public transport — Interoperable fare management system —

Part 2: Business practices

1 Scope

This Technical Report introduces a generic conceptual framework that can be applied to all Interoperable Fare Management Systems (hereafter IFMS) compliant with ISO 24014-1, as the basis for business practices relating to the conceptual framework for an IFMS, which is described in ISO 24014-1.

This generic conceptual framework comprises three parts:

a) structure of Set of Rules;

b) collaboration of functional models;

c) integration of Set of Rules.

A "Structure of Set of Rules" is applied to Set of Rules covering the whole domain of IFMS functionality in all aspects of a system including

— a structure based upon IFM-roles in the domain of IFM functional model,

— a structure based upon roles, abstract objects performing a set of functions, in all IFM domains, and

— a structure based upon business entities in all IFM domains.

These structures provide a method to easily understand the Structure of Set of Rules as a whole.

Collaboration of functional models is applied when different functional models that collaborate exist, such as might be defined by the coexistence of applications on a medium, between functional models of existing IFMS, or between IFM functional model and functional model of a non-PT system. Such relationships are best explained and understood from the viewpoint of a three-dimensional model as defined in Clause 6.

"Integration of Set of Rules" is applied to clarify the extent of interoperability that may exist between existing IFMSs which are collaborating by quantifying the integration of Set of Rules based upon "Structure of Set of Rules".

This Technical Report is used as a tool for business practices. Any organizational references and concrete descriptions in examples within this Technical Report are purely informative.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 24014-1, *Public transport — Interoperable fare management system — Part 1: Architecture*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24014-1 and the following apply.

3.1
core part of set of rules
rules relating to only IFM-roles and the use cases defined in ISO 24014-1, which defines the functions of a fare management system relating to interoperability

3.2
extra part of set of rules
rules including IFM-partners/IFM-silent-partners and other use cases except use cases defined in ISO 24014-1, which work to decide serviceability of an IFMS and do not affect interoperability of the system

3.3
full IFM functional model
functional model played by all IFM-roles and IFM-partners

Note 1 to entry: See 6.1 for the relationship among full IFM functional model, extra IFM functional model and IFM functional model.

3.4
extra IFM functional model
difference between full IFM functional model and IFM functional model

3.5
IFM functional model
functional model defined in ISO 24014-1

3.6
IFM-partner
role resides in the outside of IFM functional model, and performs a set of interactive fumctions in a functional model/use cases

3.7
IFM-role
role within the IFM

Note 1 to entry: Corresponds to the definition of "entity" in ISO 24014-1:2007.

3.8
IFM-silent-partner
role resides in the outside of IFM functional model, and does not perform a set of interactive functions in a functional model/use cases

3.9
management IFM-role
IFM-role played by security manager and registrar for administrating IFMs

3.10
non-PT-role
role within non-public transport systems

3.11
operational IFM-role
IFM-role played by product owner, product retailer, application retailer, collection and forwarding, service operator, application owner, customer service, and customer related to PT daily operation

3.12
serviceability
level of functionality of a fare management system apart from interoperability such as kinds of payment means, kinds of medium, methods of acquiring medium

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4 Symbols and abbreviated terms

IFMSs Interoperable Fare Management Systems

PT Public Transport

5 Structure of Set of Rules

5.1 Classification of Set of Rules

Set of Rules is defined in ISO 24014-1:2007 as "regulations achieving IFM policies expressed as technical, commercial, security and legal requirements and standards relevant to only IFMS". IFM Policy described by Set of Rules defines all the functionality of IFMS, and thus all the conditions necessary for constructing IFMS can be understood through Structure of Set of Rules. Therefore, the concept of Structure of Set of Rules gives PT stakeholders a guideline from which to draw the whole picture of IFMS, currently configured or as planned, compliant with ISO 24014-1.

Core part of Set of Rules is the subset of Set of Rules, which defines functions related to interoperability in a functional IFMS. From the viewpoint of existing IFMSs, the structure of core part of Set of Rules is a useful concept when integration or distribution of core part of Set of Rules is done to realize interoperability among existing fare management systems. (See Clause 7 and ISO 24014-1:2007, Annex B, Figure B.4.)

Extra part of Set of Rules, also a subset of Set of Rules, is outside of the core part of Set of Rules. It defines the contents of each element related to serviceability, such as payment options and accepted media.

From the viewpoint of multiple functional model collaboration, which is introduced in 6.1 for functional models outside public transport area, the structure of extra part of Set of Rules is a necessary concept for harmonization of services in collaboration with multiple functional models.

5.2 A table form of Set of Rules

In order to clearly show the structure of Set of Rules, a table form is proposed as a way of describing Set of Rules. In Figure 1, the columns represent the IFM-roles and the rows represent the Use Cases defined in ISO 24014-1. Based upon IFM-roles and the Use Cases, and by properties of rules, each rule can be identified, defined and related. The following table form represents Structure of Set of Rules with three characteristics of each rule: related Use Cases, related roles and related properties.

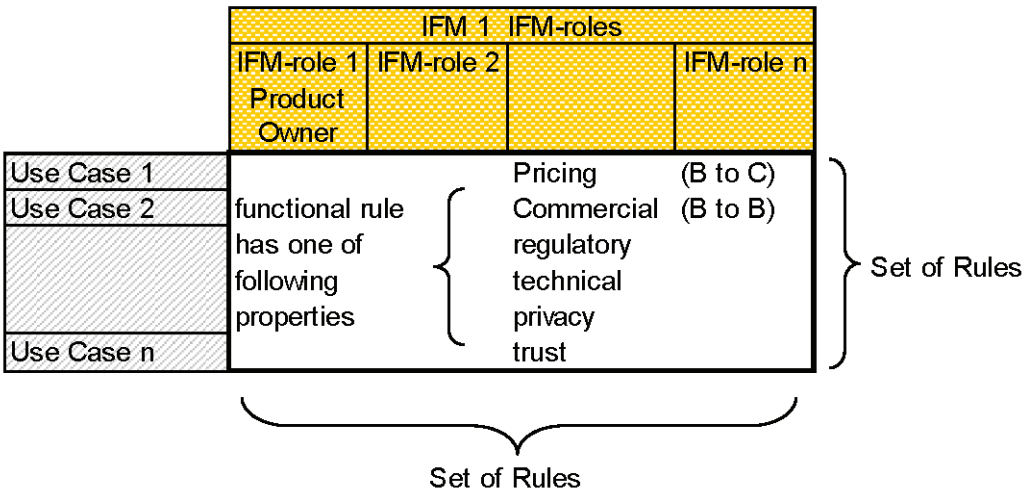

Figure 1 — Concept model of table form of Set of Rules

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In ISO 24014-1, the following definitions are included:

— Pricing Rules: rules defining the price and payment relationships to the customer.

— Commercial Rules: rules defining the settlement and commission within the IFMS.

The description of a structure of Set of Rules in the table form makes it possible to easily relate specific rules to IFM-roles and vice versa. For example, if IFM-roles are selected, rules that should be applied to relevant IFM-roles can be known. If rules are sorted out by transit properties such as being related to pricing, commercial, regulatory or others, all the relevant rules can be systematically known, which are required by implementing transit properties.

The description of the structure of Set of Rules in the table form does not mean simply grouping of rules, but showing a process of making rules in compliance with IFM functional model. Rules identify which IFM-roles are subject to the rules and how such IFM-roles are related to each other. The structure of Set of Rules gives a guide to making a real Set of Rules to PT stakeholders, and helps them to understand an IFMS through analysing the existing Set of Rules. The structure of Set of Rules is a tool to aid in the process of relating rules with roles.

5.3 Structure of core part of Set of Rules

IFM-roles and Use Cases necessary for making core part of Set of Rules are given by ISO 24014-1. As explained in 5.2, in the concept model of the table form of core part of Set of Rules (see Figure 1), from the viewpoint of each rule, the columns are IFM-roles that are governed by appropriate rules, and the rows are the Use Cases to which the rule is applied. The cross points contain individual rules that are subdivided into the properties of the rules, such as, pricing, commercial, regulatory, technical, privacy, and trust.

A generic table for applying core part of Set of Rules when used as a template is expanded as shown in Figure 2. In this generic table, a row representing an instance of the Use Cases is subdivided into its properties. At the cross points of the columns and the rows, concrete rules are described, relating Use Cases defined in ISO 24014-1 and IFM-roles specific to a property category.

Requirements per Set of Rules		IFM-roles								
Use Cases	Sub-categories	Application Owner	Application Retailer	Product Owner	Product Retailer	Collection and Forwarding	Security Manager	Registrar	Service Operator	Customer
Certification of Organisation	Pricing									
	Commercial									
.....	regulatory									
etc.	technical									
	privacy									
	trust									

Set of Rules

Set of Rules

Figure 2 — Generic table form of Set of Rules

As guidance for actually making a table form of core part of Set of Rules, a table form addressing Use Cases of Product is described in Annex A.

5.4 Structure of extra part of Set of Rules

Roles which are outside IFMS Functional model, even if they have functions relating to IFMS, are not described in ISO 24014-1, because from the interoperability point of view of functional IFMS, they need not be considered. However, these roles have to be considered from serviceability point of view.

These roles are categorized by attributes into two types. One is a role which has an interactive relationship with IFM-roles and becomes an Actor in Use Cases defined in ISO 24014-1. This role actively performs a

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set of functions of implementing serviceability of an IFMS in cooperation with IFM-roles, and if necessary in collaboration with roles outside the IFMS. This is called IFM-partner. Full IFM functional model, the functional model including serviceability, which defines functions of IFM apart from interoperability, is described as interactive relationships among IFM-roles and IFM-partners.

The other is a role which must obey rules created by interactive relationships among IFM-roles and IFM-partners. Therefore, the role is a party governed by Set of Rules, but is not a player in full IFM functional model. This is called IFM-silent-partner.

As IFM-partners and IFM-silent-partners are also roles as well as being characterized by their IFM-roles, the description of the structure of extra part of Set of Rules should be designed in a similar form to the structure of core part of Set of Rules. The table form is expanded from core part of Set of Rules with addition of columns of IFM-partners/IFM-silent-partners. This table presents Set of Rules for the whole IFM functions. In this table, relationships about serviceability applied to non-PT systems can be contained.

The table form of Set of Rules expanded into the whole IFMS functionality is given in Figure 3. Additional use cases may be required depending on the IFMS functionality.

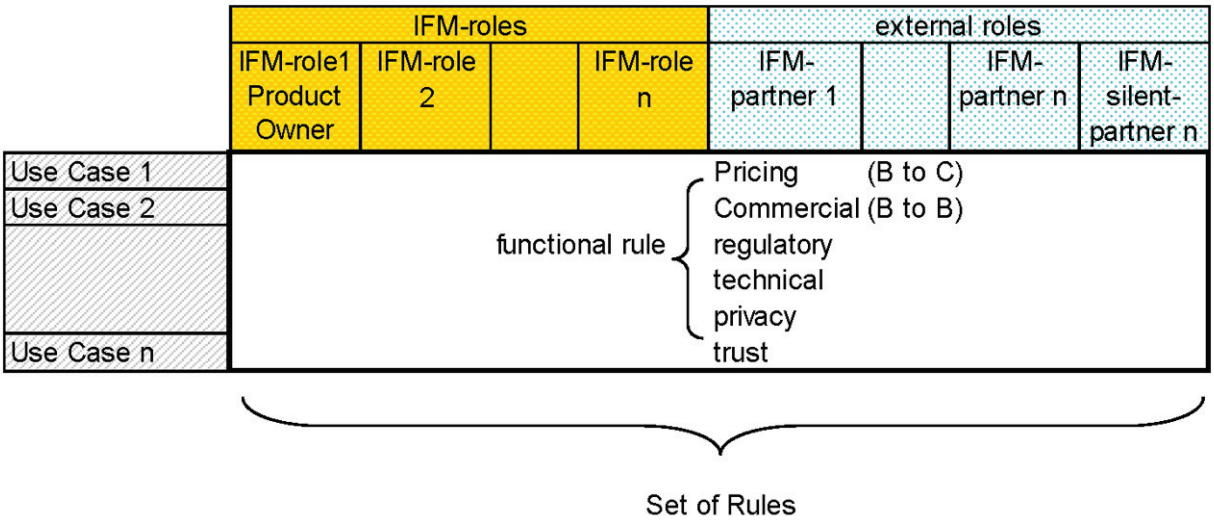

Figure 3 — Extension of table form with IFM-partners/IFM-silent-partners

5.5 Transforming structure of Set of Rules into business entities

In an existing IFMS, objects responsible for rules are not roles but are business entities within real organizations. To make the table form of Set of Rules a practical guideline to construct an IFMS, a transformation from roles to business entities should be provided.

Figure 4 explains a way of transforming a table from roles to business entities. The following should be noted when the table form of Set of Rules with business entities is created.

— One role may correspond to multiple business entities and one business entity may correspond to multiple roles.

— The correspondence between roles and business entities may be different from Use Case to Use Case. Therefore, this correspondence table may be specific for each Use Case.

— Each allocation of roles to business entities may differ from one existing IFMS to another.

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