SLOVENSKI STANDARD
SIST-TS CEN/TS 16658:2014

01-september-2014

Zahteve za vzpostavitev medobratovalnosti procesov v proizvodnih podjetjih - Model zrelosti za ocenjevanje medobratovalnosti podjetja

Requirements for establishing manufacturing enterprise process interoperability - Maturity model for assessing enterprise interoperability

Anforderungen für das Erreichen einer Prozess-Interoperabilität in Fertigungsunternehmen - Teil 2: Reifegradmodell zur Beurteilung der Unternehmensinteroperabilität

Exigences pour établir l'interopérabilité des processus d'entreprise manufacturière - Modèle de maturité pour évaluer l'interopérabilité d'entreprise

Ta slovenski standard je istoveten z: **CEN/TS 16658:2014**

ICS:

03.100.01	Organizacija in vodenje podjetja na splošno	Company organization and management in general
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

SIST-TS CEN/TS 16658:2014 en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 16658

June 2014

ICS 03.100.01; 35.240.50

English Version

Requirements for establishing manufacturing enterprise process interoperability - Maturity model for assessing enterprise interoperability

Exigences pour établir l'interopérabilité des processus d'entreprise manufacturière - Modèle de maturité pour évaluer l'interopérabilité d'entreprise

Anforderungen für das Erreichen einer Prozess-Interoperabilität in Fertigungsunternehmen - Reifegradmodell für die Beurteilung der Unternehmensinteroperabilität

This Technical Specification (CEN/TS) was approved by CEN on 20 January 2014 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. CEN/TS 16658:2014 E

CEN/TS 16658:2014 (E)

Contents

Page

Foreword

This document (CEN/TS 16658:2014) has been prepared by Technical Committee CEN/TC 310 "Advanced automation technologies and their applications", the secretariat of which is held by BSI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

During its preparation, contributions have also been received from ISO/TC 184/SC5, "Industrial automation systems and integration/Architecture, communications and integration frameworks".

CEN/TS 16658 was prepared with the aim to provide an implementation of EN ISO 11354-1: Framework for Enterprise Interoperability.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CEN/TS 16658:2014 (E)

Introduction

This document is based on EN ISO 11354-1. Part 1 of the standard (EN ISO 11354-1:2011) describes the background and motivation for the standard, and provides a Framework for Enterprise Interoperability (FEI) for describing and representing concerns, barriers and approaches to enabling enterprise interoperability. It identifies four levels of concern (business, process, services, data) and three kinds of barriers (conceptual, technological, organisational) that are significant for enterprise interoperability, and specifies three approaches (integrated, unified, federated) to address these concerns and overcome these barriers.

This Technical Specification is also based on work carried out in the European projects ATHENA [9] [10], INTEROP NoE [15] and others.

The barriers and concerns identified in EN ISO 11354-1 are used to characterise five levels of interoperability maturity. For each combination of barriers and concerns, for all levels of interoperability maturity, mechanisms are specified to enable an enterprise to assess its interoperability capabilities, and to evaluate these against characterisations of maturity level. Two methods are then specified for overall assessment (i) by concern and barrier or (ii) by maturity level. An illustrative method is provided to show how concern and barrier assessments can be combined into a graphical representation, so providing an overall indication of existing enterprise capability to interoperate with others (AS-IS). Additionally this analysis and representation can identify where capabilities that are needed to achieve desired higher levels of interoperability are insufficient and consequently investment or reengineering is required (TO-BE).

The International Standard EN ISO 11354 focuses on, but is not restricted to, enterprise (manufacturing or service) interoperability. It is intended for use by people who are concerned to assess capabilities for enterprise interoperability and identify areas where those might need to be improved to meet the needs and ambitions of the enterprise.

1 Scope

This Technical Specification specifies:

• levels to represent the capability of an enterprise to interoperate with other enterprises;

• measures for assessing the capability of a specific enterprise to interoperate with other enterprises;

• methods for combining these measures into two kinds of overall assessment (i) maturity level by concern and barrier and (ii) assessment relative to four designated maturity levels;

• a method for representing concern and barrier overall assessments in a graphical form and for identifying where capabilities are required to achieve desired higher levels of interoperability.

2 Normative references

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

EN ISO 11354-1, *Advanced automation technologies and their applications - Requirements for establishing manufacturing enterprise process interoperability - Part 1: Framework for enterprise interoperability (ISO 11354-1:2011)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Definitions copied verbatim from existing standards are followed by a reference to the source standard.

3.1
enterprise
one or more organisations sharing a definite mission, goals, and objectives to offer an output such as a product or service

Note 1 to entry: This term includes related concepts such as extended enterprise or virtual enterprise.

[SOURCE: ISO 15704:2000]

3.2
enterprise interoperability
ability of enterprises and entities within those enterprises to communicate and interoperate effectively

Note 1 to entry: Interoperability is considered as significant if the interoperations can take place at least on the three different levels: data, services and process, with a semantics defined in a given business context.

[SOURCE: EN ISO 11354-1:2011]

3.3
enterprise interoperation
interactions between enterprise entities

CEN/TS 16658:2014 (E)

3.4
[enterprise interoperability]
maturity level
decimal in the range of 0 to 4 providing a numeric representation of the highest level of enterprise interoperability maturity achieved for a particular combination of interoperability concern and interoperability barrier

Note 1 to entry: A maturity level represents the degree of ability of the set of enterprise ICT-related capabilities that determine the ability of the enterprise to interoperate with other enterprises. Other enterprises may be suppliers, customers, partners, subsidiaries or others.

Note 2 to entry: The five maturity level integer values of 0, 1, 2, 3 and 4 are designated to have the following meanings: 0 – unprepared, 1 – defined, 2 – aligned, 3 – organised, 4 – adaptive, possibly with intermediate values representing partial and intermediate states between these levels. These five level values are further specified in 7.2.

3.5
interoperability approach
manner in which interoperability problems are solved and barriers are overcome

Note 1 to entry: EN ISO 11354-1 defines three interoperability approaches: integrated, unified and federated.

3.6
interoperability barrier
incompatibility between enterprise entities that obstructs the exchange of information and other items with other entities, the utilisation of services or the common understanding of exchanged items

Note 1 to entry: EN ISO 11354-1 defines three categories of barriers: conceptual, technological and organisational.

[SOURCE: EN ISO 11354-1:2011]

3.7
interoperability concern
aspect of interaction or interoperation that addresses a stakeholder's need

Note 1 to entry: EN ISO 11354-1 defines four interoperability concerns: data, service, process and business.

[SOURCE: EN ISO 11354-1:2011]

3.8
[enterprise]
interoperability practice measure
assessment, evaluated relative to each of the five specific maturity level values 0 to 4, for each of the four kinds of interoperability concern (business, process, service and data) of an enterprise's practices and hence capability to overcome each of the three kinds of interoperability barrier (conceptual, technological, organisational), expressed in terms of the most appropriate interoperability level

3.9
[enterprise]
interoperability practice classification
enterprise practice classification corresponding to each combination of concern, barrier and level

3.10
maturity model
representation of degree of the ability of the set of enterprise ICT-related capabilities to interoperate with other enterprises

Note 1 to entry: The model will cover only those parts (entities) of the enterprise, which are to be involved in the information exchange.

6

4   Abbreviated terms

ATHENA   Advanced Technologies for Heterogeneous Enterprise Networks and their Applications

FEI   Framework for Enterprise Interoperability

ICT   Information and Communication Technology

INTEROP   Interoperability Research for Networked Enterprises Applications and Software

SME   Small and Medium-sized Enterprises

5   Conformity with this Technical Specification

In order to comply with this Technical Specification, any particular interoperability solution shall address the normative requirements of Clauses 7, 8 and 9.

6   Basic concepts of enterprise interoperability (informative)

6.1 Enterprise Interoperability

The concept of enterprise interoperability refers to the ability of enterprises (or part of them) to interact with other enterprises (or other parts of the same enterprise) through the exchange of information and other items such as material objects, energy, etc. Interoperability is seen as a necessary support to allow business collaboration to happen, but interoperability is only a means and not the business collaboration itself. It should also be noted that the concept of enterprise interoperability generally applies to both inter- and intra-enterprise activities and includes extended enterprise, virtual enterprise and sub-systems of one enterprise, be they distributed, networked or located in a single site, and whatever their type (discrete or continuous production), nature (for example manufacturing or service) or scale (large companies or SMEs).

NOTE 1   Enterprise interoperability is not an all or nothing situation. There are different extents and different kinds of enterprise interoperability. It is not appropriate to say "enterprise A is interoperable but enterprise B is not". One needs to say how much interoperability (what extent? which functionality?) exists or is needed within the appropriate business context and the tasks on hand.

NOTE 2   Enterprise interoperability is not aiming at providing interchange ability for the enterprise system as a whole, but to provide the necessary means only for those parts directly involved in the interaction.

A high level of interoperability cannot be achieved for free. It is generally costly and time consuming. Each enterprise shall define its needed interoperability requirements and the maturity level to reach. It is not recommended that all enterprises seek to reach the highest interoperability level regardless of their needs. An enterprise will need to carry out an assessment of the benefits, costs and impacts of making such a move, and the particular need to consider environmental aspects in that assessment by reference to the CEN Environmental Checklist and similar documents.

6.2 Framework for Enterprise Interoperability

EN ISO 11354-1 defines a three-dimensional framework – illustrated in Figure 1 – that allows one to identify and relate causes and effects of interoperability problems, and to identify relevant approaches and potential solutions for those problems.
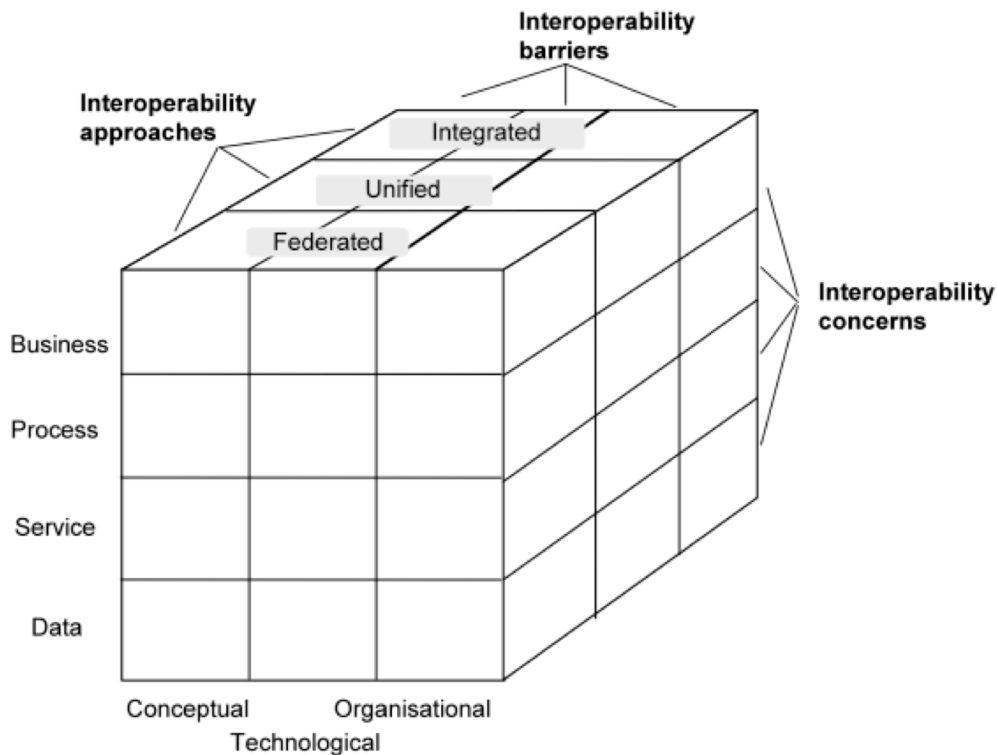
Figure 1 — Framework for Enterprise Interoperability

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST-TS CEN/TS 16658:2014
https://standards.iteh.ai/catalog/standards/sist/ea14f643-a5da-40a8-bedb-
3a74d189ede5/sist-ts-cen-ts-16658-2014

7 The Maturity Model for Enterprise Interoperability (MMEI)

7.1 Scope of model

The MMEI covers the two main dimensions of the Framework for Enterprise Interoperability (four kinds of interoperability concern and three kinds of interoperability barrier). It also considers relations to the dimension of the interoperability approach (integrated, unified or federated).

7.2 Overview of the levels of interoperability maturity

Enterprise interoperability maturity can be evaluated in two situations: (i) *a priori,* where the evaluation relates to the interoperability potentiality (i.e. with a possible future other enterprise whose identity is not known at the moment of evaluation) or (ii) *a posteriori,* where interoperation between known other enterprises is needed and the assessment is concerned with the existing interoperability situation (i.e. considering the incompatibilities between two known systems).

The five specific levels of enterprise interoperability maturity shall be defined as shown in the Table 1 and further detailed in Clause 8. Each level identifies a certain degree of capability required to establish or improve interoperability.

Enterprise interoperability maturity can be represented in two different ways: (i) relative to each combination of concern and barrier or (ii) relative to each of the five specific maturity level values of 0 to 4.

Table 1 — Enterprise interoperability maturity levels

Maturity Level	capability for interoperation
Level 0 - Unprepared	The enterprise has no capability for or intention to enable interoperation
Level 1 - Defined	The enterprise is capable of properly modelling and describing its systems to prepare for limited interoperation
Level 2 - Aligned	The enterprise is capable of making necessary changes to align its operation to common formats or standards
Level 3 - Organised	The enterprise is capable of using meta modelling to achieve the mappings needed to interoperate with other compatible enterprises
Level 4 - Adaptive	The enterprise is capable of negotiating with and dynamically accommodating any other enterprise

Levels 0 and 1 correspond to the situation where there are no or only *ad hoc* interoperations. From levels 2 to 4, levels of maturity are defined corresponding to the interoperability approach dimension of the FEI (integrated, unified and federated).

Table 2 shows the mapping between maturity levels and interoperation environments created according to the different approaches identified in the framework.

Table 2 — Maturity levels vs. interoperation environments

Maturity Level	Interoperation environments
Level 0 - Unprepared	Isolated: The interoperation environment can exchange information only through manual mechanisms (document, fax, etc.)
Level 1 - Defined	Connected: In the interoperation environment information can be exchanged only though simple electronic exchange such as messaging
Level 2 - Aligned	Integrated: The interoperation environment has a commonly agreed format (or standard) to which all other enterprises can build their systems or components thereof
Level 3 - Organised	Unified: The interoperation environment uses meta-models, so allowing heterogeneous systems to be mapped one to another
Level 4 - Adaptive	Federated: The interoperation environment has no pre-defined format or meta-models, instead interoperation can adjust and accommodate dynamically using information which has been defined *a priori* (e.g. available capability and capacity, entity profiles)

Each level of maturity also corresponds to a degree of interoperability ranging from no interoperability to full interoperability as shown in Table 3.