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Electronic Public Procurement — Architecture

Part 4: Technical architecture

National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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European foreword

This document (CEN/TS 17011-4:2025) has been prepared by Technical Committee CEN/TC 440 “Electronic Public Procurement”, the secretariat of which is held by DIN.

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This document is part of a series of multi-part documents prepared, or under preparation, by CEN/TC 440:

- 17011-series: **eProcurement Architecture**, providing a set of specifications outlining different aspects of the eProcurement architecture for Business Interoperability Specifications.
- 17014-series: **eTendering Business Interoperability Specifications**, providing a set of specifications outlining business choreography, transaction, syntax binding specifications and guidelines required to support the eTendering processes.
- 17015-series: **eCatalogue Business Interoperability Specifications**, providing a set of specifications outlining business choreography, transaction, syntax binding specifications and guidelines required to support the eCatalogue processes.
- 17016-series: **eOrdering Business Interoperability Specifications**, providing a set of specifications outlining business choreography, transaction, syntax binding specifications and guidelines required to support the eOrdering processes.
- 17017-series: **eFulfilment Business Interoperability Specifications**, providing a set of specifications outlining business choreography, transaction, syntax binding specifications and guidelines required to support the eDelivery processes.

The terms “shall”, “shall not”, “should”, “should not”, “may”, “can” and “cannot” are interpreted according to the CEN-CENELEC Internal Regulations Part 3:2022, Clause 7¹.

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¹ <https://boss.cen.eu/reference-material/refdocs/pages/>

Introduction

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Intended use of this publication

This document has been developed for any organization looking for guidance on the implementation and use of electronic procurement deliverables as well as for organizations developing or implementing software applications related to electronic procurement, such as software providers, business entities and national authorities. These software applications should be in conformance with this publication.

Parts of the document to which derivative use apply

Each subclause, which falls under derivative use, will be clearly marked with a footnote. The degree to which the specific content can be modified is specified in CEN/TS 17011-3², *Electronic Public Procurement — Architecture — Part 3: Customization Guideline*.

Annex A provides an overview of the line number references to all subclauses of the publication which fall under derivative use.

² Under preparation.

1 Scope

The purpose of this deliverable is to specify and describe the reference architecture applied as the basis for the development of Business Interoperability Interface specifications in the eProcurement domain by the TC 440 technical committee.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 639, *Code for individual languages and language groups*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 agent

person, organization, or system that act in procurement or have the power to act in procurement

[SOURCE: eProcurement Ontology]

3.2 business process

sequence or network of activities and collaborations between two or more agents

3.3 business process variant

specification of a business process belonging to a choreography

Note 1 to entry: Different variants may support different electronic information exchange or collaborations. Agents may publicly advertise their capability to support one or more variants in an automated fashion.

3.4 choreography

set of business processes having the same goals

3.5 collaboration

interaction between two or more agents that result in the exchange of data between the agents involved as part of a business process

3.6 role

part played by an agent in a particular business process, including its responsibilities (options and obligations) to perform certain activities and collaborations in that business process

Note 1 to entry: The role is used to show the division of labour and responsibility amongst the agents involved in the process or within the organization of an agent.

3.7

state

set of options and obligations of the participating agents at a defined step in a business process to perform specific activities and collaborations

Note 1 to entry: Additional information: an activity of an agent or a collaboration may cause the transition of one state to another in a predefined set of next steps.

3.8

transaction

content of data exchanged or shared between the agents in a collaboration

Note 1 to entry: A transaction is the atomic unit that leads to a synchronized state in the information systems of collaborating agents. It is the basic building block to define the choreography between agents. When an agent recognizes an event that changes the state of a business object within a business process, it uses a transaction to synchronize with the collaborating agent. A transaction therefore changes the state of a business process. It carries the intention of the initiating agent and is represented by a data structure that is defined by a data model. The exchange of a transaction may alter legal obligations between business partners.

4 Symbols and abbreviated terms

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

ABB	Architectural Building Block
IoP	Interoperability
EIF	European Interoperability Framework
EIRA	European Interoperability Reference Architecture

5 Alignment with the European Interoperability Reference Architecture (EIRA)

5.1 General

The European Interoperability Reference Architecture (EIRA) provides a structured framework that supports the design and governance of interoperable systems across various domains. By leveraging EIRA, the proposed architecture ensures compliance with the principles of the European Interoperability Framework (EIF) and alignment with European initiatives such as CEF eDelivery. EIRA's structured approach, which organizes systems into Architecture Building Blocks (ABBs), enables the reuse of capabilities, promotes harmonization, and reduces redundancies.

EIRA defines five primary views—Legal, Organisational, Semantic, Application, and Infrastructure—that guide system design. For this architecture, the focus primarily lies on the Application and Infrastructure views. The Legal and Organisational views, although integral to the overarching EIF framework, are indirectly supported through compliance with existing regulatory requirements, such as GDPR, eIDAS, and public procurement directives, and through the implementation of process choreographies that manage stakeholder interactions.

The Application and Infrastructure views are particularly relevant to the technical aspects of the architecture. These views describe how procurement documents are securely transmitted, processed, and stored across decentralized platforms, ensuring seamless integration with existing European solutions. For example, the architecture utilizes secure messaging and transport mechanisms, such as ASiC-E containers, in accordance with established standards. By aligning with EIRA's infrastructure

specifications, the architecture supports robust data exchange protocols and ensures interoperability across different platforms.

Semantic interoperability, a critical layer of EIRA, ensures shared understanding of the data exchanged within eTendering systems. This aspect is already extensively covered in CEN/TS 17011-5, which defines the semantic model and associated syntax bindings. By integrating these provisions, the architecture avoids duplicating efforts while ensuring full compliance with EIRA's Semantic view. The semantic specifications ensure consistent interpretation and processing of procurement data, enabling interoperability at both technical and organizational levels.

Alignment with EIRA also involves identifying relevant ABBs and integrating them into the architecture. Common ABBs such as eSignature Verification and Validation Services, eTimestamp Creation Services, and secure transport mechanisms are reused wherever applicable. Where domain-specific needs exceed the capabilities of existing ABBs, additional specifications are developed to extend EIRA building blocks. For instance, tender document encryption and the handling of REM evidence profiles are tailored to meet the specific requirements of the pre-award procurement phase while maintaining coherence with EIRA's principles.

5.2 Mapping between EIRA Components, Architecture Building Blocks and the 4-Corner Model

In the 4-Corner model, the exchange of eProcurement documents is mediated through intermediaries, each operating within a distinct domain. This decentralized architecture requires a robust transport layer supported by trust services, reliable communication protocols, and standardized semantic models. The EIRA alignment ensures that these components adhere to a unified framework, enabling smooth interaction between all stakeholders. The model's reliance on interoperable systems demands careful mapping of its components to EIRA's building blocks, including Infrastructure Security Enablers, Data Source Enablers, Transition Enablers, Collaboration Enablers, Administration Enablers, and Discovery Enablers.

Infrastructure Security Enablers form the foundation of secure communication between the four corners of the model. Trust Service Provisioning Components, such as eIDAS-compliant services for eSignature and eSeal validation, authenticate messages and guarantee their integrity. e-Timestamp Creation Services verify the chronology of interactions, which is essential for regulatory compliance and trust management (REM Evidence e.g.). Secure Data Exchange Services ensure encrypted and protected communication between intermediaries, safeguarding the data from unauthorized access. These enablers are indispensable for the proper functioning of the transport layer, which connects the decentralized entities in the 4-Corner model. Without them, the model would be vulnerable to data breaches, fraud, and compliance issues, undermining the trust that intermediaries provide to buyers and suppliers.

Infrastructure Data Source Enablers facilitate access to shared resources across the system. Metadata registries and semantic models enable consistent interpretation of messages, ensuring alignment across different corners. Shared repositories support the reuse of information, streamlining processes and reducing redundancies. These enablers ensure that data flows remain consistent, accurate, and reusable within the architecture.

Transition Enablers address the challenge of integrating legacy systems with modern interoperable standards. By translating proprietary formats into interoperable models through syntax bindings, the architecture ensures that existing systems can function within the 4-Corner model without significant redesign. This flexibility maintains continuity for stakeholders who operate older systems while allowing them to participate fully in standardized exchanges.

Collaboration Enablers are integral to managing the interactions between intermediaries in the 4-Corner model. The choreography specifications detailed in CEN/TS 17011-5 define the flow of processes, such as order submissions and validation exchanges. This ensures that all corners operate cohesively, adhering to the choreography's predefined rules and maintaining process alignment across domains.

Infrastructure Administration Enablers provide the necessary tools for monitoring and managing the system. Response messages enable intermediaries to notify stakeholders about the status of their transactions, enhancing transparency and ensuring timely issue resolution. Monitoring tools maintain the operational health of the transport layer and provide early detection of potential errors, ensuring that the system operates smoothly and reliably.

Discovery Enablers ensure that participants in the 4-Corner model can identify and integrate with other entities dynamically. Service directories allow stakeholders to discover endpoints and capabilities, simplifying the process of onboarding new participants and facilitating the seamless scaling of the architecture.

Within the 4-Corner model, Infrastructure Security Enablers are the most critical to its success. The decentralized nature of the model places a heavy reliance on the transport layer to establish trust and ensure data integrity. Services such as eIDAS-compliant trust mechanisms, eTimestamp creation, and secure data exchange protocols underpin the reliability and security of interactions. These enablers safeguard the system against threats, maintain compliance with regulatory requirements, and ensure that all four corners operate with confidence in the security of their communications.

Figure 1 visualizes the most important EIRA ABB discussed in the text above.

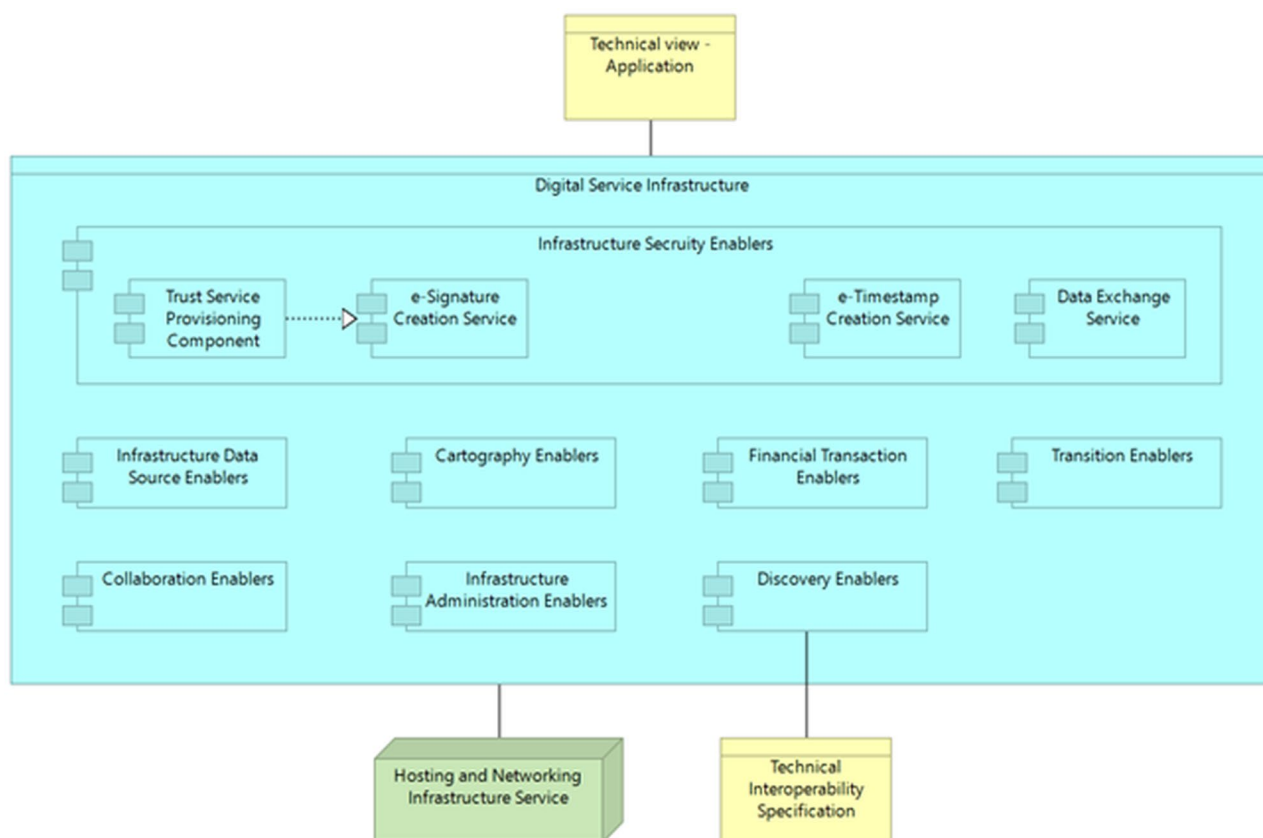


Figure 1 — Simplified Infrastructure Layer

This alignment supports semantic, technical, and organizational interoperability in compliance with the EIF. By focusing on the Application and Infrastructure views while leveraging semantic provisions from CEN/TS 17011-5, the architecture remains consistent with EIRA's objectives and ensures its interoperability with other European public procurement solutions.

6 The 4-Corner Model

6.1 General

The 4-Corner Model is a fundamental framework in the context of CEN/TC 440, providing a robust structure for ensuring interoperability and seamless exchange of information in digital procurement processes. This model is designed to facilitate the secure and efficient transmission of documents and data between trading partners, while also allowing for flexibility and scalability. The 4-Corner Model consists of four primary components: the Sender, the Sender's Service Provider (also known as the Sender Access Point), the Receiver's Service Provider (Receiver Access Point), and the Receiver.

6.2 The 4-CornersPe

The first component, the Sender, is the originator of the document or data. This could be a business or any organization that needs to send information, such as invoices, purchase orders, or other transactional documents. The Sender is responsible for ensuring the accuracy and completeness of the information being transmitted. The role of the Sender is crucial as it initiates the entire transaction process and ensures that the data complies with relevant standards and formats.

The second component is the Sender's Service Provider, also referred to as the Sender Access Point. This entity acts as an intermediary that facilitates the secure transmission of data from the Sender to the Receiver's Service Provider. The Sender Access Point is responsible for validating if the received data conforms to a standardized format that is compatible with the transport network. These standardized formats are defined by CEN in the form of transaction specification. This conversion ensures that the data can be seamlessly integrated into the Receiver's systems, regardless of any differences in the underlying technology. The Sender Access Point also adds a layer of security by encrypting the data and ensuring it is transmitted through secure channels.

The third component, the Receiver's Service Provider, also known as the Receiver Access Point, functions similarly to the Sender Access Point. It receives the data from the Sender's Service Provider, decrypts it, and converts it into a format that is compatible with the Receiver's systems. The Receiver Access Point ensures that the data is accurately and securely transmitted to the Receiver, maintaining the integrity and confidentiality of the information throughout the process. This component is vital in enabling interoperability between different systems and ensuring that the data can be seamlessly integrated into the Receiver's business processes.

Finally, the fourth component is the Receiver, the end recipient of the data or document. The Receiver can be a business or any organization that needs to process the information received from the Sender. The Receiver is responsible for integrating the data into their internal systems and using it for various business processes. The efficiency and effectiveness of the 4-Corner Model depend on the Receiver's ability to accurately process and utilize the information received.

Notably this structure allows for decentralized management of Access Points, enabling flexible participation of all parties. Figure 2 visualizes the basic structure of the 4-Corner model