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## European Connected Factory Platform for Agile Manufacturing Interoperability (EFPFInterOp)

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## European foreword

This CEN and CENELEC Workshop Agreement (CWA 17907:2022) has been developed in accordance with the CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – A rapid prototyping to standardization” and with the relevant provisions of CEN/CENELEC Internal Regulations - Part 2. It was approved by a Workshop of representatives of interested parties on 2022-10-19, the constitution of which was supported by CEN and CENELEC following the public call for participation made on 2020-12-16. However, this CEN and CENELEC Workshop Agreement does not necessarily include all relevant stakeholders.

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The following organizations and individuals developed and approved this CEN and CENELEC Workshop Agreement:

- 3D ICOM GmbH & Co. KG
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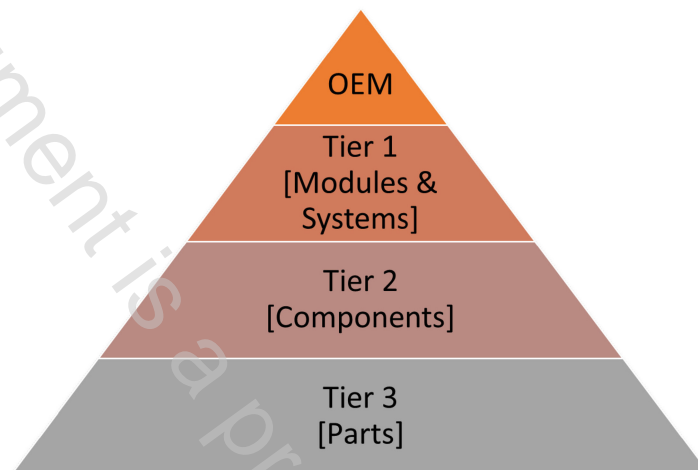
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## Introduction

With the advent of Mass Production the goal in manufacturing was to reduce the cost per piece down as much as possible within given quality and time constraints. A lot of methods were introduced like Lean Manufacturing or Six Sigma that fostered constant improvements in all relevant manufacturing areas.

Production capacities were distributed into a network of suppliers across several countries and continents with an optimized production flow (like “Just in time production”) which results in a rather static supply chain. The supply pyramid from Figure 1 shows the hierarchy between the different tiers of suppliers.



**Figure 1 — Supply pyramid**

In the manufacturing domain, as a result of increasing digitalization and the rapid growth and pervasiveness of smart factory and (Industrial) Internet of Things ((I)IoT) solutions, the industry trends are changing, and new possibilities are arising.

Due to changes in customer behaviour Agile Manufacturing becomes increasingly important – with the term “Lot Size 1 Manufacturing” as the keyword. This means as a company to be able to manufacture products that are tailored to the customers wants as much as possible. In Automobile manufacturing this is almost a reality as there are so many options a customer can choose from

The traditional way of producing in large quantities helps reduce the product cost per unit significantly. However,

- a) New demands of highly customised products are not possible or difficult to fulfil / too time consuming with the current supply chains (difficult to find specialised suppliers quickly and establishing new ad-hoc, short-lived supply chains)
- b) Entries of SMEs barred as joining multiple platforms is too expensive, the SMEs don't always have the necessary digital infrastructures (e.g., ERP systems) needed to directly become part of the supply chain network of large OEMs or to prove adherence to the rigorous quality constraints set while manufacturing certain products for the OEMs – this is a hindrance to innovation

Today's smart factory and IoT platforms are largely heterogeneous, vendor-specific, vertically oriented, functionality-wise fragmented, and behind their own closed identity and access management mechanisms. Because of such interoperability gaps between services of different platforms at the levels of interfaces, communication protocols, data formats, data models, identity providers, etc., it is not

possible to easily form composite applications with services from multiple platforms and support companies in their aforementioned endeavours.

The goal of this CWA is to provide a blueprint of a federation platform and describe components and functionalities that reduces the barrier to innovation by providing seamless access to services and solutions through an open platform. The creation of a federated ecosystem of IoT platforms of companies in the manufacturing domain can help companies form agile, ad-hoc collaborative networks, establish dynamic supply chains, and optimize production processes to meet such market demands as lot-size-one manufacturing. In addition to the definition of a reference architecture (see Figure 2 below) a specific implementation of a federated platform from the EFPF project will be described as well.

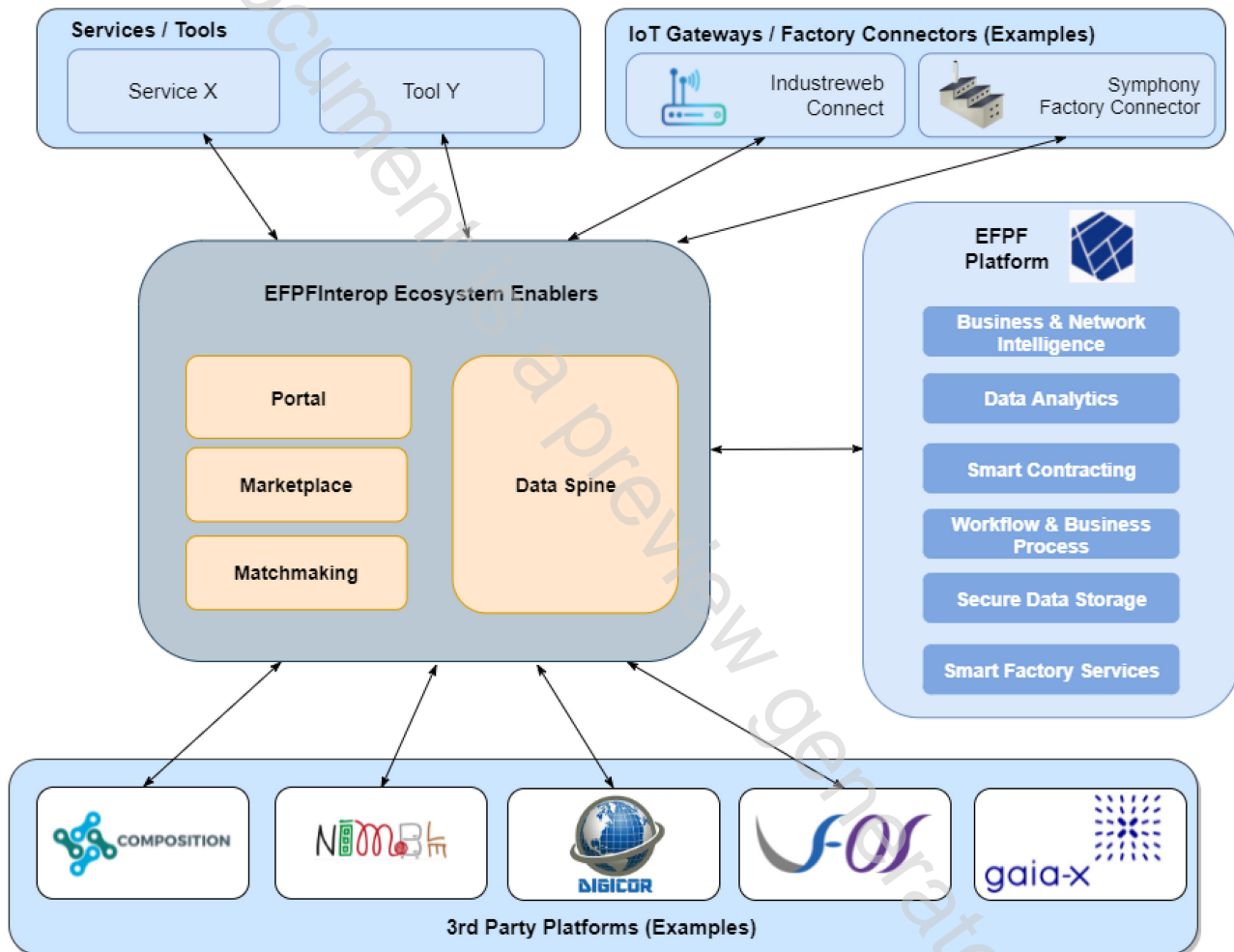


Figure 2 — EFPFInterOp ecosystem overview

## 1 Scope

This CEN-CENELEC Workshop Agreement (CWA) defines a reference architecture for federating manufacturing platforms focusing on the interoperability on Service-Oriented Architecture (SOA), Protocol, Security and Data Model level. Additionally, a reference implementation in the form of the EFPF Data Spine and associated components will be described including Best Practices identified.

This CWA will not define requirements related to safety aspects.

## 2 Normative references

There are no normative references in this document.

## 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:

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

### 3.1

#### **EFPFInterOp**

EFPFInterOp acronym for this CEN and CENELEC workshop “European Connected Factory Platform for Agile Manufacturing Interoperability”

In addition, EFPFInterOp is used as an example of an Ecosystem of Digital Platforms in order to explain the concepts presented in this workshop agreement document.

### 3.2

#### **Data Spine**

Federated interoperability enabler that bridges the interoperability gaps between the services of heterogeneous platforms and enables an easy and intuitive creation of cross-platform applications

### 3.3

#### **Integration Flow**

dataflow or workflow created using the Integration Flow Engine component of the Data Spine for realising composite applications, performing data model transformation, data enrichment, or protocol translation, etc.

### 3.4

#### **Digital Platform**

platform that provides offerings such as digital tools, services and data and secures access to them using its own Identity and Access Management service

### 3.5

#### **Ecosystem of Digital Platforms**

federation of digital platforms that enables an easy creation of cross-platform applications

## 4 EFPFInterOp Ecosystem Requirements

Building on the motivation from the Introduction we will list in this clause the requirements relevant to create federated platform ecosystems.