OntoCommons

Clara Pezuela, Alberto Abella (FIWARE)

4 April 2023

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

innovalia ASSOCIATION

TABLE OF CONTENTS

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

01 DATA SPACES INTRODUCTION

The European Data strategy

European Alliance for Industrial Data, Edge and Cloud

IPCEI* on Next Generation Cloud
(*Important Project of Common European Interest)

EU Data Strategy

Coordination

Data Spaces Support Centre
Coordination and governance

Cloud actions:
Cloud Rulebook

Co-Investments in cloud-to-edge services, cloud federation and marketplaces.

Data actions:
New legislation (Data Act, Data Governance Act, etc.)

Co-investments in common European data Spaces

DIGITAL EUROPE PROGRAMME

Federation & interoperability standards

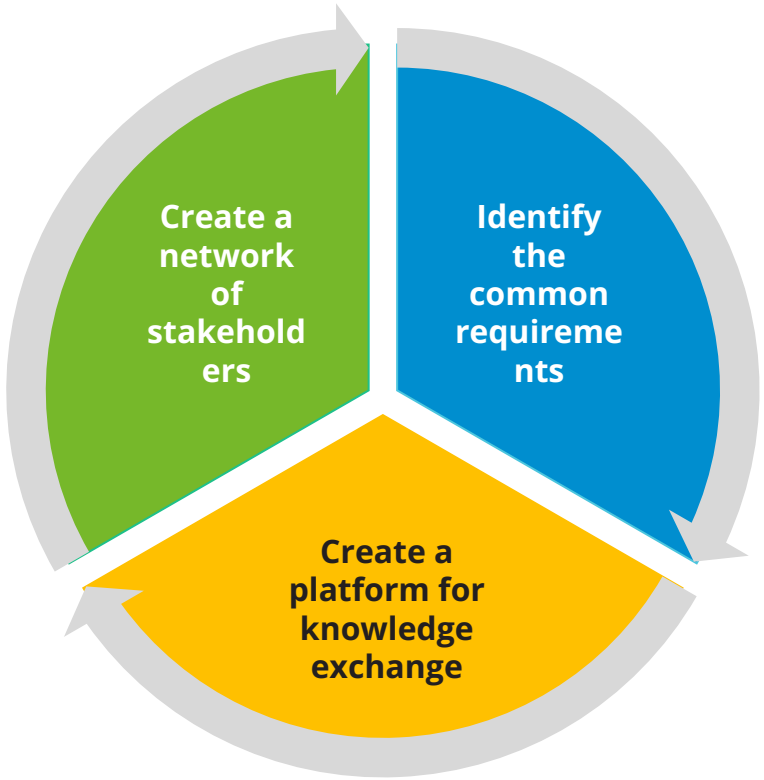
Complementing & integrating private and public initiatives

Use cases; technical architecture

Funded by the European Union

Data Spaces Support Centre

Closely work with CSAs and projects funded under DIGITAL



Support the work of the envisaged European Data Innovation Board

Support the deployment of data spaces

Funded by the European Union

Common European Data Spaces

DATA SPACES SUPPORT CENTRE

DATA SPACE FOR SMART AND SUSTAINABLE CITIES AND COMMUNITIES

PrepDSpace4Mobility

DATA SPACE 4.0

DS4Skills
Data Space for Skills

GREAT
Green Deal Data Space

AGRI DATASPACE

European Genomic Data Infrastructure

europeana pro

TOURISM DATA SPACE

EUCAIM

DATES
European Data Space for Tourism

int:net
Interoperability Network for the Energy Transition

Funded by the European Union

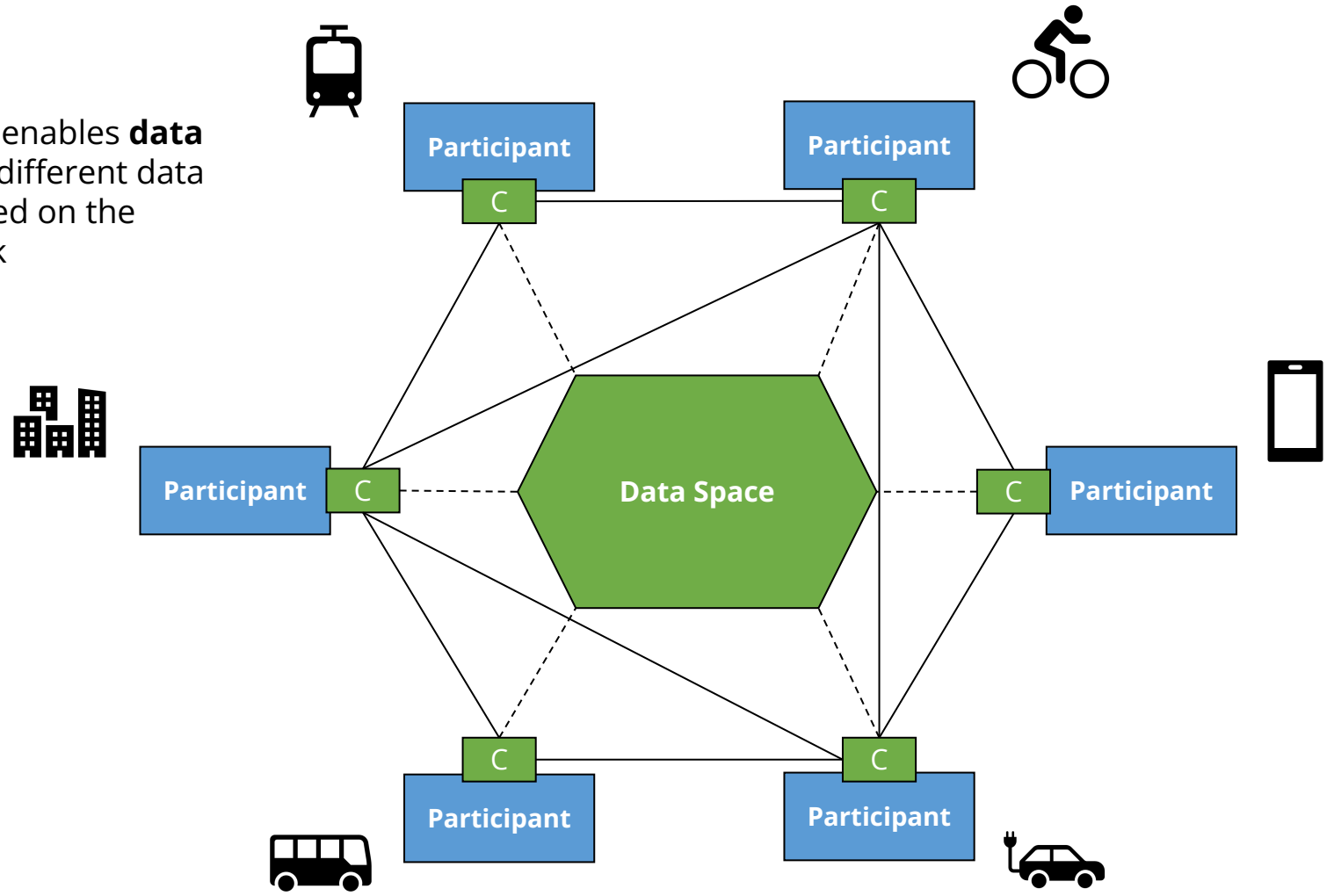
The Data Spaces Support Centre receives funding from the European Union Digital Europe Programme under grant agreement n° 101083412

Funded by the European Union

A Data Space Example

DATA SPACES SUPPORT CENTRE

An **infrastructure** that enables **data transactions** between different data **ecosystem** parties based on the **governance** framework



The Data Spaces Support Centre receives funding from the European Union Digital Europe Programme under grant agreement n° 101083412.

Funded by the European Union

Legend: ---- Metadata; —— Data; C – Connector.

We are on a mission!

DATA SPACES SUPPORT CENTRE

- Enable data spaces to reach a higher flight level faster: a **quick start** and an **accelerated scale-up**
- Provide the tools to address the **basic organizational and technical matters**, required by every data space
- This includes a **blueprint**, best practices, common standards and reference implementations which will be developed according to a **co-creation process**
- Enable dataspaces to focus on their domain-specific business challenges and **provide business benefits to their participants**

The Data Spaces Support Centre receives funding from the European Union Digital Europe Programme under grant agreement n° 101083412

Funded by the European Union

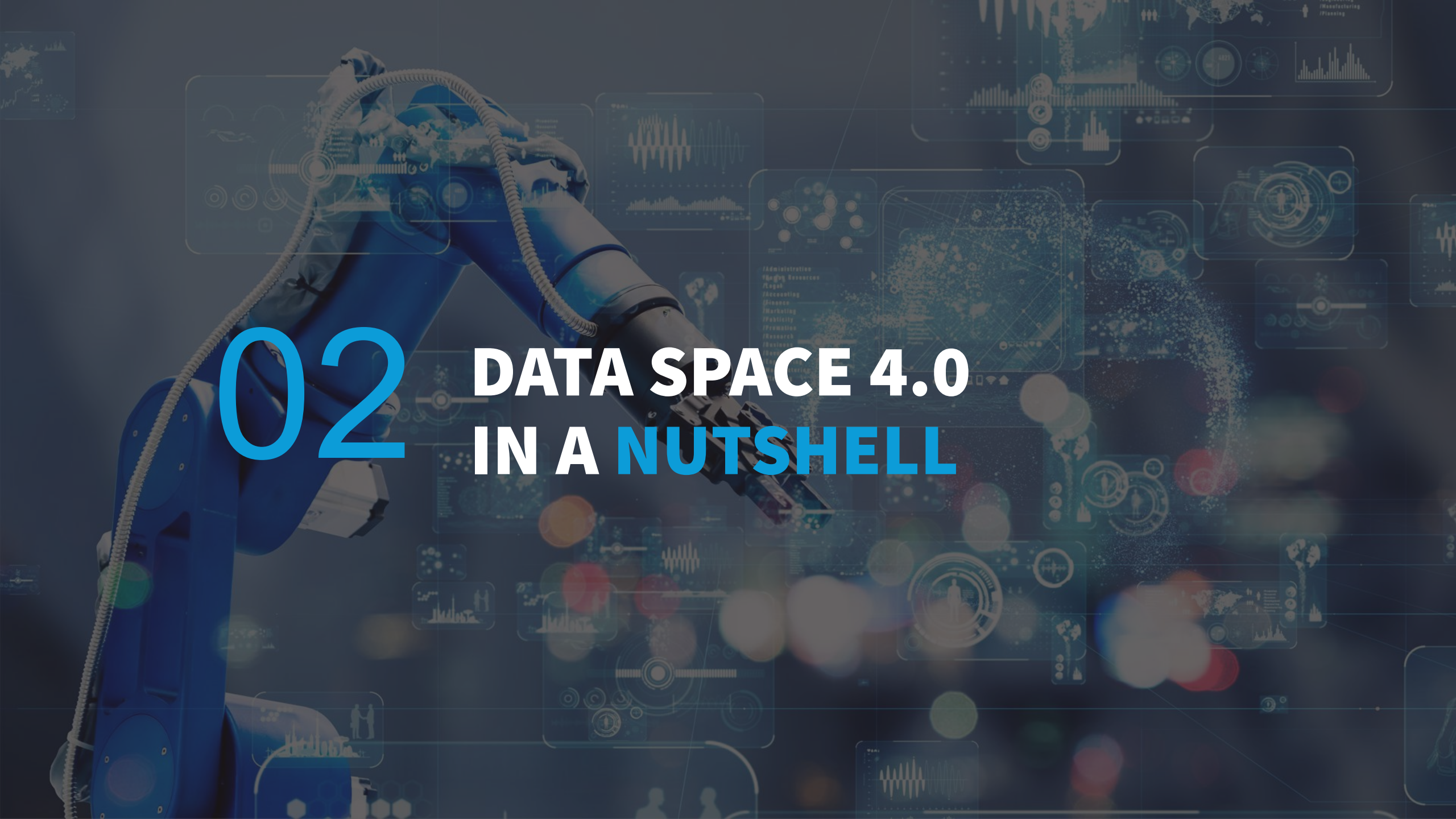
DATA SPACES SUPPORT CENTRE

dssc.eu/

Your Go-To place for data spaces

The Data Spaces Support Centre receives funding from the European Union Digital Europe Programme under grant agreement n° 101083412.

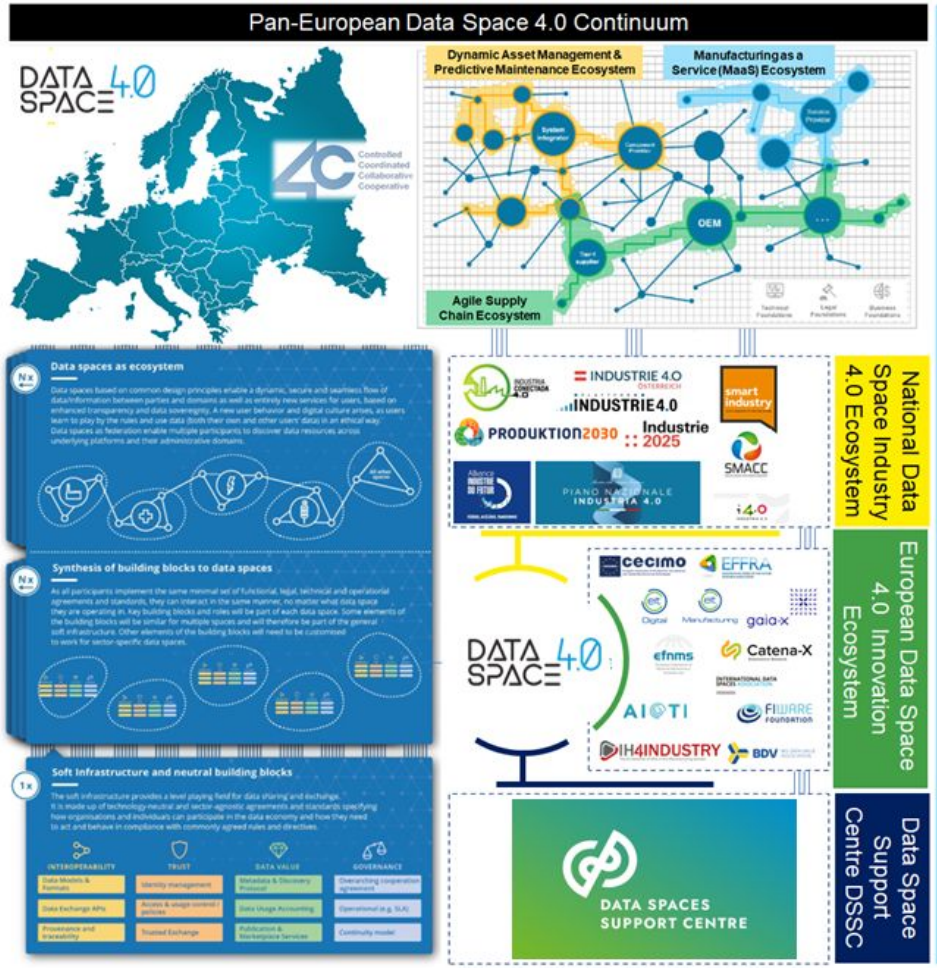
Funded by the European Union



02 DATA SPACE 4.0 IN A NUTSHELL

DATA SPACE 4.0

A **EU**ropean Common **D**igital M**A**nufacturing InfrasT**T**ructure and Dat**A** **S**pace **P**athway for Connected Factories **4**.0 Data Value **C**hain Governanc**E**



10 National Initiatives

100+ Events

3 Joint DSCC – EU Data Space Workshops

2 EU Data Space 4.0 Weeks

2 DIH/TEF Partnership Programmes

35 Ethnographic Analysis

1000+ Stakeholders

200 Smart Data Sets

10 DVC Reference Scenarios

4 Certifiable Blueprints

5 Vocabulary Areas Prioritised & Aligned

4 Catalogues/Inventories

2 Business Model Navigators

1 Data Space 4.0 MVP

1 Skills Development Programme

10 Bootstrapping Actions

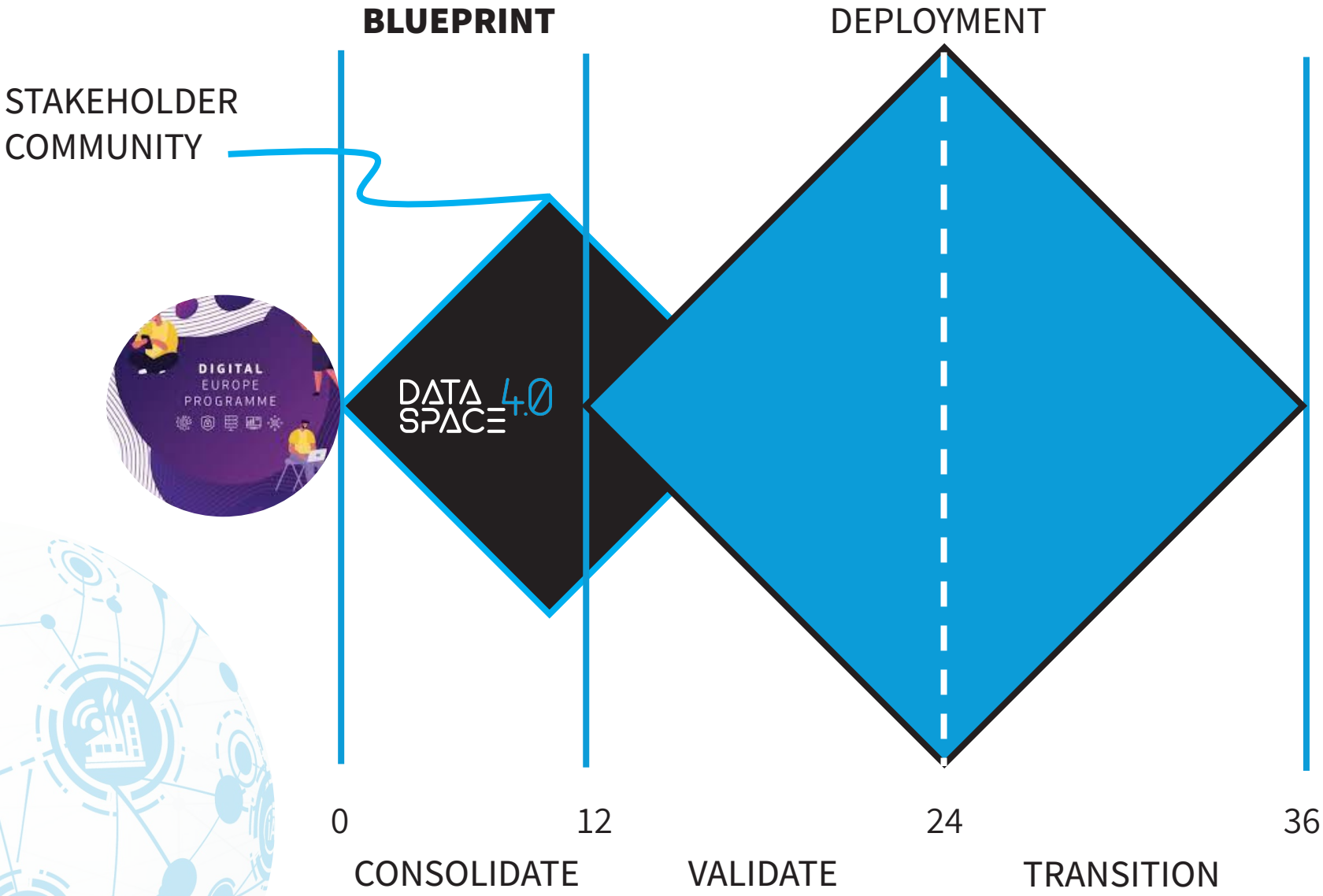
98% Industry 4.0 Activates Impacted at EU Level

1 Data Space 4.0 Alliance

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

MISSION



https://www.connectedfactories.eu/video/data-space-pathway-video

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

MISSION

DATA SPACE 4.0

Provide Access to a **Set of Comprehensive Tools, Reference Best-practices and Assets** To Support Manufacturing Industry To Share Data Securely, Cost-Effectively and With Full Sovereignty

Maintain a **Set of Reference Data Space Blueprints** For Predictive Maintenance, Agile Supply Chains And Circular Manufacturing.

Maintain a Data Space 4.0 **Minimum Viable Framework 4.0** Implementation For Manufacturing Data Spaces For the Benefit of the Community.

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

SCOPE

DATA SPACE 4.0

3 **Focused Data Value Networks**

- Dynamic Asset 4.0 Management & Predictive Maintenance
- Agile Supply Chains
- Circular Manufacturing

5 **Sectors Addressed (to be selected)**

- Automotive
- Aero
- Electronics
- Textile
- Machine Tool
- Energy, Oil & Gas
- Medical/Pharma
- ……

2 **Data Space 4.0 Ecosystems Analysed**

- Hierarchical
- Non-Hierarchical

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

KEY OBJECTIVES

- Codesign Data Space 4.0 pathway to meet **Data Act data sharing challenges**.
- Set data spaces guidelines for agile supply chains, dynamic asset management and predictive maintenance **data value networks organic growth**.
- Set Data Space 4.0 broad consensus to **accelerate secure, fair and responsible data sharing and reduced operational and maintenance costs**.
- Boost pan-European dialogue for Data Space 4.0 **SME friendliness**.
- Facilitate access to Data Space 4.0 initiatives and legal, business and technical building blocks to **ease Data Space 4.0 adoption**.
- Explore the role of Data Space 4.0 to **support resilient digital product passport (DPP) implementation** and circular manufacturing.

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

OUTCOMES

European Data Space 4.0 Alliance & Multi-stakeholder Governance Model for data spaces for manufacturing

Directory of existing manufacturing data space assets, toolkits and blueprints

A **Multi-Step** Roadmap towards deployment of pan-EU data spaces for manufacturing

Data Space 4.0 Canvas of design strategies, business modelling, incentive schemes and best-practices

Reference **Smart Data 4.0 Models. Data Space 4.0 Roadmap**

Data Space 4.0 **Minimum Viable Framework** (MVF)

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

CONSORTIUM MEMBERS

DATA SPACE 4.0

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER

ASSOCIATED & COLLABORATION PARTNERS

DATA SPACE 4.0

SIEMENS

INDUSTRY COMMONS

IOF

COMAU

ATLANTIS ENGINEERING

EFFRA
EUROPEAN FACTORIES OF THE FUTURE RESEARCH ASSOCIATION

cecimo
European Association of the Machine Tool Industries and related Manufacturing Technologies

VTT

SMACC
DIGITAL BOOST FOR FINNISH INDUSTRY

SWITZERLAND INNOVATION

Industrie :: 2025

GAIA

meditech
COMPETENCE CENTER

UNINOVA

i4.0
INDÚSTRIA 4.0

PRODUKTION2030

eurecat
Technology Centre of Catalonia

4.0
PROACCIÓ

GENERALITAT VALENCIANA

agenda indústria 4.0
Comunitat Valenciana

BAI DATA
INTERNATIONAL DATA SPACES ASSOCIATION

efnms
European Federation of National Maintenance Societies vzw

CONFINDUSTRIA

ZVEI:

IDTA
Industrial Digital Twin Association

VDMA

LNI4.0
LABS NETWORK INDUSTRIE 4.0

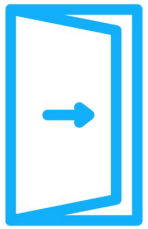
STANDARDIZATION COUNCIL INDUSTRIE 4.0

tice.pt
PÓLO DE COMPETITIVIDADE DAS TECNOLOGIAS DE INFORMAÇÃO, COMUNICAÇÃO E ELECTRÓNICA

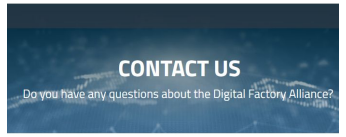
WORLD MANUFACTURING FOUNDATION

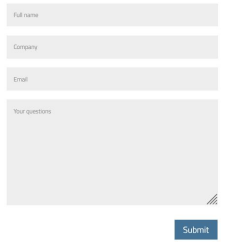
MADE
Competence Center I4.0

bitkom



OPEN





https://digitalfactoryalliance.eu/contact-us/

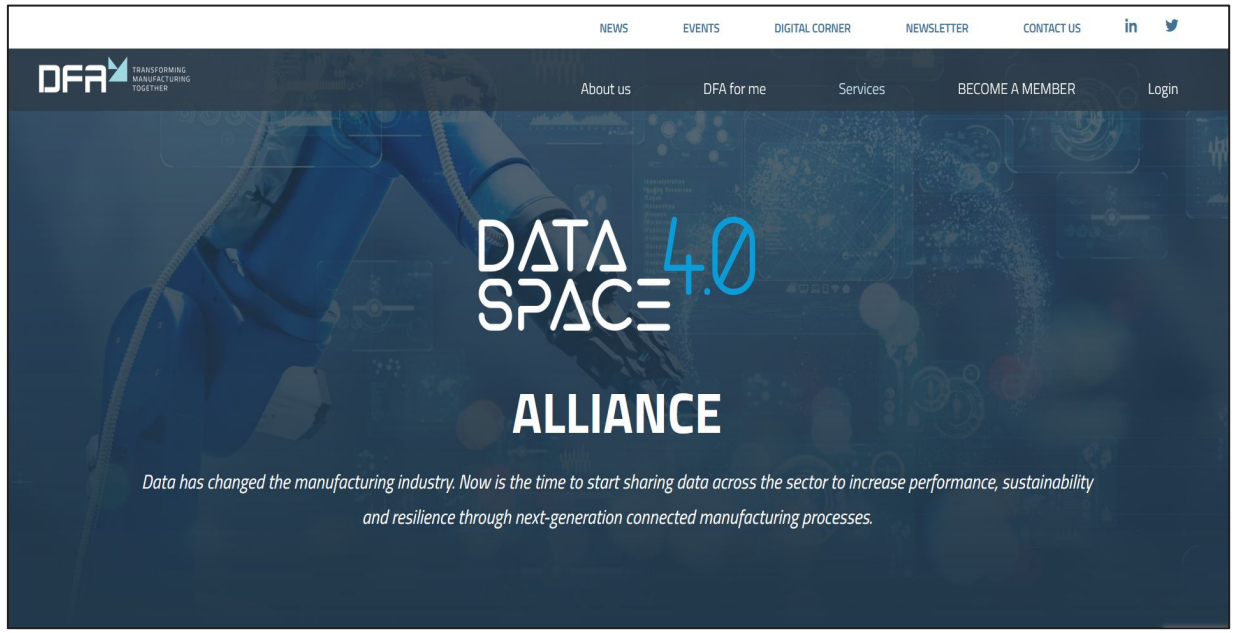
CONNECT

DATA SPACE 4.0

Project Website

https://manufacturingdataspace-csa.eu

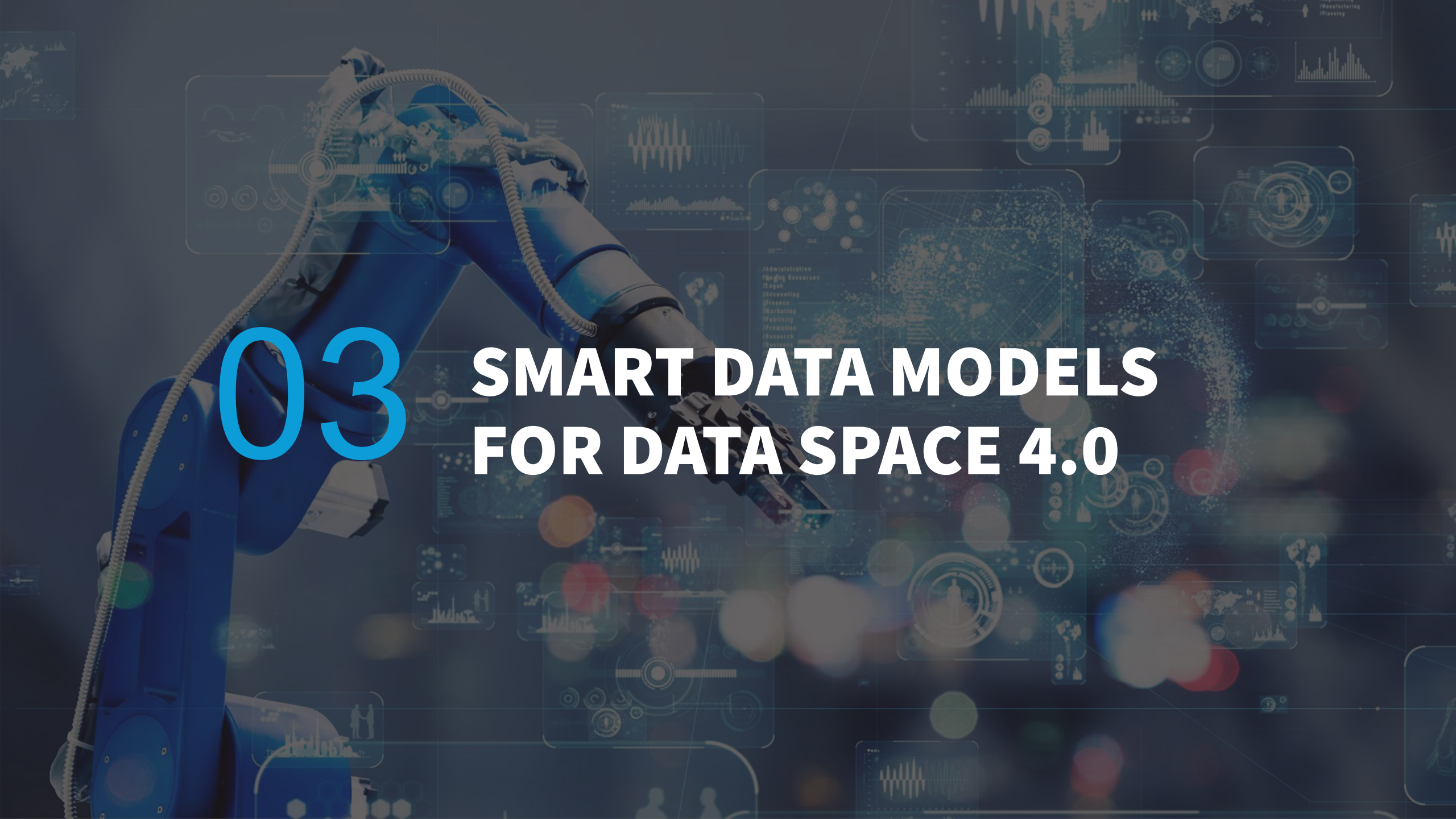
Data Space for Manufacturing Community



https://https://digitalfactoryalliance.eu/data-space-4-0-alliance/

Data Space 4.0 is a flagship initiative of

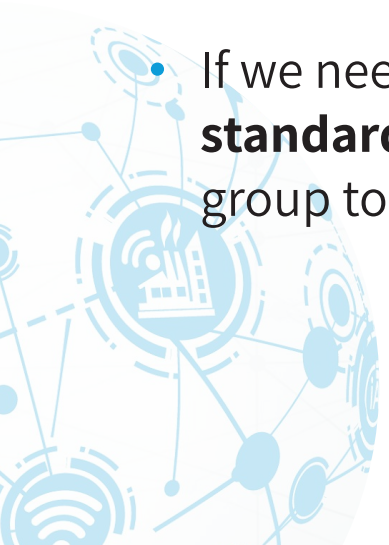
DFA TRANSFORMING MANUFACTURING TOGETHER



03 SMART DATA MODELS FOR DATA SPACE 4.0

THE CHALLENGING QUESTIONS

- How will we **input and describe** our data models in the data spaces?
- What will happen if every participant in the data space provide data with **different data models**.
- How could we ensure that the data models of the data shared **complies with a standard**?
- If we need to describe a dataset **not formerly standardized** will we ask a Standardization group to create the specification?
- Shouldn't be Automated?
- Divergence will force users to transform data to use (large barrier).
- Simplification for integration
- Do it on the fly?



WHAT IS IN A DATA MODEL AT SDM

- **3 elements**
  The list of attributes (short names)
  Their data types
  Their definitions
- **Examples** (mandatory*) in different formats for the
  Structure: json schema, yaml, SQL
  Payloads: json, jsonld, csv, DTDL, geojson features
- **Open licensed**
  Free use, modification and sharing
  payloads: json, jsonld, csv, DTDL, geojson features

- **Services** for users
  Specification in 7 lang (EN, DE, FR, IT, SP, JP, ZH)
  Search for any element
  Map with existing ontologies
  Generate random examples of a data model
  Python package pysmartdatamodels
- **Draft a data model 'on the fly'**
  With a spreadsheet.
  Based on actual examples in json or csv
  with an online editor

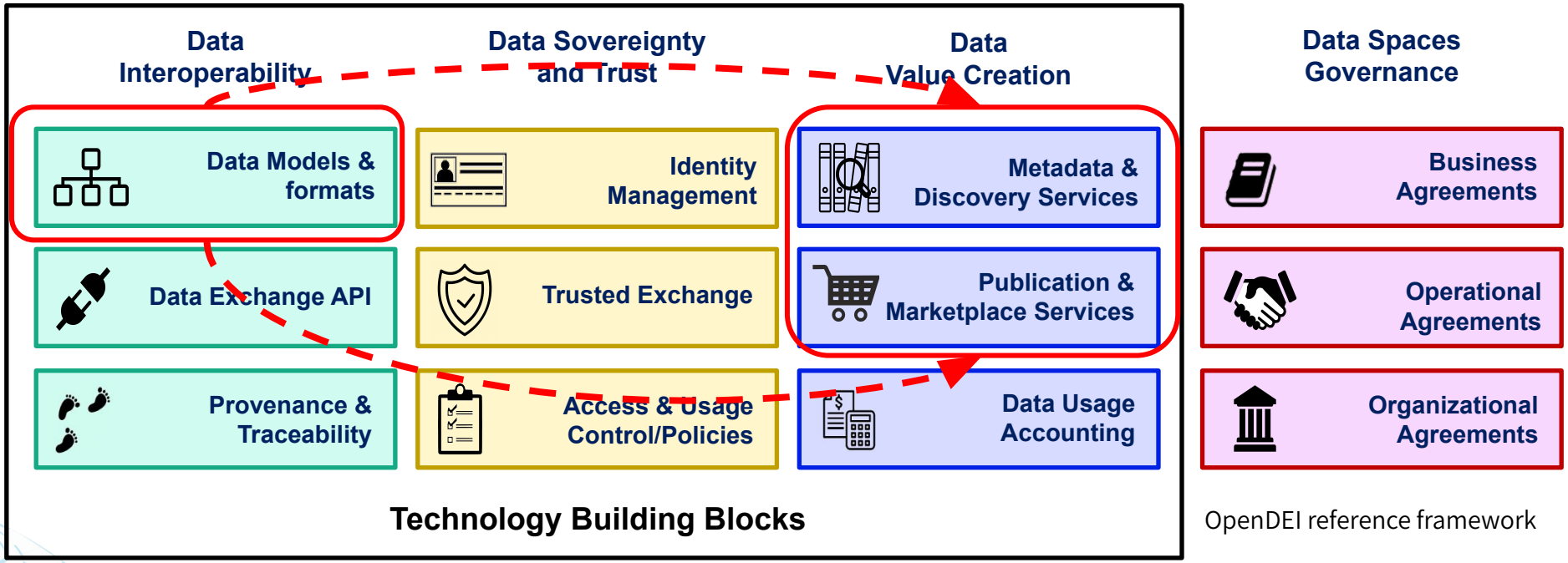
Data Space 4.0 is a flagship initiative of
DFA TRANSFORMING MANUFACTURING TOGETHER

MANUFACTURING DATA MODELS AT SDM

- Subject **Manufacturing Machine** (3 data models)
  ManufacturingMachine
  ManufacturingMachineModel
  ManufacturingMachineOperation
- Subject **AutonomousMobileRobot**
  5 data models for connection with Robot
- Subject **OPC-UA**
  Mapping the standard (15 companions, 2 available)
- Subject .**RoboticIndustrialActivities**
  5 data models for pallet, piece, RobotArm, RoboticCell, VacuumPump

- In progress
  Assessing the map of AAS
  Mapping of Smart MES
  Corosect project
  ROS mapping
- Exploring
  ALICA
  ISA-S88
- **Always possible to contribute** to data models
  Either with an example
  or based on open adopted standard

INTEGRATING SDM IN DATA SPACES



- Automatic publication of Metadata for the data space
- Reference the SDM for compliance
- Provide structure of data shared automatically exported from SDM

DATA SPACE 4.0

GRACIAS • THANKS • MERCI • DANKE • GRAZIE • DANK JE • OBRIGADO

JOIN US

FOLLOW US

www.linkedin.com/company/dataspace40

@dataspace40

innovalia ASSOCIATION

Funded by the European Union

Data Space 4.0 is a flagship initiative of

DFA TRANSFORMING MANUFACTURING TOGETHER