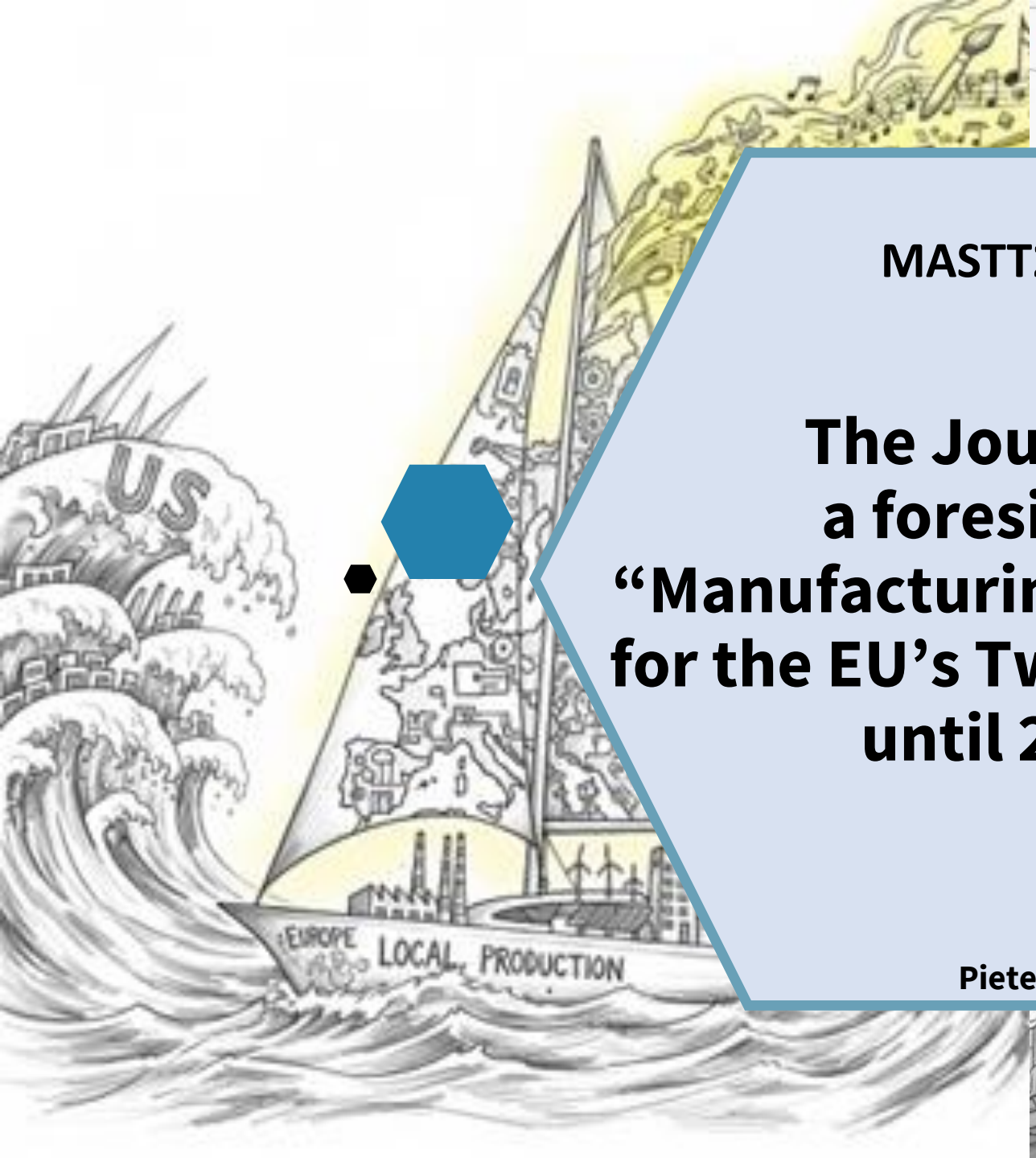

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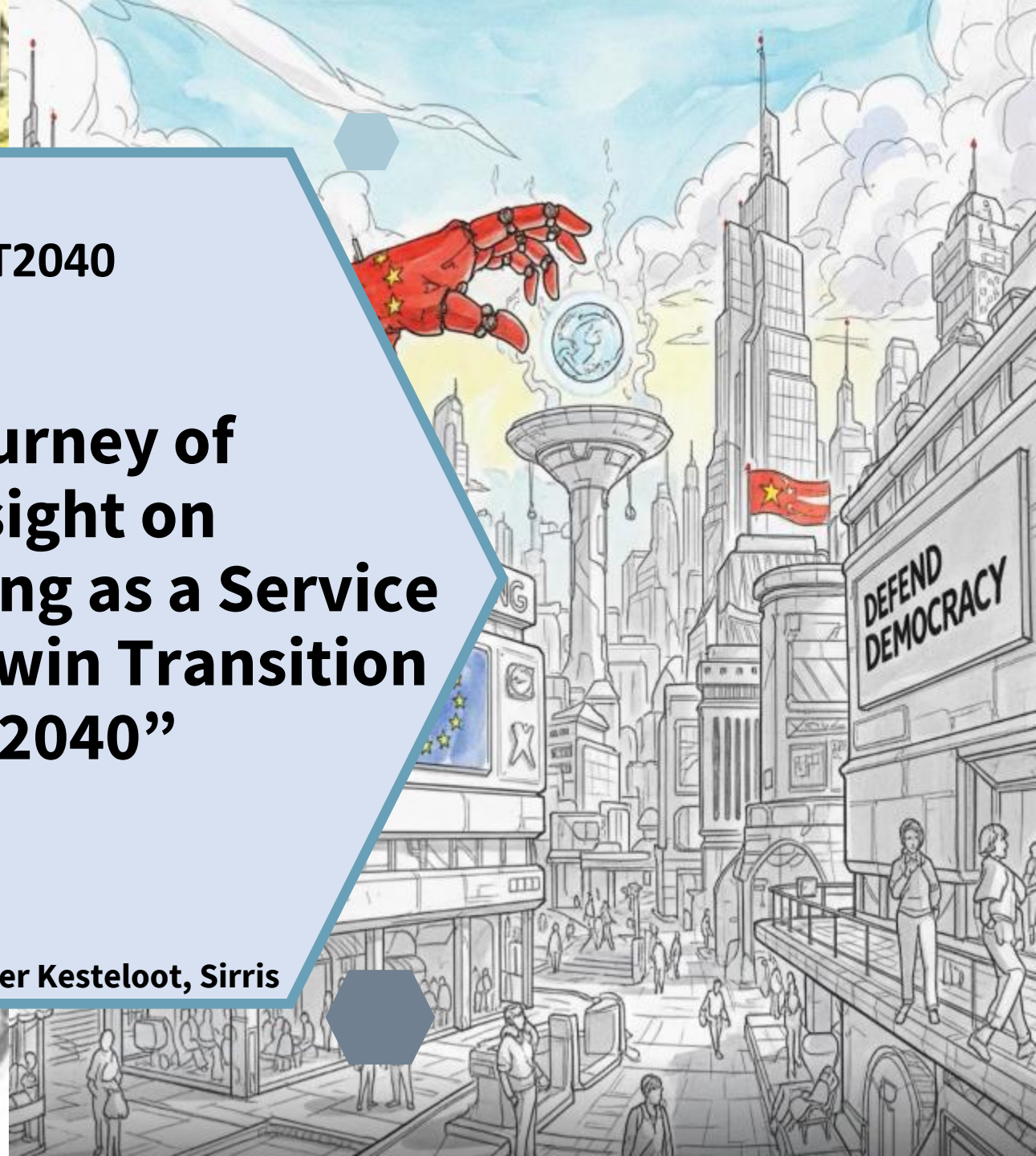
The Journey of a foresight on “Manufacturing as a Service for the EU’s Twin Transition until 2040”

Pieter Kesteloot, Sirris



For a long time,
Manufacturing as a Service (MaaS) pioneers operated quietly unnoticed by most.

The EC recognised MaaS as a possible key driver for the future of European manufacturing and it's twin transition.

Call within Horizon Europe for a CSA foresight study in 2023

the origin of our foresight study

"Manufacturing as a Service for the EU's twin transition until 2040"

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A participative foresight

Jan 24 → **Dec 25**

Scanning & scoping

Analysis of MaaS approaches and best practices
to advance sustainability/circularity of industrial production in manufacturing

Envisioning and reframing

Analysis of foreseeable developments and trends in manufacturing
to
develop scenarios and MaaS use cases for manufacturing in 2040

Strategizing & planning

Strategic Roadmap towards 2040
for EU industry to transform and anticipate on these changes
Pathways:
now-2030, 2035, 2040

Sense-making & recommendations for policies

Recommendations for an EU manufacturing standardisation strategy focusing specifically on the role of data

Stakeholders' engagement in foresight
(workshops, interviews, consultations, …)

MASTT2040 sirris innovation forward 4CF Surf the future Steinbeis Europa Zentrum Enabling Innovators to Grow PARP Grupa PFR COMET Cluster Metalmeccanica Friuli Venezia Giulia THINK BV

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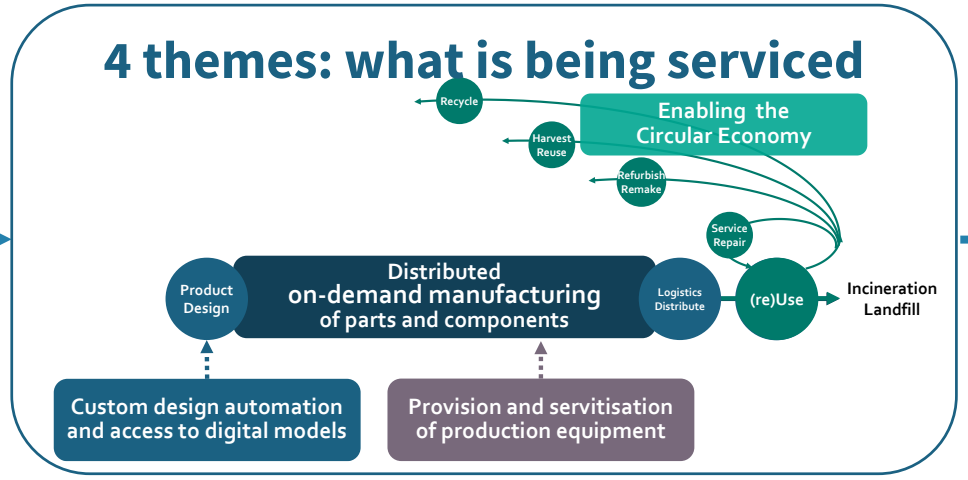
State of practice: from analysis to insights

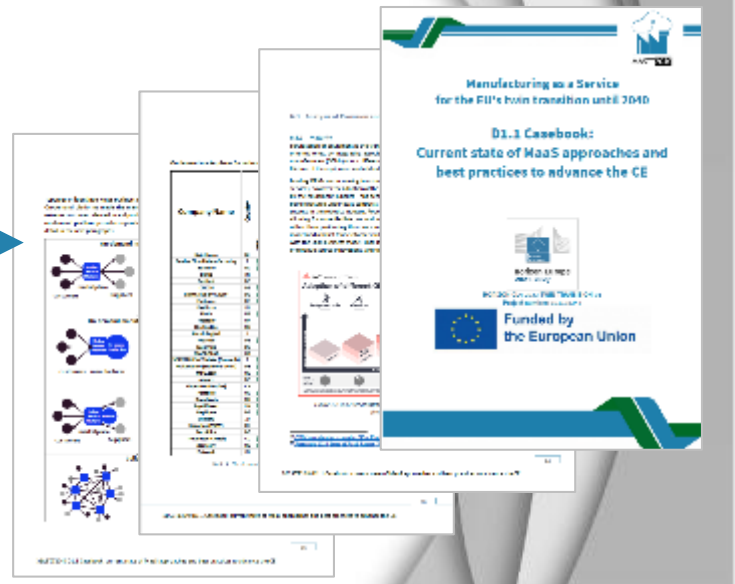
MaaS is a distributed system of production in which resources (including data and software) are offered as services, allowing manufacturers to access distributed providers to implement their manufacturing processes.

- Analysis (scientific) literature
- Analysis Industrial use-cases
- In-depth interviews With stakeholders

→ +15 business models →



a broad field of approaches and digitized services



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On-demand manufacturing of tailor-made products

247 TAILOR STEEL
ON DEMAND. ON TIME.

Sophia® web portal & platform
Sophisticated Intelligent Analyzer

24/7 fast and easy ordering

Upload part design and specifications → Instant/Fast Quote → Review & placement of order

DfM Manufacturing Advice

Short reliable delivery times

Part Production (own production facilities) → Quality Control → Shipment of parts

Tracking of order status

One mouse click is enough to control the entire production process in the factories.

Unbroken Digital thread

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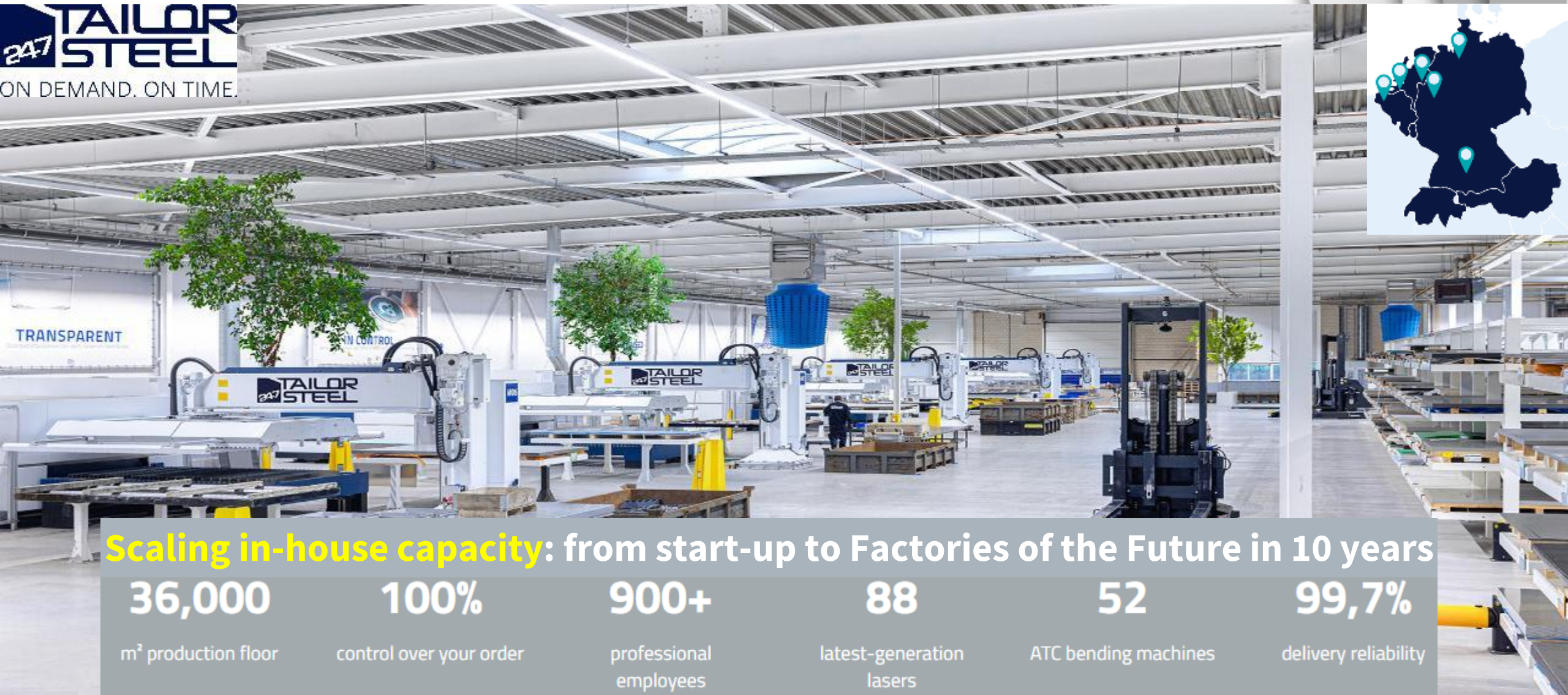
On-demand manufacturing

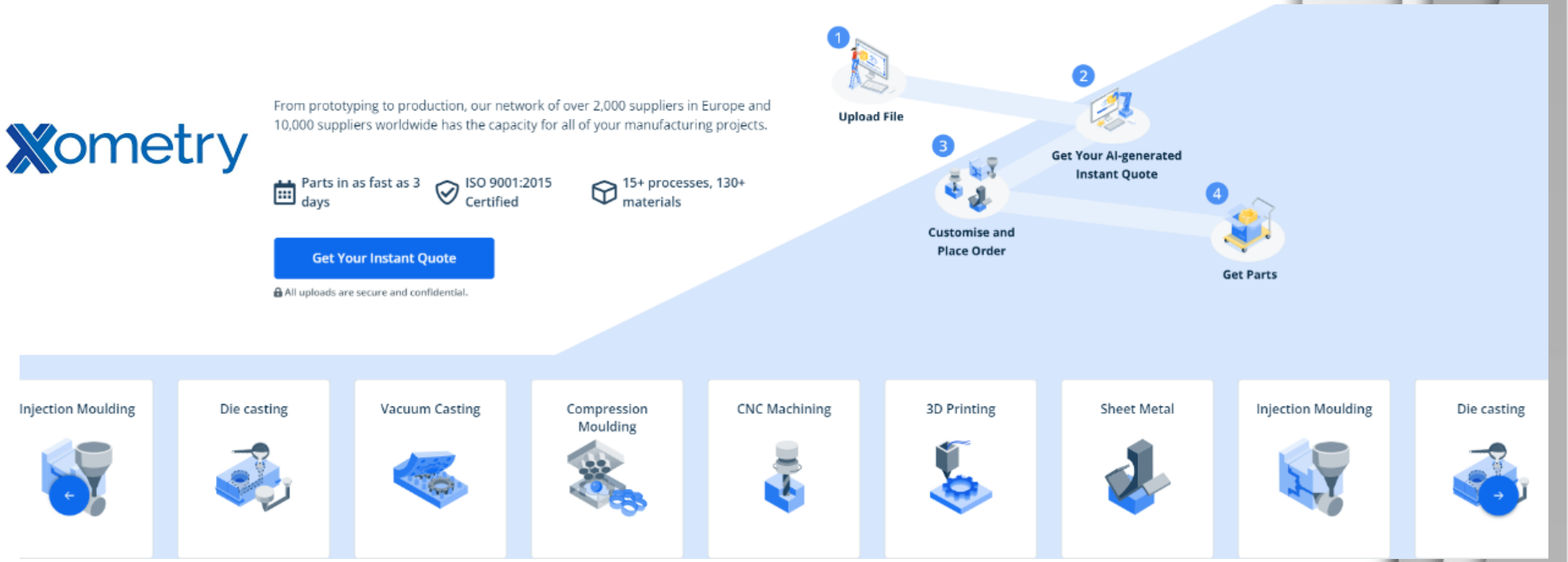
High level of automation and digitization



Scaling in-house capacity: from start-up to Factories of the Future in 10 years

36,000	100%	900+	88	52	99,7%
m² production floor	control over your order	professional employees	latest-generation lasers	ATC bending machines	delivery reliability

On-demand manufacturing marketplace



Xometry has no own production capacity,
builds on free capacity of a large network of approved suppliers

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On-demand by Manufacturer

Company Name	Country	3DP	Assembly	Casting	CNC Machining & Turning	Electronics	InjectionMolding	SheetMetal	SurfaceTreatment - Finishing	Textile / Fashion
247TailorSteel	NL							●		
A3D Manufacturing	US	●		●	●		●			
BMW Additive Manufacturing Campus	DE	●								
DyeMansion	DE	●								
Fathom	US	●	●	●	●		●	●	●	
Immensa	UAE	●								
Imnoo	SW				●					
i.Materialise	BE	●								
myProto	BE					●				
P&G Laser	BE							●		
Ponoko	US/CN							●		
Print&Logistics	PL									●
Protolabs (incl. 3D Hubs)	UK	●			●		●	●		
Quickparts (3D systems)	US	●		●	●	●				
Rapid Axis	US	●			●		●	●	●	
Sculpteo (BASF)	F	●								
SendCutSend	US							●	●	
Shapeways	NL	●			●		●			
spreadshirt	DE									●
Spreadshop	DE									●
Star Rapid	CN	●		●	●		●		●	
Stratasys Direct	US/IL	●					●			
VDL (OrderOn)	NL							●		
Weerg	IT	●			●					
ZiggZagg	BE	●								

On-demand by platform operator

Company Name	Country	3DP	Assembly / welding	Casting	CNC Machining & Turning	Electronics	InjectionMolding	SheetMetal	SurfaceTreatment - Finishing	Textile / Fashion
Batchforce	NL				●					
Beelse Cloud Manufacturing	F	●								
Beamler	NL	●								
Bijnis	IN									●
Castfast	DE			●						
CNC24	DE	●		●	●		●	●		
CraftCloud by All3DP	DE	●		●	●		●	●		
Facturee	DE	●			●			●	●	
Fashinza	IN									●
Fictiv	US	●		●	●		●	●		
Fractory	UK		●		●			●	●	
HeyScottie	US								●	
Kornit Digital	IL									●
Kreatize	DE	●			●			●	●	
Laserhub	DE				●			●		
MACROFAB	US					●				
3DEXPERIENCE Make (Dassault)	F	●			●		●	●		
Makerverse (Siemens-Zeiss)	DE	●		●	●		●	●		
MFG.com	US	●			●		●	●		
mipart	DE	●			●			●		
Orderfox (Partfox)	CH				●					
PartzPro	US	●		●	●			●	●	
Rapid Axis	US	●			●		●	●	●	
RapidDirect	CN	●		●	●		●	●	●	
Replique	DE	●								
Sitateru	Jp									●
Spanflug (VDW)	DE				●				●	
TechPilot	DE									
Truventor (Chizel)	AU	●		●	●		●	●		
Xometry	US	●		●	●		●	●		
Zetwerk	IN		●	●	●		●	●		

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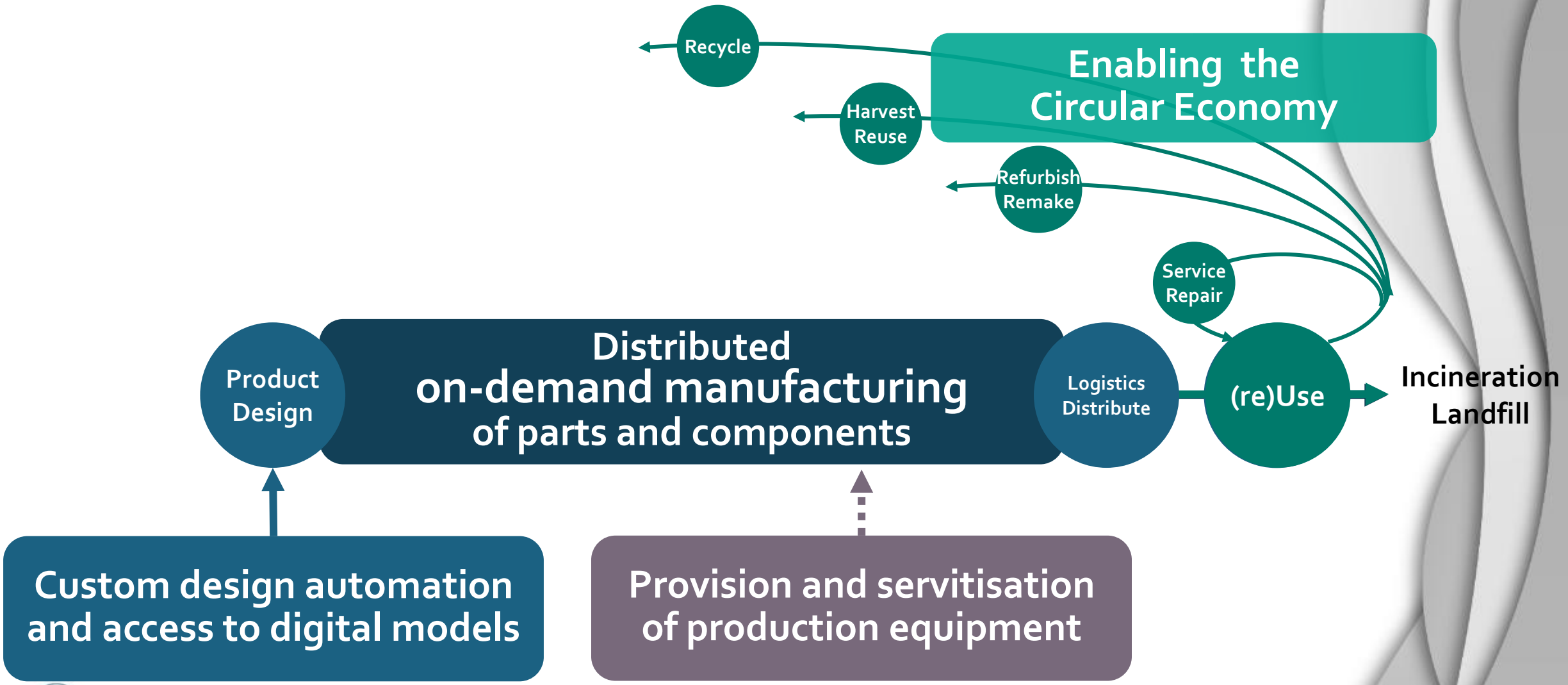
At the Heart of MaaS: On-Demand Manufacturing



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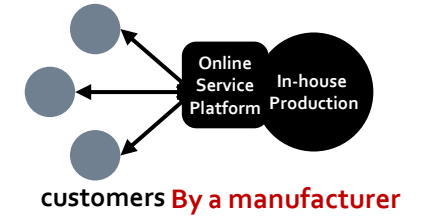
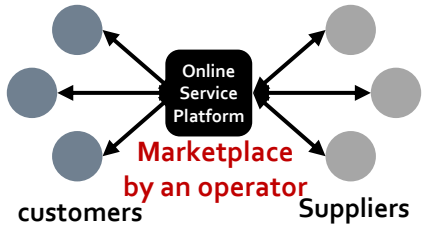
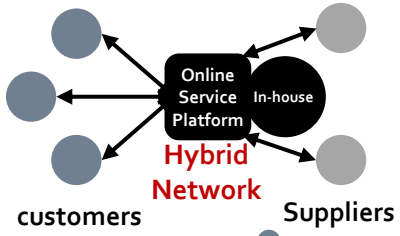
Understanding the state of practice

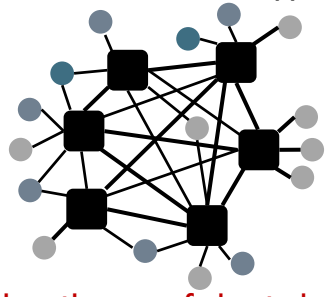
MaaS Core Theme

Business Models









Collaborative open federated model

Key-success factors

- Real-time, easy to use and instant services
- Dynamic pricing, excellent product quality
- Reliable short lead times and micro-caring for customer needs
- Cost-effective hyper-scaling of the service, with a limited need for human resources
- The integrated manufacturing knowledge . reduces the need for skilled workers in office & production

Maturity

- Proprietary: competitive landscape taking the market by storm
- Collaborative and open: research ➔building the eco-system

Sustainability

- Not yet a focus

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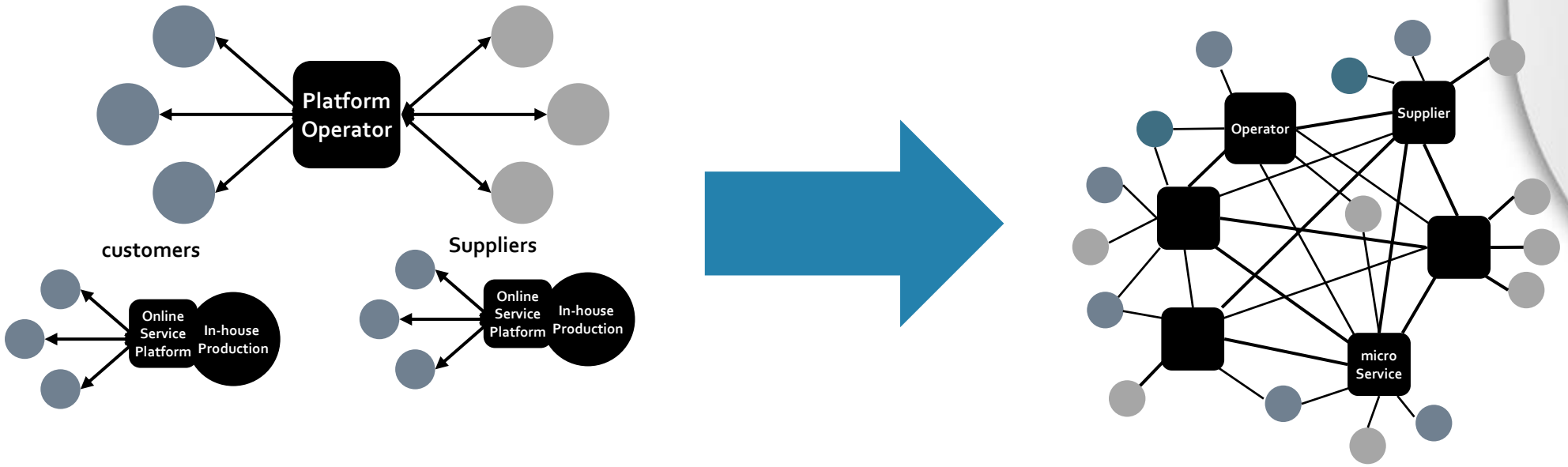
For end-users

From ownership to access.
Manufacturing becomes a service
you access resources instantly,
wherever and whenever you need it.

For providers

MaaS is not just a technology.
It's a mindset shift,
requiring a huge investment.

MaaS depends on the strength of the network



Today's systems on market:
closed, proprietary, and siloed

- Risk of a lock-in by operators
- Trust in unknown providers
- No ecosystem for providers of micro-services

Research on future systems:
open, interoperable, and federated

- Collaborative ecosystem
- Direct communication between actors
- An ecosystem for providers of services

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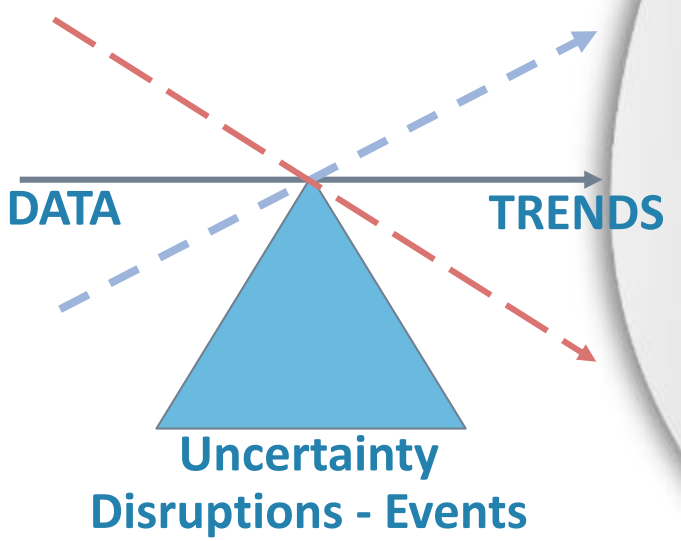
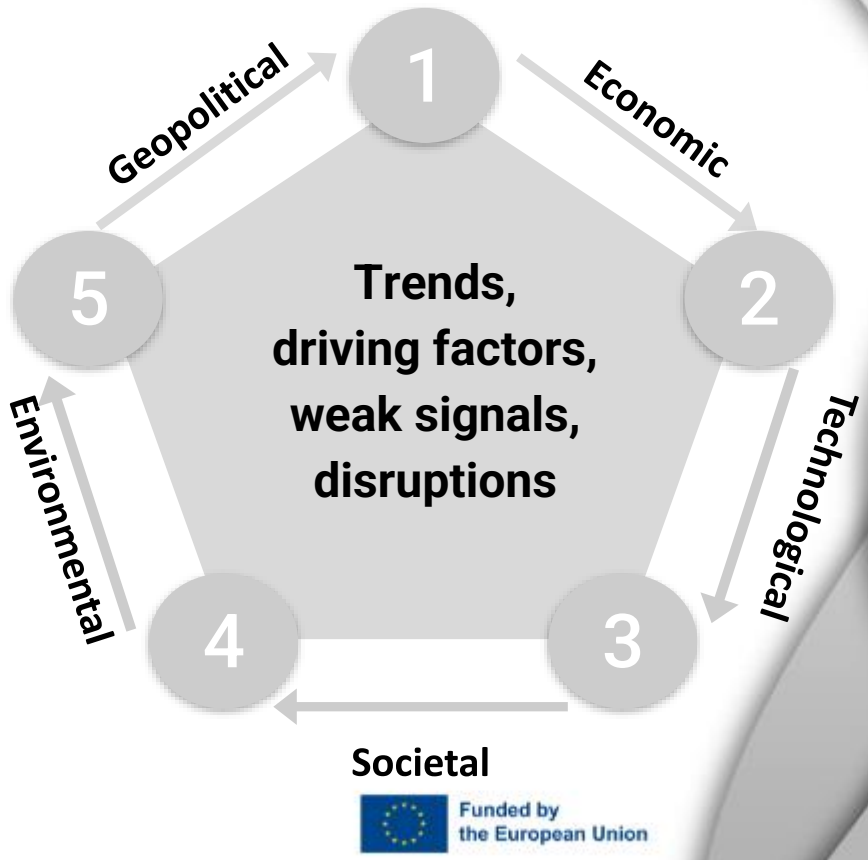
Why foresight

1. The future is not predictable

When we think about the future of manufacturing, we tend to **extrapolate** past data assuming that current trends will continue.

This assumption is incorrect because the dynamics, complexity, uncertainty and ambiguity of the wider environment systematically “produce” various **discontinuities** that **disrupt trends**.





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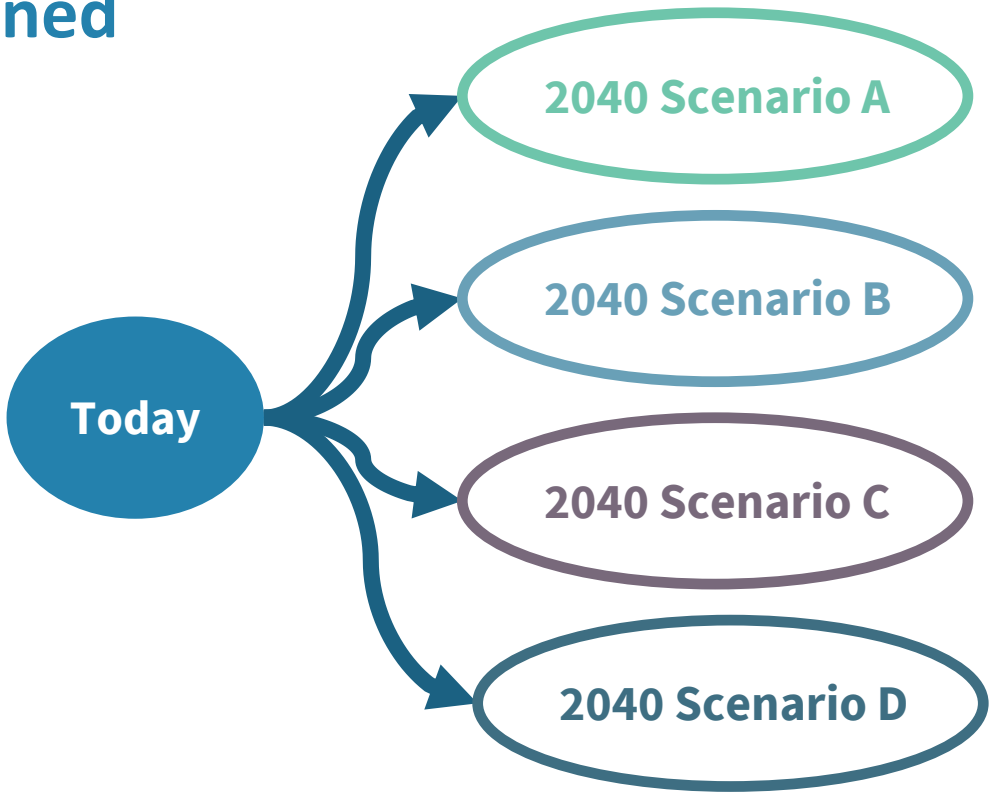
Why foresight

2. The future is not predetermined

Yes, some things will **continue**, so we study continuities, but….
Some things will **change**, so we need to identify and explore potential discontinuities and disruptions.

From these insights pictures of potential **risks, opportunities, dilemmas** for the future of manufacturing can be anticipated (through scenarios).



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Why foresight

3. We can, to some extent, influence the future

By anticipating on alternative future **scenario's and MaaS use cases**, we are better positioned to identify available **options**, and we are able to recommend what needs to be done **(decisions & actions)** in the present to address the challenges ahead.

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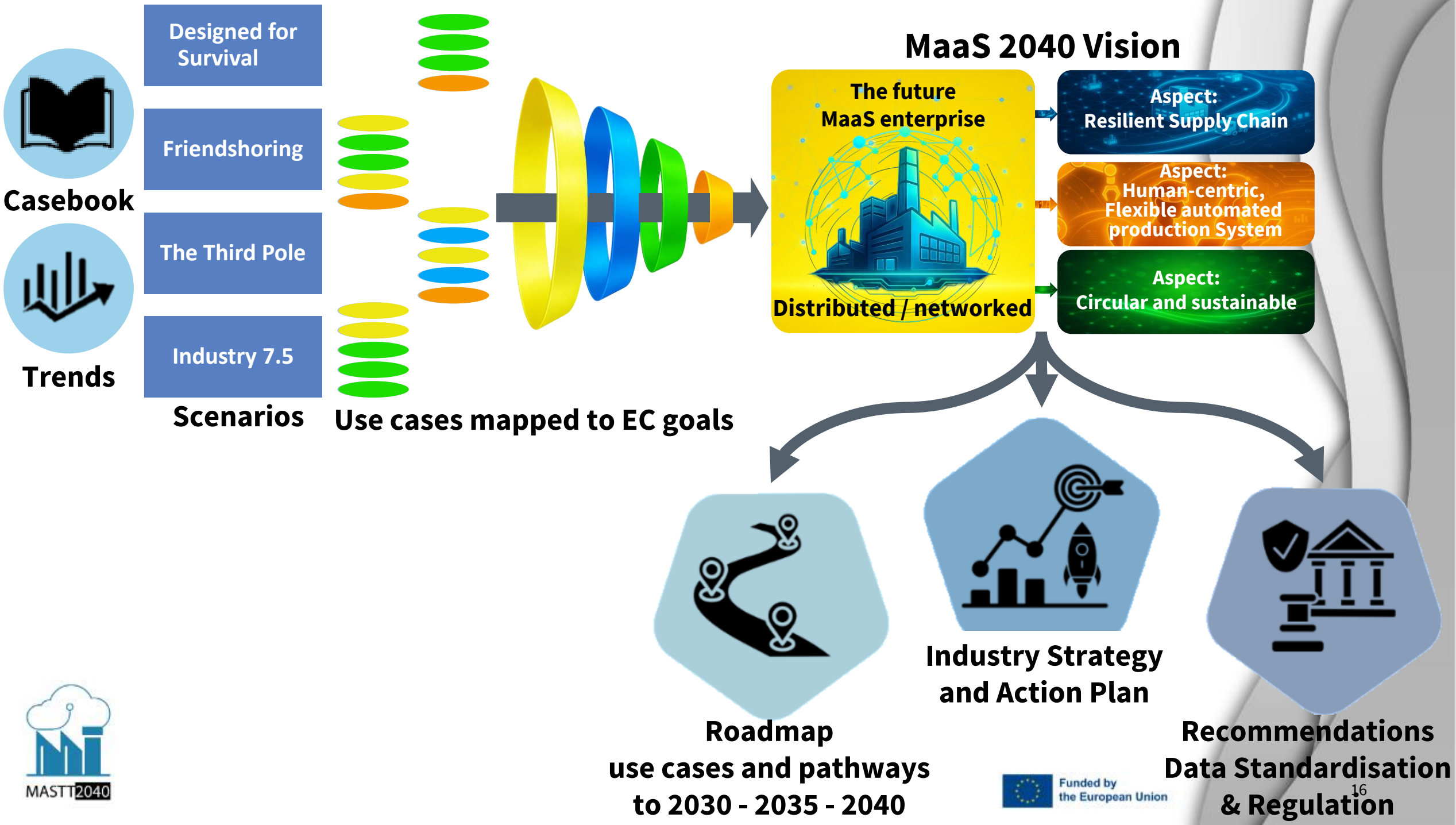

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2040 vision: MaaS, backbone of a networked industry

The future MaaS enterprise

On-demand networked ecosystem
Extreme flexibility & automation
Fully Digital & interoperable
Seamless integration
Transparency & Trust

Product Design

Distributed
on-demand manufacturing
of parts and components

Logistics Distribute

Custom design automation and access to digital models

Provision and servitisation of production equipment

Aspect: Resilient Supply Chain

Predict & anticipate on disruptions
Agility to rapid reconfigure supply network and operations
Built-in redundancy and flexibility (resources – partners)
End-to-end transparency of supply and inventory
Collaborative ecosystem sharing data, capacity, …

Aspect: Human-centric, Flexible automated production System

Empowerment & shifting roles
Adaptability: learn & upskill

Flexible automation & rapid reconfiguration
Hybrid teams of human-machines

Aspect: Circular and sustainable

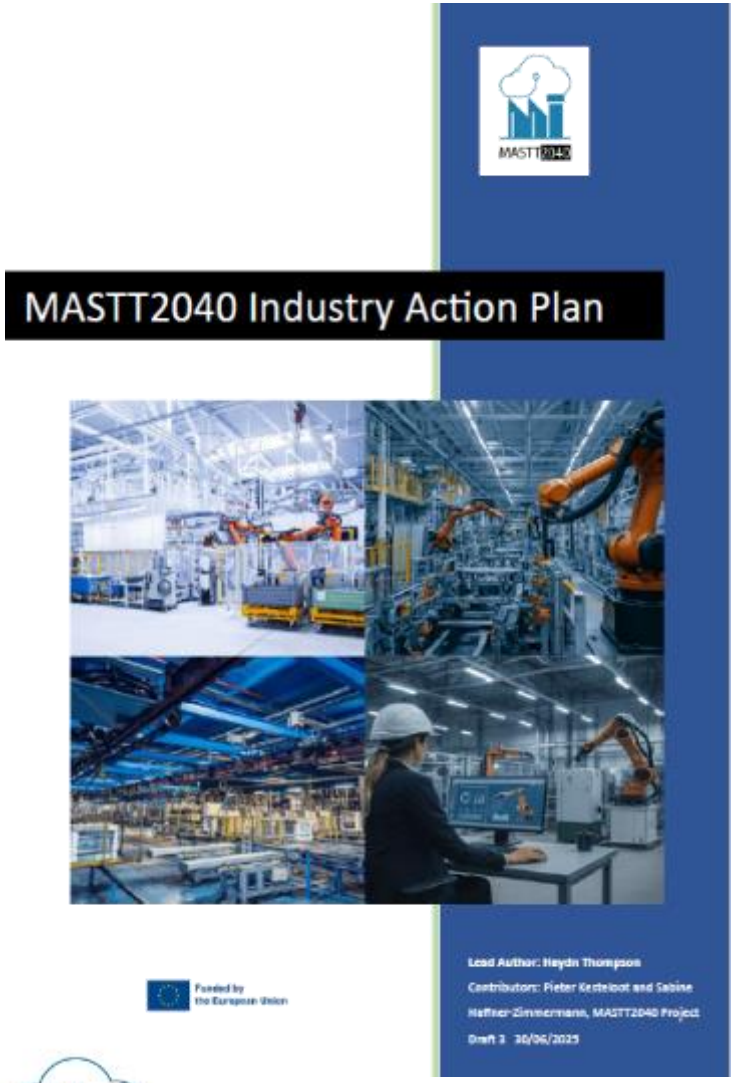
Efficient use of energy and materials
Localisation close to demand

Transparency & traceability supported by DPP
R-cycle services & closed-loop use of resources

Roadmap & pathways

Key EC Goal	Components	Sub-Assembly	Product
	2025	2030	2035	2040
			
	Single Manufacturing Company	Multi-Company Collaboration	Collaborative Manufacturing Network
Resilience	Order-Supply	Supply Chain	Complex Stakeholder Networks
	Data Exchange Buyer-Supplier	Collaborative Data Exchange	Trusted Federated Dataspaces /Marketplaces
	Stable Environment	React to Disruptions	Resilient to Disruptions
	Secure Communication with Customer	Secure Intra-Company Communication	Trusted Secure Networks
Green	Proprietary	API / Integration	Open Ecosystem On-demand, Plug-Play
	Sustainable Not a Key Aspect	Linear Sustainability	Circular life-Cycle
	Contractual Data Exchange	Transparent Data	Open Data Sharing
Human-Centric	AI Quality Control and Optimisation	AI Assistants and Decision Support	AI Everywhere (ML and Generative)
	HMI	Augmented Reality HMI	Close Integration Human Machines/ Cobots
	Awareness (cybersecurity, AI, sustainability)	Empowerment & Upskilling	Lifelong Learning

	2025	2030	2035	2040
MaaS Development & Vision	Contract Manufacture, e.g. 3D Printing & Equipment-as-a-Service	Manufacturing-as-a-Service	X-as-a-Service	



Recommendations
to guide collective action

to accelerate adoption,

to align industry, policy, and research on standards, skills, and investment.

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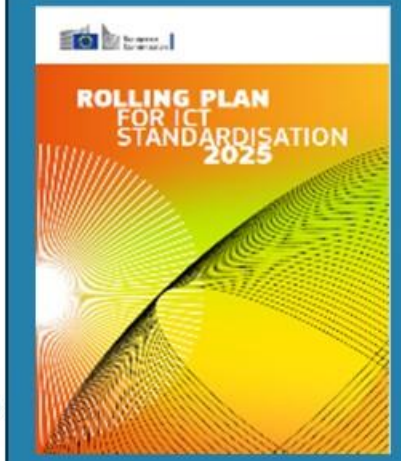
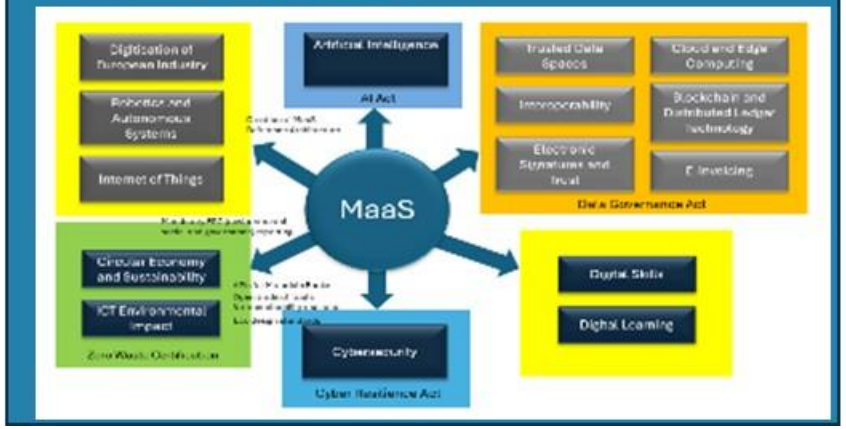
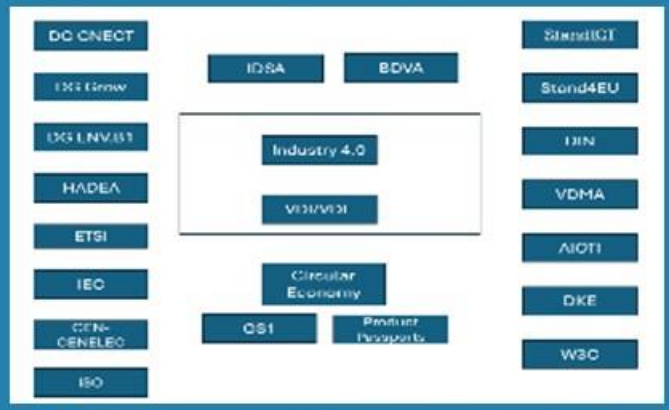
Roadmap



Gap Analysis



Standardisation Recommendations



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Let’s shape together the future of Manufacturing as a Service

https://www.mastt2040.eu/

Deliverables
Waiting for your download.

Let’s explore it together.
Visit our booth!

Join the MaaS event on Thursday!
(co-powered with HE MaaS projects)

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