



# Speeding up industrialised Building renovation by introducing the Local Pop-up Factory concept

*Maria Sara Di Maggio –ABT BV*



The BuildUPspeed project has received funding from the LIFE programme of the European Union under Grant Agreement no. 101075843.

# The BuildUPSpeed team

3 years project

Funded through LIFE programme, European Union project

16 partners from EU countries

HE



DOMO

IBS



acr



eurac  
research



# Why BuildUP Speed?

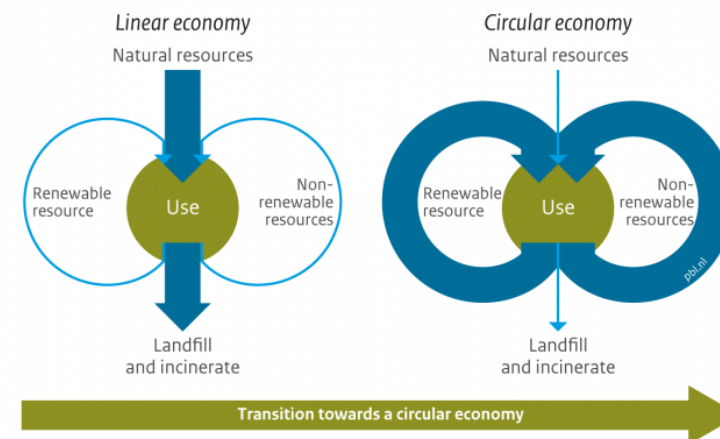
- BuildUPSpeed acknowledges the fact that **we are running out of time** in reducing the environmental impact of our building stock!
- We need to find a **sustainable and scalable way to accelerate the decarbonization** of our communities
- **A wealth of knowledge and drive is available** from recent European projects on industrialized renovation level to make deep renovation more attractive for consumers and investors (from the public and private sectors)
- The success of the approach and legacy of several chapters of the '**Energiesprong**' **can be scalable** and applicable to more EU countries



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EU project More Connect project demo

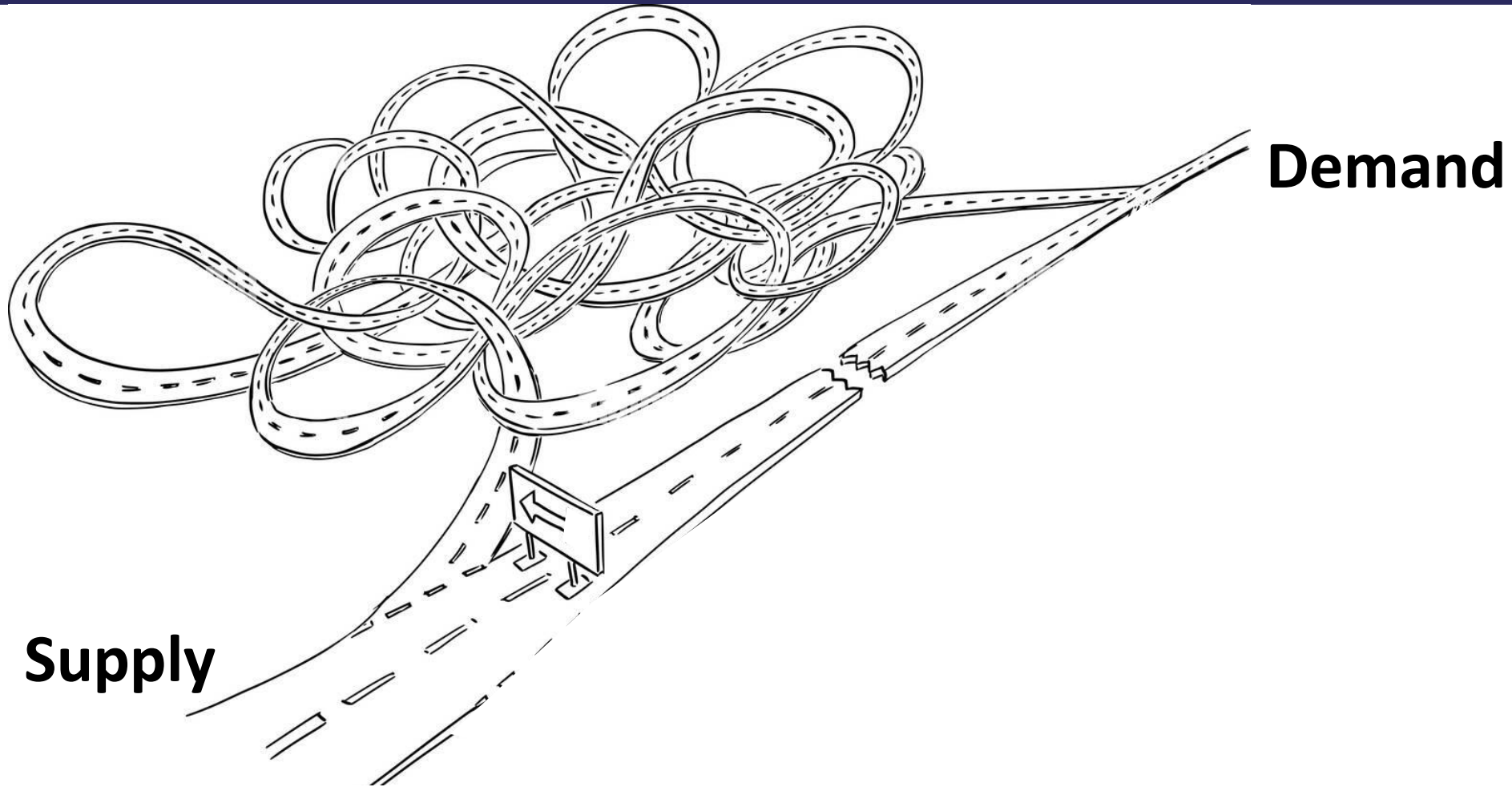


Source: PBL 2016

www.pbl.nl

EU project More Connect project demo

# BuildUPspeed: main issue



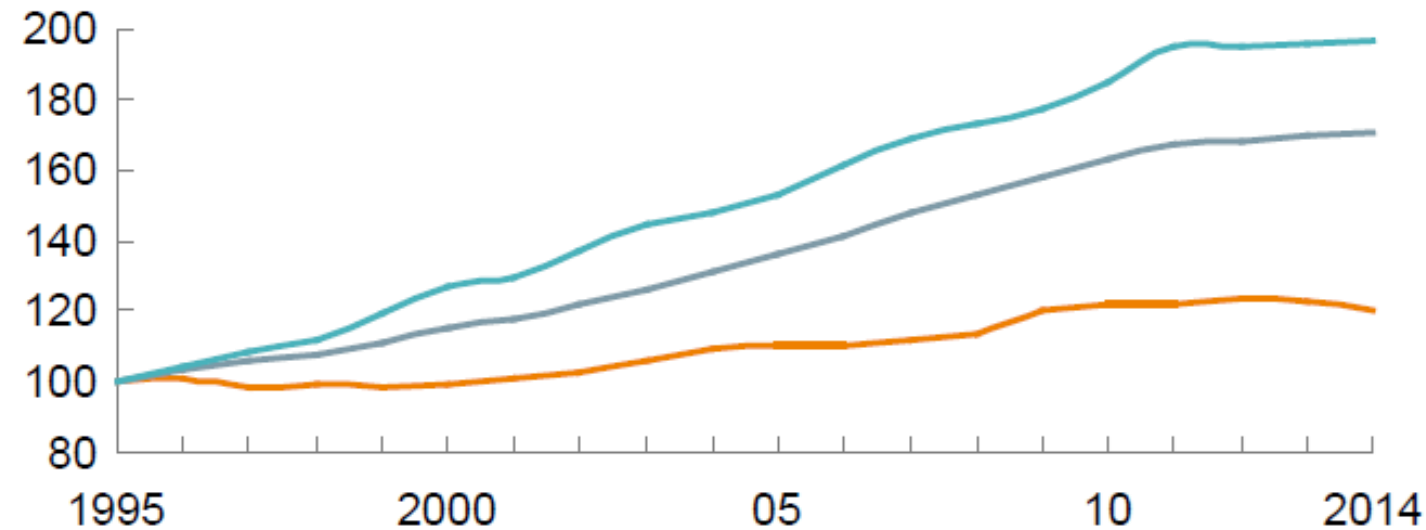
# The industrialisation potential - the big numbers

## *the why: manufacturing vs construction*

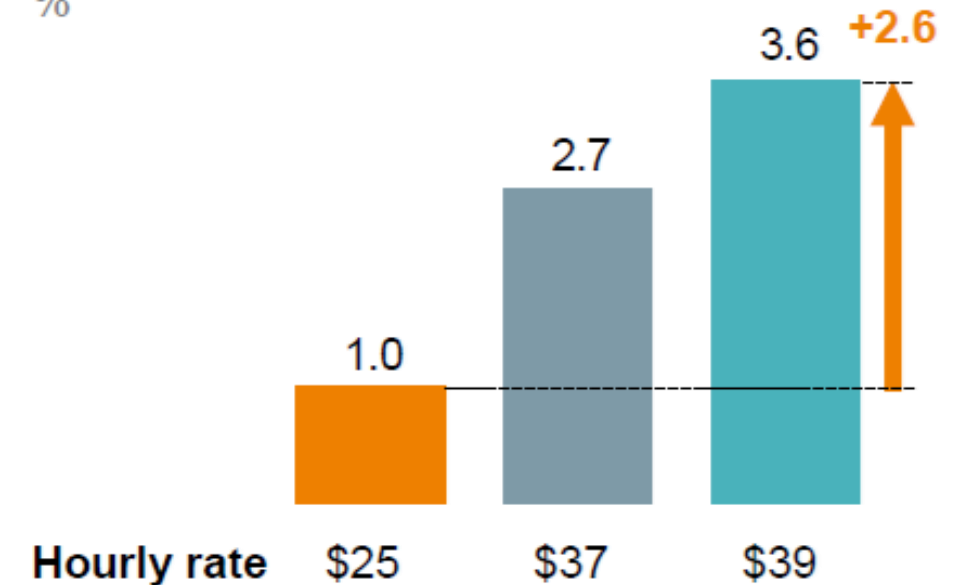
Global productivity growth trends<sup>1</sup>

Construction Total economy Manufacturing

Real gross value added per hour worked  
by persons engaged, 2005 \$  
Index: 100 = 1995



Compound annual growth rate,  
1995–2014  
%



# Automotive Industry versus Construction Industry

*.....which one is cheaper?*



~ € 900



~ € 25.000

Basically the same functions: producing power and heat



# Product modularity as a strategy to sustain the development and adoption of circular building technologies

“...Modularity applied in housebuilding, **has the potential to ease the disassembly of buildings** in its constituent components providing opportunities **for the re-use of components** and the refurbishment and recycling of components that are at the end of their life cycle.”

(Ellen MacArthur Foundation, 2015a,b; Van Oorschot, 2020).



*Ellen MacArthur Foundation, 2015a. Growth within: A circular economy vision for a competitive Europe. Ellen MacArthur Foundation.*

*Ellen MacArthur Foundation, 2015b. Towards a circular economy: Business rationale for an accelerated transition. Ellen MacArthur Foundation.*

*van Oorschot, J. (2020). On the adoption of innovation in the housing sector. Doctoral dissertation, University of Twente. <https://doi.org/10.3990/1.9789036550918>*

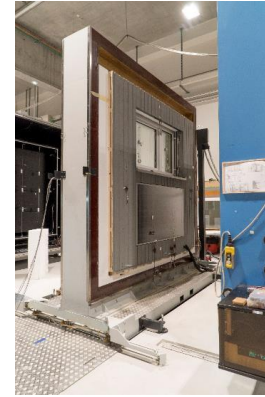
# Lessons learned in general on industrialized prefabrication so far (from H2020 projects on deep renovation)



BuildUPspeed

- Industrialization of the construction process is in fact the decomposition of a building in different elements (step1).
- These elements can be produced and pre-fabricated off site (step 2).
- The next steps in prefabrication are:
  - Step 3: industrializing
  - Step 4: automizing
  - Step 5: roboting
- At this moment, the *average* renovation process is not much further then step 2. In some H2020 projects we could also address the steps 3 and 4 (but not mainstreamed yet).

→ **Question/challenge for BuildUPspeed: To which extend can we accelerate and establish now the steps 3 – 5?**



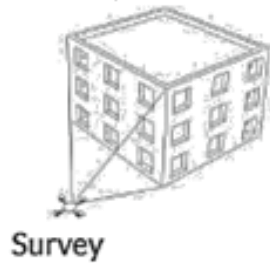


# Industrialised workflow: Renovation 4.0

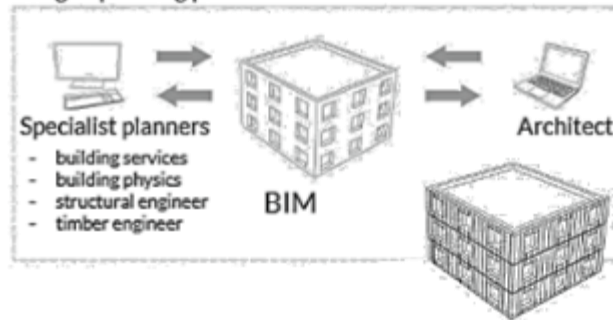


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One-stop-shop, Renovation As Service, New Financial Models, ...



Integral planning process



Timber production planning



Prefabrication  
Component integration



Finishing works  
Commissioning



Drones  
Robotics  
Engagement

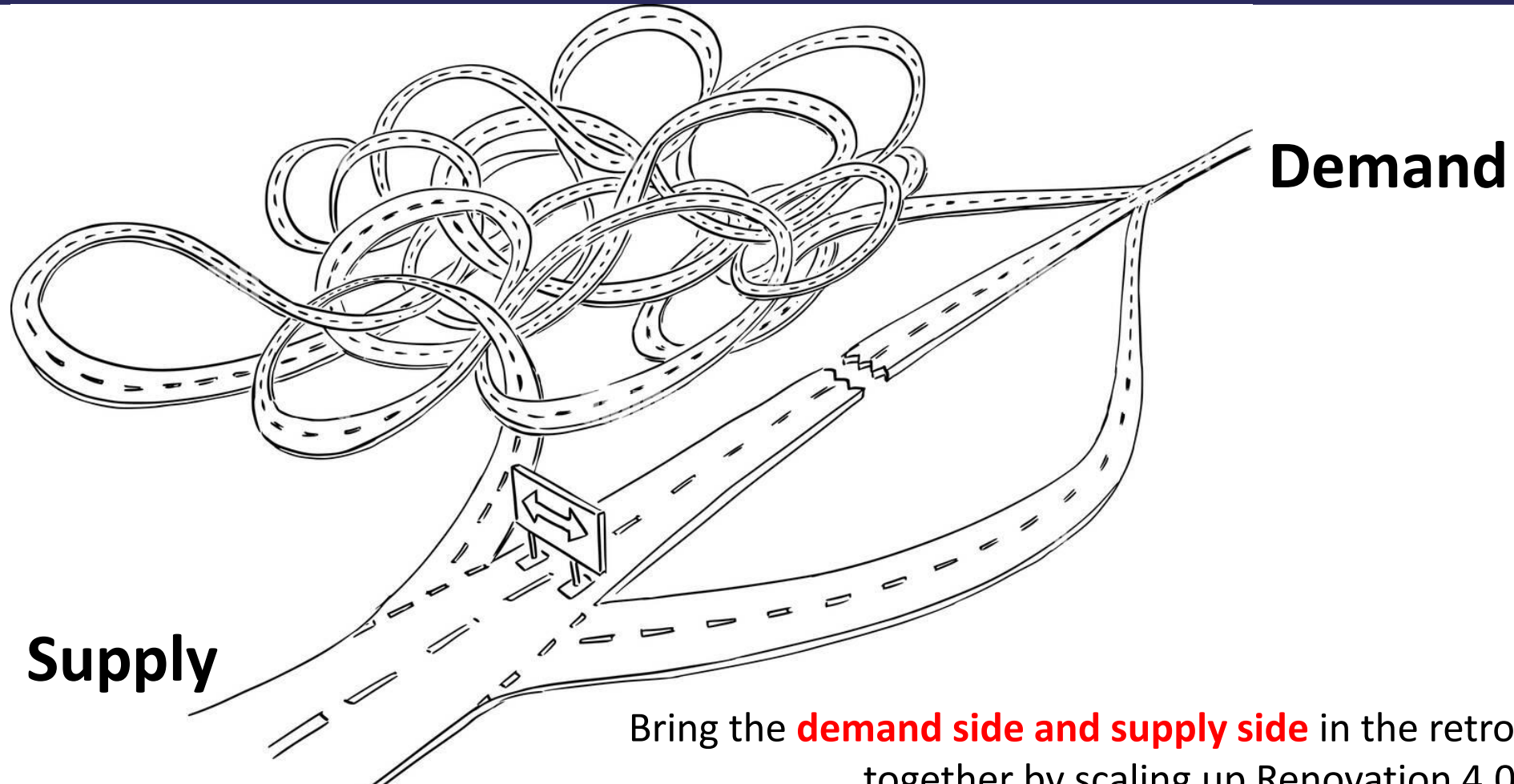
Scan2BIM  
Common Design Platform  
Design 4 (Dis) Assembly  
Big Data

Machinery  
Robotics  
Machine learning

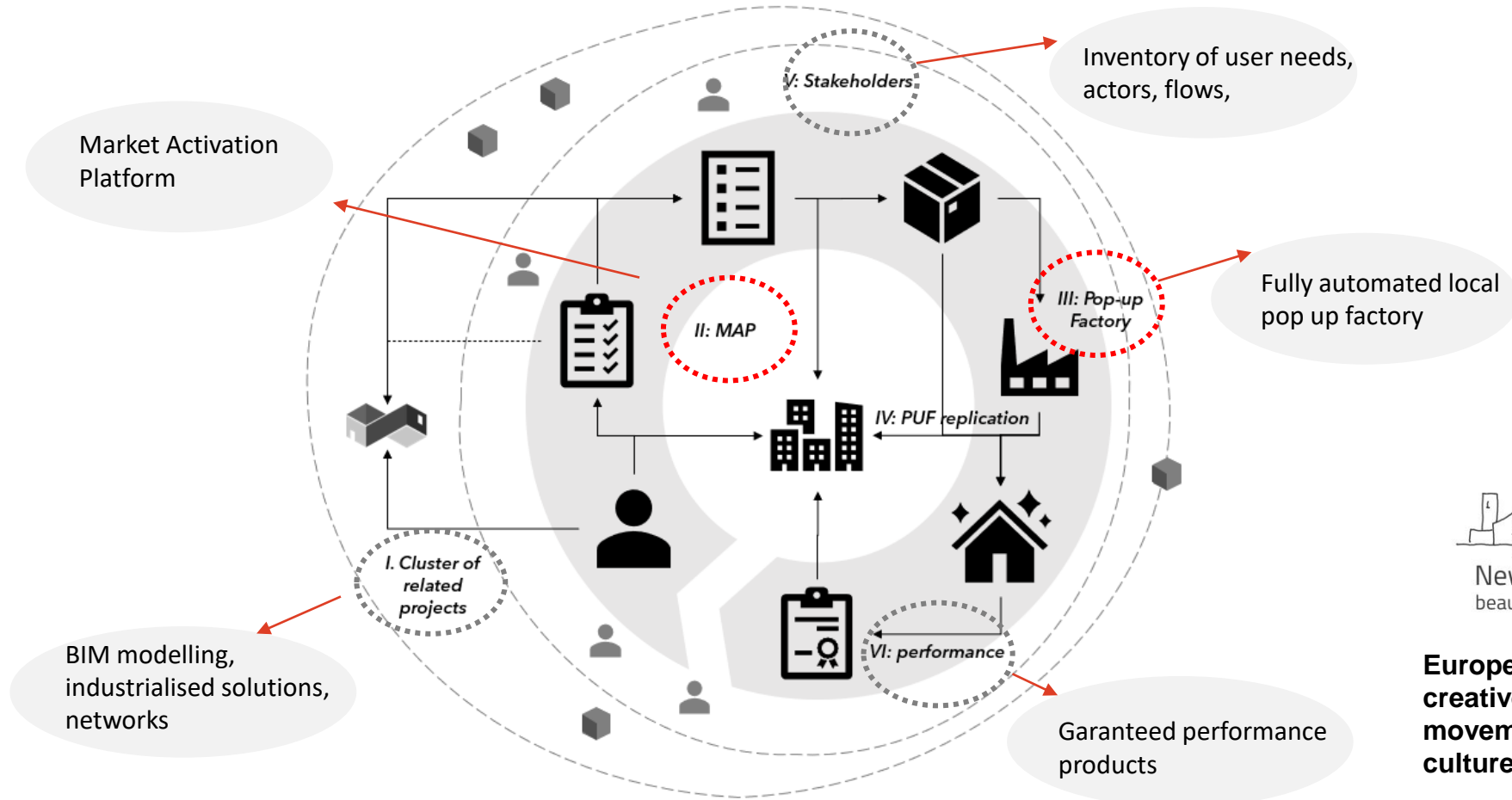
Augmented Reality  
Additive Manufacturing

Urban mining  
CDW- Construction and  
demolition waste  
Recycle

# BuildUPspeed: goal



# The BuildUPspeed workplan – how?

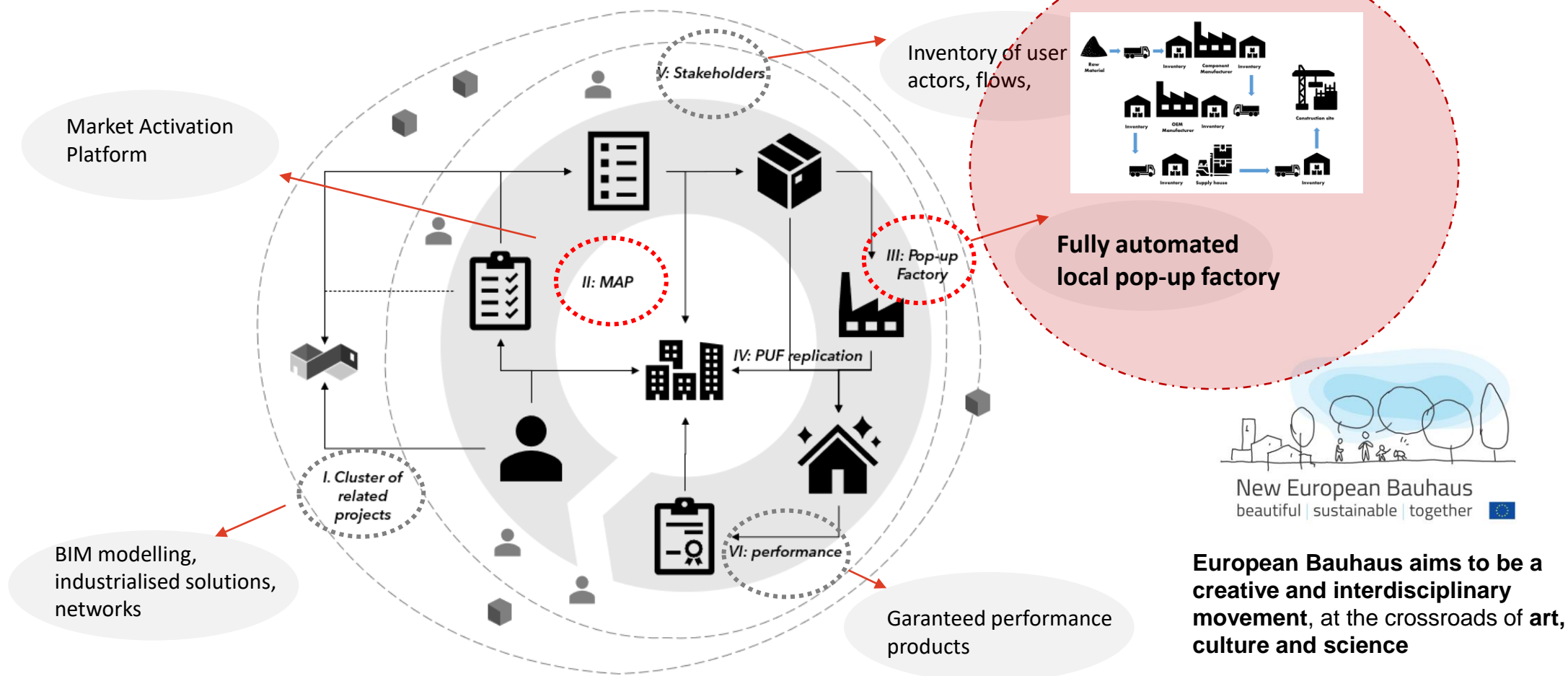


**European Bauhaus aims to be a creative and interdisciplinary movement, at the crossroads of art, culture and science**

# The BuildUPspeed workplan – how?



BuildUPspeed





# 5 pilot projects



Italian Ecosystem



Austrian Ecosystem



Spanish Ecosystem



Dutch Ecosystem



French Ecosystem



5 ecosystem across Europe





# Next steps

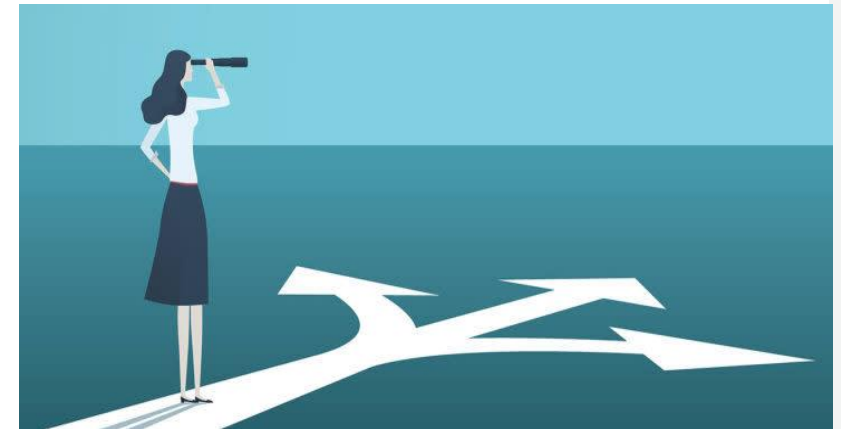
## Next challenge for BuildUPSpeed

- Bring the circular deep renovation to the commercial sector
- Make **these models scalable and replicable**, with attention to the local context and value local craftsmanship/techniques (New Bauhaus movement)
- Invest in **digitalization** of systems and workflow, **monitoring and forecasting** material flows from the site

## Key aspects for the decarbonization

- **Pop up factories, social urban mining models, one stop shops (OSS)** can **raise awareness and change the mindset** in the construction industry
- It's not only our challenge, **it's everyone's challenge!** All the stakeholders of the built environment supply chain are to be involved

→ *Do you want to know more about BUPs?*



**SCAN TO  
PROJECT  
SPACE**



# BuildUPspeed

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## Thank you for your attention!

### COLOFON:

This project has received funding from the European Union's LIFE framework programme under grant agreement no. 101075843

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# Local pop-up factories

*Mohamed Elagiry*



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# What is Pop-up Factory



# What is Pop-up Factory





# What is Pop-up Factory



# What?



A factory in the district itself for the time of the district retrofitting program. The factory will develop and assemble industrialized prefab building components that will be installed in the retrofitting projects.

Bring the **demand side and supply side** in the retrofitting market together

# Why?

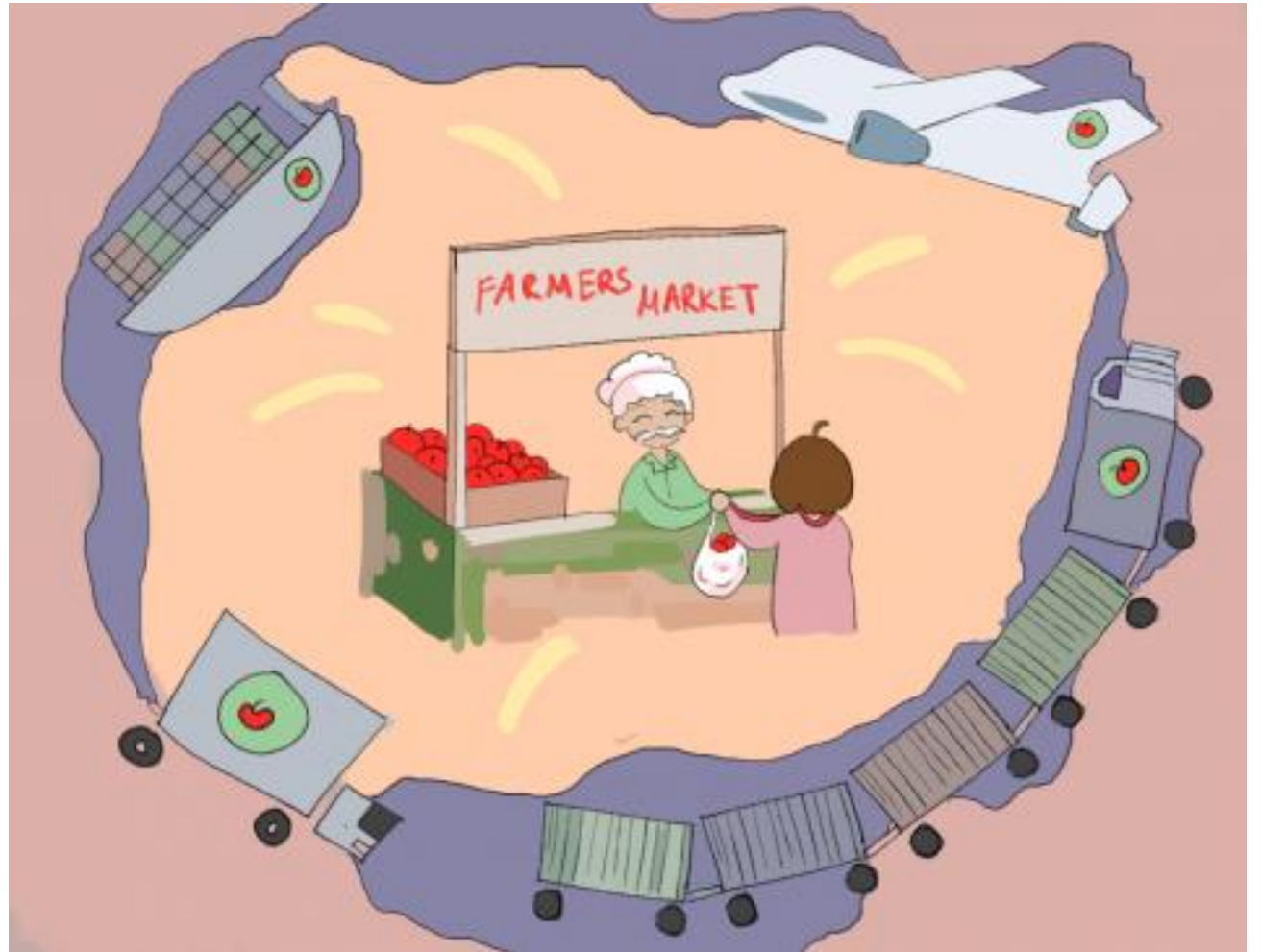
- The key concepts for developing the Local Pop-up

**Reduce the waste**

**Efficient logistics**

**Easy assembly**

# Farmer market



# Benefits

- 1. **Megatrend Sustainability:** reduction of transport and therefore CO2 emissions
- 2. **Rising logistics costs:** reduce physical transports
- 3. **Individuality and mass customization:** individual products
- 4. **Democratization of Design and Open Innovation:** Involvement of the customer in product development
- 5. **Proximity to the market and point of consumption:** Just-In-Time delivery and shorter delivery times
- 6. **Production at the place of critical resources:** e.g. raw materials or highly qualified human resources
- 7. **Regionalism and authenticity:** Authenticity in special cases

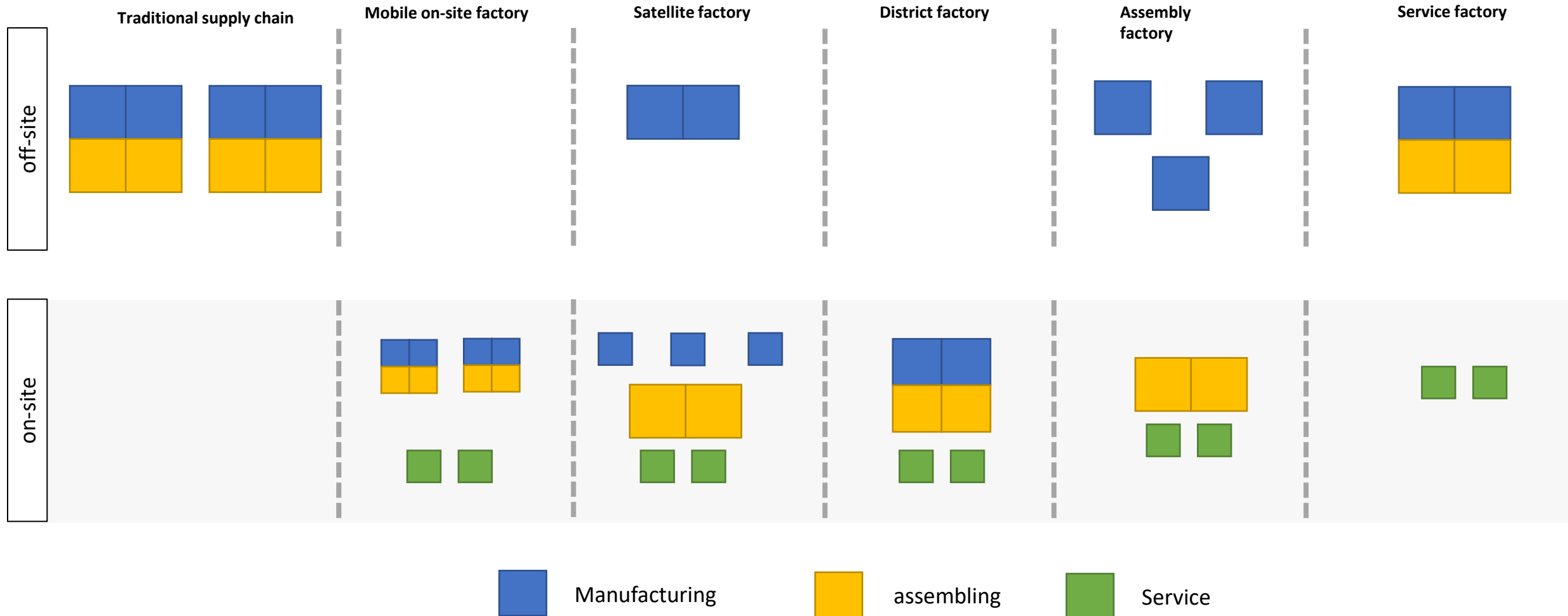


# Implementation

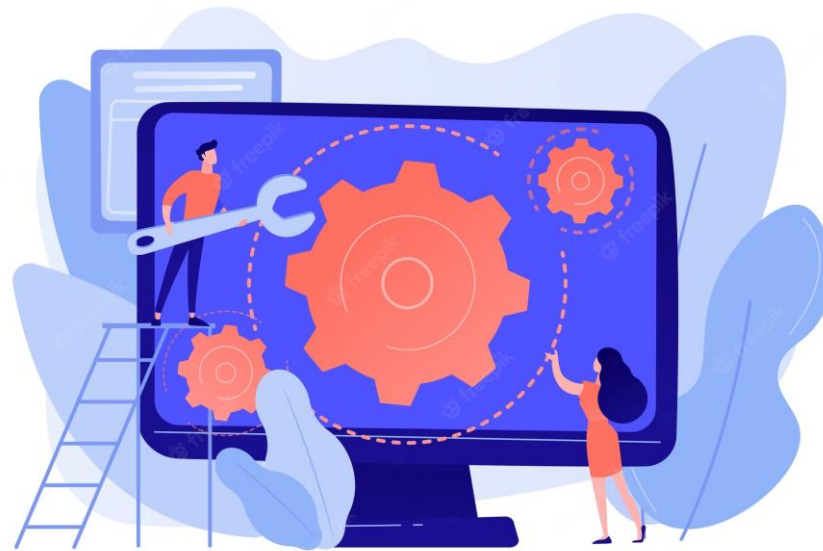


- Implementation and the success of this concept highly depends **on the maturity and the readiness of the local or even national markets.**
- The implementation can differ in **a wide range, from pop-up services to fully operational pop-up factories.**

# How? scenarios

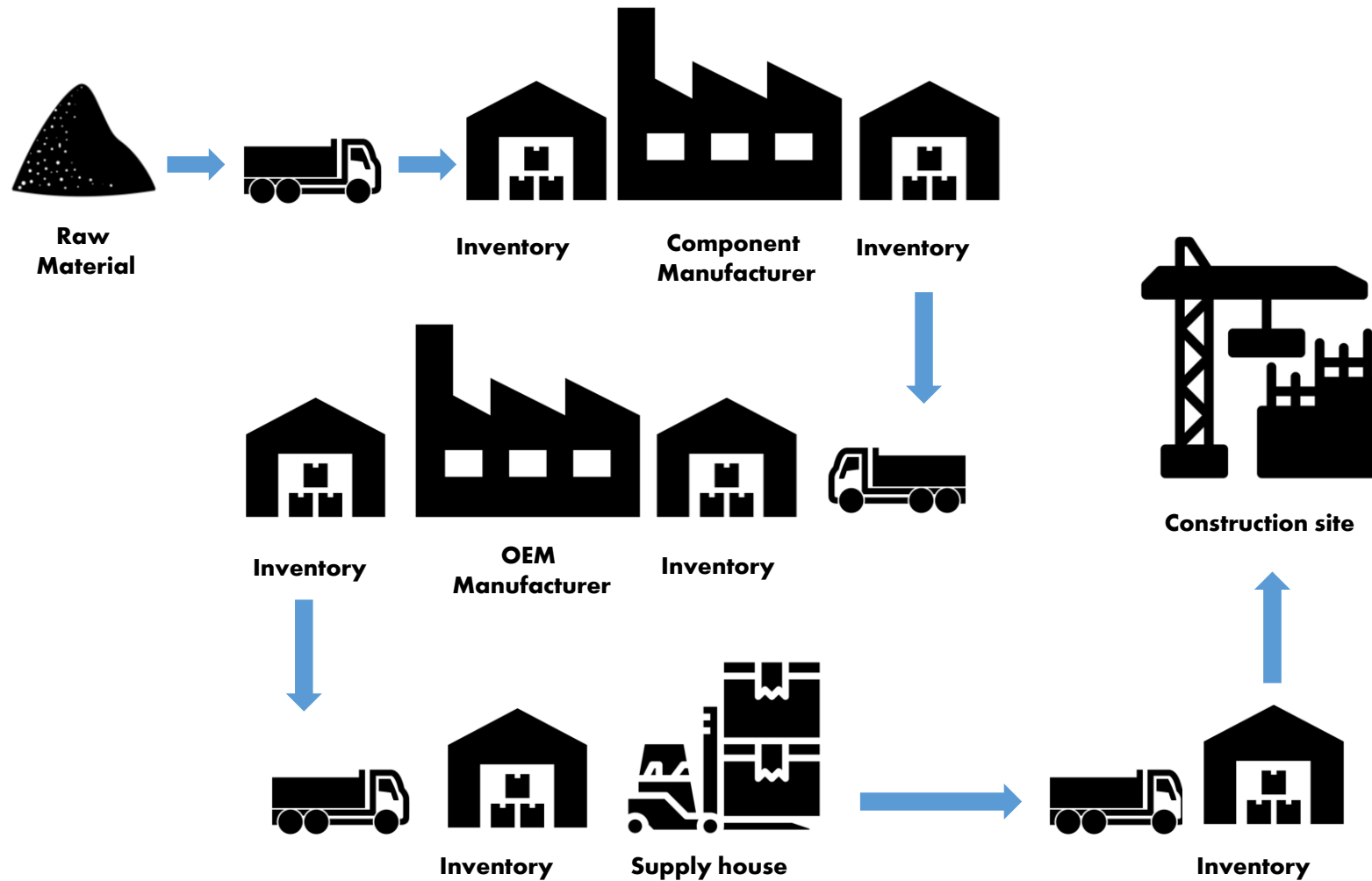


# Service

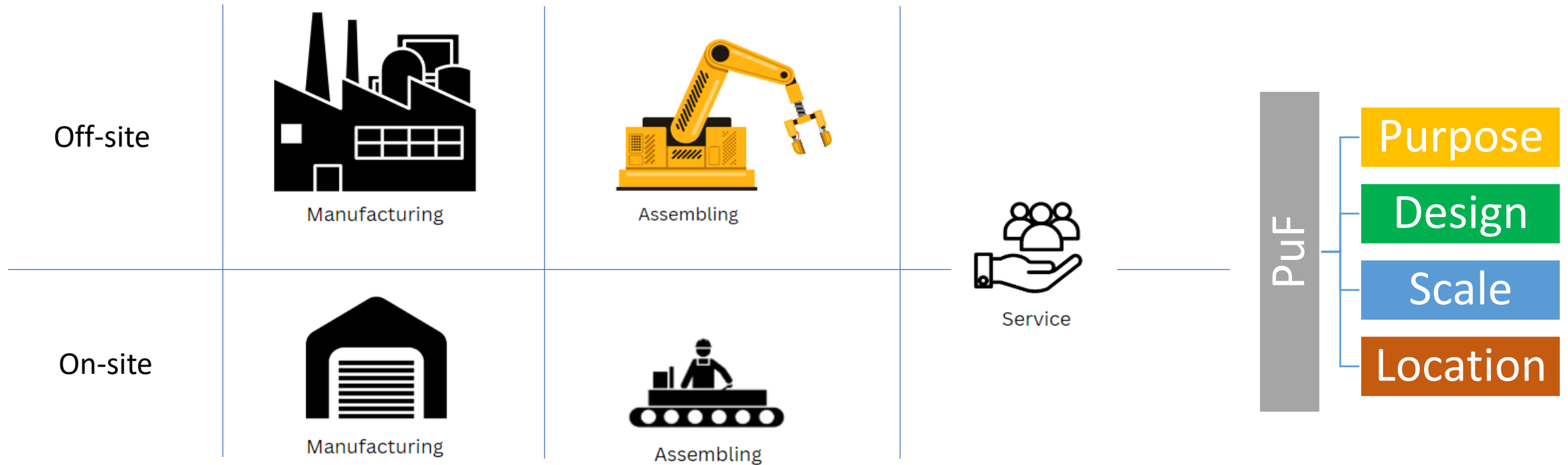


**Market Activation Platform**

# Traditional factory

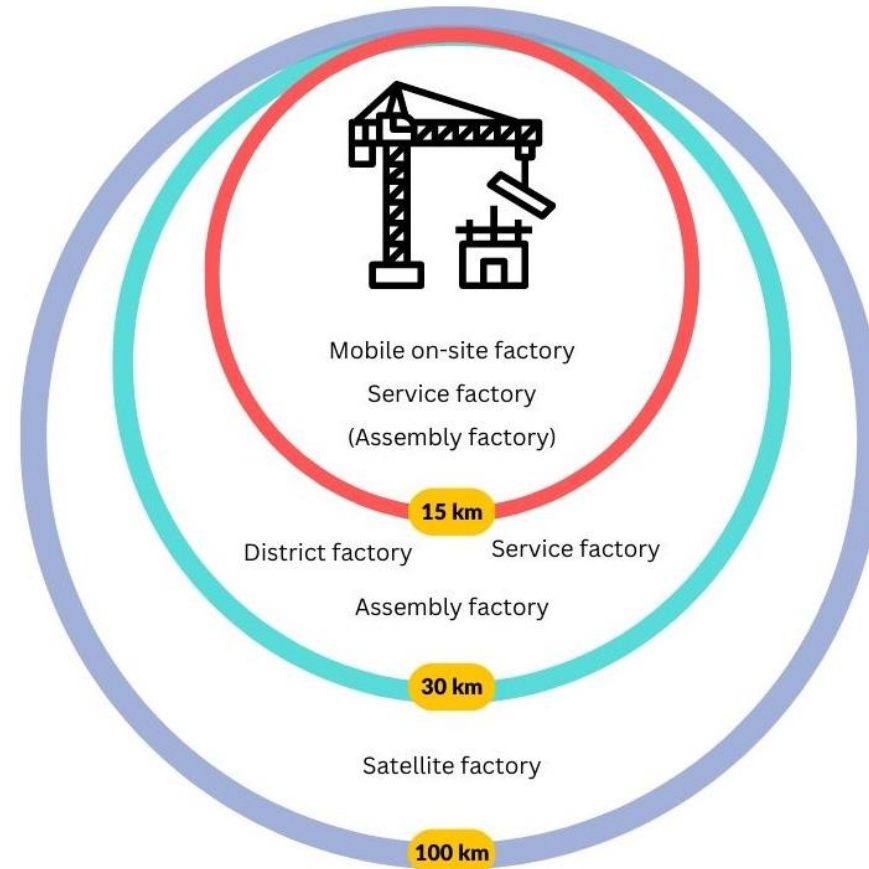


# Scenarios



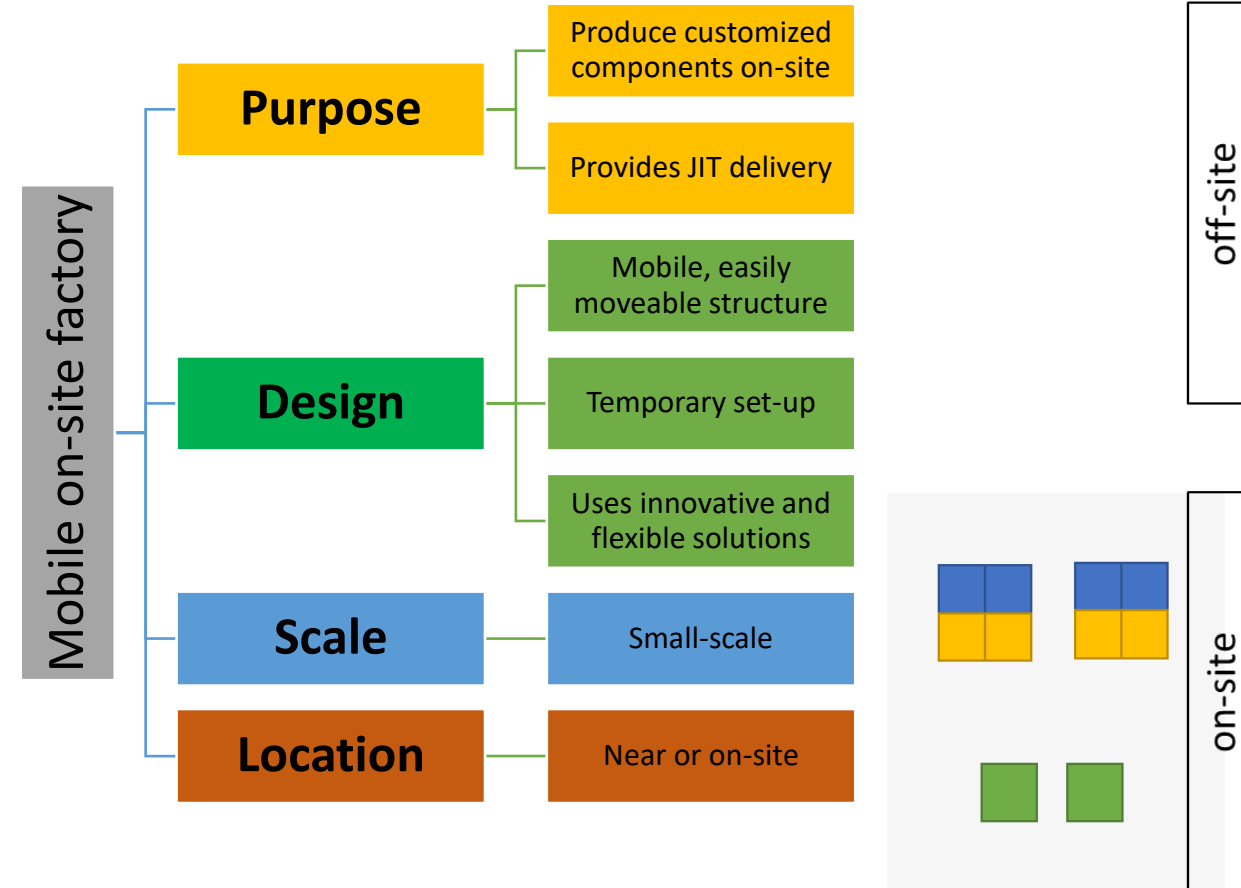


# Proximity



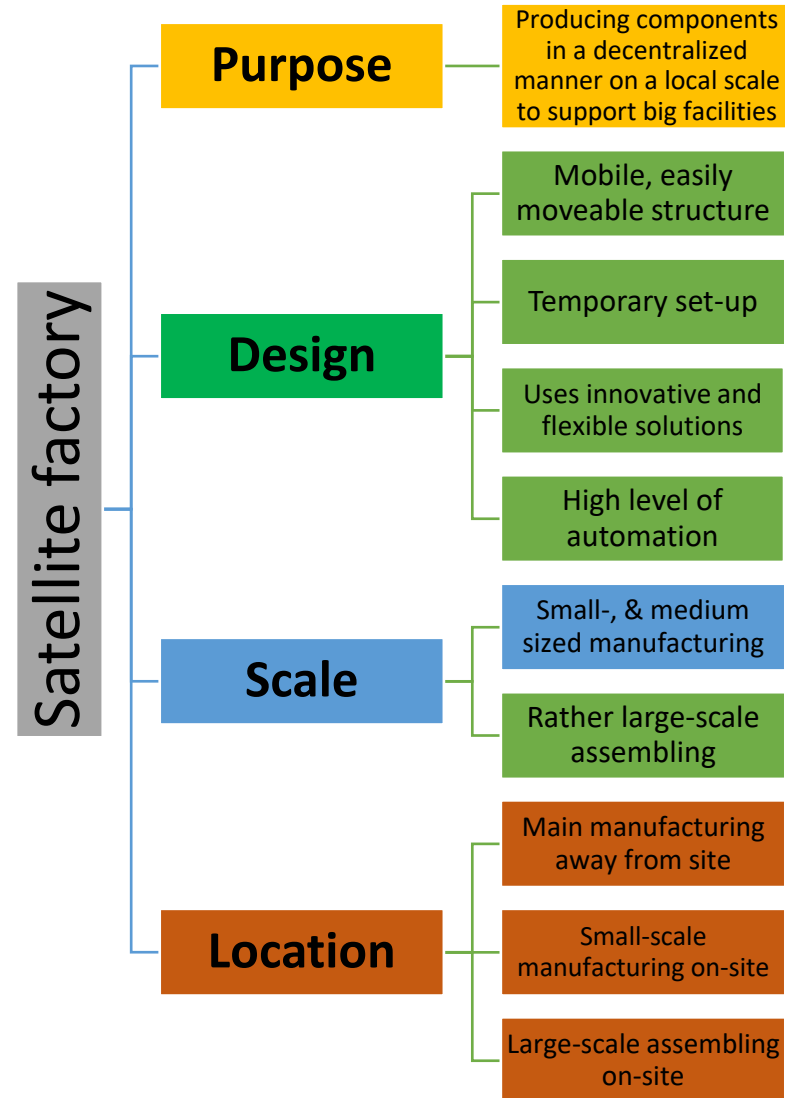
# Mobile on-site factory

- Fully functional mobile mini-factories or mobile production cells at the construction site
- Flexibility and scalability
- Instead of long distances, frequent transports, or high quantities of materials to be shipped
- Includes manufacturing, assembling, and providing services on a small-scale basis
- Just-in-Time (JIT) delivery



# Satellite factory

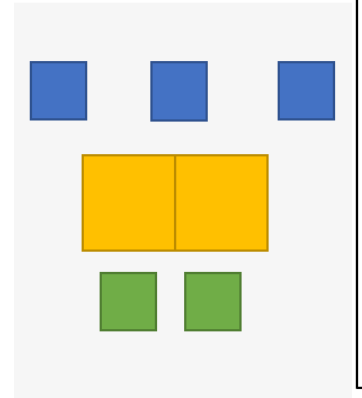
- A central production facility
- Collaboration with small-scale local production facilities or construction SMEs
- Support local production by providing knowledge, skills and tools
- Specifications depend on the needs of projects
- Often tailor-made production or assembly
- Designed to be self-sufficient



Satellite factory



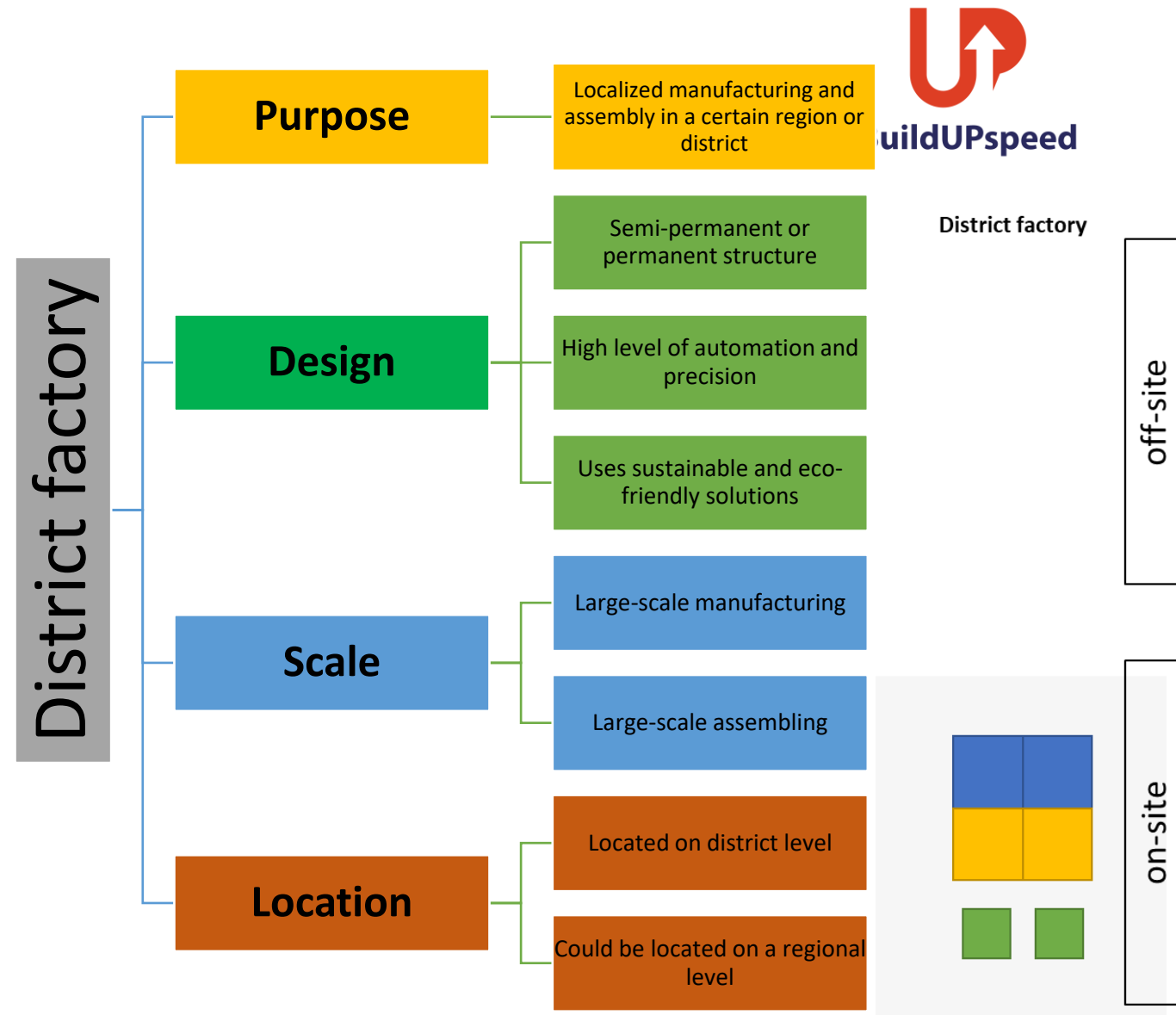
off-site



on-site

# District factory

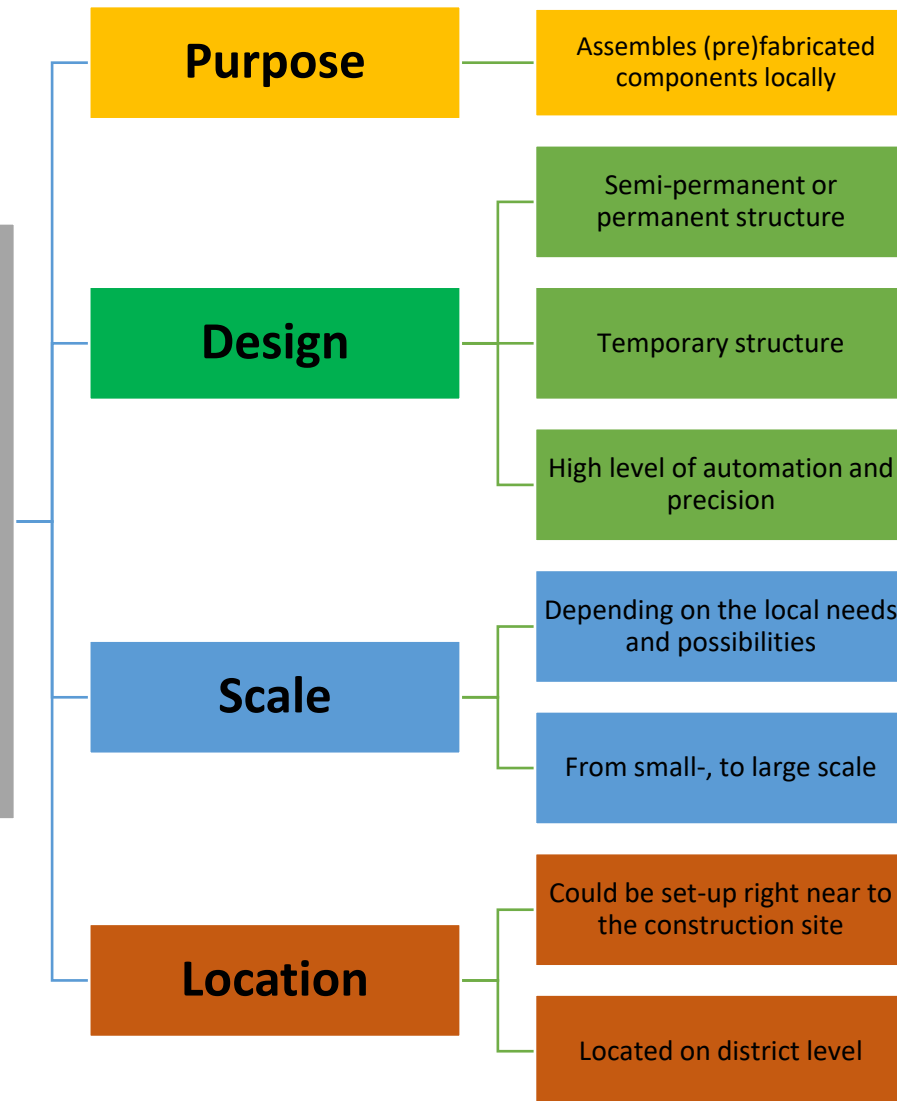
- A centralized manufacturing and assembly facility
- Serves multiple construction projects within a particular geographic area or district
- Located in industrial areas or other locations with easy access to transportation networks
- Designed to produce a variety of prefabricated components
- Acts as a 'system integrator', typically working on individual projects and bringing together stakeholders



# Assembly factory

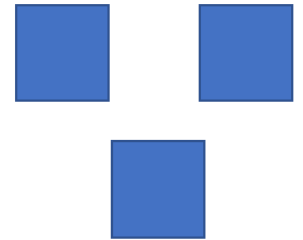
- Installed on-site or at the district level to assemble prefabricated components
- Off-site manufacturing and on-site or nearby assembly facilities.
- Unification of the manufacturing process
- Allowing different SMEs and local industries to provide components
- JIT delivery

## Assembly factory

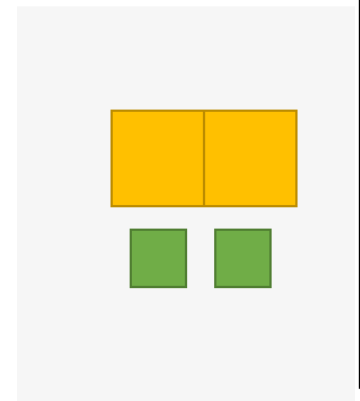


**BuildUPspeed**

Assembly factory



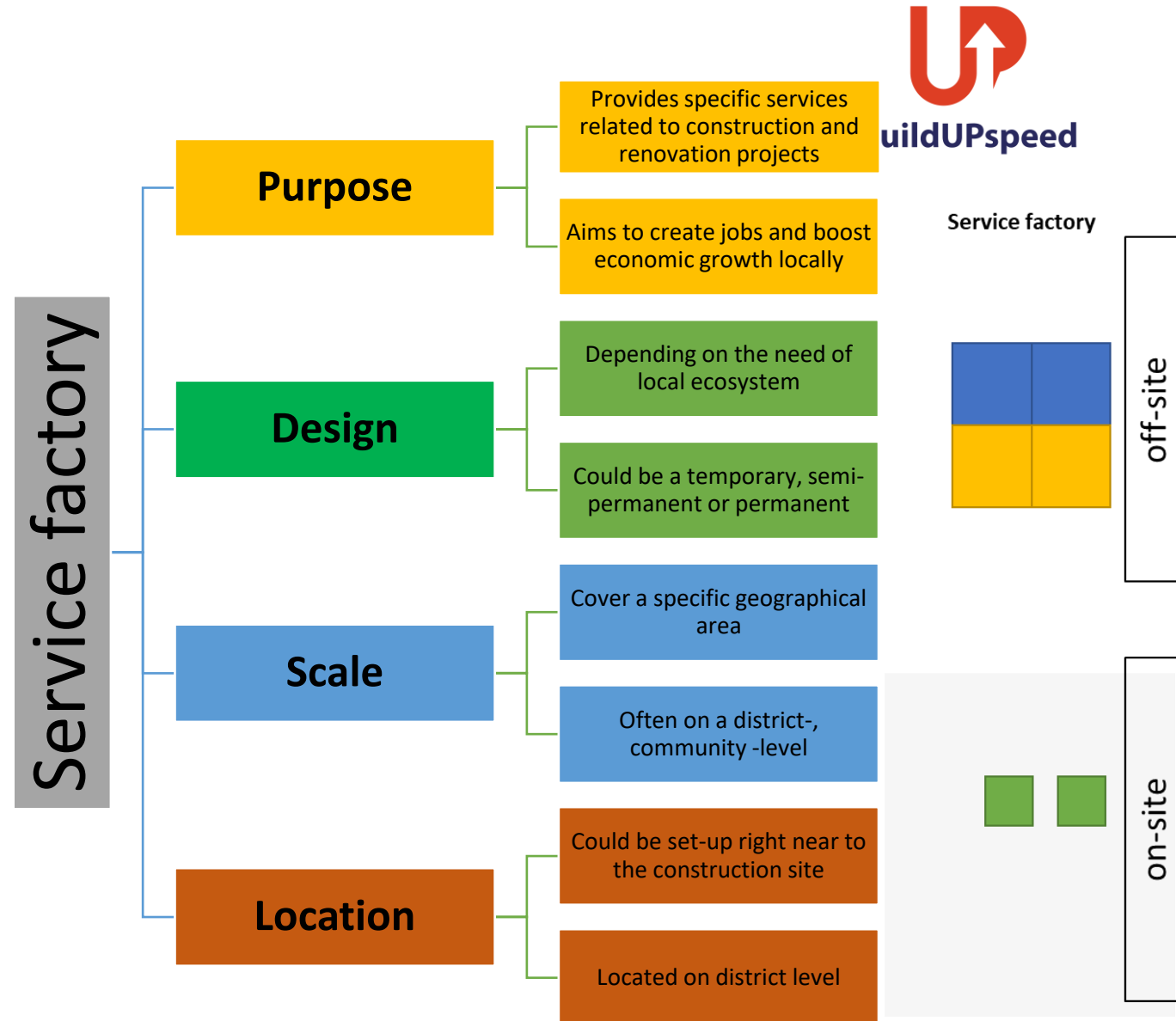
off-site



on-site

# Service factory

- Offer specific services, support, and advice
- Acting as intermediaries
- Promoting and accelerating the adoption of new technologies and practices
- Provide accessible support, connect suppliers with local communities
- Located/designed in a variety of settings



# Examples – Dutch ecosystem

## Mobile on-site factory

- On-site recycling of concrete
- Specific concrete recipe
- Kerkrade, Netherlands
- Circular concrete was used for three housing units
- Alternative to prefabricate the structural elements



Mobile on-site factory for producing circular concrete



Structural elements made of circular concrete

	Mobile on-site factory
<b>Purpose</b>	
Produces customized components on-site	✓
Provides JIT delivery for specific projects	✓
<b>Design</b>	
Mobile, easily transportable structure	✓
Uses innovative and flexible manufacturing processes	✓
<b>Scale</b>	
Small-, medium-scale manufacturing	✓
Small-, medium-scale assembling	✓
<b>Location</b>	
Near the construction site (on-site)	✓

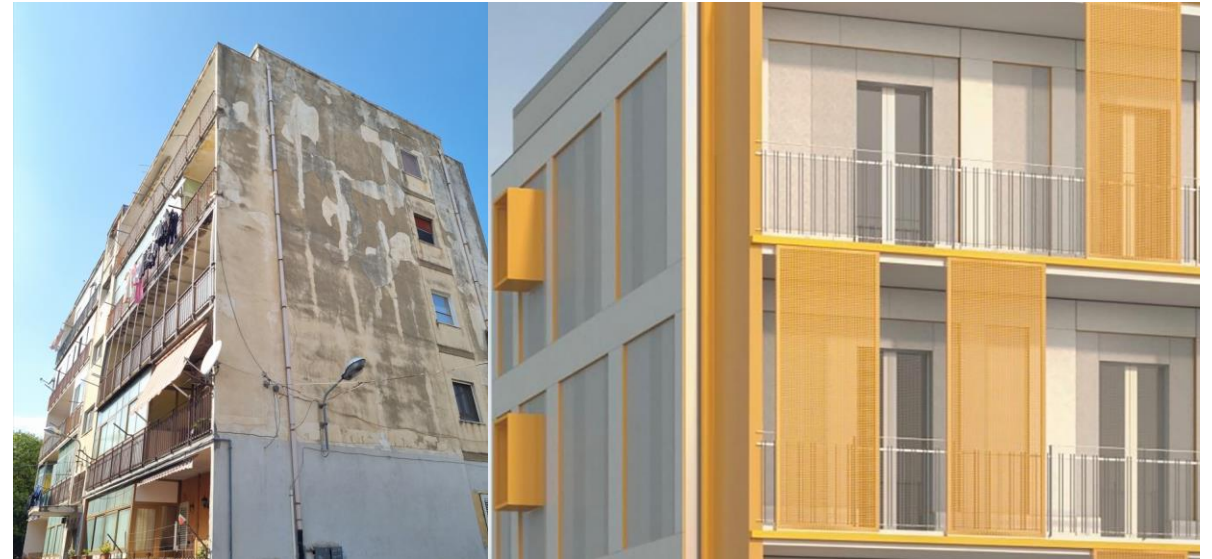




# Examples – Dutch ecosystem

## Satellite factory

- WEBO as central manufacturer working with University of Catania (UoC) and local construction companies
- Renovation in Sicily
- Specifics are designed by WEBO and UoC and shared with local builders who manufacture the facades
- High level of flexibility, scalability & automation
- Alternative to prefabricate the structural elements



	Satellite factory
<b>Purpose</b>	
Supports larger manufacturing facilities by producing components or products in a more decentralized manner on a local scale	☑
<b>Design</b>	
Temporary structure	☑
Uses innovative and flexible manufacturing processes	☑
High level of automation and precision	☑
<b>Scale</b>	
Small-, medium-scale manufacturing	☑
Large-scale assembling	☑
<b>Location</b>	
District level	☑
Within proximity (regional level)	☑
Off-site (away from construction site)	☑

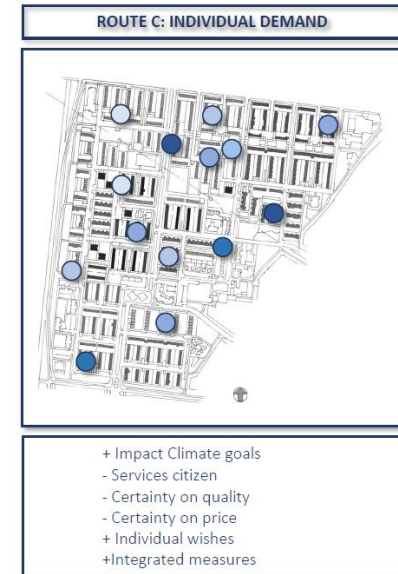
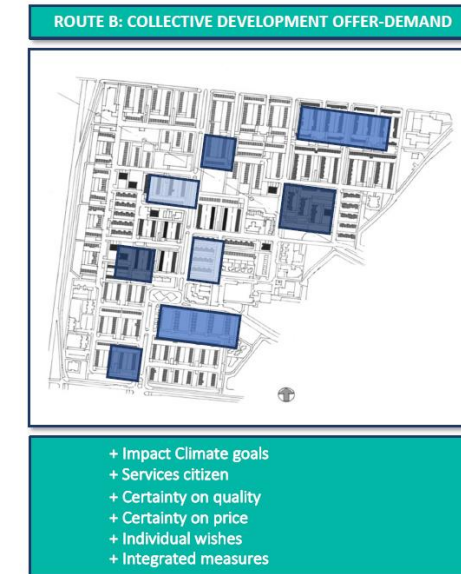
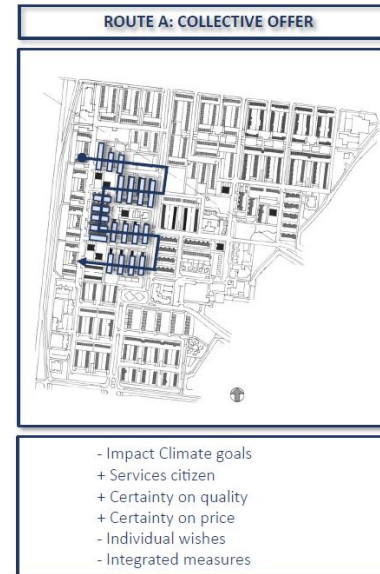


# Examples – Dutch ecosystem



## District factory

- Mobiele Buurtfabriek
- Development of renovation modules for target building types
- Digital platform to coordinate activities
- Standardizing the deep-renovation process and orchestrating the supply chain
- Depending on actual demand, direct contact is sought with relevant system integrators and module suppliers
- Traveling 'circus' – goes where the demand is



	District factory
<b>Purpose</b>	
Provides localized manufacturing and assembly of construction components and systems in a certain region or district	☑
Aims to create jobs and boost economic growth locally	☑
<b>Design</b>	
Semi-permanent structure	☑
Uses sustainable and eco-friendly solutions	☑
<b>Scale</b>	
Large-scale assembling	☑
<b>Location</b>	
District level	☑
Within proximity (regional level) – max 50 km from key suppliers	☑

# Examples – Dutch ecosystem

## Assembly factory

- BAM's housebuilding and deep-renovation system
- Prefabricated elements and on-site assembly to construct Dutch houses
- Adaptations to serve deep renovation actions as well
- Central coordination while assembly team moves from site to site
- Standardized off-site manufacturing and on-site construction



	Assembly factory
<b>Purpose</b>	
Assembles (pre)fabricated components locally	✓
<b>Design</b>	
Semi-permanent structure	✓
Temporary structure	✓
High level of automation and precision	✓
<b>Scale</b>	
Large-scale assembling	✓
<b>Location</b>	
Near the construction site (on-site)	✓
District level	✓



# Examples – Dutch ecosystem



## Service factory

- Reimarkt - provides renovation options for individuals and housing associations based on their personal situations through online consultancy.
- Woonzijnwinkel – provides advise for sustainable renovation and energy efficiency along with having a showroom. Functions as a liaison between residents and municipalities.
- Verbeterjehuis – platform to plan and design energy efficiency improvements. Possibility to ask for a digital twin of the building. Connects contractors with residents.



## All improvement options in a row

What can you do to make your home sustainable and energy efficient? Discover the benefits, tips and experiences of others per option.



Show all improvement options ↓

	Service factory
<b>Purpose</b>	
Provides specific services related to construction and renovation projects	☑
Aims to create jobs and boost economic growth locally	☑
<b>Design</b>	
Semi-permanent structure	☑
Permanent structure	☑
<b>Scale</b>	
District-, community-level service	☑
<b>Location</b>	
District level	☑
Within proximity (regional level)	☑



# BuildUPspeed

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## Thank you for your attention!

**Mohamed Elagiry**  
mohamed@demobv.nl



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# The Pop Up Factory BauKarussell Social Urban Mining in Practice

*Markus Meissner, Austrian Institute of Ecology*

*ISEC Conference 2024*

*Graz*



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# BauKarussell as a Start-Up



Research and Development



Consulting



Start Up for Social Urban Mining



BauKarussell

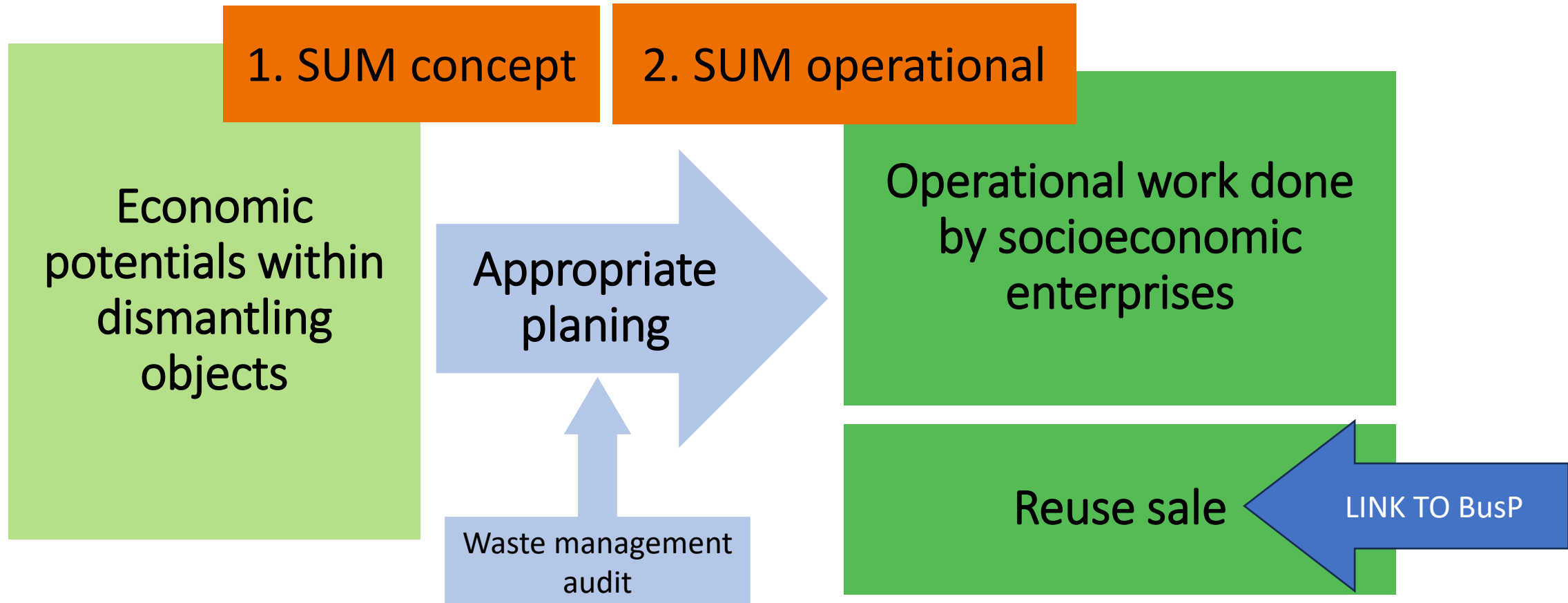


# A bunch of challenges for more circularity in the construction sector



- Crack a well established value chain
- Deal with time limits
- A lack of terms
- Unsolved Warranties and liabilities
- Economic aspects
- Lack of demands and needs
- Socioeconomic enterprises as partners
- Waste management act
- Limitations due to other acts (like F-Fluids, Electronics)
- Data need for planers (like for BIM-applications)
- Storage
- Market place
- And, and, and .....

# The concept “Social Urban Mining”



... BauKarussell is the first start up to realize the concept of social urban mining.

# SUM in Practice



BuildUPspeed



© Jobtransfair



© BauKarussell

# PuF Concept Mobile on-site factory



BauKarussell's reuse activities run...

- in coordination with the project developer
- In a defined Time frame
- With promotion activities

The indicators for the concept:

- ...temporarily using entirely functioning mobile mini factory at the site of need or consumption
- highly flexible and scalable design (easy adaptable)
- Idea for situations with long distances and a large number of transports or high quantities of materials to be shipped
- Avoid logistics costs, since the fabrication of components happens on site



# PuF: Re-Use Box Villach

Former military barrack  
on Behalf of Austrian Federal Army

Time frame: Winter 2023/24

Social economic partner:  
Schindel&holz (Tyrol)

Project app. 100.000m<sup>2</sup> BGF





# PuF Concept Mobile on-site factory

Existing  
Building  
stock



# PuF Concept Mobile on-site factory



Promotion in the surrounding area and via local network (also by the client) – Mail box flyer:

**BauKarussell**  
Beschäftigung & Kreislaufwirtschaft

## Die Hensel-Kaserne wird zur Re-Use Box!

**16. - 17. Februar 2024**

Fr 9 - 18 Uhr  
Sa 9 - 17 Uhr

**Hensel-Kaserne**  
Obere Fellacher Straße 60-69  
9500 Villach

Es werden Zeitfenster im  
2-Stunden-Takt vergeben.

Bei Schlechtwetter wird ein  
Ersatztermin bekanntgegeben.

Voranmeldung unter  
[office@baukarussell.at](mailto:office@baukarussell.at)  
erforderlich

### Weiterverwendung statt Verschwendung:

Die Hensel-Kaserne wird schrittweise rückgebaut und abgetragen. Die gesamte Ausstattung steht zum Verkauf:

Möbel, Gastronomie-Ausstattung, Garagen, Tore und Baumaterial aus dem Fundus der Hensel-Kaserne zu günstigen Preisen erhältlich!

### Gegen fachgerechten Selbstabbau und Abholung!

Haftung und Gewährleistung entsprechend unserer Allgemeinen Geschäftsbedingungen, dem Konsumentenschutzgesetz und dem Verbrauchergewährleistungsgesetz.

### Über BauKarussell

Mit Social Urban Mining setzt BauKarussell kreislaufwirtschaftliches Handeln in der Bauwirtschaft um und schafft damit integrative Beschäftigung und Qualifikation.

In Kooperation mit dem  
Österreichischen Bundesheer



Das buildUPspeed-Projekt wurde im Rahmen des LIFE Programms der Europäischen Union durch den Vertrag Nr. 101075843 gefördert.

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# PuF Concept Mobile on-site factory



Installed Re-Use Box for three days (then followed by pick-up by arrangement)





# PuF Concept Mobile on-site factory



Re-Use spotlight





# PuF Concept Mobile on-site factory

Dismantling of three  
Wooden barracks



# Impacts since 2015

Extend lifetime of  
components and  
materials

Create qualification &  
employment

Advance the  
second hand market

1.749 t  
Material

45.000 h  
Working hours

733 t  
Second life products



## Social Urban Mining ...

- ... makes waste visible – it becomes valuable
- ... conserves resources and reduces energy demand
- ... creates social economy jobs and qualification
- ... needs local social economy partners for the operational work
- ... work is co-financed from the proceeds of the sale



# BuildUPspeed

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## Thank you for your attention!

 Österreichisches  
Ökologie-Institut

BauKarussell

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# Introduction World Cafè



The BuildUPspeed project has received funding from the LIFE programme of the European Union under Grant Agreement no. 101075843.

# Workshop guidelines



- We have organized 4 World café tables to discuss the different types of Pop-UP factory.
- **Step 1** Take a moment to review the information on the PuF models on the printed BuildupspeedA4 leaflet

# Workshop guidelines



- **Step 2** select the pop-up factory of interest and head to the right World café table, we have prepared one per each of the following type:
  - Mobile on-site factory
  - Satellite factory
  - District factory
  - Assembly factory



# Workshop guidelines



- **Step 3** contribute to the SWOT matrix exercise at the selected PuF table for 15 min;
- **Step 4** Change table and head to another Pop up factory of interest and work on the SWOT matrix for the next 15 min;

# Workshop guidelines



- **Step 5** Don't forget to sign the registration attendance list at each World café table;

Thank you!