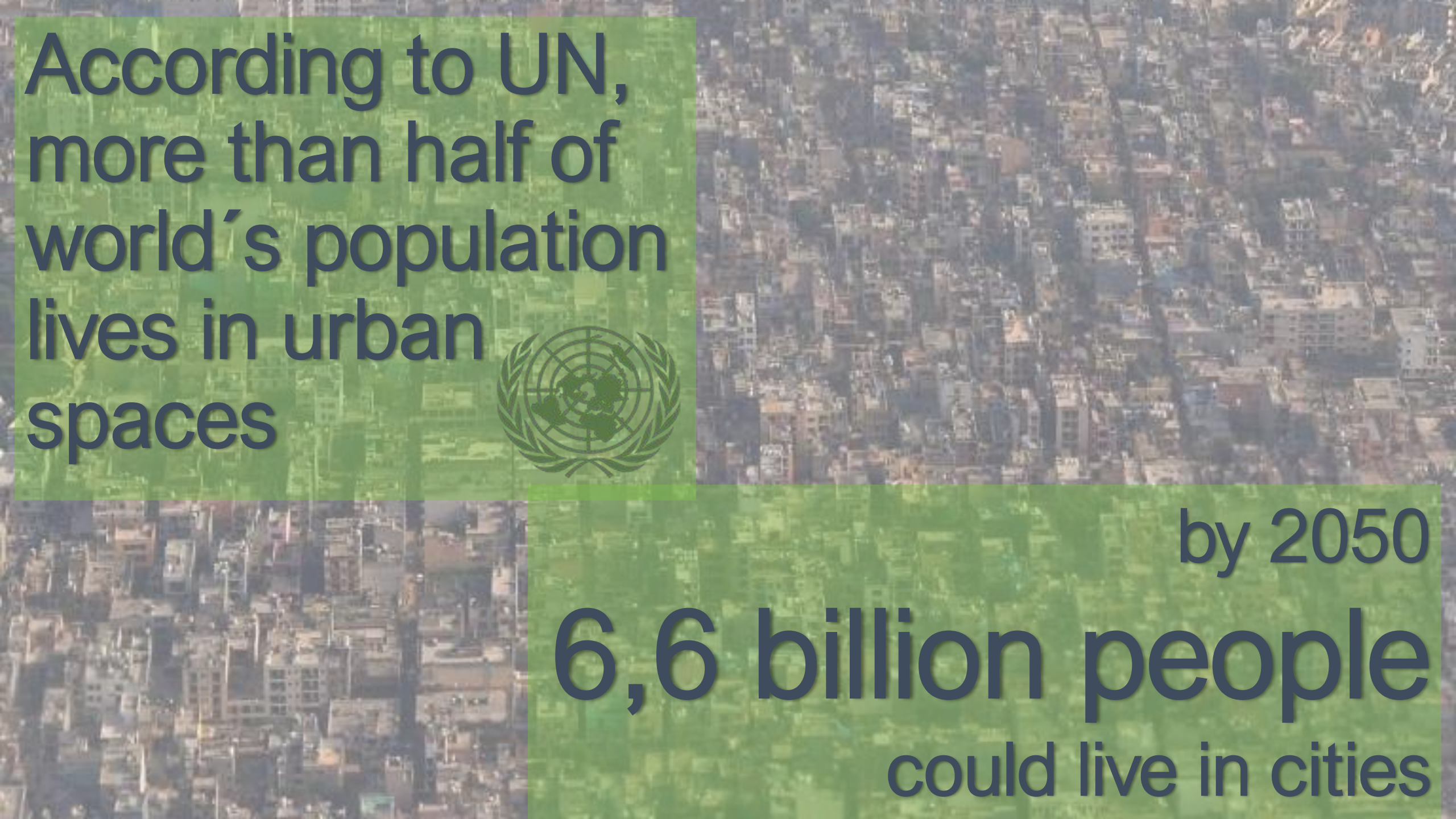
Urban outdoor bio-based materials

The AMBIANCE project approach

Dr. Gemma Ibarz- Ric, Project Coordinator

EUBCE 2024, Circular Value Chains for Bio-based products,
26th June, Marseille (France)

THE CONCEPT


According to UN, more than half of world´s population lives in urban spaces
by 2050
6,6 billion people
could live in cities

Policies addressing urban sustainable development

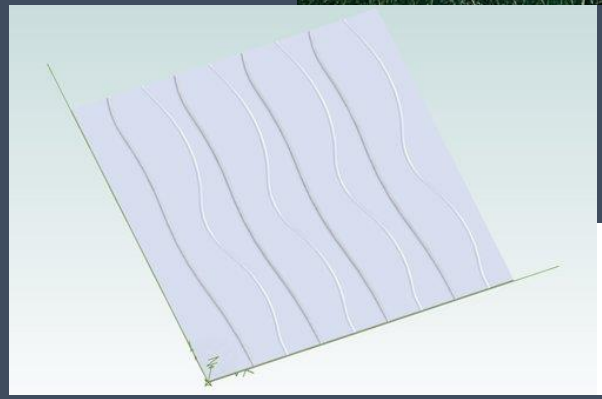
Make cities inclusive, safe, resilient and sustainable

Products to develop

- Recyclable artificial turf from bio-thermoplastics and bio-materials of natural origin

- Street furniture made by 3D printing from bio-based materials

- Decorative panels using agricultural waste streams



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The call: European Call Horizon Europe CL4 Digital, Industry and Space

TWIN TRANSITION

Waste Management

Recycling Technology

Circular Economy

Material tracking

Supply Chain

Machine Learning

Artificial intelligence

Sensors

Block chain

Quantum computing

Internet of Things

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Our approach

More digitized processes

More environmentally friendly materials and products

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Our approach: objectives

Optimisation of manufacturing processes using digital technologies

More digitized processes

More environmentally friendly materials and products

Development of advanced bio-based products with similar characteristics and properties to oil-based raw materials

-extrusion
-large-scale additive manufacturing
-compression moulding

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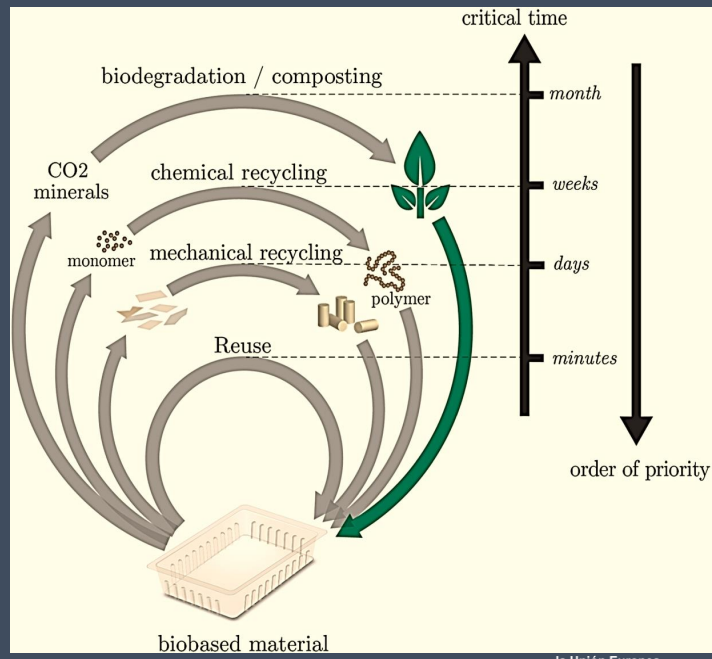
CHALLENGES

The challenges

1.- Resistance to Weathering: Rain, Wind, Frost _ LONG LIFESPAN

2.-End of life: Recyclability /reuse

3.- Implementation of digital models (data, physical) in fabrication



ACHIEVEMENTS ADDRESSING THE CHALLENGES

Results to date

1.-
Resistance to Weathering: Rain, Wind, Frost _ LONG LIFESPAN

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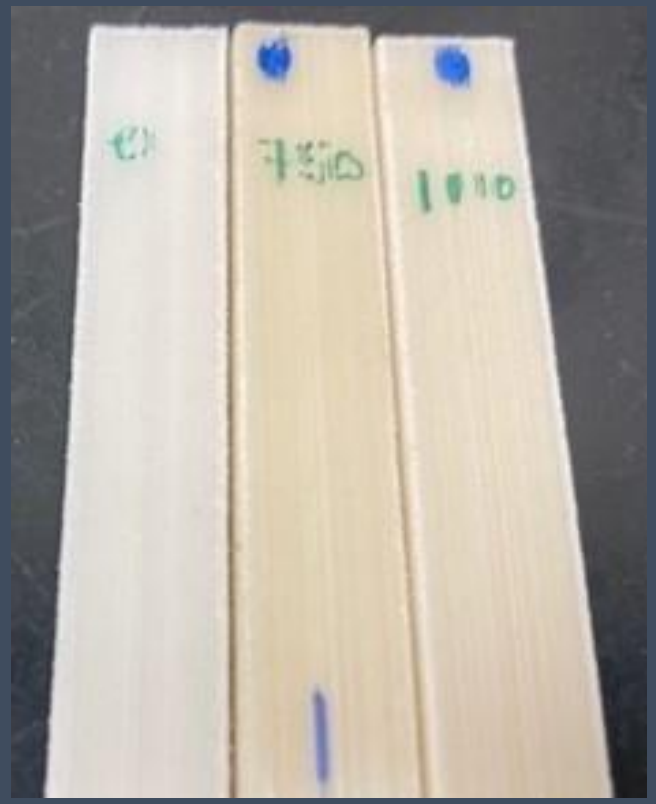
No discoloration of PLA under harsh weathering conditions



Slight colour deviation after exposure

750 h vs 1 year (real exposure)

Good visual matching between climatic chamber and real exposure

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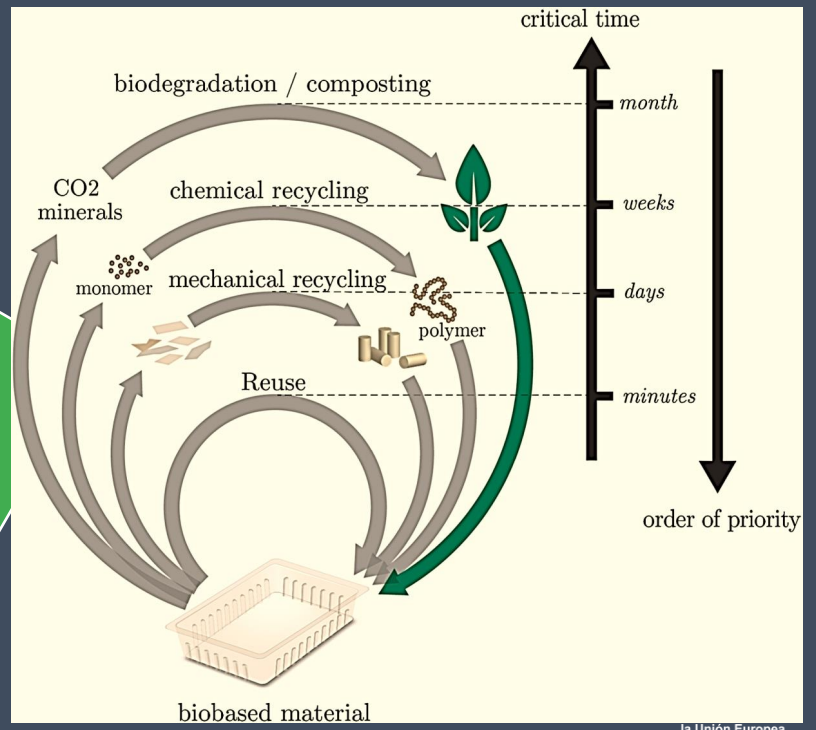
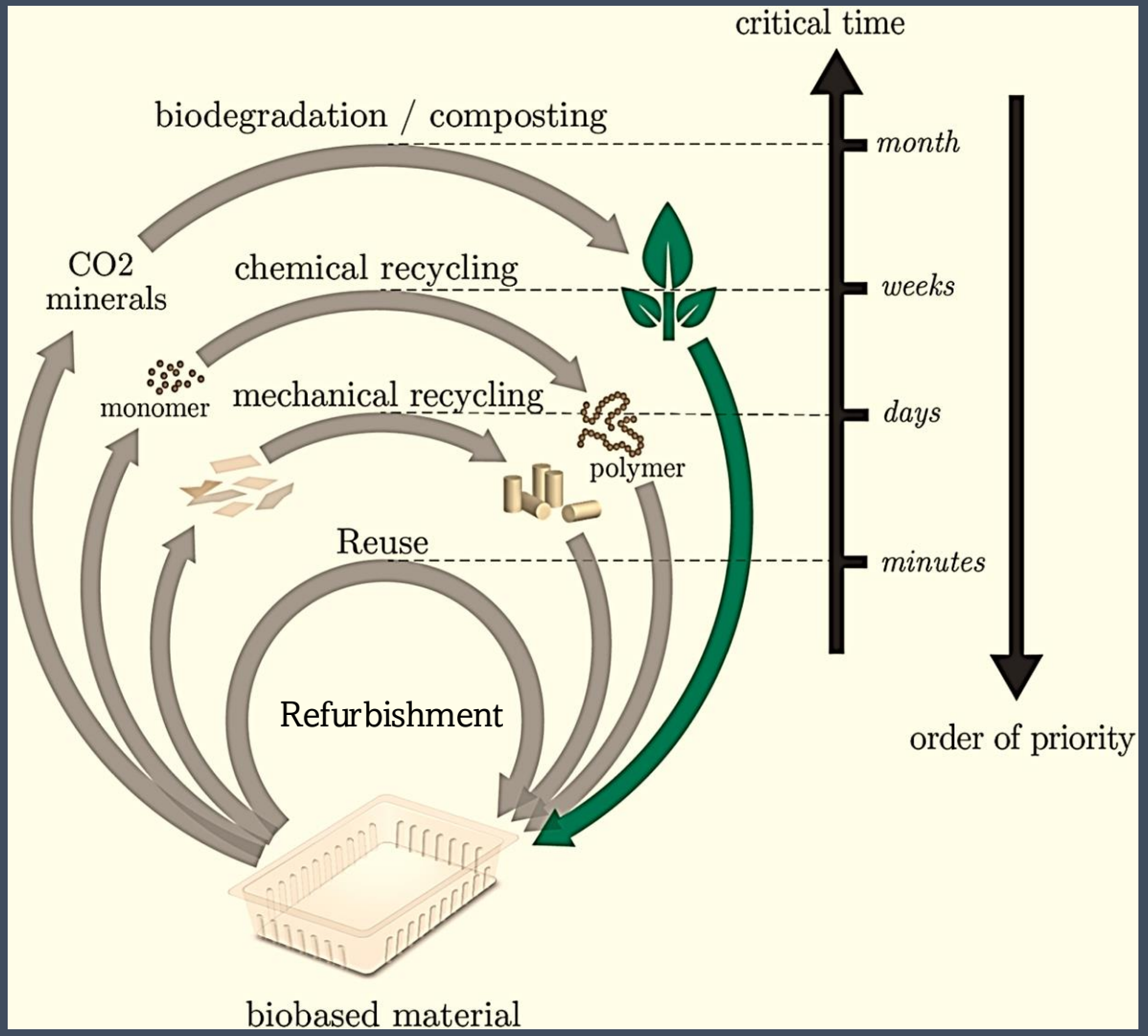
Results to date

2.-End of life: Recyclability /reuse



End of life scenario: extend the loop

- Refurbishment
- Reuse/Repair
- Mechanical / Chemical Recycling
- Biodegradation and composting



Isabelle Dedieu, et al. Polymer Testing, Volume 111, 2022,

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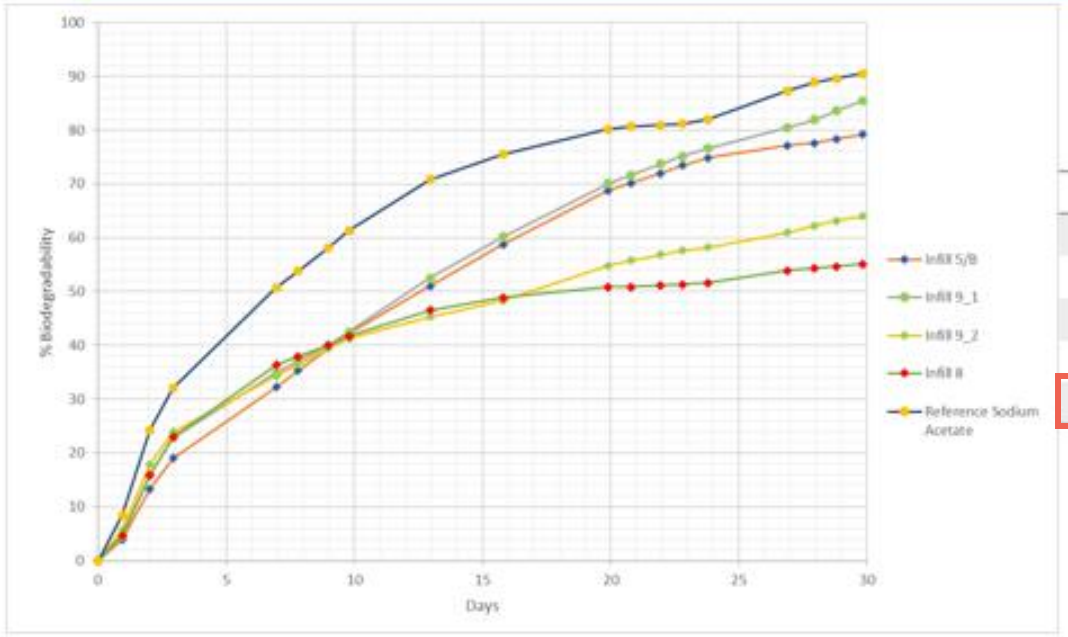
New biobased infills from artificial turf show high rates of biodegradability



% Biodegradability	
Sample	Day 28
Sodium acetate	88,92
Infill 8	54,37
Infill 9	72,10
Infill 5/B	77,58

Accelerated test in 28 days

The challenges

3.-
Implementation of digital models (data, physical) in fabrication

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Initial data acquisition , monitoring and analysis of results

Test setup

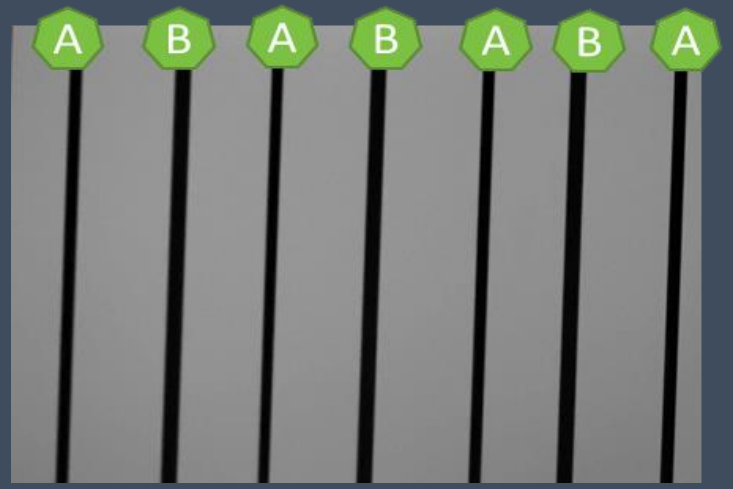
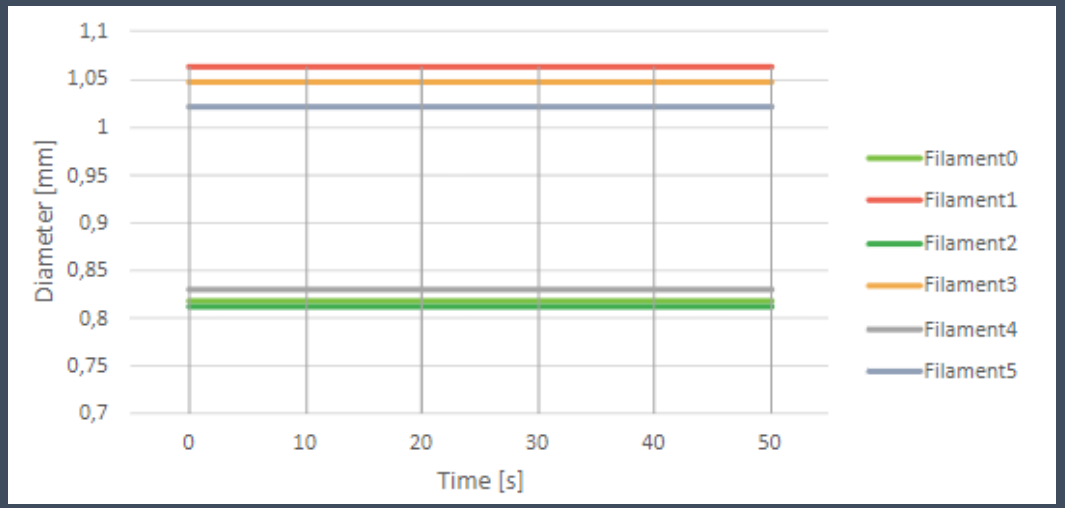


Image of filaments

Measurement of filaments' profiles



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Real time temperature monitoring during FPF deposition

Flir A70
Thermal Camera

EDGE COMPUTING FRAMEWORK

Nuvo-9160gc
NVIDIA A2000

Image acquisition

Image Processing

Control & Data communication

IOIO ↔ IOIO

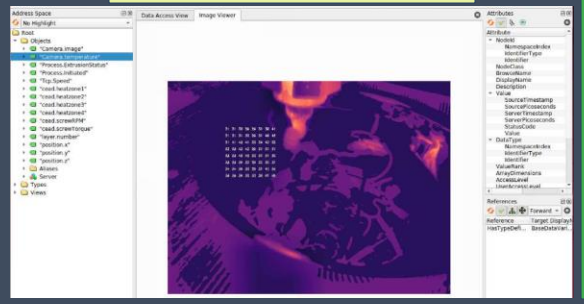
OPC-UA Server

coreIC

Data Storage

IOIO ↑↓ IOIO

UA Expert Client

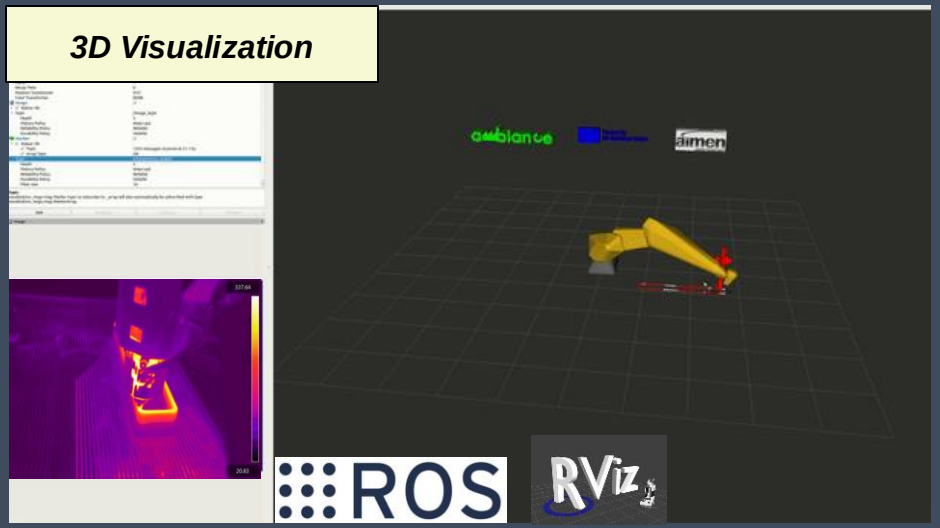


Large Format Additive Manufacturing Cell

PLC

CEAD
Robot+Printing head

3D Visualization



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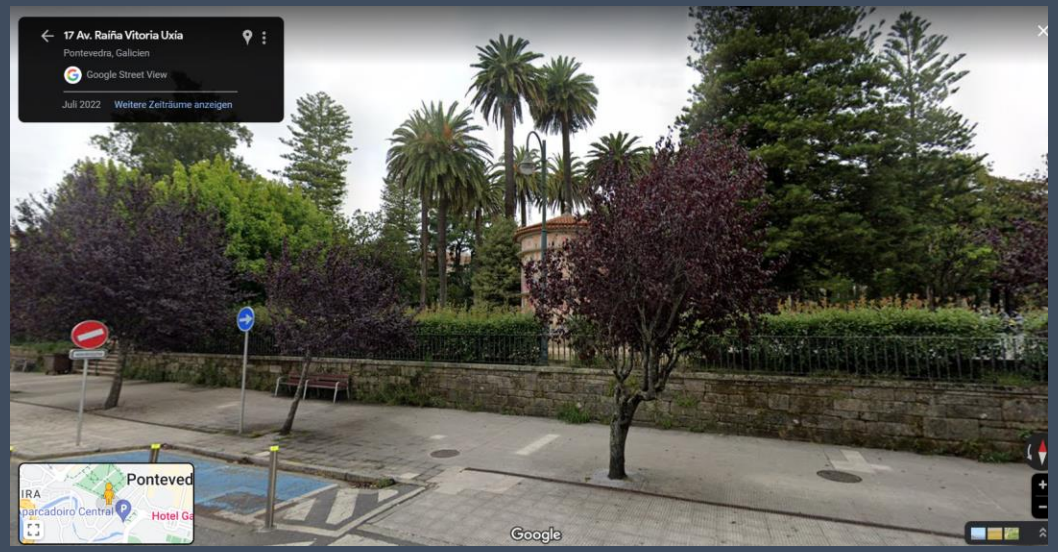
NEXT STEPS

Impact

Demo /showroom in the city of Pontevedra
(1st semester 2025)



Standardization

Demonstration and Assessment

Artificial grass pitches (grass carpet, infill)	Outdoor urban furniture	Decorative and construction products
Extrusion, bambury	Large scale additive manufacturing	Compression moulding

HORIZON RESULTS BOOSTER

European Commission

Go2Market strategies
Business plan, IPR

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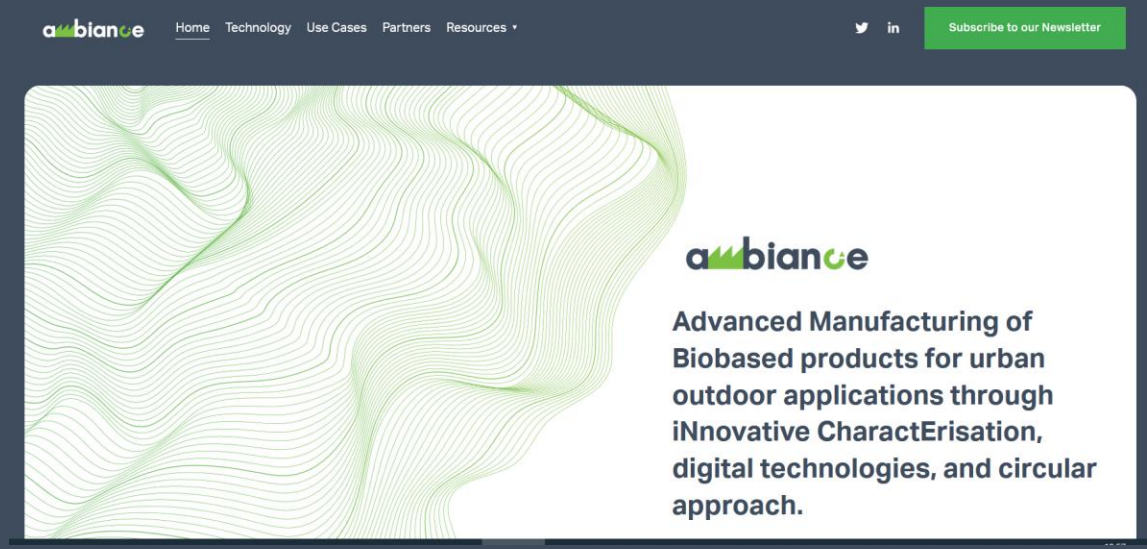
https://www.ambiance-project.eu/



https://mobile.twitter.com/AmbianceEu

Thank you!

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