Introducing RECONMATIC project – new solutions for **Construction and Demolition Waste Management**
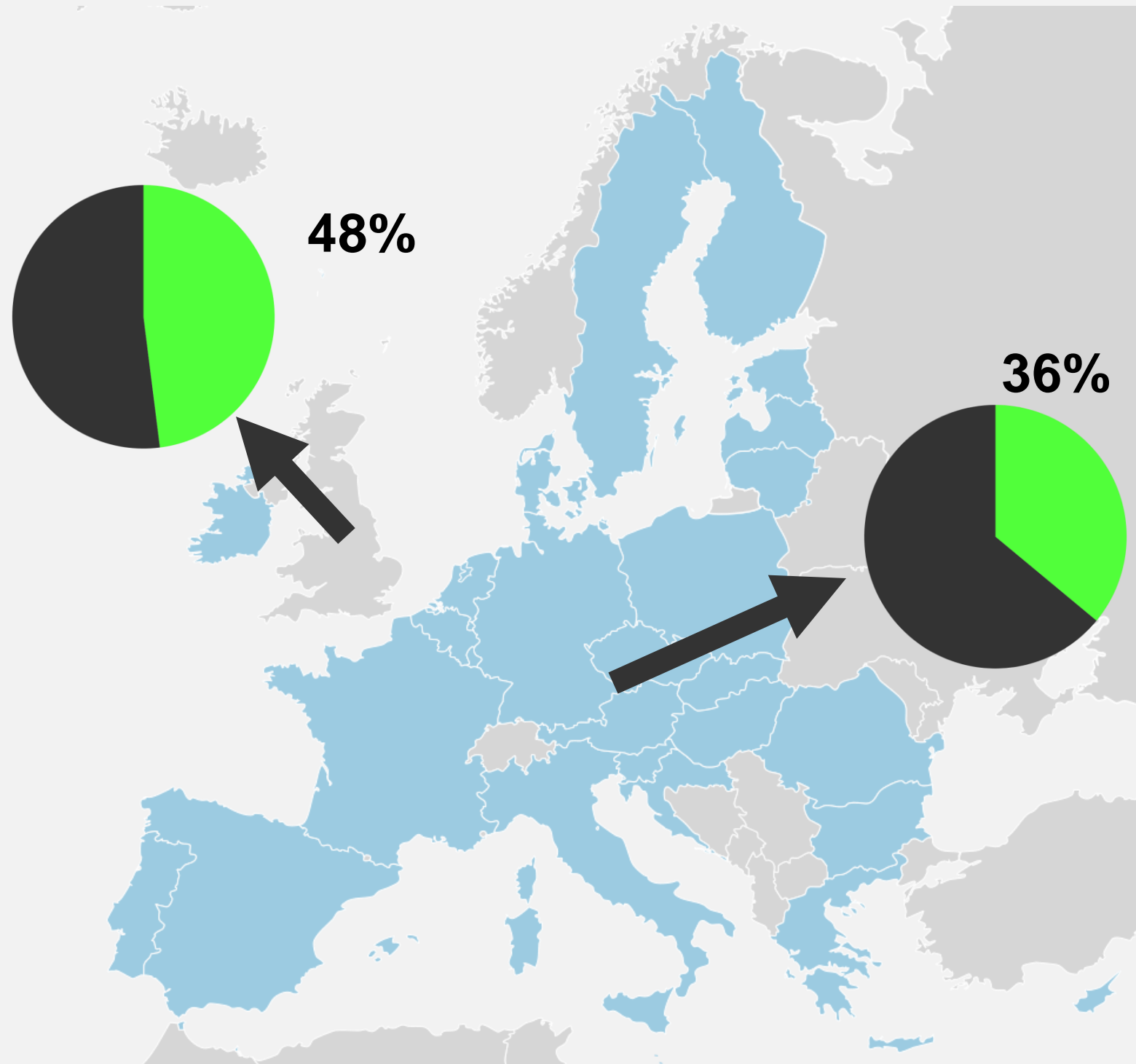
WP6 workshops, 2024

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WP6 workshops | Introduction

48%

36%

CONSTRUCTION AND DEMOLITION WASTE PROPORTION

- MORE THAN 10 BILLION TONNES IN THE WORLD
- 35%-65% OF LANDFILL VOLUME OCCUPATION
- CHINA, US AND EU ARE THE BIGGEST PRODUCERS
- EU-28 RECOVERY RATE AROUND 90%
- MAINLY IN LOW VALUE USES
- CHALLENGES TO ACHIEVE :
    - THE NEW GREEN EUROPEAN DEAL
    - EU FRAMEWORK DIRECTIVE
    - ZERO ENERGY AND WASTE TARGETS BY 2050

AIM:

To identify the main challenges to successfully implement the principles of circular economy in CDW management and outline digital and automated solutions to be developed in the RECONMATIC project.

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WP6 workshops | Challenges

THE MATERIAL

■ High volume and weight of CDW

■ Increased pollutants

■ Waste segregation, heterogeneity and material degradation

■ Lack of technical data, specifications, QC and QA

■ Uncertainty with EoLS, selective demolition and waste impurities

■ Lack of accuracy with waste traceability and predictability

■ Low customer's confidence, use in low-value purposes

■ Competition with primary materials (e.g. CE marking is less restrictive)

DELIVERABLES

■ Barriers regarding availability, economics and acceptability

■ Bigger challenge for SMEs

■ Subcontracting

■ Fragmented waste value chain

■ Inefficient collaboration between stakeholders, lack of common understanding and vision

■ Difficulties to develop policies, standards and regulation

■ High reliance in human-operated machinery and manual work

■ Conservative sector, reluctant to change

■ Digital & automated solutions are low implemented, and very slowly

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Implementation of digital and automated solutions in the waste value chain can improve performance substantially and open realistic pathways for energy and waste zero targets from a bottom-approach

- Building Information Modelling (BIM)
- Geographic Information System (GIS)
- 3D printing
- Geo-spatial data analysis
- Artificial intelligence (AI)
- Virtual Reality (VR)
- Augmented reality (AR)
- Blockchain
- Internet of Things (IoT)
- Cybersecurity
- Robotics etc.
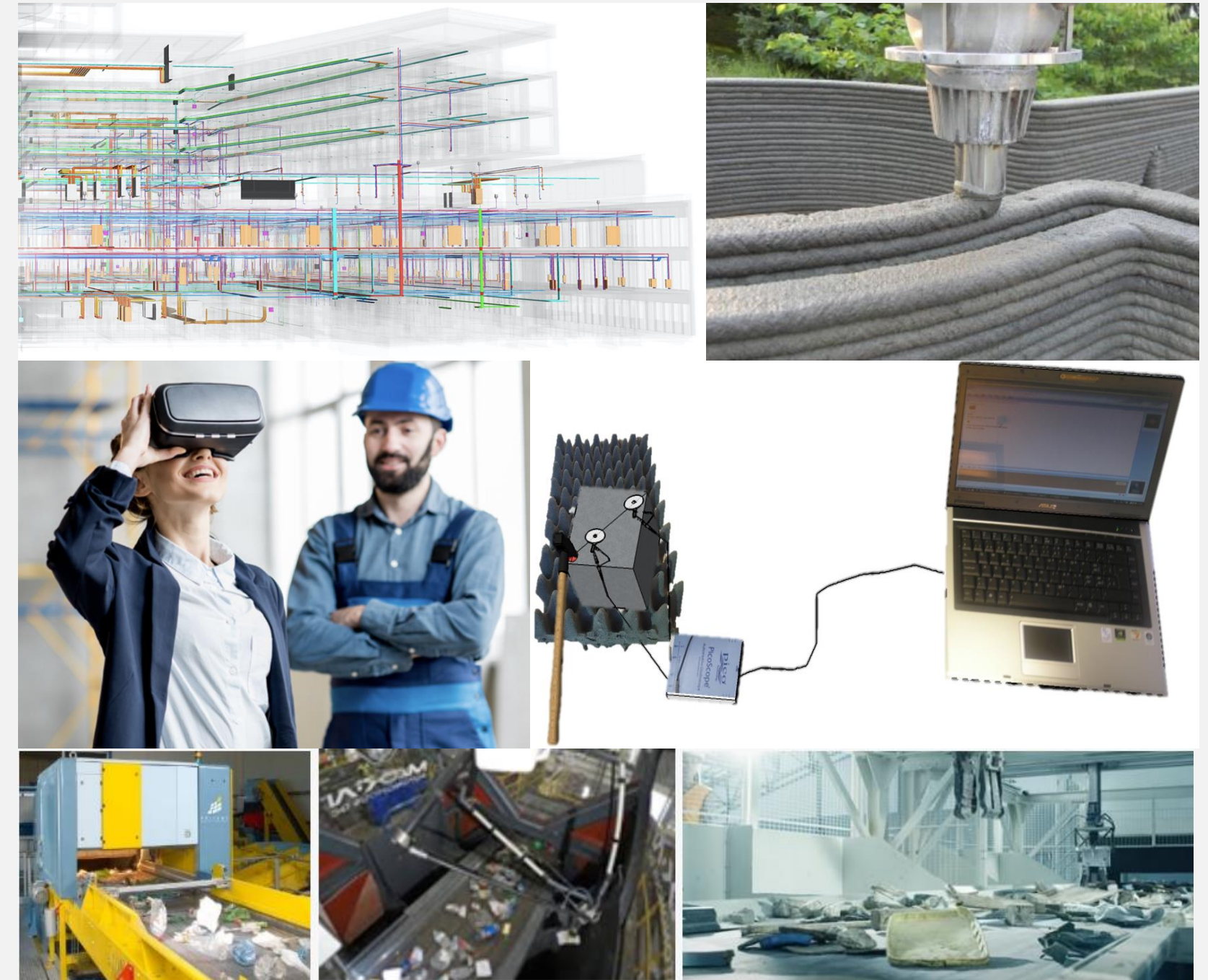
Machines available for waste sorting. Left to right: a) Pellenc, b) MaxAI, c) ZenRobotics.

WP6 workshops | RECONMATIC vision and objectives

Mission #1 | Avoid Waste

- Integrate secondary materials in design
- Mitigate future waste generation using smart design (LCA)

Mission #2 | Minimise Waste

- Reuse recycled products and by-products
- Prefer durable materials
- Employ digital construction planning
- Segregate waste on site and reuse

Mission #3 | Reduce Waste

- Asset management using digital twins
- Continuous structural health monitoring
- Mitigate waste and segregate
- Force reuse during refurbishment

Mission #4 | Presort Waste

- Deconstruction planning using digital twins
- Enforce selective waste selection
- Dismantle when possible

Mission #5 | Sort and Treat Waste

- Use effect logistics concept and digitalised waste management in plants
- Introduce automated solutions for waste sorting and treatment

Mission #3 | Valorize Waste

- Develop and produce new competitive recycled materials
- Avoid inefficient recycling solutions
- Use products from locally recycled materials

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WP6 workshops | RECONMATIC vision and objectives

1. **The CDW stream has to be minimized**
2. **Produced CDW has to be treated and better controlled, so that recovery can be developed in high-value construction products, with the right traceability and quality assurance**
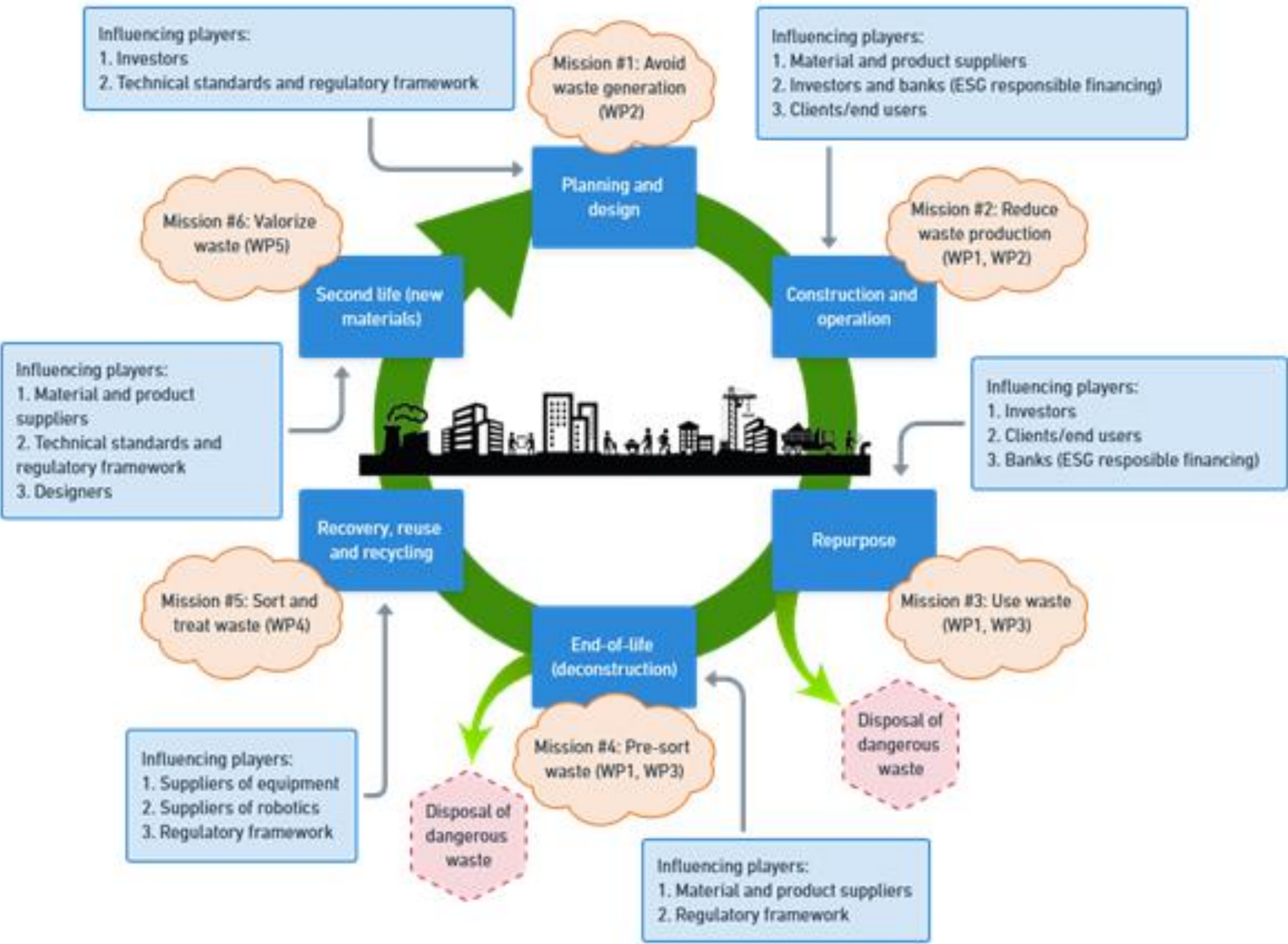
Special emphasis is given to:

- Waste traceability data
- LCA and environmental sustainability
- stakeholders collaboration
- Integrated and easily adoptable solutions
- QA
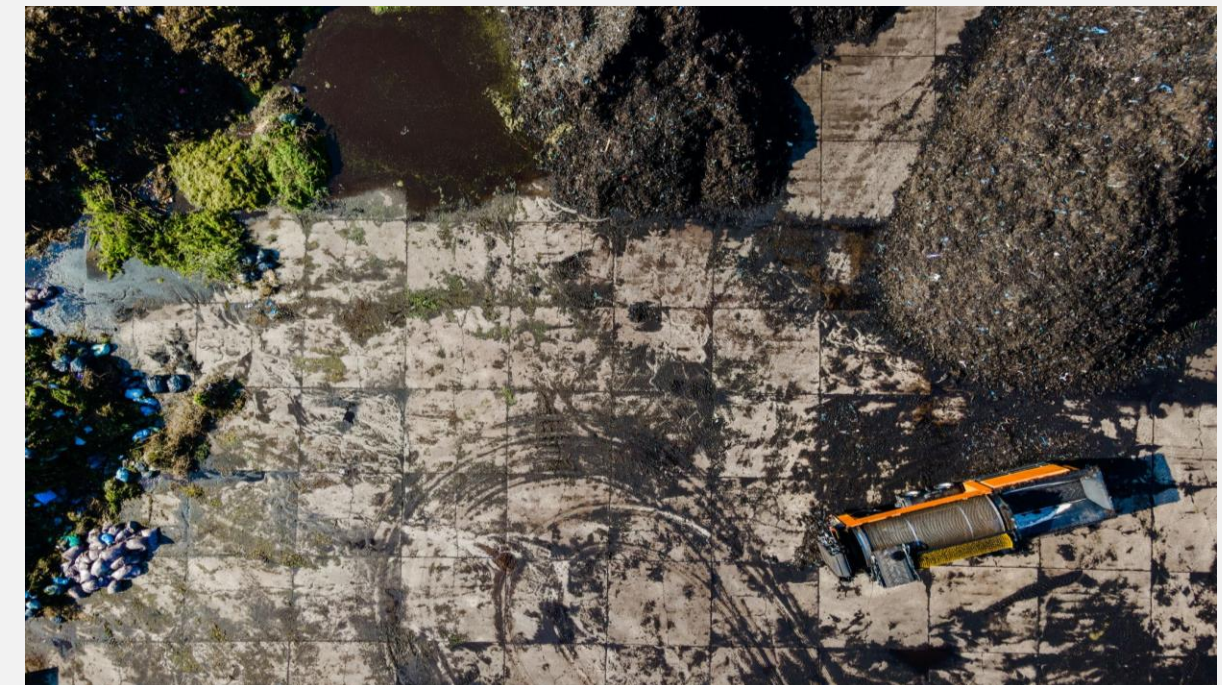
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WP6 workshops | Outline of RECONMATIC implementation

CDW whole value chain

- Digital protocol for sustainability and circular assessment
- Digital information management system for integration of solutions and stakeholder collaboration

Design and construction

- Material mapping tools for reusability
- BIM waste predictive tools
- Advanced BIM models with active waste management processes
- Blockchain tracking tools

Use and end of life

- Digital twin generation with as-built material identification
- EoSL material datasets
- Automation of waste audits

Off-site sorting and logistics

- AI-based automation for waste sorting
- Improved logistics for waste collection and automated management at off-site treatment
- Automated recognition by sensors
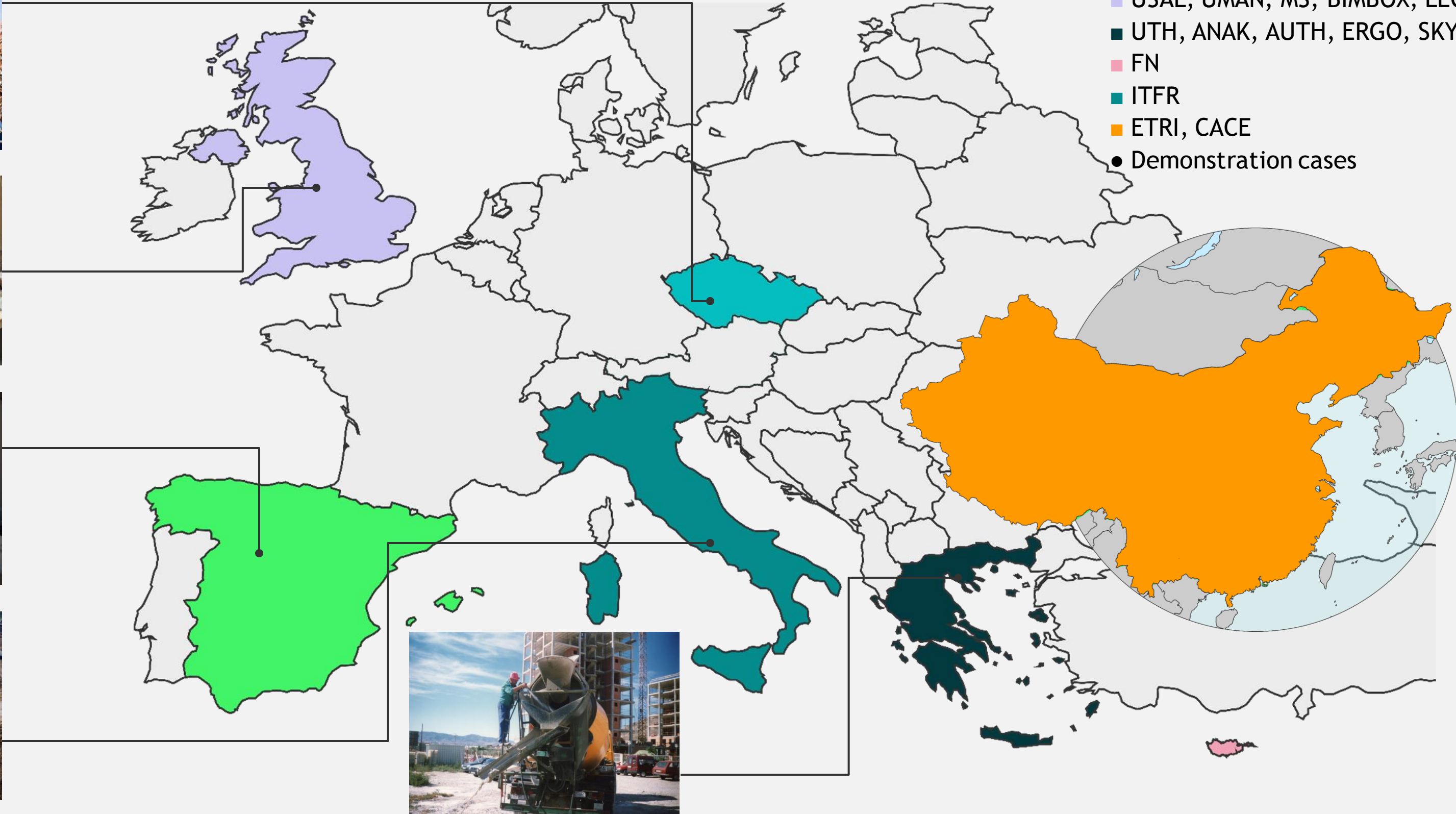- Processing of new recycled materials

New materials derived from CDW

- Extension of material service life
- Added value assessment of new materials
- QC & QA
- Overcoming market barriers

Communication & dissemination

- Training material and sessions
- Communication, dissemination, branding
- Contribution to legal, regulatory and standardization frameworks

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WP6 workshops | Outline of RECONMATIC implementation

- CVUT, ENVI, STR, JAIP
- TEC, ICAT, AEICE, ITC-AICE, RECSO
- USAL, UMAN, MS, BIMBOX, LECYC
- UTH, ANAK, AUTH, ERGO, SKYDE
- FN
- ITFR
- ETRI, CACE
- Demonstration cases

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WP6 workshops | Outline of RECONMATIC implementation

OUTCOMES

- Knowledge of reuse, dismantling and high value recycling of CDW to achieve zero waste

- Heightened awareness of feasibility of technologies and methods/solutions of the project

- Increasing by 50% the reusability of construction products in post demolition and reduce of waste

- New or updated standards for reuse and recycling of CDW and related new materials

- Materials for further educating future stakeholders

IMPACTS

- Holistic and replicable solutions for more circular and climate neutral construction

- Acceleration in green and digital transition of manufacturing and construction sectors

- Sustainable, flexible, responsive and resilient supply chain of construction materials

- Upskilling of workforce in manufacturing and construction

- Creation of high skilled jobs in digitization, automated construction, AI, advanced robotics

- Increased European productivity, innovation, competitiveness, resilience, sustainability

- Major contributions to CO_2 reduction, carbon neutral and zero waste initiatives in climate control

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THANK YOU
FOR YOUR ATTENTION

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