ET4D

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ET4Digital – Empowering Trainers for Digital Innovation in Construction Ecosystem

Deliverable 2.2

Stakeolder Panel for dissemination

Author(s)	Mrs. Mousoulidi Aspasia Panagiota
PP	PEDMEDE (Panhellenic Association of Engineers Contractors of Public Works)

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Technical References

Project Acronym	**ET4Digital**
Project Title	**Empowering Trainers for Digital Innovation in Construction Ecosystem**
Project Coordinator	**The Istituto per l'Istruzione Professionale dei Lavoratori Edile di Bologna**
Project Duration	**2024-2026**

Deliverable No.	
Dissemination level [1]	**PU**
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Task	**2.2**
Lead beneficiary	**PEDMEDE**
Contributing beneficiary(ies)	**R2M Solutions, IPLE**
Due date of deliverable	**30/04/2025**
Actual submission date	

[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

V	Date	Beneficiary	Author
1	30/04/2025	PEDMEDE	Mrs.Mousoulidi Aspasia Panagiota
2	02/05/2025	PEDMEDE	Mrs.Mousoulidi Aspasia Panagiota
3	06/05/2025	PEDMEDE	Mrs.Mousoulidi Aspasia Panagiota
4	13/05/2025	PEDMEDE	Mrs.Mousoulidi Aspasia Panagiota

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Summary

ET4Digital – Empowering Trainers for Digital Innovation in construction Ecosystem is dedicated to advancing the quality, effectiveness, and innovation in training trainers and teachers within the construction sector for the seamless integration of digital technologies. The initiative involves creating innovative tools and a comprehensive capacity-building program. Trainers will engage with a specially designed digital technologies demonstrator, fostering hands-on experience. The project aims to overcome barriers hindering SMEs from adopting digital technologies by co-designing, testing, and validating training programs. The ultimate goal is to empower trainers to lead the digital transition in the construction industry, tapping into its significant but underexplored potential.
Although digital innovation has grown significantly in recent years, companies are finding it difficult to effectively exploit this enormous potential. Instead, digitization in the construction sector can offer significant opportunities for the entire value chain by not only improving existing practices, but also integrating disruptive technologies and tools that can lead to new processes, business models, materials and solutions. It is important to underline that the combination of digital technologies makes it possible to maximize the benefits associated with digital transformation. For example, BIM, IoT, Augmented Reality and Digital Twins are deeply interconnected, as they refer to technologies that leverage each other and can be seen as different phases or elements of the same digital transformation.

As demonstrated by several European and national researches, the construction sector is positioned far behind the other industrial fields when it comes to digitalisation.
To date, the European construction sector is facing challenges which are hampering its competitiveness. Among these:

- Labour shortage
- Lack of digital skills in some countries
- Lack of interest among entrepreneurs and workers on the digitalisation of processes
- Lack of motivation on the part of young people to work in the sector
- Need to increase productivity while improving quality, cost efficiency and project delivery
- High costs related to technologies and digital tools

Therefore, the specific objective of the project is to deliver customized programs to professional trainers, aiming to equip them with new digital strategies, tools and skills. As intermediaries, these trainers play a crucial role in demonstrating to enterprises and workers the benefits of digitalization and the positive outcomes it can yield. This approach facilitates the upgrading of workers' skills in digitalization, emphasizing that traditional materials and techniques can be innovatively supported by digital technologies, leading to reduced costs and time wastage.

Furthermore, the job market continually evolves, shaping the required profiles and skills that workers need to possess in response to the demands of companies and employers. By updating the professional profiles required in the construction sector and digitalizing its processes, we can attract young, educated workers to a field of work still considered "traditional".

1. Introduction

PEDMEDE as the leader of Task 2.2 recently hosted the hybrid public ET4D Stakeholder Panel on April 15, 2025, marking a key moment for the ongoing project. The event brought together a diverse group of stakeholders, both in-person and online to engage in discussions around the project's aims and its potential outcome to drive digital transformation within the European construction industry.

The Stakeholder Panel was an essential step in enhancing the ET4D project, in view of exploring the role of digital technologies in the construction sector. An overview of the event involved the following thematics:

- An introduction to the ET4D project
- The integration of smart technologies in construction
- The skills needed for the next era in construction
- AI and how it shapes the construction industry

The Stakeholder Panel itself was structured to engage relevant stakeholders from fields of construction, sustainable development, digital technologies as well as training professionals.

1.1 Purpose of this document

The purpose of this document is to provide a comprehensive overview of the ET4D Stakeholder Panel Event held in Athens on April 15, 2025. It aims to summarize the key objectives, discussions, and outcomes of the event. It is structured as follows:

1. Analysis of the agenda and the key topics that were discussed
2. Provision of information with regards to event details
3. Summary of the key outcomes and conclusions of the event and proposals for future meetings under ET4D project.
4. Attached annexes related to the dissemination of the event

2. Agenda Overview

1.

2.

2.1 Event Details

The decision to structure this agenda was based on:

- The results gathered under WP2 from RR2M Solutions
- The aims and objectives of the project itself

- The general innovative aspects that are discussed about construction in EU countries

In this context, the event has started with a brief discussion on the aims and objectives of ET4D project in view of informing the general audience about it. The leader of the project provided the general insights and information about the expected results. On behalf of IPLE, Mr. Gianmarco Fontana, Project Manager of the project, presented the whole project idea and provided a general overview of the aims and objectives. In this context, the first presentation about ET4D emphasized in the following aspects:

- The general idea and scope of the project
- The reasons behind the development of this project; More specifically, the leader of the project emphasized that the delay in the digitalization process of the construction industry as a whole, creates barriers and demands urgent solutions. Moreover, the rapid changes that AI brings to the construction workforce, put a risk the people that do not possess the technical skills. ET4D should play a pivotal role on helping the workforce to gain new competences.
- The target groups that ET4D helps; Especially the educational community will gain new insights on how to train the new construction workforce.
- The sequence of activities and WPs

After this, RR2M solutions presented the key results of the WP2 analysis. On behalf of this organization, Mr. Massimo Fuccaro, project manager of the project provided a detailed analysis on the results of the research WP. Specifically, it emphasized on:

- The methodology being used (desk review, focus groups etc.)
- The comparative analysis of results in different countries; The main results have shown that the construction sector is one of the least digitised in Europe.
- Many SMEs struggle to adopt new technologies.
- Trainers often lack the tools, time and access to keep up.
- There is a risk of a widening digital divide without targeted support.
-
- The key results identified in view of providing a strategic methodology of how the ET4D training will be constructed

Taking this into account, the conference continued with the welcoming of expert guests. More specifically, the following people attended:

1. **Mr. Panas Antonis**: He holds the position of the General Manager of TEKAL S.A., a mid-sized general construction contractor, with a specialty in civil engineering, building and electromechanical projects offering construction services throughout Greece. He possesses experience in managing construction projects for both the public and private sectors. He also serves as President in the Companies Section of PEDMEDE (Panhellenic Association of Engineers Contractors of Public Works) while acting as a liaison with the European Construction Industry Federation (FIEC) for the development of proposals at European level. He is also teaching in the Faculty of Civil Engineering, NTUA and his research interests and publications focus on innovation aspects of contemporary construction project management. Dr. Antonis Panas is a Civil Engineer and holds a M.Sc. in

Construction Management from Loughborough University and a PhD in Resource Planning of Civil Engineering Projects from the Centre for Construction Innovation of the National Technical University of Athens (NTUA).

2. **Mrs. Palogou Eirini**: She is a Civil Engineer with a Dipl. Ing. degree from the University of Glasgow, holding two Master's degrees—an MSc in Structural Engineering from the University of Glasgow and an MSc in Waste Management from the Hellenic Open University. From 2016 to 2019, She worked at Omikron Kappa Consulting Engineers Company, where she was involved in the design and supervision of civil engineering projects. Since 2020, She has been working at ERGASFALT EE Company in Livadeia, contributing to infrastructure projects and gaining further experience in construction and project management.
3. **Mr. Rehan Khan**: He is a highly skilled professional with expertise in Construction Digitalization at Digital Twin Technology GmbH Company. With a strong background in research, 3D BIM modeling, and data management, contributed to projects involving buildings, bridges, tunnels, and infrastructure. He holds a Master's in Advanced Computational and Civil Engineering Structural Studies (ACCESS) from Technische Universität Dresden, and a Bachelor's in Civil Engineering from Aligarh Muslim University.

As far as the 1st expert speaker is concerned, he provided a general overview of how construction industry is shifted towards digitalization in EU and Greece. More specifically he emphasized at the following:

- Very important tools in construction for the purpose of digitalization include: Building Information Modelling (BIM) ,Internet of Things (Iot), Drones & 3D Scanning, AR & VR
- Future trends in construction will focus on: 5G & Smart Construction Sites which will enhance connectivity for real-time collaboration, Automated Manufacturing (3D Printing) for the reduction of waste as well as human-centred design with a focus on ergonomics, accessibility, and user experience.
- In Greece, government initiatives and EU funding (e.g., Recovery and Resilience Facility) are driving digital and sustainable transformation.

The next speaker, Mrs. Palogou Eirini -Member also of PEDMEDE, has emphasized on the next generation workers in construction and gave insights on what skills are needed. Specifically, she emphasized that:

- Law and digitalization should be key skills in construction in view of workers know the legal framework
- Basic digital tools like Microsoft Office and Project Management tools should be integrated
- AI will influence more the upper level of workers (i.e. managers etc.).

Finally, a presentation was made by Digital Twin Technology GmbH, Germany, an SME specialized in AI. In this context, the following aspects were mentioned:

- How AI theoretically changed the construction industry

- What case studies and practical aspects should be used for better training in digital skills and construction

The event gathered 40 people online and 20 people face to face. Most people (At least 50%) were coming from Greece, and the rest were from:

- Italy
- Germany
- Austria
- Spain
- North Macedonia
- Finland

2.2 Key outcomes and conclusions

The following key outcomes were emphasized:

- ET4D should focus on two different levels of digital skills: Practical case studies for EQF 4 and more theoretical skills for EQF 5 plus
- ET4D will get inspiration by Digital Twin's presentation on the practical aspects of AI
- The next generation of workers in construction should focus on AI and Internet of Things

Moreover, PEDMEDE launched a quality assurance survey in which it reported the following results:

3. Supporting Materials

ET4Digital

Empowering Trainers for Digital Innovation in construction Ecosystem

PROJECT no. 2024-1-IT01-KA220-VET-000249119

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15.04.2025

EU CONSTUCTION INDUSTRY IN THE DIGITAL ERA

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HYBRID STAKEHOLDER PANEL EVENT

FIND US HERE: ASKLIPIOU 23 ATHENS. GREECE, PEDMEDE PREMISES 6TH FLOOR

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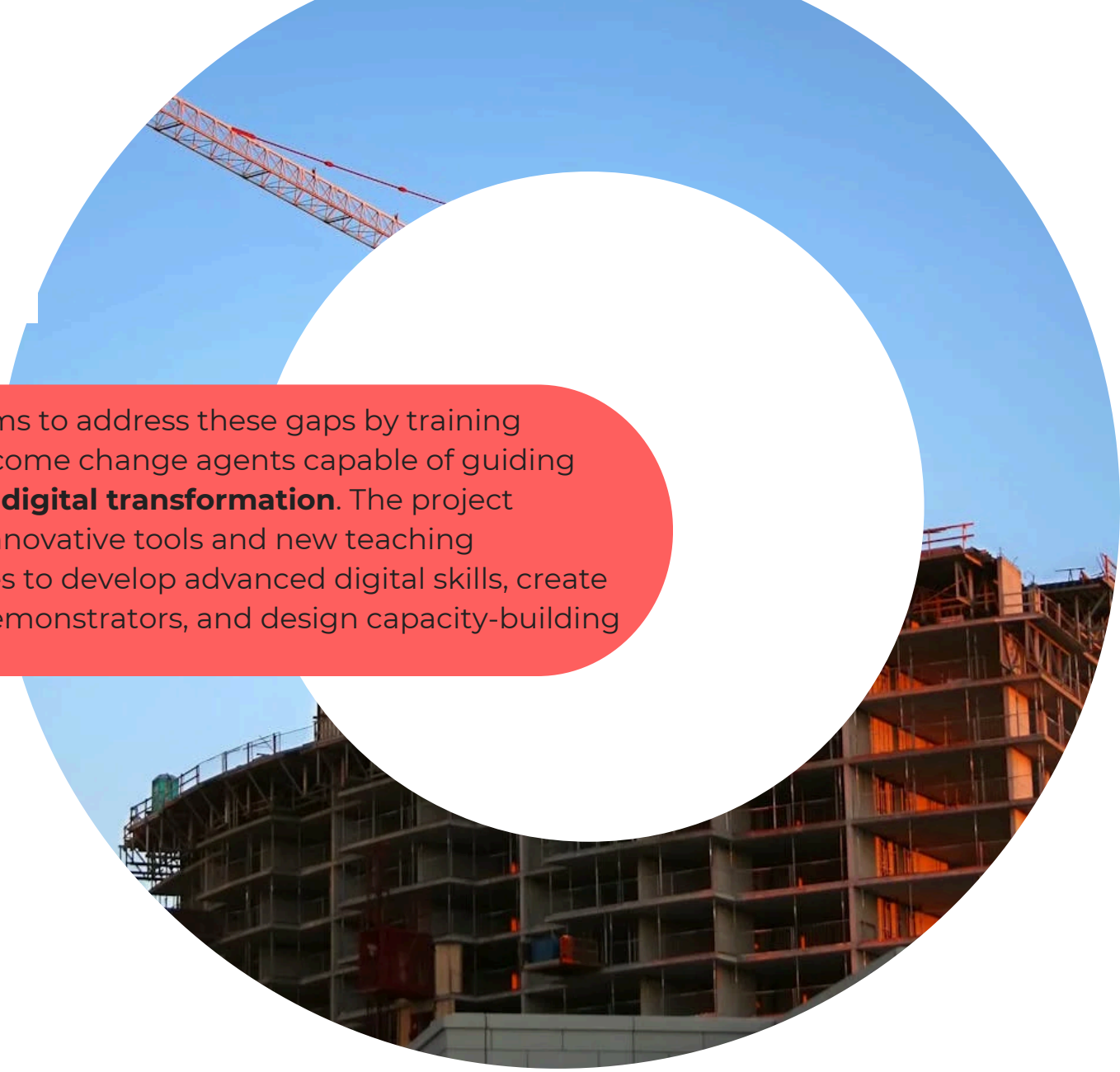

ET4Digital aims to address these gaps by training trainers to become change agents capable of guiding **SMEs toward digital transformation**. The project emphasizes innovative tools and new teaching methodologies to develop advanced digital skills, create technology demonstrators, and design capacity-building programs.

- **Mapping of digital competencies** ✓
- **Technological demonstrator for educational purposes** ✓
- **Capacity-building program for trainer** ✓
- **Guidelines for replicating the training model** ✓

MORE INFO

https://www.et4digital.eu/

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AGENDA

15.04.2025

[JOIN THE MEETING HERE]

TUESDAY

10.00 AM-1.00 PM

ASKLIPIOU 23 ATHENS GREECE 6TH FLOOR -PEDMEDE PREMISES

01 INTRODUCTION — 10.00 AM

Starts with a welcoming session, hosted by ***Mrs. Papagianni Eleni-*** Director of PEDMEDE

02 ET4DIGITAL: IMPORTANCE AND ADDED VALUE — 10.10 AM

Starts with a welcoming session, hosted by ***Mr. Gianmarco Fontana*** – European Project Office, IIPLE - Scuola Edile di Bologna, Italy

03 THE DIGITAL FRAMEWORK OF CONSTRUCTION INDUSTRY — 10.30 AM

A brief introduction of research analysis of the project by ***Mr. Massimo Fuccaro*** -Senior Consultant - Risk, Finance and Bankability, R2M Solution, Italy

04 THE INTEGRATION OF SMART TECHNOLOGIES IN CONSTRUCTION — 10.50 AM

A brief introduction on the importance of new technologies in construction in EU and Greece by ***Mr. Antonis Panas-*** General Manager TEKAL S.A., Vice President IPMA Greece,f. Assistant Professor(P.D. 407/80) National Technical University of Athens, Member of the Steering Commitee of the Panhellenic Association of Engineers Contractors of Public Works (PEDMEDE)

Coffee Break

05 BUILDING A DIGITALLY COMPETENT WORKFORCE IN CONSTRUCTION — 11:35 PM

A brief introduction on the needs and skill gaps of the future workforce in construction by ***Mr. Thomas - Panougrias*** - Civil Engineer, Member of the Panhellenic Association of Engineers Contractors of Public Works (PEDMEDE)

06 AI AND NEW ERA IN CONSTRUCTION INDUSTRY — 12:05 PM

A brief introduction on how AI technologies influence the construction industry by ***Mr. Rehan Khan*** – Digital Twin Manager, Digital Twin Technology GmbH, Germany

07 CLOSING — 12.35 PM

A short closing session to review the key points of the day.

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ETAG
Where are we going to?
Main Objectives
Expected Outcomes
Increase quality and innovation in digital training for the construction sector, focusing on digital tools to assist trainers and teach
Identify new teaching
to support the digital tra
SMEs in the construction
Improve the current framework of digital technologies.
Creation of a map of digital skills for trainers aimed at understanding training needs and gaps.
Fine-tuning of digital technologies demonstrator for educational purposes.
Co-design, test and validate a Capacity building programme for
to the application of


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ET4D
Objectives
of the
Understand how SMEs and trainers are addressing digitalisation in the construction sector.
Key goals:
identify tec
option barriers
Analyse tra
and trainers
Formulate s
transition
for digital
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AGENDA

15.04.2025

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General information

- Title: **ET4Digital - Empowering Trainers for Digital Innovation in the Construction Ecosystem**
- Acronym: **ET4Digital**
- Duration: **24 Months**. 1° of November 2024 – 31° of October 2026
- Countries: **Italy, Greece, Germany, Austria, Estonia, Spain, Republic of North Macedonia**

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Partner organizations

- Istituto per l'Istruzione Professionale dei Lavoratori Edili (IT)
- Pedmede (GR)
- R2M Solution SRL (IT)
- Fundacion Laboral de la Construccion (ES)
- Westdeutscher Handwerkskammertag (DE)
- Knowledge and skills management centre K&S Skopje (MK)
- Tallinna Tehnikaulikool (EE)
- Alma Mater Studiorum – Università di Bologna (IT)
- European Center of Entrepreneurship Competence & Excellence (AT)

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Where are we going to?

Main Objectives

- **Increase quality and innovation in digital training** for the construction sector, focusing on **digital tools** to assist trainers and teachers.
- **Identify new teaching approaches**, to **support the digital transition in SMEs** in the construction sector.

Expected Outcomes

- Improve the current **framework of digital technologies.**
- Creation of **a map of digital skills** for trainers aimed at **understanding training needs and gaps.**
- Fine-tuning of **digital technologies** demonstrator **for educational purposes.**
- **Co-design, test and validate a Capacity building programme** for trainers related to the application of digital technologies.

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Why ET4Digital?

Delay in the digitalisation of the construction sector.

Despite its great economic and social impact in the EU, the construction sector is one of the **least digitised** compared to other sectors. This has led to **lower productivity growth** in recent decades.

Lack of digital skills.

Construction workers often **do not know about or have access to the digital tools** that could facilitate their work

Need to build capacity among trainers.

There is a **lack of trainers adequately prepared** to address the issue of implementing digital technologies in the construction industry. Inadequate training is one of the main reasons for the lack or limited use of digital technologies

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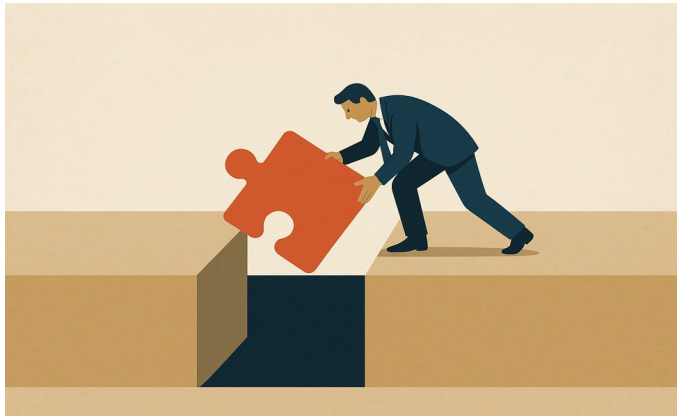
Filling the gaps

Overcoming barriers to digital adoption in SMEs.

Many SMEs struggle to adopt a clear strategy for digital transformation. ET4D aims to provide trainers with the tools to demonstrate the importance and value of digital technologies to SMEs.



Promoting the use of BIM in SMEs

Although the BIM approach is necessary for the management of the entire life cycle of a building, today it is adopted almost exclusively in the design phase, which is often not managed by SMEs. The project aims to promote the use of BIM in the subsequent phases as well.

Modernising teaching and learning methods in vocational education and training (VET) to effectively integrate digital technologies

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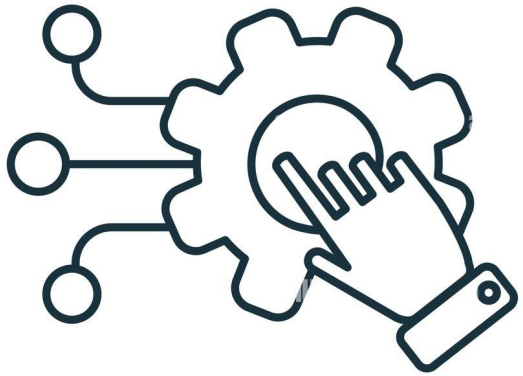
Needs and target groups

Needs:

- Addressing digital transformation through development of digital readiness, resilience and capacities to overcome existing lacks
- Contributing to innovation in vocational education and training methods in the field of VET
- Promoting digital transition in the construction industry (especially SMEs)



Targets:

- Trainers of VET Providers;
- Teachers in technical institutes,
- Institutes for surveyors,
- Universities
- Professionals and trainees in the construction chain

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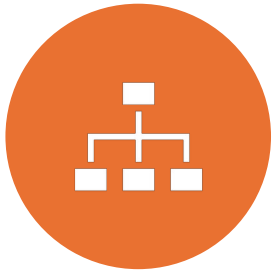
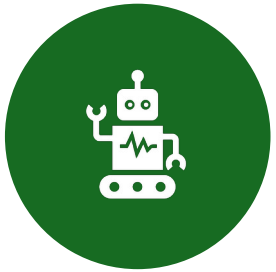
Work Packages (WP)



WP1: ***PROJECT MANAGEMENT***



WP2: ***ANALYSIS OF DIGITAL ECOSYSTEM IN CONSTRUCTION SECTOR***

WP3: ***NEW TEACHING APPROACH FOR DIGITAL TRANSITION***

WP4: ***CAPACITY BUILDING PROGRAMME FOR TRAINERS***

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Communication & dissemination strategies

- **ET4Digital website**
- **Partners' websites** to ensure project visibility.
- **Newsletter** to keep potential stakeholders involved and share the results of the activities
- **Regional event for dissemination** in each partner country involved
- Online and face-to-face **periodic meetings**
- Dissemination in **news**, **articles**, and **posts** on the **partners-dedicated project section websites**
- **Social Media Campaign** (Facebook, LinkedIn, X, Instagram)
- Inclusion of the project on the **partners' advertising materials** (leaflets, brochures, dossiers)
- **Presentation in events related to the project** in which the partners participate

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Thanks for your attention

For any questions, please contact the IIPLE team:

- Luisa Sileni, luisasileni@edili.com
- Gianmarco Fontana, gianmarcofontana@edili.com

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Empower your digital transition!

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ET4Digital - Empowering Trainers for Digital Innovation in the Construction Ecosystem

Athens 15th April 2025

The Digital Framework of Construction Industry

Massimo Fuccaro – R2M solution

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R2M RESEARCH TO MARKET SOLUTION

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Objectives of the Research

Understand how SMEs and trainers are addressing digitalisation in the construction sector.

Key goals:

- identify technologies in use and adoption barriers
- Analyse training needs of educators and trainers
- Formulate strategic recommendations for digital transition

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The Value of This Investigation

More than data – a European snapshot of reality

A significant and well-balanced sample across 7 countries

Data gathered through structured, multilingual tools and moderated discussions

Over 3 months of coordinated work by project partners

Combined quantitative evidence (surveys) and qualitative depth (focus groups)

Representation of both SMEs and training professionals, from theory to practice

This research goes beyond numbers – it captures the voices, needs and strategies of those shaping digital transformation in construction

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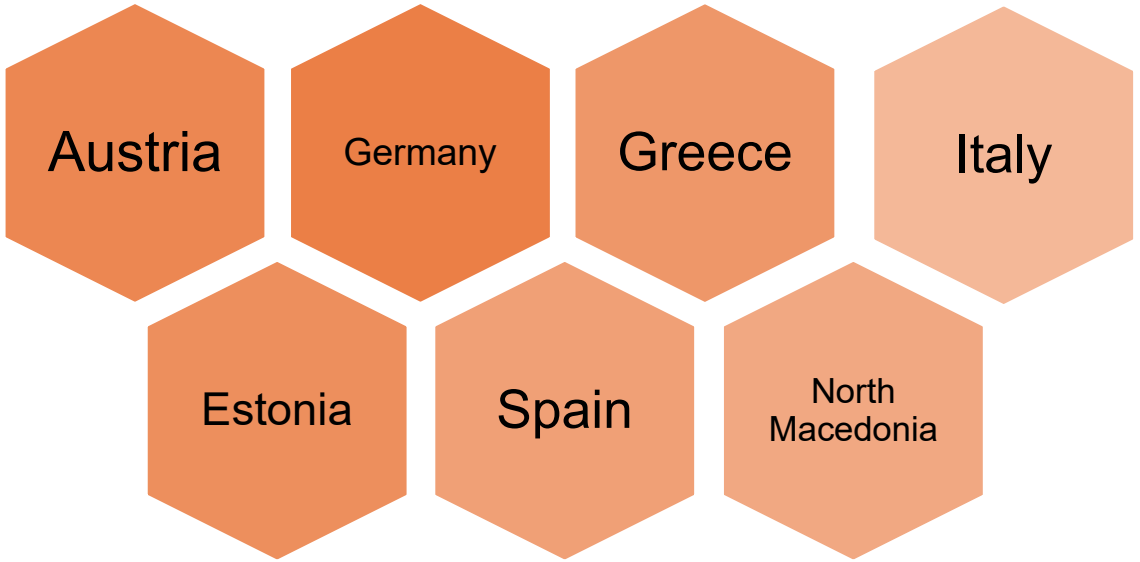
Countries and methodology

Countries involved



Methodology

- 2 European surveys
- 14 national focus groups (2 per country)
- 188 participants from industry and education

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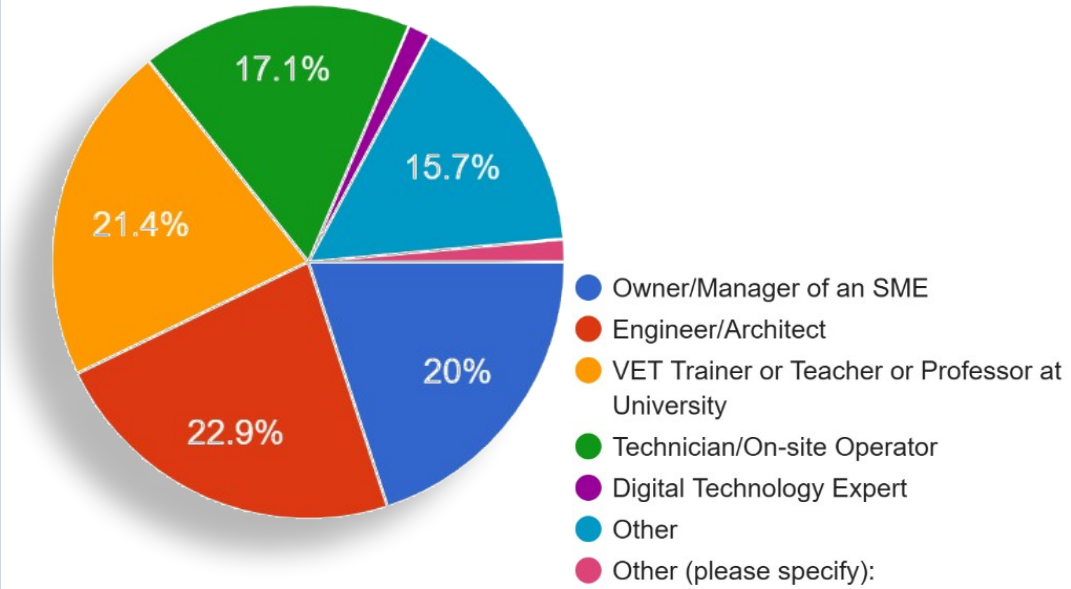
Participant Profile and Geographic Distribution

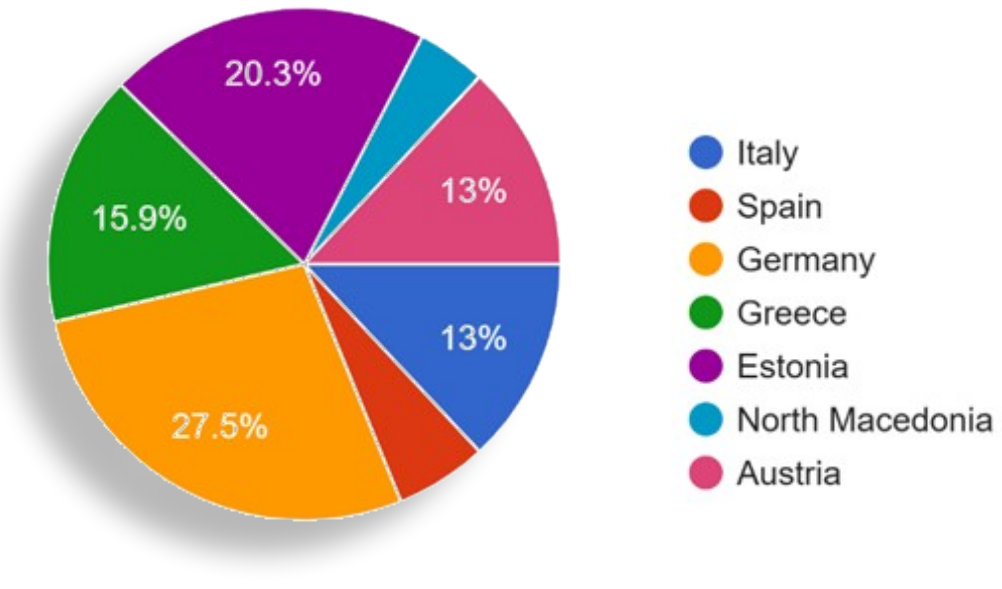
What is your primary role in the costruction sector?

70 response



Which country do you primary operate in?

69 response



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Why this matters?

The construction sector is one of the least digitised in Europe.

Many SMEs struggle to adopt new technologies.

Trainers often lack the tools, time and access to keep up.

There is a risk of a widening digital divide without targeted support.

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Software and technologies familiar to construction professionals

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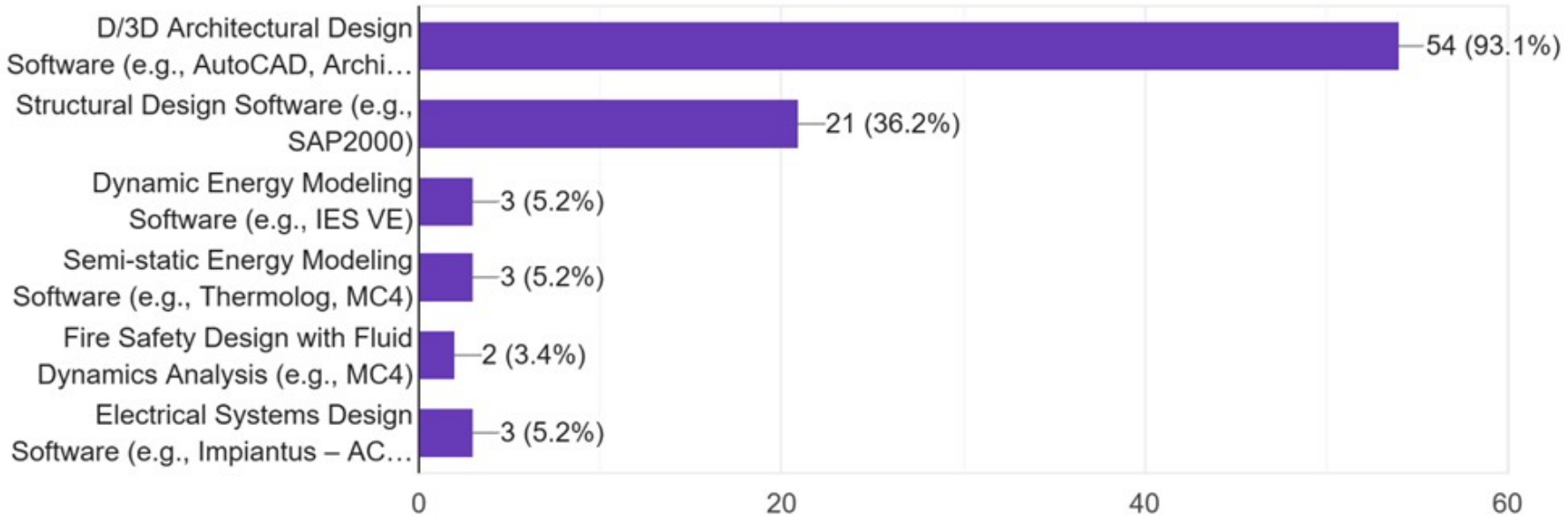
Which of the following design and simulation software do you use or are familiar with?

58 response



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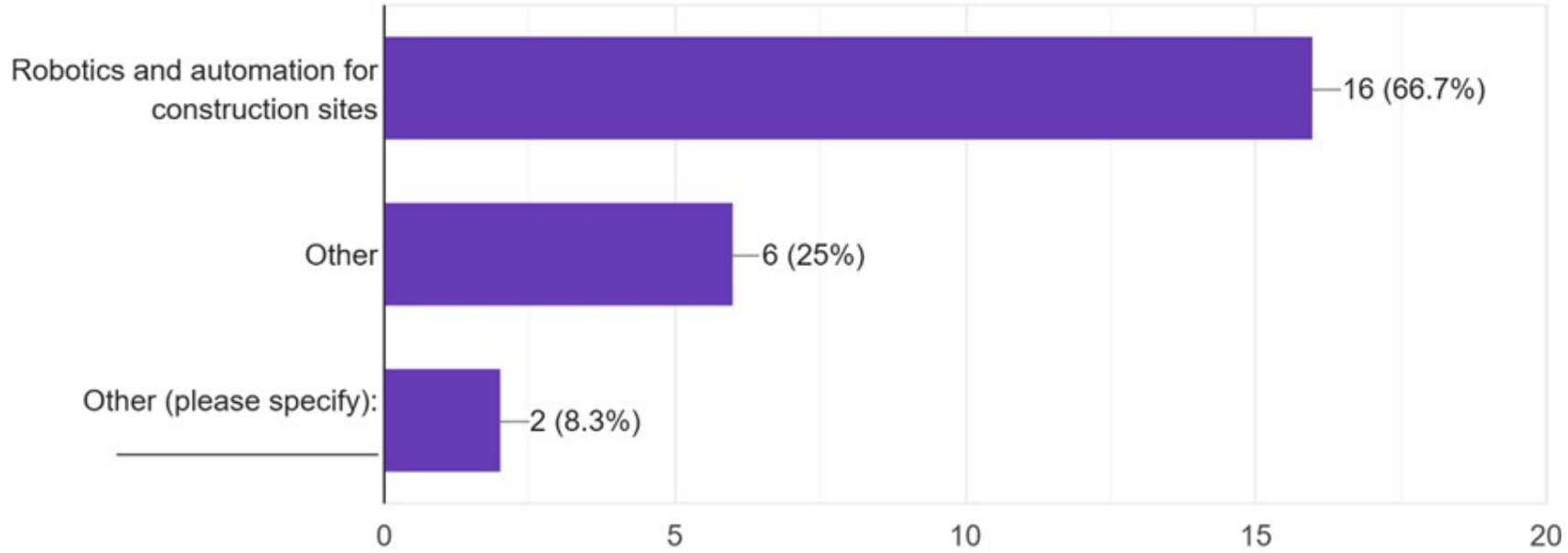
Which of the following other technologies do you use or are familiar with?

24 response



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Most commonly used technologies (SMEs)

Technologies already adopted:

- BIM for design and coordination.
- Drones for site surveying and monitoring.
- Cloud platforms for documentation and collaboration.
- Laser scanning.
- Basic IoT (e.g., RFID badges).

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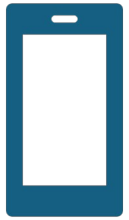
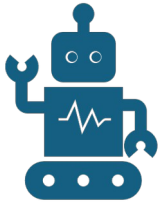
Emerging technologies

Identified as strategic, but not widely used;



Digital Twins



Artificial Intelligence (AI)

3D Printing Augmented & Virtual Reality (AR/VR)

Blockchain (mainly in contract/payment management)

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Main barriers

High initial investment costs.

Lack of digital skills.

Time constraints on site.

Resistance to change.

Limited access to tools and training

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Perceived benefits

- Improved project quality and coordination
- Cost and time savings
- Enhanced safety and collaboration
- Better data and decision-making
- Greater competitiveness

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Suggested strategies

- Short, practical training modules (2–4 hours).
- Use of real-life simulations and demonstrators.
- Case-based learning.
- Public incentives and free software access.
- Real pilot projects in construction settings

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Priority technologies for the future

AI for risk management and predictive maintenance

Digital Twins for dynamic project tracking

IoT sensors for real-time data

3D Printing for modular building

AR for inspections and remote assistance

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Common trends in 7 Countries

BIM is the shared baseline.

Varying levels of awareness on AI and Digital Twins

Common resistance to digitalisation among SMEs

Shared need for hands-on exposure

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SMEs need to see to believe

- Live demonstrations and real ROI data help build trust
- Hands-on experience changes mindsets
- Concrete benefits matter more than technology trends
- Use successful SME stories to inspire others

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Current digital skills of trainers

Large skill gaps between trainers.

Some have advanced experience (e.g., BIM, VR)

Others lack time, access, or institutional support

General gap in AI, IoT, Digital Twin knowledge

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Training needs

Advanced BIM

AI and Digital Twin applications

IoT and sensors

AR/VR for teaching

Data security and collaboration tools

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Adequacy of training offer

Main issues:

Courses are too theoretical

Not adapted to the construction sector

High costs and limited access

Lack of updated teaching resources and examples

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Preferred teaching methods

Experiential learning (learn by doing)

Case studies and real projects

Simulations and interactive platforms

Preference for short, focused modules over long lectures

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Cultural barriers in training

- Senior trainers and SMEs resist change
- Fear of technology and its complexity
- Disconnection between education and real-world practice
- Lack of visible, applicable examples

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Trainer proposals

- Build a trainer network to share best practices
- Give free access to teaching tools and licenses
- Provide real-world learning materials
- Support flexible, modular course design

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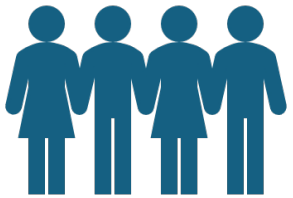
Inclusion focus



Need for digital pathways for migrants and vulnerable groups

Focus on visual learning and mentoring

Integration with language, sustainability and job skills

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European convergence (trainers)

Agreement on BIM as the starting point

Common training needs in AI and Digital Twin

Demand for flexible, modular and sector-specific training

Shared emphasis on “learning by doing”

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Recommendations for trainers

Prioritise continuous upskilling

Collaborate in trainer communities

Use real models and simulations in class

Focus on practical toolkits, not just theory

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Key messages

- Digitalisation = efficiency, quality, competitiveness
- The technologies exist, but adoption is slow
- Trainers are the key enablers of transformation
- Collaboration across all actors is needed

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What the data tells us and what we should do

SMEs are aware of digital tools, but adoption is blocked by culture, cost, and complexity.

There is a clear demand for practical, flexible, sector-based training.

Trainers are not always prepared to teach what the market actually needs.

A shared European challenge calls for shared solutions: frameworks, incentives, and collaboration.

The most promising technologies (AI, Digital Twin, AR) are also the least accessible.

Bridging the digital gap requires alignment between technology, training and trust.

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Key message and call to action

A sector at the crossroads – Let's move forward together

Digitalisation is no longer optional – it's vital for competitiveness and sustainability.

Training is the lever that will enable SMEs to innovate, if done right.

Projects like ET4DIGITAL show how to connect practice, policy and education.

We must invest in people, not just in technology.

The future of construction is digital, inclusive, and driven by skills

Let's empower those who build – starting with the ones who train.

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"Innovation is the only weapon we have to win the battle for the future."

Carlo Rubbia, Nobel Prize in Physics

Thank You for Your Attention

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The Integration of Smart Technologies for Sustainable and Efficient Construction

Dr. Antonis Panas

15 APRIL 2025

ΠΕΔΜΕΔΕ 1935 90 YEARS

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Introduction

“The construction industry is rapidly evolving, moving from traditional methods to innovative digital solutions that streamline projects and improve sustainability.

Objective:

Explore how modern digital tools can enhance construction efficiency, transform the labor market, and drive sustainable practices.

Discussion Overview:

- Modern Digital Tools
- Impact on the Labor Market
- Sustainability & Smart Technologies
- Future Trends & Perspectives
- Challenges & Considerations

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Modern Digital Tools in Construction

- **Building Information Modelling (BIM)**
  Enhances collaboration and project management.
- **Internet of Things (Iot)**
  Enables real-time monitoring and data-driven decisions.
- **AI & Machine Learning**
  Improves predictive analytics and safety.
- **Drones & 3D Scanning**
  Facilitates accurate site surveying and progress monitoring.
- **AR & VR**
  Optimizes training and design visualization.
- **Blockchain**
  Supports secure contracts and transparent supply chains.

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Impact on the Labor Market

The introduction of digital tools in construction is reshaping the workforce. While automation increases efficiency, it also changes job roles and skill requirements.

Key impacts include:

- **Automation of Tasks**
  Reduction of repetitive manual work.
- **Need for New Skills**
  Emphasis on technical and digital expertise.
- **Transformation of Professions**
  Evolution in project management, design, and data analytics.

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Opportunities for SMEs

Small and medium-sized enterprises (SMEs) stand to benefit significantly from the integration of smart technologies in construction:

- **Cost-Effective Innovation**
- **Improved Resource Management**
- **Access to New Markets**
- **Fostering Collaboration**

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Sustainability & Smart Technologies in Construction

- **Smart Buildings & Energy Efficiency**: Integration of sensors and automation for optimal energy use.

- **Circular Economy**:
Focus on resource efficiency, reuse, and waste reduction.

- **Digital Simulations**:
Use simulations to optimize design and reduce environmental impact.

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Future Trends & Perspectives

Future construction sites will be hyper-connected and automated, with innovations such as:

- **5G & Smart Construction Sites**:
  Enhanced connectivity for real-time collaboration.
- **Automated Manufacturing (3D Printing)**:
  Potential for rapid, customized construction with reduced waste.
- **Human-Centred Design**:
  Focus on ergonomics, accessibility, and user experience.

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Challenges & Considerations

- **Implementation Barriers**:
  - High initial costs
  - Training needs
  - Data security concerns

- **Integration Issues**:
  - Compatibility Challenges
  - Interoperability Between Tools
  - Data Management and Storage

- **Regulatory and Ethical Considerations**:
  - Evolving Standards and Compliance
  - Addressing Workforce Displacement
  - Privacy Concerns

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Situation in Greece

- The adoption of smart construction technologies in Greece is in its early stages but gaining momentum.
- Increased investments in digital tools like Building Information Modeling (BIM) and IoT-driven smart infrastructure are shaping the future of the sector.
- Government initiatives and EU funding (e.g., Recovery and Resilience Facility) are driving digital and sustainable transformation.
- Challenges include high implementation costs, shortage of skilled professionals, and outdated regulatory frameworks.

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Key Takeaways

- **Smart Technologies Are Reshaping Construction**
  Boosting efficiency, reducing costs, and enhancing sustainability.

- **The Workforce Must Adapt & Evolve**
  Automation and AI are transforming job roles—investment in digital skills is crucial.

- **Sustainability & Innovation Go Hand in Hand**
  Digital tools optimize resources, minimize waste, and support eco-friendly construction.

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The Path Forward

- **Adopt New Technologies**
  Innovation is the key to staying competitive.

- **Empower the Workforce**
  Training and digital expertise will drive progress.

- **Prioritize Sustainability**
  The future of construction must be eco-conscious.

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Q & A

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Needs and Skill Gaps of the Future Workforce in Construction

Mrs. Irene Palogou –Engineer

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Introduction

The construction sector is undergoing rapid digitalization with workforce requirements shifting accordingly. As new technologies emerge and market demands evolve, the skills required to succeed in this sector are also changing.

Objectives

- To examine the primary factors driving change in construction.
- To identify the skills that workers will need to thrive in this evolving landscape.
- To analyze the existing skill gaps and their implications.
- To understand the role of technology in bridging skill gaps
- To explore potential solutions and strategies to address workforce needs.

The Changing Landscape of Construction

Impact of digital transformation and automation

Use of Building Information Modeling (BIM), drones, and AI-powered design.

Rise of sustainable and smart construction practises

New materials, energy-efficient designs, and regulatory changes.

Growing demand for efficiency and safety

Smart tools anticipate risks, optimize resources, and improve maintenance.

Increasing complexity of projects

This shift pushes the need for continuous training and upskilling, as well as collaboration between professionals from various disciplines to manage complex projects effectively.

Key Workforce Needs

Technological proficiency

Workers must become comfortable using BIM, AI-powered planning tools, automated machinery, and data analytics.

Sustainability and green construction knowledge

Green certifications, carbon-neutral construction, and waste reduction techniques.

Adaptability and lifelong learning mindset

Update of skills through training and professional development.

Collaboration and communication skills

Partnerships between professionals using cloud-based collaboration platforms and real-time project management tools.

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Emerging Skill Gaps

- Lack of expertise in BIM (Building Information Modeling), AI (Artificial Intelligence), Robotics, and Data-Driven Construction Processes
- Limited Understanding of Green Materials, Energy Efficiency, and Carbon Reduction
- Weak Skills in Handling Construction Data, Predictive Analytics, and Protecting Digital Infrastructure
- A Gap in the Ability to Adapt, Innovate, and Manage Complex Projects Effectively
- Insufficient Communication Across Engineering, Architecture, and Technology Sectors

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Implications of Skill Gaps on the Construction Industry

Project Delays
Skill gaps lead to longer timelines and delayed project completion.

Higher Operational Costs
A shortage of skilled workers drives up wages and project costs.

Lower Productivity
Inefficiencies arise when workers lack the necessary expertise.

Difficulty Implementing New Technologies
Lack of tech-savvy workers hinders the adoption of AI, BIM, and automation.

Compromised Quality
Skill deficiencies result in errors and subpar workmanship.

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Role of Technology in Bridging Skill Gaps

- **Artificial Intelligence and automation:** AI-powered scheduling and risk assessment tools can help project managers make better decisions, while automation can handle repetitive tasks more efficiently.

- **Virtual Reality (VR) and Augmented Reality (AR):** These technologies can be used for hands-on training, allowing workers to practice complex procedures in a safe, controlled environment before applying them on-site.

- **Online learning and digital training platforms:** Web-based courses and interactive modules can provide accessible, cost-effective training to workers anywhere in the world.

- **Smart construction equipment:** Modern machines with intuitive interfaces can reduce the need for extensive manual training, allowing workers to quickly adapt to new technology.

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Strategies to Address Workforce Needs

- Investment in vocational training and apprenticeships
- Collaboration between industry, academia, and government
- Promoting diversity and inclusion to expand the talent pool
- Encouraging lifelong learning and professional development

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Key Takeaways

The construction industry is rapidly transforming due to digitalization, automation, and sustainability, which requires workers to develop new skills.

There are significant skill gaps in areas such as technology (BIM, AI), sustainability, data handling, and collaboration between disciplines.

Technology, such as AI, VR/AR, and smart construction equipment, plays a crucial role in bridging these skill gaps, improving training, and increasing on-site efficiency

To address these gaps, it is essential to invest in workforce training, foster collaboration between industry stakeholders, and promote a culture of lifelong learning.

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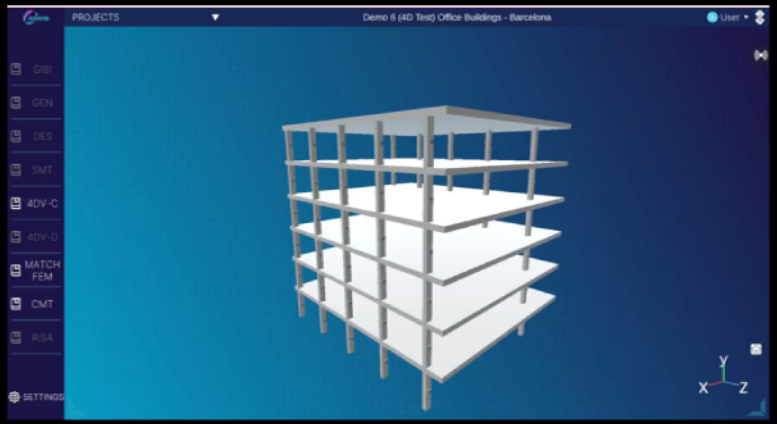
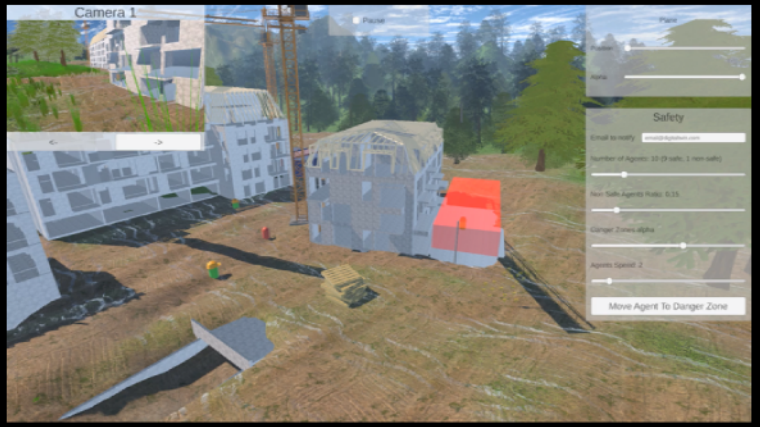
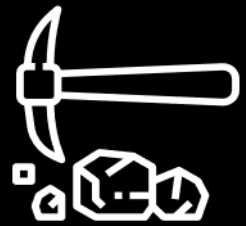
AI in Construction Safety

- Configuration Management
- Safety Management

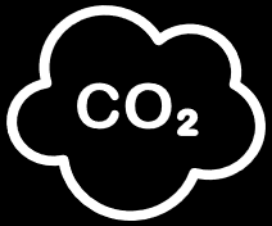




Impact

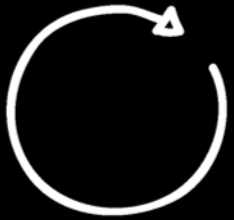


Site Productivity



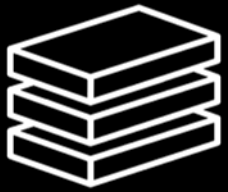
CO2-and cost reduction

Predictive Maintenance and Risk Management



Reuse

Sustainability



Project Planning

AI in Robotics and Automation

RoBetARME

Digital Twin Interface (DTT)

Selection of dates and different parameters visualized.