



**INSITER** INTUITIVE  
SELF-INSPECTION  
TECHNIQUES

**DEMO**  
CONSULTANTS



**CITC-8**  
Construction in the 21st Century



# *Intuitive Self-Inspection Techniques based on BIM for Energy-efficient Buildings: EU Horizon 2020 Research Project INSITER*

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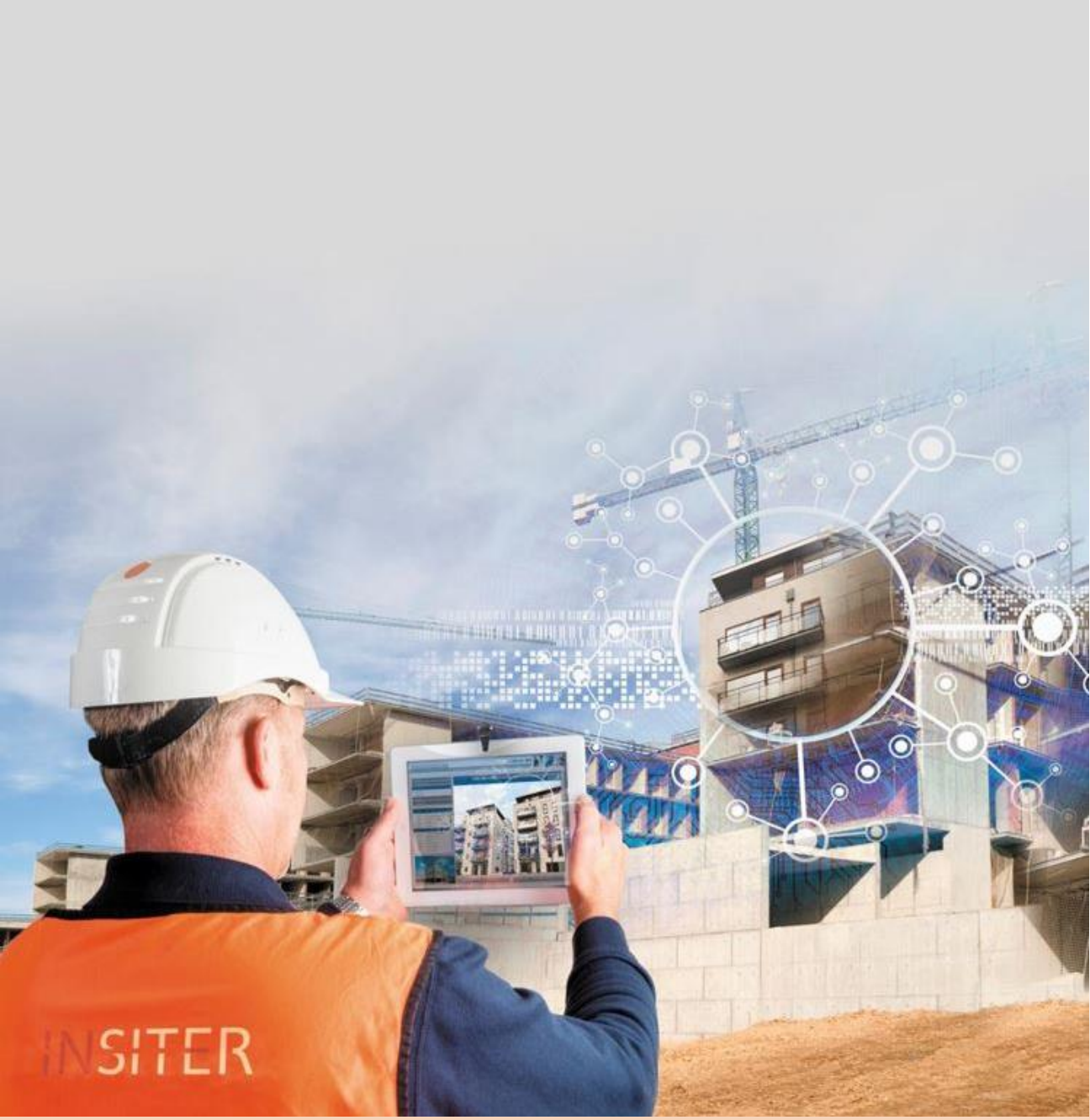
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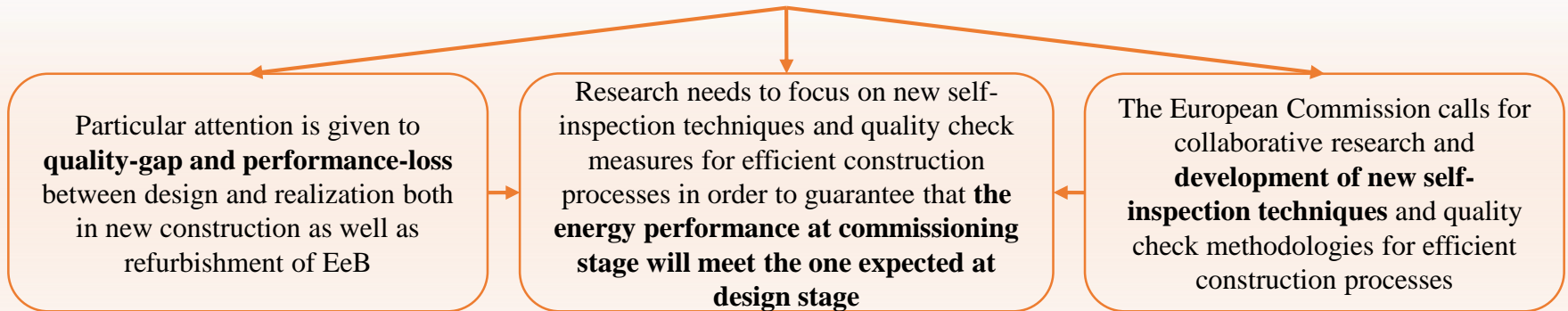
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- 1. **INTRODUCTION AND CONTEXT**
- 2. *RESEARCH METHODOLOGY*
- 3. *IMPLEMENTATION*
- 4. *LAB-TESTING AND CASE-BASED VALIDATION*
- 5. *CONCLUSION*

# 1. INTRODUCTION AND CONTEXT



**EeB-03-2014:** *Development of new self-inspection techniques and quality check methodologies for efficient construction processes*



**INSITER** INTUITIVE SELF-INSPECTION TECHNIQUES

*Intuitive Self-Inspection Techniques using Augmented Reality for construction, refurbishment and maintenance of energy-efficient buildings made of prefabricated components*

# 1. INTRODUCTION AND CONTEXT



## PREFAB COMPONENTS

More than **70% of all buildings** in the EU are based on prefab components

The EU countries represent **50% of world's export** of prefab building components

The critical bottleneck of industrialised EeB is during on-site assembly and commissioning. As a result, the energy-efficiency potential as designed is not realised in the new or refurbished buildings based on prefab components

Miscommunication and misinterpretation between designers, general contractors, subcontractors, building owners and building occupants have caused sub-optimal assembly, lower performance and financial outcomes of prefabricated systems

*INSITER deals with these existing bottlenecks by introducing an innovative set of solutions that includes Systems (integrated hardware and software) and Methodology (process guidelines and calculation methods) for real-time self-inspection and self-instruction to eliminate or reduce the gaps of quality and performance.*



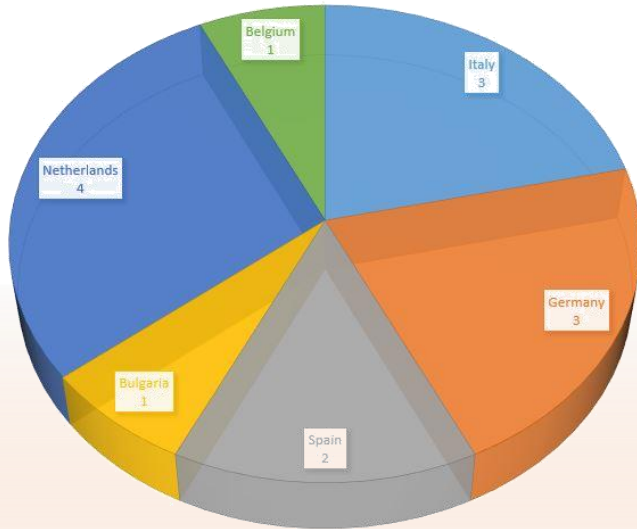


# 1. INTRODUCTION AND CONTEXT

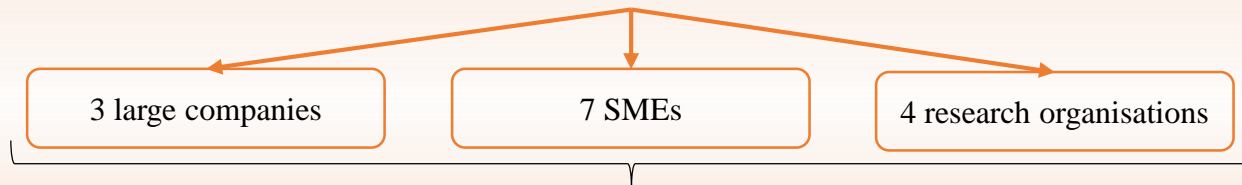
## INSITER INTUITIVE SELF-INSPECTION TECHNIQUES

*Intuitive Self-Inspection Techniques using Augmented Reality for construction, refurbishment and maintenance of energy-efficient buildings made of prefabricated components*

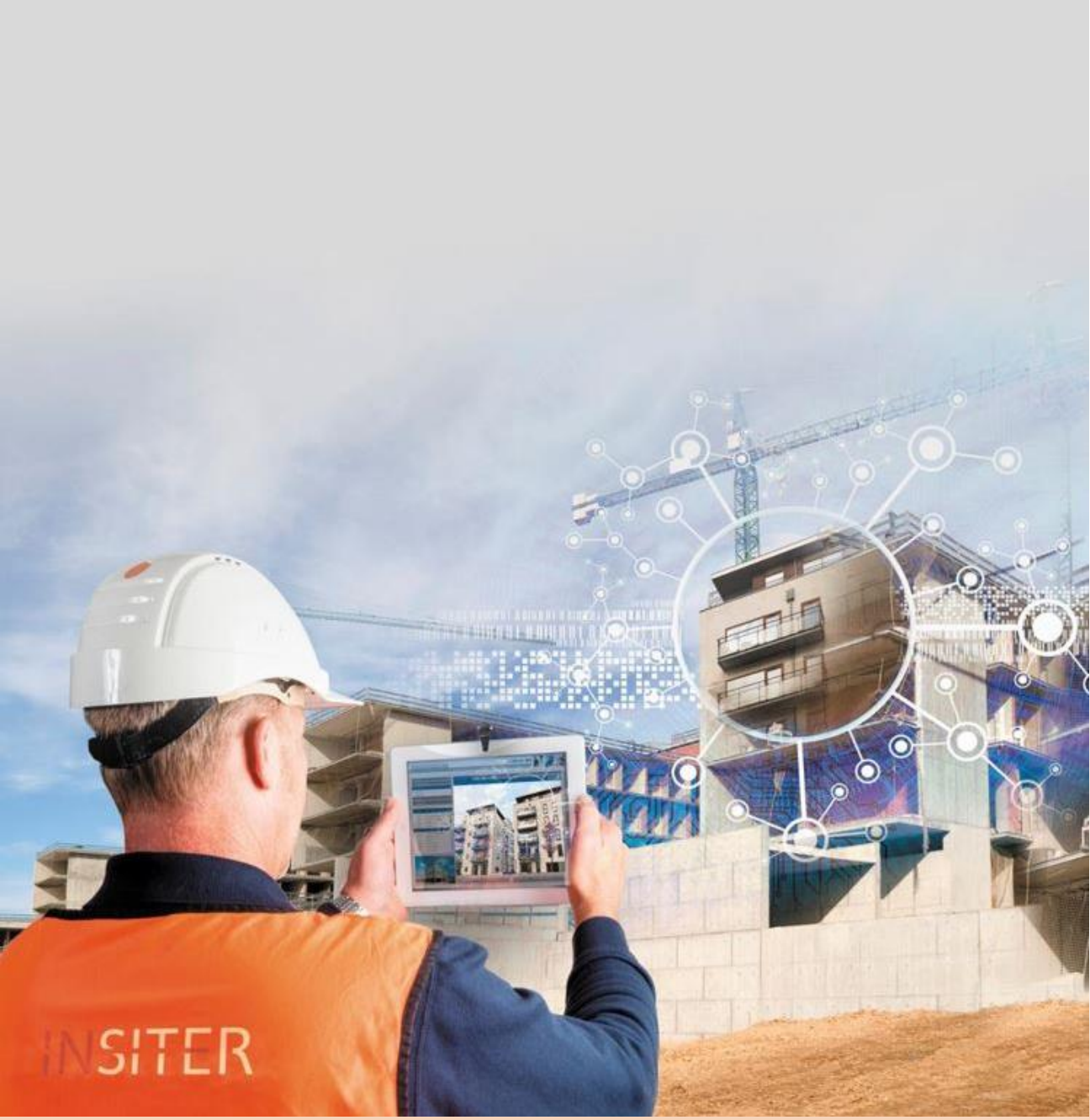
NUMBER OF PARTNERS PER COUNTRY



### Consortium



**All main geographical regions of Europe** (Western, Central, Southern) with their climate-related, regional and cultural characteristics **are covered by the INSITER partners** that represent 6 EU countries (Netherlands, Belgium, Germany, Bulgaria, Italy, and Spain).



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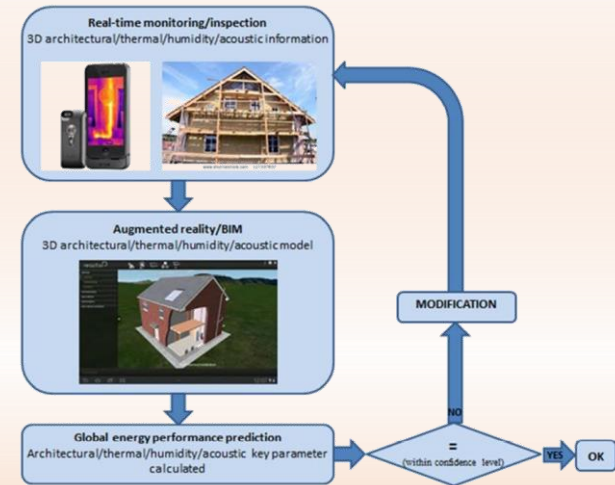
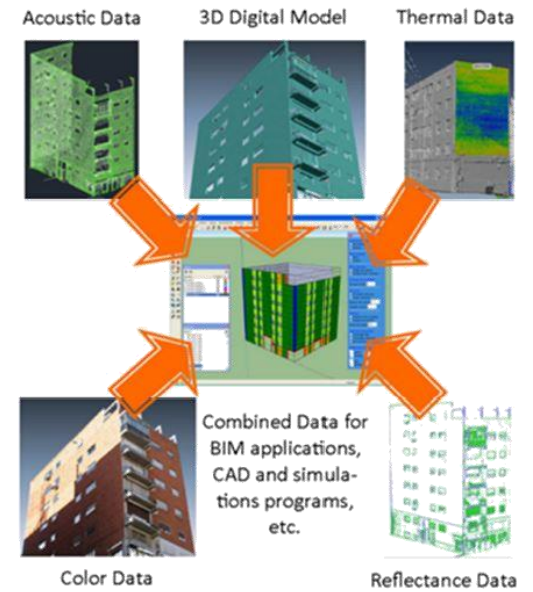
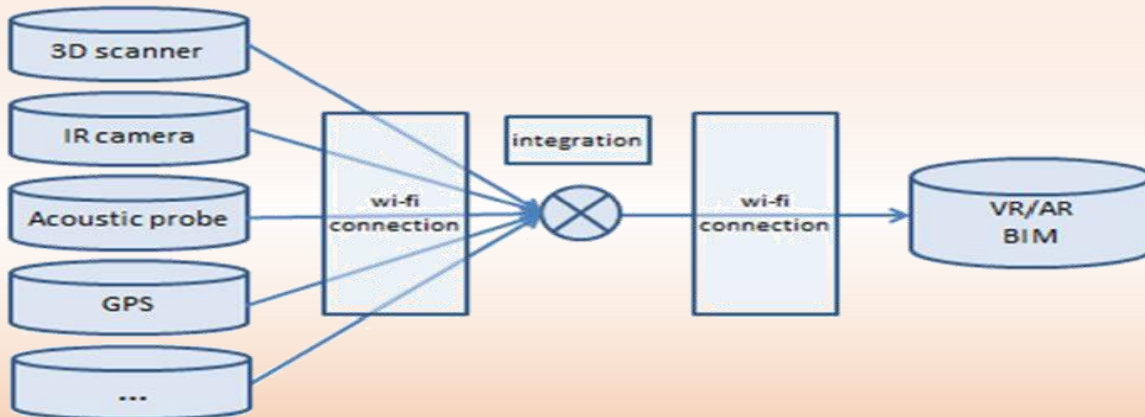
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## 2. RESEARCH METHODOLOGIES

### SYSTEM AND METHODOLOGY

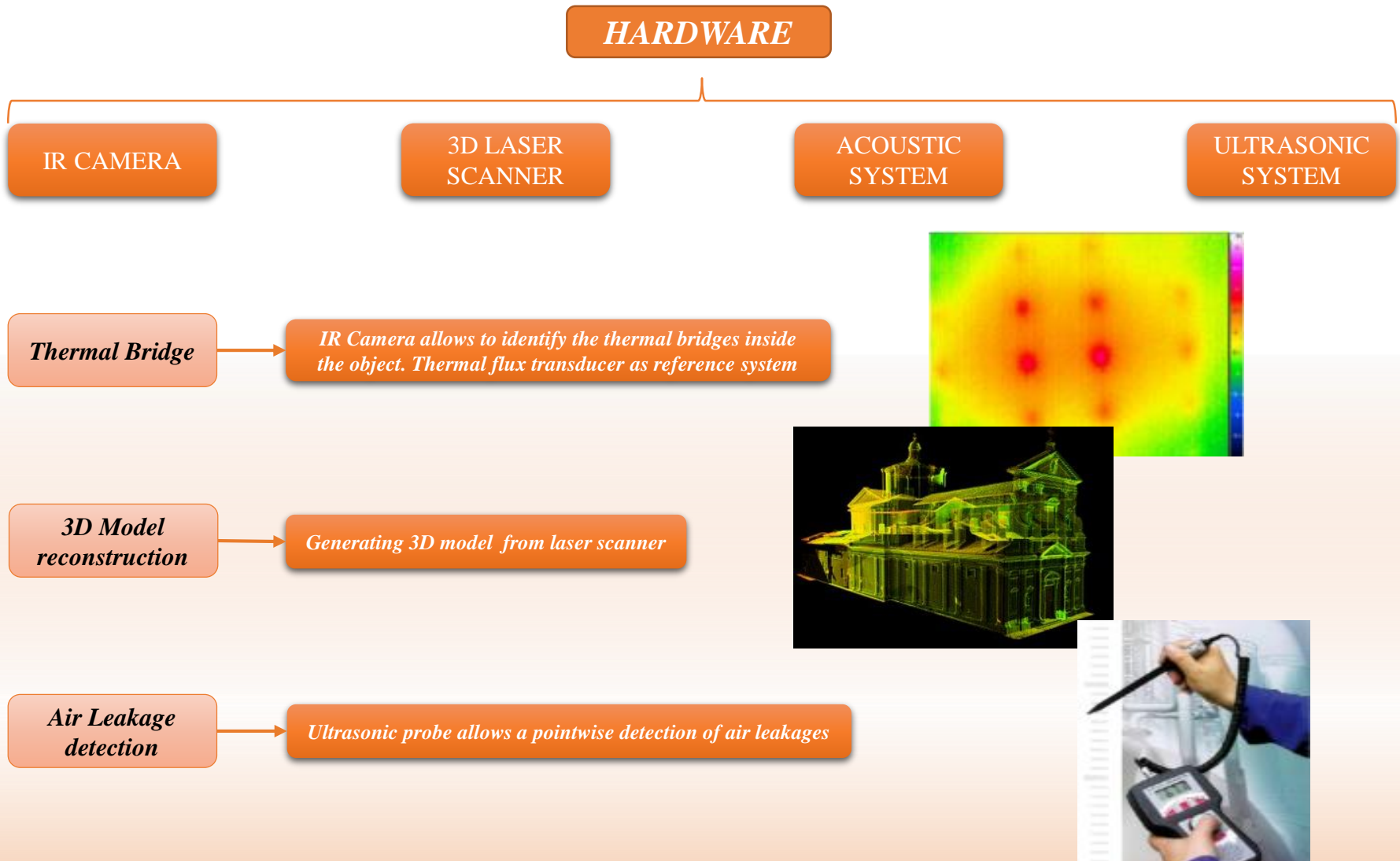
*The key innovation of INSITER is the intuitive and cost-effective Augmented Reality that connects the virtual model and the physical building in real-time*

INSITER will substantially enhance the functionalities and capabilities of **measurement and diagnostic instruments** (like portable 3D laser scanners, thermal imaging cameras, acoustic and vibration detectors, real-time sensors) by means of a smart **Application Programming Interface (API)** and data integration with a cloud-based **Building Information Model (BIM)**. The triangulation of Geospatial Information, **Global and Indoor Positioning Systems (GPS and IPS)** will support accurate and comprehensive **Virtual and Augmented Reality (VR and AR)**.



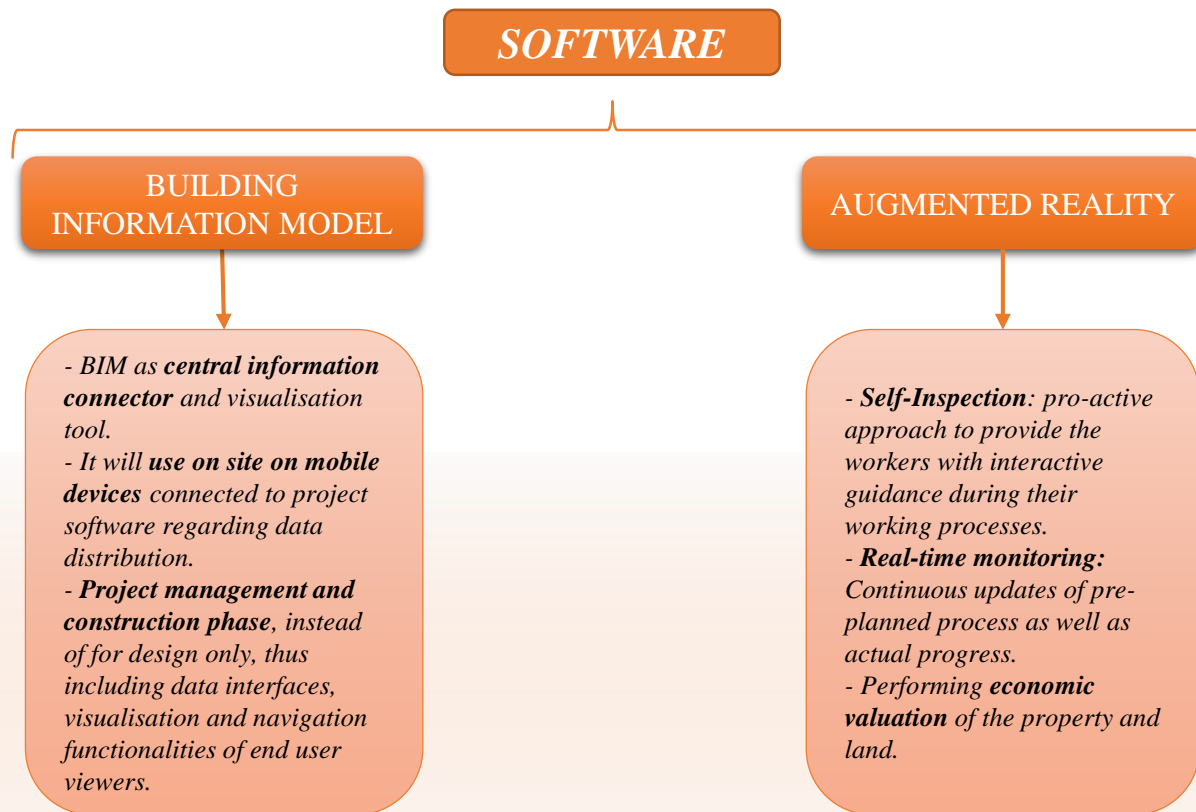


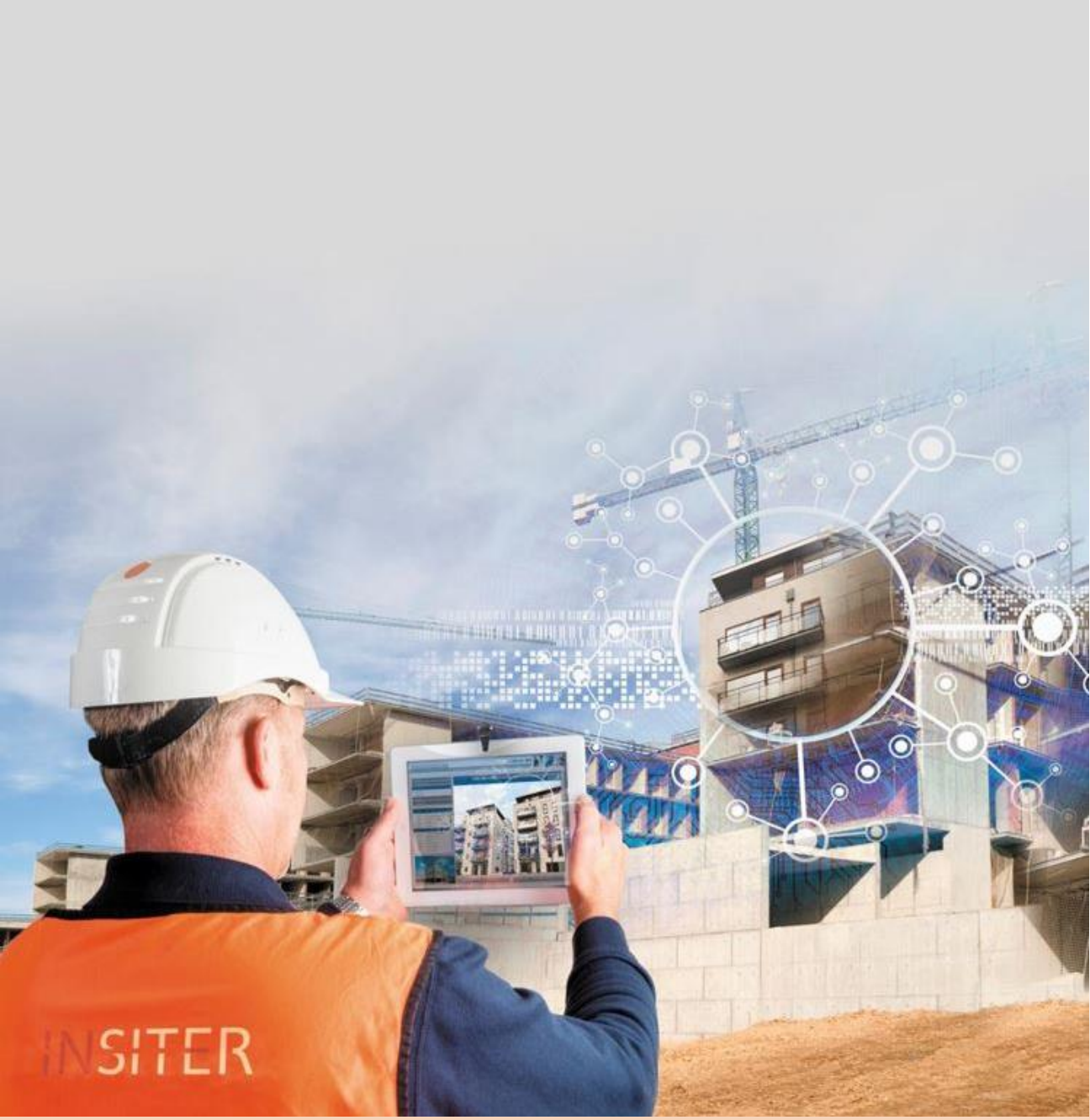
## 2. RESEARCH METHODOLOGIES





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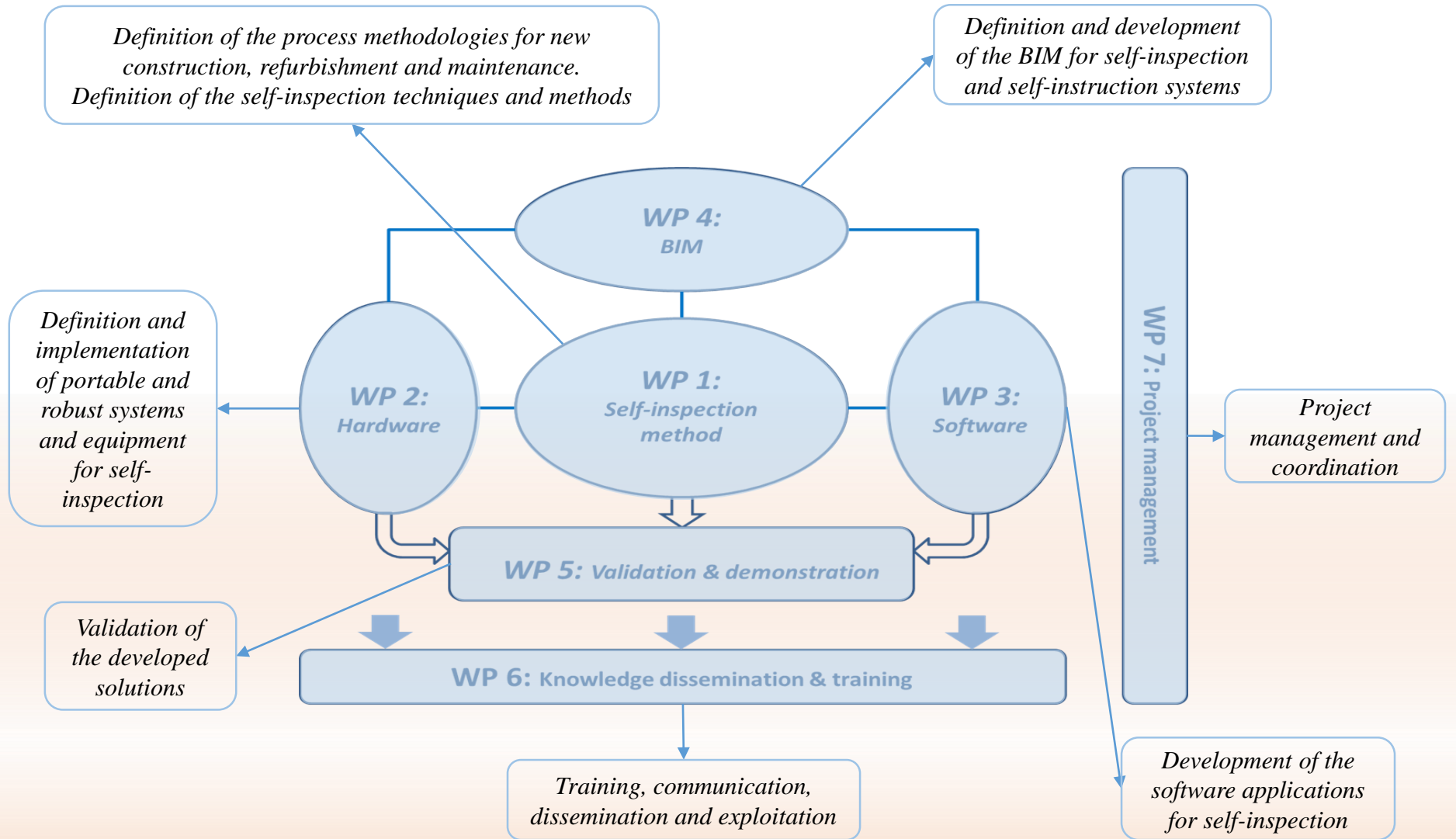




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### 3. IMPLEMENTATION





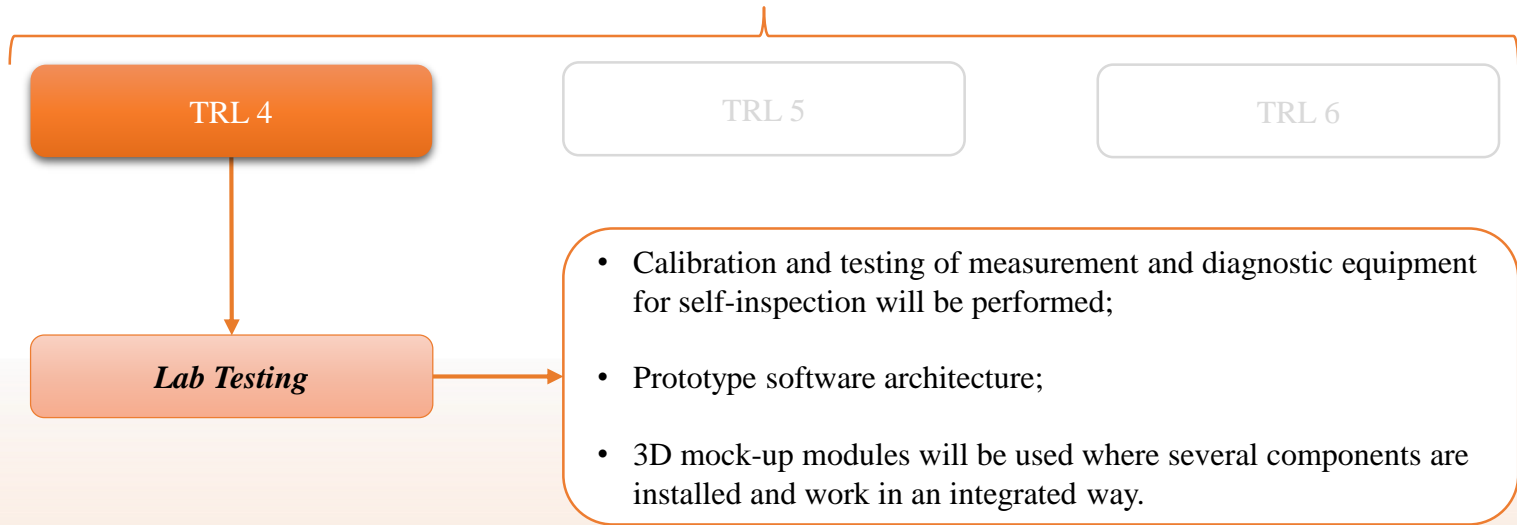
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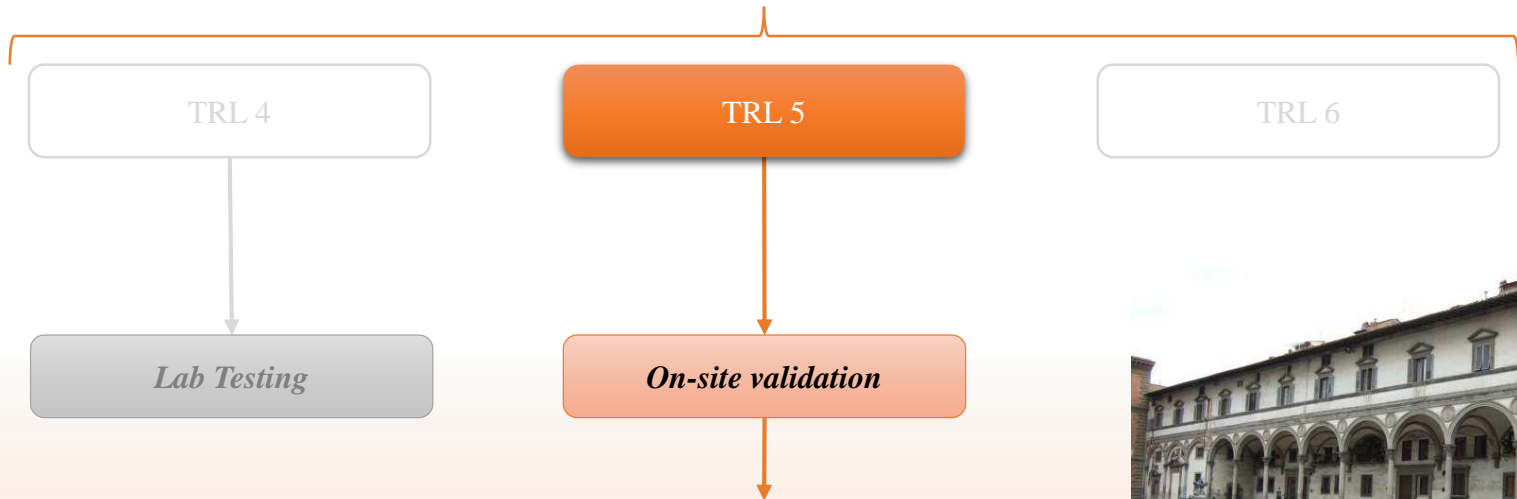
# 4. LAB-TESTING AND CASE-BASED VALIDATION

## PLANE FOR LAB-TESTING AND CASE-BASED VALIDATION



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## PLANE FOR LAB-TESTING AND CASE-BASED VALIDATION



*Ex-manifattura, Lucca, IT*



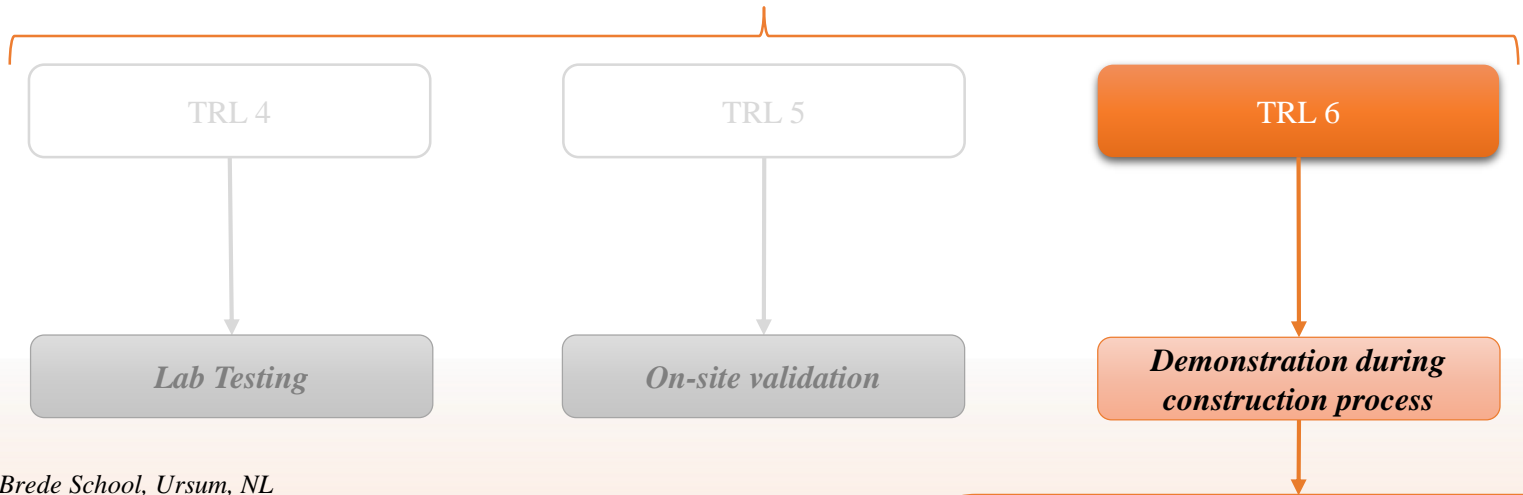
- Validation of INSITER Systems and Methodology will be conducted on-site using real case studies;
- Limited scale construction and refurbishment processes of prefabricated buildings;
- Action-learning feedbacks are collected to adjust/improve INSITER prototypes.



*Museo Degli Innocenti (Mudi), Florence, IT*

# 4. LAB-TESTING AND CASE-BASED VALIDATION

## PLANE FOR LAB-TESTING AND CASE-BASED VALIDATION



Brede School, Ursum, NL



Wias, Cologne, DE



- The objective is to show the building final performance (i.e. thermal, acoustic, energy, quality) when INSITER Systems and Methodology are used;
- Demonstration will show the final performance in terms of reducing and eliminating gaps of quality and energy-performance between design and realisation, delay avoidance, as well as improved productivity, health and safety of workers;
- Several new construction and refurbishment projects will be selected as real demonstration cases.



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## 5. CONCLUSION

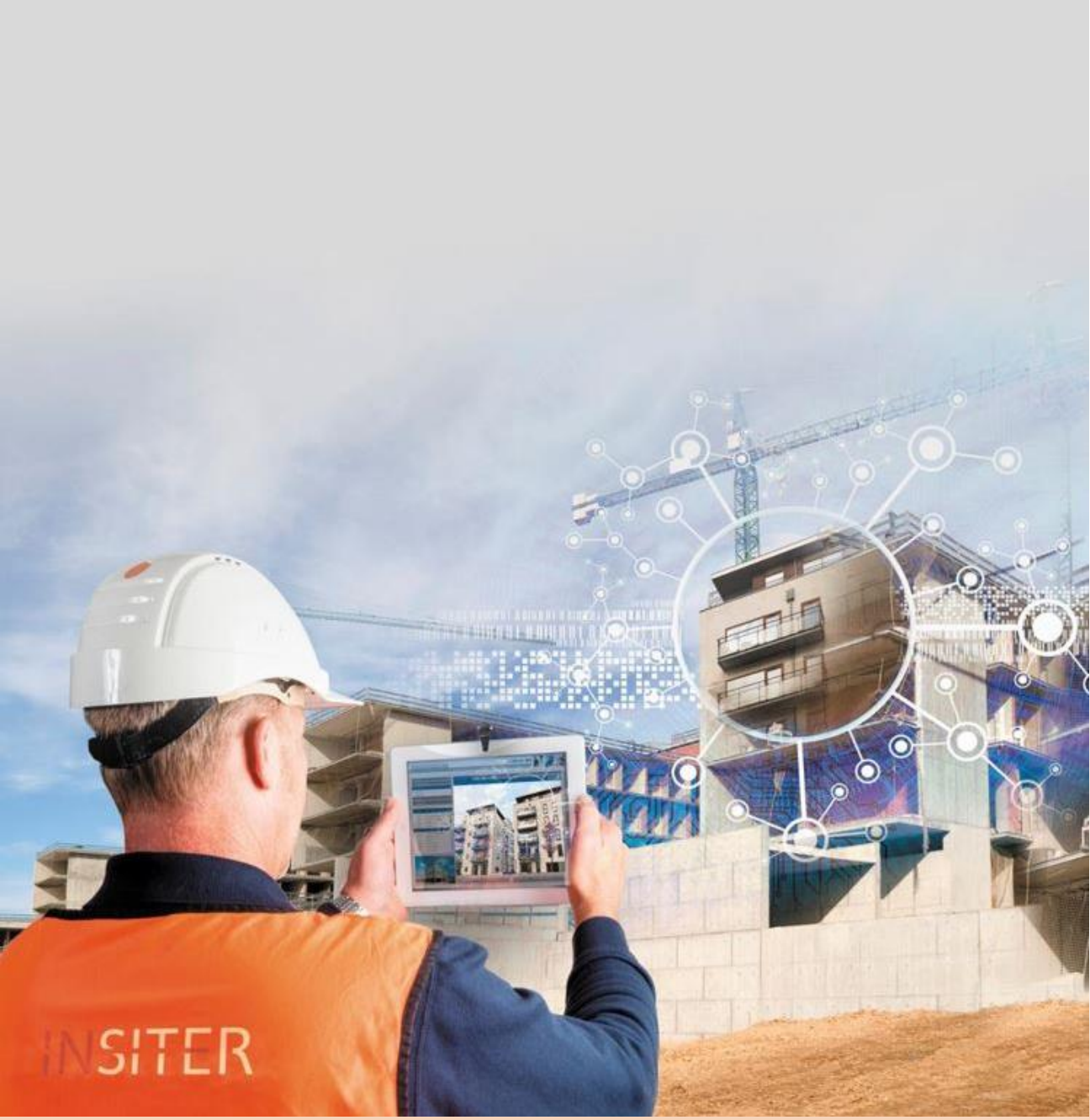
Expected results from the INSITER Project:

- New *self-inspection techniques and methodologies* in order to enhance the state-of-the-art of the hardware technologies and measurement procedures;
- *Software applications for self-inspection* based on the advancements of the software tools for quality and energy-performance assessment, planning and cost monitoring, and decision-support systems based on BIM data;
- *BIM-based self-instruction models* for construction and refurbishment, accessible on mobile devices of construction workers and other stakeholders, supported by an innovative use of *Augmented Reality* able to indicate any interventions and improvements to be made in real time;
- In terms of methodology, the **INSITER's real-time self-inspection concept has a strong contrast with the traditional approach of 'post-inspection'** where inspections are done by an observer / auditor / controller after a working process is finished.

*INSITER will eliminate or significantly reduce the quality-gap and performance-loss between design and realisation of energy-efficient buildings*

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***THANKS FOR  
YOUR  
ATTENTION***