AN IFC INTEROPERABLE FRAMEWORK FOR SELF-INSPECTION PROCESS IN BUILDINGS









28-30 June Middlesbrough

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AN IFC INTEROPERABLE FRAMEWORK FOR SELF-INSPECTION PROCESS IN BUILDINGS



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INTRODUCTION

- Full title:
 - "Intuitive Self-Inspection Techniques using Augmented Reality for construction, refurbishment and maintenance of energy-efficient buildings made of prefabricated components"
- Grant Agreement # 636063
- 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 (GIS, GPS, IPS) will support accurate and comprehensive Virtual and Augmented Reality (VR and AR).



INTRODUCTION

- Objectives
 - To eliminate the gaps in quality and energy performance between designate realisation
 - To develop a set of intuitive, robust and cost-effective instruments for self-_ instruction and self-inspection by workers and other stakeholders
 - To develop a methodology that consists of protocols and guidelines for self-_ instruction and self-inspection



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SELF-INSPECTION

- What is?
 - Tool for quality management —
 - Ensure overall performance —
 - Checklist to avoid errors in advance _
 - Auto-tool for construction workers
 - Reduce errors and costs



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DATA-FORMATS FOR INFORMATION EXCHANGE

- Multiple data formats in the state-of-the-art
 - gbXML
 - Revit (rvt)
 - IFC
 - ...
- Characteristics to be applied
 - Open standard (INSITER requirement)
 - Type of necessary knowledge to exchange information
 - Maturity of the standard





INSITER INTUITIVE SELF-INSPECTION TECHNIQUES

DATA-FORMATS FOR INFORMATION EXCHANGE

- Selection of IFC (ISO16739)
 - Better representation of surfaces
 - Including scheduling and cost capabilities
 - 4D/5D BIM
 - Embedded textures
 - New ways to store geometrical information



INSITER SELF-INSPECTION TECHNIQUES

Building Plumbing Structural Structural Controls FireProtection Elements Analysis Domain Domain Domain Domain Construction HVAC Electrical Architecture Management Domain Domain Domain Domain Shared Bldg Shared Shared Shared Shared Building Services Component Management Facilities Elements Elements Elements Elements Elements Control Product Process Extension Extension Extension Kernel External Geometric Geometric Geometry DateTime Material Reference Constraint Model Resource Resource Resource Resource Resource Resource Profile Property Utility Actor Quantity Topology Measure Resource Resource Resource Resource Resource Resource Resource Presentation resentation Presentation Repres-Structural Constraint Approval Cost Definition Organization entation Load Appearance Resource Resource Resource Resource Resource Resource Resource Resource

DATA-FORMATS FOR INFORMATION EXCHANGE







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INTEROPERABLE FRAMEWORK







DATA INTEGRATION MECHANISM CARTIF SUSTAINABLE PLACES 2017 Middlesbrouch, uk Native Point Cloud Format INSITERDLL **3D Point Cloud** Index of Reflectivity (3D) (high accuracy) PLY Format OpenSource Té AUTODESK MeshLab REVIT Processing and editing 3D Point Cloud of unstructured 3D data 2D Coloured Images BIM (low accuracy) *: As many PLY files as 2D/3D overlays in MeshLab Native Format to Image Format **IFC Format** 2D Thermal Images 80 2D Acoustic Images

INSITER SELF-INSPECTION TECHNIQUES

DATA INTEGRATION MECHANISM



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ENERGY EFFICIENCY TOOLS



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- In-advance detection of errors
 - Reduce time-to-solve time
- Data integration ۲
 - Common format and harmonization of data
 - Provide workers merged information

- Quality-gap and performance-loss between design and realization of buildings made of prefab components
- Time-consuming and costly current inspection procedures ۲
- New procedures are required
 - BIM-based guidelines
 - On-site checks



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THIS RESEARCH PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S H2020 FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION UNDER GRANT AGREEMENT NO 636063.

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