

ROBOTIZING WORKFORCE IN FUTURE BUILT ENVIRONMENTS

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ABSTRACT. The aim of this paper is to define challenges for Automation and Robotics in construction (A+R) to enhance client and social value. Construction contributes to a positive living environment for society and is the largest sector of Europe's economy with a size of around 2,500 billion Euros. Ten research projects have been analyzed to select the challenges for development. These challenges present a road map for Automation and Robotics in construction particularly on Human-machine technologies, Process management and Performance engineering.

Key words: *Human-machine Technology, Automation, Robotics, Performance Engineering, Client Value, Society Value*

INTRODUCTION

The aim of this paper is to define challenges for A+R to enhance client and social value. Construction contributes to a positive living environment for society and is the largest sector of Europe's economy with a size of around 2,500 billion Euros. [1]

Without embracing the performance concept, the transition of the building, construction and property industry into a client-focused, knowledge-based and services-based industry, characterized by sustained innovation and excellence will be extremely difficult to achieve. Or, in other words, the comprehensive application of the performance approach in practice will facilitate and hasten this transition. [2]

According the European Commission three priorities are in the heart of the policy Europe 2020:

Smart growth (developing an economy based on knowledge and innovation), Sustainable growth (promoting a more resource efficient, greener and more competitive economy) and Inclusive growth (fostering a high-employment economy delivering economic, social and territorial cohesion). [3]

The construction sector faces the following challenges and A+R needs to address and to adapt them: climate

change, demographic change, energy supply and security, food shortages and environmental concerns. Construction can offer society more convenience by low maintenance, automation, flexibility, health improving features and optimal environmental integration. [1]

METHOD

A road map to reach added value for end-users and society with the help of mechanization, robotization and automation technologies has been described by Maas and Van Gassel [4]. Human-machine technologies lead to performances by the help of various management approaches. See Figure 1. To find challenges a number of research projects have been carried out during the last 20 years at the Eindhoven University of Technology.

These projects are:

- Human-machine technologies, (i) method analyzing activities on the construction site, (ii) method analyzing Activities Daily Living (ADL), (iii) method designing modular building systems.
- Process tools: (iv) collaborative working during design meetings, (v) quality monitoring in Design-Build projects, (vi) lean construction management in projects.
- Performance engineering for the built environments:

