



Integrated BIM for failure-free retrofitting of a motorway tunnel

Johannes Anrijs

BIM Manager, BESIX, Brussels, Belgium

Jan van Steirteghem

Director Engineering Department, BESIX, Brussels, Belgium

Contact: janrijs@besix.com; jvansteirteghem@besix.com

Abstract

Nowadays numerous tunnels need in-depth retrofitting to comply with EU Tunnel safety regulations. To deal with the high project complexity and accomplish the goal within the tight deadlines, the Velsertunnel project team identified the key risks and controlled them by use of some innovative methods and collaborative tools.

Keywords: innovation; BIM; systems engineering; scrum; virtual reality; tunnel; renovation

1 Introduction

Nowadays numerous motorway tunnels need in-depth retrofitting to comply with EU Tunnel safety regulations. A daunting challenge to project managers and engineers as they have to deal with increased project complexity on technical, organizational and strategic level.

The ever increasing importance of electro-mechanical installations significantly contributes to an increase in the technical complexity of tunnels. Technical installations can already account for 40% to 60% of the contract value [1].

In comparison with other sectors, a greater number of different disciplines have to be integrated within the construction sector [2].

Furthermore, development of innovations and learning curves is difficult in the project oriented construction sector, where companies work together in varying joint ventures. This phenomena of 'loosely coupled systems' complicates the integration of innovation and strategy [3].

2 Velsertunnel Project

In 2014, the joint venture Hyacint was charged by Rijkswaterstaat with the Design Build and Maintain-contract of the Velsertunnel complex. This crucial 60-year old motorway west of Amsterdam was in dire need of retrofitting. To accomplish the goal within the tight deadlines, the multi-disciplinary project team had to identify the key risks and how to control them by use of some innovative methods and tools.

2.1 Scrum: requirement clarification

An unclear, incomplete or contradictory client brief is one of the biggest risks. Scrum sessions forced all stakeholders to enter into dialogue in an early part of the project. The client gets an efficient forum to formulate his functional expectations as a contractor we were able to had a clear view on client expectations at a very early stage, a win/win situation from which great mutual trust arose. Besides, it proved to be a perfect method, which is used frequently in software development, to clarify the main