Collective decision-making with 4D BIM: identification of synchronous collaborative practices and natural user interactions
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1/ 4D COLLAB RESEARCH PROJECT

This thesis is a part of ANR 4DCollab international research project [1]. Fig. 1 resumes related to the project research steps. The project aims to:

- propose an efficient set of BIM/4D collaboration tools;
- increase the quality of human-computer interactions with digital decision support;
- bring new scientific, professional, educational values.

2/ 4D BIM USES & PROJECT PHASES

4D (3D+time) BIM major benefits: information accessibility; clear visualization—all actors access 3D model & attached schedule and analysis. Guerriero et al. [2] propose 4D BIM uses. Their introduction and implementation by project phases and with a corresponding LOD is summarized in Fig.2. 4D BIM main value is perceived as a visualization, however other potential uses have not yet been put in a common practice. All of them involve stakeholders’ expertise and collaboration.

3/ MULTI-USER SUPPORTS

There is no fully collaborative solution for a synchronous collaboration. 4D model interactions are mostly single-user targeted, thus the multi-user aspect is an important feature to be developed. An ease of access and low appropriation time with a tool is offered by natural user interfaces (NUI), we propose to implement a multi-touch collaborative table and wall within a NUI as session equipment (Fig.a,b). NUI fosters the convergence of 4D uses with project documents. The use of the table with the 4D software (Fig.2c) reveals new values for AEC project decision-making. The thesis research objective aims for a democratization of the 4D simulations of AEC projects usage and develop an easy access to these practices for the future actors.

4/ Collaboration personas approach

BIM allows the team to use the entire set of collective knowledge, skills and competencies as parts of collective intelligence, which is the key feature for digital project management. In order to describe a project group collective activity, we propose a collaboration persona (CP) approach [6], which is derived from the original user persona method, also called Individual Persona. CP describes a new type of persona which focuses on group goals and needs, instead of personal needs, and includes collaborative work aspects (Fig.2d).

5/ Designing a collaboration support for 4D

The design of a new support will consider different actor roles throughout the collaboration process, and adapt the interface and collaboration scenarios and 4D BIM use-cases. The design is focused on: 1. providing users with a simple 4D simulations interactions 2. creating semi-automated digital feedback on collective decision-making.

RÉFÉRENCES

[1] https://www.4dcollab-project.eu

THÈSE DE DOCTORAT

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