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| | Augmented Reality for Concurrent Engineering Activities (ARCE) | Issue | A | Rev. | 00 |
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TITLE OF THE PRESENTATION: Augmented Reality for Concurrent Engineering (ARCE)

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SHORT DESCRIPTION / IMAGES:

Augmented Reality for Concurrent Engineering Activities (ARCE) is a SW framework developed by Lusospace. The goal of the system is to assist multidisciplinary, distributed design teams through Augmented Reality (AR) at the Concurrent Design Engineering Facility of ESTEC, while ensuring a seamless integration with OCDT/COMET.

The consortium successfully implemented a software suite, composed by a Server application, a Desktop application and the AR Interface. The system allows for interacting both with satellite 3D models (modifying absolute/relative positions and orientation of the model/components, evaluating dimensions) and with OCDT/COMET engineering data (consulting and altering parameters, design options, budgets and issues, amongst others) in an AR environment.

The 3D model's position and orientation are shared amongst all users in the session, engineering data is synchronized between all AR users and OCDT/COMET, and a presentation mode is available for those users not wearing AR headsets. Several users from different disciplines can participate in the session (duly authorized and with corresponding permissions).

Run in *Mixed Reality* on HoloLens 2, ARCE allows for state-of-the-art interaction using only the users' hands and no other external hand-held device. This allows for a comfortable experience and removes the problems of extreme fatigue, nausea, and vertigo sometimes associated with Virtual Reality.

Validation was performed during the design exercise (two ESA experts who were frequent and active in concurrent design exercises) at ESTEC facilities at Noordwijk, Netherlands. The overall results were satisfying (4.5 out of 5 answers when questioned "I found that the ARCE application could add value to a concurrent engineering session"). Then, a series of features and improvements were identified and implemented in a project extension. The main challenges, results and conclusions will be presented during this presentation.



Figure 1 Two users running a design exercise with ARCE at the CDF, ESTEC, and moving pieces of the 3D model while the presentation mode is active and visible on the projector canvas



Figure 2 ARCE budget feature