Co-Design using HYVE-3D

Representational Ecosystem and Design Conversations

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OBJECTIVES

The goal of this workshop is to initiate participants coming from different backgrounds to the approach of co-design in a multidisciplinary and collaborative context. The idea is to prepare the participants to actively support co-design activities through the appropriate Representational Ecosystem (Dorta et al. 2016a) ranging from traditional tools as physical models to freehand sketches all combined to digital hybrid immersive techniques via Hyve-3D(TM) (Hybrid Virtual Environment 3D) (Dorta, et al. 2016b).

During this workshop, all the stakeholders of the given project will master the elements of the Design Conversations (Dorta, et al. 2011), namely: the verbal protocols of this particular kind of collaborative ideation. This will allow them to gain awareness of the emergence of collective creative ideas, therefore learning the co-creative steps underlying better performance of the co-design process.

Participants will engage collaboratively to propose creative and innovative solutions to ad-hoc projects. These projects will be realized in immersion, locally and remotely, through interconnected Hyve-3D systems (internationally). Hyve-3D is a multiuser Social VR system allowing 3D sketch creation and embodied interaction with 3D models inside a hybrid immersive virtual environment (Dorta, et al. 2016b).

The innovative visualization technique uses a non-intrusive anamorphic image projected on a spherical concave screen. This open fabric screen permits enough space in order to accept many people at once ensuring the needed communication among users.

In addition, the 3D Cursor(TM) technology of Hyve-3D facilitates local and remote collaboration. Using a handheld tablet, users interact with the virtual environment by moving the device and using well-known multi-touch gestures. Every user has a dedicated 3D cursor, enabling for an intuitive navigation in the virtual environment via the 3D trackpad (Fig. 1).

Users will be able to go back and forth, exporting vectors (.dxf) of their 3D sketches to the CAD software of their choice, detailing their projects and importing them back into Hyve-3D (wavefront .obj textures files) for further co-design work. Also, it is possible to import photogrammetric models as large point clouds (.ply).

Figure 1

Hyve-3D and two users with their respective 3D cursors.

SCHEDULE

Day 1:
Part 1. Co-design rationale sessions in groups (up to 4 groups of 3-5 participants) learning about the representational ecosystem with traditional tools and
the design conversations.

**Part 2.** Hyve-3D: Introduction and training sessions. Co-design in immersion.

**Day 2:**

**Part 1.** Hyve-3D: International remote codesign.

**Part 2.** Refinement of conceptual sketches in personally preferred CAD software and export/import into Hyve-3D for iterative co-design cycles.

**Part 3.** Interconnection with Montreal collaborators for final revisions and open-access presentations.

**PREREQUISITE SKILLS**

No particular skills or experience in design are essential as the proposed activity aims to foster the potential of a more open ideation process shared collaboratively by different multidisciplinary stakeholders engaged in the project using a representational ecosystem. Participants are encouraged to bring their personal laptops with any 3D modeller of choice pre-installed, which can export .obj files and import .dxf files. If available, participants can use their photogrammetry software (a point cloud model will also be provided).

**BIOGRAPHIES**

**Tomas Dorta**

Tomás Dorta has a background as a practitioner architect and designer. His research interests include the design process and co-design using new technologies and the development of new techniques and devices of design in the virtual realm. He obtained his Ph.D. (2001), studying the impact of virtual reality as a visualization tool into the design process. As a design educator, Tomás Dorta joined the School of Design of the University of Montreal in 2003 where he is now a professor. Tomás Dorta is the director of the Design research laboratory Hybridlab.

**Emmanuel Beaudry-Marchand**

Emmanuel is currently a master’s student in the Design and Complexity program at the University of Montreal and is working under the direction of Tomás Dorta at Hybridlab. Emmanuel’s research focuses on immersive virtual environments and the perception of architectural scenes transposed using affordant digital representations for a contextualized ideation. Coming from a background in graphic design, his projects are driven by a deep interest in the implications of novel forms of mediatic documentation.

**PAST WORK IN RELATION TO THE WORKSHOP**

Tomas Dorta demonstrated their system Hyve-3D at SIGGRAPH 2014 (Vancouver) where it was launched, and 2015 (Los Angeles). He organized in collaboration with colleagues of the Victoria University of Wellington (NZ) a workshop about virtual heritage using Hyve-3D in CAADRIA 2016 conference at Melbourne. Hyve-3D is selected as one of the best user interfaces of 2014 by Co.Design. Other mentions on the media include Bloomberg, Tech Crunch and The Telegraph.

**PARTNER**

The Design Research Laboratory Hybridlab of the University of Montreal is a research laboratory under the direction of professor Tomás Dorta. It is composed of team of professors/collaborators as well as graduate and undergraduate researchers, designers and programmers focusing on fundamental research and development on new digital solutions supporting the ideation process.

**REFERENCES**

