Layered Elaboration:
A New Technique for Co-Design with Children

Greg Walsh, Allison Druin, Mona Leigh Guha, Elizabeth Foss, Evan Golub, Leshell Hatley, Elizabeth Bonsignore, Sonia Franckel

Human-Computer Interaction Lab, University of Maryland
College Park, MD 20742 USA
gwalsh@umd.edu, allisond@umiacs.umd.edu

As technology for children becomes more mobile, social, and distributed, our design methods and techniques must evolve to better explore these new directions. This paper reports on "Layered Elaboration," a co-design technique created to support these evolving needs. Layered Elaboration allows design teams to generate ideas through an iterative process in which each version leaves prior ideas intact while extending concepts. Layered Elaboration is a useful technique as it enables co-design to take place asynchronously and does not require much space or many resources.

THE FOUNDATIONS OF LAYERED ELABORATION

The concept for Layered Elaboration has its roots in storyboarding for interactive media [5], paper prototyping [8], and annotation tools [6]. Storyboards and drawings have been used as a method in participatory design research for decades [2, 3, 7]. Paper prototyping has been used for game design [4] and interface testing [1]. The technique described in this paper builds upon these and is named *Layered Elaboration* because it enables design groups to add ideas presented by others with layers of transparencies while encouraging design team members to expand on those earlier ideas.

Layered Elaboration is different from other techniques because few lend themselves to revisiting design ideas and adding upon them in a straightforward manner. Many design techniques require the permanent change of original items as additional designers modify them. Layered Elaboration enables co-designers to add and modify ideas without permanently destroying the original through the use of transparent materials.

LAYERED ELABORATION IN PRACTICE

Layered Elaboration was originally conceived during the design of a motion-controlled, history-based, instructional video game [9]. An adult team member created storyboards representative of one module in the game. We wanted a way to add to and extend the ideas without having to recreate or destroy the artifacts from this initial phase of

Figure 1. Using Layered Elaboration to design a game.

design. Adding a layer of overhead transparencies to the storyboard fulfilled this goal.

Our team made modifications to the technique based on those initial experiences. The modified technique emphasized collaboration and elaboration between groups. Our next use of Layered Elaboration occurred when our intergenerational design team was tasked with developing a technology that would help other children be more environmental-conscious in three different locations. Our team split into three smaller groups, each consisting of two children and at least one adult. Each team was assigned one of the three locations.

Increasing Participant Ownership

To begin the session, each team was given drawing paper and markers to create a design. The groups were assigned one of those topics and given fifteen minutes to create their designs.

After the time was up, the groups got together in the middle of the room for a "stand-up meeting" to rapidly move along the process and as an interim debriefing. At the meeting, each group explained their design and answered any questions that the other groups might have had. Once a group presented, a transparent overlay was added.

Inter-Group Collaboration

In order to solve some of the challenges of the initial implementation of Layered Elaboration, the groups exchanged designs to foster inter-group collaboration and communication. With the new designs in hand, the groups began elaborating on the ideas presented. By using the transparent overlay and markers, the design partners were able to draw on the previous group's work without permanently destroying it.

After another ten-minute period, the groups got back together in the middle of the room for another stand-up meeting. Each group presented what they added or changed to the previous design. After each group presented, another transparent overlay was added to the design and prepped with registration points. The groups then had one more opportunity to add to the design.

After the final design period, all of the groups sat down and discussed the final designs.

LESSONS LEARNED AND FUTURE WORK

As with any co-design technique, Layered Elaboration has strengths and challenges. Its strengths include:

- The ability to add to and modify the initial storyboard without permanently damaging or altering it.

- The ability of the design team to stack the transparency overlays over the original storyboard to see common trends or "hot spots" in the different groups' feedback.

- The portability as a co-design tool. Instead of needing a large physical space for low-tech prototyping, the stackable storyboards are no larger than a clipboard.

- The relatively rapid, iterative nature of the technique allows a number of design partners to provide input and ideas in a short amount of time.

- The cost of the materials is low.

We have also identified a few challenges with the modified technique, which we intend to address in the future. They include:

- Not all team members paid attention to the other groups as they presented in the stand-up meetings, which led to confusion and less elaboration.

- The washable markers used by the design teams were inadequate for writing on transparent overlays because they smudged; permanent markers were required.

This technique is useful when non-destructive design annotation, limited space, and evolutionary artifacts are design requirements. We would like to use this technique with a geographically distributed audience, so, we developed a web-based, co-design tool called DisCo.

Using the lessons learned from previous experiences, and trying to address the needs of a geographical distributed co-design audience, we designed and implemented DisCo to facilitate Layered Elaboration and support creative expression. DisCo is built with Flash, PHP, and JavaScript and enables users to collaborate asynchronously on designs.

Our initial work with DisCo has provided us with a foundation to develop new, distributed co-design tools.

ACKNOWLEDGEMENTS

REFERENCES

[1] Bailey, B. P., Biehl, J. T., et al. (2008). Adapting paper prototyping for designing user interfaces for multiple display environments. Personal Ubiquitous Comput., 12(3), 269–277.

[2] Brederode, B., Markopoulos, P., et al. (2005).pOwerball: the design of a novel mixed-reality game for children with mixed abilities. Proc. IDC '05: Proceedings of the 2005 conference on Interaction design and children, 2005. 32–39.

[3] Moraveji, N., Li, J., Ding, J., O'Kelley, P., and Woolf, S. (2007). Comicboarding: using comics as proxies for participatory design with children. Proceedings of the SIGCHI conference on Human factors in computing systems; 2007.

[4] Ollila, E. M. I., Suomela, R., et al. (2008). Using prototypes in early pervasive game development. Comput. Entertain., 6(2), 1–17.

[5] Orr, K. L., Golas, K. C., et al. (1994). Storyboard development for interactive multimedia training. Journal of Interactive Instruction Development, 6(3), 18–31.

[6] Reside, D. (2007). The AXE Tool Suite: Tagging Across Time and Space. Proceedings of Digital Humanities, 178–9.

[7] Scaife, M., Rogers, Y., Aldrich, F., and Davies, M. (1997). Designing for or designing with? Informant design for interactive learning environments. Proceedings of the SIGCHI conference on Human factors in computing systems; 1997.

[8] Snyder, C. (2003). Paper prototyping. Burlington, Massachusetts: Morgan Kaufmann, .

[9] Walsh, G. (2009). Wii can do it: using co-design for creating an instructional game. Proceedings of the 27th international conference extended abstracts on Human factors in computing systems; 2009.