

Design Process Depiction for Richer Process Experience

Yusuke Kita, Kyoto University, Kyoto, Japan, yusuke.kita@design.kyoto-u.ac.jp

Nozomu Kutomi, Kyoto University, Kyoto, Japan, kutomi.nozomu.83e@kyoto-u.jp

Tomohiro Sakaguchi, Kyoto University, Kyoto, Japan, sakaguchi@nlp.ist.i.kyoto-u.ac.jp

Kumiyo Nakakoji, Kyoto University, Kyoto, Japan, kumiyo@acm.org

Abstract

Design processes are so complex that it is not easy to remember, reflect and record in detail after the actual processes are over. This paper proposes a notation to depict a design process as a whole while keeping its original complexity in terms of visual and structural aspects. The notion affords two types of structures to represent design processes, through *activity units*, a series of actions of the same kind, and *design elements* including ideas, prototypes and theories emerged, created, and applied during the design process. We use a design process of an actual design workshop as a case to derive the notation while using the online presentation tool “Prezi” as an interaction framework. We then investigated the depicted design process by re-experiencing the process as a first-person engagement using the designed notation. Prezi's animation mode allowed us designate a sequence along which viewers can experience the design process by zooming in some activity units and design elements, and its presentation mode allows us to look back the design process from the start to the end by following activity units arranged in the temporal order. Following the transitions among some design elements allows us to focus on essential objects in the design process. The depicted process illustrate that the two structures of activity units and design elements are not corresponding to but independent of each other.

Keywords: design process, depiction, complexity, empirical study

1. Introduction

Design processes are quite complex and chaotic. We are aware from our own design experience that a design discussion sometimes goes to divergence even though the designer wants it to converge, that a quintessential idea emerges unexpectedly without paying much attention on the analysis of the situation, and that multiple ways of thinking proceed simultaneously in the designer's mind.

Existing design research has presented two approaches to analyze complex design processes. The one approach is to segment a design process into a series of parts along the timeline. Baker and Hoek (2010) expresses the design processes of workshops in a way similar to a task scheduling chart by categorizing subjects of discussion the designers addressed, and how designers attended to the subjects. One of our previous studies has shown the design processes of twenty-seven workshops in the form of series of time-stamped self-reported activities, which lasted for three days in parallel on different topics (Kita et al. 2016). The other approach is to focus on concepts and ideas emerged during a design process and to plot them at the points of time when they arise along the timeline. Goldschmidt (1990) proposed a concept called *design move*, which is defined as “a step, an act, or an operation, which transforms the design situation.” Goldschmidt developed a notation called *linkography* where such design moves and their relationships are visually represented. Design practice generally uses a widely accepted views of a design process, such as *analysis-*

and-synthesis, divergence-and-convergence, or the *Plan-Do-Check-Action* cycle. A design firm IDEO proposes a cycle of *emphasize, define, ideate, prototype and test*. These process models are mainly to understand and guide a design process by dividing it into several phases along the timeline.

We argue that such existing approaches on depicting a design process primarily aim at simplifying what had been actually happening during a design process in order to analyze and better comprehend the process. As such, elements used in those depicted process models are often abstracted and sometimes oversimplified, resulting in the lack of details of some aspects of a design process. Missing details of a design process make it impossible for designers to reflect on some aspects of the process, and for non-members of the design project to understand what happened in some moments during the process. Missing details of a design process may matter in different contexts. It is not possible to know a priori which details would matter later in the time. A seemingly trivial activity at the time of the actual design project might lead to a significant consequence if the project is reflected back years later.

The research presented in this paper is not to suggest yet another design process notation to simplify the process. Rather, we are interested in developing a notation, which would allow us to know what actually happened as a design activity in a variety of details on demand. Such a notation would make it possible for us to look back and re-experience the design process as a whole as needs and interests emerge.

The second aspect of our goal is to investigate the depicted design process by re-experiencing the process as a first-person engagement using the notation. Studying the user experience of a depicted process would help us examine whether the representation of the design process based on the notation actually embodies the design process as it was. It would also help us analyze how the two types of structures, *activities* and *elements*, correspond to design process re-experiences.

2. The Approach

The goal of this project is twofold. First, we are interested in developing a notation to depict an actual design process as a whole while keeping its original complexity in terms of visual and structural aspects. We use a design process captured during an actual design workshop to derive such a notation. We propose to use two types of structures to represent design processes, consisting of what focuses on design *activities*, and what focuses on design *elements* such as ideas, prototypes and theories emerged, created, and applied during the design process.

The second aspect of our goal is to investigate the depicted design process by re-experiencing the process as a first-person engagement using the notation. Studying the user experience of a depicted process would help us examine whether the representation of the design process based on the notation actually embodies the design process as it was. It would also help us analyze how the two types of structures, *activities* and *elements*, correspond to design process re-experiences. We use a free online presentation tool “Prezi” (<https://prezi.com/>) as an interaction framework to develop a notation for a design process. Prezi allows us to arrange words, diagrams and pictures at various levels of granularity on a vast canvas. We can also set an animation mode on objects on the Prezi canvas to change viewpoints by zooming in elements along a temporal sequence designated by the user. Such features of Prezi make it easy for us to interact with and experience the representations produced as a depiction of a process by viewing it both in its entirety and in details.

3. A Sampled Design Project

We have sampled and studied in detail a design project in order to design the notation for a design process. The sampled project was a workshop titled “about Jimen.” The meaning of a Japanese word “Jimen” is roughly equivalent to ground in English, but not exactly the same. The workshop organizers, which included one of the authors of this paper, chose this title so that the word implies more than a physical ground or surface of ground, such as geography, a land lot, or the earth. The goal of the workshop “about Jimen” was to produce ideas to make and turn our city into more attractive place for residents and visitors by observing existing “Jimen,” and freely imagining an ideal form on it. This was one of the 37 workshops conducted during “Kyoto University Summer Design School 2016,” an event held in September 2016 for three consecutive days (<http://www.design.kyoto-u.ac.jp/sds2016/>). The design workshop was organized by the first author of this paper (serving as a workshop director) and two other faculty members. Six members consisting of university students and office workers participated in the workshop.

The “about Jimen” workshop was quite challenging both for the participants as well as for the organizers. Focusing on an abstract object to design, the workshop made each member to extensively collaborate with others who have different backgrounds. Because of the ample complexity inherent to the arrangements of the workshop, we have decided to use the data from

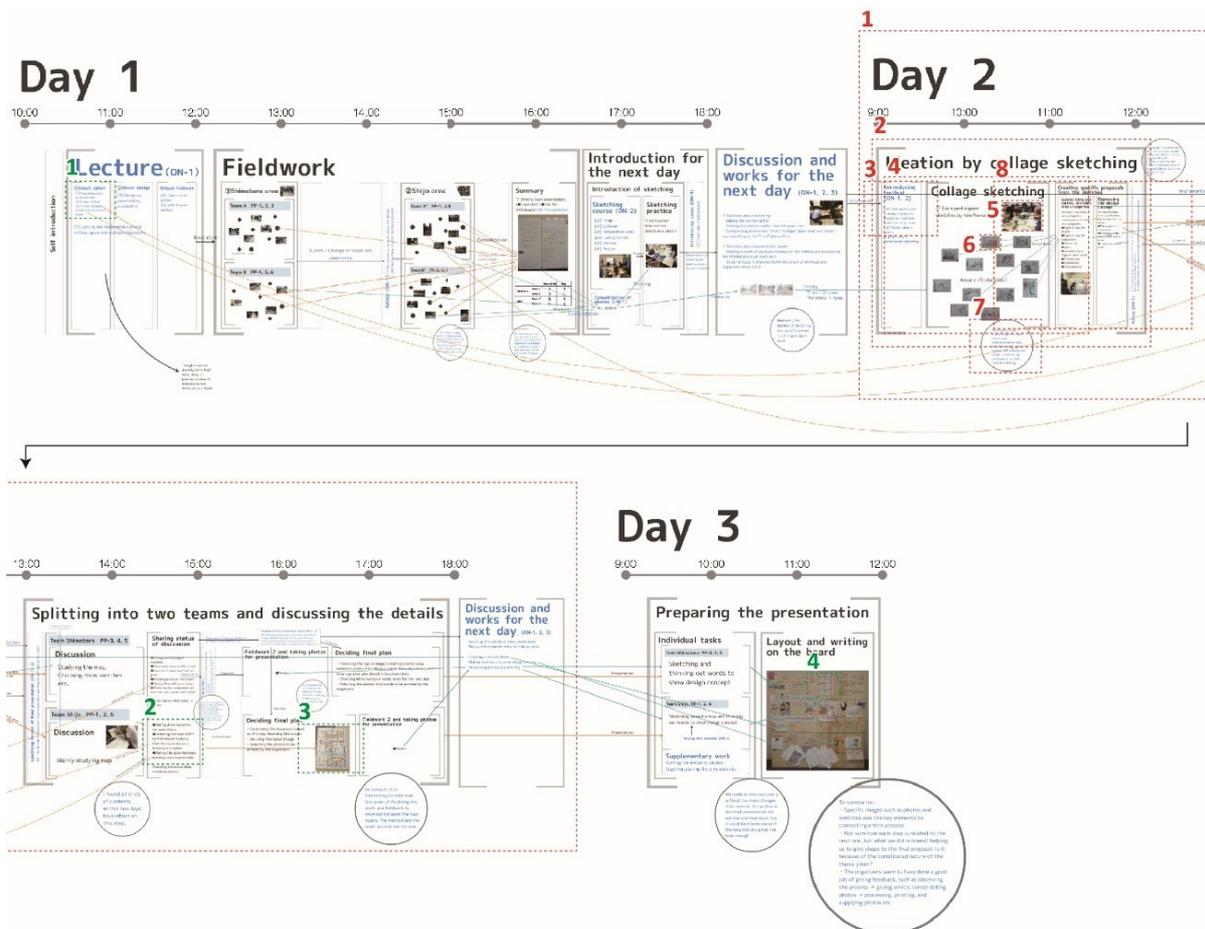


Figure 1 A depicted design process of the "about Jimen" workshop (Note: The annotations in red and green are later added and are corresponding to the areas in Figure 3 and Figure 4.)

this workshop as a case data to derive a notation for depicting a design process for our goal. When the workshop was over, the first author looked back the workshop and started representing its process. We first sketched out the process roughly by hand, and rectified it by using Prezi. The notation was not originally prepared before the depiction but gradually and incrementally evolved through the externalization process. Figure 1 shows the depicted design process of “about Jimen” using the developed notation, in which the time flows from left to right. The original Prezi data of this depiction is available at the website (<https://tr.im/sds2016process>).

Note that the designed notation is not limited to the use by those who are actually engaged in the design process: external observers may also use the notation to represent the design process.

4. Designed Notation

Figure 2 shows the legend of the notation developed during the above step. The notation affords two types of structures.

The first type of structure is *activity units*, where the process time is divided into a nested structure. An activity unit corresponds to a series of actions of the same kind, such as fieldwork, presentation preparation, or an organizers' briefing. Each activity unit is presented with a square bracket which encloses the period of time of the activity in the timeline. The notation defines three relationships among units. The *sequential relationship* is presented by arranging two or more units horizontally. It expresses activities conducted in a consecutive manner along the timeline. The *concurrent relationship* is represented by putting two or more activity units vertically. It expresses such situations as team members separate into some groups and conduct different activities in parallel. The *inclusive relationship* is represented by nesting brackets. It expresses activity units in a hierarchic structure.

The second type of structure is *design elements*. Design elements represent concepts or objects

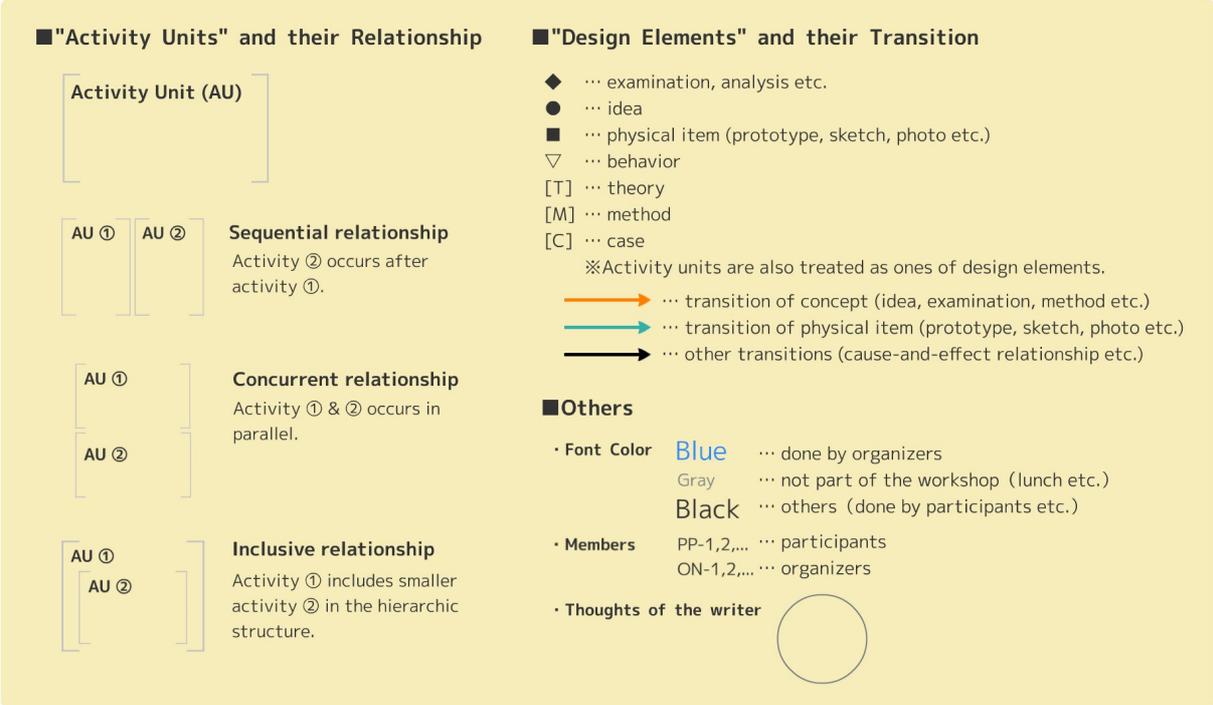


Figure 2 Legend of the proposed notation

which are produced, emerged or mentioned during a design process, such as ideas, prototypes, photos, analysis results, particular theories, or methods. Design elements are represented by texts with signs. If a design element is a visual object (i.e., a picture or a sketch), it is presented by arranging the element on Prezi canvas. When the design element is restated, reused, refined or changed later, or when a cause-and-effect relationship arises between elements, an arrow is used to connect the point of time on which the original element arises and the point of time on which it is restated, reused, refined, changed or effected. Thus, such an arrow represents the transition among connected design elements. Different types of design elements are displayed in different signs as shown in Figure 2. Activity units may also be treated as ones of design elements because we can often find cause and effect relationship among activity units or between activity unit and design element.

5. Experiencing the Notation

Prezi's animation mode allows us designate a sequence along which viewers can experience the design process by zooming in some activity units and design elements. We designated two types of animation corresponding to two structures.

The first type of animation is to follow activity units in the temporal order. Figure 3 shows a part of sequence of designated animation. This type of animation follows activity units in a sequential relationship. When some activity units are in inclusion relationship, the animation displays from a higher activity unit in the hierarchic structure to lower ones. When the members separate to groups and a concurrent relationship between activity units arises, the animation first displays the activities from one group then those of another. When pictures, sketches or thoughts of the writer are arranged on the canvas, animation zooms in such elements to make it easier for viewers to read the contents.

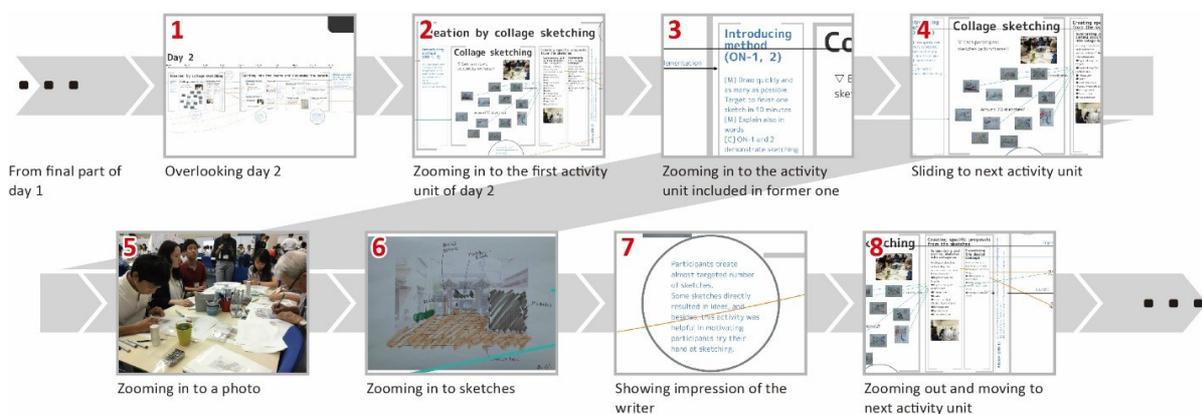


Figure 3 A part of animation following activity units (Red numbers correspond to the areas shown in Figure 1.)

We can look back the depicted design process from the start to the end by following activity units in order. This experience allows us to trace *what had been happening* in the process. Inclusive relationships help us not only following activity units one by one, but also overlooking hierarchy between activity units in advance. We can browse all the different activities in parallel through concurrent relationships.

The second type of animation is to follow the transitions of design elements. Figure 4 shows a part of the animation of this type. It starts at the point of time on which a design element arises

and flies along the arrow to the next point of time on which the element transits. When the animation reaches a final transition point of a design element, it goes back to the start of the timeline and follows the transition of other design element.

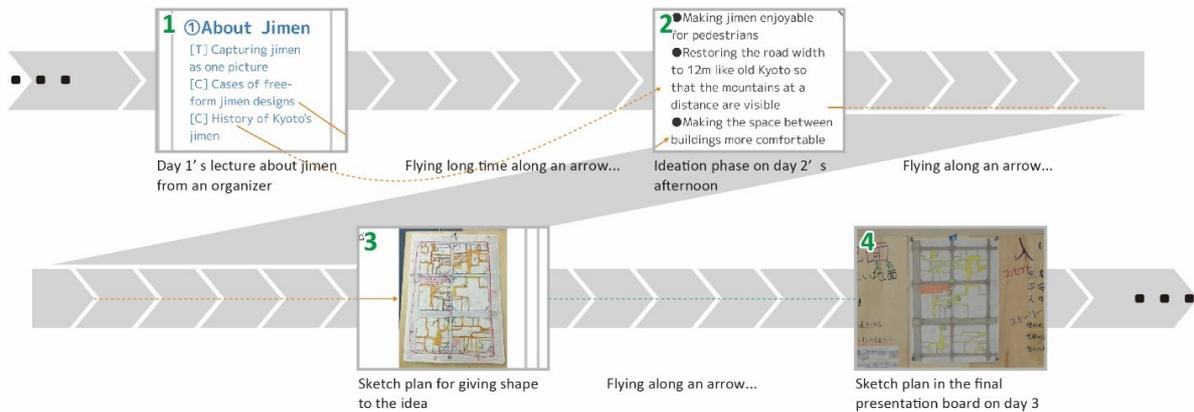


Figure 4 A part of animation following design elements (Green numbers correspond to the areas shown in Figure 1.)

Following the transitions of design elements allows us to focus on the key objects in the design process. This type of experience helps us to know *what had been important* in the design process.

By using animation, we depicted the design process not only as a static figure, but also as a dynamic presentation which makes the process to be re-experienced sequentially by the viewers. Animation works for designers who engaged in the process to profoundly reflect on the process and also for non-members of the design project to better grasp the process.

6. Discussion

6.1. The Role of the Two Structures

Design elements may be left out and not attended to for a long time in the process. For example in “about Jimem,” some contents of the lecture on Day 1's morning effected on the ideation phase in the latter half of Day 2. A picture taken in Day 1's fieldwork gave inspiration to a participant in Day 2. In contrast, activity units connected directory with a sequential relationship often shared little from the aspect of design elements. Though participants summed up examinations in the fieldwork on Day 1, the summary, which was a kind of design element, did not have explicit effects on the following activity because it was a lecture on how to do sketching.

The creation of each design element is inevitably situated during an activity unit. How designers think and what kind of design element emerges depend on the activity unit in which the design element is born.

Two structures of activity units and design elements are not corresponding but independent of each other. We have found that this might be the reason why design processes are often found complex.

6.2. Planning a Design Process based on the Notation

The notation may also be useful for planning design activities. Designers may sketch out how to proceed a design process in advance by using the notation. For effective planning of the design process, it would be necessary to prospect what kind of structure of activity units and design

elements would be suitable. This is one of the future agenda for our research.

Acknowledgement

This research was partially supported by JPMJCR1401, CREST, JST.

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Author Biographies

Yusuke Kita

Yusuke Kita is a lecturer at Unit of Design, Center for the Promotion of Interdisciplinary Education and Research, Kyoto University. He got his Ph.D. in Architecture from Kyoto University in 2012. His thesis topic was *urban modality*, which refers to the way our city exists is captured in its entirety from the viewpoint of the system of people and their environment. His current research interests include general design systems and design processes, as well as architectural and urban planning. He presently serves as the chief editor of “Discussions on Studies of Design” at the Unit of design. He is licensed as a Registered Architect and a Real Estate Transaction Specialist.

Nozomu Kutomi

Nozomu Kutomi is a Ph.D. student at Graduate School of Informatics, enrolled in the Collaborative Graduate Program in Design, Kyoto University. He received his master's degree in Mathematics from Kyoto University in 2004, where he studied algebraic geometry. He then engaged himself in teaching mathematics at high schools and a variety of educational work. His current research is to construct mathematical models for representing massive learning data through machine learning, and applying them to support teachers. He is a director of Japan Society of Digital Textbook.

Tomohiro Sakaguchi

Tomohiro Sakaguchi is a Ph.D. student in the Language Media Processing Laboratory at Kyoto University. He is also enrolled in the Collaborative Graduate Program in Design. He holds M.S. in Informatics from Kyoto University and B.S. in Bioinformatics and Systems Biology from the University of Tokyo. His current research focuses on clarifying how people's perceptions of concepts and object have evolved by processing a large amount of text available on the web.

Kumiyo Nakakoji

Kumiyo Nakakoji is Professor at Unit of Design, Center for the Promotion of Interdisciplinary Education and Research, Kyoto University. After receiving her Ph.D. in Computer Science from University of Colorado, Boulder, in 1993, and working with LifeLong Learning and Design Center as Adjoint Associate Professor, she has been serving as Professor at RCAST, University of Tokyo, and as Director at Key Technology Laboratory, Software Research Associates Inc., Japan. Her current research interests include knowledge interaction design, human-computer interaction design for data engagement, experience design for inspirational museum services, and collective creativity support.