Activity-based Design in Service Fields

Methodological Comparison with the Engineering Design Approach

Kentaro Watanabe*, Takeshi Sunaga**, Maiko Kobayakawa***, Takuichi Nishimura*

National Institute of Advanced Industrial Science and Technology,
{kentaro.watanabe, takuichi.nishimura}@aist.go.jp
*** Tama Art University, sunaga@tamabi.ac.jp*
**** Aichi Shukutoku University, koba@asu.aasa.ac.jp*

Abstract: The importance of services is growing and how to design services is being discussed in various design fields. Most of services are highly human-related, and for the improvement of them, the deep analysis on not only activities and an environment but also the subjectivity of employees and customers is required. The objective and systematic analysis based on the engineering design approach is effective to improve a service, but there are some difficulties to handle such subjective perspectives of humans. Concerning this issue, there are several effective design approaches based on expressive activities. However, the mutual understanding between both design approaches has not been established yet. In this study, the authors compared "activity-based design" with the engineering design approach to explore the possibility to integrate them for the efficient and effective improvement of services. Activity-based design is a design approach to extract subjective concerns and viewpoints of potential stakeholders through their own self-expressions and to encourage them to design an object by themselves. As a result of the comparison, the authors acknowledged that there are certain similarities and differences in both design processes. The authors discuss how to create a complementary effect between these design approaches.

Key words: activity-based design, service design, engineering design, expressive activities

1. Introduction

The service industry is a major driver of the modern economy especially in developed countries. Even in the manufacturing industry, services take an important role to provide added value for customers. Under such a circumstance, how to design services has become an important issue and is being discussed in various fields [1-3]. One of these design approaches is the engineering design approach. The engineering design approach is characterized in the objective and systematic analysis to improve a service especially from the aspect of its efficiency. Meanwhile, most of services are highly human-related and the subjectivity of people within service fields affects the results of services strongly. Therefore, it is important to analyze the subjectivity of not only customers but also employees such as their concerns and sense of value and to promote their autonomous activities which fit their subjectivity. Concerning this issue, there are several effective design approaches based on expressive activities by users of design results. However, the mutual understanding between both design approaches has not been established yet.

In this study, the authors compared a design approach based on expressive activities with the engineering design approach to explore the possibility to integrate them for the efficient and effective improvement of services. The authors took up "activity-based design" as a target design approach which is familiar to the improvement of

service fields [4]. After the comparison of both design approaches, the authors discuss how to utilize these design approaches complementarily.

2. Service design and its approaches

2.1 Characteristics of service design

A service has been considered as a different kind of design object from a tangible product. Zeithmal et al. [5] pointed out that there are four characteristics of services compared with products: intangibility, inseparability, heterogeneity and perishability. These characteristics influence a design approach toward a service. Service design focuses on intangible, perishable human activities and experiences though a service environment and artifacts used there are also important design objects. In addition, heterogeneity of a service is strongly related to the subjectivity of customers and employees in a service field. The satisfaction of a service to customers depends on their status and sense of values of customers. Furthermore, the mindset and motivation of employees as service providers affect the result of a service substantially.

2.2 Engineering design approach

Engineering design has been taking an important role in product design and development. When service design became an important issue in industries, researchers in the engineering design domain also started to study how to design services. For example, Morelli [6] applied several system engineering methods such as IDEF0 [7] that is a functional modeling method to the design of services related to products. In Japan, the research to develop a design methodology of services has been conducted for many years [3, 8, 9].

In general, the engineering design approach aims at determining the specification of a design object in a step-by-step and structured manner. For example, one of the most famous engineering design methodologies proposed by Pahl and Beitz [10] includes concrete steps and models to determine the specification of products. The same approaches can be seen in service design studies such as [9, 11, 12].

Many of the engineering design processes for services include the following three major steps.

1. Requirement analysis

Requirement analysis is performed to extract requirements for design objects. These requirements are extracted from stakeholders and are also determined based on technical and environmental constraints.

2. Design

According to the extracted requirements, the specification of design objects are concretized and structured, usually in a step-by-step manner. For this purpose, a service designer applies design models and methods to describe several aspects of services such as service processes, systems for providing a service and relations among stakeholders to figure out the ideal shape of services [8, 11, 12].

3. Evaluation

A designed object is evaluated based on the extracted requirements. There are also various evaluation methods for services such as a process simulation method [12]. After the evaluation, the designed object is modified or refined.

The application of engineering models and methods enables designers to clarify and confirm the specification of services exhaustively within the range of the models and methods, and even to evaluate and optimize services from specific viewpoints.

Meanwhile, the existing approaches in service design have relatively small interest in the subjectivity of employees. For example, how to implement a designed service into an actual service field has not been discussed in detail. Since it is usually difficult to change the working style of employees [13], it is preferable to consider whether a designed service is acceptable to employees during its design period. For this purpose, it is essential to take the concerns and mindsets of employees in a service field into consideration for realizing successful services.

2.3 Design approach based on expressive activities

Meanwhile, there are other design approaches which focus more on the subjectivity of people related to a design object. Especially, the design approach based on expressive activities has a strong interest in the subjectivity of related people. For example, cultural probes can be taken up as such a design approach [14]. Cultural probes are self-report packages of artifacts, questionnaires and exercises that encourage users to reflect on their experience. Expression by people includes their subjective mindsets, preferences and concerns, some of which are even not realized by their own. By analyzing them, a designer can acquire important clues to determine the concept of services and to evaluate design results.

These design approaches have a considerable potential to overcome the aforementioned issue in the existing engineering design approach. In this study, the authors take up one of the design approaches based on expressive activities and discuss the similarity and difference of both kinds of design approaches and the possibility to utilize them for better service design.

3. Activity-based Design

3.1 Overview

In this study, the authors focus on activity-based design. Activity-based design is a design approach to extract subjective concerns and viewpoints of potential stakeholders through their own self-expressions in the workshop style [4]. In addition, this design approach encourages them to design new tools and processes by themselves. This approach would be effective to motivate them to implement designed processes and tools into their actual service field. In this sense, the activity-based design has a potential to tackle the issues in the engineering design approach.

3.2 Process and methods

The activity-based design is usually performed by a group. For the design activities in a service field, employees, designers and other stakeholders would be participants of the group. According to the facilitation of designers, participants perform the design activities as follows. (See Figure 1)

1. Reflection on experiences through self-expression

The activity-based design starts with the reflection on experiences. For this purpose, participants express their experiences and episodes by drawing pictures related to them or writing essays on them. After finishing it, participants are required to explain their productions. In such expressed results, their concerns and mindsets related to their experiences in their work are involved. By explaining them, participants realize what they feel,

care and aim at in their work. Some of them may be unconscious during their work. This approach is characterized in the self-motivation to express the subjectivity of participants.

2. Design and evaluation by expressive activities

In the activity-based design, new processes and tools used in their work are designed by participants based on the extracted mindsets and concerns. Several methods are utilized for this purpose. Storyboarding is one of the methods which describes how new processes and tools could be applied in a service field with pictures and sentences [15]. Acting-out is another method which is to have participants act as determined roles according to a certain scenario which includes designed processes and tools [4]. Tools used in acting-out are developed by paper prototyping or other mock-up methods. This approach is especially effective to simulate and test the designed processes and tools through the actual movement or participants. After using these methods, participants evaluate the designed processes or tools based on their extracted concerns and mindsets. According to its result, redesign of processes or tools is usually conducted several times.
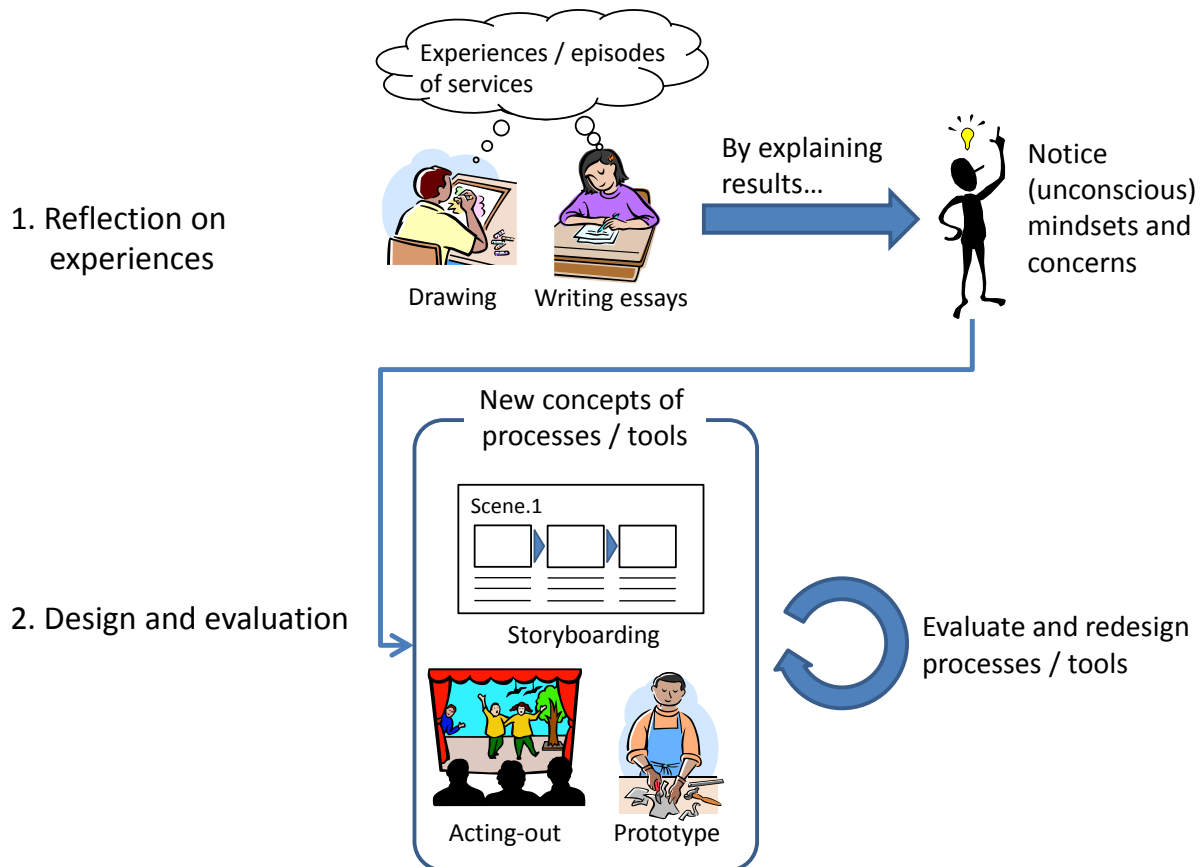

Figure 1 Schematic view of the activity-based design

4. Comparison between the design approaches

In this section, the authors compare the aforementioned activity-based design and the engineering design approach from several aspects. As can been seen, the overall processes of both design approaches are similar. They start with the analysis of current situation and requirements. After that, a design concept is developed and

concretized in detail. From the viewpoint of the engineering design approach, the reflection on experiences is a kind of self-analysis of requirements by participants.

Meanwhile, there are some differences between the design approaches. Table 1 describes the summary of their comparison.

· Relation between designers and users

In the engineering design approach, designers and users of design results are usually separated. On the other hand, the activity-based design lets participants have more active roles in design. In the activity-based design, designers focus more on the facilitation of design activities. This is one of the advantages of the activity-based design to motivate employees to change their processes or to use new tools, since their active roles in design create a positive feeling to the design result. Meanwhile, tools with high technology cannot be developed by employees in a service field in general. Therefore, to create better tool concepts is important for the actual development conducted by engineers.

· Design process

In general, rather deterministic design processes and models are used in the engineering design approach such as [10]. By using them, the specification of design objects can be structured and refined. The design process of the activity-based design is more exploratory than the one of the engineering design approach. Participants in the activity-based design can describe their design results in a more free form.

· Evaluation

As has been mentioned, the evaluation of the activity-based design is based on the subjectivity of participants. Since evaluators of designed results are users who participate in design activities, their subjective evaluation is relatively reliable from the aspect of actual usage. On the other hand, the results of the engineering design approach are evaluated based on more objective standards. The engineering design approach is effective especially for the assessment of technical feasibility of design results and other evaluation based on observable parameters [8].

Table 1 Differences between the engineering design approach and the activity-based design

Engineering Design	Compared elements	Activity-based Design
Design for users	Relation between designers and users	Design with/by users
(More) deterministic	Design process	(More) exploratory
Place emphasis on objectivity	Evaluation	Place emphasis on subjectivity

5. Discussion

According to the comparison between two kinds of design approaches, the authors discuss how these design approaches are utilized for various situations and mention their complementary relation.

As can be seen in the previous analysis, the activity-based design approach is rather a bottom-up approach closely related to stakeholders. It is especially effective to extract their fundamental concerns and mindsets, and to adapt the design result to a service field. Meanwhile, the engineering design approach is crucial especially to determine detailed specifications of tools implemented in a service field, since the design of products should be performed from various aspects which are established through the history of industrialization.

Concerning these features of both approaches, they can be utilized at each design phase in a complementary manner. For the requirement analysis within a service field and concept making based on its result, the reflection on experiences based on the activity-based design would work effectively to explore the subjectivity of employees deeply in addition to the objective and technical analysis of the engineering design approach. The engineering design approach is effective to make a design concept in more detail and to develop especially complex systems and tools used in a service filed. When the designed tools and processes are implemented in a service field, the common understanding through expressive activities of the activity-based design would effectively work for the smooth implementation of them. Though the actual design process should be considered more, there seem some complementary relations among both design approaches. For the unification of these design approaches, further research is required.

6. Conclusion

In this study, the authors explained the features of the engineering design approach and the activity-based design approach and compared with them. Based on the comparison, the authors discussed the possibility of their complementary usage.

The authors are working in an actual service field to develop an information system to support employees there by applying both design approaches. In the future report, the authors will introduce its result, and explore further possibility to utilize both design approaches.

7. References

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