Proposal for an Event Design Process Using Systems Engineering Approach

Mikiko Nakada*
Graduate School of System Design and Management, Keio University, Kanagawa, Japan

Makoto Ioki
Graduate School of System Design and Management, Keio University, Kanagawa, Japan

ABSTRACT

The purpose of this study is to propose an event design process for department stores. Department stores are made up of multiple retail companies and act as one organization with common goals. As a result of this feature, a department store is similar to a "system." Thus, we propose a detailed event design process using a systems engineering approach. Moreover, we propose an event design process sheet providing a detailed description of the process. It can be used readily, and can be filled out easily. Using the sheet, event designers can easily identify two things: all the stakeholders of the event in department stores, and what the designers need to do to design the event. In this paper, we have referred to the existing International Standard ISO 20121 (Event Sustainability Management Systems), and have proposed a far more detailed description of how to design the process for practitioners. We have also verified the process. Event design practitioners at department stores have confirmed its effectiveness.

1. INTRODUCTION

Due to the development of technology, communications between customers and retailers have changed. In the past, the actual store was the only place where they could buy products or goods. However, digitalization has brought in many channels to enable purchase activity (Hendriyani, 2018). Hansen and Sia (2015) discuss how important it is to have an Omni-channel strategy for retailers. According to the Ministry of Economy, Trade, and Industry in Japan, Japanese retailers, such as department stores, are also adopting Omni-channel strategies (2016). An Omni-channel strategy is a customer touch-point or a medium in which the company and the customer interact (NesLin et al, 2006). This could be online, offline, in actual shops, and at events, among others.

Japanese department stores are no exception when it comes to adopting an Omni-channel strategy and various efforts are made by each company toward Omni-channelization (Antonio, 2013.) Along with Omni-channelization, Frow and Payne

explain the importance of how much customers feel the need to interact with suppliers. Retailers need to create opportunities where they can interact with customers in various ways. It has been shown that holding events in Japanese department stores will prove useful for sales, and each retail store has organized many types of events (Shimizu, 2011) such as exhibitions of Japanese local food, salon du chocolat, and seasonal sales events, among others.

A department store, which differs from other retail stores, is made up of multiple retail stores and stakeholders sharing concepts and managing mutual dependencies in order to retain the brand of the department store. It can be said that different companies gather together to constitute one retail store (Ishihara, 2000). We consider events held in a department store as part of the system. A system is where plural elements interact (INCOSE, 2011). Further, systems engineering refers to "an interdisciplinary approach and means to enable the realization of successful systems" (INCOSE, 2011). We approach the event as one system using systems engineering.

Since multiple stakeholders are involved in the events, it is necessary to visualize and share the purpose of the events. Each stakeholder agrees at a superficial level, and holds an event in this study. However, each stakeholder has their own reasons to attend the events (Crespi-Vallbona 2007.) Thus, it is important to acknowledge stakeholder needs in the first place, as otherwise, it will lead to the event increasing design man-hours and wasteful costs in the phase of implementation (Kemerer, 1989) (Myrtveit, 2003).

The ISO 20121 (ISO 20121, 2012) is an international standard for event management that stipulates social responsibility and requirements for the environmental management system and is a framework for the management system to support sustainability. However, ISO 20121 (ISO 20121, 2012) only provides a framework for the event management system. Thus, it is difficult to arrange it for event design for any person, because it does not have detailed methods and tools.
In this study, our aim is to reduce the man-hours and wasteful costs incurred in organizing the event because of the lack of knowledge of methods and tools used in event design. We propose an event design process that includes methods and tools and present guidelines to use it for event design. It can be used for any person, and refers to ISO 20121(ISO 20121, 2012) along with method and tools.
The novelty of this study, Oliver et al. (2008) proposed the process of the event. However, they didn't propose method and tools along with the process. This study propose an event design process sheet, which lists the functions of stakeholders, as well as their roles and requirements.

This paper contains four sections. The first section is the introduction. The second section describes this study. The third section describes the verification of the event design process. We conducted a survey to verify the event design process and the respondents who are event practitioners in department stores, and confirmed its effectiveness. The final section concludes the paper and provides directions for future research.

2. DESCRIPTION

2.1 Literature review

In this chapter, we describe past studies on event management and the systems engineering process.

Oliver et al. (2008) proposed a process comprising a chain of events based on the event process model. They proposed process of events applies to customers who participate in events such as wedding ceremonies. It is designed on the premise that the team always cooperates in achieving the purpose. However, we believe that recognizing the stakeholders' requirements leads the success of these events. It is important to understand the kind of requirements that stakeholders are seeking in their relationships with events. Therefore, it can be said that Oliver and his colleagues' studies lack the items to be verified by stakeholders.

In this study, we apply the systems engineering process to design events. We not only propose the process, but also propose a tool for each part of the process. By doing so, event designers will be able to structure the event design appropriately. Martin (1994, p.1) addressed the necessity of the methods approach and said that "SE methods bridge the gap between systems engineering process and systems engineering tools. With the increasing interest in continuous process improvement and assessment of process maturity for systems engineering, more attention needs to be given to the methods, which support the process. Quite often little consideration is given to using the proper methods while implementing a process and a set of tools on a project. The use of inappropriate methods can lead to inefficiencies and sometimes even failure."

2.2 The scope of the Event design process

The scope of the event design process aims to fill the gaps between the conceptual level and the details of the event plan. In this study, we apply the event design sheet as a means of filling in these gaps. The conceptual levelof the event, which is a high level abstract version of the event, is out of scope. Further, the execution of the event plan, which describes the details of the execution plan, is out of scope. We describe the event design process sheet under Section 2.7.

2.3 Event Design Process

The event design process is shown in Figure 1.

FIGURE 1. EVENT DESIGN PROCESS
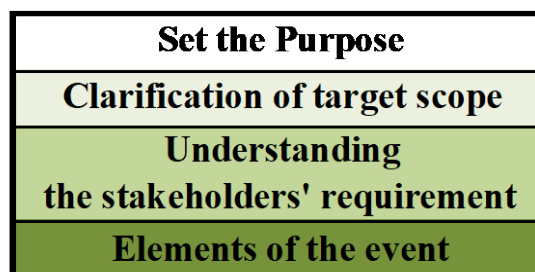
It is important to clarify the purpose of the event and share it with the stakeholders. Each stakeholder agrees at the high level, however each stakeholder has their own

reasons to attend the events (Crespi-Vallbona 2007). We propose an item called "Set the purpose." Further, it is necessary to clarify the scope of the event, and thus, we have an item called "Clarification of target." In order to clarify the kind of event we are planning, we have an item called "Understanding the stakeholders' requirements" and "Elements of the event." We include stakeholders' requirements because stakeholders need to cooperate with each other and this lets us understand their needs.

The process is aimed at helping visualize and clarify the event. It leads to the transmission of information objectively across multiple stakeholders. By visualizing the event process, we can improve communications among stakeholders and reduce the risk of inconsistent understanding of events at the time of collaboration.

2.4 Event design method

Before, we propose the event method, we define each item in the method. We refer to the items under ISO 20121, and based on the scope of our event design process, we redefine the items in our plan around specific sections of ISO 20121. Further, in this study, sustainability in the environment is outside the scope because this study focuses on designing a department store event. The redefinition of each item is shown in Table 1.

TABLE 1. REDEFINITION OF EACH ITEM BASED ON ISO20121

Requirements of ISO20121	Setting items in this study
Identify and engage intrested parties	Identification of stakeholders and clarification of requirements
Determine scope of the management system	Detemination of scope of event
Define governing principles of sustainable development	Definition of purpose o event
Establish and document policy	Clarification of role of stakeholders
Assign and communicate roles and responsibilities	Clarification of responsibilities and suthority of organization
Identify and valuate issues	Understanding the reskes and laws and regulations
Set objectives and plans to achieve them	Planning to merge

According to ISO 20121, there are six items in planning an event, such as "Identify and engage interested parties", "Determine the scope of the management system," "Define the governing principles of sustainable development," "Establish and document policy," "Assign and communicate roles and responsibilities," and "Identify and evaluate issues, and set objectives and plans to achieve them." Due to the characteristics of ISO in general, the items are highly abstract. Thus, we explain each item and show how we rephrase them for the design process in this study.

<Identify and engage interested parties>
ISO 20121 stated that interested parties related to the sustainability management system of the event needed to be identified. Further, it is important to recognize their requirements such as their needs and expectations, whether stated, implied, or obligatory. We rephrased the item as "Identification of stakeholders and clarification of requirements" because the aim is for the event designer to understand what needs to be done for these items.

< Determine scope of the management system >

ISO 20121 stated the importance of setting boundaries and the applicability of sustainable management system of the event. Based on that, we rephrased it as "Determination of the scope of events" because our management system in this study comprises events.

< Define governing principles of sustainable development >
ISO 20121 states that an event planner shall "define its governing principles of sustainable development in the form of a statement of purpose and values." We rephrased it as "Definition of the purpose of an event" because sustainable development in this case is event design.

< Establish and document policy >
ISO 20121 stated that the top management shall establish the policy for sustainable event management system including the commitment of each stakeholder. We rephrased it as "Clarification of the role of stakeholders" because if the stakeholders' role is clarified and shared among stakeholders, they are likely to commit to their roles.

< Assign and communicate roles and responsibilities >
ISO 20121 states that the clarification of responsibilities and authorities for each role is necessary because as a sustainable management system, the organizer must make sure that each role is responsible and has the authority over its actions. We rephrased the item as "Clarification of responsibilities, and authorities" because in this study if all stakeholders visualized and shared their roles, they take responsibility for their actions.

< Identify and evaluate issues, Set objectives and plans to achieve them >
ISO 20121 states the importance of addressing risks and opportunities. It mentions means to integrate and implement action into the system. We rephrased it as "Understanding the risks, laws and regulations, planning to merge the event."

Now, we have six methods and integrate those methods in our event process, which we described in Section 2. The integration of processes and methods are as shown in Figure 2.

FIGURE 2. METHOD LIST FOR EACH PROCESS

Process	Method
Set the Purpose	Definition of the purpose of an event
Clarification of target scope	Determination of scope of events
Understanding the stakeholders' requirements	Identify stakeholders Clarification of role & requirements
Elements of the event	Understanding the risks, laws, regulations Planning to merge

2.6 Event design tool

Next, we propose a tool to derive the method. A list of tools set for each process is shown in Figure 3.

FIGURE 3. TOOL LIST FOR EACH PROCESS

Process	Method	Tool
Set the Purpose	Definition of the purpose of an event	Brainstorming
Clarification of target scope	Determination of scope of events	Lifecycle Context diagram
Understanding the stakeholders' requirements	Identify stakeholders Clarification of role & requirements	CVCA WCA
Elements of the event	Understanding the risks, laws, regulations Planning to merge	Archtecture Design

In "Set the purpose," it is important to create ideas for the purpose of the event for the event designers to follow. The purpose of the event should state the variety clearly enough, because many stakeholders, who have different backgrounds are involved. Thus, brainstorming is a suitable tool for creating numerous and various ideas (Osborn, 1948).

In "Clarification of target scope," it is necessary to consider the time factor of the event process, so we use lifecycle as the tool (INCOSE, 2011). Along with lifecycle, a context diagram is necessary. By using these tools, the event designer can grasp the scope of the event and identify how stakeholders influence each other (INCOSE, 2011).

"Understanding the requirements of stakeholders" is the most important item in this study. In order to understand the stakeholders' requirements, we need to grasp the value flow of stakeholders. Thus, we use the Customer Value Chain Analysis (CVCA) (Donaldson, 2006). We also use the Wants Chain Analysis (WCA) (Makino, 2012) as a tool to find the desire behind the value. By using CVCA and WCA, it is possible to grasp the requirements of stakeholders.

In "Elements of events" in order to implement and integrate all necessary elements of events to achieve the purpose, we use architecture design as a tool (INCOSE, 2011).

2.7 Event design process sheet

In this study, we propose an event design process sheet as shown in Figure 4. We have proposed this sheet based on the event design process, methods, and tools that have been explained above.

We use the process for the event as mentioned in the event design process sheet. As explained above, for the "Set the Purpose" process, we define the purpose of the event. In order for stakeholders to realize that a department store acts as one organization, this event process sheet states not only the purpose of the actual event, but also specifies the idea of the companies' vision. While carrying out the event, practicality is a significant element. In order to avoid losing sight of why this event is held in the first place, the vision of the company and the vision of the organization

should be specified. Then, by describing the purpose of the event afterward, it also aims at consciousness among the stakeholders of the event.

FIGURE 4.   EVENT DESIGN PROCESS SHEET

We visualized lifecycle as the process for "Clarification of target scope."
 For "understanding the stakeholders' requirements," we made space for each stakeholder. It is possible to understand each stakeholder, and their roles and requirements. The roles of the stakeholders should be communicated to them. Moreover, it is important to clarify the requirements of the stakeholders. In this case, not only the obvious requirements, but also the implicit ones must be grasped.

 With regard to the "Elements of the event," it is important to grasp the risks and regulations for objective execution and to clarify constraint conditions. In order to identify the required function of the event based on stakeholder requirements, listing it up as a function is important.

 The purpose of this event design process sheet is to understand the event design process easily by visualization. By listing the necessary items, it is possible to iterate the features of systems engineering. Through the iteration process, an event designer can check whether what he/she has put in the process truly meets the purpose of the event. Further, the results from filling this sheet help stakeholders understand the event.

3. VERIFICATION

3.1. Evaluation of this study

By using the event design process sheet, we verified whether the actual event design is possible or not. As a verification method, we conducted a questionnaire and an interview evaluation with an event design practitioner. We decided to satisfy the following conditions such as:

· Having had the actual event design or having a possibility to do it
· Never used a design method similar to systems engineering in event design

Based on the results of the evaluation, it was confirmed whether the event design process sheet was useful for understanding (understandability), easy to use (usability), and whether event designing was effective when used in practice (efficacy). As a result, it was found that the event design process sheet has understandability, usability, and efficacy with respect to event design in practice.

3.2 Purpose of the evaluation

The purpose of the evaluation was to identify if it is effective for an event design practitioner to design an event by using the proposed event design process sheet. The following three points were used as points of evaluation;
· Understandability: Is the process easy to understand?
· Usability: Is the process easy to use?
· Efficacy: Is it effective for an event design using the process?

3.3 Method of verification

For the purpose of the aforementioned verification, we evaluated the person in charge of event design practice using the following method:

TABLE 2. METHOD OF VERIFICATION

Subject	A practical person in charge of event design work at a company
	Experts familiar with event design
Conditions	Having had the actual event design or having a possibility to do it
	Never used a design method similar to system engineering in event design
Evaluation method	Workshop format with personal work of about 2 hours
	Outline of this study
	Description of the event design process to be implemented
	Fill in the event design process sheet
	Event design for each actual work based on event design process items
	After creating the event, a questionnaire answer
Participant	Event designer: 9 people in total
	Event design experts: 6 people in total
Evaluation implementation period	December 2016 - January 2017

3.3.6 Questionnaire

The preliminary questionnaire comprised five levels of evaluation (3 questions) on the frequency of the actual event design and method of promoting the current situation. The post-event questionnaires comprised a five-point evaluation (19 questions), given to the question items on understanding, usability, and effectiveness while designing the event by actually using the event design process. The participants were asked to evaluate the questions. The evaluation was a Likert-scale type, which has 5 levels, from 1 (strongly disagree), to 3 (neither agree or disagree), to 5 (strongly agree). It is

said that it is a high score (high evaluation) as the answer is positive (as the answer on the left side is).

3.4 Result of verification
Table 3 summarizes the results of each question item that was evaluated in five stages up to the previous section in terms of understanding, usability, and efficacy in Table 15. The evaluation of each item and design process was conducted using a median score of 3 or more.

TABLE 3. UNDERSTANDABILITY, USABILITY, EFFICACY LIST FOR THE WHOLE PROCESS

	Process visualization	Design tool	Stakeholder analysis	CVCA and WCA	Event Design Process
Understandability	4.33	4.22	4.89	3.78	4.67
Usability	4.33	4.44	4.67	4.00	4.44
Efficacy	4.78	4.67	5.00	4.56	4.78

	Overall objective	Consensus formation	Process bird's-eye view	Event Design-ability	Pre-event Design-ability
Understandability	-	-	-	-	-
Usability	-	-	-	-	-
Efficacy	4.22	4.44	5.00	4.67	3.78

3.5 Discussion
The event design process was verified for its effect on event design practice for the purpose of solving the problem of events in department stores.
The issues in event design in the department store are as follows:
· It is not possible to grasp the overall picture of stakeholders
· Mutual understanding of events with stakeholders is difficult
· An appropriate event design process along with the methods and tools are not proposed

The following items were set up as a solution to these problems and the effect was verified by actually applying it to an event design practitioner.
(1) Event Purpose
(2) Lifecycle
(3) Role of stakeholders
(4) Requirement of stakeholders
(5) Premise / constraint condition
(6) Function-based on the purpose
(7) Contents for purpose

In particular, as a tool to analyze (3) and (4), we decided to visualize the requirement of stakeholders by using CVCA and WCA. The event design process tool proposed in this study was adopted by using the process design sheet so that the event design practitioner could fill in the overview of the items of (1) to (7).

The subject to be verified was set as a person who had experience being in charge of event design in practice, or who could become a person in charge of event design in the future. Subjects were asked to design the event using the design tool proposed in this study as a model of an actual event design in business. Then, we verified the differences in event design-ability before and after using the design tool.

In addition, since the evaluation items themselves were highly evaluated in terms of understandability, usability, and efficacy, the event design process sheet proposed in this study is considered to be effective.

4. CONCLUSION

In this study, we proposed an event design process for designing an event in Japanese department stores. We considered the events at a department store as part of the system. We adopted a systems engineering approach to propose the event design process. We proposed not only the process, but also methods and tools for each process. In doing so, we have clarified the flow of designing the event and ways to achieve the flow.

Our study is unique in that it referred to ISO 20121 and proposed the event design method. Based on the ISO 20121, we have proposed a more detailed event design process, using a process sheet. We conducted a survey to verify the design process sheet and concluded that it is understandable, usable, and effective.
Although we have verified the event design process, we have not applied it to an actual event. In the future, we would like to conduct actual event using the event design process sheet and confirm its validity in the next study.

REFERENCES

[1]   Antonio, R. (2013), "It's All E-Commerce Now. Beyond the Checkout Cart", *Review Technology MIT*. https://www.technologyreview.com/s/520786/its-all-e-commerce-now/

[2]   Banker, R.D. and Kemerer, C.F., (1989), "Scale Economics in New Software Development", *IEEE Transaction on Software Engineering.*, 15, 1199-1205.

[3]   Crespi-Vallbona, M., Richards, G., (2007), "The meaning of cultural festivals: Stakeholder perspectives in Catalunya", *International Journal of Cultural Policy*, 13, 103–122.

[4]   Donaldson, M. K., Ishii, K., and Sheppard, S.D., (2006), "Customer Value Chain Analysis", *Research in Engineering Design*", 16, 174-183.

[5] Hansen, R., and Sia, S. K., (2015), "Hummel's digital transformation toward omni-channel retailing: key lessons learned", *MIS Quarterly Executive*, 14, 51–66.

[6] Hendriyani, C. and Chan, Arianis (2018) "Understanding the New Millennial customer Path in the Era of Omni-Channel Marketing in Indonesia", *Review of Integrative Business and Economics Research,* 7, 359-367

[7] International Organization for Standardization. 20121:2012(E), ISO. Event sustainability management systems — Requirements with guidance for use. 2012. www.iso.org/obp/ui#iso:std:iso:20121:ed-1:v1:en

[8] Martin. J., (1994) "Exploring the Relationship Between Systems Engineering Process and Tools", *INCOSE International Symposium*, 4, 176-183.

[9] Makino, Y., (2012), "Wants Chain Analysis (Tool for Analysing and Designing Social Systems Considering Various Needs of Humans)", *The Japan Society of Mechanical Engineers*, 78, 7

[10] Ministry of Economy, Trade and Industry, (2006), "E-Commerce Market Survey to analyze the current state of the Japanese e-commerce (EC) market and the market trends"

[11] Myrtveit I and Stensrud, E, (2003), "Identifying High-Performance ERP Projects",*IEEE Transaction on Software Engineering.*, 29, 398-416.

[12] Oliver, T. H., (2008) "Reference Model-Based Event Management", *International Journal of Event Management Study*, 4,.

[13] Osborn, F. A., (1953), *Applied Imagination, Principles and Procedures of Creative Thinking.* New York, Charles Scribner's Sons.

[14] Shimizu, I., (2011), "The effectiveness of events in a department store", *Event Research*, 4,

[15] Systems Engineering Handbook v.3.2.2.: INCOSE, 2011.