

# Facilitating Knowledge Creation in Innovation Activities with Boundary Media

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## ABSTRACT

Innovation is an essential aspect of contemporary corporate administration. While the co-creation of innovation activities by stakeholders in diverse positions enables the exploration of new value, there are also difficulties, such as conflicts arising from differences in positions and expertise within the organization. Therefore, it is necessary to establish an approach to manage co-creation and create value as an organization. Several cases have reported the function of specific media facilitating collaboration across boundaries among diverse actors in corporate innovation activities, referring to the concept of Boundary Objects introduced in sociology. The mechanism of which media and how they function as boundary objects remain unclear. In this study, we defined Boundary Media as “media intentionally introduced to a group” and conducted an idea creation workshop simulating the early stages of innovation activities. This study aimed to examine how boundary media function as boundary objects in facilitating group knowledge creation. Our findings indicated that two types of boundary media were effective: sculptures that artfully depict keywords for idea creation and idea sketches that describe ideas. In particular, they were especially effective in idea creation for tangible products by evoking creativity through inspiration and facilitating knowledge sharing, thereby facilitating group knowledge creation.

**Keywords:** Boundary media, Innovation, Communication, Organizational creativity, Ideation workshop

## INTRODUCTION

Innovation is becoming increasingly important in modern corporate management. In a rapidly changing business environment, there is a demand for Ambidexterity in management that balances activities in both Exploitation, which is deepening existing businesses by improving them, and Exploration, which is searching for new technologies and business opportunities (O’Reilly and Tushman, 2016). Indeed, the frequency with which innovation is treated as a topic in papers in management studies has grown dramatically since the 21st century, confirming the growing interest in innovation (Anderson, Potočník and Zhou, 2014).

Diversity management is essential in innovation activities that are intended to result in an innovation for the firm (OECD/Eurostat, 2018). Innovation

activities in companies involve co-creation with diverse stakeholders through approaches such as industry-academia collaboration and open innovation to acquire knowledge not possessed by the organization and to search for new value (Chesbrough, 2003; Belderbos, Carree and Lokshin, 2004; Vargo and Lusch, 2014). Collaboration among people with different knowledge and values, as well as respect for different ways of thinking, encourages collective creativity (Stark, 2011; Edmondson, 2012). However, innovation activities involving diverse stakeholders are fraught with difficulties, such as conflicts arising from differences in position and expertise in the organization. As a result, diversity cannot be managed, and individual creativity cannot be harnessed in the group (Bissola and Imperatori, 2011). Methods to overcome these problems and manage diversity have yet to be established.

Therefore, this study focuses on the media intervening in communication in groups. Generally, various media are used in communication in a group consisting of diverse people with different backgrounds. For example, in the idea creation phase in the early stages of innovation activities, engineers use technical information, marketers use customer information, and new business managers use new business proposals to concretize the direction of innovation activities. Some of such media could be effective in facilitating innovation activities. In this study, a workshop that simulates idea creation in the early stages of innovation activities in a company is conducted to investigate how media intervening in the communication of a group of diverse members facilitates group collaboration. Lastly, the effects on group knowledge creation in innovation activities are considered.

### **Media to Facilitate Multi-Disciplinary Co-Creation**

An example of media facilitating multi-disciplinary co-creation is the Boundary Objects. American sociologists Star and Griesemer, through a case study of museum establishment, reported that some media, such as the specimens and the fieldnotes, which existed among diverse actors with different purposes and specialties—such as founder, patron, and hunter—facilitated collaboration. They described Boundary Objects (BOs) as such media that are both adaptable to different viewpoints and robust enough to maintain identity across boundaries (Star and Griesemer, 1989). The concept of BOs is used in various studies to describe knowledge sharing and multi-disciplinary collaboration through the object (Nicolini, Mengis and Swan, 2012). The concept is also frequently referred to when describing collaboration in innovation activities in firms. For example, it has been reported that prototypes and drawings functioned as BO in innovation activities (Carlile, 2002; Rhinow, Köppen and Meinel, 2012). It has also been reported that BO sheds light on the redefinition of meaning, focusing on the front-end of innovation (Zasa, Artusi and Verganti, 2022).

The KODO sculpture is an example of media that facilitates innovation activities differently from the examples mentioned so far. KODO sculpture is an abstract sculpture created by clay modelers in the design department of Mazda Motor Corporation to explore the form of the future car body design development. It has been used in the development process since around

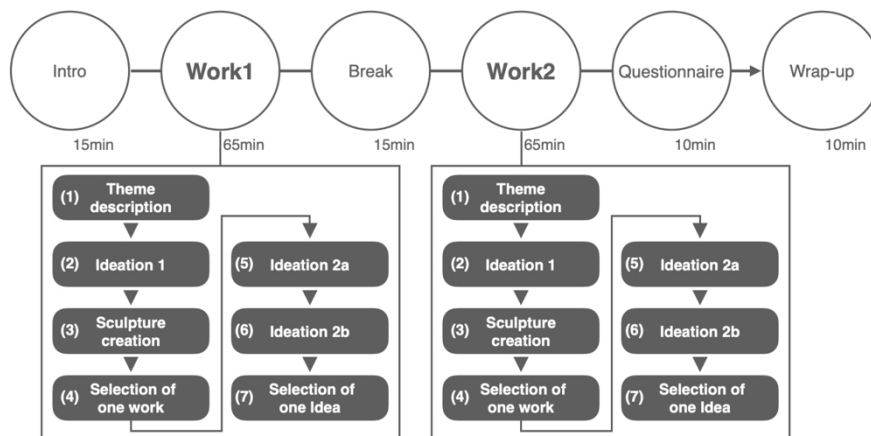
2014 (Mazda Motor Corporation, n.d.). KODO sculptures, created based on keywords obtained from discussions in the design department, are shared with the production department. The engineer or craftsman in the production department resonates with the sense of life and dynamism expressed by the KODO sculpture. This resonance leads to an intrinsic motivation for them to try to reproduce the animated and dynamic feeling of the KODO sculpture through trial and error, resulting in the ‘KODO kezuri (shaving)’ and ‘KODO migaki (polish)’ techniques. The wide range of interpretations by the medium recipient differs from the BO examples introduced so far.

In the cases discussed so far, several media have been used as BOs to facilitate collaboration. However, it needs to be made clear which media function as BOs and by what mechanism. In this study, Boundary Media (BM) are defined as media that are intentionally introduced to facilitate collaboration in innovation activities. This study aims to examine how BM function as boundary objects in idea creation workshops.

### Boundary Media Workshop

A “Boundary Media Workshop” is conducted to investigate how BM can function as BOs and facilitate collaboration in the idea creation phase in the early stages of innovation activities. The BM used in the workshop were idea sketches to describe ideas, and sculptures to represent keywords abstractly. Participants in this workshop were those who have experience in innovation activities. This was because participants with experience in innovation activities are more likely to evaluate the impact of BM since they have experience in co-creation with diverse stakeholders and are accustomed to idea creation. Participants were recruited via Google Forms. Company contacts from the top 30 companies in the Innovative Large Companies Ranking 2022 (Innovation Leaders Summit, 2022) were asked to cooperate with the survey via email or an inquiry form. At the same time, communities on social networking services (SNS), which were considered to have a high affinity for innovation activities, were asked to participate in the survey.

The structure of the workshop is shown in Figure 1. First, the purpose of the workshop was explained in the Intro, followed by an ice-breaker in which



**Figure 1:** Structure of the boundary media workshop.

participants created abstract objects and introduced themselves to each other. Next, Work1 and Work2 were conducted to create ideas on two different themes, with a break in-between. Participants were then asked to complete a questionnaire survey, and the workshop concluded with an explanation of the theoretical hypothesis behind the workshop. Each work session was conducted in groups of 2–3 participants, as follows: (1) Explanation of the theme was given, and information for the idea creation was shared. Next, in (2) Ideation 1, participants created ideas on the given theme. In the following step (3), each participant created a sculpture based on the keywords related to the theme, and in step (4), each team was asked to select one sculpture that they thought most accurately expressed the keywords of the theme. Next, in (5) Ideation 2a, the participants created ideas while appreciating the selected sculpture of their own team, and in (6) Ideation 2b, they created ideas while appreciating the sculpture of the other team. Finally, in (7), each team was asked to select one idea they thought was the best among the ideas they had created at that point, presenting it as their final idea.

Table 1 shows the themes of idea creation in Work 1 and Work 2. For example, Work 1 used as its theme a simulated situation in which keywords leading to the concept of “Deep Breath of the Forest” was proposed in the creation of ideas for desk light products in a major manufacturing company. To evaluate the impact of tangible sculpture on idea creation, Work 1 focused on tangible product idea creation, while Work 2 focused on intangible service idea creation. Referring to examples of KODO sculptures created at Mazda Motor Corporation based on keywords such as “dignified tension” and “glossy and deep charm,” abstract keywords were established for creating sculptures in the workshop.

Participants created two types of BM through the workshop process: sculptures and idea sketches. They created sculptures based on the keywords given in each work session, and through appreciating the sculptures, they expressed their ideas on idea sketch sheets. On the idea sketch sheet, the ideas conceived in the ideation process were described in words and visuals. Sculptures were created not to express the idea itself but to express their imagination of the keywords. Materials used to create sculptures were daily necessities such as paper cups, straws, aluminum foil, and yarn, as well as stationery such as pens, markers, and glue, which were available at hundred yen stores, and all of which were prepared and ready to use on the table (see Figure 2). Sculptures were created as three-dimensional works by assembling these materials.

**Table 1.** The themes of idea creation in Work 1 and Work 2.

	Work1	Work2
Theme	Desk Lights	Financial Services
Companies to be simulated	Major manufacturing company	Regional bank
Keyword	Deep Breath of Forest	Happiness of Generation Z
Category	Tangible	Intangible



**Figure 2:** Materials used for creating sculptures.

The following information was recorded for analysis and discussion of the workshop results. The participants' idea sketches and the sculptures they created based on the keywords were taken in photographs. Participants were asked to fill out an "Explanation Sheet" about their intentions in creating the sculpture. They were also asked to write their impressions on an "Appreciating memo" while appreciating the sculptures. Furthermore, at the end of the workshop, participants were asked to answer a questionnaire survey to collect their comments on their impressions and findings during the workshop process. In addition, with the permission of the participants, their comments during the workshop were recorded with an audio recorder, and a verbatim transcript was made from the audio recordings.

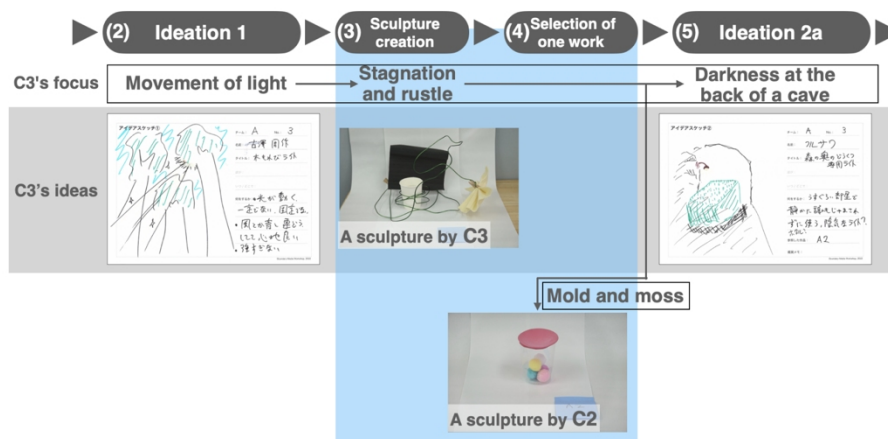
## RESULT

The Boundary Media Workshop was conducted at a rented conference room in Chiyoda-ku, Tokyo, on September 23 and 24, 2022, for three hours each day. Four participants on the first day and five participants on the second day attended and were divided into two teams. Through the two-day workshop, nine sculptures based on the keyword (Deep Breath of Forest) and 29 ideas for desk lights were created in Work 1, and nine sculptures based on the keyword (Happiness of Generation Z) and 28 ideas for financial services were created in Work 2. One of the final ideas presented by each team was based on an idea that was created before the creation of the sculpture, five were based on ideas created while appreciating the sculptures selected by their own team, and two were based on ideas created while appreciating the sculptures selected by the other team. In the workshop, there were four cases out of a total of eight trials in which the two BM, the sculpture, and the idea sketch, were considered to have facilitated collaboration within the team as well as influenced decision-making and idea development. In one case, only the sculpture was considered to function as a BO. In another case, only the idea

sketch was considered to function as a BO. In two cases, both were considered to be BOs.

The following is a detailed description of the Work 1 process in Group C, one of the two cases in which both the sculpture and the idea sketch were considered to function as boundary objects. Group C consists of three participants C1, C2, and C3. Figure 3 illustrates the idea creation process of participant C3 before and after creating and appreciating sculptures. Participant C3 had an idea focused on the “movement of light” in Ideation 1 before creating the sculpture. However, through the creation of the sculpture, he discovered a new perspective of “stagnation and rustle.” It was also confirmed that appreciating the sculpture created by C2 evoked memories of “mold and moss,” from which C3 gained a perspective that it had not initially possessed: “darkness at the back of a cave.” In Team C, the expression of the sculpture created by participant C2, which opened up the possibility of diverse interpretations, such as mold, moss, life, and spores, attracted the interest of the entire team and was selected as the team’s sculpture. On top of that, the idea created by C3, “a light so faint that it can only be used in the darkness at the back of a cave,” was praised by the team for its connection to the sculpture of C2 and for its perspective that was a great leap forward from the original idea, which stimulated discussion and resulted in a unanimous agreement of that idea.

In the workshops conducted this time, there were two cases in which both the sculptures and the idea sketches were considered to function as BOs in Work 1, which involved idea creation for tangible products. On the other hand, there were many cases in which the creation and appreciation of sculptures influenced the participants’ own ideas. In fact, according to the questionnaire results, eight out of nine participants in Work 1 and seven out of nine in Work 2 responded that their perception of the theme changed before and after the creation.

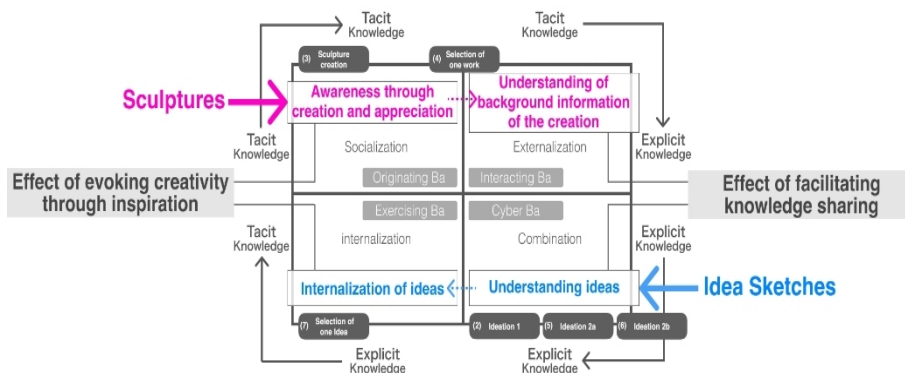


**Figure 3:** the idea creation process of participant C3 in Work1.

## DISCUSSION

The results of the workshop suggest that the BM evoked creativity through inspiration and facilitated knowledge sharing. Therefore, to examine the BM's potential to facilitate innovation activities, we will discuss the workshop results using the SECI model (See Figure 4). The SECI model is a process model of knowledge creation in organizations proposed by Nonaka and Takeuchi (Nonaka 2009). The SECI model illustrates that the conversion of tacit knowledge to explicit knowledge, and vice versa, is a chain reaction that improves the level of knowledge in an organization.

The sculpture in the workshop was an expression of the creator's tacit knowledge. Inspiration gained through reflective practice and appreciation during the creation phase of sculpture elicited new tacit knowledge (Schön 1992; An and Youn 2018). In doing so, they tended to function as BOs in cases such as the sculpture by C2. They were moderately abstract and open to interpretation and therefore were perceived to contain the possibility of novel perspectives by the team members. In addition, in the situation where each team selected a sculpture, the creative intention and background knowledge were shared in front of the sculpture, which enabled the sharing of explicit knowledge in addition to tacit knowledge. The other BM, idea sketches, described ideas, which are explicit knowledge, and facilitated mutual understanding by sharing ideas among the team members. In addition, resonating ideas tended to function as BOs, and individual interpretation of the ideas described in the idea sketches allowed the internalization of others' ideas as tacit knowledge within oneself. Although the SECI model advocates the use of "Ba" for the mutual transformation of tacit and explicit knowledge, the results of this study indicate that it may be possible to turn the cycle of organizational knowledge creation even by using BM.



**Figure 4:** Mutual transformation of explicit and tacit knowledge by BM on the SECI model.

## CONCLUSION

This study investigated how BM can function as BOs to facilitate group knowledge creation by conducting a “Boundary Media Workshop” simulating the idea creation in the early stages of innovation activities. The results indicated that two types of BM were effective for facilitating collaboration: sculptures that artfully depict keywords for idea creation and idea sketches that describe ideas. These BM facilitated group collaboration in four of the eight cases. In particular, they were especially effective in idea creation for tangible products by evoking creativity through inspiration and facilitating knowledge sharing, thereby facilitating group knowledge creation.

The approach to knowledge creation implemented in this study by introducing BM suggests the possibility of avoiding intra-group conflicts and facilitating collaboration because the group’s diversity leads to diversity in the expression and interpretation of BM. Therefore, it can be expected that supporting the creation of BM in communication in innovation activities will also enable more diverse actors to be involved in co-creation. For example, support by a system that converts verbal information into nonverbal information or by having an artist with high creative ability create sculptures on behalf of group members may also facilitate knowledge creation in innovation activities. On the other hand, the results of this study may have been influenced by the fact that the workshop was a simulation of idea creation in a company, which is different from a realistic situation. Therefore, further validation of the results by studying innovation activities in actual companies will be conducted.

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