

## A Proposal of an Emotional Assurance Case to Prevent the Hollowing Out of Thoughts in the Organization

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### ABSTRACT

While knowledge sharing is important, much of the tacit knowledge of the individuals in an organization is shared through collaborations. In the field of knowledge management, the thoughts and mental models, which are classified as tacit knowledges from cognitive dimension, do not directly reflect the thoughts that are tacit knowledge. In addition, when trying to realize the thoughts that have become formal knowledge in an organization, it is difficult to recognize them while maintaining the state of tacit knowledge. Therefore, the purpose of this study is to propose an Emotional Assurance Case that visualizes the collaborations in an organization and realizes them within the activities in order to prevent the hollowing out of thoughts in the organization. The focus of the evaluation of this study was on an event to create a new football field at a golf course. The participants of this event are those who have never used the golf course. A reason for choosing this event for this study is that there are challenges from the employees in the golf course company who have never experienced it before because it is a conceptual endeavor and thus it is hard to capture their sentiment.

Keywords: Emotional assurance case; Goal structuring notation; Dependability case; Emotional evidence.

### 1. INTRODUCTION

While knowledge sharing is important, much of the tacit knowledge (Nonaka et al., 1998) (beliefs, ideals, values, mental models, etc.) of the individuals in the organization is shared through collaborations. This is the work of communizing the ranges of known and unknown as indicated by Johari's window (Luft et al., 1955). In the field of knowledge management, the thoughts and mental models which are classified as tacit knowledges (Nonaka et al., 1998) from cognitive dimension, does not directly reflect the thoughts that are tacit knowledge. In addition, when trying to realize the thoughts that have become formal knowledge (Nonaka et al., 1998) in the organization, it is difficult to recognize them while maintaining the state of tacit knowledge (Nonaka et al., 1998). As for example, this is something that is not maintained within the organization, even though they are trying to realize the same thought at the festival, which is repeated every year. In other words, there is a hollowing out of thoughts within the organization. Therefore, the purpose of this study is to propose an Emotional Assurance Case that visualizes the collaborations in the organization and realizes them within the activities in order to prevent the hollowing out of thoughts in the organization. In this proposal, the collaborations will

be visualized using an assurance case (ISO15026-2-2011, 2011) that is capable of traceability of logic. Afterwards, the thought will be realized in each task in the collaborations will be visualized and confirmed aiming to prevent the hollowing out of thought by agreeing or sharing in the organization. Furthermore, we aim to prevent the hollowing out of thought by agreeing or sharing to be realized within the organization. To evaluate the proposal, the results of the Emotional Assurance Case were used whether they were able to share their thoughts for realization.

Next, we describe the novelty of this study. Kobayashi et al. (2018a) proposed the assurance case description method (Kobayashi et al., 2018b) to improve the feasibility of accomplishing management vision and management strategy by using four models (Management vision model, Management strategy model, Business process model, and IT system model). In other words, the proposal suggests that being able to adequately describe the assurance case can increase the feasibility of the goals agreed upon among stakeholders. However, the proposal is for the traceability of logic, not the assurance of thoughts. The previous studies proposed assurance case description method for solving communication challenges in business (Kobayashi et al., 2016) (Kobayashi et al., 2017) (Kobayashi et al., 2018c). Although these researches focus on business activities within the organization, they do not focus on confirming the thoughts of the employees. Kobayashi et al. has proposed an assurance case description method to reduce misunderstanding caused by the difference of grasping the objects managed in various departments as a monolithic system or a System of Systems (Kobayashi et al., 2018d). The research focuses on the difference of a monolithic system or a System-of-Systems perception, but it does not focus on confirming the thoughts. In addition, the other previous study has proposed an assurance case description method which allows considering simultaneously the inside of a system and the assumed changes outside the system (Kobayashi et al., 2018e). The research focuses on how people think about the inside of the system, assuming that the outside of the organization will change, but it does not focus on confirming their thoughts. Nonaka et al. (1998) describes the relationship between the tacit knowledge of individuals and the formal knowledge of organizations, which again forms the tacit knowledge of individuals through introducing the SECI model. However, this is a traceability based on the transformation of knowledge, and does not focus on the assurance of thoughts. From the above, there is novelty in agreeing or sharing the thoughts in the organization by visualizing the thoughts through each task of the joint activity based on the assurance case.

Section 2 summarizes previous studies. Section 3 describes description method of Emotional Assurance Case. Section 4 shows the evaluation method used in this study. Section 5 shows the evaluation results. Section 6 discusses the results by using the method Section 7 concludes with future research topics.

## 2. PREVIOUS STUDY

GSN (Kelly, 1998), which was proposed by Kelly, is one of the notation methods used for assurance cases (Menon et al., 2009). The assurance case can express the discussion of the entire quality with an acceptable level. D-Case (Dependability-Case) (Matsuno et al., 2012) is a description method that extends GSN. D-Case is a description method using six nodes, including Goal node, Context node, Strategy

node, Evidence node, Monitoring node, and Undeveloped node (Kobayashi et al., 2018b) (Menon et al., 2009) (GSN Community., 2011). Table 1 shows the six nodes. The strategy node used in this study is presented in both D-Case and GSN, respectively. The previous assumes that the strategy node relates to structuralizing systems with multiple viewpoints (Kobayashi et al., 2018f) (Kobayashi et al., 2019). The reason is that structuralizing systems with multiple viewpoints utilizes the viewpoint of decomposing the target to be discussed by using the strategy node (Kobayashi et al., 2019).

Table 1: Explanation of Six nodes for D-Case.

Node	Figure	Explanation
Goal		Goal node describes what to assure, with a combination of a subject and predicate.
Strategy		Strategy node describes how to break down the Goal into sub-goals leading to the lower layer.
Context		Context node describes the state, or environment and conditions of the System, and shows ways to lead to the Goal and Strategy.
Evidence		Evidence node eventually assures that we can reach the Goal, and shows ways to lead to the Goal.
Monitoring		Monitoring node is intended to represent Evidence available at runtime, corresponding to the target values of in-operation ranges.
Undeveloped		Undeveloped node shows the status that there is no Evidence or Monitoring, or discussion supporting the Goal.

### 3. EMOTIONAL ASSURANCE CASE

The proposed method of this study uses the traditional notation of assurance cases (D-Case) to visualize joint activities. By visualizing the participants' expectation of each task, the participants could confirm the expectation of each task in the joint activity. As shown in Table 2, we proposed the Emotional Evidence node as the node of assurance case in order to visualize their expectation. We gathered the stakeholders and explained Emotional Evidence in order, which is the same as we explained assurance case. Besides, we pointed out that Emotional Evidence was one of the assurances when explaining about the evidence to the participants. The reason why Emotional Evidence is necessary for the goal and the cause of the emotion were explained.

### 4. EVALUATION METHOD

We describe the subject of this propose and the evaluation method. The focus of the evaluation of this study was on an event to create a new football field in a golf course. The participants of this event are people who had never used the golf course on a

regular basis. The suitable reason for choosing this event for this study is that there are challenges for the employees in the golf course company, who have never experienced before because it is a conceptual endeavor and hard to capture what sentiment to achieve. Therefore, the employees will use the proposed method to assess whether they were able to understand the emotions of the participants of the event, which involved in achieving a sense of attachment, excitement, and fulfillment for an event at a golf course that they have rarely visited. The event planner defined the Emotional Assurance Case. Afterwards, 10 event planners explained the event with Emotional Assurance Case and conducted questionnaire survey. As Table 3 shows, all event planners in this research are male. Table 4 shows the questions of the questionnaire. Responses were given on a five-point ordinal scale, ranging from -2-"disagree," to +2-"agree," with 0 representing "neither agree nor disagree." Scores from +1 to +2 were assumed to be valid for "Criteria of assessment" in Table 3. Furthermore, the comments from event planners and survey results were compared to confirm that event planners understand each node.

Table 2: Explanation of emotional evidence node for Emotional Assurance Case.

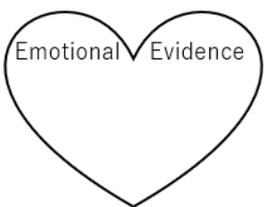
Node	Figure	Explanation
Emotional Evidence		Emotional evidence node shows the necessary emotions to lead to the Goal.

Table 3: Number of persons in charge of each age.

Age	Number of persons in charge
20's	1
30's	2
40's	1
50's	2
60's	4
Total	10

Table 4: Correspondence of "Criteria of assessment" and "Questionnaire statement".

Criteria of assessment	Questionnaire statement
Understanding	Did you understand the content of the event?
Whether the emotion was transmitted	Did you get a sense of what emotions you were trying to achieve with that event?

## 5. EVALUATION RESULTS

Figure 1 is the results of emotional assurance case. In order to explain an event to create a new football field in a golf course for the evaluation, we write the assurance case with explanation of emotional evidence node for Emotional Assurance Case. We put three emotional evidence nodes in Figure 1 to assure the most important emotions in the event. Three results using Emotional Evidence in Figure 1 show as follows. One, in order to assure that "the participants know where we're going" of G7, we set that "moving adds to the excitement to the participants" as emotional evidence 1 (EE1), and visualized the participants' expectations. Two, in order to assure that "The participants can carry the lawn" of G9, we set that "getting fulfillment from hauling turf to the participants" as emotional evidence 2 (EE2), and visualized the participants' expectations. Three, in order to assure that "The participants can put the turf in place" of G10, we set that "gaining a sense of attachment to the destination of the turf" as emotional evidence 3 (EE3), and visualized the participants' expectations. The comments in Table 5 are corresponded to the note in Figure 1. Results of questionnaire statement are shown in Table 6.

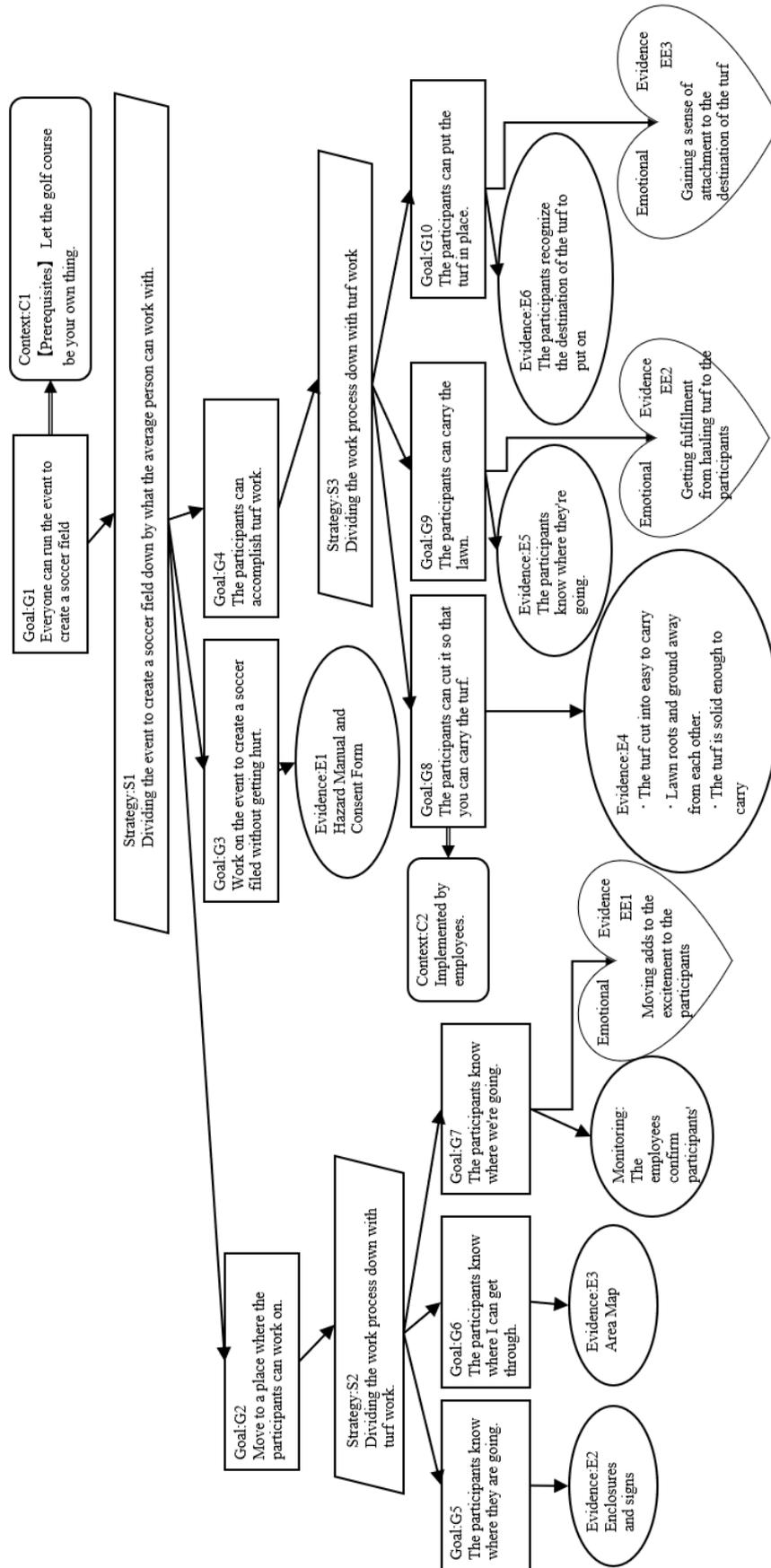


Figure 1: Description results of emotional assurance case.

Table 5: Correspondence of "Node Number of Figure 1" and "Comments".

Comments	Node Number
It's really hard to explain. It's not the same but kind of similar to crowd funding and social funding.	C1
Kind of like community-based service, combining golf course with local community.	C1
A great experience for children.	C1
The importance to connect with neighbors, good experience for children, good memory.	C1
I'm happy that the children enjoyed it.	C1
It was great that I have the opportunity to enjoy this special experience.	S1
Fun to help. Enjoy some nature.	EE2
Develop good relationships with other participants.	EE3
What is the meaning general public? who is looking for an enclosure.	E2, E6
I think it is good to work with a lot of people since it's easier to manage.	S1
It would be a good place for children to play soccer.	G1
Concerned about the number of participants but still an interesting event.	G1
Great experience for those who had never been to a golf course.	C1, S1
Feel the achievement of making our own playground.	EE2
The grass was cut in small pieces so it is easy for those who are not strong enough to carry heavy goods.	G8
Good to have a warning sign near grass cutter machine.	G5, G6, M1
Do my best in sodding work.	EE2
The children were taught how to treat the grass. It is kind of hard for children but they tried their best to teach them.	C1, G9, EE3
Enjoyed the golf course and had fun interacting with other participants.	EE1, EE2
The most important thing is to enjoy the work. The grass was cut in small pieces for everyone to carry easily.	E4, G8, G9, EE2
The size of the grass was cut properly for participants to carry it easily.	G8, C2, E4

Table 6: Results of questionnaire statement.

Questionnaire statement	Average	Standard deviation
Do you understand the purpose of the event?	+1	0.943
Do you feel the expected emotion of the event?	+1.3	0.675

## 6. DISCUSSION

Table 6 suggests that 9 participants gave positive feedbacks about understanding the purpose of the event. Besides, Table 6 suggests that 9 of 10 participants provided positive feedbacks about their feelings after the event. We had used the comments in Table 5 from participants to confirm if they have understood each node.

“It’s really hard to explain. It’s not the same but kind of similar to crowd funding and social funding.”: From this comment, the employees consider that by encouraging participants to feel like crowdfunding and social funding, they could promote to take action to make it their own thing. Therefore, we considered the comment to be related to C1.

“Kind of like community-based service, combining golf course with local community.”: From this comment, the employees understood that the golf course, which is not usually involved with the local, will not become concern of the community unless it becomes a place for the community and the golf course and the local community little by little in order for it to become my business. Therefore, we considered the comment to be related to C1.

“A great experience for children.”: From this comment, we found out that this is a good experience for children since they have few opportunities to go to a golf course. From this point of view, we considered the comment to be related to C1.

“The importance to connect with neighbors, good experience for children, good memory.”: From this comment, we realized that non-daily event can be a good experience and pleasant memories for children. Besides, we found out that it is important to make local residents feel intimate with the place.

“I’m happy that the children enjoyed it.”: From this comment, we knew that if children could enjoy the event, they would get the sense of connection to it even though they didn’t have many opportunities to go to a golf course. From this perspective, we considered the comment to be related to C1.

“It was great that I have the opportunity to enjoy this special experience.”: From this comment, we realized that by recognizing the difficulty of this task, the event planners will try their best to make it easier for participants to work. Therefore, we considered the comment to be related to S1.

“Fun to help. Enjoy some nature.”: From this comment, we knew that participants would get a sense of fulfillment when they have fun helping out. From this point of view, we considered the comment to be related to EE2.

“Develop good relationships with other participants.”: From this comment, we found out that participants' intention of feeling a sense of intimacy is related to their behavior of pursuing an attachment. Therefore, we considered the comment to be related to EE3.

“What is the meaning general public? who is looking for an enclosure.”: There are two derivation of nodes from this comment. First, we recognize that it states who does the enclosure and marking. Therefore, we considered relevant to E2. Second, we recognize that they understand the activities of the general public in this event. Therefore, we considered the comment to be related to E6.

“Enjoyed the golf course and had fun interacting with other participants.”: There are two derivation of nodes from this comment. First, they believe that interacting with so many people will enhance the fulfillment of carrying the turf. Therefore, we considered the comment to be related to EE2. Second, we recognize that a sense of liberation of the golf course will add to the excitement. Therefore, we considered the comment to be related to EE1.

“I think it is good to work with a lot of people since it's easier to manage.”: From this comment, we found out that the event planners understand the benefits of working with participants. From this perspective, we considered the comment to be related to S1.

“It would be a good place for children to play soccer.”: From this comment, we recognize that they understand the purpose of the event to create new soccer field. Therefore, we considered the comment to be related to G1.

“Concerned about the number of participants but still an interesting event.”: From this comment, they considered it is an interesting event and sympathize with the concept, so the purpose of the event is conveyed. Therefore, we considered the comment to be related to G1.

“Great experience for those who had never been to a golf course.”: From this comment, we consider they made the assumption and understand the prerequisite that the participants had never seen a golf course before. Therefore, we considered it to be related to C1 and S1.

“Feel the achievement of making our own playground.”: From this comment, we considered that a sense of accomplishment in creating a place to play would provide a sense of fulfillment. Therefore, we considered the comment to be related to EE2.

“The grass was cut in small pieces so it is easy for those who are not strong enough to carry heavy goods.”: From this comment, we considered they had found an ingenious way to make the turf easier to carry. Therefore, we considered the comment to be related to the G8.

“Good to have a warning sign near grass cutter machine.”: There are three derivation of nodes from this comment. First, they understand that they need to move to a place that is not dangerous. Therefore, we considered the comment to be related to the G5. Second, they understand the need for directions to get to places that are not dangerous. Therefore, we considered the comment to be related to the G6. Third, they understand that they are making sure that participants are moving in a way that is not dangerous. Therefore, we considered the comment to be related to the G6.

“Do my best in sodding work.”: From this comment, we consider that they could get a sense of fulfillment from turfing a lawn together on the turf. Therefore, we considered the comment to be related to EE2.

“The children were taught how to treat the grass. It is kind of hard for children but they tried their best to teach them.”: There are three derivation of nodes from this comment. First, we consider that guiding the kids will help them carry the turf. Therefore, we considered the comment to be related to the G9. Second, we consider teaching them how to handle and grow the turf would make the golf course into their own thing which they don't usually have much to do with, Therefore, we considered the comment to be related to C1. Third, we considered teaching them how to handle and grow the turf would encourage them to get a sense of attachment to the turf they were riding on. Therefore, we considered the comment to be related to EE3.

“Enjoyed the golf course and had fun interacting with other participants.”: There are two derivation of nodes from this comment. First, they believe that interacting with so many people will enhance the fulfillment of carrying the turf. Therefore, we considered the comment to be related to EE2. Second, we recognize that a sense of liberation of the golf course will add to the excitement. Therefore, we considered the comment to be related to EE1.

“The most important thing is to enjoy the work. The grass was cut in small pieces for everyone to carry easily.”: There are four derivation of nodes from this comment. Therefore, we considered the comment to be related to E4. First, they understand the importance of cutting the turf to a size that is easy for the ordinary person to carry. Second, we recognize that cutting to be able to carry the turf is connected to having fun carrying the turf. Therefore, we considered the comment to be related to the G8. Third, we recognize that by cutting the turf smaller, they will be able to carry it. Therefore, we considered the comment to be related to the G9. Fourth, we recognize that it is important to cut the turf small enough to make the ordinary person easy to carry so that they can get a sense of fulfillment from carrying the turf. Therefore, we considered the comment to be related to EE2.

“The size of the grass was cut properly for participants to carry it easily.”: There are three derivation of nodes from this comment. First, we consider they will be able to cut the turf to a size that will not be too much for the participants to carry. Therefore, we considered the comment to be related to the G8. Second, we are able to consider as little as possible about the burden on the participants, and we recognize that it is something that employees think about. Therefore, we considered the comment to be related to C2. Third, this comment leads them to consider "cut to a size that is easy to choose," "the ground is far away from the roots of the turf," and "remains firm

enough to carry," so that the participants are not burdened as much as possible. Therefore, we considered the comment to be related to E4.

From the above, they recognized they need to concern each node of EE1, EE2, and EE3. This result suggested that Emotional Assurance Case is effective for agreeing or sharing the thoughts to be realized.

This study showed whether participants in the organization are able to share their thoughts for the realization of collaboration, and did not focus on kinds of collaboration. For example, the previous study (Schneider et al., 2018) states that if we regard open systems of systems (SoS), it is important to distinguish between closed ecosystems on the one hand and open ecosystems on the other hand. Therefore, future research topic needs to apply to kinds of collaboration which the previous study states (closed SoS, open SoS, closed ecosystem and open ecosystem, etc.). The previous study (Madni et al., 2014) shows when a system participates within an SoS, it is necessary to ensure that it understands the data, processing, and policies of the other systems in the SoS with which it interoperates, and that they, in turn, understand its data, processing, and policies. The collaborations of organizations are as well as systems that participate within an SoS in the above. In other words, in future research, in order to collaborate more effectively among new participants and existing participants in closed SoS, open SoS, closed ecosystem and open ecosystem, etc., all participants need to share each other thoughts.

## 7. CONCLUSION

The purpose of this study was to visualize the collaborations in the organization and to propose Emotional Assurance Case to share the thoughts within the collaborations, in order to prevent the hollowing out of thoughts in the organization. The results of the evaluation suggested that it was effective in agreeing or sharing the thought to be realized. Finally, we indicate future research topics as follows:

- Future research topic needs to show what the actual results have been in response to these results.
- Future research topic needs to see if it can be done for other events as well.
- This study is not comparing the Emotional Assurance case with previous Assurance cases, so future research topic needs to compare how much thoughts were conveyed.
- Future research topic needs to clear emotions that are hard to convey whether there are any emotions that are hard to convey.
- Future research topic needs to apply to kinds of collaboration which are closed SoS, open SoS, closed ecosystem and open ecosystem, etc.

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