

# Proposal of Collaborative Learning Support Method in Risk Communications

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**Abstract.** In this paper, we propose the supporting method of the risk communications that use the collaborative learning. Using collaborative learning, participant of risk communication can acquire not only knowledge the participant is interested in, but also the intention and knowledge of other party who do not concern the participant's concern. In the process of collaborative learning, participants of risk communication get the mutual understanding about risks. The feature of this method is to use the WD (Write Down) form and the construction drawing of the opinion understanding made from Fishbone.

**Keywords:** Risk Communication, Collaborative Learning, Participant.

## 1 Introduction

A social risk is diversified as the information society develops, and a complex social trouble like the youth information restriction problem occurs. And the enterprise and the society are holding various risks respectively. Recently, the phenomenon in which one risk measures generates a new risk is caused. For instance, security countermeasures such as the encryption and introduction of the public key certificate for the digitalized signature cause the personal information leak such as the address and date of birth, and the risk concerning privacy is generated as a result.

Thus, requesting the combination of preferable measures ideas (optimum solution), while considering two or more risks and costs becomes very important in the situation in which correspondence to a certain risk, increases other risks.

It is finally essential to find the most suitable solution which can form an agreement among people of decision making participation. It is need in consideration of interests between people of participation to solve these problems. At the same time, not only knowledge and judgment of the expert but also opinions of participants are necessary.

Therefore, the risk communications (RC) that are the processes to do the consensus building among those with different standpoint and aspect (the stake holder and the decision-maker are included) and specialists are needed.

As the risk communications supporting tool to solve the social risk problem and the social mutual agreement problem in the information society, the multiple risk communicator (MRC) is developed[1].

It has been understood that in the process applying MRC to the large-scale, social mutual agreement problem, the participation person's prior study is important for

participation person's decision making, and also the consensus building among those who take part is moreover difficult if participation person's decision making is not enough.

In this paper, to do the mutual understanding between participants smoothly, the risk study supporting method that uses cooperative study[4] is proposed. In the proposal technique, participant studies risks concerning the interested field, and this is put into writing. Participant clarifies own intention while requesting the opinion of other participants by showing the study result, and decides the optimum solution that he consents. Communications are done among participants for each participant's optimum solution, and the final mutual agreement solution is obtained. Those of the feature of the proposed method is first participant can know intentions and the finding of other participants during the risk study period, so multipronged study can be done, and secondly each participant knows other party's intention at early stages, so mutual understanding can be achieved smoothly. The utility of the proposed method is shown by the verification experiment.

## 2 Risk Communications Support Problem

### 2.1 Outline of MRC for RC

In MRC, participant support part consists of three stages of the following (a)(b)(c). [2][3]. The RC support process is shown in Fig. 1.

- (a) 1stRC : Information acquisition phase for each participant to attempt clarification of self-opinion.
- (b) 2ndRC : Phase in which the mutual understanding between participants is attempted.
- (c) 3rdRC: Phase to plan the agreement formation between participants.

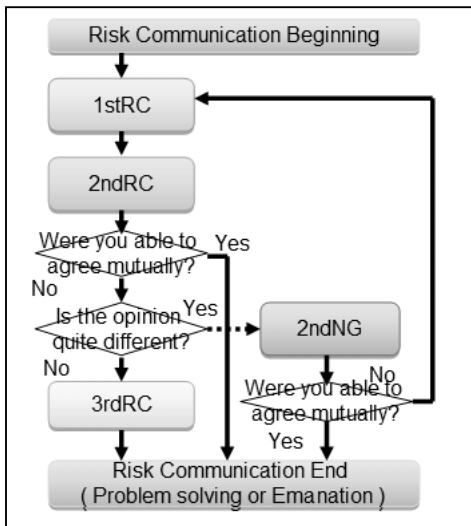


Fig. 1. RC support process

In this paper, we propose an RC support method for 1stRC and 2ndRC.

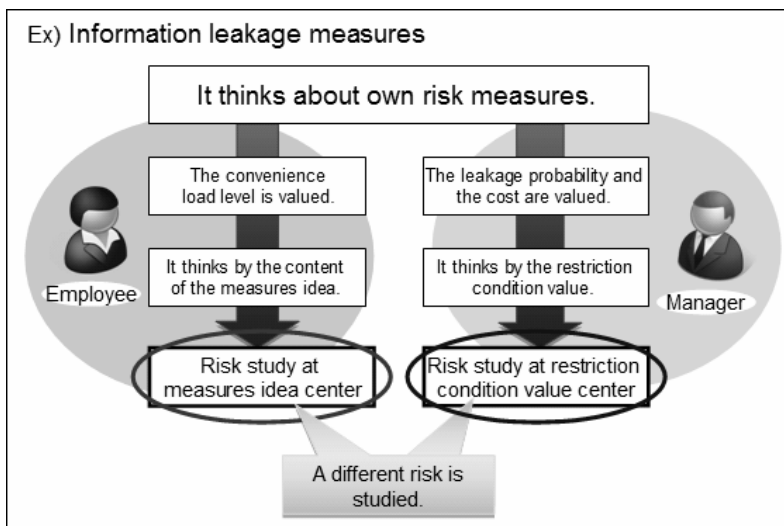
### 2.2 A Risk Learning Problem for the Participants

We performed an experiment. As a result of experiment, the argument between participants took much time in 2ndRC and did not advance smoothly. In 2ndRC, An argument between participants is performed so that participants find respected measures considering each other's intention. As the result, it has understood that the support of this phase is necessary for agreeing. The following issues are made clear.

**Difference of the intention between participants and participant's risk understanding shortage**

When participant adopts risk measures, participant emphatically take care about own risk. In that case, the participant's intention to the risk is different according to the difference of each participant's standpoint. Evaluation figure of measures was different according to this difference in each participant. (Fig.2) This phenomenon caused the discussion in 2ndRC not to go well. Because only the risk study along own intention of participant was done. Therefore these two points were made clear, that is (1)in the sturdy of participant, the important study range that is valued originally for RC was lacked. (2)Time has hung in the understanding of participant about the proof that is behind another participant's opinion.

Moreover, as for the content that became proof of the testimony of another participant, the participant's concern was left in low level.



**Fig. 2.** Evaluation figure and risk study

**Timing of information exchange and information log.** In the RC support method that uses above-mentioned MRC, it is necessary to execute a lot of study processes in 1stRC. For instance, when those who take part study the information of the measures idea, participant should study "Leakage probability", "Measures cost", "Convenience load level", and "Privacy load level", etc. for the individual information leakage problem. In that case, participant study each item with the measures idea unit. Participant should study at the same time again while combining these items.

In this case, when the risk measures ideas are 15 pieces, participant should think about the combination of these measures ideas. In a word, various study cases exist for participant. Therefore, it becomes difficult for participant to integrate and understand study content that be studied in the first stage, while becoming the latter half of study.

Moreover, as the result, the chance of the information exchange in this phase was few though 2ndRC was being offered in the RC support method described in 2·1 as a place for the information exchange. This issue cause by difference of the content type that participants study and by the difference of the amount of study. In 2ndRC, participants discuss and negotiate solution based on the knowledge that they obtained in their risk study. In that case, the amount of unknown content or hearing only in the word for certain participant has increased when there is a study difference among participants. As a result, the following inconvenient cases were generated as the discussion was done repeatedly.

- (1) Case where important points for participant became indefinite in the discussion
- (2) Case where participant missed relativity with own risks in the discussion.

Therefore, the discussion for the consensus building was not settled well.

### 3 Proposed Solution

To solve the above-mentioned problem, we propose the solution that adds the viewpoint of the cooperative study to conventional RC method in this paper. This solution consists of the following three methods.

#### 3.1 RC Using Cooperative Study

Cooperative study is based on the assumption of a close, active interaction activity between learners, and enables metacognition formation (Expression power, persuasive power, problem discovery way, problem solving way, observation method of others speech and behavior and look into oneself of self-speech and behavior) and deepen the knowledge, and gives overall view of the target to participant of RC.

One of the features is the technique called 'write down'(WD, Zaika in Japanese). In the WD(Zaika), people writes knowledge and the reproof as documents or figures, and these documents or figures are left as the log for study. Participant can review the study finding and the self-intention at any time by looking at WD. Therefore, an active discussion becomes possible by executing WD.

#### 3.2 Cooperation Type Risk Study Method

In considering collaboration type risk study, we proposes two type of methods, that is "Allotment type study" and "Development type study".

**Allotment type study.** The risk is studied to the event based on own necessities of each participant. Next, the content that participants studied mutually is given each other. It aims that all participants cover about the range of study necessary for RC by this procedure.

Participant independently decides the individual participant's range of study. However, the facilitator intervenes the participant's study according to the study theme, and in this case, participants study separately mutually. In that case, the difference of the recognition between participants becomes clear by comparing the study results

between participants. Moreover, the study range that all participants did not study at all is covered by what the specialist explains based on WD information. (Fig.3)

Moreover, the following effects arise so that the learner may teach the content of study to another learner in Allotment type study.

- (a) Participant has a sense of responsibility for his study.
- (b) Participant does an independent study action.
- (c) The interpersonal relationship between Participants is formed

Allotment type study can be used as a personal cure for Epistemic Egocentrism Epistemic. Egocentrism is a bias through that the other person also knows what I know. In allotment type study, participant examines whereabouts and the bigness and smallness of an actual risk closely. Allotment type study makes participant's acknowledged risk visible, makes participant conscious of the risk, and, in addition, corrects the risk acknowledgment of participant.

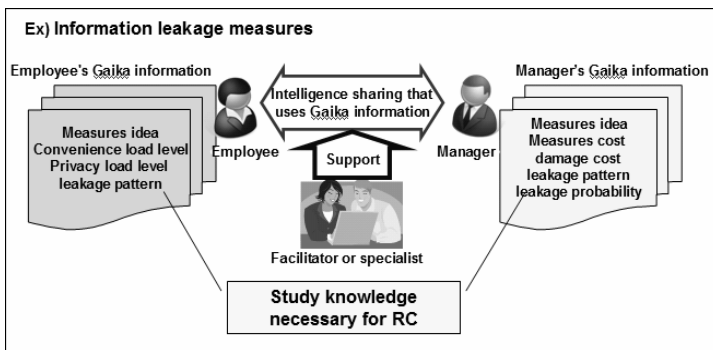


Fig. 3. Range of knowledge necessary for RC

**Development Type Study.** The development type study uses participant's "Opinion" and "Actual experience", etc. in WD that is the feature of the cooperative study. The chance to think about the problem, the finding, and the opinion which is not studied for myself alone, by knowing another participant's intention and finding through WD arises. In a word, deep risk understanding arises by facing the problem, the finding, and the opinion that are not studied for himself alone.

## 4 RC Process Using Cooperative Study

This chapter describes a concrete process procedure of the proposal method described in Chapter 3 (Fig.2).

### 4.1 1<sup>st</sup> Step Risk Study and Mutual Understanding

In this phase, the information gain (risk study) done with 1stRC and discussion done with 2ndRC is united in the technique. There is a feature of this phase in the point for participant to study the risk while sharing information with other participant. However, there is no place of the spoken answer discussion among participants, and mutual understanding among participants is achieved by sharing information by WD.

In this paper, the cooperation type risk study is done in the form of decentralized study. In the process, participants advance self-study (individual study) and the intelligence sharing and these studies are advanced concurrently. Two kinds of WD patterns are set. In a word, these are WD pattern by self-study, and an opinion pattern to the intelligence sharing. Moreover, the form of the development type study that participant reaches the in-depth understanding further is adopted by receiving another participant's opinion in this method.

#### **4.2 2<sup>nd</sup> Step (Consensus Building)**

This phase is placed on the extension of mutual understanding in 1st Step. In this phase, the discussion by the spoken answer among participants is chiefly performed. In this phase, the facilitator makes the construction drawing of the opinion understanding (Fig.4) based on the hope solution on each participant by putting out first of all with 1st Step and WD information. Participants discuss about final solution by using this construction drawing. The construction drawing of the opinion understanding is an improvement of Fishbone figure to understand the situation of the development type study of other participant and the intention by present quickly.

In the construction drawing for the opinion understanding, a horizontal axis is a time axis, and content of WD of participant and WD content of other participants who see the content of each participant's WD is described. In this figure, the RC name is described in the screen left end, and the first WD of the event on an upper and lower edge is described, and, in addition, final WD is described on a fat line at the center. The first WD and final WD are tied in the line, and other WDs are on the way of the line. Final WD is decided from WD from other participants to the first WD, and Final WD is put out by receiving these WD. When the discussion emanates without the mutual agreement solution's to which all participant's opinions correspond or when mutual agreement solution among participant is obtained, this phase is assumed to be an end. (The above-mentioned mutual agreement solution contains the proposal of concerning alternatives about the measures idea that MRC offers and proposal and the adoption of compromise solution about the change of the measures idea setting etc.)

## **5 Verification Experiment**

### **5.1 Experiment Purpose**

The proposal technique is applied to the individual information leakage problem, and whether the problem described in 2·2 is solved is verified.

### **5.2 Precondition**

In this experiment, RC intended for the security review is performed, for the enterprise that has urged by the necessity to solve the individual information leakage problem. A student in one's twenties performed the manager post and the employee as a testee. Eight students participated, and experiments on four cases are performed each by two students. The facilitator advised the testee on each phase at any time while experimenting. The following three points were required for participants.

- (a) The manager and the employee take cooperated each other, standpoint for the company.
- (b) Participant doesn't keep a secret to another.
- (c) Participants agree on the final search of each other for the solution to satisfy.

### 5.3 Outcome of an Experiment

All groups reached the consensus building as a result of applying the RC support method described in Chapter 4. (Fig.4 shows the construction drawing of understanding of the opinion between participants made as a result of the experiment.)

### 5.4 Consideration and Finding

The proposed method to use the cooperation type study was found to be effective for smooth RC, that is, smooth selection of optimal solution and the consensus building from the outcome of an experiment. An insufficient points were observed about the risk understanding by participant and the understanding of the risk structure by participant. The information exchange at yhe timing that the risk was studied and the consensus building support by the construction drawing of the opinion understanding were effective for RC. For the WD form, the evaluation value was obtained from the testee with the high appraisal of four or more, including the following comment.

- (a) Participation person's WD is easy.
- (b) The understanding of other participant's WD was easy.

It was clarified that the intelligence sharing at an early stage was effective from the free description type questionnaire that had been done at the same time after experiment including the following opinions.

- (1) Participant worked on RC valuing other participant's opinions.
- (2) The utility of measures was able to be discussed among participants.
- (3) It became easy to compromise because it was able to confirm other participant's intentions before own opinion hardened.

As a whole, the process to which the discussion for the consensus building was done from the risk study was observed, and the problem described in 2.2 was solved.

## 6 Conclusion

In this paper, we proposed information acquisition methods, that are the development type study that used the cooperative study, and allotment study method, as a support method of the risk communications in the cooperation type study. Mutual understanding and the consensus building supporting tools such as WD forms and Fishbone were introduced. As a result of the RC experiment, the effectiveness of the proposed method became clear.

We will develop with a more effective method by systematizing the proposal method in the future.

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