

The Use Plan of the Effective Computer Simulation Program for Strengthening the Disaster Field Response Strategy

Seung Hee Ham^{a,*}, Namkwun Park^{b,1}, Myong O Yoo^{a,2}

^a *Urban Safety&Security Research Institute, University of Seoul 163 Seoulsiripdaero, Dongdaemun-gu, Seoul 130-743, Republic of Korea*

^b *Public Safety & Construction Committee, Seoul Metropolitan Council, 15 Deoksugung-gil, Jung-gu, Seoul 100-739, Republic of Korea*

A B S T R A C T

The full extent of damage depend greatly on the quick and rational decision making by the incident commander soon after the disaster. The decision that everybody should wait by the captain, not to enter into the ship by the first dispatched incident commander, broadcasting failure have brought about a huge loss of life at Sewol cruise ship incident. Thus this study reviews the training and education system supporting the rational crisis decision making performed by the incident commander to cut off the expansion of disaster which is caused by the failure of the incident situation awareness and the decision making described above.

KEYWORDS

On Scene Decision Making
Rational Crisis Decision making
On Scene Response Competence
Virtual Reality Education & Training Program

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* Corresponding author. Tel. 82-2-2245-3119. Fax. 82-2-6490-5380.
Email. dandyhaam@gmail.com

1 Tel. 82-2-3705-1124. Email. park9616@naver.com

2 Tel. 82-2-2245-3119. Email. yoonyoo@empal.com

ARTICLE HISTORY

Received May. 31, 2016

Revised Jun. 08, 2016

Accepted Jun. 16, 2016

1. Introduction

Unlike the usual accidents such as the fire, rescue, and relief, the disaster field is an unfriendly to fire officers who urgently respond. In case of the usual accident, most accidents can be treated only by the fire station's response but in case of disaster field, multiple institutions get involved in or the subject of the response changes. In Korea, the importance of the education and training for strengthening the disaster field response ability is being emphasized. The disaster has features of complexity, uncertainty, interactivity, and redundancy, these features require personnel participating in the disaster field for the reinforced ability different from the usual job performance ability.

Since it is impossible to actually conduct the training or education by reenacting the disaster field realistically, the computer-based simulation is being used as an education/training tool. However, since the education training simulation used by the existing fire station is designed based on the disaster response manual or standard operating procedure(SOP), it is difficult to achieve the practical education training goal and it is being alienated by trainees. Utilizing the computer-based simulation to the disaster-related education is attributed to the features of disaster mentioned above which is a greatly useful method. However, the effectiveness will be secured through the process of designing the scenario, applying to the training, and giving feedback after setting the education training goal and use target clearly. For this, this study conducted the scenario design method and the suggestion of the training space in order to extract the ability to be reinforced through the computerized adaptive AI(artificial intelligent) simulation among abilities required for the disaster field and to reinforce that ability effectively.

2. Ability of the disaster field responder

2.1 Ability

The ability on individualities is decided by the sum of the knowledge, technology, and attitude, it is known the knowledge and technology can be increased through the education and training. The lecture education and practice education are being utilized as a way to strengthen the knowledge, the repetitive training, practice, and exercise based on the stamina training are used as a way to strengthen the technology.

2.2 The teachable ability by applying the computerized based simulation

Considering the features of the diversity, complexity, redundancy, and interactivity the disaster has, the high-level situation judgment and decision making ability are required besides the knowledge and technology required during the usual accident response in the disaster situation. The process of the judgment and decision is done before reaching certain behavior or action, in case of disaster field, these judgment and decision are made through a commander. Therefore, the situation judgment and decision making ability is highly regarded about the personnel applying to the commander class. However, since the situation judgment or decision making ability includes the emotional/psychological areas that cannot be acquired by the way to acquire the common knowledge and technology, the importance of recognizing in advance through the experience has been emphasized. That is, the personnel should experience the disaster situation repeatedly through the simulation to make a decision in a right direction in the situation that the personnel cannot recognize.

2.3 Decision making

The disaster field commanders' decision making method includes the naturalistic decision making(NDM) and recognition-primed decision(RPD). According to researchers, the commanders pursuing NDM choose a satisfactory

alternative rather than choosing the optimal alternative in the dynamic and high-pressure field due to the restriction of time and risk, which is the instinctive method. On the other hand, in case of the RPD method, the pre-playing course of the action which is the spiritual evaluation activity is done before the recognized situation-oriented response activity is done. That is, the personnel can reach the reasonable decision making by experiencing a number of alternatives and result values in advance in the pre-playing course of the action. As a result of evaluating the decision making of the commander by applying RPD, the decision makers with experience are much more likely to reach the time reduction and the reasonable decision making. It represents many experiences on the disaster situation are the core element inducing the reasonable decision making.

3. Computerized adaptive AI(Artificial Intelligent) Simulation for strengthening the disaster response ability

In order to reinforce the disaster response ability by using the computerized based simulation, the performer should experience the situation in the varying context and simulate the cognitive factors(expectation, relevant clue, reasonable goal, response method) working as the situation judgment elements and the hindrance factors(time pressure and risk) of the proper situation judgment elements into the similar situation to the actual field. It should be the computerized adaptive AI(artificial intelligent) simulation method rather than the computerized based simulation. The reason why existing instruction training simulation program could not secure the effectiveness is because the training scenario was decided based on the SOP which stipulated the behavior according to the time flow or the manual, a written document to compel the action. Whether to properly do an action or not in the disaster field is the area that includes the technology. In case of the simulation lacking the hardware for evaluating whether the technology is exact, the suitability of the behavior cannot be evaluated and the skill cannot be cultivated. SOP stipulating the behavior according to the time flow cannot reflect the disaster nature and does not provide the trainees with the situation judgment hindrance factors such as the time pressure or risk. It just can evaluate if the performers are well-informed of the procedure.

Therefore, in order to compose the computerized based training program effectively, the simulation must be based on the interactive method that the situation changes according to the trainees' decision making and behavior.

4. Scenario design process

As seen in figure 1, the scenario design that must be applied to the computerized based simulation program for reinforcing the disaster field response ability should go through 5 stages. The process of first assessment -> duty analysis > education goal setting -> scenario evaluation -> education application should be repeated, and in the first assessment stage, the selection of disaster types, actual accident case analysis of selected disaster type, analysis of all kinds of papers, and apprehending interested persons(trainees) are carried out. In the duty analysis, the role analysis about what duty to fulfill in the disaster type each interested person chose is carried out. It is judged if the situation change elements for realizing the educational goal can be reflected in the education environment by composing the education goal for each trainee and through the scenario assessment after the role analysis. If the scenario is completed through this, the effective education training result can be brought through the process of applying to the education and reflecting inadequate parts in the scenario again to improve.

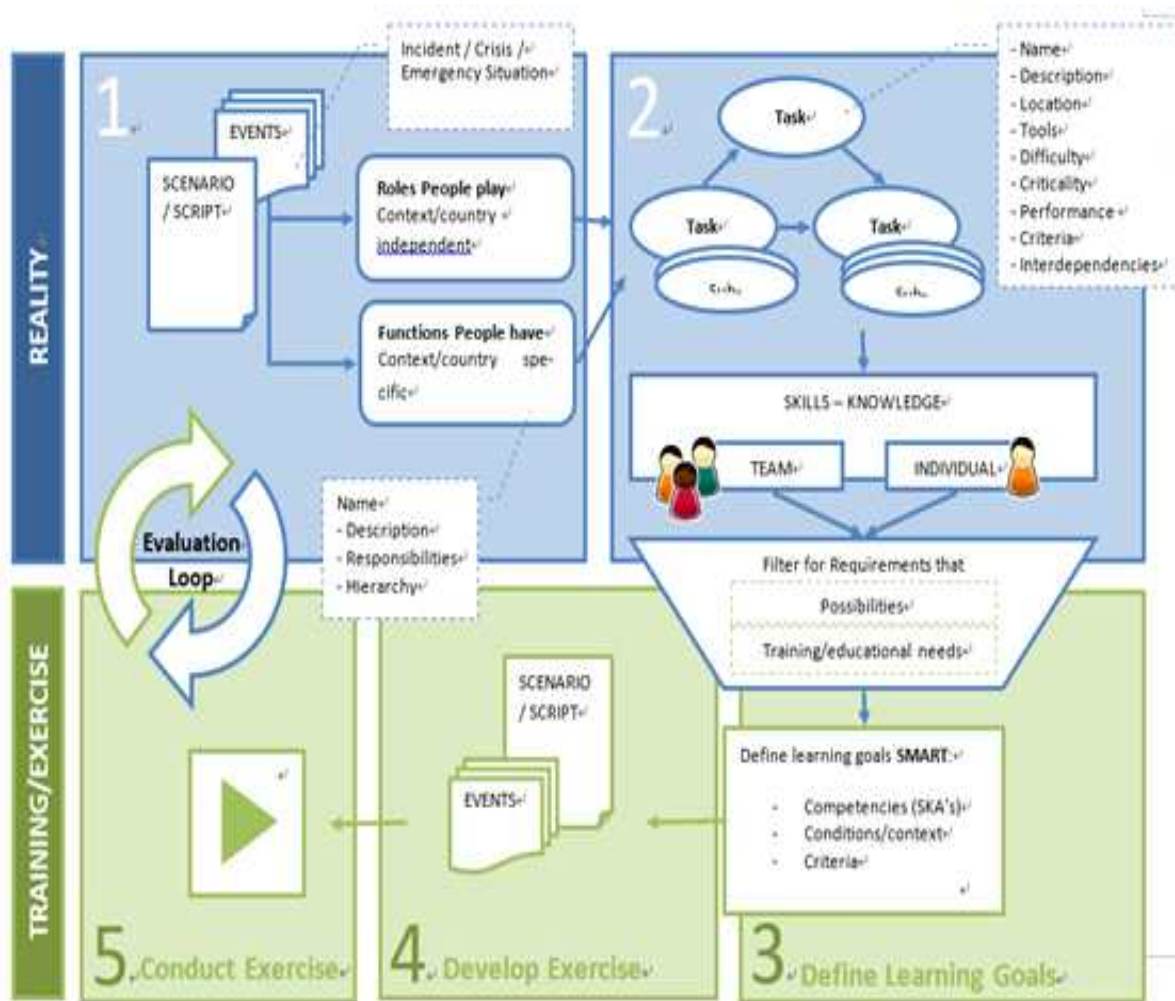


Fig. 1. Design Cycle in a 5 Step model

5. Composition of training environment

The training environment includes not only the environment embodied through the computer such as the composition of space, attire of trainees but also the entire composition of the pertinent education training room. The disaster field visualized through the simulation should have a very high similarity to the real situation and should have an immediate variability to reflect the situation cognition factors and situation judgment hindrance factors.

Also, the clothing, protective gear, and radio worn in the disaster field should be applied during training for trainees to be trained in the similar situation to the disaster field, and the space should be arranged considering the manner of communication (face-to-face, non face-to-face) like the actual field. The information on the disaster field visualized on the screen should be displayed only for personnel participating in the pertinent field to see. The reenactment is enhanced through this and it becomes possible to use the simulation program reflecting the hindrance factors of the physical situation judgment such as the time pressure, information restriction, and risk. Figure 2 is the block diagram of the actual education training simulation room which reflected all of these consideration elements.

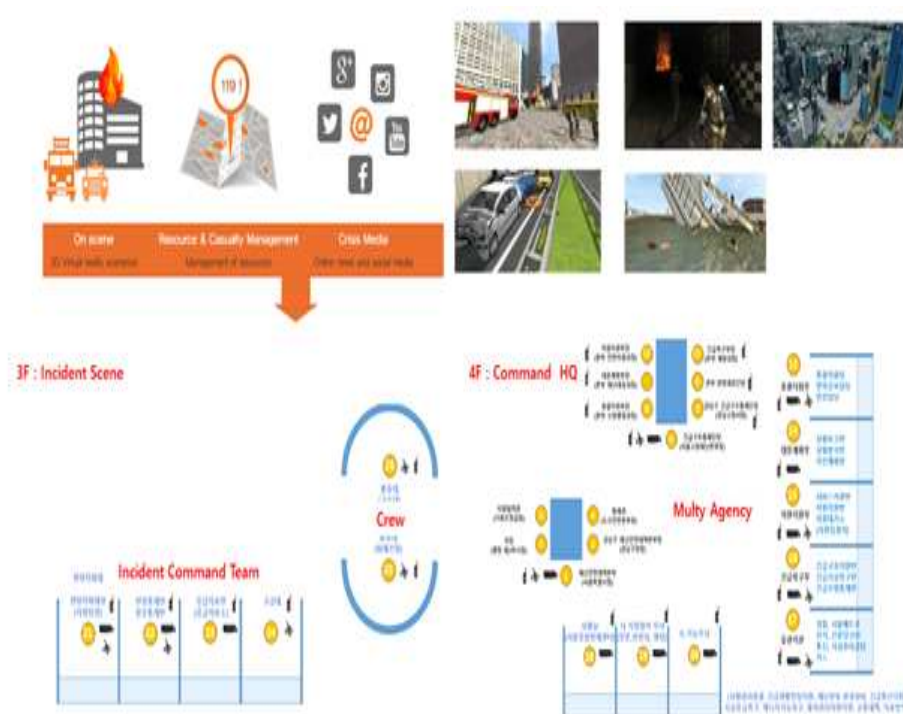


Fig. 2. Incident Command Training Center Design

6. Conclusion

The response ability in the disaster field depends on whether the person who has to decide a behavior for the field situation in multiple institutions can make a rightful decision. As a way to educate this, the maximization of the experience on the trainees who utilized the artificial intelligence-applied simulation is an useful and only alternative. This study suggested the clarification of the education target and goal, application direction of the simulation program, and composition plan of the educational environment in order to raise the effectiveness of the disaster field response ability education training using the simulation. As a follow-up study, the verification is required through the assessment on the effectiveness by comparing the result of the simulation education training and the result of existing simulation education training suggested by this study.

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