7.3. Operation management

There were differences among the five research groups in the way the survey was conducted. Some groups followed the instructions, while others did not. Comparison of survey results conducted by different investigators revealed areas with a high degree of agreement and those with a low degree of agreement. This was likely due to personal bias in the criteria used by the investigators to make judgments according to the instructions (Figure 10).

7.4. System interface

We realized that it was necessary to develop an interface to minimize human errors in the operation management. In particular, there was an issue with investigator A mistakenly surveying an area that was assigned to investigator B, which ended up overwriting the evaluation result of investigator B. To rectify this issue, we added a link to the assignment management table that allows an area to be surveyed again and that takes the investigator automatically to the login screen for the appropriate survey area. Additionally, it became clear that a checking mechanism, using information such as a user ID, was required upon system login in the future.

8. Information processing framework

Based on our research team's experiences in this disaster, we proposed an information-processing framework as shown in Figure 11. Areas enclosed with dashed lines show a flow to obtain a common operational picture based on an assumption that actual damage situation is known. However, in the event that an actual damage situation cannot be determined, a flow to directly connect hazard observation information from hazard observation equipment was used. This was implemented in normal time, in response to the initial response system in order to minimize a delay in disaster response. It is important to utilize a simulation in normal times in order to connect hazard observation information to disaster response. In normal times, the relationship between a hazard scenario and social asset information (vulnerability) draws a possible damage result. With the aid of this framework, it is necessary to minimize a delay in disaster response by establishing an initial response system without an input of actual damage information and by having preparation based on possible damages. As disaster response progresses and actual damages gradually become known, approximated damages can be replaced with actual damages by area or by type of damage.

9. Projected work

Multiple people judged the effectiveness and viability of the cloud-based participatory WEB-GIS system to certify building damage due to the tsunamis. Although a web-based system can increase the participation of investigators, it is often difficult to guarantee the quality of investigation conducted. The effectiveness of this system was demonstrated with the assistance of psychological experiment methodology. This methodology is also expected to be effective in improving the reliability and appropriateness of data surveyed by multiple investigators, rather than being only an experimental model. In addition to our system functioning as an effective survey, it was a great achievement for us to generate a common operational picture among investigators and stakeholders through the sharing of the survey process on WEB-GIS. While this system was configured to be a judgment system, it is possible to adopt it to a wide variety of surveys depending on how categories are set for judgment and selection; therefore, it has promise as a highly versatile survey system. We aim to build a system with an even higher level of viability by solving the issues that we found in the areas of data, management, and systems.

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