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CAPACITY BUILDING OF INTERNATIONAL SEARCH AND RESCUE TEAMS THROUGH THE CLASSIFICATION SYSTEM: EXAMPLE FROM JAPAN DISASTER RELIEF TEAM AND INSARAG EXTERNAL CLASSIFICATION AND RECLASSIFICATION

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ABSTRACT: This paper examines how the internationally-deployed search and rescue team of Japan, Japan Disaster Relief (JDR) team, strengthened its capacity through the classification system conducted by International Search and Rescue Advisory Group (INSARAG), which is called INSARAG External Classification (IEC) and Reclassification (IER). This paper concludes that IEC/R contributed to the capacity building of the team such as change of the team composition and introduction of the new techniques, through learning from other countries. The effect was not limited to JDR team, and it also contributed to strengthening the domestic teams in Japan.

Key Words: Japan Disaster Relief (JDR) Rescue team, International Search and Rescue Advisory Group (INSARAG), INSARAG External Classification (IEC), Urban Search and Rescue (USAR)

1. INTRODUCTION

In March 2010, Japan Disaster Relief (JDR) Rescue Team was classified as Heavy team by the classification system conducted by International Search and Rescue Advisory Group (INSARAG), or INSARAG External Classification (IEC). Since the introduction of IEC in 2005, more than 50 teams have been classified[1], and more and more teams are in the queue for classification by the IECs.

The purpose of this article is to analyze if IEC contributes to capacity building of international search and rescue (SAR) teams by taking the example of JDR Rescue team. It will look at how JDR

[1] Based on the INSARAG website (http://www.insarag.org/iec)

Rescue Team prepared for the IEC in 2010 and the INSARAG External Reclassification (IER) in 2015, and also put an eye on what changes have been brought to the domestic SAR teams in Japan. All the authors have been involved in the IEC/R process of JDR Rescue Team, deployments of, or IEC/Rs in other countries. Thus, some information in this article is based on their experiences.

The next chapter will introduce the existing studies on the relationship between qualification or certification and capacity building, and will clarify the position of this paper. The third and fourth chapters will touch upon the background information on INSARAG, IEC/R, and JDR Recue Team. The fifth chapter will look at the JDR's preparation for the IEC/R such as additional training and changes in the team composition. The sixth chapter will see the actual JDR deployments that happened before and after the IEC/R. Through these discussions, the article analyzes if the IEC/R contributes to capacity building of JDR Rescue Team. Furthermore, it then analyzes if IEC/R, by strengthening the internationally-deployed team, brought any changes to the domestic SAR activities.

2. QUALIFICATION/CERTIFICATION AND CAPACITY BUILDING

Regarding the definition of "qualification" and "certification," Sasaki[1)], while pointing out that these two terms tend to be mixed up, defines the technical certification by using the cases in Japan; the technical certification is a system where a certain organization sets standards of knowledge and technical capability, tests if examinees' knowledge and technical capability satisfy the standards, and certifies their results. The result of test does not officially affect employment or business of examinees. In contrast, qualification differs from certification in that qualification limits the persons who can take a particular job by the result of test by law or any other arrangements.

In international SAR activities, if international SAR teams cannot be deployed if they are not IEC-classified, or if their participation to international SAR activities are limited because of the lack of the IEC certification, then IEC should be regarded as a qualification system. However, teams can be deployed even if they are not IEC-classified if they are requested by affected countries[2)]. In this sense, IEC should be considered as certification system instead of qualification.

The preparation for IEC requires a lot of cost, and once classified, teams are required to contribute to additional work such as the coordination activities led by Office for the Coordination of Humanitarian Affairs (OCHA). Despite these additional burdens, many teams are requesting their IECs. One possible reason of this is that IEC, a certification system, is actually regarded as a qualification to participate in international SAR activities. Many teams might be requesting their IECs to get this "license".

Arai[3)] argues that, in order for a certification system to serve as a qualification system, the three functions as shown in Fig. 1 must operate. They are skill level certification, skill upgrading, and skill evaluation. By using this model, and in order to analyze if IEC serves as a qualification system, this paper analyzes if IEC has the three functions.

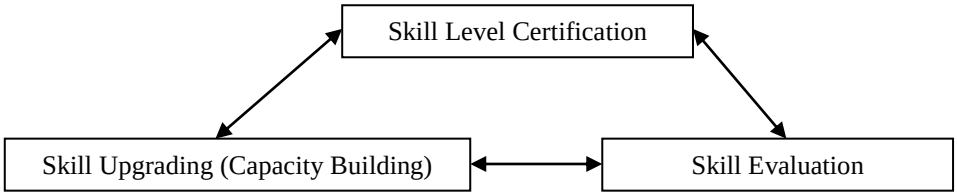

Fig. 1 Three functions where a certification system serves as a qualification system

For the skill level certification, all the IEC-classified teams are posted on the INSARAG website, and they put the IEC patch on their uniforms in addition to the certificate given by INSARAG. It is clear that IEC has the skill level certification function. For the skill evaluation function, it can be judged by checking whether the IEC-classified teams are properly evaluated, or in other words, whether they are prioritized by receiving countries. Okita[2)] conducts a study on this, using examples from the New Zealand Earthquake, the Great East Japan Earthquake, and the Nepal Earthquake.

Considering the above, this paper focuses on whether IEC has the function of skill upgrading, or capacity building. Thus, it will analyze whether IEC has contributed to capacity building of international SAR teams, using an example of JDR Rescue Team. There is no study that analyzed if IEC has contributed to capacity building of international SAR teams. There are some articles on the IEC/R process of JDR Rescue team, but they just introduced that JDR Rescue Team passed the IEC and the IER without any major challenges[4)5)].

To measure the capacity building function of IEC, some might think that using examples of developing countries is appropriate because JDR Rescue Team already has high SAR capability. On the other hand, IEC itself is a certification system for the internationally-deployed teams, and the number of IECs in developing countries is not many as of today: for example, Ukraine in 2014, Armenia in 2015, and Malaysia in 2016. However, in order to gauge the capacity building function, it should be more convincing to demonstrate that even the strong teams needed to prepare for IEC. For example, when SMART team of Malaysia went through the IEC in 2016, they mentioned that they had to improve almost all the aspects such as member qualification, additional equipment, and necessary training[6)].

Furthermore, the studies so far regarding the effects of certification system have tended to focus on capacity of individuals, or a certification system in a particular one country (e.g., study of Takahashi and Kurokawa[7)] that analyzed the Skill Standard Testing Systems in automotive industry in Thailand using the Arai model above). Compared with them, IEC is not the one conducted in one particular country, and the evaluation standards are determined by an agreement among participating countries, having plural classifiers from other countries. Another feature is that not only capacity of individuals but capacity as a team is evaluated.

In terms of a certification system for SAR techniques in Japan, there are the ones conducted in each organization such as Fire Department and Police Agency, but there is no common or standard certification system which is used by all the related SAR agencies in Japan[2]. It is valuable to analyze the effects of IEC, a unique certification system as pointed out above, on capacity building of SAR teams.

3. OVERVIEW OF INSARAG AND IEC

This section will introduce the overview of INSARAG and IEC, and Japan's contribution to them.

3.1 History of INSARAG and Contribution from Japan

INSARAG, the network of international SAR teams, was established in 1991 from the lessons of the 1988 Armenia Earthquake where some international SAR teams did not follow the instruction of the affected country. The activities of international teams were not well coordinated, and it caused the additional burden for the Armenian authorities. The Secretariat of INSARAG was located within the Department of Humanitarian Affairs (DHA), and the current OCHA. The mandates of INSARAG are to develop the common rules and procedures such as the INSARAG Guidelines and to improve efficiency in international SAR activities[8)]. Although SAR activities include many types of activities, INSARAG focuses on urban search and rescue (USAR) activities which are required after, for example, earthquakes in urban areas[3].

Japan has participated in the INSARAG activities since its inaugural meeting held in Germany in 1991[8)]. In 2010, Japan hosted the first INSARAG Global Meeting (IGM) in Kobe city, and in 2016, hosted the INSARAG Team Leaders (ITL) Meeting in Tokyo. In 2018, Japan was chosen as the Asia-Pacific (AP) Regional Chair, and is continuing its support to INSARAG until today.

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[2] For example, the rescuers of Fire Departments in each prefecture of Japan must complete the 140-hour SAR training designated by the Fire Academies in each prefecture established by Fire and Disaster Management Agency (FDMA). However, after completing the 140-hour training, a skill check and a physical test depend on each Fire Department's decision.

[3] Regarding international USAR activities, please also refer to Reference 21).

3.2 Overview of IEC

INSARAG has introduced IEC since 2005 where international SAR teams are classified into Heavy or Medium category. According to Dewey Perks[4], the Chairperson of the INSARAG Training Working Group (TWG), the United States (US), although the INSARAG Guidelines was already developed by 1990s[9], INSARAG was then discussing how to ensure its implementation as the next issue. Thus, the INSARAG Americas Group established a working group for this, and set tangible standards that ensure the contents of the Guidelines. Then, the Americas Group tested the standards by applying them to the teams in the US. At the same time, the Americas Group introduced this initiative to the other regional groups: AP and Africa-Europe-Middle (AEME).

However, there were at first negative reactions from some countries against the introduction of this system. One possible reason of this was that some teams thought the system as a test where evaluators were deployed from a particular country or organization. The word "accreditation" used at that time also contributed to this misunderstanding. In order to avoid the confusion, the Americas Group decided to use the word "classification" instead, and explained the following things. The evaluators are deployed from plural countries, and thus, it is a peer-review process, but not a test. The evaluators check only the minimum standards and they do not impose the system that is a standard in a particular country. INSARAG has continued the discussion, and in 2005, it conducted an IEC on trial at the USAR training held in Hungary. In 2006, IECs were officially held in the United Kingdom (UK) and the US[5]. According to Perks, when INSARAG started IEC, it was expected that only around 10 teams would go through the IEC process, and it was not expected that more than 50 teams were classified as of today.

The revised INSARAG Guidelines (version 2015) have the three volumes, and the Manual C of the volume II is the IEC/R Manual. According to the IEC/R Manual, the objective of IEC/R is "to provide the government of an affected country with a database of independently verified INSARAG Medium or Heavy teams" [10]. The idea is that the IEC-classified teams can ensure quick deployment, self-sufficiency, sophisticated and safe SAR operations, coordination with affected countries, and contribution to OCHA's coordination mechanism, and thus they should not be a burden for affected countries when deployed[10].

In order to be classified in IEC, teams must satisfy all the items, which are more than 140, listed in the IEC/R Checklist. The Checklist is part of the Manual C of the INSARAG Guidelines[6]. Even if they are classified, the classified teams must be reclassified every five years, which is called IER, to maintain their classification level. Thus, the teams are requested to improve their capabilities continuously. In the IEC/R events, teams must conduct 36-hour field simulation exercise so that classifiers can check all the items in the Checklist. Not only IEC/R events, teams must invite mentors from other IEC-classified teams or very experienced experts at least two years before the tentative IEC/R date, and start the preparation[10].

Some might think that JDR Rescue Team does not have to go for IEC because they already possess high SAR capabilities. INSARAG, however, requests all the internationally-deployed teams to go through the IEC process[11]. Since the introduction of IEC in 2005, the teams in Hungary, the UK, the US, Netherlands, Germany, Singapore, Sweden, Switzerland, and Australia were classified by 2008[7]. Furthermore, there were possibilities that IEC-classified teams might be prioritized when rescue sites were allocated, and offers of non-classified SAR teams might be declined by affected countries[5]. Therefore, JDR Rescue Team decided to go for IEC, and was classified in March 2010. In 2015, they were reclassified in IER and successfully maintain their classification level. In the following sections, this paper will analyze how JDR Rescue Team prepared for the IEC/R.

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[4] The interview was conducted during the ITL Meeting held in Indonesia on October 19, 2017.

[5] Although the IEC in Hungary in 2005 was a trial one, the Hungarian team was classified as Heavy team in this IEC. This paper also takes the position that IEC has been implemented since 2005.

[6] The Guidelines is translated into Japanese, and downloadable from the INSARAG website.

[7] Based on the INSARAG website

4. OVERVIEW OF JAPAN DISASTER RELIEF (JDR) RESCUE TEAM

This section will look at JDR Rescue Team, focusing on how the team composition of JDR Rescue Team has been developed.

The Law of JDR, established in 1987, stipulates the arrangements of sending JDR teams, which are deployed by the Japanese government based on requests from affected countries or international organizations against massive-scale overseas disasters. The Clause 1 of the Article 3 stipulates that Foreign Minister of Japan can request support from the related Ministries and Agencies listed in Table 1. The team structure of JDR Rescue Team was developed by having the rescuers from the three agencies that can provide rescuers among 14 agencies in the list[12]. They are National Police Agency (NPA), Fire and Disaster Management Agency (FDMA), and Japan Coast Guard (JCG)[8].

Table 1 Related Ministries and Agencies[9]

Cabinet Office; NPA; Ministry of Internal Affairs and Communications; FDMA; Ministry of Education, Culture, Sports, Science and Technology; Ministry of Health, Labour and Welfare; Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; Agency for Natural Resources and Energy; Ministry of Land, Infrastructure, Transport and Tourism; Japan Meteorological Agency; JCG; Ministry of the Environment; Ministry of Defense

The Ministry of Defense (MoD) and Japan Self-Defense Forces (JSDF) can also contribute to SAR activities, but the Clause 2 of the Article 3 of the Law of JDR determines that Foreign Minister should consult with Defense Minister "only when it is especially needed" regarding deployment of JSDF. For this reason, in the normal deployments of JDR Rescue Team, the rescuers from the three agencies are to be deployed, and the rescuers of the JSDF are not included.

The Article 5 of the Law of JDR stipulates that Foreign Minister can request Japan International Cooperation Agency (JICA) to deploy staff of national or local public agencies, staff of independent administrative agencies and other members[10] as JDR Team members. Based on this, JICA organized arrangements to deploy JICA staff, medical doctors and nurses who were also members of JDR Medical Team, as part of JDR Rescue Team.

The basic composition of JDR Rescue Team that consists of members from several agencies was developed based on the above background. The basic composition is a Team Leader from Ministry of Foreign Affairs (MoFA); four Deputy Team Leaders from NPA, FDMA, JCG, and JICA; rescuers from the three agencies; medical unit from doctors and nurses registered by JICA; Coordinators from JICA and other organizations.

Figure 2 shows the team structure of the JDR Rescue Team deployed to Algeria in 2003. The team had three squads under one Unit Leader. The three Squad Leaders were deployed from NPA, FDMA, and JCG. According to the report of the Algeria Earthquake JDR Rescue Team, the team members discussed internally during the transit time in Paris, and decided that each unit had the members from the three agencies so that each unit would have the same level of SAR capability[13].

Looking at the previous deployments, the JDR Rescue Team deployed to the Colombia Earthquake in January 1999 had the rescuers from the two agencies, NPA and FDMA, and each agency provided one Squad Leader[14]. In the Turkey Earthquake in August 1999, the rescuers were from FDMA and JCG, and again each agency designated one Squad Leader[15]. Thus, the number of rescue squads equaled to the number of agencies that provided rescuers. Since the 2003 Algeria Earthquake, all the JDR Rescue Team deployments have rescuers from the three agencies, and the basic structure of JDR Rescue Team was established as one Team Leader from MoFA, four Deputy Team Leaders from the three agencies and JICA, and three rescue squads under one Unit Leader.

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[8] The order of NPA, FDMA, and JCG, which is used in all the JDR-related documents, is based on the order in this list.

[9] From the Law of JDR

[10] Other members here include, for example, medical staff of public and private hospitals, staff of Japan Overseas Cooperation Association (JOCA), and Japan Structural Consultants Association (JSCA).

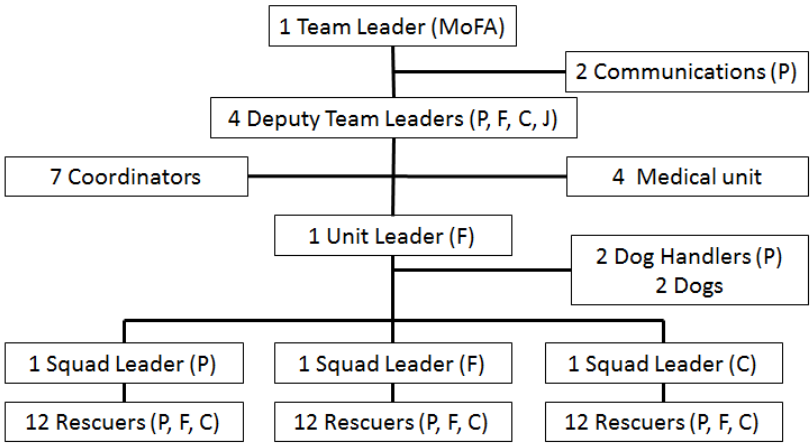

Fig. 2 Team structure of JDR Rescue Team deployed to the Algeria Earthquake[11]

5. JDR RESCUE TEAM AND IEC/R

This section will look at how JDR Rescue Team prepared for the IEC in 2010 and the IER in 2015.

5.1 Measures taken against IEC/R Checklist

In order to be classified in IEC/R, teams must satisfy all the items listed in the IEC/R Checklist. Table 2 shows the major items that JDR Rescue Team had to take special measures to meet the standards. In other words, JDR Rescue Team did not satisfy these points before the IEC/R.

Table 2 The items that JDR Rescue Team had to take special measures[12]

Checklist No.	Issues
5.2	Does the USAR team have sufficient personnel in its structure to work continuously in accordance with the INSARAG Guidelines? (Heavy: 24 hours operations for 10 days at two sites simultaneously and continuously; Medium: 24 hours operations continuously for seven days at one site).
6.3	Has the team trained sufficient English-speaking personnel to perform Reception/Departure Centre (RDC) and On-Site Operations Coordination Centre (OSOCC) functions?
12.2	Does the USAR team conduct structural assessments with appropriate structural engineering expertise?
13.5	Does the USAR team demonstrate the ability to analyze and conduct stabilization operations of structural elements?
13.7.2	Can the medical unit provide medical care in a confined space, including performing field amputations, for victims encountered?
13.7.3	Does the team have the ability to provide emergency veterinary care in collaboration with their handlers?

5.1.1 Additional members and change in team composition

As shown in the previous section, the basic structure of JDR Rescue Team had three squads under one unit. However, that structure could not conduct 24-hour operations continuously for 10 days at two sites, which are required for Heavy teams in the item 5.2. In order to establish a rotation system within the team, the team must have the structure with four squads under two units.

In order to secure the safety of rescuers during SAR operations, teams must have structural

[11] Created by the authors based on Reference 13). P: Police (NPA), F: Fire (FDMA), C: Coast (JCG), J: JICA.
[12] Created by the authors based on the IEC/R Checklist 2018. The Checklist version 2018 is not the one that JDR Rescue Team used in their IEC in 2010 and IER in 2015, but the basic items and contents remain the same.

engineering experts to evaluate and monitor collapsed buildings (checklist No. 12.2), but JDR Rescue Team did not have that function in the team. To solve this, JICA coordinated with Japan Structural Consultants Association (JSCA) and started registration and training for the consultants of JSCA so that they can send structural engineers with JDR Rescue Teams. This led to the first deployment of a structural engineer from JSCA in the 2011 Christchurch Earthquake response[16)].

5.1.2 Additional training and equipment

The stabilization techniques such as shoring and cribbing[13], which are included in the ICE/R Checklist (No. 13.5), were not very common in Japan[17)]. Thus, JDR Rescue Team members had to have additional training before the IEC[18)]. For example, before the IEC in March 2010, JDR conducted shoring training in May 2009 and cribbing training in February 2010. At the time of the IEC, the shoring techniques of the JDR members were still not very professional ones. Thus, they demonstrated only the basic shoring techniques and avoided using professional ones[4)].

In order to be classified in IEC, teams must contribute to the coordination activity led by OCHA. Because of this, IEC-classified teams are requested to provide support staff to the coordination mechanism led by United Nations Disaster Assessment and Coordination (UNDAC) team deployed by OCHA. They are, for example, Reception/Departure Centre (RDC) and USAR Coordination Cell (UCC) in On-Site Operations Coordination Centre (OSOCC) (Checklist No. 6.3)[14]. The Secretariat of JDR located in JICA sent some staff to UNDAC training, and they then as lecturers provided RDC and OSOCC-UCC training for the JICA staff that would be deployed as coordinators of JDR.

JDR Rescue Team, before the IEC in 2010, already had medical unit within the team. However, its main mandate was to provide medical care for the JDR team members, and not necessarily for the people being rescued who were under the rubble (Checklist No. 13.7.2) and for search dogs (Checklist No. 13.7.3). The members of the medical unit were selected from the pool of the registered JDR Medical Team members. Before the IEC, however, JICA started a separate registration system for the medical unit of JDR Rescue Team, and organized special training for confined space medicine (CSM) and medical care for search dogs[18)].

Photo 1 Example of Shoring[15]

Photo 2 Example of Cribbing[16]

5.2 Observation of IEC/Rs in other countries

INSARAG recommends the teams to observe IEC/Rs in other countries and to understand the IEC/R process before their IEC/Rs. Based on this, JDR Rescue Team sent observers to the IEC/Rs in other countries as listed in Table 3 and prepared for the IEC and the IER.

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[13] These techniques are introduced in Reference 4) with pictures.

[14] Please refer to Reference 25) for the details of UNDAC, RDC, OSOCC, and UCC. In short, RDC is a function to register incoming international teams at arrival airports. OSOCC is established at the center of affected areas and in charge of coordination of relief activities. UCC is a part of OSOCC, and coordinates international SAR activities. They are run by UNDAC members and support staff from other international assistance teams.

[15] Photo taken by the author at the IER in Korea in November 2016

[16] Photo taken at the JDR Rescue Team exercise in March 2017 and provided by JICA

Table 3 List of Observers from JDR Rescue Team[17]

(Before the IEC in 2010)

Year	IEC/R
2008	IEC Singapore
2009	IEC Poland
2009	IEC Iceland
2009	IEC China

(Before the IER in 2015)

Year	IEC/R
2010	IEC Belgium and Denmark
2011	IEC Russia
2011	IEC Korea
2013	IER Australia
2013	IER Singapore

5.3 Mentors from New Zealand and Australia

According to the INSARAG Guidelines, it is mandatory to invite mentors from other teams or someone who is very experienced before IEC/Rs. The role of mentors is to check the current status and to provide necessary advice. JDR Rescue Team invited Jim Stuart-Black of New Zealand Fire Services (NZFS) before the IEC[19], and John Cawcutt of Queensland Fire Services, Australia, before the IER as their mentors[20].

Stuart-Black, the mentor for the IEC, participated in the JDR Rescue Team exercise held in November 2009. He checked the documents to be submitted to the INSARAG Secretariat and advised JDR Team on USAR techniques and exercise scenario setting through observation of the exercise. The cribbing exercise held in February 2010 was organized based on his advice.

Cawcutt took the mentor's role from 2012, which was three years before the IER. He attended the JDR Rescue Team exercise in 2012, 2013, 2014, and the IER event in 2015. He also advised them on documentation, USAR techniques, RDC and OSOCC management, and exercise scenario. Cawcutt commented on the capacity building of JDR Rescue Team[18] as below:

> "JDR Rescue Team, as the team already classified in IEC in 2010, was an already capable team. However, the team recognized that, with changes in personnel and equipment, and government expectations, they needed to continue to evolve and improve. This was a very important point because the team leadership could have simply met the minimum standards required under the IER process, but rejected that, and decided to strive for continual improvement.
>
> The JDR Rescue Team was made up from very independent and different agencies (e.g., NPA, FDMA, JCG) and each one having a strong culture and reputation for professional performance. The risk for JDR Rescue Team was that it would become a team made up of three different sub-teams rather than a single team. Thus, JDR Rescue Team needed to develop its own culture and outlook so it could perform at the highest level. While not perfect, each agency made an effort to change so that this could occur. The ability for these agencies to self-reflect on how they do things and then adjust was a very good achievement in the IER process.
>
> The team also improved in workplace health and safety particularly in the area of working in hot climate. The ability to rest improved, but this was often challenged by the team's high work ethic. Team members did not like having a rest mid-way through a rescue even if it meant they could stay on site longer. It also improved respiratory protection by increasing the use of particulate masks.
>
> While serving as mentor, JDR Rescue Team improved especially in the following items: on-site information collection, concrete breaching, lifting and cribbing, rope work, shoring, medical assessment and engagement of medical unit into rescue activities, and logistical capabilities which enables 10-day operations."

5.4 Improvements based on IEC/R classifiers report

In the 2010 IEC, the classifiers were sent from Singapore (as the classifiers' Team Leader), Austria,

[17] This list only shows the list of observers, but JDR Rescue Team also sends classifiers to IEC/Rs in other countries.

[18] The interview was conducted through e-mails (received the reply on October 12, 2017).

Czech, Finland, International Rescue Dog Organization (IRO) in the UK, Australia, Korea, and the US. In the 2015 IER, the classifiers were from Singapore (Alan Toh who served as the Deputy Team Leader in the IEC was then designated as the Team Leader for the IER), Russia, Switzerland, Austria and China. They evaluated the team through the presentation by JDR Rescue Team, observation of the 36-hour simulation exercise, and the interviews with JDR members. JDR Rescue Team was successfully classified or maintained the Heavy classification in both the IEC and the IER.

Although JDR Rescue Team was successfully classified, it does not mean that the team was perfect in all the items. The classifiers team submitted Advisory Note together with the Checklist for further improvement of the team capabilities. The classifiers pointed out the issues listed in Table 4. Based on this Note, JDR Rescue Team took the necessary actions for improvements.

Table 4 Issues raised by the classifiers in the IEC and the IER[19]

Topics	Advice by classifiers (IEC or IER)
Management	- Do a final check of all passports before the composition of the team is finalized. (IEC) - Medical treatment area should be separated from command post tent. (IEC) - Written safety and security plan should be developed. (IER) - More training for JDR staff responsible for RDC/OSOCC is needed. (IER)
Training	- Only one annual comprehensive joint training does not allow all registered personnel to participate and enhance their competency. (IEC) - The current training facility remains insufficient for a heavy USAR team to train its full potential. More advanced training facilities should be built. (IER) - The future training should be designed with more challenging situations and obstacles to test USAR skill sets and decision-making ability of the team. (IER)
SAR	- Consider using search dogs in pair. (IEC) - Some rescuers lacked experience in handling the rescue equipment. Accurate training with rescue tools is needed. (IER) - Structural engineers should be involved in the shoring process. (IER)
Medical	- It was observed that JDR Rescue Team is currently not able to bring controlled drugs to abroad due to the laws. It is recommended that the team should look into some arrangements to enable medical unit to dispense such drugs for treatment rather than rely on supplies at the affected country. (IEC)
Logistics	- The team should standardize the personal travelling luggage. (IER) - The team should bring water purification system with the team. (IER)

6. IMPROVEMENTS IN ACTUAL FIELD DEPLOYMENTS THROUGH IEC/R

In the previous section, this paper looked at the preparation taken by JDR Rescue Team for the 2010 IEC and the 2015 IER. In this section, it will look at the changes in the actual field deployments before and after the IEC/R.

Table 5 shows the list of earthquakes after 2000 where JDR Rescue Teams were deployed, including scale of earthquakes, damages, timing of arrival and completion of activities, and types of activities. There are some more JDR deployments, but the deployments to Morocco in 2004, Thailand in 2004, Pakistan in 2005, and Malaysia in 2014 are not included in the list. These deployments were excluded because only small-scale teams were deployed to the 2004 Morocco Earthquake (23 personnel) and the 2005 Pakistan Earthquake (49 personnel), or the teams were deployed not to earthquake but to tsunami (Thailand in 2004) and missing air plane (Malaysia in 2014). In response to the 2011 Christchurch Earthquake, the JDR Rescue Team was deployed from the first batch to the third batch. This paper deals with only the first batch because the main mandate of the second and third batches was recovery activity instead of SAR.

[19] Created by the authors based on the Advisory Note submitted by the classifiers team of the IEC/R.

Table 5 List of disasters and activities of JDR Rescue Teams[20]

Earthquakes	Time of Earthquake occurrence	Scale	No. of killed	Time of arrival (time after the earthquakes)	Time of completion of SAR activities	Main activities
Algeria Earthquake	19:44 May 21, 2003	M6.7	More than 2,200	10:25 on May 23 at Algiers (38 hours 41 minutes)	At 21:00 on May 25	Rescued 1 live and 6 bodies in 3-day operation
Sichuan Earthquake (China)	14:28 May 12, 2008	M8.0	More than 69,000	02:23 on May 16 at Chengdu (83 hours 55 minutes)	At 08:30 on May 19	Rescued 16 bodies in 3-day operation
Padang Earthquake (Indonesia)	17:16 Sep 30, 2009	M7.6	1,115	09:40 on Oct 2 at Padang (40 hours 24 minutes)	On Oct 4	Only search activity in 3-day operation
IEC (March 2010)						
Christchurch Earthquake (New Zealand)	12:51 Feb 22, 2011	M6.3	185	04:16 on Feb 24 at Christchurch (39 hours 25 minutes)	Completed activity of first batch on Mar 1	Rescued 23 bodies in 6-day operation
IER (March 2015)						
Nepal Earthquake	11:56 Apr 25, 2015	M7.8	About 9,000	11:44 on Apr 28 at Kathmandu (71 hours 48 minutes)	On May 5	Rescued 1 body in 8-day operation
Mexico Earthquake	13:14 Sep19, 2017	M7.1	369	12:30 on Sep 21 at Mexico City (47 hours 16 minutes)	At 16:50 on Sep 24	Rescued 1 body and 1 live dog in 4-day operation

Table 6 Team composition of JDR Rescue Teams[21]

Disasters	Total	TL/DY	Unit Leader	Squad Leader	Comm	SAR	Handler (Dog)	Medical	Structural Engineer	Coordinator
Algeria Earthquake	61	5	1	3	2	36	3 (2)	4	-	7
Sichuan Earthquake	61	5	2	3	2	36	4 (3)	4	-	5
Padang Earthquake	65	5	2	4	2	36	4 (3)	5	-	7
IEC (March 2010)										
Christchurch Earthquake	66	5	2	4	2	37	4 (3)	5	1	6
IER (March 2015)										
Nepal Earthquake	71	5	2	4	2	38	5 (4)	5	2	8
Mexico Earthquake	72	5	2	4	2	38	5 (4)	5	2	9

It is not appropriate to compare only the number of live rescues or extricated dead bodies to analyze the capability of the team[22]. This figure depends on the factors such as scale of disasters,

[20] Created by the authors based on the JDR mission reports of each mission. Regarding the Mexico Earthquake, the information is based on the authors who were deployed with the team. The damages of disasters are the ones which are generally recognized. The scale or "M" means magnitude of earthquakes. The time of earthquake occurrence and arrival are the local time. Regarding the arrival time, it refers the arrival time of the main teams at the nearest airports to the affected areas, but not the one of the advance (reconnaissance) team.

[21] Created by the authors based on the JDR mission reports of each mission. "TL" stands for Team Leader, "DY" stands for Deputy Team Leader, and "Comm" means Communications. The SAR members include Unit Leader Support members, and the medical unit includes the position of Medical Manager (added after the 2009 Padang Earthquake).

[22] For reference, the live rescues conducted by the JDR Rescue Teams were only two: the 1999 Turkey

response capacity of affected countries, makeup of buildings, distance to affected countries, and timing of arrival[21]. Regarding the timing of arrival, in case the request for assistance made by affected countries is delayed, it automatically leads to the delay of arrival. Thus, the logistical capability cannot be evaluated only by the timing of arrival. For example, in the Sichuan Earthquake that occurred on May 12, 2008, despite the relatively close distance between China and Japan, the Japanese government received the request from the Chinese government on May 15, which was three days after the earthquake[22]. One thing that can be concluded from Table 5 is that JDR Rescue Team is now able to conduct longer time operations of six to eight days as shown in the Christchurch Earthquake and the Nepal Earthquake operations. This is one of the outcomes that the team has developed the team structure that enables 24-hour operations for 10 days through the IEC/R process.

Table 6 summarizes the team composition of the JDR Rescue Teams deployed to each earthquake. As mentioned above, because it is difficult to compare and analyze the capacity of the team based on their activities only, this paper will look at the changes in the team composition and analyze if JDR Rescue Team has been strengthened.

6.1 Algeria Earthquake in 2003: First deployment of search dogs and modification of the role of medical unit

The Japanese government deployed the 61-member JDR Rescue Team to the Algeria Earthquake that occurred on May 21, 2003. IEC has not yet started as of 2003, but according to the mission report, the team was establishing the team structure aligned with the INSARAG Guidelines since 2000s. As part of this arrangement, they were preparing for deployment of search dogs and medical unit together with the team. To achieve this, JICA provided training on CSM for the registered JDR Medical Team members, and some medical personnel also participated in the JDR Rescue Team training. The Algeria Earthquake happened while JDR Rescue Team developed this new structure[13].

The deployment for the Algeria Earthquake was not the first deployment of medical unit within JDR Rescue Team. A medical unit, as part of JDR Rescue Team, was actually deployed to the 1991 Bangladesh Cyclone and the 1999 Colombia Earthquake. However, the main mandate of the medical unit at that time was medical care for the JDR members, but not medical care for trapped people[12][14]. On the other hand, in the Algeria deployment, medical care during rescue operation was clearly expected as one of their mandates[13]. In the Algeria Earthquake, two search dogs and three dog handlers were also deployed, and it was the first search dog deployment for JDR Rescue Team[13].

Regarding the coordination activity, the JDR Rescue Teams deployed to the Colombia Earthquake and the Turkey Earthquake in 1999 did not participate in the coordination meeting led by UNDAC. The teams negotiated with the affected country's governments directly[14][15]. The JDR Rescue Team deployed to Algeria mainly negotiated with the government directly, but it was reported that the team also attended the OSOCC meeting. It can be said that the team was under the coordination of OSOCC run by UNDAC team[13].

6.2 Sichuan Earthquake in 2008: Medical care for search dogs and change in the number of unit leaders from one to two

The Japanese government deployed the 61-member JDR Rescue Team to the Sichuan Earthquake that occurred on May 12, 2008. Although IEC has started since 2005, it is not clear if JDR Rescue Team had an intention to go for IEC in the future from the mission report. As in the case of the Algeria Earthquake, the team had three squads with the Squad Leaders from NPA, FDMA, and JCG, but the number of Unit Leaders has increased from one to two[22]. This change was made based on the lesson of the Algeria deployment where the only Unit Leader could not take a rest while three squads could do so by rotation[23]. As in the case of the Algeria Earthquake, a medical unit was also deployed, and medical care to search dogs was provided as well[22].

Earthquake and the 2003 Algeria Earthquake.

[23] Based on the information from one of the authors who was deployed to the Algeria Earthquake and also worked for the Secretariat of JDR at that time.

6.3 Padang Earthquake in 2009: Team structure of two units and four squads and first deployment of Medical Manager

The Japanese government deployed the 65-member JDR Rescue Team to the Padang Earthquake that occurred on September 30, 2009. The earthquake happened in Asia, and the JDR Rescue Team was one of the first arriving international SAR teams in Padang. When the JDR Team arrived, the teams that have already arrived were only the six-member advance team of the Swiss SAR team and one UNDAC member who traveled with the Swiss team. The RDC, which should be established by the first-arriving team at the arriving airport, was not yet established by them[23].

The JDR Rescue Team, although they joined the initial assessment activity with the Swiss team, rarely contributed to the establishment and management of the RDC and the OSOCC. The Team Leader of the JDR Rescue Team later pointed out that the team should have had UNDAC members within the team and contributed to the RDC and the OSOCC operations[23].

Regarding the team composition, the one for the IEC planned in 2010 was reflected so that the team had the capability as Heavy team such as 24-hour operations at two sites; the SAR unit had the four squads under the two units. The two Unit Leaders were from NPA and FDMA while the four Squad Leaders were provided as one from NPA, two from FDMA, and one from JCG[23]. The basic structure of two units and four squads, and the provision of Unit and Squad Leaders from each agency remained the same in the following deployments. In terms of the medical unit, Medical Manager, who was in charge of overseeing the unit, was added from this deployment. Under the Medical Manager, the medical unit had two doctors and two nurses so that each work site had one doctor and one nurse respectively[23].

6.4 Christchurch Earthquake in 2011: Clarification of the roles of Deputy Team Leaders and first deployment of structural engineer

In response to the Christchurch Earthquake that occurred on February 22, 2011, the Japanese government deployed the JDR Rescue Teams from the first batch to the third batch. The first batch was deployed from February 23 to March 3, the second batch from February 28 to March 8, and the third batch from March 6 to 12. This paper will look at only the first batch for the analysis.

The deployment to the Christchurch Earthquake was the first deployment after the IEC in 2010. There was no change in that they had the four Deputy Team Leaders, but the role of each Deputy Team Leader was clarified from this deployment. The role of Deputy Team Leader from each agency was as follows; NPA: public relations and recording, FDMA: planning and analysis, JCG: safety management, and JICA: coordination and logistics[24]. This was based on the IEC Checklist where teams were required to designate the persons who are in charge of these roles. In addition, the structural engineer was added to the team. It was the first deployment of structural engineers for JDR Rescue Team.

New Zealand did not request an UNDAC team for this disaster, but Jim Stuart-Black of NZFS who supported the IEC for JDR Team as the Mentor was taking the lead in the coordination of SAR teams, and a Japanese-speaking liaison officer from the New Zealand government was attached to the JDR Team. According to the mission report, these arrangements enabled the JDR Rescue Team to conduct the smooth activity in the field[19][24].

The mission report mentioned that the concept of decontamination was not very familiar for the JDR Rescue Team, and the team had a difficulty in managing it. Decontamination means cleaning up boots and uniforms or changing clothes when rescuers return to the Base of Operations (BoO) from work sites in order to avoid infection in the BoO area. In the Christchurch Earthquake response, the decontamination post and the tents for changing clothes were established at the entry point of the BoO by the New Zealander authorities[24]. The decontamination (e.g., cleaning up boots at entry point of BoO) was not included in the IEC/R Checklist version 2010, but it was added to the revised Checklist when JDR Rescue Team took the IER in 2015. JDR Rescue Team, based on this requirement, currently has the equipment for decontamination as part of the standard arrangement.

6.5 Nepal Earthquake in 2015: Contribution to SC, RDC, and UCC

The Japanese government deployed the 71-member JDR Rescue Team to the Nepal Earthquake that occurred on April 25, 2015. In addition to the team, JICA's JDR division sent one UNDAC member,

and he worked in the RDC established at the Kathmandu airport[25].

The deployment to Nepal was just after the IER in March 2015. About half of the members deployed to Nepal were the same as the members for the IER. Thus, according to the mission report, the communication among the team members was relatively easy from the early stage. There was not a much difference in the team composition from the one for the Christchurch Earthquake deployment, but the number of structural engineers increased from one to two so that one structural engineer was able to be posted to each work site in case the team had two separate sites. In addition, two additional Unit Leader Support members were added to support the two Unit Leaders[26].

Notably, in the Nepal response, the team contributed to the coordination work led by the UNDAC team as part of the responsibility of IEC-classified teams. In addition to the one UNDAC member who worked in the RDC, the JDR Team provided one support staff to the UCC. The UCC divided Kathmandu city into 19 sectors[27], and the IEC-classified teams were appointed as Sector Coordinator (SC). JDR Rescue Team was appointed as the SC of Sector K, and was in charge of the coordination of SAR activities in the sector[26].

6.6 Mexico Earthquake in 2017: 24-hour operations at two sites and USAR practices in the field

The Japanese government deployed the 72-member JDR Rescue Team to the Mexico Earthquake that occurred on September 19, 2017. Before the main unit of the JDR was deployed, the advance unit composed of two JICA-JDR staff were deployed and arrived in Mexico on September 20. Advance unit's purpose was collecting information and negotiation with the affected country's government. They later joined the main unit. From the lesson that the JDR Rescue Team had to provide its staff to the coordination mechanism in the Nepal Earthquake, the Coordinators who are in charge of the coordination work were added, making the team 72 members in total. In the end, the Mexican government, without requesting an UNDAC, coordinated the international SAR activities by themselves, and thus, JDR Rescue Team did not have to provide support staff to the RDC or UCC operations.

Despite the long distance from Japan to Mexico, the JDR Rescue Team arrived only a few hours after the arrival of the US team. Immediately after the arrival, the Team Leader and the Deputy Team Leaders had a meeting with the local emergency management authority (LEMA), and some work sites were allocated for the JDR Team. The negotiation by the advance unit also facilitated this process. Because the JDR Rescue Team was classified in Heavy, the Mexican government requested them to conduct SAR activity at two sites, and the team started their activities in separate two sites within the day of the arrival.

Through the search activity using search dogs and electromagnetic wave search device, there was a sign of life at one site. As it was a site of collapsed building made of reinforced concrete, the team conducted rescue activities using the techniques such as shoring, breaching, and cribbing that were introduced to the team through the IEC/R processes. The team successfully rescued one live dog roughly 122 hours after the earthquake, and the dog was returned to the family members. Because the dog was surprised by the sound of the rescue equipment, the dog handlers who were good at dealing with dogs calmed it down. It was the rescue activity where the SAR techniques and the personnel that were strengthened through the IEC/R processes were fully utilized[24].

[24] The information of the Mexico Earthquake is from the authors who were deployed to Mexico as part of the team.

Photo 3 Rescue of the live dog[25]

Photo 4 SAR activity in Mexico[26]

Figure 3 shows the team structure of the JDR Rescue Teams deployed to Nepal and Mexico. Compared with the one of the Algeria deployment as shown in Fig. 2, it is clear that the team becomes more operational so that the team can satisfy the responsibility as IEC-classified team. For example, the roles of Deputy Team Leaders are clarified, Structural Engineers are added, Unit Leader position is strengthened with two Unit Leader Support members, and the team can conduct SAR activities at two separate sites with four squads under two units.

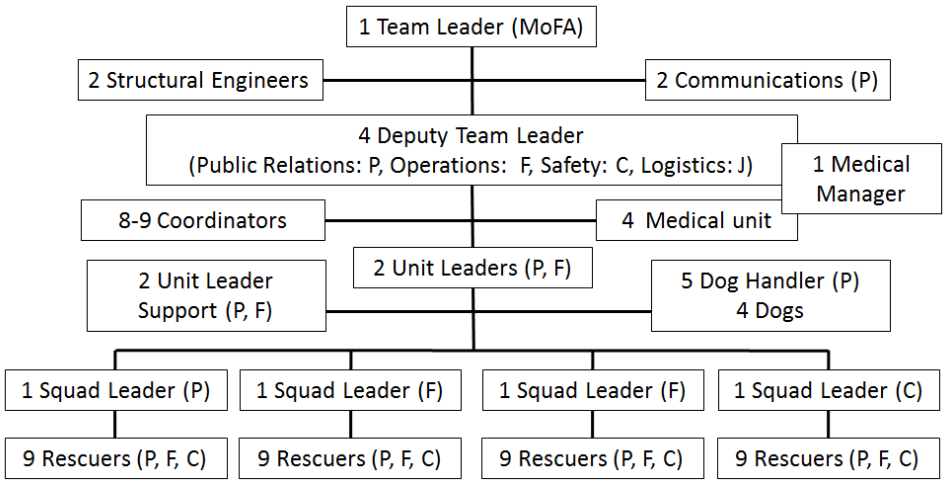

Fig. 3 Team structure of JDR Rescue Team deployed to the Nepal and the Mexico Earthquakes[27]

7. INFLUENCE ON DOMESTIC SAR ACTIVITIES

This paper reviewed how the IEC/R contributed to the capacity building of JDR Rescue Team, an internationally-deployed team. This chapter will then look at how the IEC/R contributed to the capacity building of domestic teams where the rescuers of JDR Rescue Team belong. It will focus on the case of FDMA where the biggest number of JDR rescuers is registered[28].

7.1 Introduction of the INSARAG coordination methodologies

INSARAG has developed the marking system that enables SAR teams to tell information such as existence of live victims, hazards, and situation of SAR activities. The marking is put on the collapsed buildings where teams conduct SAR activities. It is part of the IEC/R requirements to understand and

[25] Photo provided by JICA

[26] Photo provided by JICA; the rescuer was trying to enter the void created by the techniques such as cribbing (left) and shoring (center).

[27] Created by the authors based on Reference 26); P: Police (NPA), F: Fire (FDMA), C: Coast (JCG), J: JICA

[28] According to the report submitted by JDR Rescue Team at the time of IER, as of 2013, the 1,156 registered rescuers consist of 438 members from NPA, 599 from FDMA, and 119 from JCG.

use the INSARAG marking system, and thus, JICA's JDR division provides training on the marking for the JDR rescuers[29].

The INSARAG marking is now being introduced in domestic SAR activities in Japan. In April 2014, FDMA[28)] issued the official letter titled "Introduction of the standard marking system in case of massive-scale disasters" that was sent to the heads of the Fire Departments of the local authorities. The letter mentions that INSARAG introduces the same type of marking system, and requests them to introduce the standard marking system so that they can work with other agencies such as NPA, JCG and JSDF.

The marking introduced by FDMA is the translated version of the INSARAG marking that INSARAG had used until 2015 as shown in Fig. 4. The letter also mentions that FDMA provides information on this marking with other agencies such as MoD, NPA, and JCG. This indicates that there had been no common marking system in Japan that could be shared with the other teams. In the Great East Japan Earthquake in 2011, FDMA, NPA, JSDF had coordination meetings, but it was recorded that the marking system was not coordinated or shared among these agencies at the early stage[29)]. This is an example that the common marking system that had not existed in Japan was introduced through the IEC/R processes.

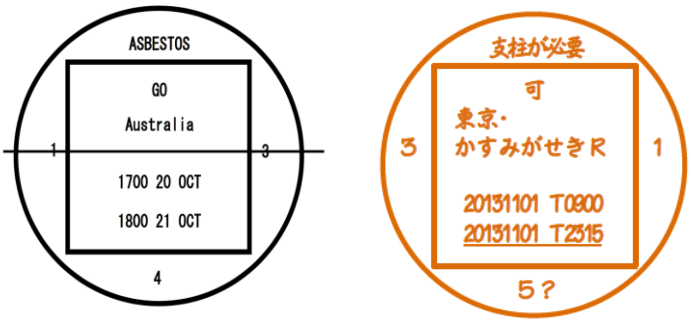

Fig. 4 The old INSARAG marking (left) and the marking introduced by FDMA (right)[30]

7.2 Introduction of the INSARAG-standard USAR techniques

It has been said that the SAR skills of the Japanese rescuers are very high. However, as described in this paper, some USAR techniques such as shoring were not very common in Japan when they went through the IEC in 2010. This section will introduce an example that the JDR Rescue Team members who learnt shoring techniques at the JDR training then came back to their original domestic teams, making the technique common in Japan by conveying it to other members.

Below is the excerpt from the report of the Fiscal Year 2008 Committee on Higher Rescue Techniques where the members of JDR Rescue Team from FDMA were also part of it, and the introduction of shoring was discussed[17)].

> "In many domestic rescue work sites, the rescue activities conducted by FDMA have rescued many lives thanks to the strong leadership of the team leaders with a lot of experience, the high rescue techniques and courage of each rescuer, the team work, and the high capability as a team. However, it cannot be said that the knowledge and techniques of stabilizing collapsed buildings has been systematically organized. In fact, some fire fighters regrettably died while on duty at the sites of fire because of the collapse of buildings in Japan. Fortunately, there has been no critical incident at the sites of earthquakes, but it is just the result of the fortunate coincidences. … Thus, in Japan where big urban-type disasters caused by massive-scale earthquakes are predicted, it is important to systematically introduce the shoring techniques both as the concept of safety and as the element of rescue techniques to enable the complicated rescue activities."

[29] Regarding the INSARAG marking system, see also Reference 9) and INSARAG Guidelines Vol. II, Manual B.

[30] The old INSARAG marking is from Reference 9) while the one in Japan is from Reference 28).

The report requested to introduce the shoring technique arranged for Japanese rescuers, to provide necessary training, and to conduct research[17]. FDMA continuously conducted the research on shoring by the Committee in the next year as well[30]. The result of the discussion at the Committee is reflected to the next year's teaching curriculum at the FDMA College in Japan[31].

Shoring techniques was part of the IEC requirements, and thus, JDR Rescue Team had special training on this before the IEC. It is pointed out that, without IEC, shoring was not introduced to the rescue teams in Japan[4]. In relation to this, in October 2009 which was one year before the 2010 IEC, FDMA issued the official letter titled "Amendment of Criteria and Registration for International Rescue Team (IRT)"[31] to the local Fire Departments where the JDR rescuers belong. In this letter, in order to be registered as members of IRT (JDR Rescue Team is called as IRT in FDMA), it is clearly mentioned that the members must acquire the USAR techniques such as shoring and cribbing.

Although only a limited number of FDMA staff can participate in the IRT training, they then teach the learned techniques at each local Fire Department. As an example, the Report of the Fire and Rescue Symposium introduces the case of Sendai city Fire Department. In Sendai city Fire Department, the special unit members mainly take part in the IRT training, and the special unit members provide training for the other rescue members as lecturers as shown in the flow of Fig. 5. The shoring technique that JDR Rescue Team strengthened to prepare for the IEC is also the priority of Sendai city Fire Department[32].

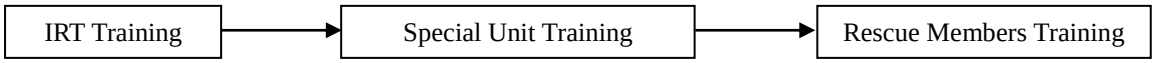

Fig. 5 Flow of the rescue training at Sendai city Fire Department[32]

CSM is also part of the IEC requirements. There was another positive effect of IEC/R for the domestic teams in terms of medical care for trapped people and co-working between rescue and medical unit during rescue activities. A medical doctor who was a registered member of the medical unit of JDR Rescue Team has joined the above-mentioned Committee on Higher Rescue Techniques since 2010. The report of the Committee added the topics such as observation and immediate attention for the victims and treatment for crush syndrome as an important element of rescue activity[33]. In addition to this, the medical unit of JDR Rescue Team was just invited to the IRT training to deliver a lecture in the past, but they now participate in the field training as well[33].

It is not only in Japan that the efforts of strengthening internationally-deployed team through the IEC/R led to strengthening domestic teams. The ITL Meeting was held in Indonesia from October 18 to 20, 2017, and the representative of Chile introduced their progress towards their IEC which was planned in November 2017. It was pointed out that one of the biggest advantages of the IEC was the introduction of new techniques and capacity building of the domestic teams by learning from the INSARAG network[34].

8. CONCLUSION

This paper has analyzed if the certification, or the classification, implemented by INSARAG, or IEC/R, has the capacity building function for international SAR teams by reviewing the case of JDR Rescue

[31] Regarding proliferation of the SAR techniques in FDMA and Fire Departments, the authors interviewed with Mr. Mitsuyoshi Tani of Otsu city Fire Department through e-mails (received the reply on October 10, 2017) who also worked for FDMA from 2008 to 2010 and supported the JDR Rescue Team's preparation for IEC.

[32] Based on Reference 32)

[33] Regarding the co-working between rescue and medical unit, the authors interviewed with Dr. Yasushi Nakajima, a medical doctor at Hiroo Hospital in Tokyo, who is the member of the Committee on Higher Rescue Techniques and INSARAG Medical Working Group. The interview was conducted during the ITL Meeting in Indonesia on October 19, 2017, and later received an e-mail message on November 3, 2017.

[34] Based on the presentation by Mr. Sebastian Mocarquer, Bomberos de Chile, at the ITL Meeting on October 19, 2017

Team. It can be said that IEC/R brought the introduction of new USAR techniques such as shoring, and the operational team composition that enabled the team to meet the responsibility as Heavy team. Furthermore, it also led to capacity building of the domestic teams. The standardized team structure and techniques developed by INSARAG will serve as a useful reference for the domestic rescue activities in Japan where they have not developed common SAR techniques and methodologies across the different rescue agencies. It can be concluded that, in case of JDR Rescue Team, the capacity building function of IEC/R is demonstrated because even JDR Rescue Team, which already had high USAR techniques, was strengthened through the IEC/R processes.

This said, more case studies, especially the ones of developing countries and disaster-prone countries, will be needed to strengthen the conclusion that IEC/R can contribute to capacity building of USAR teams.

(*) The views shown in this paper are the authors' alone. They do not necessarily represent the view of the organizations the authors belong.

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