SESSION 4: Training and Drill/ Emergency Management Education/ Strategies, Tactics, and Tools to Effectively Manage Mass Casualty Incidents

议程四:培训与演练/应急管理教育/大规模伤亡事件应急的战略、战术与工具

群策群力

通过演练在形态上获取业务连续性管理程序

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【摘要】组织花费时间和资源的分配来开发和记录各种业务连续性管理程序的组件。毕竟努力将变成进程和程序的粘合剂，很少有时间留余去验证什么事情已经完成。即使验证已做，也没有时间去更新演练过程中发现任何问题和文件。随着公司继续成长和变化，需要 BCM 组件支持公司，保持过程是对所有 BCM 程序的挑战。

本文强调演练策略，演练计划的各种方法，怎样管理演练以获得最佳的价值，如何一个好的演练心态可以提高 BCM 的验证。

对于开发的程序组件有效地并有效率一起工作，他们必须被验证。只强调技术，当任何决定之前需要其他进程和程序，只会导致问题时，需要不断地制定，直到技术恢复。

演练必须是持续和渐进。如果能满足公司在灾难来临需要时，那么它进入良好的状态并保持这种方式。

【关键词】演练，测试，目标，演练方法，业务连续性管理（BCM）

THE WORKOUT!

GETTING YOUR BCM PROGRAM IN SHAPE THROUGH EXERCISE

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Keywords

Exercises, Tests, Objectives, Exercise Methods, Business Continuity Management (BCM)

Abstract

Organizations spend allot of time and resources developing and documenting various components of their Business Continuity Management (BCM) program. After all the effort put towards the development of binders, processes and procedures, there's little time left to validate the program content. If validation is performed, often there not time assigned to update the documentation with any of the findings found through exercising. Keeping current is a challenge for all BCM programs. As corporations grow and change so to must BCM components.

This paper focuses on exercise strategies, the various methods of exercising plans and how to manage an exercise so as to receive the best value. It will also describe how an exercise mindset can enhance the validation of BCM.

For developed program components to work effectively and efficiently together, they must be validated. Concentration solely on technology components will only cause issues when there are other processes and procedures needed to be initiated prior to any Technology Recovery activities beginning.
Exercising must be continuous and progressive. It must get into good shape and stay that way if it's to meet the needs of the corporation when disaster comes calling.

Resources / References

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Introduction

It can take a lot of time and effort to establish something to a point where one is happy with the results but does that mean that no more time and effort is required? That's a question organizations must ask themselves when it comes to validating their Business Continuity Management (BCM) program. An organization can work for years at establishing a fantastic program but if it isn't validated along the way, the information developed just ends up looking fantastic only on paper.

When we take a road trip, do we not validate where we are, the level of gas left in the tank and the time it takes us to get to our destination? Yes, we do or else we may never know where we are. So too must an

organization's BCM program. Organizations must continually work towards their destination but validate their progress along the way. When components are validated they become living – real, workable and usable. What's been developed – and enhanced through exercise - can then be used to respond to situations that will hamper an organizations ability to continue operations or at the very least, provide guidance on actions to take. If processes and procedures aren't validated and those responsible to execute activities don't get the opportunity to practice them, the plans just end up as dust collectors, useless words on pages or devices used to hold up rickety tables. The plans offer no benefit or value to anyone and are quickly forgotten.

This paper addresses how exercises enhance an organization's BCM program, the various methods of exercising and how continued exercising will make any organization stronger in its proactive and responsive actions to disasters and crises. It also provides questions that every organization must ask itself to understand why it should exercise BCM components and focuses on good methodologies, considerations and practices that when implemented and utilized, can ensure successful exercise regimes and programs.

Why Exercise at All?

Why should an organization exercise its plans? What's the value of exercising? What does the organization gain and how will management see as the benefits of exercising? Organizations must ask themselves a set of core questions that can either lead them in a supportive direction in building a strong BCM program or down a dark and lonely road where the only saviour in a disaster will be that of 'Lady Luck.'

Sometimes it may be difficult to find the reasons and benefits in exercising but the questions below will aid organizations in understanding the value of exercising a BCM program, component or plan:

1. Will an exercise increase overall BCM awareness within the organization?
2. Will the exercise identify potential 'gaps' in developed and documented BCM plans and procedures?
3. Is there potential for an exercise to provide 'learning opportunities' for participants and the organization in general?
4. Will the exercise provide an opportunity to leverage the results for further corporate gain and benefit?
5. Can the exercise provide skills and knowledge transfer between participants?
6. Can the exercise increase the responsiveness and effectiveness of the organization should a real disaster (or other severe event) occur?

If the response to any of the questions is "Yes" – especially if it's to more than one question – the groundwork, support and value for exercising is established. The responses will help identify the fact that management will see benefit in performing exercises and that the results will help make the organization resilient and if managed and supported appropriately, can provide a strategic advantage over competitors that may not see BCM or BCM exercises as adding any value to their operations. The Business Continuity Institute's Good Practice Guidelines state the following with regards to exercising and testing; *"...it is important to demonstrate that an exercise is an opportunity to measure the quality of planning, competence of individuals and effectiveness of capability rather than a simple 'pass' or 'fail' examination."* Exercising

plans isn't just a nice-to-have; it's a necessity if an organization is to ensure its plans work cohesively and effectively and stay competitive amongst its peers.

A State of Mind

'Test' is not a positive word. The word test comes with negative connotations. With a test, you're given only two possible outcomes pass or fail. With options such as these, it's not surprising many people don't like them. The difference between tests and exercises is that one will produce value and significant results and help motivate employees while the other will de-motivate employees, cause finger pointing and result in lower confidence levels in the overall program - and themselves.

John Sensenich, in his essay, *The Recovery Vendor's Perspective,* states that *"...the purpose of exercising a plan is to determine its weaknesses and well as its strengths, and to look for ways to ensure a successful recovery in the face of disaster. Exercising focuses attention on the positive not the punitive."* What an organization must do is change its mind-set; change from the testing mentality to one of exercising.

Exercising helps an organization work towards something; a goal to make itself and its employees better at what they do. Exercising helps people actively build upon their skill sets and knowledge base, challenges assumptions - either to confirm or dispel them - and helps maintain a level of service that can be managed under any circumstance. Like the obligatory New Year's resolution, one trip to the gym won't make a person fit and strong; it must be continuous with a positive outlook before the resolution sees any benefits. Exercising is a mind-set and if structured effectively with the appropriate attitude and support, can continually return value. How?

Exercise has a more positive connotation rather than the negative connotation associated with a *test.* Many BCM practitioners have had to deal with those who want their continuity strategies tested repeatedly until the initiative is proven successful and finally receives a passing grade. The problem is the constant testing and re-testing utilizes the same scope and objectives and strategy, never moving the program forward. It only provides confirmation that after numerous failures a passing grade is obtained. Meanwhile, in the background, the business process or technology component supporting that process has changed or evolved to meet new needs.

There's no benefit or value here because many will not want to be part of further initiatives that set them up for failure. Anything that has a connotation associated with it that can mean a person is a failure; the less likely they're going to want to participate. If during the test people find even just one issue, senior management are 'howling in the boardroom,' stating the strategies aren't working and assume the participants have it all wrong. This won't move a program forward; it might actually move the program backwards because the test is still focusing on the scope and objectives originally agreed too from the first attempt, meaning they continually test the same strategy over and over again until they get it right; a strategy that may relate to the company as it was months earlier. What happens when participants are told they failed and that they have to do it again and again until they get it right?

What often occurs is that results will be *'fudged'* or issues hidden so that they can get on with other activities – their day-to-day jobs. This helps remove themselves from the cross-hairs of management who repeatedly send them back to the testing table once more.

An exercising mindset supported by management, will actually get participants to *want* to find issues. Those involved actively find the gaps and see this as a step forward for the program, making it more and more valuable because management – and others – would rather be able to find the deficiencies during controlled circumstances rather than discovering them during a real situation. An organization can't find fault in this strategy; its helping them move forward with BCM planning, awareness, training and process development. This attitude actually shows value because management and employees – let alone those involved with the exercise – are seeing the program develop and they are becoming part of the *'plan.'* The false sense of security that results from *'fudged'* findings doesn't exist when it comes to exercising. It's a positive approach to find gaps, gaffs, mistakes and inconsistencies. This is a win-win situation because it's finding mistakes, oversights and omissions before they occur. Contribution and collaboration make exercises successful, no matter how many issues are uncovered.

When an organization gets to this stage, team members are showing commitment not just to the organization and its clients, suppliers, vendors and customers but they are showing commitment to themselves. This is much more positive than telling people they've failed in a role. Exercising is positive. Exercising is collaborative. Exercising BCM programs can be fun, enlightening and revealing; not in a spiritual sense but in a sense of discovering ways on how to do things better. There is no fear of failure with an exercise; in fact the very idea of challenging people to find gaps in processes and procedures is seen as empowering and encouraging. It helps find components that are not fully developed or helps dispel assumptions that are used to build Business Continuity Plans and procedures. No one is condemned for identifying gaps and no one is seen as a failure for helping find an issue that if not identified under controlled circumstances, could damage an organizations reputation and ability to respond to a disaster.

What to Exercise?

Combining and incorporating various BCM components into exercises can help ensure all the various components fit together so that they work effectively and efficiently together, rather than as separate entities. It's like a jigsaw puzzle; you only see the full picture when all the pieces are put together. In *The Disaster Recovery Handbook* by Wallace and Webber (2004), the authors state that *"No matter what type of testing (exercising) you're doing, you want to try and exercise as much of the plan as possible."* It's quite common for many exercises to focus on a single component, which in many instances turns out to be technology. However, that's not the only BCM component that comes into play when a disaster occurs; there are others that must be considered.

There are procedures that are activated *before* anyone ever reaches the alternate data centre to perform technology recovery activities and the link must be made between the two to validate how the activities would really unfold. All components must be exercised if they're to be successful and useful to the corporation.

The following strategies are just some of the additional methods that can be utilized to enhance an exercise that when combined with technology recovery exercises – or others - can eventually produce a robust BCM program.

1. *Project Team / Crisis Management Team (CMT)* - Instead of developing a project team to participate in the planning and execution of exercise activities, try utilizing the Crisis Management Team or Disaster Team structure. These teams contain the people who would be part of disaster response activities, so why not utilize them for the exercise. Many will never get the opportunity to practice their roles in advance of a disaster. Let those who would be doing the actual role in a real situation get practice by performing their role in a controlled exercise environment. It will help develop their current skill set and provide an opportunity to develop new skills. Among them; how they communicate with each other, their roles and responsibilities and how issues are handled and communicated.

2. *Vendor Management* - This includes Service Level Agreements (SLA) you have with 'Disaster Service Providers.' Would you not want to know that they could deliver the services you've purchased when a disaster occurs? As an example, if your storage vendor has a SLA to deliver your media within 90 minutes, then declare a disaster with them to see if they can meet the expectation. There's nothing worse than trying to find out that the SLA can't be met during a time of disaster; the time you need it most. You'll also be able to discover how the overall declaration process works with the vendor(s). In many cases, those who can ask for specific media during normal operations aren't the same individuals authorized to declare a disaster with the vendor because it initiates different processes. It helps to identify these kinds of gaps prior to a real disaster, so why not incorporate these kinds of activities into an exercise.

3. *Crisis Notification / Communication Protocols* - During disasters, teams expect to receive communications and notices in a timely manner using specific protocols. Instead of redeveloping the protocols for the exercise, utilize the ones that you'd use in a real disaster. This will help teams become comfortable with the proper communication channels and protocols. You can even utilize your executives in the initial stages of the exercise – a type of kick-off marker. In a real situation, it may be one – or a combination of – executives authorized to declare a formal disaster, so have them start things. Give them the opportunity to utilize the processes they would be responsible for so they can contribute to the program – not just through resources and financial support – but actively participate to see if they have recommendations for refining the disaster declaration process. If you utilize third party applications for communications, then utilize it as you would in a real situation. The more practice with the software the better it will meet the organizational need.

4. *Issue Management* - Often issues that arise before an exercise or during an exercise are coordinated and managed by the exercise coordinator but in the real world when something occurs, that may not be the case. Each team is expected to manage their own issues and use the designated communication protocols (noted earlier) to investigate and communicate the issues they're encountering and responsible for. This gives team managers some experience on how to manage their teams in a disaster and how their team interacts with others. For example, if there are network issues then it's the network team manager (or designate) who owns, investigates and communicates the issue, its status and resolution; don't have the network issue controlled by someone else who may only hinder the investigation and resolution process. In a *real* situation the network team would deal with network issues so they should have the opportunity to practice the disaster team protocols.

5. *People Availability* - This is probably the hardest thing to do in an exercise, as everyone wants things to go well, even when one of the objectives may be to find gaps in program procedures. Still, nothing will prove better at how mature and effective your BCM awareness and training program component is – and the documented plans - than by taking away those that have knowledge of the overall processes when you execute exercise activities; a sort of last minute change in participation. During a Pandemic Influenza outbreak, the World Health Organization (WHO) estimated an infection rate of up to 40%; reason enough to ensure this component is validated. The day of the exercise, simply decide that certain members of the project team are no longer required to participate and they can continue on their normal day-to-day operational activities. Those that remain need to figure out what to do, though they should already understand what's required of them because communications and awareness training has been consistent throughout the planning of the exercise and part of the regular BCM program practice.
6. *Restoration & Recovery Documentation* - Don't allow any outside documentation to be brought into the disaster facility (or the exercise location) so that it simulates the fact that people are at home (or at least are offsite) when a disaster occurs and would be traveling to the designated location. Not everyone is going to have immediate access to a set of documents. This can be exercised in conjunction with the media storage provider who at the same time may be delivering the documentation to the alternate site. It would certainly show if the processes you have in place are documented and are available off site - and maintained. If not, then it offers an opportunity to build this component.
7. *Facility Availability/ Fire Drills* - This can be done in conjunction with the 'no documentation' point noted in #6. If the facility is deemed not available – due to a fire or major power outage and only critical life safety mechanisms are operational – then it would help solidify the fact that everything that's needed in the main facility can't be accessed. Again, this would help identify what resources are deemed the most critical (i.e. documentation, restoration disks, applications CD's etc) and those that are required to be kept off site; either at the DR location or with the media storage provider. After the drill(s) you can also investigate if any clients or partners would be impacted due to the facility being evacuated. Was there something critical being done for a client at that time of the drill and what would your organization implement if that critical activity was suddenly suspended for an hour or two while employees are gathered at the assembly location(s)?

These are brief description of some combined efforts that should be incorporated into BCM exercises. Depending on the nature of your organization, these can change in size and scope. Some add fun new twists but each combination – whatever combination you decide to utilize – can push the boundaries of your program and find surprising – yet beneficial – outcomes.

Clear Objectives

Objectives need to be specific and goal oriented; something that can be measured and achieved. An objective that states, *'We will test our Disaster Recovery (DR) plan'* isn't specific enough and doesn't define what's to be accomplished. It's broad and general and can be interpreted many ways; it also can't be

measured. It doesn't allow for goals to be achieved, measured or benchmarked against any previous results nor does it establish initial standards if no exercise has been held prior. Often, the objective is so general that no matter what participants do they'll never meet the objective; it's setting people up for failure.

Then there is the moving objective or those verbally stated by stakeholders but never formally documented. They continuously changed based on the stakeholders *'mood of the day.'* These objectives – along with others – can be interpreted in a myriad of ways and in a most cases, aren't interpreted correctly.

Any objectives attributed to an exercise must be S.M.A.A.R.T.: S*pecific*, M*easurable*, A*ttainable*, A*greed to* (everyone involved needs to understand them and agree to them), R*ealistic* and T*imely*. If exercise objectives don't meet the SMAART requirement, there's a chance the exercise might not be moving the program forward or sufficiently validating the scope of the exercise nor the components involved.

Having specific objectives for exercises allows for successful measurement and an opportunity to find inconsistencies within the overall program. Below are just a couple of examples of objectives that can be incorporated into an exercise.

1. *Validate 3rd Party Vendor Service Level Agreements (SLA)* - The reasons for validating Service Level Agreements has been captured earlier in this paper so it'll not be repeated here however, depending on the exercise an organization is performing, it may want to include SLA validation as an objective to obtain. Discovering inconsistencies and understanding the 'gaps' in service expectations with regards to your partners and suppliers, will help prevent unnecessary incidents from occurring when a disaster strikes and organization.
2. *Identify Amendments to Department Business Continuity Plans* - Change is constant and documentation is something that's hard to keep current, as it's usually the one piece of a program or a project than falls by the wayside for higher priorities. Once a secure and solid scope has been established, exercise participants can review their existing documentation to work towards the objectives, identifying amendments along the way – or while they are exercising. As they perform their tasks they can make notes as they follow along and update various sections and their activities, then voila, a set of updated BCM documents. It must be understood that the documentation must not be tailored to match the exercise scope but rather the documentation should incorporate findings *from* the exercise, so that it is continuously updated and adapted to cover multiple situations and disaster scenarios. What works well with this approach is that an organization is utilizing real documentation for an exercise, not documentation created *for* an exercise. This utilizes the BCM maintenance process and keeps documents and procedures up-to-date.
3. *Benchmark Recovery Times Against Previously Established Times* - If an organization has exercised on more than one occasion there is a sure bet that recovery times have been established for systems and services. As each system is restored and becomes available, the recovery time is documented and is benchmarked or measured against previous findings. This approach helps to establish and validate current restoration strategies, confirming they meet the needs of the organization or helps identify what further work is required. If one year it took 4 hours to restore "x" system but the following year it takes 5 hours, there will be a need to investigate what has caused the discrepancy. It could be that different resources were utilized (i.e. team members) or documentation wasn't updated after a previous exercise or updates weren't captured during operational or system changes

implemented. It could identify changes implemented to the systems throughout the past year were not reflected or incorporated into current restoration strategies or documentation.

Objectives set for any exercise should be clear and concise, rather than murky and vague. Objectives set the stage for an exercise. They help build a roadmap – a destination if you will – for participants to reach. The noted three examples can all be measured, with each one providing opportunities to build stronger processes, procedures and documentation. Start with a small set of objectives for an exercise, then over time, an organization can work towards an unannounced exercise. As the great Chinese philosopher Lau-tzu once said, *'a journey of a thousand miles begins with a single step.'*

Types of Exercises

A person's exercise regime will change depending on what they wish to accomplish; so to will the need to vary an organization's method of exercising their BCM program. When a single method of exercise has been exhausted, the organization must change its exercise routine if there is to be any increased value in exercising. An organization can't perform one type of exercise forever if it wants to grow and continue to challenge itself.

During any type of exercise regime, there will be confusion on activities. To keep these to a minimum and to help establish clear roles and responsibilities under controlled circumstances – rather than during a real event – issues should be dealt with as soon as possible. Susan Snedaker puts it this way in her book *Business Continuity & Disaster Recovery for IT Professionals*, *"If...there (is) massive confusion during the exercise, stop and address it immediately."* She goes on to say, *"The few minutes you spend clarifying can make all the difference in the confidence and competence of staff if they are ever called upon to put their training to the test."* As the method of exercise changes and the scope level increases, so to will the confusion level, which must be addressed prior to when an event actually hits an organization.

The following will outline some of the various ways to exercise a BCM program.

1. *Tabletop Walkthrough* - A tabletop walkthrough is a group of individuals associated with the BCM program, either contributors or members of the Crisis Management Team (CMT) discussing the components of the program based on a presented situation and scenario. It helps provide participants the opportunity to discuss in an open forum, the various activities that would need to be implemented based on the situation and what would and wouldn't work for the organization based on existing plans and procedures. It helps bring forward questions, ideas and potential gaps in the overall program and allow participants to make recommendations. A tabletop is only the first step in the program exercise development. Don't get fooled into believing that after the exercise everything with the program is fine; it will take many more exercises – of various types - to help identify other 'gaps' in processes.
2. *Component Level Exercise* - This is just as it sounds, pick a component and exercise it. It can be a single technology component or you can exercise another component of the BCM program. For example, Crisis Management Plans or Evacuation plans. Exercising individual components helps to ensure they are affective and execute they way the organization expects.

3. *Functional* - Functional exercises relate to a scope with the sole focus of concentrating on a specific line of business. There is some planning and coordination efforts required here because as teams rebuild, restore and recovery a specific line of business or process, often the same process is being utilized in the production environment. So it is necessary to make sure that all consideration is given to strategies that won't hamper the 'live' environment; no organization wants to suddenly contend with issues that relate to a live environment sending transactions and data to a non-live environment or have an exercise environment corrupt a production environment. An example of this type of exercise could be the restoration and recovery of the Sales Application or the Accounting System.
4. *Simulations* - Simulations mean exercising to meet a specific situation. Such as, what does the organization do when a flood occurs? Then plan the exercise to address the specific situation. It can also encompass the rebuilding a specific technology component, to the network infrastructure to data submission and validation processes. It could even focus on a core end-to-end process and validate whether that process could be available within the desired Recovery Time Objective (RTO). This kind of simulation would include business unit resources as well as technology resources - a combined effort. It takes allot more planning and can have a myriad of departments involved, as many processes incorporate finance teams, client service teams as well as the technology team. Keep in mind though that too much planning for a simulation will take away the value of the exercise. Too much planning is actually planning for specific results - 'fudging results' – just so that objectives can be met. All that would be validated is that the teams can plan for an exercise.
5. *Full-scale Exercise* - Full-scale exercises can cause issues with resources because production environments still need to be operational and supported. This incorporates rebuilding the entire infrastructure and many other technology services along with any related business processes and services. This will include the setup of workstations and other peripherals that users need to execute activities. It also includes the data restoration and data testing to make sure that the services restored and recovered are in fact, functional and not corrupted. It may even include some aspects of data submission; inputs and outputs to ensure all is correct with the recovery effort. Again, like a simulation it can be very taxing on resources and planning efforts.
6. *Announced (Planned)* - Announced exercises require very little planning – if any at all – but at least provide a specific date in which the organization will believe its operating in 'disaster mode.' Executives will decide that on a specific date a disaster is declared and BCM activities are to be activated. It's a chance for the organization to pull all its resources together to execute and review its plans without significantly impacting staff, clients and vendors; at least be able to mitigate any impacts by knowing an exercise date in advance. This does require some prior communications so that clients and staff don't make the mistake of actually believing a real disaster ha occurred.
7. *Unannounced (Unplanned)* - Unannounced exercises can cause serious issues with staff; clients and vendors and will disrupt business operations. For staff, that *might* be acceptable but clients and vendors may not be so forgiving, as their operations may be impacted by your organizations sudden disaster declaration. It will definitely provide information on what would happen in a real situation – even if there was no 'simulated' fire or flood to speak of. No prior planning is performed except by senior management representatives and possibly the BCM representative to determine the date this course of action will take place. Still, it is the *best* way of determining how an organization

would respond and react to a disaster declaration and the overall ability of the program to accomplish a successful restoration and recovery of services.

All of these strategies when combined with multiple components and specific objectives can truly enhance an organization's BCM program. Start with easier components and challenges and then slowly add more and more complexity and over time strong procedures, plans and mentalities will emerge, placing the organization in a great position should it be challenged with a disaster.

Conclusion

Exercising keeps people involved and contributing to overall program development, not because anyone is forced to be participants but because they feel part of the experience; a part of the overall initiative. As they participate and progress through exercises, so too do the processes and procedures; becoming stronger and more effective.

It opens the lines of communications between both technology and business participants, as they work together in ways they may not normally get the opportunity. They may also come in contact with other employees that under normal circumstances they might never meet. Those that are involved with the various exercises will come to understand that it's *themselves* who'd be playing the roles of restoration and recovery personnel in a disaster situation and the more opportunity they have to contribute and practice those roles, the stronger the program will become – as well as themselves.

It's not uncommon in today's world for potential clients – even current clients renegotiating contracts – to want to know what your organization would do in the event of a disaster. If you have a proven track record that systems and services can be operational during tough times (i.e. disasters) then you have a better chance of gaining a new client or keeping an existing one.

For exercising to be effective, an organization must continue to perform them as often as necessary; each time raising the bar to ensure regimes becomes stronger and stronger. Not only that but once a specific level has been obtained and people are comfortable in their abilities, the exercising must continue or the program will become old, stagnant, out of shape and no longer reflect the needs of the organization.

The Good Practice Guidelines set by the Business Continuity Institute (BCI) suggests the frequency of any exercising is *dependent upon the size, scale and nature of the organization*. The larger and more complex the organization is – and the greater the impact of a disaster has on the organization by being inoperable – the more exercises and exercise methods should be utilized. At the very least, program components should be exercised on an annual basis, as anything longer could render plans and processes out of date.

Strength comes from practice, positive reinforcement and constant exercising. Change the *'test'* mentality and an organization will see that others will want to contribute to the program because they'll see it as delivering value; to a department, to clients and customers, the organization and to the participants themselves. With exercises, an organization will discover its program moving forward, even when along the way it may be identifying things that it can be improve upon. That is why people workout – they gain strength and confidence over time. That is the strength of exercising.

Author Biography

Alex Fullick has been helping major Canadian organizations initiate and manage customized Business Continuity Management (BCM) programs for over 15 years. He is the Founder and Managing Director of **S***tone***R***oad*, a consultancy and training firm specializing in BCM. Alex is routinely asked to speak at global BCM conferences such as the "BCM Symposium 2009" London, UK and "Continuity Insights Conference" Phoenix, AZ.

Alex's recent book "Heads in the Sand," is a helpful manual with tips and advice for hesitant companies who want to develop a BCM program but don't know where to start, or have difficulty understanding why their program isn't as effective as it could be. Alex is a member of the Business Continuity Institute, earned his Certified Business Continuity Professional status with the Disaster Recovery Institute, and was recently awarded his Certified Business Resiliency Auditor designation.

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关于应急响应组织学习的讨论

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【摘要】在学习文献，有两个主要的学习认识，获取性学习和参与性学习。获取性学习模式是独立的认知态度，看待学习是独立的知识技能获取。参与学习模式可以被称为一个社会和文化的态度，看待学习是参与和融入社会体系。这意味着，通过学习在于和发生在社区实践过程中。

本文将介绍应急工作人员如何独立学习的理论框架。我们认为，通过此次获取性学习和参与性学习的结合是必要的。理解学习意味着人的心理机制内在和外部条件的充足性。两个不同的观点主导危机和应急管理的文献，是偶然决策路径（应变方法）和自然决策，指导我们的学习的讨论。

发展技能和应急工作能力在很多方式上等同于在紧急情况下发展适当的行为。应急管理人员必须发展正确的身份和态度，他们必须具备相关的隐性知识，他们必须发展必要的个人技能和能力，以满足实际工作的要求。改善认识应急管理人员是如何学习，将有利于设计培训方案，以及实行听取报告，化解和调查过去的事件行动表现。

【关键词】学习；专门知识；应急响应组织；应急管理

A DISCUSSION OF LEARNING IN EMERGENCY RESPONSE ORGANISATIONS

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Abstract

In the learning literature there are two major understandings of learning, *learning as acquisition* and *learning as participation*. The acquisition paradigm is an individual cognitive approach, and views learning as acquisition of individual knowledge and skills. The participation paradigm can be referred to as a social and cultural approach, and views learning as participation and involvement in social systems. This means that learning is situated and occurs through processes of participation in communities of practice.

In this paper we will present a theoretical framework for how individual emergency workers learn. We argue that a combination of the acquisition and participation paradigm is necessary. Understanding learning implies understanding the adequacy of both the human psychological mechanisms involved and the external conditions. Two different perspectives dominating the literature on crisis and emergency management, the Contingent Decision Path (Contingency Approach) and the Naturalistic Decision Making, guides our discussion on learning.

Developing skills and competence in emergency work is in many ways equal to development of appropriate behaviour in emergency situations. Emergency workers have to develop the right identity and attitude, they have to possess relevant tacit knowledge, and they have to develop essential personal skills and competence to meet the practical task demanded. An improved understanding of how emergency workers learn will benefit the abilities to design training programs, as well as performing debriefs, defusing and investigate operational performances from past events.

Introduction

This paper is a discussion of learning in emergency response organisations. The focus is on how individual emergency workers, such as police officers, fire-fighters and paramedics, learn and develop their skills and competence. Crisis and emergencies takes many forms, and are typically concerned with values at stake related to social, human, material and environmental values at immediate risk. The time pressure and uncertainty involved may be enormous, and the need for prompt action is obvious. This puts huge demands both on the emergency response organisations as a whole, and the emergency workers as individuals. Thus, training and learning become essential in preparing emergency workers for managing crisis and emergencies.

The paper is divided into three parts. Firstly, different approaches to learning are discussed. Secondly, these approaches to learning are discussed on view of their contributions to explain learning among emergency workers. Thirdly, it is discussed how to assess expertise in crisis and emergency management, based on the understanding of competence in the different approaches to learning. The paper concludes on recommendations of issues to consider when learning is to be assessed.

Different approaches to learning

There is no consensus among researchers on how to understand the concept of learning in work places, organisations and professional practice. According to Beckett & Hager (2002) there are two major

understandings of learning, *the standard paradigm of learning* (learning as acquisition) and *the emerging paradigm of learning* (learning as participation). The former views learning as acquisition of individual knowledge and skills, while the latter views learning as participation and involvement in social systems.

Learning as acquisition

The acquisition paradigm has three characteristic assumptions (Beckett & Hager, 2002). First, the basic image for understanding learning is of an individual mind steadily being stocked with ideas. Second, mental life is considered as "interior", where learning is perceived to involve a change in the contents of an individual's mind. Third, there is an assumption of a transparency of learning, the idea that something is truly learned and can be made explicit. These three assumptions in combination assume that the best learning consists of abstract ideas that are context independent and transparent to thought (Hager, 2004). Theories within this paradigm focus on individuals as learners and mainly on the rational cognitive aspects of work performance. It can therefore be referred to as an individual cognitive approach to learning.

There are two main theoretical directions in this approach. The first direction is behaviorism, which focus on how individuals change behaviour as a result of external conditions. The issue is not how new knowledge is acquired, but acquisition of new behaviour (Phillips & Soltis, 2009). Skinner's (1965) theory of operant conditioning states that how an individual behave or act is related both to what happens prior to the action (stimulus), and to the result of the action (consequence). If the consequence of a certain action is rewarding, individuals learn to repeat that action if they are exposed to the same stimulus again. Positive reinforcement of desired behaviour is therefore essential for learning to take place. As a consequence, there is an underlying belief in behaviorism that "practice makes perfect" (Lyngsnes & Rismark, 2007), and that learning builds on the physical experiences to an individual.

In the second direction learning is understood as acquisition of information, which is transformed into knowledge through cognitive processes. According to Piaget (1972/1997), individuals develop "schemes" for dealing with and understanding its environment. These schemes are cognitive structures, which contains all the knowledge, experience and ways of thinking an individual possess. When an individual becomes exposed to a new experience, this will be understood based on the existing schemes. Piaget refers to this as assimilation. The new experience is integrated into the existing structures. If the new experience confirm or support what the individual already know, mental equilibrium will be preserved. But, if the new experience challenges the individual's knowledge, or put differently, the existing structures are not able to completely handle the new experience, there will be a loss of mental equilibrium. Some changes must then be done to the existing structures. Piaget refers to this process as accommodation, which is an attempt to accommodate the novel aspects of the new experience. This can be done by modification or adjustment of existing schemes, or development of new schemes. Learning is therefore a process of building more and more adequate cognitive structures, through a cycle of attempted assimilation leading to accommodatory change and returning to equilibrium. This implies that new knowledge has to be developed gradually, based on existing knowledge. And, individuals themselves have to take an active role in learning, in order to construct their own knowledge and understanding of their world.

The main criticism of the individual cognitive approach to learning is that individual cognitive theories explicitly conceptualize learning as acquiring and processing of information or modifying and enhancing of individuals mental models as a rational adaption (Filstad & Blåka, 2007). This put the main emphasize on

delivery of information, from a knowledgeable source (e.g. an instructor or a text book) to a not so knowledgeable source (the individual learner) that needs to be "filled" with specific knowledge. In an organizational setting, Gherardi et al. (1998) argues that this approach to learning is inadequate for at least two reasons. First, it suggests that learning is separate – and to some extent opposed to – any other activity in organizations. Second, it view learning as a totally individual activity. The importance of social environments, human interactions and human participations in social practices are ignored. Instead, the social context and social interaction are considered to be frames for where the learning takes place. As a consequence, the individuals become the unit of analysis.

Learning as participation

The participation paradigm characterizes learning as action in the world, where the main outcome of learning is the creation of a new set of relations in an environment (Hager, 2004). This paradigm focuses on the social relations between people rather than the isolated individual. The attention shifts from the processing of information and the modifying of cognitive structure, to the processes of participation and interaction that provide and sustain the proper context for learning (Gherardi et al., 1998). Learning is seen as intrinsic to human activity (Lave & Wenger, 1991), which means learning is situated and occurs through processes of participation in a community of practice. This paradigm can therefore be referred to as a social and cultural approach to learning.

Wenger's (1998) concept of "communities of practice" is prevalent. A community of practice can be defined as a "*group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interaction on an ongoing basis*" (Wenger, McDermott, & Snyder, 2002, p. 4). Competence in a community of practice is related to practice, and is a combination of the three dimensions mutual engagement, joint enterprise and shared repertoire (Wenger, 1998). *Mutual engagement* of participants implies that the members interact with one another, and establish norms and relationships of mutuality that reflects these interactions. Competence is in this way the ability to engage with other members within the community, and to be accepted as a part of these interactions. A *joint enterprise* means that members are bound together by their collectively developed understanding of what their community is about. Competence is therefore the ability to understand the enterprise deeply enough to take some responsibility for it and to contribute to it. A *shared repertoire* of communal resources is what the community of practise has developed over time. This can for instance be tools, routines, concepts, styles, stories and historical events. Competence is thus the ability to have access to this repertoire and to be able to make use of the repertoire of practice.

As a result, learning is regarded as social participations, related to the three dimensions of competence in practice. In that sense, learning becomes a process of being active participants in the *practices* of social communities and constructing *identities* in relation to these communities (Wenger, 1998). Wenger's social theory of learning is therefore focusing on the social conditions for learning to take place. The essential components in this theory are the concepts of meaning, practise, community and identity. *Meaning* is a way to describe ones abilities, both individually and collectively, and to experience ones doings as meaningful. To participate in a community of practice includes exchanging meanings, which is a way to describe experiences. Exchange of meanings involves thinking about and discussing actions and interactions, and responding to and reflecting on meanings. In this way, learning is equal to developing experience. *Practice* is the characteristic features of the community of practice, developed over time in order to be able to do the job

and have a satisfying experience of the work. The concept of practice includes both the explicit and the tacit. Learning is thus equal to doing, which means to learn how to do things according to common practice. *Community* is the group of people who constitute a community of practice, by sharing a common understanding of how to solve problems. They develop this understanding through a consecutive dialogue with each other, which lead to development of a unique perspective on what they do. Learning is thus equal to belonging, in other words becoming a part of the community and acquires the knowledge existing within the community. *Identity* is related to the way individuals conceive themselves and who they consider themselves to be. Members in a community of practice define who they are as a result of how they experience themselves through participation. By exchanging views, their attitudes and actions are influenced. This contributes to shape who they are, both by themselves and by others in the community. Learning is thus equal to becoming, by changing the identity and developing the right attitude. To sum up, learning according to this theory is a result of all these four kinds of learning taking place more or less simultaneously.

In the social and cultural approach to learning, artefacts are an important part of learning and knowledge development within a social practice. Artefacts, which for instance can be documents, systems and tools, are developed by humans. In these artefacts lays the mutual insights and knowledge developed through the community's history. Through the use of artefacts, individuals obtain practice that is more or less anchored in professional culture and traditions. Learning a profession is thus about gaining access to and being part of cultural artefacts and practice (Filstad & Blåka, 2007).

One criticism of the social and cultural approach to learning is that this perspective "loses" the individual in the understanding of learning (Filstad & Blåka, 2007). It takes for granted that individuals will learn what they need, as long as they are part of the right community of practice. Here knowledge is seen as something that is indirectly constructed and drawn upon. The system therefore becomes the unit of analysis, not the individuals. Another criticism of this approach is how it enables the learning of something new. The social and cultural approach "*provides a compelling account of learning as socialization into existing beliefs, values and practices, but does not offer an account of how new knowledge is produced*" (Edwards, 2005, p. 57). It is not only newcomers who learn in organizations, old-timers also learn. But when members of a community of practice learn something brand new (e.g. new knowledge from an accident investigation report), the participation metaphor fails to explain how the learning take place.

The golden mean

Both the individual cognitive approach and the social and cultural approach to learning give a reasonable account of how individuals learn. But, the two approaches have different focus and different assumptions. Therefore, none of them are superior. Sfard (1998) warns against giving full exclusivity to one of these two approaches, and instead argues that an adequate combination of the acquisition and participation metaphors would bring to the fore the advantages of each of them. Illeris (2003) argues that understanding learning implies understanding both the human psychological mechanisms involved and the external conditions and their adequacy. Thus, learning occurs only if both the social interaction between the individual and his/her environment, and the inner psychological processes within the individual, take place at one and the same time (Illeris, 2004). To understand how individual emergency workers learn, it is necessary to look at both the individuals and the social and cultural environment. In the next chapter we will discuss how these two approaches contribute to explain learning among emergency workers, by focusing on development of skills and competence in emergency work.

Skills and competence in emergency work

When looking at how emergency workers learn, a reasonable starting point would be to explore what skills and competence emergency workers should have. Learning is in many ways equal to the development of these skills and competences. So, what should emergency workers know? Generally speaking, the ability of an emergency response system is dependent on the three elements *Situation*, *Personnel* and *Equipment*, and their actual occurrence/ behaviour at the time of an incident (Njå, 1998). Personnel must be able to understand the situation occurred and know what to do. At the same time they must be able to use required equipment in an efficient way. In addition, the equipment has to be suitable for the situation. A good emergency response system could be considered as a proper interaction between these three elements, leading to a quick recovery of the situation with a minimum of damage occurred.

The individual emergency workers ability to meet emergency situations in a functional way can be explained with a model from cognitive psychology (figure 1). Experienced or training situations will never be identical to new crisis situations. The goal is therefore to ensure that the knowledge is *generalised* to situations that look like experienced/training situations. *Personnel* (P) must be able to recognise typical signs (cues, characteristics) of the *situations* (S) and respond with determined *behaviour* (B). The personnel must also be able to evaluate the *consequences* (C) of their own behaviour and recognise whether it is effective or not. *Discrimination* is the opposite of generalisation. The emergency workers must also be able to distinguish between situations that require different behaviour. The balance between discrimination and generalisation represents emergency management's philosophy regarding the behaviour flexibility of their emergency response organisations (Njå, 1998).

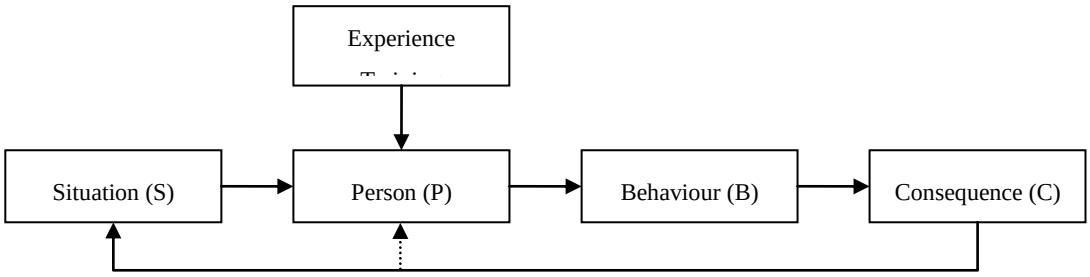

Figure 1: Elements to be considered in performance analysis.

Based on this model, the competence of emergency workers will be expressed by the behaviour shown in certain emergency situations. Development of these skills and competence is thus based on an individual cognitive approach to learning. The issue is how individual emergency workers acquire knowledge and become able to behave in a proper way. Here behaviourism partially explains how learning takes place. If the way emergency workers behaved in previous situations, that be real or training situations, had a positive outcome, they will learn that this behaviour is advantageous. In new situations, with similar cues and characteristics, it is likely that the behaviour will be repeated. The more often a specific behaviour is proven advantageous, the more likely it is for the behaviour to be permanent. Further, development of cognitive structures must also be taken into consideration. Experienced and training situations represent the emergency workers knowledge, through the cognitive structures that this knowledge constitutes. When exposed to new

situations, the existing cognitive structures will be challenged. If the situation is practically identical to a previous situation, the new situation will more or less be interpreted (and solved) in the same way. But, if the new situation deviates from previous experiences, there will be no prescribed way to behave. Instead the novel aspects of the new situations will be interpreted based on previous situations and the behaviour in these situations. New knowledge that emerges will be added to the existing knowledge to the emergency worker (modifying or adjusting the cognitive structures). Experience and training can thus influence emergency workers behaviour to become more automatic, improve the cognitive processes and increase the quality of decisions.

This way to understand learning explains in a good way how emergency workers learn and behave by making use of their previous experiences. New situations will always be understood based on the existing knowledge to the emergency worker, which is acquired through experienced or training situations. As a consequence, training and experience becomes crucial for an emergency worker to develop skills and competence. For learning to take place, every emergency worker has to be active by themselves. They have to actively interpret situations (to challenge their existing cognitive structures) and to experience how their behaviour results in positive or negative outcome (to activate the learning effect which positive reinforcement provides). When something new is to be learned, the new knowledge should be introduced "step-by-step", building on the existing knowledge to the emergency worker (to make it possible for a gradual development).

Knowledge and practices in emergency organizations are mainly experience-based, and learning through experiences and "on-the-job training" are dominant (Flin & Arbuthnot, 2002; Rake, 2008; Aase & Njå, 2004). Taber, Plumb & Jolemore (2008) found that paramedics and fire-fighters value learning in their daily work above initial qualification training. Learning took place in practice through increasing collaboration with others, and in the broader context of legitimate peripheral participation. These findings imply that learning among emergency workers not fully can be explained by the individual cognitive approach to learning. Social and cultural elements also have to be taken into consideration.

An emergency organization, and especially a team or unit of emergency workers, can be defined as a community of practice. When an emergency worker starts as a novice, he/she become a member of an existing emergency organisation (or a team/unit). In other words, he/she get introduced into an existing community of practice. With this as a starting point, the social and cultural approach to learning can be applied to explain how emergency workers skills and competence are developed. The community of practice contains a certain kind of knowledge, in the shape of its artefacts and established practice. Through interaction with existing members of the community, the novice emergency workers learn how to use these artefacts and to do things according to common practice. They simply "learn by doing". But this interaction also contributes to shape the emergency worker. He/she will change identity and develop the right attitude, to become "one of the gang". Learning is thus the movement from novice to fully member of the community of practice. The emergency worker is a fully member when he/she is able to engage with the other members of the community, deeply understand the enterprise and contributes to it, and have access to the shared repertoire of communal resources and are able to make use of these resources.

According to this approach to learning, emergency workers skills and competence will be a result of the knowledge existing within the community of practice. The behaviour in emergency situations will thus be marked by the practice of the community and the identity/attitude to its members. When learning something

new in the community of practice, exchange of meanings is central. The common practice is preserved because it is regarded as meaningful, and is a result of a shared understanding of how to solve problems (developed through discussions and exchange of meanings). If new experiences emerge, the meaningfulness of these experiences will be evaluated. If these new experiences bring along new ways of doing things, and these are regarded more meaningful, the practice may change.

Important tasks in an emergency response are concerned with outlining strategies for crisis mitigation, choosing tactics and performing damage limitation effectively. As the discussion above shows, learning how to do this differs in the two approaches to learning. The individual cognitive approach focuses on how emergency workers learn to behave in a proper way, and how experience and training contributes to learning. The social and cultural approach, on the other hand, focuses on how emergency workers become a fully member of an emergency organization (or a team/unit). Learning is hence a process of being active participant in the practice of the community and the development of the right identity and attitude. Another significant difference between the two approaches to learning is what characterizes knowledge and competence. In the individual cognitive approach, knowledge is something that the individual possesses. Competence is thus the individual's ability to use his/her knowledge to make decisions and behave in a proper way. The social and cultural approach considers knowledge as decentralized, meaning that the knowledge exists in the culture and within the community, and not as a separate "treasury of knowledge". As a consequence, how the individual think, understand situations and problems, and behaves, is a product of the community of practice. Knowledge will therefore be linked to the context, and competence is the ability to fully make use of the knowledge "stored" within the community.

Despite the differences between these two approaches to learning, both are needed to fully understand how emergency workers learn. In many ways they complement each other. The social and cultural approach to learning explains how emergency workers get socialised into their emergency organization (or team/unit), and how learning through "on-the-job training" take place. More specific, this approach explains how the external conditions and their adequacy contribute to learning, and to shape the emergency workers competence and identity/attitude. The individual cognitive approach to learning, on the other hand, explains the human psychological mechanisms involved when an individual learn. In other words, how the individuals acquire their personal skills and competence. This approach therefore explains the personal improvement that an individual emergency worker undergoes to become able to manage demanding emergency situations.

Assessing expertise in crisis and emergency management

Njå & Rake (2009) have explored two different perspectives that they find dominating in the literature on crisis and emergency management: the Naturalistic Decision Making (NDM) and the Contingent Decision Path (Contingency Approach). Both perspectives have led to models and conclusions about the characteristics of decision making in crisis situations.

The NDM perspective focuses on experienced personnel operating in real life settings, trying to understand how people make decisions under emergency situations. The main model in this perspective is the Recognition-Primed Decision (RPD) model (Klein, 1989, 1998), where the emphasis is on remembering the response to previous situations of the same type. The RPD model is a process model where decision making is a sequence of activities, consisting of three typical phases: *situation recognition*, *serial option evaluation*,

and *mental simulation*. Klein's conclusion is that proficient or expert decision makers rarely compare alternatives. Instead they assess the essence of the situation and select an action which they "know" will cope with the urgent situation. Experience is a key element in this perspective, and experts are distinguished from novices mainly by their situation assessment abilities. This perspective is based on cognitive psychology, and focuses on how individuals use their experience to understand situations and make decisions. As a consequence, the individual cognitive approach to learning is more or less solely used to explain how individuals learn to manage crisis and emergency situations.

The contingency approach focuses on sociological perspectives, and consider crisis to be "*a process unfolding as manifold forces interact in unforeseen and disturbing ways*" (Rosenthal, Boin, & Comfort, 2001, p. 6). This approach therefore relates to the system and critical decision within the system as a process, especially before and after the acute emergency situation. As a consequence, the individual emergency workers are just a minor part of the model. In major events, decision makers is within the crisis path, characterised be nonroutine action in turbulent environments, which leads to an "inspirational" decision-making topology. At this stage, it is the emergency workers degree of expertise, intuition and situation awareness that are important for success or failure. The main focus of the contingency approach is on the group level, which means what the organised group as a social entity do in a specific context. This perspective therefore considers social and cultural elements to be much more crucial than in the NDM perspective. Even so, when explaining how individuals learn to manage crisis, it seems like the individual cognitive approach to learning is more dominating than the social and cultural approach.

Both these approaches have much in common. In both approaches, crisis and emergency management could be evaluated in terms of the emergency workers abilities to *generalise and discriminate* situations. It is about making the right decisions and doing the right things, which an expert normally manage to do without any significant problems. In this context, an expert can be defined as a person who generally knows what needs to be done based on mature and practised understanding (Dreyfus & Dreyfus, 1986). But, according to Nj å& Rake (2009), neither NDM researchers nor Contingency Approach researchers have clearly distinguished how to assess the degree of expertise in incident command.

In the previous chapter we argued that the way emergency workers learn explains how they develop their skills and competence. When understanding these learning processes, it is possible to understand how they become skilled and competent, and thus become *expert* emergency workers. Therefore, when assessing emergency workers degree of expertise, it makes sense to assess their degree of knowledge and competence (which implicit entails assessing *what* they learn and *how* they learn). To do this, as discussed in the previous chapter, it is necessary to use a combination of both approaches to learning.

According to the social and cultural approach to learning, an expert will be an emergency worker who is a fully member of the emergency organization (defined as a community of practice). Therefore, when assessing the emergency workers degree of expertise, it is necessary to assess the knowledge existing within the community of practice (common practice, shared understanding, attitude/identity etc). But, it is also necessary assess to which degree he/she is able to make use of the knowledge "stored" within the community. According to the individual cultural approach to learning, on the other hand, an expert will be an emergency worker who has good situation assessment abilities and makes good decisions (and thus behave in a proper way). Assessing the degree of expertise will therefore be a question about how well the individual emergency worker processes information mentally, and how appropriate the behaviour is in certain

emergency situation. By combining these two approaches, it will be possible to assess the emergency workers degree of expertise in a more holistic way. The social and cultural approach makes it possible to assess what knowledge and competence the emergency worker possess, while the individual cognitive approach makes it possible to assess how the emergency worker uses his/her knowledge. These two aspects are therefore closely connected. Using only one of these approaches to assess the degree of expertise is inadequate, and will give an incomplete understanding. Therefore, when assessing the degree of expertise, a combination of these two approaches is necessary.

Both the NDM perspective and the Contingency Approach can benefit from assessing expertise in this way. Rake & Njå's (2009) study of incident commanders shows that decisions are not made in a vacuum, but rather in close cooperation with the other actors on scene. Decisions and performances are highly influenced by tacitly understood procedures and incremental reactive problem-solving behaviour. However, none of the two perspectives considers what managerial background and experience incident commanders possess to make adequate decisions (Njå & Rake, 2009). The emergency workers competence, and how this competence influences the behaviour in emergency situations, is not fully taken into consideration. Neither is the influence of the tacit knowledge the emergency workers possesses (the knowledge "stored" within the community of practice). The NDM perspective could benefit from including social and cultural elements, and take into consideration how these external conditions shape the emergency workers competence and influence the behaviour in emergency situations. The Contingency Approach is already focusing on social elements and processes within the system. But, it is not focusing especially on how social and cultural elements shape the emergency workers competence and their behaviour. Neither is this approach fully taking into consideration the individual aspects of decision making and behaviour in emergency situations. This approach could therefore benefit from a stronger focus on social and cultural elements, in combination with individual aspects.

Concluding remarks

A combination of the two approaches to learning, *learning as acquisition* and *learning as participation*, is necessary for fully understanding how emergency workers learn. These two approaches together makes it possible to understand both the human psychological mechanisms involved in learning, and how the external conditions and their adequacy contribute to learning. The way emergency workers learn give an explanation on how they develop their skills and competence, and further how they become skilled and competent (or *expert* emergency workers). When assessing the degree of expertise in crisis and emergency management, it is therefore advantageous to combine the way expertise is understood in the two approaches to learning. Some implications of these issues are:

- When emergency workers are trained, they should get the opportunity to build their competence based on their existing knowledge, and the knowledge existing within their own community of practice.
- In assessment of quality in emergency management, vital elements to consider are the contents and context of the decision-making situation. To assess the decision-makers comprehension of the situation, and thus the behaviour/performance, an assessment of the decision-makers competence should be part of the analysis.

- Both the NDM perspective and the Contingency Approach could improve the models of decision-making by including how the decision-makers competence influences how situations/problems are defined and understood.
- Debriefs activities organised within emergency organisations could provide a greater learning potential by focusing on counterfactual developments. Reflecting on what might have happen if the conditions had been different, could improve the emergency workers abilities to generalise and discriminate situations. Also combining experiences with more scientific based knowledge could improve these abilities.

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应急管理的高等教育与认证机会

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【摘要】在国际上，教育是增长最快的行业，尤其是应急管理。这种极具增长的趋势，导致合格师资的国际短缺，尤其是那些具有博士学位的教授。根据劳工统计局劳工部，应急管理是美国增长排名前 20 位的专业。本文来自于一个寻求全时间高等教育的学生或一个寻找兼职或远程教育机会的实习生观点。不过，学者，研究人员，管理人员，非政府组织，市场营销和公民也将受益于该文。

应急管理的第一学位课程 1983 年首次在美国北德州大学开设。联邦紧急事务管理署的高等教育工程网站提供了 1 120 机构名单，提供不同层次的 255 个应急管理有关的方案。2009 年 12 月，美国在北达科他州立大学授予"世界应急管理第一个博士，佩斯卡罗尔 Cwiak。还有其他 7 所美国大学在应急管理研究的学科提供 8 个博士点。七个欧洲大学合作提供联合欧洲大师的国际人道主义行动。英国许多大学提供灾害管理高等教育的机会。

在对等审查程序以后，国际应急管理协会正提供应急管理认证（CEM）资格。应急管理认证在北美被公认。国际应急管理学会正在提供一个认证计划。在美国联邦紧急事务管理局的网站上，由美国应急管理本科教员为应急管理本科学生 50 本最为推荐的书籍。这份清单是本作者在美国联邦紧急事务管理局资助下研究编写的。

此次发表涵盖世界各地以英语教学的灾害管理高等教育机会，包括美国，英国，加拿大，澳大利亚，新西兰，土耳其和印度等。

【关键词】高等教育；认证；博士；高等学校应急管理程序；高等教育工程

HIGHER EDUCATION AND CERTIFICATION OPPORTUNITIES IN EMERGENCY MANAGEMENT

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Higher education, certification, Ph.D., Collegiate emergency management programs, Higher Education Project

Abstract

Internationally, education is the fastest growing industry in general and emergency management in particular. This spurt has resulted in an international shortage of qualified faculty, particularly those having doctoral degrees. Emergency management is among the top 20 growing professions in USA according to the Department of Labor, Bureau of Labor Statistics. This presentation is from the perspective of a student seeking full time higher education or a practitioner looking for part-time or distant education opportunities. However, academicians, researchers, administrators, NGOs, marketers and citizens will also benefit from the presentation.

The first degree program in emergency management in the world was started in 1983 at the University of North Texas, USA. The Higher Education Project website of Federal Emergency Management Agency gives a list of 120 institutions offering 255 emergency management related programs at different levels. North Dakota State University, USA granted world's first Ph.D. in Emergency Management per se to Carol Cwiak in December 2009. There are seven other U.S. universities offering eight Ph.D. programs in different disciplines, with specialization in emergency management. Seven European Universities in cooperation provide Joint European Master's in International Humanitarian Action. Many universities in the United Kingdom provide higher education opportunities in disaster management.

International Association of Emergency Managers is offering Certified Emergency Manager (CEM) qualification after a peer review process. CEM is well recognized in North America. TIEMS is working on offering a certification program. There is a list of fifty most recommended books for graduate students of emergency management by the graduate faculty of emergency management in USA on the FEMA web site. This list was prepared after a FEMA funded research by this author.

The presentation will cover disaster management higher education opportunities in English language throughout the world, including in USA, UK, Canada, Australia, New Zealand, Turkey, and India.

Introduction

According to Department of Labor, Bureau of Labor Statistics, emergency management was among the top 20 list of growing professions in USA (Blanchard 2006). The call for faculty has gotten louder and decisively more demanding 44% (24) of respondents reported finding qualified faculty was the biggest challenge they faced. Additionally the definition of qualified has gone beyond the search for simple degree qualifications (most are seeking Ph.D. holders) and now includes a call for experience, researching skills, and teaching ability as well (Cwiak 2008).

Collegiate emergency management programs in USA have grown from 4 in 1994, when FEMA started Higher Education Project, to 255 now. These include at Certificate, Diploma, Associate Degree, Bachelors Degree, Masters-Level Program, 7 Doctoral level programs.

In the recent past disaster management higher education opportunities are increasing globally. In India during 2005-06, Tata Institute of Social Sciences (TISS), Mumbai started Disaster Management Center with five research scholarships for master's degree in disaster management. TISS also provide specialization in

disaster management at the doctoral level. TISS is probably the world's first social science related disaster management research institution as it is working in the disaster relief since 1948. Disaster management is a new growing discipline and profession in the making. The spurt of disaster management higher education has resulted in international shortage of faculty. This paper is mainly from the perspective of a student or professional who want to go far higher education in disaster management. However, academicians, researchers, administrators, NGOs, marketers and citizens may also benefit from the paper.

For the purpose of this paper education is not short term courses, generally referred as training. Falkiner (2005) states, "Disaster management education should be conceptually distinguished from disaster management training, in that it purports to step beyond the "transfer of skill from a trainer (i.e., instructor or facilitator) to a learner". Here we are concerned with the long term organized education programs.

The only effective disaster management is community disaster management. Therefore, the whole community need to be educated, you, me and everybody in between. It is good that the Central Board of Secondary Education in India has started disaster management modules as part of social sciences in classes VIII, IX, and X. This follows the dictum, 'catch them young'. This will help the students and teachers, and hopefully some parents in basic knowledge of disaster management.

In this paper we are mainly concerned with education beyond graduation or first degree level. We are concerned with disaster management higher education with English language as a medium of instructions. This is not to say that higher education opportunities in other than English language do not exist or they are not important.

Disaster management is interdisciplinary subject and not merely multi-disciplinary. In an interdisciplinary subject, many disciplines are integrated and make a holistic coherent symphony. A multi-disciplinary subject covers many disciplines, but they stand apart. Disaster management cuts across many disciplines and it may be covered variety of ways, for example earthquake engineering or emergency medicine. However, the focus of this paper is to cover higher education opportunity in disaster management per se as a focus area and not its different components.

Theory and Method

"Emergency managers need an academic, not just experiential, knowledge base of natural and manmade hazards (to develop) the deep understanding necessary... to effectively develop and implement strategic efforts to mitigate and recovery from their consequences" (Woodbury 2005).

The method used for this paper are Internet research, scholarly journals, participation in conferences, and personal knowledge gained in the process of applying for Ph.D. programs around the world,

Results

I give below the results of my research classified according to the countries in no particular order.

USA

The first Bachelor of Science (BS) in Emergency Management program in the world was started in 1983 at the University of North Texas (UNT), Denton, USA. By 1993 three collegiate certificate programs were added, two of which were for non-academic credit. An Emergency Management Higher Education Program

(EMHEP) was created in 1994 at Federal Emergency Management Agency (FEMA)'s Emergency Management Institute (EMI) in Emmitsburg, MD to encourage and support the dissemination of hazard, disaster, and emergency management-related information in colleges and universities across the United States. The EMHEP helped in continuous growth of higher education opportunities in USA. Approximately 10,000 students are enrolled in these programs and another 20,000 annually take courses within these programs (Blanchard 2009). The EMHEP on its website http://www.training.fema.gov/EMIWeb/edu/collegelist/ lists details of all the programs offered, with links to the college websites. A classification of emergency related programs in USA listed on the EMHEP is given below:

Program Level	**Institutions Listed**
Doctoral	8
Master's	45
Bachelor	19
Bachelor Conc./Minor	23
Associate	34
Certificate	54
Total	255

Source: Carol L. Cwiak. (2008). Emergency Management Education: A Status Report 2008 FEMA Emergency Management Higher Education Program Report

Although the number of programs offered are 255, but many colleges offered multiple level programs, e.g. UNT offers Bachelor, Master, and Doctoral programs. The unique count of colleges is 120. Eight universities offer 9 doctoral level programs in USA. These are:

- Capella University – Doctor of Philosophy in Public Safety with Emergency Management Specialization
- George Washington University – Doctor of Science in Engineering Management with Research Focus in the Field of Crisis, Emergency and Risk Management
- Georgia State University - Ph.D. Degree in Public Policy with Disaster Management Specialization
- North Dakota State University - Ph.D. in Emergency Management
- Oklahoma State University - PhD in Fire and Emergency Management
- Saint Louis University – Doctoral Program in Biosecurity & Disaster Preparedness
- University of Delaware – Disaster and Public Policy Concentration within the Ph.D. in Environmental and Energy Policy

- University of Delaware – Ph.D. in Disaster Science and Management
- University of North Texas –PhD in Public Administration and Management with a Concentration in Emergency Administration and Planning

The first Ph.D. in Emergency Management per se in the world was awarded by North Dakota State University (NDSU), Fargo to Carol L. Cwiak during December 2009 Convocation. As of now NDSU is the only university in the world offering stand alone Ph.D. in Emergency Management.

FEMA under the Higher Education Project has developed 22 college courses. These courses can be accessed at: http://training.fema.gov/EMIWeb/edu/collegecrsbooks.asp. There is much other useful material for higher education at the FEMA Higher Education web site. Under the Body of Knowledge program of the FEMA Higher Education Project, Gupta (2005) did research. All the faculty of graduate emergency management and allied subjects and disaster researchers in USA were contacted with a list of over 350 books. The responded were requested to rank, priority wise, 50 most recommended books for the graduate students of emergency management and allied subjects. They were free to add additional books, if not included in the original list. The final list according to order of priority is available at the web link http://www.training.fema.gov/EMIWeb/edu/docs/Body%20of%20EM%20Knowledge%20-%20Graduate%20Level.xls.

The Disaster Research Center (DRC) came into being at the Ohio State University in August 1963. The DRC later moved to the University of Delaware. DRC claims to be the world's oldest research centre on social science aspects of disasters (Please see TISS in India). The Natural Hazards Center at the University of Colorado at Boulder with its Quick Response Research Program funded by the National Science Foundation and other programs is contributing to the emergency management knowledge. There are many other emergency management research centres in USA.

With the tremendous growth of emergency management programs the question of accreditation is also important. The Foundation of Higher Education Accreditation for Emergency Management and Homeland Security has been incorporated. The objective of the Foundation is to serve the emergency management educational communities by developing post-secondary coursework and programs, including those for use in Associates, Baccalaureate and Graduate programs. It aims to accredit emergency management programs and not institutions. The Foundation seeks a full partnership with all professional organizations around the world. Arkansas Tech University volunteered to be the first institution and received the accredited (Foundation of Higher Education Accreditation n.d.).

United Kingdom

The Resilience Centre, Department of Defence Management and Security Analysis, Defence College of Management and Technology, Defence Academy of the United Kingdom, Cranfield University offers M. Phil. / Ph. D. programs in disaster management. www.rmcs.cranfield.ac.uk

Faculty of Business, Environment & Society, Coventry University offers bachelors, masters and doctoral degree in variety of disaster management and related subjects. Bachelor level degrees include Risk & Disaster Management MBA and International Disaster Engineering & Management BSc Honours degree. Profs. David Gillingham and David Noon are the Deans of Faculty. www.coventry.ac.uk.

Disaster and Development Centre (DDC), Division of Geography and Environmental Management, School of Applied Sciences of the Northumbria University has M. Sc. / PG diploma / PG Certificate in Disaster Management and Sustainable Development. www.northumbria.ac.uk/ddc. Dr. Andrew Collin is the Director of the DDC

University College London (UCL) has Benfield Hazard Research Centre. Its hardcopy broacher claims that with sixty researchers and practitioners, it is Europe's leading multidisciplinary hazard research centre. www.benfieldhrc.org. However, it itself does not offer higher education opportunity. Prospective student has to get admission in other academic department of the UCL (www.ucl.ac.uk) and could be attached to it as a research assistant.

Kings College London through its Department of Geography offers postgraduate education in disaster management. Dr. Mark Pelling, Reader in Human Geography is the person to be contacted and the web site is www.kcl.ac.uk

Middlesex University has Flood Hazard Research Centre and offer postgraduate education. http://www.fhrc.mdx.ac.uk

Environment Change Institute, University of Oxford (http://www.eci.ox.ac.uk) offers M. Sc. Environmental Change and Management. The course aims to produce students with a broad appreciation of all aspects of the management of people and institutions in relation to environmental change.

Kingston University, London School of Earth Science and Geography provides B. Sc. in Environment Hazard & Disaster Management education.

The Civil Emergency Management Centre in the School of Paramedic Sciences, Physiotherapy and Radiography of the University of Hertfordshire (www.herts.ac.uk) offers Masters Degree M. Sc., Post Graduate Diploma Pg. D., and Post Graduate Certificate Pg. C. in Emergency Planning and Management. Mr. Tom Pine is the head of the Centre.

The University of Warwick within its Sociology Department offers postgraduate research expertise in sociological aspects of disaster management. www.warwick.uk

Above is not an exhaustive list. An online guide for students interested in studying in UK featuring a searchable course database is available at www.educationuk-in.org.

Canada

The School of Community and Regional Planning of the University of British Columbia (www.ubc.ca) offers graduate degrees at the Masters and Ph.D. levels that allow for a specialization in emergency management and disaster preparedness planning. There is a Disaster Preparedness Resources Centre, which provides access to information through its library and facilitates research that supports counter-disaster planning and mitigation activities. M. Wayne Greene is Director, Disaster Preparedness Resources Centre.

Brandon University's Department of Applied Disaster and Emergency Studies offers B.Sc or B. A. in Applied Disaster and Emergency Studies. John Lindsay is the department chair and website is http://www.brandonu.ca/academic/ADES/.

University College of Cape Breton and the Atlantic Institute for Infrastructure Protection offers Bachelor of Technology in Emergency Management. It is a post diploma / degree distant education program. Dr. Hal Jorch, Dean of the School of Science & Technology is the program director. www.uccb.ns.ca

For a description of undergraduate courses dealing with disaster management in thirty-eight schools in Canada, please see Falkiner (2005).

The Netherlands

School for Disaster Geo-Information Management, International Institute for Geo-Information Science and Earth Observation (ITC) (www.itc.nl) offers 18 month M. Sc. degree course in Applied Earth Sciences. ITC also offers Ph. D. program. Indian Institute of Remote Sensing (IIRS), Dehra Dun and ITC had collaborated for long.

Switzerland

Natural Hazard and Mitigation Group, Department of Geosciences and Environment, University of Geneva offers a PG Certificate in Study and Management of Geological Risks. www.unige.ch/hazard

Australia

School of Safety Science, Faculty of Science, University of New South Wales offers Ph. D. and Masters degree by research in the area of emergency and disaster management. Prof. Jean Cross is the Head of the School.

http://www.safesci.unsw.edu.au/future/postgraduates.html

Charles Sturt University, through its Faculty of Health Studies offers Master of Emergency Management degree. The web site http://www.csu.edu.au/courses/postgraduate/emergency_management/

gives the details. It also offers a Bachelor of Social Science degree program with an emphasis in Emergency Management through distance education. Contact person is John Lunn - Faculty of Health Studies - School of Public Health.

School of Arts and Social Science, Southern Cross University, has available an on-line program that combines Community Development and Emergency Management in postgraduate studies. The school offers Graduate Certificate / Graduate Diploma / Master of Community Development (Emergency Management) programs. The approach is disaster mitigation through community development rather than a merely logistics-based response focus. http://www.scu.edu.au/schools/sass/cdem/

Dr. David King is the Director of Center for Disaster Studies, School for Tropical Environment Studies and Geography, Faculty of Science, Engineering and Information Technology, James Cook University. www.tesag.ju.edu.ac/CDS/index.htm. The university offers environmental related degrees at graduate and postgraduate level.

New Zealand

According to Britton (2005), *"Most of New Zealand's public universities provide risk, hazard or disaster relevant courses as part of their undergraduate and postgraduate programs"*.

Department of Geological Sciences, College of Science, Canterbury University, offers Hazard and Disaster Management degrees and diploma at B. Sc., Post-graduate Diploma in Science, M. Sc., and Ph. D. level. Prof. Steve Weaver is the Head of Department and the web site is http://www.geol.canterbury.ac.nz/pgradprog.shtml#mschazm

Massey University is providing postgraduate Emergency Services Management Program since 1991. This is taken in full- or part-time distance education mode administered within the College of Humanities and Social Sciences; it is a multi disciplinary course.

The Auckland University of Technology has a relatively new modular program designed for first responders and those involved in risky businesses such as adventure tourism and industrial safety. It is designed to provide opportunities for emergency management sector personnel to diversify the scope of their education.

Japan

Britton (2005) states that, "There is only one Japanese university offering full-time courses that relate to EM (emergency management). Fuji Tokoha University, a relatively new campus in Shizuoka Prefecture, established a course in 2003 within its Environment and Disaster Prevention Faculty. While not explicitly created for EM personnel, it is an innovative program available to people who work in local governments, including emergency managers. The undergraduate program includes a Web-based learning environment and an outreach program, and is designed to be highly interactive with the local community designated as being under threat of forthcoming Tokai earthquake. By linking with the community, students are encouraged to find out who end-users are for hazard and disaster-relevant material, thus making them better equipped to respond".

Turkey

Center for Excellence for Disaster Management, Istanbul Technical University, Turkey in cooperation with Oklahoma State University, USA is offering a Master's Degree in Emergency Management. The program is designed to educate professionals in charge of the emergency and / or disaster management systems. Prof. Dr. Alper Ünlü of the Department of Architecture, Faculty of Architecture is the Director of Center for Excellence for Disaster Management. http://www.cedm.itu.edu.tr/yls_00.html.

India

Higher education opportunities in disaster management in India are increasing in the recent past. Tata Institute of Social Sciences (TISS), Mumbai, a deemed university, had a major reorganization in sixty years. As one of the components of the reorganization, The Jamesdji Tata Disaster Management Center of TISS was inaugurated by Dr. Manmohan Singh, Prime Minister in May 2006. It has very ambitious plans. TISS has the tradition of responding to human needs and natural disasters by sending relief teams after major disasters since 1948. The DRC, USA was started in 1963. Therefore, it appears that TISS is probably the world's oldest institute researching on social science aspects of disasters, and not the DRC. For years disaster management was one of the papers in master of social work program. From the academic year 2006-07 the Master of Philosophy (M. Ph.) and Ph. D. programs by research were revamped to course work and research. Master of Philosophy courses are offered by some universities in India, which are between a normal master's and doctoral degree, with emphasis on research methods. Some universities in India require M. Ph. Before a

student could start Ph.D. The Jamsedji Tata Trust has initiated five research scholarships in the area of disaster management. Prof. Janki Andheria is the Director of the Jamsedji Tata Center for Disaster Management and Prof. S. Parasraman, disaster management expert and joint editor of India Disaster Report is the Director of TISS (www.tiss.edu).

The Centre for Disaster Management Studies, Guru Govind Singh Indraprastha University (GGSIPU), Delhi is probably the first in the country to start MBA in Disaster Management from 2005-06 academic year. Prof. Amarjeet Kaur is the Director of the Centre (Florida Atlantic University, USA and Coventry University, UK also have disaster management related MBA programs).

The Indian Red Cross Society (IRCS) in association with GGSIPU has started one year PG Diploma in Disaster Preparedness and Rehabilitation from 2006-07 academic year in Delhi. Prof. (Dr.) S. P. Agarwal, Secretary General of the IRCS (http://www.indianredcross.org) is the Director of the program.

Sikkim Manipal University of Health, Medical and Technological Sciences, Gangtok, Sikkim from its Extension Centre, Indian Institute of Ecology and Environment (www.ecology.edu) at New Delhi has been offering distant education Master of Science in Disaster Mitigation program.

The Indira Gandhi National Open University (IGNOU) is among the first institutions which started disaster management educational program in India. IGNOU started six-month distant learning Certificate in Disaster Management long time ago. This is an introductory course with two papers. IGNOU in 2006 also started Post-Graduate Diploma in Disaster Management (PGDDM). This has eight subjects, including one project work. Disaster Management is also one of the subjects in Master of Public Administration of the IGNOU. It may be mentioned that IGNOU has the largest number of students enrolled in any university in the world. The textbooks of the PGDDM are divided into number of rubrics or components each comprising a few units. Each unit has a standard structure, including learning outcome, introduction, conclusion, key concepts, references and further reading, and activities. Different units of the text books are written by subject experts. Prof. Pradeep Sahni is the Convener of Faculty of Public Administration, School of Social Sciences and Drs Uma Medurary, and Dolly Mathew, Readers are Program Coordinators of the PGDDM. IGNOU has number of study centers. The website is http://www.ignou.ac.in.

The Institute of Envirnmental Sciences of the Bundelkhand University, Jhansi is offering from at least 2003 one year P. G. Diploma in Disaster Management with an intake of 30 students. The weblink is http://www.bundelkhanduniv.org/_dept/_dept7.htm.

M. S. University of Baroda started Post-Graduate Diploma in Disaster Management from the academic year 2007-08. An MBA course in Disaster Management has been offered at Jamnagar, Gujarat for few years. The Malaviya National Institute of Technology, Jaipur started Master of Disaster Mitigation course from the academic year 2008-09.

There are nearly 350 universities in India and there may be other higher education opportunities in disaster management. Some universities and institutions offer disaster management as one of the courses as a part of their higher education programs. For example, the Department of Sociology, Pune University in its master of sociology has a paper on Sociology of Disaster and Disaster Planning. School of Planning and Architecture, Delhi covers disaster management for architecture and planning students. Centre for Environmental Planning and Technology, Ahmedabad has disaster management as one of the subjects for its architecture and

planning students. The Civil Engineering Department of the Birla Institute of Technology and Science, Pilani offers an elective course of disaster management.

Multi Country Program

The Joint European Master's in International Humanitarian Action is an inter-university, multi-disciplinary postgraduate program that provides high quality academic education and professional competencies for personnel working or intending to work in the area of humanitarian action. This is offered by the Network of Humanitarian Assistance (NOHA) Universities working in close collaboration with two Directorates-General of the European Commission: DG for Humanitarian Aid (ECHO) and DG for Education and Culture. There are seven European Universities cooperating in this program: Universite catholique de Louvain, Belgium; Universite Paul Cezanne Aix-Marselle III, France; Ruhr-Universitat Bochum, Germany; University College Dublin, Ireland; Universidad de Deusto, Spain; Uppsala universitet, Sweden; and Rijksuniversiteit Groningen, The Netherlands. The details can be had at www.nohanet.org.

Limitations

The presentation is only indicative and cannot be exhaustive, as disaster management is a new growing discipline and profession in the making. New higher education programs are being launched continuously. The inclusion of an institution does not necessarily imply recommendation by the author and non-inclusion does not mean anything adverse about the quality of the institution or its program, but the limitations imposed on the length of the paper by TIEMS. This paper does not go into the accreditation or quality of the education programs offered by different institutions.

Conclusion

Emergency management is already among the top 20 list of growing professions in USA. Mileti (2002) projected that a post-graduate degree will become a basic requirement for entry into all levels of the hazard management profession. Therefore, disaster management higher education industry is set to grow tremendously, internationally in the foreseeable future and hope fully will help save lives, property, and environment from disasters.

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Author Biography

Kailash Gupta earned 33 credits towards Ph.D. in Emergency Management at the North Dakota State University, Fargo, USA. He is pursuing to complete his Ph.D. in Public Administration and Management, with specialization in Emergency Management at the University of North Texas, Denton, USA. Kailash has bachelor's degree in electrical engineering and MBA from the Indian Institute of Management, Ahmedabad. The International Association of Emergency Managers (IAEM) presented him with 2008 Honorary Citation in appreciation of his work as the first National Representative in India, and for his help in launching the Asia Council. At the invitation of the Indira Gandhi National Open University, New Delhi he co-authored a textbook on Disaster Preparedness, and has other publications. He has presented papers internationally. He has done research on mass fatalities management after tsunami in Sri Lanka and India, after cyclone Aila in Bangladesh and India, and going for Quick Response Research to Haiti; all funded by the National Science Foundation. Kailash has held senior management positions in public organizations, private companies, nonprofit organizations, and has also been an entrepreneur.

对于有效应急演练的目标导向性学习

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【摘要】应急演练对应急管理能力的发展有重要的作用，其中一个重要功能就是学习，然而，很多应急管理演练没有按照未来的能力需求来努力建立足够明确的目标。这样就削弱了从演练中直接学习的机会，而且使评估演练学习有效性变得困难，一个从应急演练中检查目标导向性学习影响的方法是应用预期学习成果，比如，为每一个参与者设置学习目标。为探究在应急管理领域使用预期学习成果的可能性我们计划和执行了一个瑞典市政应急管理部门高级管理者参与的演练。考虑一般应用，建立了一个基于已有理论的应急状态下的简要概念模型。在模型中为演练设计了预期学习成果。然后这些预期学习成果用来设计、指导和评估演练。演练用于视频记录下来并在演练中进行观测。此外，及时记录汇总演练后参与者的感受和反应。这些结果用于指导预期学习成果的应用是很有用的。在其他事情中，参与者表示有用的新能力符合预期学习成果。这一点在他们自发地使用概念模型评估中得以验证。而且，结果表明改进模型相对容易理解和应用，结果可用于开发认知为目的的应急演练框架。

【关键词】预期学习成果；应急管理；演练；能力

GOAL DIRECTED LEARNING FOR EFFECTIVE EMERGENCY EXERCISES

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Keywords

intended learning outcomes, emergency management, exercise, capability

Abstract

Emergency exercises play a central part in the development of emergency management capability. One of their main functions is to generate learning. However, many emergency management exercises are performed without sufficient efforts to establish explicit goals expressed in terms of future capability needs. This impairs the possibility to direct learning during and from exercises, and makes it hard to evaluate their learning effectiveness. One way to examine effects of goal directed learning from emergency exercises is to utilize Intended Learning Outcomes, i.e. set learning goals for the participating individuals. To explore the possibilities with using Intended Learning Outcomes in the domain of emergency management we have planned and performed an exercise with top-level managers, responsible for emergency management, in a Swedish municipality. Based on established theories a brief conceptual model over emergency situations, considered generically applicable, was compiled. From the model Intended Learning Outcomes for the exercise were formulated. These were then used in designing, directing and evaluating the exercise. The exercise was video recorded and observations were made during the exercise. In addition, the participants' impressions and reflections were gathered in a survey immediately after the exercise. Findings indicate that the use of Intended Learning Outcomes was beneficial. Among other things, the participants expressed experiencing useful new competence in line with the Intended Learning Outcomes. This was supported by that they spontaneously used the conceptual model in the evaluation. Furthermore, the results suggest that the developed conceptual model over emergency situations is relatively easy to understand and use. The results can be used in developing a framework for learning-centered emergency exercises.

Introduction

Preparedness is sometimes seen as the process that builds or improves emergency management capability (see for example Godschalk, 1991; Perry & Lindell, 2003). Within this process, aiming at creating capabilities, emergency exercises play a central role. The process of creating capabilities is a process of learning, where activities at one time are supposed to have impact on capabilities at a later time. When designing learning situations the point of departure should preferably be taken at the imagined future situations where the developed capabilities might be needed (cf. Bowden & Marton, 2004). The capabilities assumed to be relevant in possible future emergency situations should be used as design criteria for the learning situations that constitute emergency exercises.

Rational planning and carrying through of emergency management exercises requires set goals to aim at. The same goes for assessment of exercise efficiency and effectiveness, which require explicitly set exercise goals against which the actual exercise results can be compared. Although goals are most often formulated for emergency management exercises, many exercises are performed without sufficient efforts to establish explicit goals expressed in terms of future capability needs. This impairs the possibility to direct learning during and from exercises, and makes it hard to evaluate the exercises' learning effectiveness. One way to enhance and examine effects of goal directed learning from emergency exercises is to utilize Intended Learning Outcomes (ILO:s).

Intended Learning Outcomes are set goals for pedagogical processes, formulated in terms of what the participants, as results of their learning, shall know and/or be able to do at the end of the pedagogical process (see figure 1). With an outcome-oriented approach utilizing ILO:s focus lies on what participants shall know and be able to do, in contrast to the traditional curriculum-centred educational ideal which focuses on what is covered in the learning situations during the pedagogical process.

Figure 1. Intended learning outcomes (ILO:s) as goals for a pedagogical process.

In this paper we describe a pilot test run of a learning centred emergency management exercise utilizing ILO:s. The aim was to explore the possibilities with using ILO:s as a basis for planning and performing an emergency management exercise. The exercise was performed with twelve top-level managers in a Swedish municipality, responsible for emergency management. Emphasis is put on pedagogical and learning-oriented aspects of preparing, performing and evaluating the exercise.

Method

The use of ILO:s as a tool for structuring the planning and conducting of emergency management exercises was studied through an exercise with a group of participants that are top level managers within a Swedish municipality and responsible for emergency management.

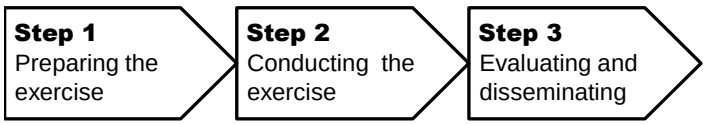
Early in the planning of the exercise ILO:s were formulated. The ILO:s were then used as a guiding force in further planning and preparing the exercise. They were also openly communicated to the participants at the exercise, and functioned as guides for the exercise chairmen. More details are given below.

The exercise was video recorded, to enable objective examination of the exercise afterwards. Immediately after the actual exercise sessions the participants were asked to give their opinions in an evaluating discussion. They were also asked to individually write down their opinions of the exercise, its methods and its implementation. They were instructed to express whether they thought that they would be able to and whether they actually would utilize the conceptual model from the ILO:s. These sources of information were supplemented by the authors' observations during the exercise.

The exercise

The exercise concept is described in Eriksson & Borell (2009). It comprises three steps, illustrated in figure 2. Below we will discuss these three steps, intertwining theoretical background with specifics from the studied exercise. It can be pointed out that in practice the different steps are not discretely separated. For example, general exercise planning takes place in Step 1, but additional planning is done during the actual exercise.

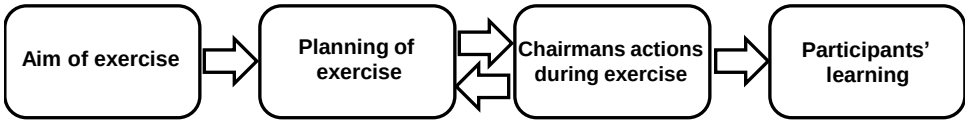
Figure 2. Chronological model over the exercise process.



Step 1: Preparing the exercise

The exercise concept applies the principle of constructive alignment (Biggs 1996), which means an exercise is planned and performed so that it directly addresses its ILO:s. This is illustrated in figure 3, which gives an overview of the pedagogical model behind the exercise concept. The illustration shows that the aim of the exercise directs exercise planning. The plan in turn affects chairman behaviour during the exercise. Adaptation of the plan to actual circumstances during the exercise execution is reflected in the arrow leading back to planning, indicating that some on-line re-planning is necessary. The final relation shown in figure 3 shows that chairman actions are assumed to affect what and how the exercise participants learn. Obviously this is a highly simplified model, merely covering a few aspects. In the model it can be noted that the chairman constitutes a crucial link between the planning of the ILO:s and the participants' learning, with the latter supposed to develop a realization of the ILO:s. In other words, the pedagogical model suggests that what the chairman does, as well as how and why it is done, is highly important for exercise effectiveness in reaching its ILO:s. One thing that the chairman usually should do is communicate the ILO:s to the exercise participants. When the participants have a good understanding of the ILO:s they can actively manage their own learning, which boosts exercise efficiency.

Figure 3. Overview of the pedagogical model behind the exercise.



Defining the ILO:s is done early in exercise planning. Since the ILO:s are supposed to reflect relevant future competence for the learners, supposed future capability needs were identified. What a person can be aware of, and consequently how that person can act, depends on which dimensions of possible variation the person is able to discern in the particular situation (Marton & Booth 1997, cf. Eriksson & Borell 2009). This means that one's capabilities rely on one's ability to experience. For emergency managers we assumed that the ability to comprehend or grasp emergency situations is fundamental. The function of repeatedly construing situational awareness, considering options and choosing action is sometimes called sensemaking (Weick 1995), and constitutes a basis for competence. For emergency managers effective sensemaking may benefit from experience of regularly occurring dimensions of possible variation in emergency situations, i.e. well established theories on what characterises emergency situations. Therefore we compiled a set of theories that constitute a generically applicable model over emergency situations, and used that in the ILO:s of the emergency exercise. For practical reasons such a generic model over emergencies, aimed at facilitating

emergency management, needs to be relatively brief and easy to communicate. The components of the model that was used are outlined below.

In the emergency management literature two different types of needs or problems that require to be responded to during an emergency are distinguished; the agent-generated needs and the response-generated needs (Dynes, 1994). The agent-generated needs are the needs that the emergency in itself creates, for example search, rescue, care of injured and dead as well as protection against continuing threats (Dynes et al., 1981). The response-generated needs can be seen as a result from the particular organisational response to the emergency situation, for example the need for communication and coordination. The agent-generated needs tend to differ more between emergencies than the response-generated needs do. Thus Dynes (1994) mentions that one in preparations should focus more on the process of solving an emergency situation and not the specific agent, i.e. one should focus on the response-generated needs and not on the agent-generated ones. The distinction between agent-generated and response-generated needs was included in the model behind the ILO:s for the exercise.

At every moment of emergency management some conceptualization in terms of a causal system is necessary. Depending on which agent lies behind an emergency situation, different threats arise that call for different responses. In the generic model we choose to include the idea of causal systems around central events, combining fault-trees and event-trees as in the bow-tie model. Chronologically causal systems extend from the past into the future. Branches of the fault-trees represent actual or possible causal chains that either separately or combined may lead up to some critical event. Similarly, the branches of the event-trees emanating from the central event represent actual or possible chains of events evolving into the future. Using such a framework enables choice of at which points in the causal chains measures shall be taken to try to break the continuation of negative situational development.

For effective emergency response the main features of individuals' conceptualizations should preferably be made explicit and used to structure communication and coordination. The externalized conceptualization should also be subject to recurrent revision. Thus what is considered the central event(-s) in the causal systems may change from time to time, depending on e.g. available situational information and situational development. It can also be changed due to a shift in strategic approach, with rethinking of aims and goals for the present emergency response.

When performing emergency response as accurate situational awareness as possible is ideal in the causal system model of the situation. When working with exercises to develop emergency management capability a broad variation regarding model content, yet encompassing probable future states, is beneficial for effective learning and the development of broadly applicable capability (Eriksson & Borell, 2010).

The actual ILO:s for the exercise were formulated in the following way: *Each participant shall be able to use the generically applicable model over emergency situations.* This was then used as the main guiding force in preparing and conducting the exercise, i.e. we applied constructive alignment (Biggs 1996).

To support the participants in developing the sought understanding and thereby the capability to grasp and possibly 'sensemake' and manage future emergency situations two different scenario descriptions were prepared. These were organized using a template structure that opens up for exploring possible variation of the parameters in the generic model. The initial scenario content was chosen as to be realistic yet allow for

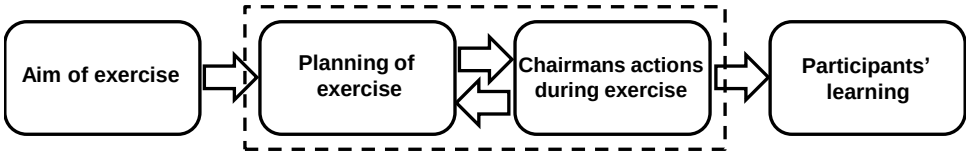
exploring discussions on possible "worst-cases" and other variation. For details see Eriksson & Borell (2010).

Step 2: Conducting the exercise

The actual exercise was a one-day event, arranged as a discussion seminar with the authors alternating as chairmen. The one currently not chairing acted as observer and documented important features.

Ideally, the exercise chairman should check all actions taken during an exercise against the ILO:s. Then all instructions, exemplifications and feedback on participant statements can become aligned as to optimize the realization of the ILO:s. The functional space for such reflection-in-action (Schön 1986) is framed with a dotted line in figure 4, illustrating that live re-planning should take place during exercise performance.

Figure 4. Functional space for chairman's reflection-in-action.



Step 3: Evaluating and disseminating

Immediately after the actual exercise a session for evaluation followed, which also was chaired by the authors. During an hour the participants talked about how they had experienced the actual exercise sessions, and what they thought about effects and results. They were also asked to fill in a written form, answering some open questions with free text.

Dissemination of results within the organization beyond the exercise participants was not studied.

Results

Using the principle of ILO:s had the following salient effects on *directing learning*:

- In exercise planning the use of ILO:s set a framework for exercise scenario content.
- During the exercise it supported the chairmen in their reflection-in-action, and thus aided constructive alignment towards goal achievement.
- The explicit communication of the ILO:s to the exercise participants supported their individual reflection-in-action towards fulfilment of the ILO:s.

ILO usage also facilitated *evaluation of the learning effect* of the exercise. ILO assessment was straightforward. The participants clearly demonstrated, although at a rudimentary level, proficiency in using the generic model of emergency situations. This means that the ILO:s were met. Participant statements as well as author observations suggest that the exercise was successful in helping the participants to understand and be able to use the generically applicable model over emergency situations. In the discussions during the exercise the participants were able to differentiate between agent-generated needs and response-generated needs, and the authors' impression was that this division helped them to focus on what was important in the discussions. The participants also discussed in terms of different possible cause-and-effect-chains linking and surrounding critical events in the exercise scenarios. During the evaluation the participants were positive to

the usefulness of the generic conceptual model over emergency situations, and expressed that they believed they understood the model. Furthermore, some of them clearly expressed that they will probably use the generic model in their practice. The model thus seemed useful and trustworthy.

In the written survey immediately after the exercise the participants, among other things, expressed the following:

- The generic model enabled systematic and structured mapping of emergency situations.
- Being potential emergency managers in case of real emergency situations, the participants appreciated the theoretical framework of the generic model.
- Spontaneously, several of the participants expressed that they would probably use the model in their emergency preparations as well as when examining future instances of emergency responses.
- Some said that they will use the model when managing on-going emergency situations, while some others said that they would probably not.
- They found the model simple enough to be graspable.

Discussion

The results show that the exercise was successful in reaching its ILO:s. This suggests that the approach with utilizing ILO:s as a basis for planning and conducting the exercise was successful. It also made assessment of goal achievement easy. Furthermore, the generic model over emergency situations appeared easy to communicate and seemed valid in the eyes of the exercise participants. However, it is important to note that this pertains to the immediate results of the exercise. How well the results will last is not studied. Neither was any testing of actual emergency management capability performed.

The results suggest that ILO:s are a good tool when working with emergency management exercises. Provided that the ILO:s are carefully chosen and properly communicated to participants they can be of great value for structuring the learning aspects around set goals. In selecting and formulating ILO:s it is recommendable to have clear pictures of what will probably be needed in actual future instances of emergency management, and explicitly aim towards mastery of that.

The exercise led to promising results, with the participants demonstrating abilities to use the intended model. They also liked and would probably use the model embedded in the ILO:s. However, it is unclear how the long-term effects will be. Future studies will have to examine if and to what degree the knowledge and attitudes displayed and expressed by the participants linger.

What is new with using ILO:s when working with emergency management exercises? Using constructive alignment and ILO:s does not make covered content unimportant; it merely shifts it from being an end in itself into having a more instrumental role. The shift is supposed to permeate every relevant aspect of exercise preparations and performance, working to align ideas and activities so as to maximize fulfilment of the ILO:s. Equivalent results can be achieved without knowing about or using the concepts of ILO:s and constructive alignment. However, consciously using the concepts can contribute to more efficient and effective exercises.

The participants had varying degrees of emergency management experience. Some but not all had been working with real emergencies. All had at least some earlier experience of emergency planning or preparations. This may have facilitated their understanding of the generic model.

The concepts of ILO:s and constructive alignment are widely used in the field of higher education. There is a vast literature available on teaching and learning, which can be used in further development of learning-centered emergency exercises. With additional studies more precise recommendations and guidelines on how to best make use of the concepts in the field of emergency management can be given.

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Both authors are active in FRIVA, a framework research program funded by the Swedish Civil Contingencies Agency.

基于变易理论的应急演练广义能力

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【摘要】应急演练在应急管理能力发展中具有重要的作用，通常应急管理演练会产生狭义结果而不是必需的结果。演练通常主要围绕演练中使用的特定情节对有限的能力发展起作用， 这有助于与演练相同情形下的应急管理能力的提高，然而，我们更需要针对更广泛适应能力的提高，这样获得的结果会在未来更大范围内进行应用。获得这样结果的一个方法是将演练更多的重点放在学习方面，特别是，教育学变易理论能更适合来设计发展广义能力的演练，本文在瑞典市政进行了一个试验来研究如何将教育学变易理论应用于实践并指导应急演练，文中描述了演练是如何设计和操作的，尤其突出了教育学相关方面。对演练视频、参与者陈述以及所作的观察等方面进行了分析。结果表明参与者提高了包括应急状态下概念化变易的能力，本文结果可用于开发认知为目的的应急演练框架。

【关键词】 应急演练；变易理论；学习；应急管理能力

BROAD CAPABILITY THROUGH VARIATION IN EMERGENCY EXERCISES

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Emergency exercises, Variation theory, Learning, Emergency management capability

Abstract

Emergency exercises play a central role in the development of emergency management capability. Often, emergency management exercises generate more narrow results than necessary. Exercises commonly contribute to limited competence development, mainly focused around the specific scenario used in the exercise. This enhances emergency management capability for situations similar to the one exercised. However, it is highly desirable to aim at developing more generally applicable capability, and thus achieve results that are useful in a larger set of possible futures. One strategy to achieve this is to put more emphasis on the learning aspects of exercises. In particular, the pedagogical variation theory is well suited for designing exercises that aim at developing broad capabilities. In this paper we present an empirical study of how the pedagogical variation theory was used in designing and conducting an emergency exercise in a Swedish municipality. We describe how the exercise was designed and performed, highlighting pedagogically relevant aspects. Analyses were performed on video recordings of the exercise, statements from the participants and observations made during the exercise. The results indicate that the participants developed their abilities to include variation in their conceptualizations of emergency situations. The findings can be used in developing a framework for learning-centered emergency exercises.

Introduction

When organisations build and develop their emergency management capability to manage future emergencies exercises often play a central role. Emergency exercises and training can take many different forms, ranging from tabletop exercise to full-scale exercises (Perry and Lindell, 2007). Exercises can provide a large potential for learning. However, this potential is seldom fully used due to inadequate lessons drawing, meaning that there is an opportunity to increase the value of exercises. Unfortunately, dysfunctions observed during an exercise event are often overlooked in the post-exercise analysis (e.g. Robert and Lajtha, 2002), and can therefore be observed again in future exercises or real emergency responses.

Emergency exercises are often structured around emergency scenarios, where a scenario can be seen as the thematic content of the exercise. A scenario is within this article described with different parameters as well as their values. Each parameter is representing an aspect of the scenario, for example days without electricity or people available for responding to the emergency.

To focus more explicitly on learning aspects when developing emergency management exercises is a step towards making better use of exercise occasions. One principle discussed in the literature that facilitates learning for the unknown future at primarily the individual level is the pedagogical variation theory. Learning about something is about experiencing it in a new way. How an individual experiences a situation is reflected by which aspects of the situation that the individual is focally aware of. For an individual to be focally aware of an aspect that aspect must be discerned from its context and the individual must simultaneously experience different values of it. In order for an individual to learn, i.e. experience a situation in a new way, the individual needs to become capable of discerning more or other aspects than previously (Marton and Booth, 1997).

A basis for developing an emergency management exercise is the sought capability for the participants. Following the variation theory the participants should therefore experience the aspects that are critical for

their aimed capability (Runesson, 2006), that is the capabilities they need to manage their future tasks. These aspects should be varied in the exercises situation to support the participant to discern them. In addition, the use of explicit variation also aims at improving the participants' ability to in a new situation discern critical aspects (Bowden and Marton, 1998). When it comes to preparing for future emergency situations improving ones capability to manage new situations is vital.

In this paper we present an empirical study of how the pedagogical variation theory was used in designing and conducting an emergency exercise in a Swedish municipality. The study is based on an approach for table top exercises presented in Eriksson and Borell (2009).

Method

The empirical study is mainly based on a tabletop emergency management exercise with 12 participants from a Swedish municipality. The participants were all top-managers in the municipal organisation working in different administrations (i.e. had responsibilities for different areas in the municipal organisation). The empirical study was a one-day event including three parts. The first part was a presentation of some emergency management concepts, the second part was the tabletop exercise and the final part was an evaluation of the exercise. The day was lead by the authors alternating as chairmen.

The tabletop exercise consisted of discussions around two different scenarios. Besides leading the discussion the chairman also wrote down the agreed upon parameters as well as parameter values on a white board. The author currently not chairing the session was taking notes. The notes were primary about which parameters that were discussed as well as the variation of these parameters discussed. Also other relevant observations were noted. After the tabletop session an individual evaluation was conducted where the participants were asked to write down their opinions. In addition, a discussion of how to continue the work with emergency management in the municipality was held. The presentation, the exercise around the two different scenarios as well as the discussion of how to continue the work in the municipality was video recorded.

Analyses of the participants' use of variation during the exercise were performed on video recordings of the exercise, written opinions from the participants and observations made during the exercise.

Conducting the exercise

Below a description of how the exercise was designed, prepared, performed and evaluated is given, highlighting pedagogically relevant aspects. For a more detailed description of the approach for tabletop exercises see Eriksson and Borell (2009). The approach consists of three steps; preparing the exercise, conducting the exercise, and evaluation of the exercise including disseminating the results, see figure 1.

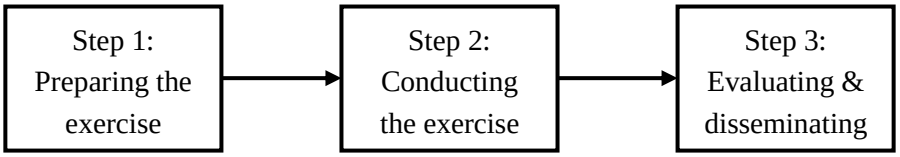

Figure 1: The approach for tabletop exercises

Step 1: Preparing the exercise

Prior to any specific preparations aims and goals of the exercise need to be defined. In defining aims and goals the most central criterion is the presumed roles and tasks that the participants in the exercise might have in future emergencies. On the level of individuals, goals should be in the form of Intended Learning Outcomes (Borell and Eriksson, 2010). The main goal of the actual exercise was defined as that the participants should create an ability to discern similarities as well as differences between different emergency scenarios.

With the defined aims and goals as a basis the next step is to develop and describe one or several main scenarios to be used during the exercise. A scenario is here seen as a description of the thematic content of the hypothetical exercised emergency described with several parameters and their values.

For the exercise occasion presented in this paper two main scenarios were developed and described by the authors with support from the municipality's preparedness planner. The first scenario described a fire in one of the municipality's retirement homes and the second scenario described electric power loss in the whole municipality. The initial descriptions were very short and aimed to be just the start for the discussion during the tabletop seminar. Apart from the short descriptions of the main scenarios additional parameters as well as parameter values were prepared as a support for the people chairing the exercise.

Step 2: Conducting the exercise

The exercise was conducted as a so-called tabletop seminar, with discussions around the two emergency scenarios. As mentioned above, a scenario is described with a set of parameters as well as their values.

In this exercise the parameters primarily represented needs that have to be managed within the emergency response e.g. managing the response and coordinating with other actors. The focus was on needs that had to be managed at a high level in the municipality due to that the participants were top-level managers. The parameters were divided into three categories: agent-generated needs, response-generated needs and other relevant circumstances. Agent-generated needs are the needs that the emergency in itself creates i.e. are created of the emergency agent for example the storm or the flood. Response-generated needs are instead created by the response to the emergency (Quarantelli, 1997). Using this division while studying several emergency situations shows that the response-generated needs more commonly arise and that the agent-generated needs vary more depending on the type of situation. In addition, we also have a group of parameters defined as "other relevant circumstances". These were aspects of the scenario that were identified but not central for the aim or goal of the exercise.

The point of departure for the discussion was the main scenarios. Following the variation theory, to learn about a phenomenon the learner needs to become capable of discerning more or other aspects than previously. Thus each scenario was made explicit for the participants during the exercise by clearly stating and systematically varying the parameters and their values. This aimed to encourage the participants to discern critical aspects of the exercised situation in a developing way. To support the individuals to discern new aspects "what-if thinking" was used i.e. questions such as "What if the electric power loss lasted for one more week?" were asked.

One advantage with exercises it that by working in groups individuals have the possibility to learn from each other. As mentioned learning according to the variation theory is about experiencing something in a new way. One way for the individual to experience new aspects of a situation is to discern how a situation appears to

others (Marton and Booth, 1997). By explicitly discussing parameters and parameter values in a group the participants support each other in discerning the situation in different ways.

Since a tabletop seminar is based on the participants' discussion, one essential input is the participants' professional skills and their experience of emergency management. Which parameters that are especially critical to experience for successful managing of future emergencies is hard to determine by a small preparedness group beforehand. In addition, there is no "true" set of parameters for a specific scenario. Instead this may vary depending on the composition of the group and the aims and goals of the exercise. It is the participants that best know the municipality and their own roles in the municipal organisation. It is thus the participants that together are best suited to identify the relevant parameters for the group.

Step 3: Evaluating and disseminating

One main aim of an emergency management exercises is for the participating individuals to develop a capability to manage future emergencies. By using the proposed approach utilizing a distinctive and explicitly elaborated variation around the exercised scenarios the participants get the possibility to deepen their understanding of the scenario. In addition, individuals learn to discern critical aspects also in other scenarios than the one exercised, so that they become better at managing future emergencies.

The exercise also resulted in a report containing the collectively developed scenarios including the parameter as well as parameter values. This report will hopefully be used as a basis for further improvement of emergency preparedness for example in future exercises, but if this report and the discussions during the seminar have been transferred in the municipal organisation has not yet been studied.

Result

The discussions during the exercise scenarios as well as the participants expressed opinions in the evaluation indicate that the participants found it valuable to discuss around the two scenarios. The participants' commitments and abilities to participate in the discussions also indicate that they found it useful and understood the concepts.

During the discussions the participants seem to have developed their interpretations of the two scenarios. For example when discussing the fire scenario at first some of the participants did not understand their own role in the response to such a scenario, but after discussing around several parameters they started to perceive that a fire in this retirement home would influence the whole municipality and all administrations and not only the one responsible for elderly care.

In addition, by using two different scenarios and explicitly discussing the response-generated needs the participants were supported in discerning some general aspects of emergency responses. Examples of aspects that they identified as general was the need for the top-managers to lead the municipal response and the need for cooperation with numerous other actors.

Summing up, the empirical study indicates that by explicitly using variation in emergency management exercises the participants develop their abilities to include variation in their conceptualizations of emergency situations.

Discussion

To use different types of exercises, e.g. tabletop, is common within the emergency management area. The exercise approach used in this article emphasises a conscious focus on creating learning at the individual level. By explicitly using variation during the exercise the participants develop their abilities to experience variation in also other scenarios, thereby developing their abilities to handle the unknown future.

Both variations within one scenario (variation within which parameters and parameter values that described the scenario) and between two different scenarios were made explicit to assure that the participants experienced variation. This also supported the participants in identifying both similarities and differences between different emergency scenarios.

Based on the participants' statements the use of variation seems to be useful when discussing emergency situations. Working explicitly with variation provides the participants with a tool to also understand other emergencies.

The focus in this article has been on learning at the individual level, but as mentioned in Eriksson and Borell (2009) an exercise needs to be connected to the overriding emergency management process in the organisation if it is to enhance capability also at an organisational level. How the work has proceeded in the municipality after the exercise has not yet been studied.

As fundament for the approach for exercises used in this article lies the pedagogical variation theory. This is a theory that is used above all in educational research (see e.g. Marton and Booth, 1997; Pang and Marton, 2005). An approach related to the one presented in this article has also been used in evaluating different emergencies with promising results. Individuals participating in these evaluation processes have expressed that the discussions in terms of variation of parameters and parameter values have broadened their views (Borell and Eriksson, 2008).

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塑造个性：虚无主义与美国反恐政策

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【摘要】反恐战略中的基本民主理念支持尽量保护反应行动文化价值的观点。从历史观点上说，这一战略观点已被反恐政策制定者所认可，报复性地违反受害者的文化准则经常标志着恐怖主义发起人的胜利。在过去的十年中，美国政府的反恐组织所采用的一些政策、程序和战略都试图削减未来的非常规暴力行为。本文探讨了应对和反击不断演变的恐怖主义手段的特点，研究了传统的和非传统的应对措施。需要特别强调的是当前反恐战争中参与者的特点，本文分别从恐怖分子和美国政府两个方面进行了研究，揭示了他们各自的基本意识形态以及他们希望达到的目标。

本文在恐怖分子的特征研究中，提出恐怖分子的心态出现了越来越多的虚无主义。这种极端虚无主义的存在意味着美国政府在打击恐怖主义的战略和战术上都发生了急剧变化。同样，美国政府所采取的行动也有虚无主义的倾向，建议对反恐主义的未来发展做出调整。

【关键词】政策；反恐怖主义；恐怖分子；激进；战争

SHAPING IDENTITY: NIHILISM AND U.S. COUNTERTERRORISM POLICY

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Policy, Counterterrorism, Terrorist Actors, Radicalization, War

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Abstract

The fundamental democratic concept in counterterrorism strategy has been to uphold the cultural values that response actions are trying to preserve. This strategy perspective has been historically true for counterterrorism policy makers, and a violation of victim cultural norms in retaliation has often marked a victory for the terrorist initiators. Over the past decade, several policies, procedures, and strategies employed by the United States Government against terrorist organizations have attempted to curtail future acts of extraordinary violence. This paper explores the nature of response and retaliation to the evolving tactics of terrorism, examining both conventional and non-traditional response measures. A particular emphasis is made on the nature of the participants involved in the current war on terror. Both terrorists and the U. S. Government are examined to reveal the idiosyncrasies of what they each consider foundational ideologies and what they each hope to accomplish.

Within the exploration of the nature of terrorist actors, this paper proposes the increasing presence of nihilism within the terrorist mind set. The presence of extreme nihilism in terrorists could predicate a drastic change in the strategies and tactics used in repose by the U. S. Government in combating terrorism. Juxtaposing the actions of terrorists with the actions taken by the U. S. Government, and factoring in nihilistic tendencies, suggestions regarding the next evolution of counterterrorism are made.

Introduction

As the study of terrorism expands, the fundamental epistemological questions concerning justice and morality continue to haunt scholars and policymakers alike. When it comes to understanding the complex nature of terrorism, analysts oftentimes find themselves constrained by historical experiences, present policies and procedures, and an unknown and unaccountable future. Expectations set by the domestic public and international players tend to conflate, and in some cases confuse, the actions and responses that need to be actualized when it comes to responding to terrorist activity. However, despite the intense and congested political climate, it is up to the elected officials to implement a justifiable response to terrorist activity as they mitigate and prepare for future acts of violence.

Charged with the responsibility of justifiably responding to terrorism, the United States continues to find itself amid a plethora of choices and consequences – none of which are simple and straightforward. On the contrary, the fundamental struggle that plagues both public figures and decision-makers is the need to balance a necessary and sufficient response to terrorism on the one hand, while maintaining a strong and justifiable ideological foundation for the country on the other.

This paper will address some of the most pressing concerns that ought to be examined before further response to terrorism is determined. Working through a series of historical accounts and facts, the evolution of the nature of war and conflict, along with U.S. counterterrorism policy, will be illustrated and analyzed. After highlighting the most relevant "focusing event" (Birkland, 1997) that occurred on September 11th, 2001, which caused significant U.S. policy changes, analysis regarding the philosophically pertinent and logistically relevant nature of the United States' response to terrorism will be addressed.

To capture the most essential concerns facing the United States' counterterrorism policies, it is crucial that the ways in which the nature of war has changed over the past several decades be accounted for. Knowing

how war and the U.S.'s initial understandings of the laws and morality of war-like actions shape their policy will help scholars and policymakers extract accurate responses, while dismissing erroneous ones.

Determining the differences in past and current wars will allow the U.S. to develop more effective responses to current terrorism; identifying the cornerstones of U.S. constitutional foundations will allow the U.S. to remain true to its justifiable principles, thus strengthening their ideologies, and ultimately their identity. Recognizing this potential disconnect between the policy and procedures are implemented, and what the United States' identity stands for, will hopefully yield an academic and scholarly discussion regarding counterterrorism and the foundational characteristics that encapsulate the identity of the United States. If not, then the risk of dismissing the rethinking and reevaluate nature of the United States' ideological system becomes a reality that challenges the very nature of what it means to be a democracy.

Know The Enemy, Know Yourself'

To claim that the nature of war and aggression has changed dramatically over the past several thousand years, at this point, goes without saying. From the times of the Greco-Roman wars, to the trench wars of World War I, to the standoff during the Cold War, and now to present- day asymmetrical warfare, it becomes almost trite to say that, over time, the methods, laws, and perspectives of war have largely changed in ways we could never predict or fully account for.

From axes to maces, from pikes to spears, and from rifles to bunker busters, the tools and methods used to achieve victory have dramatically evolved. However, there are several ways in which the nature of strategically conducting, engaging, and participating in war remains constant. When the tactics, strategies, and approaches to war differ greatly from those used in the recent past, it is the responsibility of political decision-makers to consult the philosophically-driven ideological standpoints that serve as the foundational understandings of warfare. Because war is a concern that continues to capture the attention of nearly all humans, across nearly every culture, there continues to be a significant amount of labor – both physical and scholarly – dedicated to its study. To begin, it is important to refer to one of the first philosophers to articulate the idiosyncrasies of war – Sun Tzu. Sun Tzu's most famous work, *The Art of War*, explicates the aspects of war that stand as the most fundamental elements, serving as the necessary and sufficient conditions needed to fight effectively. With his simple, yet provocative, statement "…all warfare is based on deception" (6th century B.C./1963), Sun Tzu offers an analysis on the nature of war that continues to be a timeless element found through decades of conflict.

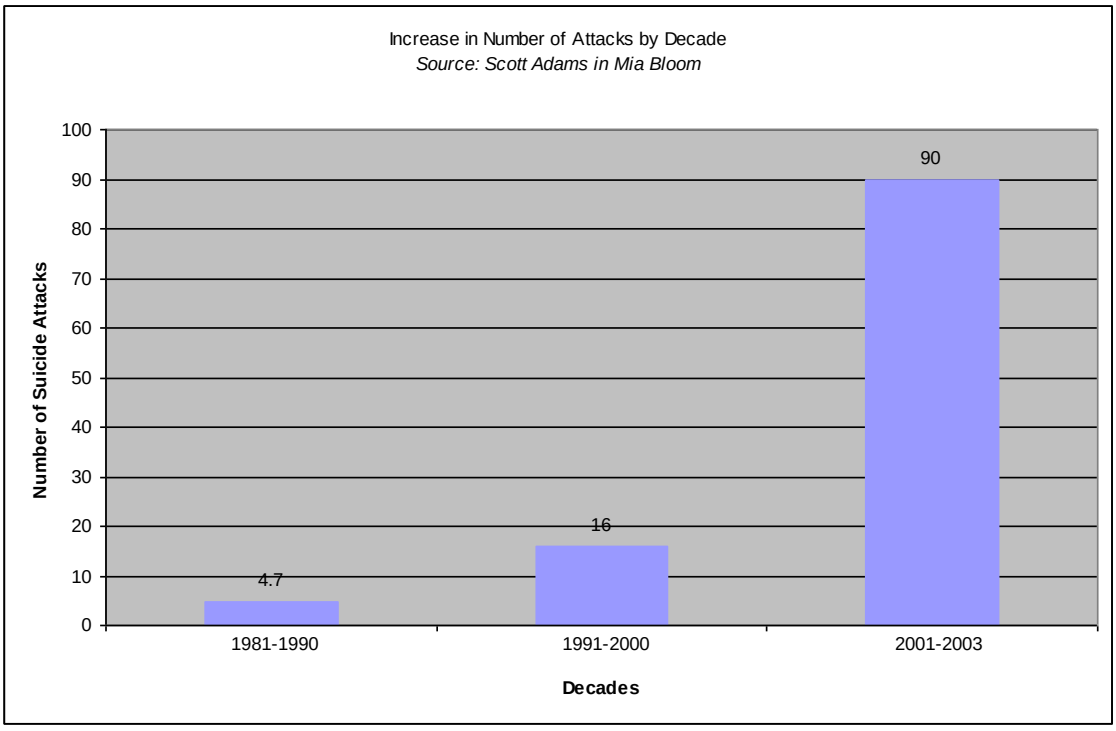
Present-day asymmetrical warfare shows us that the very tactics used by terrorists and terrorist organizations abide by this same principle. Suicide bombings, Improvised Explosive Devices (IEDs), and biological weapons are just a few examples of the clandestine tactics used by terrorists to gain ground in the asymmetrical warfare they covertly make themselves a part of.

The use of women, young men, and unexpected individuals who are seen as representatives of the norm of society strap bombs to their chests, or carry them in briefcases or bags, walk into crowded marketplaces and full buses – a tactic that, although is well-known and identified today as terrorist techniques, still surprise and shock victims and onlookers, making for a successfully deceitful operation. Improvised Explosive Devices are placed along trafficked roadsides, covered in sand and grass, and unseen by most people who utilize those roads – another covert tactic that successfully harms civilians and soldiers alike. And finally, the

release of biological weapons via postal mail, or in crowded places, also strike fear and panic in the enemies of terrorists, which stands as another strong and successful strategy for terrorists.

Witnessing an increase in suicide attacks, the United States continuously struggles with determining the best methods for mitigation, preparation, response, and recovery. In 2007, the number of suicide bombers rose to six hundred and fifty-eight worldwide (Wright, 2008). "Of 1,840 incidents in the past 25 years, more than 86 percent have occurred since 2001, and the highest annual numbers have occurred in the past four years" (Wright, 2008). These striking statistics causes worry in the United State's intelligence agencies and military analysts as solutions to this problem of suicide bomber tactics becomes more favorable in the modern terrorist world.

Today, terrorist organizations rely increasingly on suicide attacks to achieve major political objectives, and attacks are growing in both frequency and diversity of location (Pape, 2003). Given the nature of these attacks there is an unmitigated success even in the event that limited damages are done. These attacks, regardless of their eventually kill/injured rate often inspire religious or ideological zeal, which in turn further destabilizes societies (Ganor, 2001). Because an attack with low kill/injury rate can affect public moral, suicide bombing causes not only direct damage to individuals but also severe psychological damage to the population at large. The fear of an attack, which is often greater than the threat itself, is largely the result of its unpredictability (Grimland, et. al, 2006).



Suicidal behavior, especially as a delivery method for a weapon, is not easily definable. Suicide in general can be divided between those who attempt suicide and those who succeed and die by suicide. If the intention of murder, in addition to suicide, is added to the event there is another distinction between those who are ready to die, those who seek to die, and those who are indoctrinated into suicide (Grimland, et. al,

2006). In addition, because the perpetrators' death is a precondition for the success of the mission, analyzing perpetrators post event is almost impossible.

The profile of suicide bombers is as reflective of the population at large, as terrorist organizations. Merari's 2004 study of Palestinian terrorists found no differences in socioeconomic or educational factors from the general Palestinian population. One factor of note was the predominance of male suicide bombers but that has changed over the past ten year to include women martyrs. In addition, many martyrs are often unmarried, and many organizations routinely reject candidates who are under 18 years of age (Grimland, et. al, 2006). According to Merari the typical Palestinian suicide terrorist is, "religious, normal, polite and serious. Motivations include the effectiveness of suicide bombings as a military strategy, nationalistic pride, the need to revenge national and personal humiliation, and hatred of Israel and America."

When analyzing these suicide bombing tactics, it becomes increasingly evident that the ways in which terrorism is actualized coincides directly with the nature of war. As the international community emerged from the tense Cold War atmosphere, traditional forms of warfare have almost become extinct in developed countries because of the threat of mutually assured destruction (Robb, 2007). With the evolution of traditional warfare's inclusion of nuclear weapons, it is no wonder that the next development in war quickly turned to asymmetrical tactics (Robb, 2007).

The international environment has inadvertently become a place that is more conducive for terrorists to operate more successfully than stare run military forces. To articulate this point more clearly, it is appropriate to bring in the words of Sun Tzu:

> Just as water adapts itself to the conformation of the ground, so in war one must be flexible; he must often adapt his tactics to the enemy situation. This is not in any sense a passive concept, for if the enemy is given enough rope he will frequently hang himself (6th century B.C./1963).

Standing as one of the biggest threats to the United States, terrorists altered and maneuvered their tactics and strategies to allow for more successful outcomes for their causes, but just as Sun Tzu alludes to, there may be a point in which terrorists will "…hang [themselves]" (Tzu, 6th century B.C/1963). However, without a clear understanding of the tactics, measures, and goals of terrorism, the United States may never reach a point in which enough metaphorical rope is given to the terrorists to actually hang themselves. If the United States hopes to reach the point in which they can give the appropriate rope to bait terrorists, they must first understand what will essentially be the most effective rope bait.

It is up to analysts to develop a clear understanding of who the terrorists are and, more importantly, what the terrorists want. When the United States reaches this understanding, the words of Sun Tzu should be reaffirmed, but first the United States must understand what they are truly facing so that they can develop a well-informed plan that allows terrorists to be the architects and engineers of their own demise.

A Spotlight on Terrorism and Terrorists

Some of the most fundamental components that serve as a basis for understanding terrorism and terrorists emerge from studies, surveys, and analyses that make a brave attempt of understanding who the terrorists are and where the terrorists come from. Information compiled from the PEW research center, military intelligence, interviews, and media findings are just a few examples of the sources that form the United

States' understanding of the terrorist enemy. While these sources can serve as vital components for intelligence-building, they are by no means fully comprehensive as separate entities, nor are they able to fully capture a reliable image for a potential profile of a terrorist.

Juxtaposing the ideologies founded in the United States with the beliefs held by terrorist organizations, options for expression are the foundation of a free society. Without these options, because of coercive government or oppressive ideologies, expression in its peaceful form is stilted. Terrorist organizations often no longer view themselves as part of their societal or governmental structure, nor do they view their enemies as members of governments or civil societies. Terrorist organizations, and members within terrorist organizations, have a subjective interpretation of the world. Their perspective, often narrowly focused on single objectives, give rise to the perception of limited options for action. However, at no point do these organization and members lack logic and the ability to reason. Fanaticism can include moral absolutes to a given agenda, but does not mean that irrationality or madness is at the helm. Martha Crenshaw, the seminal terrorist sociologist, writes (1995), "The variable from which their belief systems are formed include their political and social environments, cultural traditions, and the internal dynamics of their clandestine groups. Their convictions may seem irrational or delusional to society in general, but the terrorists may nevertheless act rationally in their commitment to acting on their convictions."

Given this perspective it is fair to acknowledge that terrorists, who use violence in extreme measure and often against innocent and symbolic populations, rarely view themselves as terrorisms. More often, within the narrow lens of their ideology, whether it is anarchism, Islamic fundamentalism, or revolutionary nationalism, these groups regard themselves as liberators, holy soldiers, martyrs and in all cases legitimate fighters for a noble and righteous cause.

Despite these commonalities, it is impossible to create a typical or consistent profile of a terrorist, or a terrorist organization. Post (1985) noted that, "Behavioral scientists attempting to understand the psychology of individuals drawn to this violent political behavior have not succeeded in identifying a unique "terrorist mindset". People who have joined terrorist groups have come from a wide range of cultures, nationalities, and ideological causes, all strata of society, and diverse professions." Crucial to an understanding is the concept of perspective – the idea that we all have a view of the world, a view of ourselves, a view of others, and a view of ourselves in relation to others – which are all important to understand focused ideologies such as fundamentalism (Monroe and Kredie, 1997). The key concept is that fundamentalists see themselves not as individuals but rather as symbols.

Furthermore, considerations regarding the demographics of the areas that tend to breed the most terrorist-like behavior have the potential to bring to light additional factors that play key roles in shaping who the terrorists become as a result of the environment and sociological conditions they mature in. For instance, the average ages in the Middle East range from seventeen (in Afghanistan) to twenty-seven (in Iran) whereas the average age of men and women in the United States is around thirty-six to thirty-seven years old. In areas around the Middle East, the same age discrepancies in relation to U.S. statistics are found. A few causes for concern arise because this is a population that is much younger than the United States' and therefore has the potential to understand and process international policies, needs, and concerns in fundamentally different ways. In some cases, individuals raised in this part of the world have never seen a time-period that does not include war, hostility, or conflict. For some of these individuals, a time of peace

and reconciliation is either seen as a goal that cannot be attained, or has never been considered as a worthy goal to strive for.

While age plays a vital role in sociological and political growth, it also has a very real physical and biological component that has yet to be fully explored. The target audience for recruitment of terrorists includes a majority of young, impressionable men. A lack of respect for women on earth is engrained in the psyches of these men is juxtaposed with a promise of attaining angelic-like women in the after-life if certain acts of terrorism and suicide are actualized. Therefore, we see a trend of young men giving up their lives to a cause with the essential hope of attaining women after their sacrifice is made. Again, this lack of maturity and understanding comes in direct opposition to what the United States believes and understands to be true regarding women and equality; thus, a need to better understand the enemy and their ideologies is pertinent because it is so different from what we have come to know.

Another factor that contributes to the discrepancies between the behavior of the United States and that of the individuals in the Middle East is rooted in the perceptions and messages regarding the West and western ideologies. While there is a sliding scale of Middle Eastern attitudes toward the West, a few of the reasons select groups of individuals embrace a certain amount of hostility and hatred toward the West include the following: insecurities with sexual equality, a view that the United States is directly responsible for the corruption and "suffocation" (Wright, 2006, p. 294) of Islam, a resentment toward the United States for supporting Israel, a feeling that the United States sacrificed its spiritual-self for technology (Wright, 2006, p. 195), and an inability to understand and accept secularism (Wright, 2006, p. 73). These all serve as pertinent points of contention between Islamic beliefs from the Middle East and the underlying ideologies of the United States.

Essentially, what is evident throughout this analysis is that the United States is taking on a fundamentally different kind of enemy than what was considered the terrorist norm of the past. Traditional ideas regarding terrorism define a terrorist as someone who is motivated to change politics and policies. An inclusive definition of terrorism is as follows:

> Terrorism is a form of political violence in which the terrorists have specific objectives that they are attempting to achieve and have chosen symbolic targets to draw attention to their cause (Heffron-Casserleigh, 2009).

In conjunction with this definition, it is important to understand the elements that are part of terrorism. These include the use of extraordinary violence, having political and/or religious aims, and also wanting their actions to have a psychological impact (Heffron-Casserleigh, 2009). Other aspects include a lack of uniforms or insignia, the choice of victims for symbolic values and purposes, and an individual or group of people who are not necessarily part of a state agency (Heffron-Casserleigh, 2009).

A Possible Nihilistic Terror

With the emergence of suicide bombers and individuals who are willing to kill themselves as part of their tactics, it is hard to pinpoint exactly what the goal of terrorism has become; thus, a two-fold problem surfaces – not only is the United States facing an enemy that is willing to kill others and themselves which makes military strategy aimed at terrorism exponentially more difficult, but they are also facing an enemy with fundamentally different ideas about what it means to win a conflict. When the goal of a terrorist does

not include his/her survival in the future, it is hard to accept that the traditional definition and elements of terrorism are parts of a profile that captures the current terrorist cohort. Perhaps the rethinking and reevaluation of who terrorists were, and what they have become, is in order.

Prior to the attacks on the World Trade Center of September 11, 2001, multiple policies were already in place that aimed at addressing the potential threats of terrorism. Under the Clinton administration, there was the Anti-Terrorism Act of 1996 and the Defense Against Weapons of Mass Destruction Act of 1996 (Alexander, 2006). In 1999, the Clinton administration developed the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction as well as the National Commission on Terrorism (Alexander, 2006). In 2000, the National Commission on Terrorism produced a report entitled "Countering the Changing Threat of International Terrorism" (Alexander, 2006). Some of the most important points that came out of this report emphasized that a real terrorist threats exists, a comprehensive plan to address terrorism ought to be developed, and that the United States' policies needed to target state-sponsored terrorists (Alexander, 2006).

Although analysts can look back and claim that we had strong contention to believe that the United States government ought to have known about, or seen, these threats coming, it is simply fallacious and counterproductive to focus on contrary-to-fact hypotheses. Instead, analysts need to focus on the cascading series of events and policies that developed following the events of September 11th.

Directly after the attacks, the Bush administration responded with emergency funding, a deployment of public health officials and strategies, a surge in immigration policies, a designation of foreign terrorist organizations, and a reevaluation of the detention and treatment of non-citizens (Alexander, 2006). It was clear at this point that "…everything had changed" (Kettl, 2006).

Following this immediate response, more critical policies and procedures came about once the shock of the September 11th events began to dissipate. Critical policies and procedures that followed include the creation of the US Patriot Act, the Department of Homeland Security, and The National Commission on Terrorist Attacks upon the United States (the 9/11 Commission) (Alexander, 2006). Military action was also taken in the form of the war in Iraq. The passing of the Aviation and Transport Security Act, the National Defense Authorization Act, and the Intelligence Reform and Terrorism Prevention Act are additional policies that followed (Alexander, 2006).

All of these aforementioned policies and procedures show a commitment to uncovering the intricacies associated with groups of people and state agencies involved with terrorism. But more recent policies aim at identifying individuals involved in acts of terrorism. These policies include wire-tapping, the use of biometrics, and the implementation of strict identification procedures. It is clear that these new strategies follow what can be found in *The Art of War*. These strategies represent one of Sun Tzu's claimed elements of war:

> It is one of the most important tasks of command 'to effect timely and proper change of tactics according to the conditions of the units and the terrain, both on the enemy's side and our own' (6th century B.C./1963).

While we can see a history of policies and events that are clearly changing, and aimed at a variety of populations, additional analyses pertaining to terrorist strategies still needs to be developed and articulated.

Rethinking and Redefining Strategy and Response

As perfectly stated by Martha Crenshaw in "Counterterrorism in Retrospect," terrorism is "…inherently difficult to combat" (2005) and "…dangerously adaptable and opportunistic" (2005). With this being the case, it is no wonder why the United States continues to struggle with how they ought to continue to operate in an environment that contains a significant amount of terrorism.

While the very nature of terrorism seems to abide by the same principles of traditional warfare in that it evolves and changes over time in order to produce desired results, the strategies and tactics are illicit and unsettling for a country that cannot always identify who the terrorists are; thus, there is a lack of understanding who the enemy is – a fundamental component that needs to be addressed before success against terrorism can be attained on part of the United States.

Subsequent to analyzing the ways in which terrorism picks at, and operates in, the international community, with covert operations that impose psychological and physical damage to individuals from the West, the most typical conclusion that resonates throughout the history of the past ten years is that the strategies set forth up until this point by the United States have been ad hoc, or off-mark. However, this realization ought not to lead to a feeling of defeat or a feeling that isolation from the problem of terrorism is the way out. Instead, the United States should begin to reconsider the definitions and elements of terrorism that represent the most recent selection of terrorists.

As mentioned before, more recent strategies used by some terrorists do not include their survival following their actions and attacks. With the presence of suicide bombers, it is uncertain whether or not the goals of terrorism actually include a political or sociological change in the ways in which the global community operates. While the United States receives information from terrorist organizations regarding the disbeliefs in equality and separation of church and state, and the belief in only Allah, the actions taken by these same terrorist organizations are not necessarily calling for a change in the new world order. These methods employed by terrorists cause analysts to wonder whether or not a new subset of terrorists has been bred.

While there are clear cases of terrorists who are striving for political and social change, there still remains the question of whether all terrorists are working toward the same kinds of goals. Recognizing these discrepancies between terrorists may reveal a new sub-group who are more nihilistic in nature. On the one hand, we have identified some groups of terrorists who have very specific goals, such as revolutionary terrorists. William L. Waugh identifies some characteristics of this group of terrorists:

> Revolutionary terrorists have the goal of overthrowing the incumbent elite, if not the entire regime, and, thus, cannot be negotiated with seriously without jeopardizing the legitimacy of the regime and/or compromising its authority (1990).

On the other hand, there still tends to be a grouping of nearly all terrorists in ways that suggest that their strategies and tactics are working toward the same goals. This just may not simply be the case.

However, if it is the case that a sub-group of terrorists exist where their actions and desired results fall back on the plans of nihilistic intentions, then the United States may be combating an enemy that cannot be won over using the same tactics and strategies that have been employed in the past. The United States may be facing an enemy that is no longer looking for political or religious change;

rather, they may be facing an enemy that is simply looking for destruction of the West and its ideologies to such an extent that the loss of terrorist lives is simply a means to an end of everything in existence because there is no meaning associated with life on Earth.

A Place for Democratic Values

With the striking reality of terrorism peering its way into the livelihoods of individuals across the globe, it oftentimes becomes difficult to separate the tactical responses to terrorism from the ideological ones. With the potential of a different kind of terrorist – a nihilistic one – in conjunction with the need to fully know and understand one's enemy, analysts ought to wonder whether or not reconciliation between the Middle East terrorist organizations and Western ideologies can be actualized.

More importantly, without fully fleshing out the idiosyncrasies of this possible new type of terrorist, the United States may be working against an enemy that is misunderstood, which can, in turn, promote strategies on part of the United States that misfire every time they are posed against terrorists. To combat this disconnect, and this possible misunderstanding of terrorism, the United States should first look back to the foundational ideologies that shape its identity as a republic, and what it means to truly be a democracy. Beliefs in equality, freedom, and justice weave their way through the threads of the United States' societal fabrics; and the commitment to embracing the Socratic Method in nearly every part of its judicial, legislative, and executive branches of government strengthens and reaffirms the United States' ultimate commitment to progressivism. While this stands as a fundamental element that needs to be considered and weighed in the balance of terrorism, it is rarely juxtaposed to the contradictory nature of terrorist ideologies that are static and unquestioned.

As analysts, we often question the strategies and policies employed by the United States, but rarely consider the foundational elements that shape the very nature of what the United States stands for. Only through understanding the foundational elements of the United States and its enemies will we ever be able to ensure that the tactical responses to terrorism are aligned with the ideological core of the United States.

Plato's timeless piece, *The Republic*, illustrates, that it is the duty of those who have the means and abilities to pull others out of the metaphorical cave and into the light of truth; it is a duty to pull those mesmerized by the false sentiments of shadows out of the cave of darkness and into the light outside of the cave (380 B.C./1991). In conjunction with this doctrine, it is easy to see the similarities between Plato's work and that of the United States Declaration of Independence. Both maintain that the work of a state that embraces democratic values needs to consider how it is responsibly arriving at truth and justice for all.

As we approach a new era in this complex international community, it is crucial that the United States maintains its identity as we take into consideration the challenges of facing a possible nihilistic enemy. Along with developing a better understanding of the evolving nature of war and the changing tactics of our enemies, we must continue to embrace and understand that the struggle

regarding the United States' ideological stance, and its need to craft responses to terrorism, is an element that is inherent in who we are as a nation.

As we progress through trying times, we must recognize that either we stand to lose against the terrorist because we are not fighting them in an effective manner because we do not truly know who they are, or we fail as a nation because policies that are fundamentally contrary to our ideological core as a nation are enacted against our enemies, thus misrepresenting our identity. Not only is it imperative that we know our enemies, but it is crucial that we know ourselves.

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应急管理人员培训的经验

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【摘要】培训出高水平的应急管理专业人员，是未来在学校、公共机构、工商企业的应急计划和准备工作中取得成功的关键。本文对培训技巧和策略进行了探索，以使即将踏入应急管理实施领域的人员得到专业方面的提高。用来培训专业安全员的技巧和策略也同样适用来教育应急管理专业人员。本文设计的授课与实践技巧，可用于开展教学、提高传授知识和技能的水平；教学方法的讨论为此目的提供了一个系统框架和实用说明。

【关键词】培训策略；应急管理；应急计划；培训技巧

PREPARING EMERGENCY MANAGEMENT PROFESSIONALS:

BEST PRACTICES FOR INSTRUCTION

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Key Words

Instructional Strategies, Emergency Management, Emergency Planning, Training Techniques

Abstract

Preparing highly qualified emergency management professionals is a key to the future success of emergency management planning and preparedness in schools, public agencies, businesses and industrial facilities. Instructional techniques and training strategies are explored in this paper to enhance the professional preparation of individuals entering the applied field of emergency management. The techniques and strategies used to train safety professionals can also be used to educate emergency management professionals. Practices and teaching techniques described in this paper are designed to facilitate instruction and enhance the transfer of knowledge and skillThe discussion of instructional methods provides a systematic framework and practical illustrations of how to enhance instruction for those entering the field of emergency management.

Introduction

The field of emergency management "has evolved quite extensively from its Cold War – civil defense origins" (Wilson and Oyola-Yemaiel, 2001). As an occupation, emergency manager's jobs are "professionalizing." The demand for those achieving credentials as emergency management professionals is accelerating as governments establish organizational structures to manage "the social repercussions of natural and/or technological emergencies" (Wilson and Oyola-Yemaiel, 2001). Serving as an emergency manager requires a unique set of skills and knowledge. Many of these skills are also utilized within the field of safety management. Since the applied professions of safety management and emergency management share the need for some common skills, the methods used to effectively teach safety professionals can also be applied to preparing professionals in emergency management. Both emergency managers and safety managers need to understand how emergency plans for facilities are developed and the primary components of a plan (Haight, 2008).

The expectation of educators is that instruction will influence knowledge, behavior and skills of students to prepare individuals for their chosen professional field. In *Training Ain't Performance,* Stolovitch and Keeps explain that training itself is not performance. These authors define training as "structured activities focused on getting people to consistently reproduce behaviors without variation and greater efficiency under various conditions"… and performance is "a function of both the behavior and accomplishment of a person or group of people" (Stolovitch and Keeps, 2004, p. 5 & p. 8) When people perceive training and performance as synonymous, they are unlikely to take all the steps necessary to gain the full benefits of training. This problematic viewpoint occurs when the activity or behavior of conducting training is itself considered to be performance. This limiting view of training only meets half of the definition for performance – no consideration is given to actual accomplishment or result other than the activity of training

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itself. To be more effective, educators should view instruction, even provided in a short-term training session, as part of an ongoing learning process rather than as a single event. The instructional event itself is an activity. The ability to achieve the transfer of training will be influenced by the success of the training activity and the ongoing adoption of practices by the student and its use (Schroll, 2002), (Stolovitch and Keeps, 2004).

Thesis

Best practices for training and instruction from the field of safety management can be applied beneficially to the education and academic preparation of emergency management professionals. These instructional practices are combined into a systematic framework including a chronological view of preparation, execution, and evaluation of instruction and the transfer of training.

Application

Preparation: Planning Strategies for Education and Training

Using a systematic framework to guide education and training increases the likelihood of training transfer. The use of a systems approach allows the instructional designer to consider the entire system including preparation and a needs assessment; the establishment of clear objectives; appropriate delivery strategies; and the use of evaluation as a method of continuous improvement. In preparing emergency management professionals it's important to remember that training is not a one-time event, it's an ongoing process.

Assess Needs to Enhance Strategic Planning

Evidence indicates the important step of assessing needs is often overlooked prior to education and training in many organizations. Assessments may be conducted through the use of surveys, interviews, tests, and observance of hands on performance (Stolovitch and Keeps, 2004), (Blair and Seo, 2007).

A needs assessment should be conducted before training programs are developed. An assessment should include 1) "Identifying specific problem areas in the organization, 2) Obtaining management support, and 3) Determining the cost/benefit of training" (Brown, 2002). A sense of ownership and increased value is initiated when an individual is allowed to have input into the issues addressed during training. Learning has been found to be more successful when individual perceive their issues are valued and incorporated in the training and instruction (Miller, 1998).

Establish Clear Objectives for Education and Training

Course objectives should delineate what students should achieve precisely because objectives establish guidelines for the curriculum content, the direction of the journey, and explicitly spell out the expected outcomes. The objectives can also be used by the instructor to compare actual course objectives with those in the overall curriculum. The importance of clear learning objectives are so critical that the American National Standards Institute recommends that learning objectives shall be specific and measurable as a best practice (ANSI Z490.4.3.3).

Findings and Discussion

Implementation and Delivery Strategies: How to Effectively Facilitate Learning

Instructors should serve as facilitators in addition to providing students with skills and knowledge. Instructors have the responsibility of making the learning environment comfortable and setting a tone that encourages openness and respect. Schroll notes that the "trainer's most important responsibility is to keep participants safe – which can be a challenge during the skills-building sections of emergency response training. Although the goal of training is to make training as realistic as possible, creating a realistic environment must be balanced with providing safety for participants" (Schroll 2002), (Blair, 2005).

Illustrate Key Points with Relevant Stories

Relevant stories provide many benefits for instructors and students alike. For learning, research indicates that stories can help students better understand the importance of a topic, and can aid in retention of content. Stories must be relevant to the topic at hand and not simply thrown in for humor or entertainment. Stories need not be lengthy, and the richer the details and distinctions, the better. The use of stories can empower the speaker, develop a sense of trust between the educator and participants, and establish a stronger sense of shared identity between instructor and students. Stories provide instructors a powerful tool to engage the minds of participants (Cullen, 2005).

Cullen distinguishes four categories of stories that have been used to enhance learning and labels them as the hero story, the villain story, the fool story, and the disaster story. An effective way to use stories to enhance training is to have an experienced participant share a relevant story. A story can be used to apply the material learned in the training session. For example, groups can be formed and given an in class exercise where trainees are instructed to analyze the story from the perspective of applying the skills previously discussed. Because a relevant story is more than a scenario, the skills apply to a real life experience. Using groups to resolve problems may allow specific learning objectives to be accomplished in a manner more relevant to students. Exercises allow students to experience the relevance of learned skills in a setting where students feel free to practice new skills in a secure and directed setting before applying it in the real world (Cullen, 2007).

Facilitate Meaningful Participation with Dialogue and Reflection

Burke's research suggests that high engagement training was found to be three times as effective as low engagement training. Low engagement training was defined as watching a video or listening to a lecture. High engagement training was defined as engaging in a dialogue between instructor and participants, or in a structured reflection on topics. To enhance engagement levels, instructors are encouraged to design sessions that involve a relevant case study followed by a directed activity to enhance reflective thinking. An example of a directed activity would be asking students to address one or more of the following questions. Recognition: Why did this event occur? (Or, why were mitigation steps not taken?); Lessons Learned: What did we learn to do or avoid in the future? Prevention: Ways to be proactive – how can we prevent injury? And, Application: How will we apply this systematically in our preparation of individuals for emergency situations? (Burke, 2005), (Blair, 2007), (Spielholz, 2007).

Form Focus Groups or Teams to Conduct a Needs Assessment or Prioritize Critical Issues

Focus groups can be used in the classroom to allow groups of students or trainees to share knowledge from their previous work experience or academic preparation. A more structured process than a focus group can be utilized to conduct needs assessments. One of these highly effective structured participatory methods is the Nominal Group Process. This process allows maximum participation of each individual and is used to

assess needs and set priorities. This method involves a step-by-step process led by a facilitator and allows large groups to engage in discussion by creating subgroups of 5 to 8 participants. Each subgroup is assigned a facilitator who also serves as a recorder. The first step of the Nominal Group Process is recommended for fact-finding and idea generation. Continuing the process into the next step provides the opportunity for all individuals to participate in an interactive group process for information synthesis, idea evaluation, and group consensus. The final step of the Nominal Group Process provides each member of the group an opportunity to participate in group voting to determine the highest priority or issue of greatest importance (Van de Ven and Delbecq, 1971).

Consider Using Problem-Based Learning

The concept of Problem-Based Learning (PBL) is similar to the methodology an instructor would use for a case study. One advantage of using PBL is that participants become actively engaged in the situation and must think and solve problems themselves. This is superior to simply listening to a case study that is told in a lecture style. Participants are required to think and make recommendations. With this method students are more likely to learn and to retain that learning longer. When using PBL participants are presented with a specific problem they need to solve. This method is recommended for those preparing to be emergency managers because it can be used to experience simulated events prior to being involved in a real world disaster. When designing a PBL activity the instructor can select fictitious situations or showcase elements of real events. The seven steps of Problem-Based Learning include 1) "The Case or Problem Statement, 2) The Questions, i.e., what we know, and what we need to know, 3) Action Plan, 4) Investigation, 5) Revisiting the Case: Evaluation, 6) Final Product or Performance, 7) Final Evaluation and Feedback" According to Ramsay and Sorrell PBL" is a learner-centered instructional method that enhances one's ability to analyze, synthesize and evaluate problems" (Ramsay and Sorrell, 2007). It can be described as a teaching strategy in which learners confront "contextualized, ill-structured problems and strive for meaningful solutions. It is an instructional method that uses real problems as the primary pathway of learning. The problems used in PBL activities are complex and rooted in real-world situations. They are current and reflect a typical problem encountered in the work environment specific to a particular discipline" (Ramsay and Sorrell, 2007).

The application of PBL to emergency management training is a meaningful way to engage learners because those seeking to become professionals in this applied discipline are very interested in learning through the use of real-life scenarios. (Ramsay & Sorrell, 2007) Critical to the success of PBL is the role of the instructor. Essentially, the instructor must be a facilitator of the problem-based learning process. The individuals who best facilitate learning are not simply talking heads or a sage on the stage, but have the ability to establish a relaxed and participatory environment for learning. These environments draw-in and engage participants, and stories, dialogue, reflection and PBL mixed with open listening, reflection and respect all lessen the labor of learning (Ramsay and Sorrell, 2007).

Evaluation: Continuous Improvement

Design Targeted Instructional Objectives

To be effective, instructional objectives are designed for performance in the field. A solid learning objective includes a time frame for success. Broad objectives result in confusion and serve as barriers to

learning because they lack focus on strategic implementation. Establishing criteria to meet objectives is a critical action which must occur during the design phase of training or instruction.

Assigning Pre-Course Work

According to Machles, assigning pre-course work is another strategy to enhance learning and training transfer. Through completing pre-course work, students start the process of identifying when and where the new skills will be used. Having exposure to the instructional material before the training event or instructional experience begins allows students to more fully prepare and reflect on learning objectives and course content. This strategy not only improves training transfer but it also lessens the barrier to learning of those students who might feel overwhelmed by new material (ANSI/ASSE Z490.1 – 2001),(Machles, 2002).

Content Relevance

The best instructors continually update their subject matter expertise. The field of emergency management is rapidly evolving and educators must keep abreast of the changes that affect planning and crisis response performance. Instruction must be established as a constant or foundation that provides stability as an individual progresses in his/her profession.

Evaluation for Continuous Improvement

Several methods of evaluation can be used to improve instructor skills. These include formal and informal feedback from students, invited peer evaluation of a respected educator or trainer, and/or the use of a checklist for self-evaluation and immediate self-feedback. Establishing evaluation tools to accurately measure the achievement of an objective is critical to the success of training transfer. One tool that can be used to measure transfer of training is a scorecard. Instructional objectives can be measured on a scorecard by tracking instructional expectations previously established for instruction.

Instructors teaching in the field of emergency management can borrow teaching methods and practices from the field of safety management. Research and experience suggest that effective preparation of individuals in the fields of safety and/or emergency management require a systematic approach to education and training. Initially, a practical assessment of training needs should be conducted, followed by the establishment of clear objectives. Course design incorporates the development of a curriculum which includes the assignment of pre-course work and assures content relevance. Following each instructional activity or training event, the instructor should implement both formal and informal methods of evaluation focused on continuous improvement (Machles, 2002).

Practices that training facilitators use to enhance learning include the use of stories (Cullen, 2007), dialogue and reflection (Burke, 2006), and Problem-Based Learning (Ramsay and Sorrell, 2007). The primary role recommended for trainers and educators of emergency professionals is that of "facilitators of learning" (Blair, 2007). Application of best practices for education and training can be gleaned from the field of safety management and applied to emergency management (Haight, 2008).

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合作与协调：最大限度提高社区灾害的应对策略

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【摘要】提高本地响应机构的紧急情况和灾难响应能力是本地和地区政府所面临的一项挑战。在危机和灾难事件中，应急响应组织和其领导之间的合作水平被认为是预测有效响应的关键指标。观察和文献研究发现，应急响应机构在特定目标下的应急合作水平是、社区长期应急响应水平的预报器。本文将描述当地应急响应与相关机构有效协作和协调的互动特征。协作的例子包括从欧洲到美国的本地应急响应组织。文中发现了社区组织有效进行应急响应的五大关键特征。此外，有关缺乏本地协作和社区应急响应限制相关的特征也有描述。

【关键词】合作；应急响应；灾害协调

COLLABORATION AND COORDINATION: STRATEGIES MAXIMIZING COMMUNITY DISASTER RESPONSE

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Collaboration, Emergency Response, Disaster Coordination

Abstract

Improving the ability of local response agencies to respond to an emergency or disaster is a challenge facing local and regional governments. The level of cooperation among response groups and their leaders has been found to be a key indicator in predicting an effective response by local government to a crisis or disaster. Observation and a review of the literature found the level of cooperation by responding agencies to a specifically targeted situation was a predictor of a long term community-level emergency response. This paper will describe characteristics of interactions between or among local response agencies that have been associated with effective collaboration and coordination. Examples of collaboration will be described from local response organizations in both Europe and the United States. Five critical characteristics of community organizations were found to demonstrate effectiveness in responding to emergencies. Also, characteristics will be described that are associated with a lack of local collaboration and a limited community emergency response.

Introduction

Collaboration and coordination among response groups, adjacent communities and their leaders have been found to be key elements in an effective community response to a crisis or disaster. An emergency, crisis or disaster creates the need for coordination among: fire departments, law enforcement agencies, medical personnel, utility departments, healthcare organizations, voluntary agencies, state and National Guard units and other resources. In some cases, collaboration and coordination must occur across state or national boundaries. Crises such as the wildfires that destroyed areas greater in size than the country of Belgium in the Mediterranean region will continue to be a threat. Wildfires that struck Italy, Portugal and Greece prior to the fall of 2003 would not have been controlled without "unfettered cross-border cooperation" (Sparaco and Nativi, 2003). Even with assistance from neighboring countries France's efforts in 2003 to control fires lacked the needed personnel and firefighting equipment. A lack of resources reduced the efficiency of response operations to put out the fires in southern France despite a brief period of assistance provided by neighboring countries (Auf der Heide, 2000), (Responding to Adversity, 2002), (Dahles and Van Hees, 2004) (Sparaco and Nativi, 2003). Disaster and emergencies are not confined to geographic borders; however, the response to emergencies are defined by government jurisdiction, available resources, and specific emergency response efforts.

Thesis

In this paper research is reviewed on the practical application of strategies employed by community or regional crisis response organizations to maintain or develop collaboration with various emergency response resources. Findings provide insight for community leaders to engage in or improve collaboration and coordination among community level disaster response organizations. A literature review of published research and observations of government reports were used to cite examples of collaboration and coordination at the community level.

Within this paper the term collaboration is used to demonstrate collective working arrangements whereby emergency response personnel are willing to assist in time of need. The collaboration is among emergency resources that would not be immediately connected at periods of stability from emergencies or disasters.

Coordination refers to the practice of emergency response resources functioning effectively for common outcomes or results. For coordination to occur personnel, plans, resources, regulations and other elements need to function harmoniously on a regular basis to achieve common objectives. Coordination becomes the essential structure for action in emergency preparedness. In the literature coordination and cooperation have discussed as been interchangeable terms as reflected in this paper. Collaboration during response to a disaster has been observed to be most effective if prior collaboration or coordination among organizations has occurred in practical situations prior to the disaster.

Application

Ludin (2005) found the performance of narrowly designed collaborative projects leading to implementation of a specific task was greater the more extensive the cooperation was among agencies and units throughout the entire planning and implementation process. However, quality was not found when cooperation was limited to broad general efforts rather than specifically directed to planning and implementation for a specific task. The ability of organizations to respond effectively was found to be dependent on characteristics such as the specific organizational characteristics of the organizations or units, prior experience of the group, and the level and type of stress experienced by responding groups. (Lundin, 2005), (Drabek and Hoetmer, 1991), (Bullock, et al., 2006), (Auf der Heide, 2000). A review of published literature (Auf der Heide, 2000), (Lundin, 2005), (Morrow, 1999), focused on predicting success in the collaborative response to a crisis, found the following characteristics to be present when a successful response was reported:

- Strong familiarity and trust among groups and group members working to address a crisis;
- Effective communication and the need for strong collaboration and high motivation of groups to work together in a response operation;
- The type of work associations, boundaries and level of resilience of each cooperative group;
- A history of collaborative training, drills, or exercises; and,
- Recognition by group leaders that stress will increase during a crisis and the stress levels can change based upon how decisions are made.

Each of the five characteristics will be further described in the following headings. In reviewing previous published studies reporting organizational characteristics associated with effective collaboration and response, it was apparent that the nature, magnitude, and complexities of a crisis or emergency contribute to and may determine the type of coordinated operational response needed.

Familiarity and Trust

A pre-existing level of trust and familiarity among leaders and individual members of response organizations prior to an emergency or crisis can result in improved cooperation and response. If individuals from response organizations have established a level of credibility or general trust prior to a crisis, the response of these groups to a future crisis is predicted to have a greater number of collaborative elements. One measure of predicting the potential for a high level of trust is if members from different response organizations striving to work collaboratively also live and work in the same community. Organizations collaborating from smaller communities have been found to exhibit a higher level of cooperation among groups than similar response groups living in larger communities. Increased cooperation of response groups in smaller

communities is was found to be greater because individual members of different groups were reported to collaborate informally on day to day operations during non-crisis periods prior to collaborative actions to respond during a crisis. Increased familiarity was reported to create an overall higher level of trust among response groups and resulted in greater cooperation among group members. One method some groups have used to improve collaboration among members was to create ongoing opportunities for individuals to interact socially with colleagues in a non-crisis environment. Millet (2003) reported employees have "…more effective work interaction and nurture…" and a more "…collaborative, collegial work environment when relationships are founded on social interaction" (Millet, 2003).

Communication and Work Associations

Joint efforts for a collective response require individuals to put aside personal gain and ownership. When community agencies and local governments participate in joint drills, training sessions, and response activities, the group leadership and members must be willing to participate and take direction from the other participating groups. Program planners and instructors creating and implementing training strategies and response plans need to remember to include activities that help create and maintain common ground among affected groups during training experiences (Nemeth, 2007). When first responder's exercises and drills were observed in a study published by Manoj and Baker (2007), three categories of communication challenges were identified. The three major challenges were categorized as technological, sociological, and organizational. When effective disaster communication systems were developed to address the challenges in each of the three areas, the researchers observed strong communication among response agencies and determined this communication to be one of the keys to successful inter-group or agency collaboration. Agencies who have demonstrated successful collaboration have also demonstrated that support for emergency preparedness is a continuous process and communication of messages to the population and to the emergency workforce should be coordinated (Manoj and Baker, 2007), (Langer, 2004).

Communication challenges during a crisis included the amount of information to share, the lack of uniformity and compatibility of the methods used for sharing information, and how critical information was disseminated. A lack of information can increase fear, stress, and other negative emotions for responders during a crisis response. Open communication among administration groups is an essential element for addressing security, response, and follow-up during an emergency. The ability of a local community or region to respond to a crisis or an emergency depends as much on trust and existing working relationships formed prior to the event as it does on technology and an infrastructure available to the community (Manoj and Baker, 2007), (Little, 2004).

Boundaries and Resilience

How well work relationships are maintained across groups can be influenced by several factors including an individual's informal networks, the amount of time groups spent together, and the geographic distance between collaborating groups. The boundaries set by a specific organization can either impede work by being too rigid or too weak. For organizations to achieve effective collaboration and coordination in joint activities, support must be provided to reduce stress and increase communication. Resilience of an organization is the ability of the organization to anticipate and adapt to unexpected situations. Coordination of joint activities requires groups to have the ability to synchronize an activity across teams or groups. Previous experience coordinating on smaller response events has been found to improve a group's ability to

meet the complex challenges facing local communities and agencies when a disaster strikes. Special challenges exist for decision making when groups work through a centralized hierarchical management system because in an emergency situation, individuals will be required to "suddenly work in a flatter, more dynamic, ad-hoc organization" during the response and recovery phases of a disaster (Manoj, 2007), (Nemeth, 2007), (Morrow, 1999).

Collaborative Training, Drills or Exercises

Joint participation among governmental agencies, community members and non-governmental agencies in realistic exercises or drills prior to the actual crisis has been found to be associated with a higher level of effective cooperation between agencies when an actual crisis occurred. Having a clear understanding of the role undertaken by an individual or organization during a crisis can reduce personal anxiety and stress at the time of an actual crisis. Advanced preparation and organization was found to help the appropriate personnel intervene before a conflict arises and create positive expectations during a crisis. Exercises and drills can clarify the role a team or agency is expected to carry out during a crisis. Such realistic practice sessions allow roles and responsibilities to be redefined or expanded during the evaluation session which should always immediately follow an exercise or drill. As groups and individuals take part in the problem solving and analysis of how to improve response following the drill, this review process can increase the level of ownership and understanding of roles and responsibilities among groups can emerge. This broader understanding of the roles to be followed by each participating organization can result in a reduction of single agency "territoriality" and an increase in cooperation among agencies and groups during a response (Sweeney, et al.,2004), (Seynaeve, 2001).

Actually engaging in a collaborative response during a real event has been reported to be the best way to enhance cooperation and collaborative efforts during a future crisis. Research studies have reported that demonstrating consistent behavior during joint emergency training, exercises and drills can establish trust between collaborating response groups (Eriksson, 2009).

In the United States improved collaboration and emergency response has been documented to occur through shared training and exercises. The successful formation and operation of the Eastern Montgomery County Regional Emergency Management Group is one example of how organizations within a region have worked successfully to improve collaboration in the United States. This organization was formed to bring townships, boroughs, hospitals, a school district and the American Red Cross together to collaborate in the preparation and response to emergencies. The primary reason this group of twelve organizations was formed to help stabilize response to emergencies in their own jurisdiction as well as to assist neighboring communities respond more effectively during a crisis. Following Tropical Storm Alison, this collaborative organization sponsored meetings to focus interest on mitigation, provide public education programs and implement technical training in areas such as water rescue. This group has responded to three Presidential declared disasters, military plane crashes, severe storms, terrorism alerts in the homeland and to the Anthrax threat. The group's objective is to "rapidly deploy emergency response assets to every natural or man-made disaster in a more efficient and effective manner" (Little, 2004). Each time the partner organizations work together the meet their objective of creating a more coordinated response. The joint ownership of a mobile command center vehicle by all member organizations and its deployment to enhance communication and management during a crisis over time has been an example of how continued collaboration supports coordination during crisis response events (Little, 2004), (Responding to Adversity, 2002).

During a large scale crisis, the lack of a coordinated plan and limited time spent in practice and drills can result in less than an optimal response. During the 9-11 (September 11, 2001) attacks, the first responders in New York City were the Fire Department of New York (FDNY), the New York Police Department (NYPD), the Port Authority Police Department (PAPD), and the Mayor's Office of Emergency Management (OEM). Unfortunately the Port Authority Police Department did not have standard operating procedures for describing how officers representing multiple commands should respond to a major incident like the attack on the World Trade Center. The National Commission on Terrorist Attacks Upon the United States Report (2004) stated response groups "were not prepared to comprehensively coordinate their efforts in responding to a major incident." The authors of The 9/11 Commission Report criticized a revised plan completed in May 2004 because it fell "short of an optimal response plan, which requires clear command and control, common training and the trust that such training creates" (The 9/11 Commission Report, 2004). Much work remains if leaders of response organizations are going to be ready to collaborative meet the preparedness and response demands placed on them by future disasters.

The Stress Factor

Prior to a crisis or disaster response, group leaders must acknowledge that "stress," whether perceived or real, is a condition that can impact decisions and actions. Once stress is recognized, groups can establish programs to assist their members in the management of stress during the crisis event. An important mission of emergency response groups is ensuring that emergency responders are emotionally and mentally fit to serve. Issues that impact the ability of response personnel to work effectively include: occupational stress, death of a coworker, marital/family problems, drug or alcohol addiction or financial distress (Hale, et al., 2005) (A Cooperative Approach to Building a Healthier Fire Service, 1998).

Providing responder groups' access to qualified personnel who understand psychological stress is critical. These professionals should develop, coordinate, and oversee programs focused on recognizing signs and symptoms of stress and stress reduction or management. Strategies to manage and/or reduce stress should be intrinsic components in planning efforts for: communication, warning system operations, staffing of the emergency operation center and responses to evacuation, rescue, shelter, mental or physical health services, or recovery efforts following the crisis (A Cooperative Approach to Building a Healthier Fire Service, 1998) (Seynaeve, 2001).

"There is evidence that workshops in stress management and communication skills can reduce stress in EMS workers" (Kagan, et al, 1995). When developing best practices for preparation and planning of stress management support systems for emergency responders, leaders must first recognize the need to offer different methods and strategies for diverse employee or volunteer groups. The needs of group leaders, staff groups, volunteers and individuals will vary depending on one's background, previous experience, or training (Seynaeve, 2001), (A Cooperative Approach to Building a Healthier Fire Service, 1998).

Findings and Discussion

The structure of an organization and specific characteristics such as size and complexity can encourage or prohibit collaboration and coordination among individuals or groups. The cooperation level can change if the structure or culture of the group changes. In the 1990's Southern Platte Fire Protection District was an "all-volunteer" department located in the United States near Kansas City. A high level of cooperation was reported and the moral of employees was high. The high level of cooperation among employees,

management and different units was attributed to the small size of the overall department and knowing the "chief had been elected by the firefighters and officers" (Carrizzo and Gerling, 2006). When the work load increased dramatically because of rapid population growth, the "original cooperative culture" was reported to have "deteriorated to a noticeable degree" (Carrizzo and Gerling, 2006). At this time the department had modified its organization to include full time salaried firefighters as well as volunteers. In order to deal with this deterioration in cooperation and morale, the top officers initiated a process to identity the values shared by both volunteers and career staff and integrate the values of both of these groups into the department's operation, thus creating a cooperative organizational culture with higher morale (Carrizzo and Gerling, 2006). After completing this needs and organizational assessment actions were taken by the department to increase cooperation between the volunteers and full time employees. Under this new action plan the negative change in work culture started to reverse within this organization with several units within one jurisdiction. Maintaining cooperation during a crisis is even more of a complex challenge for response agencies when they are located in communities under different national jurisdictions (Carrizzo and Gerling, 2006).

A success story for two distinct agencies from different national jurisdictions in maintaining cooperation over a twenty year period would be the fire brigades of Millingen aan de Rijn (the Netherlands) and Rindern (Germany). Since March 1972, these two fire departments have met the enormous challenge of cooperating across international borders. Describing how these two organizations maintained this cooperative effort to contain fires in the border region adjacent to their respective jurisdictions and across national borders can provide a successful example for other local agencies to establish collaborative response efforts across state or national boundaries. This successful long term collaboration was initiated when the fire brigade of Millingen aan de Rijn responded to a fire at the edge of its community and across the national border in the neighboring country. By placing a hose under the border barrier, the fire brigade was able to control the fire even though the fire did not start in the Netherland's jurisdiction. Shortly after the fire was discovered the fire brigade of Rindern also arrived, the fire was successfully extinguished. After this incident, the German fire chief contacted his Dutch colleague and these two leaders and their organizations began and maintained a long term collaborative response relationship (Dahles and Van Hees, 2004).

To overcome communication barriers twice a year members of both fire departments organized joint practice sessions. "These joint practices have a number of purposes. First, they aim at familiarizing the firefighters with the equipment and the working procedures of the fire brigade from the neighboring country. Second, they seek to identify situations that require finding solutions for (technical) problems with which the fire brigades have to deal in case of an emergency" (Dahles, and Van Hees, 2004). These technical solutions included overcoming the problem caused by the incompatibility of the use of different hose coupling systems by retrofitting hoses to have couples that could be converted to match those used in the neighboring country. Since 1972 the two groups have built on their coordination and trust based on having an affinity with local cultures that share borderlands. Joint planning and participation was evident in common emergency response exercises and drills offered each year. Also, the brigade leaders created opportunities to maintain contact between fire brigade members from both countries on a personal level. To encourage collaboration the brigades sponsored social activities for members of both brigades to meet outside the semi-annual emergency exercises. "For example, they (the brigades) compete against each other in sports and visit each other's festivities. Firefighters from these brigades also cross the border in their free time"(Dahles, and

Van Hees, 2004).

This ongoing collaborative effort from two agencies in different countries demonstrated a level of trust and cooperation, increased effectiveness during fire disaster, and reduced stress in critical situations. The two fire brigades differ in size, gender composition, intensity of practices, degree of professionalization and organizational structure. However, both fire fighting units share a strong commitment and feeling of pride at being firefighters.

In summary, familiarity and trust among groups can enhance coordination. The quality of communication and the motivation of group members to cooperate are critical to disaster response. Positive working relationships, and the ability of groups to cooperate without losing their own identity are key to coordination. Joint training for exercises and drills are active measures groups can take to increase cooperation and reduce stress among response groups (Auf der Heide, 2000), (Lundin, 2005) (Morrow, 1999).

The level of coordination and collaboration among agencies influences the ability of emergency response agencies to meet the challenges caused by complex natural or human disasters. To meet the future challenges facing emergency responders, agency leaders will need to recognize factors that impede coordination and take appropriate actions to reduce the barriers. Situations requiring an emergency response can be addressed with maximum efficiency if the people involved will optimize opportunities for collaboration among individuals and with appropriate organizations. Building and maintaining interpersonal relationships can also help organizations meet disaster challenges facing emergency responders.

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应急响应系统、服务和应用

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【摘要】每年火灾、洪水、地震和火山喷发、滑坡及其他人道主义危机对欧洲和全世界人民提出要求。随着气候变化加剧，此类事件发生的频率也在增加。随着由欧盟，GMES 联合国环境与安全监控机构联合出资的 SAFER 项目进展，应急反应服务正向全方位操作部署方向迈进。SAFER 是一项在 GMES 框架下出资并发起的大型欧洲项目。

SAFER 项目正准备为 GMES 应急反应服务的运作实现方向而努力，以加强欧洲在自然灾害和人道主义灾难事件中提供有效支持的能力。从 2009 年起，SAFER 将在欧洲及其他地区提供全方位的，如同在特定演练中的紧急情况服务。

最近的亚洲应用案例将在此描述，发言中还将展示地球观察服务的发展将是国家实现危机管理中心的大好机会。

【关键词】应急反应；危机管理；核心服务；快速映射；应激思维；民防；人道帮助

SYSTEMS, SERVICES AND APPLICATIONS FOR THE EMERGENCY RESPONSE

SAFER

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Keywords

Emergency response, crisis management, core service, rapid mapping, reactive imagery

Abstract

Every year, fires, floods, earthquakes and volcanic eruptions, landslides and other humanitarian crises claim the lives of thousands of citizens in Europe and around the world. With climate change, the frequency or intensity of such events may even increase. With the SAFER project, cofounded by the European Commission, GMES Emergency Response Services are moving one step closer to full-scale operational deployment. SAFER is a large European project funded in the frame of the GMES initiative.

The SAFER project is preparing and paving the way for operational implementation of the GMES Emergency Response Service, reinforcing the European capacity to provide efficient support in case of natural crises and humanitarian disasters. From 2009 onwards, SAFER will deliver services at full-scale in response to real emergency situations, in Europe or abroad, as well as during specific exercises.

Recent examples of applications in Asia will be described. The presentation will also show how the development of earth observations services is an opportunity for countries implementing crisis management centres

Introduction and rationale

Providing more effective response to emergencies

Efficient emergency response is highly ranked on the political agenda. Recent major disasters within and outside Europe (either natural, man-made, or complex humanitarian crisis) such as the Tsunami in the Indian Ocean or more recently the forest fires in Greece, the storm in France and the earthquake in Italy have stressed again the need to improve the European disaster response capacity.

The role played by the European Union (Emergency Response Core Service, 2007) in emergency response and disaster relief is two-fold: the first mission is to protect lives and assets of European citizens. The second one, as part of the European solidarity, is to provide effective disaster and humanitarian assistance in other parts of the world.

In December 2007, the European Parliament and the European Council recommended to strengthen the Community's Civil Protection mechanism and the co-operation between Member States in order to improve the effectiveness of emergency response in case of major disasters.

In a similar way, the European Parliament and the European Council have signed in December 2007 the European Consensus on Humanitarian Aid for improved delivery of assistance (European Commission, 2008).

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Similar needs inside and outside Europe

Disasters have more and more a cross-border nature. Their mitigation requires coordinated responses. Key criteria are speed, effectiveness and cost-efficiency and require a managed, coordinated and integrated response. The same instruments – in particular civil protection assets – are deployed by the Community and Member States to respond to the same needs within the Union and beyond EU borders, either as a stand-alone disaster response contribution or as a complement to humanitarian aid.

A clear but challenging expression of needs

Accurate and comprehensive information makes better decision-making. The users needs, expressed both by civil protection and by actors in charge of humanitarian assistance have been reported and further detailed in 2006 by the Emergency Response Core Service (ERCS) GMES implementation group and confirmed in September 2008 (BOSS4GMES, 2008) during the Lille conference. The targeted crisis situations are:

- Meteorologically-driven hazards (e.g. storms, fires, floods),
- Geophysical hazards (e.g. earthquakes, tsunamis, volcanic eruptions, landslides and subsidence),
- Man-made disasters, either deliberate or accidental (e.g. urban fires, chemical incidents on industrial sites),
- Humanitarian disasters.

Fast delivery for decision makers and in-field operatives.

The key service requirements to be implemented by Systems, services and Applications For the Emergency Response (SAFER, 2009) are:

- Geographical scope: inside and outside Europe.
- Includes reference mapping, assessment (rapid mapping) and situation mapping, crisis follow-up products, from data acquisition to delivery to the final users. Specific thematic products, depending on the type of event (floods, volcanoes, etc.) can bring additional specialised information.
- Reference maps shall be delivered in less than 6 hours. This requirement can only be met by preparing and maintaining in advance a “library” of reference maps on the world areas subject to natural or humanitarian crises.
- Optimised operational processes, including anticipation of data acquisitions.
- Information delivery to decision-makers and to in-field operatives.

The most challenging requirement is the end-to-end service delivery time: the first reference maps shall be delivered within six hours and the assessment maps shall be available in less than 24 hours for Europe and the Mediterranean basin (36 hours elsewhere).

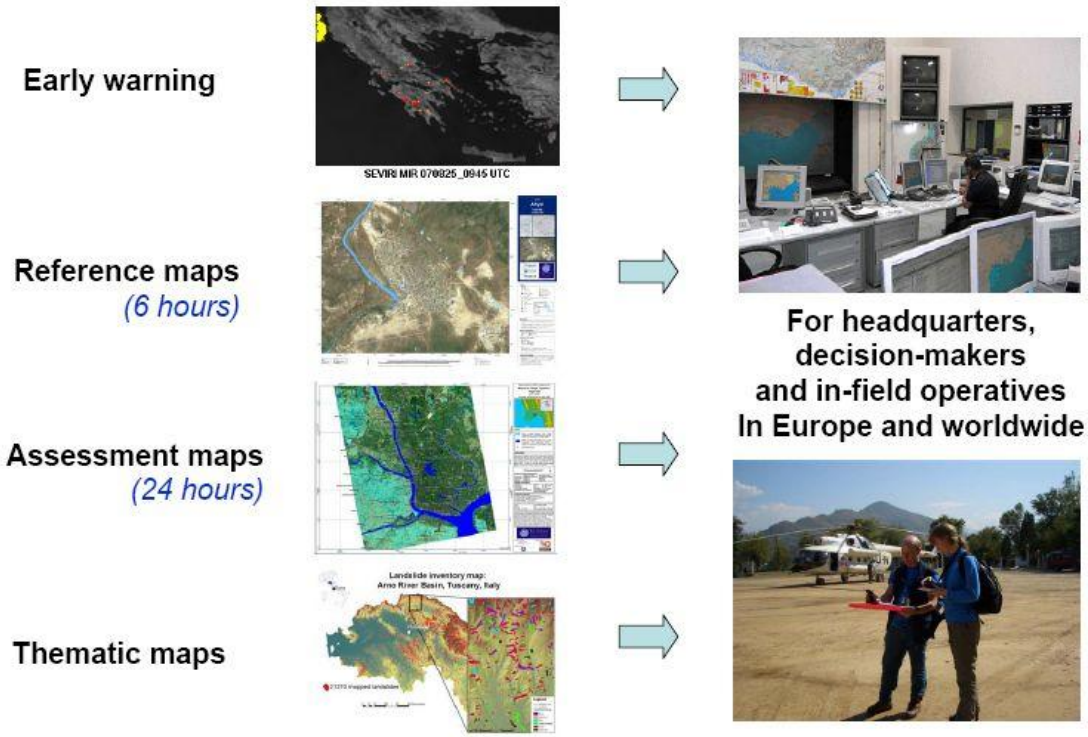

Figure 1 - The SAFER product portfolio

SAFER: From best effort to operational services

Main objective: prepare the operational services

The main objective of SAFER is to prepare the implementation of operational versions of the GMES Emergency Response Core Service. SAFER is a key contribution for the transition from pre-operational demonstrators to a fully operational and independent emergency response capacity in Europe. SAFER aims at reinforcing the European capacity to respond to emergency situations: fires, floods, earthquakes, volcanic eruptions, landslides, humanitarian crisis. The main goal of SAFER is the upgrade of the core service and the validation of its performance with 2 priorities:

- The first priority is the short term improvement of response when crisis occur, with the rapid mapping capacity after disastrous events, including the relevant preparatory services (reference maps). For validation purposes, the project will deliver, as early as 2009 a full scale service for real events or during specific exercises. The main performance criterion is the response time. Work addresses technical, operational and organisational issues.
- The second priority is the extension to core service components before and after the crisis. It targets the longer term service evolution, through the provision of thematic products, to be added in the portfolio of services. The main criterion is the added-value of products with risk-specific information.

First results, feedback of operational exploitation and impact

The main expected impact of SAFER is the integration on the service side. This action is mandatory in order to reach the critical mass and meet the targeted quality and performance of the ERCS service. Closer to the operational stage, SAFER, in particular with the "full size – real conditions" validation activities, will be a

good opportunity to foster the dialogue between the actors currently involved in rapid services and define enhanced operational processes and the related service level agreements.

As for the other GMES services, SAFER will demonstrate that efficient and shared solutions can be set up at European level, with a good balance between the mutualisation of resources and the subsidiary principle.

A user-driven pre-operational service:	Service delivered as early as 2009, with an incremental Service Level Agreement defining the levels of performance. Validation by users with the support of an independent entity (The Joint Research Centre of the European Commission).
A rapid mapping capacity:	Gradual increase of activations: 30-45-60 events per year. Reference maps available in less than 6 hours (targeted performance) Anticipation of new acquisitions, based on events monitoring, to speed-up mapping.
A more complete information content:	Reference mapping prepared in advance. More than 7 M km^2 covered. Progressive enrichment of the service with thematic maps (assets and population maps, risk maps, historical damage maps) for the different types of hazards.
An end-to-end support service:	Focal point, as single point of contact available 24/7 to manage service delivery. Service gateway for efficient access. Geo-information delivered up to the intervention field (“in-field” GIS solutions).
Preparing a fully operational service:	Service development and validation according to standard processes. Set-up of service infrastructure to allow seamless integration between service partners and with end-users. Written procedures and methods. Quality organisation. Training courses for users.

Table 1 - SAFER expected results

Products and service examples

Figures 2 and 3 are samples of products which have been delivered for validation purposes. The first map (figure 2) is a reference map to be delivered 6 hours after the alert.

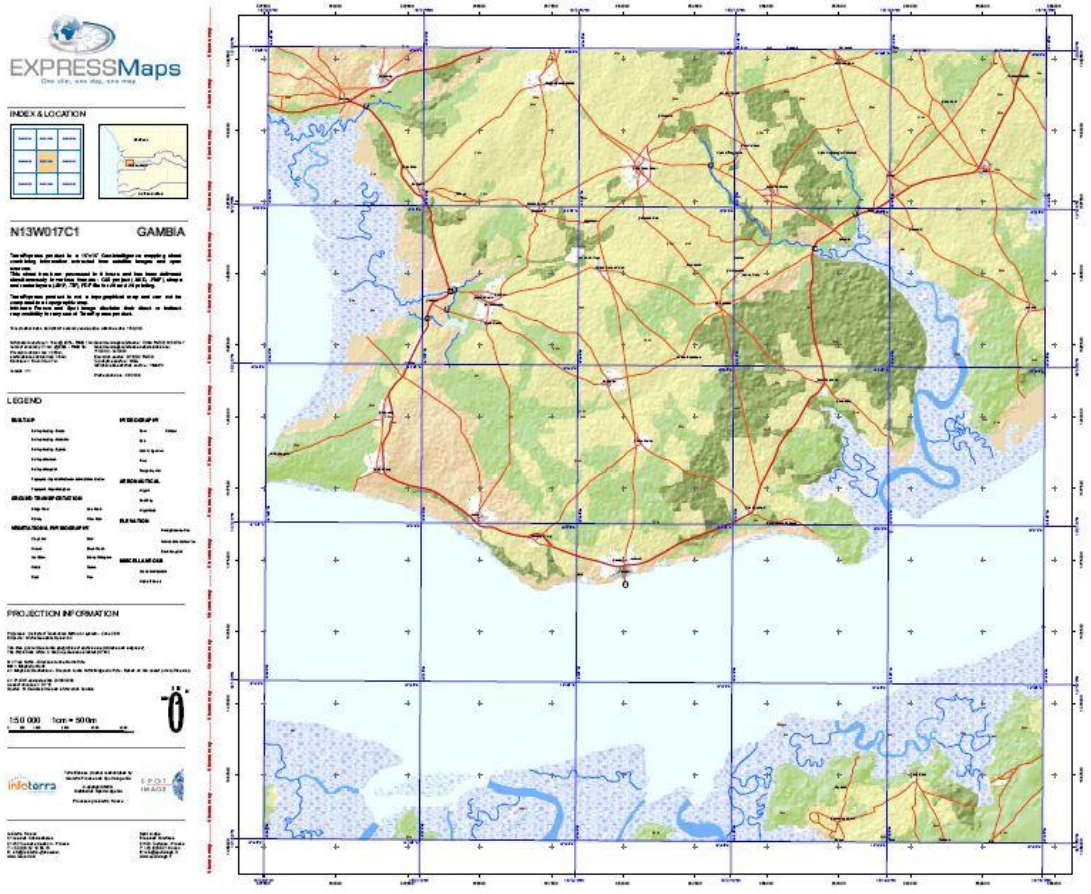

Figure 2 – Reference map on Banjul (Gambia). Copyright Infoterra - Expressmaps

The second map (figure 3) is an assessment map describing the extent of the flooded area in Tewkesbury (UK) after the severe and continuous rains having affected the city and the neighbourhood in July 2007. This map is derived from an image acquired by the Terrasar-X satellite, whose SAR sensor is able to capture information through the clouds.

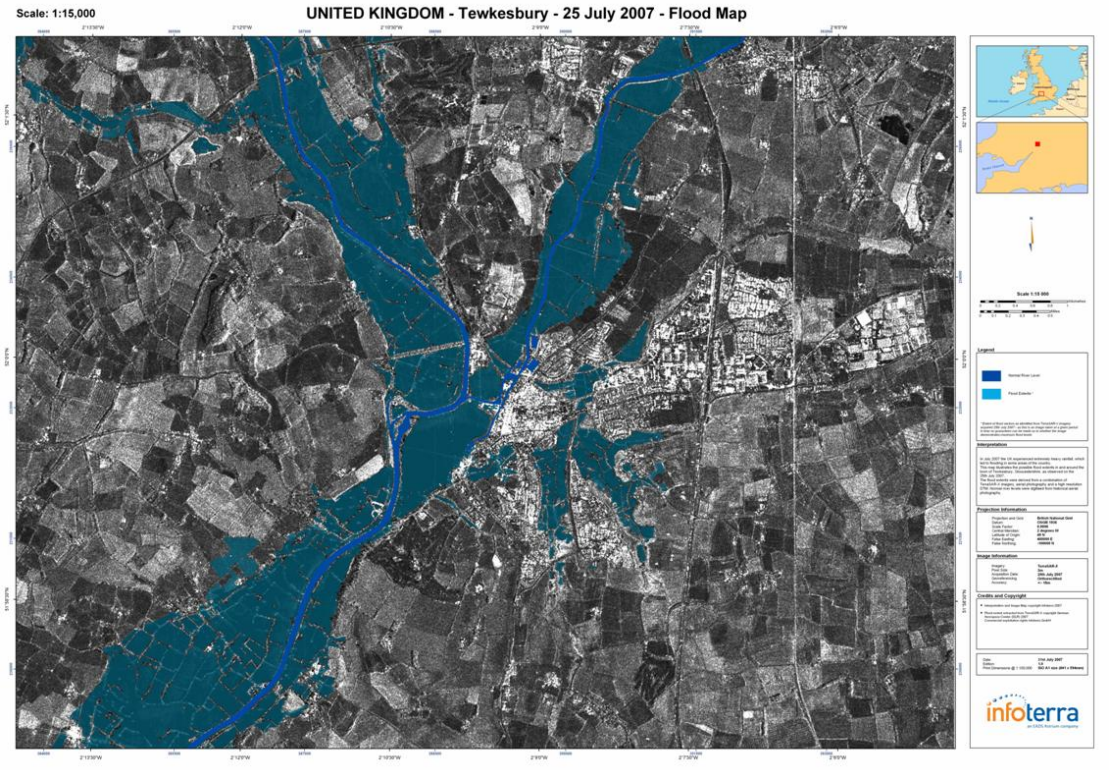

Figure 3 - Assessment map built from Terrasar-X imagery – Tewkesbury flood (July 2007)

The challenge of the timeliness performance: the operational organization of the service

The experience of the previous projects shows that, for a reactive and time-critical service as targeted in SAFER, an "operational coordinator" of the service is necessary. This operational coordinator must ensure the end-to-end management of an operation (a crisis response support), coordinating all the actors that will contribute to the service (data acquisition, value-added provision of different types), and the interface to the users.

This need is recognized in the ERCS Implementation Group report which states: "The ERCS focal point represents an expert layer able to harmonize and coordinate the activity of the providers consortia and of European agencies and centers, to receive through the national or European focal points user information requests and to decide and finalize effective operational steps (e.g. to perform the negotiation with a mission plan to acquire new data, to verify the suitability of the actual available input dataset, etc.)

The role of the SAFER focal point also appears in the functional architecture as depicted in the ERCS Implementation Group report, shown below in figure 4.

One of the operational innovations brought by the SAFER service organization is the ability to anticipate reference maps production and data acquisitions when early signs of an upcoming crisis occur (in example hydro-meteorological forecasts for flood, etc.), or when the first information regarding the effective start of a crisis arrives.

This anticipated activity allows to work in "hidden time", and thus to improve the delivery delay with respect to the effective user request.

Figure 4 - SAFER organization and operational model

SAFER implementation: a European consortium with a wide expertise

The SAFER consortium, coordinated by Infoterra France, includes 54 partners from 16 countries (29 private organisations and 25 public institutions). With users such as European civil protection authorities or international UN agencies, SAFER is built around a core team of European industry and research institutes that have gained experience in this area within the framework of both the EC's Sixth Framework Programme for Research and Technological Development and ESA programmes (including PREVIEW, RISK-EOS, RESPOND, TERRAFIRMA, LIMES and BOSS4GMES). A wide network of scientific partners and service providers extend the European dimension of the project, in particular to the EU New Member States. The total budget of this three year project is € 40 M with a € 27 M grant funded by the 7th Framework Programme for Research and Technological Development of the European Commission. SAFER is therefore one of the largest projects launched at European level in the frame of the GMES initiative.

Conclusion

In order to achieve the successful transition from a research and project-driven logic to sustainable operations, the main identified challenges are:

- Setting up an appropriate organisation and management structure at European level with three requirements:
  1) Political engagement,
  2) Link with users at European, national and regional level,
  3) Clear mandates to service operators,
  4) Pan-European organisation and activation rules for non European users.
- Defining the right balance between mutualisation of resources at European level and subsidiary at regional / member state level.
- Securing long term public funding for the operation of core services.

– Guaranteeing continuity of Earth Observation sources, not only for the core services but also for the sustainable operations of the downstream services.

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Gil Denis has dedicated numerous years of his professional experience into the development of applications and services for crisis management and disaster relief mitigation based on Earth Observation Services. Those works started first in Astrium company and later on in Infoterra France company through numerous involvement into the Global Monitoring of Environment and Security European projects which show the development and setup of the SAFER services in recent years.

Frank Bignone from Spot Infoterra has numerous scientific research works in the field of automation of mapping techniques both from satellite and airborne data. He was working first as research engineer in the Zurich Federal Polytechnic (ETH) school before joining the Infoterra company. He is now leading the Chinese branch of Infoterra Asia / Pacific based in Beijing.

用生活 7 领域模型阐述在疏散场地上有特殊要求的灾民处境

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【摘要】日本成年人的生活快节奏意味着那些平时需要特殊照顾的老年人数量在灾难中会迅速上升。这种必然的迹象在最近日本发生的 2 次地震中显著呈现，并作为一个社会问题受到公众的关注。在 2004 年 Niigata 洪水中，15 名遇难者中，有 12 名年龄超过 65 岁。Mid-Niigata 县地震，超过 1000 名需要看护的老年难民滞留在应急帐篷中。

有特殊需求的灾民需要熬过每个阶段的支持：①转移到避难场所；②住到避灾帐篷中；③住在临时房子里；④重新开始生活。这些支持的目标必须是在灾后通过自力更生来重建生活。然而，这些过程并不是通过一个整体来规划的。在 2007 年 Niigataken Chuetsu-oki 地震中，地方政府恰当的应用了过去两次灾难的经验，在灾后生活重建中对有特殊需求的灾民提供了特别护理，研究阐述了那些有特殊需求，尤其是那些通过日本认证关怀工人协会的努力，居住在避难帐篷里的灾民的处境。该协会 2007 年向 Niigataken Chuetsu-oki 地震受灾区域派出了专业的志愿工作人员。我们采访了他们中的一些人来建立这种假设，并调查了其中的 50 人来描述避难场地的处境。我们同时也发现生活 7 领域 JACCW 模型可以作为支持灾后有特殊需求灾民的框架体系。

【关键词】有特殊需求的灾民；2007 年 Niigataken Chuetsu-oki 地震；生活 7 领域 JACCW 模型；社会福利；风险管理

Clarifying the Situation of the Victims with Special needs on Evacuation Site Using the 7 Livelihood Domain Model

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Keywords

Victims with Special Needs, the Niigataken Chuetsu-oki Earthquake in 2007, 7 Livelihood Domain JACCW Model, Social Welfare, Risk Management

Abstract

The rapid pace of aging in Japan implies that the number of elderly persons requiring special care will also increase rapidly in the time of disasters. The sure sign of this state was seen in the recent two disasters occurred in Japan, which were received public attention as a social problem of suffering of the elderly. In the 2004 Niigata Flooding twelve of 15 fatalities were over 65 years. The Mid-Niigata Prefecture Earthquake caused over 1000 elder refugees staying in emergency shelters, who needed nursing care.

The Victims with special needs require the support for going through each phase; 1) move to evacuation site, 2) live in evacuation shelters, 3) live in temporary housings, 4) rebuild the life. The final destination of those supports must be the self-reliance efforts to realize rebuild the life after disaster; however, the process is never planned as the whole. At the time of the Niigataken Chuetsu-oki Earthquake in 2007 the local governments properly applied their experiences of the past two disasters to realize the intensive care of the victims with special needs through the whole process of rebuilding the life after disaster

This study clarified the situation of the victims with special needs especially in the phase of living in the evacuation shelters through the activity of Japan Association of Certified Care Workers, which sent the professional volunteers to the disaster-stricken area of the Niigataken Chuetsu-oki Earthquake in 2007. We interviewed some of them to build the hypothesis and surveyed 50 of them to clarify the situation on the evacuation site. We also found the 7 Livelihood Domain JACCW Model could be used as the framework to support the victims with special needs after the disaster.

Sections

1. Support for victims with special needs during disasters in Japan

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The fact that elderly persons accounted for more than half of the victims of storms and floods in Japan in 2004, and that the nation officially entered the era of the so-called "super-aged society" (i.e., those aged 65 or above accounting for 21% or more of the total population) in 2007, have prompted Japan to work towards establishment of a system for providing evacuation support and other assistance to the elderly and other victims with special needs at times of disaster. Between 2005 and 2007, the Cabinet Office announced a series of guidelines for local authorities to follow in terms of assisting victims with special needs during disasters.

The Niigataken Chuetsu-oki Earthquake, which struck in 2007, saw implementation of proactive and innovative measures to assist victims, particularly those who are vulnerable. A Local Welfare and Health Headquarters was established in a health center in the disaster area (Kashiwazaki City) where volunteers specializing in the fields of medicine, health, and welfare assisted victims, focusing on vulnerable persons. The main measures were: 1) establishment of nine welfare evacuation centers to assist the lives of vulnerable persons as evacuees, and 2) a health and welfare requirements survey conducted on all households in areas where damage was severe in order to ensure the safety of those afflicted by the disaster who remain at home.

In the Chuetsu Earthquake of 2004, volunteers with specialist knowledge entered the afflicted area mostly autonomously, and staff from local municipal authorities independently coordinated the activities of volunteers. While the support offered by the specialist volunteers were extremely effective for the victims, the role of managing the volunteers fell on local municipal authorities, and the disjointed nature of contact between the volunteers and the authorities made it difficult to strategically coordinate the relief effort. With such circumstances in view, the Niigataken Chuetsu-oki Earthquake in 2007 saw the prefectural authorities establish a Local Welfare and Health Headquarters and actively recruited specialist volunteers through industry organizations with an aim to strategically provide support for vulnerable persons while coordinating the overall relief effort. As a result, the relief measures were implemented with the participation of a total of 2,100 specialist volunteers in 19 days.

2. Assistance for victims who remained at home

The Local Health and Welfare Headquarters placed the confirmation of the safety of victims who remained at home as its first priority, and conducted a health and welfare requirements survey. All 24,424 households in the 15 particularly heavy-hit districts in Kashiwazaki City were surveyed over 19 days from July 21 to August 8. The survey was conducted by total of 1496 researchers, comprising health nurses, social workers, care workers, and teaching staff from nursing schools amongst others, divided into 720 teams (the majority of researchers were health nurses). As a general rule, a team comprising a pair of researchers visited a household with a pre-written questionnaire to obtain information such as previous medical histories, current medical treatments, and presence of any subjective symptoms with regards to the respondents and their families, and took separate details of any individuals who required assistance so as to ensure that they receive the necessary service. The survey contributed in particular to the discovery of 293 individuals who required assistance as a matter of priority.

The results of the survey conducted in Kashiwazaki City revealed that the main issues facing those who required assistance were as follows:

[Care] Difficulties caused by service usage restrictions, inability to contact care manager.

[Mental health care] Insomnia, depression

[Medical Service] Interruption to medical treatment, worsening of chronic conditions

[Parenting] Child regression, child anxiety

[Disabilities] Uncertainties of being at home after leaving care facilities

[Intractable Diseases] Care difficulties even for day service / day hospital users

<Others> Problems with daily life (e.g. unable to bathe / tidy) etc.

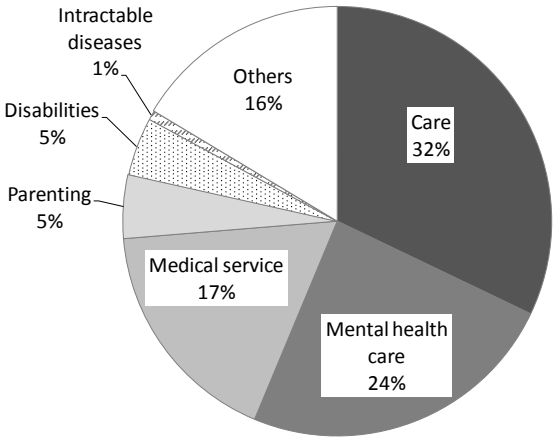

Figure1. The results of the survey conducted in Kashiwazaki City

3. Dealing with vulnerable persons at evacuation centers

Welfare evacuation spaces, which have a better environment in comparison to regular evacuation spaces, are facilities that are set aside for use by those who require special assistance at times of disaster. Specifically, welfare evacuation spaces are allocated one specialist for approximately every ten vulnerable persons, and items required by vulnerable persons are provided by the state. However, as of 2007, advance designations of welfare evacuation centers had not been in progress. This was because local authorities lacked understanding of the type of environment required due to lack of previous experience. In the aftermath of the Chuetsu-oki offshore earthquake, Niigata prefectural authorities and the local municipalities in the afflicted area actively worked to secure welfare evacuation spaces, resulting in the establishment and operation of nine welfare evacuation centers. These welfare evacuation centers were used over a total of 46 days by 2335 people. The Chuetsu -oki earthquake was the first full-scale establishment of welfare evacuation centers in Japan.

4. Activities of specialist volunteers

In this paper, the situation surrounding persons requiring special assistance during disasters in terms of evacuation life assistance is uncovered through activities of volunteer care workers from the Japan Association of Certified Care Workers (JACCW) who worked in the areas afflicted by the Niigataken

Chuetsu-oki Earthquake. The JACCW is a professional body of nationally certified care workers who, as specialists in the care industry that supports the aging society, engage in care services for the elderly and the disabled in care facilities and hospitals or through home care 5). The JACCW's activities in the areas struck by the Great Hanshin Earthquake in 1995 prompted it to commence dispatchment of disaster relief volunteers. A group interview was conducted on several care workers who worked as specialist volunteers in disaster-afflicted areas in order to comprehensively uncover the conditions of evacuation lives of victims, particularly those of persons requiring special assistance, as observed by the workers through their activities in the afflicted areas.

The seven livelihood domain model, proposed by the JACCW, are used to model concepts that represent the target framework for supporting those requiring special assistance. In addition to food, clothing, and housing, which represent the fundamentals of living, the model further assesses physical health, mental health, family relationships, and social relationships in order to establish the state surrounding the mind and body as well as the family and social backgrounds of users. These are used to analyze the causes and backgrounds of difficulties facing the users in order to deliver solutions. From the point of victims, disasters are events that destroy or alter their lives. After saving the lives of the victims in the aftermath of the disaster, there is a need to comprehensively and objectively determine, using the seven livelihood domain model, aspects of their livelihoods that still have potential and areas where they require assistance in order to recover.

Table1. Activity areas of Care workers

Assistance	Activity	#	%
Prevention	Prevention of disuse syndrome	24	48
Bathing	Assistance in bathing by undressing and dressing them	20	40
	Assistance in bathing by guiding them	19	38
	Direct assistance in bathing	16	32
Detect needs	Communicating with the victims to establish their needs	15	30
	Participating in the survey to establish the needs of those who remained at home	13	26
Bathing	Assistance in taking fluid after bathing	12	24
	Assistance in setting table	12	24
	Assistance in cleaning table	10	20
Environment	Assistance in organizing environment in shelters	9	18
Toileting	Assistance in toileting by guiding them	8	16
Bathing	Keeping watch at the time of bathing	8	16
Eating	Disseminating food and materials	7	14
	Direct assistance in having food	6	12
	Making observations about the health condition	6	12
Bathing Prevention	Assistance in dry bathing	6	12
	Assistance in exercising for care prevention	6	12
Toileting	Direct assistance in toileting	5	10
	Assistance in cleaning up portable toilets	5	10
	Making observations about the health condition	4	8
Bathing	Making observations about the health condition	2	4

5. Details of activities of specialist volunteers

Fifty individuals who participated as care work assistance volunteers were asked about the location and details of their activities. It was revealed that 37% of the respondents participated in care work support in regular evacuation centers, 23% participated in care work support in welfare evacuation centers, 21%

participated in the safety confirmation survey conducted on victims who remained at home, and 10% participated in care work support in care facilities and institutions.

The 50 individuals who participated as care work assistance volunteers were asked "What specific activities did you participate in?" to obtain responses about the types of activities that they carried out in the afflicted areas. The responses were arranged in order of frequency and divided into categories. The activity that the largest number of volunteers participated in was prevention of disuse syndrome (24 respondents), followed by assisting patients in bathing by undressing and dressing them (20 respondents), guiding them (19 respondents) and through direct assistance (16 respondents). This was followed by communicating with the victims to establish their needs (15 respondents) and participating in the survey to establish the needs of those who remained at home (13 respondents). The effective method of bathing assistance is for the carer to provide comprehensive assistance from undressing and dressing, guidance, direct bathing assistance, hydration, and keeping watch, to making observations about the health condition of the patient, with the same carer making continual observations over an extended period of time; however, the questionnaire revealed that this type of assistance was not necessarily made available in the disaster-afflicted area.

6. Status of disaster victims in terms of the seven livelihood domains.

The Japan Association of Certified Care Workers (JACCW) established the concept of the livelihood domain model for defining its sphere of activities. The Model is called “The 7 Livelihood Domain Model”, which consisted of 7 elements should be focused on; Clothing, Food, Housing, Physical Health, Mental Health, Family Relationship, Social Relationship. We also found the 7 Livelihood Domain JACCW Model could be used as the framework to support the victims with special needs after the disaster.

Figure 2. The conceptual scheme of Care Workers

6.1. Clothing

Lack of access to clean clothes was the issue that was most commonly cited by care work support volunteers as a problem that faced disaster victims, with 46% of the total considering it to be a problem. While laundry facilities were available in some evacuation centers, they were not in others, and this was the only response which almost 50% of all respondents regarded as an issue that required addressing.

Table2. Victims' condition (Clothing)

Victims' Condition（Clothing）	%
Lack of access to clean clothes	46
Lack of any change of clothes	24
Unable to purchase any clothes	20

6.2. Food

There were no aspects which more than 50% of all respondents thought to be a problem for the disaster victims. The most commonly cited problem was that the food was not nutritionally balanced (38%), followed by the supplied food not catering for restrictive diets (34%).

Table3. Victims' condition (Food)

Victims' Condition（Food）	%
Food was not nutritionally balanced	38
Supplied food not catering for restrictive diets	34
Unable to purchase any food	24
Not to drink enough fluid	18
Pattern of meals is not suitable for victims	18
Way of conserving food was not appropriate	14
No opportunity of setting/clearing table by oneself	10

6.3. Shelter

The issue that was most commonly cited by care work support volunteers to be a problem facing disaster victims was the lack of privacy, with 64% of all respondents considering it to be a problem. This was the only response that more than 50% of the respondents regarded as an issue that required addressing.

Table4. Victims' condition (Housing)

Victims' Condition（Housing）	%
Lack of privacy	64
No enough bedding to maintain good health	28
Not well-establised living space for each victim	26
Temperature or humidity was not appropriate	18
Not good enough condition for Moving around	16
Living space in the condition of poor hygiene	12
There was the difference in level on the floor	10

6.4. Physical health

With regards to physical health, the issue that was most commonly cited by care work support volunteers to be a problem facing disaster victims was the lack of opportunity to move the body. This was considered to be a problem by 52% of all respondents. This was the only response which almost 50% of all respondents regarded as an issue that required addressing.

Table5. Victims' condition (Physical Health)

Victims' Condition（Physical Health）	%
Lack of opportunity to move the body	26
Suffering poor health	20
Lack of access to primary care docto	17
Lack of enough opportunity of bathing	17
Having problem in excreting	12
Having diseases	11
Having pain	10

6.5. Mental health

Insomnia caused by anxiety was the issue that was most commonly cited by care work support volunteers to be an issue facing disaster victims, with 56% of all respondents considering this to be a problem. This was followed by build-up of stress due to unfamiliarity with communal living arrangements. Insomnia caused by anxiety was not particularly discussed in detail during the group interview, but many respondents raised this issue.

Table6. Victims' condition (Mental Health)

Victims' Condition（Mental Health）	%
Insomnia caused by anxiety	56
Getting stressed out to living togher in shelters	52
Feel unmotivated because of protracted life as evacuees	44
Remain deep in the shock by the earthquake	40
Feel conflict because of expecting return to the condition before the earthquake but it was impposible	34
Be left bihind out of the movement toward rebuilding their lives	30
Want to discuss about their problems but cannot	30
Tolerating lower living situation	30

6.6. Relationship with family

There were no issues which were cited by more than 50% of respondents to be a problem facing the disaster victims. The issue that was most commonly cited to be a problem was changes to relationships within family (36%), followed by victims not wishing to burden their children (34%).

Table7. Victims' condition (Family Relationship)

Victims' Condition（Family Relationship）	%
Aggravating relations with family retionship	36
Hesitating to cause children into any trouble	34
strengthen the bonds between family members	32
Adding to his caretakers' burden	30
Become clinically evident everyday problems about family relations	22

6.7. Relationship with society

With regards to relationship with society, there were no issues which were cited by more than 50% of respondents to be a problem facing the disaster victims. The most commonly cited issue was the unavailability of services that are normally available (38%), followed by family members losing their jobs as a result of the workplace suffering damage from the earthquake (34%).

Table8. Victims' condition (Social Relationship)

Victims' Condition（Social Relationship）	%
Not Receive everyday services in welfare program	38
Losing jobs	32
No opportunity of going out	28
Any friends not visit shelters	28
Feel lonely	26

7. Summary

The most crucial problem that was revealed was that frameworks for providing assistance that aims towards rebuilding of independent lives in the next stage after the evacuation stage were not shared among relief workers nor had there been such a system in place. Specifically, although Local Welfare and Health Headquarters and administration departments (i.e., prefectural and municipal authority staff) played a role of co-ordinating the allocation of tasks to care work volunteers, the staff lacked sufficient knowledge in the field of welfare; this resulted in undermining of the effectiveness of task allocation. A further factor that undermined the effectiveness of the relief effort was the fact that while other professional bodies (such as nurses) were also active, there was a lack of opportunity for such groups to communicate effectively between each other so as to co-ordinate their efforts.

In the future, it is necessary for specialist volunteers in the fields of medicine, health, and welfare, to 1) refine their respective skills in providing assistance to disaster-afflicted areas and organize them in a way that can be shared, and 2) develop specific means through which specialists in each field can remotely share information in the field about disaster victims (i.e., those receiving assistance), and through which users without specialized knowledge can transmit information.

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Selected Publications:

TAMURA, K., "Defining Recovery: 7-Element Model", Journal of Disaster Research, Vol.2, No.6, pp.475-483, 2007.

Academic Societies & Scientific Organizations:

Institute of Social Safety Science (ISSS)

Japan Society for Natural Disaster Science (JSNDS)

Japan Society for Civil Engineers (JSCE)

采用 GIS 使灾民生活恢复过程的状态可视化

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【摘要】在日本，一旦灾难发生，地方政府会为灾民提供各种行政支援计划。然而，并没有一个主数据库来管理他们的反应日志。由于这类数据库的缺乏，他们不能确定在生活恢复过程中有问题的灾民。为解决这个问题，我们在研究中提出了一个集成的主数据库，称为“灾民主数据库”（VMDB）。VMDB 由 2 种数据库组成：一种是主数据库，另一种是更新数据库。在 VMDB 中，我们将灾民的身份证 ID 设置为统一关系键，而更新数据库由地方响应站在灾后创建。使用 VCID，地方响应站可以在生活恢复进程中通过任何类型的数据库浏览灾民的当前状态。

基于这一理念，我们于 2007 年 Niigataken Chuetsu-oki 地震后，在 Kashiwazaki 市设计并开发了 VMDB。使用 VMDB，Kashiwazaki 市识别了那些有能力应用行政支援计划而未采取行动的灾民，并采用个人支援计划来支持他们。采取这种方式，95%以上的灾民应用了行政支援计划。

此外，我们还提出了一个有效方式使得生活恢复进程中的灾民当前状态作为一种公共操作图在地图上可视化。 这种可视化由三层组成：一个是总体任务层，另一个是片段式灾民组任务层，最后一个是个人任务层。在这项研究中，我们在一张集成地图上，使用 GIS，在这三层上实现了可视化。利用可视化技术，地方响应站开发了公共操作图，并为居住在临时住所里的灾民设计了有效的支援计划。

【关键词】GIS 灾民主数据库；临时住所；长期生活恢复；公共操作图

VISUALIZATION OF VICTIMS STATUS IN LIFE RECOVERY PROCESS USING GISTITLE

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GIS, Victims Master Database, Temporary Housings, Long-term Life Recovery, Common Operational Picture

Abstract

Once disaster occurs, local government provides many kinds of administrative support programs to victims in Japan. However, there is no master database to manage the logs of their response. Due to this lack of master database, they cannot identify victims who have problems in the process of their life recovery. Against this issue, we proposed the integrated master database which is called "Victims Master Database (VMDB)" in this research. VMDB is consisted of two types of databases: one is Master Database and the other is Updating Databases. And in this VMDB, we set Victim Certification ID as the unified relational key since Updating Databases would be constructed by local responders after disaster had struck. By using this Victim Certification ID, local responders can browse the current status of victims' life recovery progress from any kinds of databases.

Based on this concept, we actually designed VMDB and developed it at Kashiwazaki City after 2007 Niigataken Chuetsu-oki Earthquake. By using VMDB, Kashiwazaki city identified the victims who did not take actions for administrative support programs they can apply, and supported them with individual support plan. Due to this activity, over 95% of victims had applied to administrative support programs.

Furthermore, we proposed an effective way to visualize the current status of victims' life recovery progress on map as a common operational picture. This visualization should be consisted of three layers: one is overall tasks layer, another is segmented victim groups tasks layer and the other is individual tasks layer. In this research, we implement this visualization in three layers on one integrated map by using GIS. By using this visualization, local responders developed common operational pictures, and they designed the effective support plan for victims lived in temporary housings.

1. Introduction

1.1. Background and Objectives

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In Japan, we had many disasters such kinds of devastating earthquakes, heavy rainfalls, snow disasters recently. Once disaster occurs, the degree of damage due the disaster, the larger the number of people whose everyday lives are destroyed, and it takes long time for those lives to be recovered. In order to support for their life recovery process, local governments provide many kinds of administrative services to them.

However, it is difficult for these local governments to come to understand the progress that victims are making in the recovering process because there is no master database that integrates many kinds of information on the victims and they have no way to develop the common operational picture (COP). In the background of this issue, it is general for each department of local governments to manage information gathered from victims independently due to bureaucratic sectionalism. Furthermore, each database, which is managed independently, has no relational key to connect it to the others because the standardized relational key is never necessary to carry out their daily work before the disaster occurrence. Against this issue, in this research, we aimed to develop a new integrated database, the Victims Master Database (VMDB), to manage the integrated information regarding the status of victims' life recovery process.

Furthermore, in this research, we aimed to development the method to develop the COP to grasp the progress in the victims' life recovery process using GIS. Without the COP, they cannot make rational decisions in supporting for victims. Based on the conclusion of this advanced research, we focused on the belief that GIS should be an effective tool for the development of COP of the progress victims are making in the process of recovering their lives. Considering our purpose, we conclude visualize the progress victims' life recovery process in order to design support plans for victims who need help.

In this research, we designed and developed the VMDB with geo-reference and a management application for the VMDB, and applied them to Kashiwazaki City which was severely affected by 2007 Niigataken Chuetsu-oki Earthquake. Finally, we focused on the victims lived in temporary housings, generally they have many kinds of problems in recovering their lives, and supported local responders to develop COP in GIS which allow one to visualize the status of progress victims in temporary housings are making in recovering their lives.

1.2. Summary of 2007 Niigataken Chuetsu-oki Earthquake

On July 16, 2007, a strong earthquake struck the Chuetsu area, located in the center of Niigata Prefecture. This earthquake is called the "2007 Niigataken Chuetsu-oki Earthquake". It had a magnitude of 6.9 on the Richter scale. By this earthquake in Niigata prefecture, as many as 1,259 buildings totally collapsed, 5,480 buildings were heavily damaged, 15 people were killed, and 2,315 people were injured (Fire and Disaster Management Agency, 2009).

Especially Kashiwazaki city, which is located nearest by the epicentre of this earthquake, is a typical provincial city in Niigata Prefecture, with a population of 94,644 in 33,684 households (2005 Census). 1,110 buildings there were fully damaged, and 4,524 buildings were partially damaged in the earthquake. Furthermore, concerning human suffering, 15 people were killed and over 2,000 people were injured. Due to this damage, Kashiwazaki had to provide many kinds of administrative support programs to the victims in order to assist them in rebuilding their lives.

In this response, they have to pay close attention to provide the administrative support programs to victims fairly and impartially. Although they have to understand the actual status of victims' lives in order to achieve

their mission, they have no standardized way to do it. Concerning this situation, we selected Kashiwazaki city as a case study area for applying our research.

2. Design and Development of Victims Master Database

2.1. Work Flow of Administrative Support for Victims Life Recovery Process

Once disaster occurs in Japan, local governments provide many kinds of administrative services to victims whose lives are destroyed. Before they provide these services, however, they have to identify who the victims are and who is eligible for the support programs. To implement the identification of victims, governments has to carry out building inspections to assess the damage to buildings, to construct a database to hold the results of these building inspections, and to grant to the victims certification of the degree of damage to their buildings.

As described above, local responders managed the logs of their work in an independent database after they carry out their work. Therefore, it was difficult for them to use the database as the basic information for the subsequent support services to victims. Against this issue, firstly we have to manage those information in an integrated database. In this process, however, it is unable to connect each together because there is no master relational key.

Against this problem, in this research, we decided to develop a database with geo-reference for the results of building inspections, and to grant certification of the degree of building damage based on this geo-database. Furthermore, we proposed the development of the Victim Master Database (VMDB) to manage various kinds of information on the victims in order to utilize the geo-database of building damage certification to ensure the effective and prompt provision of services to victims. Subsequently, local responders would be able to provide many kinds of administrative support to victims effectively and certainly, based on the VMDB. This effective workflow we proposed is shown in Figure1. Following this workflow, local government can develop the integrated database which is VMDB with geo-reference. As a result of development, they can manage the basis for development of Common Operational Picture to visualize of the progress of victims life recovery process.

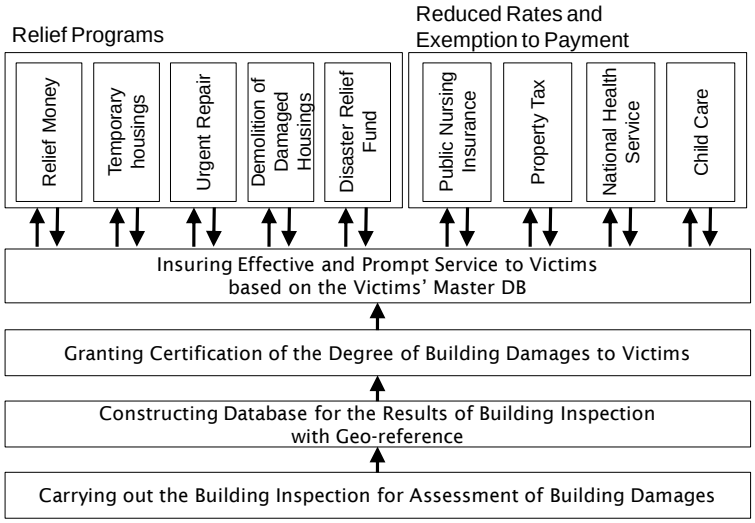

Figure 1. Work flow of administrative support

2.2. Design of Victims Master Database by Integration of Independent Databases

In order to provide the administrative support programs to victims effectively and rationally, all information related to the situation of the victims must be managed appropriately in an integrated database: the VMDB. In developing the VMDB, we should connect many different databases which are managed by each department. Some of them are used in the daily business of local government, and others are constructed in response to disasters. However, it is unable to connect those databases with simple method of table join with relational key because the individual databases have no unified relational key. In this research, we tried to set appropriate relational keys for each database. We then connected all databases, one by one, through their individual relational keys to develop the VMDB shown in Figure2. In this figure, we emphasize that the Granted Certification of the Degree of Building Damage have the geo-reference information. By inheriting this geo-reference of the damaged buildings, VMDB can be given the geo-reference, and then VMDB can be treated in GIS.

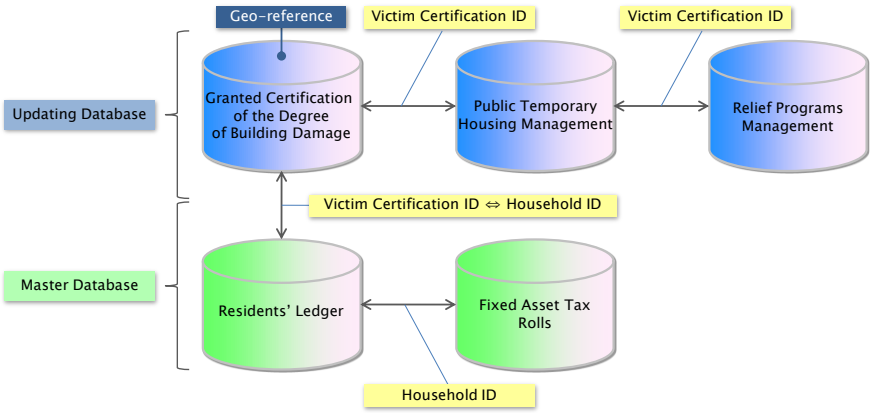

Figure 2. Configuration diagram of Victim Master Database

In developing the VMDB, those databases should be divided into two categories: one is Master Databases and the other is Updating Databases. While Master Databases are consisted of Residents' Ledger and Fixed Asset Tax Rolls, Updating Databases are consisted of Granted Certification of Degrees of Building Damage DB, Public Temporary Housing Management DB, and Relief Programs Management DB. Through the division of these databases, the stored information becomes highly reliable. Note that we set Victim Certification ID as the unified relational key since Updating Databases would be constructed by local responders after disaster had struck. This Victim Certification ID should be inherited to any databases following the work flow of local responders.

3. Development of Information Management System for VMDB

3.1. Definition of Requirements for VMDB Management System

Needless to say, VMDB cannot be utilized effectively unless local responders manage the VMDB certainly. In order to manage the VMDB effectively and certainly, we designed and developed the

Information Management System for VMDB which is called “VMDB-MS”. In designing of VMDB-MS, we defined major six system requirements by analyzing of interaction between users and VMDB-MS. Especially in this research, we would apply this system to the consultation counter in local governments in which victims come and consider their life recovery plan. The six requirements are that VMDB-MS should (1) improve the efficiency of consultation, (2) present accurately the complete picture of current situation response, (3) require only law level of IT literacy, (4) control the quality of stored information, (5) connect with other databases or other computer applications, and (6) protect victims’ personal information securely.

Especially local responders were not familiar with IT systems, so we have to design the User-Interface of VMDB-MS simply. Furthermore, VMDB can manage the detail of personal information about victims’ lives, so we deal with their personal information with extreme caution, and VMDB-MS also should be designed and developed completely to protect those information.

3.2. Development of VMDB-MS in Two Types

By following the six requirements as described in previous section, we developed actually VMDB-MS at Kashiwazaki City and they used this system in the consultation work after 2007 Niigataken Chuetsu-oki Earthquake. Mainly this system can gather the personal information about victims’ live and how the local responders provide the administrative support programs to victims. The user-interface to browse these information is shown in Figure 3. Thorough this user-interface, local responders register the personal information of victims and logs of their response into VMDB following their work flow.

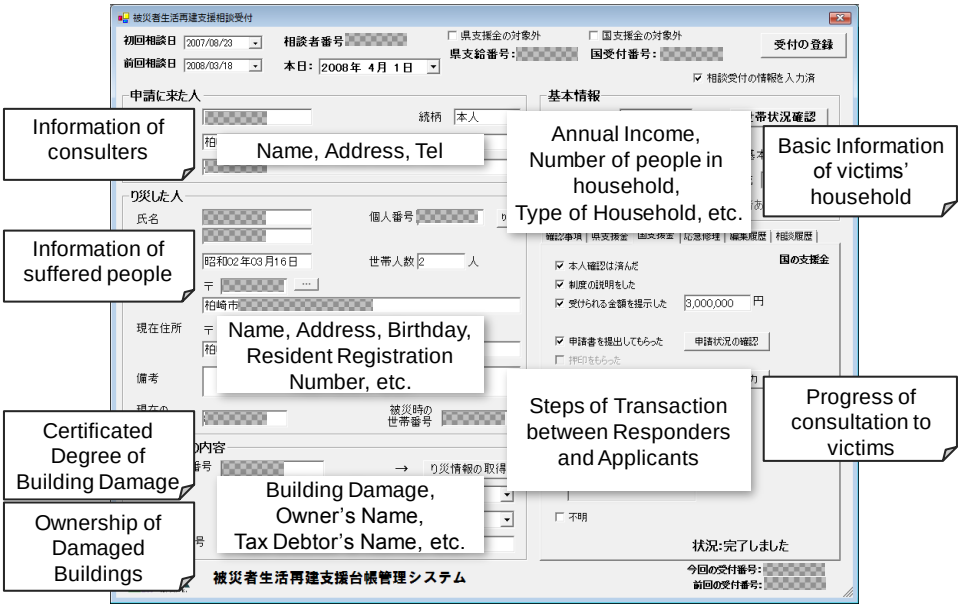

Figure 3. User-interface for browsing the result of consultation with victims

Additionally, victims who live in temporary housings have severe problems in their life recovery process, so it is difficult for them to recover their life by themselves. To these kinds of victims, Kashiwazaki city

decided to provide individual support continuously. To do this, they visit each victim and determine the needs of the individual victims. From all departments of city, local responders do this response. To support this response, we developed a simple application to register the problems determined in their visit into VMDB. Figure 4 shows one user-interface to collect and register the problems which victims have. Especially, by using this application, information collected can be broadly categorized into visit reports and life recovery status.

Items of information collected in order to determine the status of life recovery are based on 7 elements of life recovery according to Tamura et al (2001). These elements are "housing", "communication", "community", "preparation", "mind and body", "livelihood" and "interaction with the authorities". By organizing individual circumstances into these elements, it is possible to assess the type of expertise required, or the type of support measures which are lacking. These information is collected on each household level and it allows individual circumstances to be accurately ascertained for local responders. This collected information is used as a basis for creating common operational pictures.

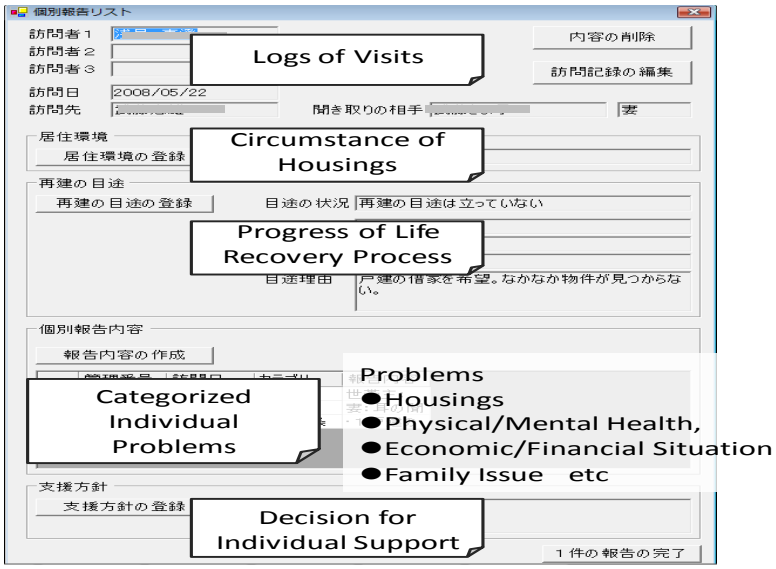

Figure 4. User-interface for browsing individual problems

4. Implementation of VMDB and VMDB-MS

4.1. Implementation of VMDB following the Consultation Work

By using this developed application, local responders at Kashiwazaki city carried out the consultation work and registered the information about the status of victims' life recovery process into VMDB continuously. As the result of this registration, VMDB got rich and local responders can understand the big picture and detail status of the progress in victims life recovery process. Figure 5 is a graph of the transition of the amount of information on victims stored in VMDB. Now, the information of over 90% of victims is stored in VMDB.

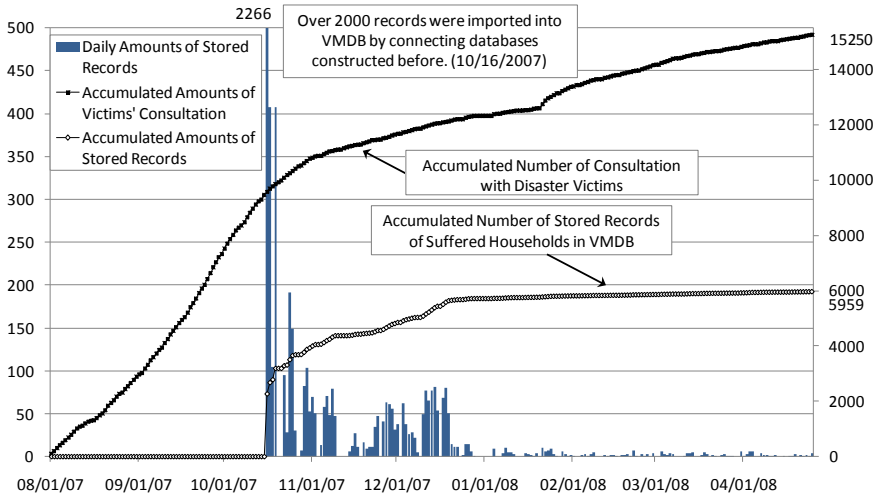

Figure 5. Transition of the amount of stored information on Victims in VMDB

4.2. Implementation of Effectively Support for Victims by Using VMDB

By development of VMDB following the local responders' work as described in previous section, Kashiwazaki city run the model of effectively support victims' effort to recovery their lives as shown in Figure 6. In this model, local responders identify the victims who can qualify for administrative support programs from VMDB. Next, they can assess victims' action whether they applied to the programs or not. By this assessment, they can recognize which victims are necessary to be provided an individual support. After that, local responders determine the reason why these victims cannot take actions by clarifying their problems. Considering their problems, local responders design the individual support plan for them, and promoted their life recovery process aggressively.

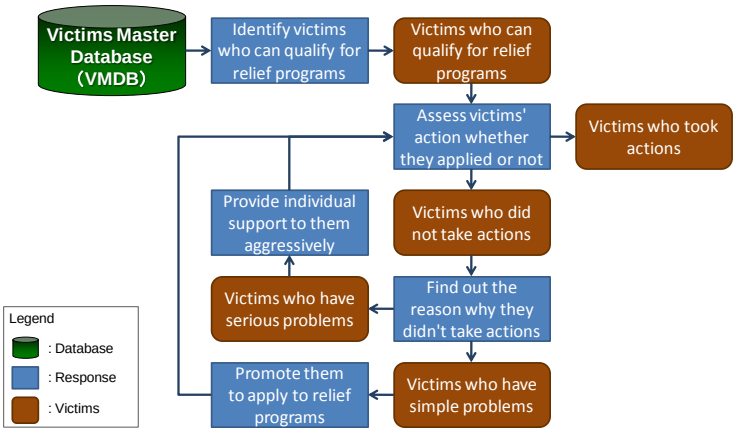

Figure 6. Model to effectively support victims' efforts to rebuild their lives

By running this model based on VMDB, over 95% of victims who can qualify for the administrative support programs had applied to the programs and they got the administrative support rationally.

Furthermore, victims who lived in temporary housings did leave the temporary housings and they went ahead with their life recovery plan by the deadline of closing the temporary housings.

5. New Visualization Technology with GIS for Creating COP

5.1. Proposal for 3 Layer Types for Situation Visualization to Create COP

In achievement of effectively support for victims, it is not enough for them to summarize the victims who have problems as a style of list. We developed the COP about the status of victims' life recovery progress periodically. In this development of COP, we proposed three types of layers for situation visualization as described below. By combination of these three layers, the COP can help local responders to design and implement the more supportive plan for victims who have problems in their life recovery process.

(1) Overall tasks layer

This layer allows local responders to understand a big picture by a panoramic visualization of the overall status across the entire area under the responsibility of the authority. This layer helps them to estimate how their support programs are implemented. Firstly local government design the support programs to help victims' life recovery process. This program has a large area-wide effect across the area under the jurisdiction of the authority, then a large number of applicable disaster victims can utilize this support for their life recovery.

(2) Segmented victim groups tasks layer

Victims who have problems in their life recovery process can be classified to some segments. By visualizing their status in this layer, local government can design the more specific support plan to each segment of victims with problems. To visualize their status in this layer, local responders should retrieve the information of victims' characteristics from VMDB.

(3) Individual tasks layer

In this layer, individual circumstances for each disaster victim are ascertained and visualized on an individual level. By visualization in this layer, individual needs can be ascertained and individual support measures can be devised. Therefore, this layer is one that supports detailed support measures which meet the needs of individual victims which do not get addressed until the end.

5.2. Implementation of Situation Visualization with GIS

By following three layer types as described above, we designed a visualization template using deformed maps. This template can visualize the status of victims' life recovery progress in three layers in an integrated map. This template shows in Figure 7. Each housing in this map template connected victims household ID in VMDB and their individual problems are stored in VMDB. When local responders selected a kind of problems, the status whether victims have problem or not is visualized on this map easily and quickly.

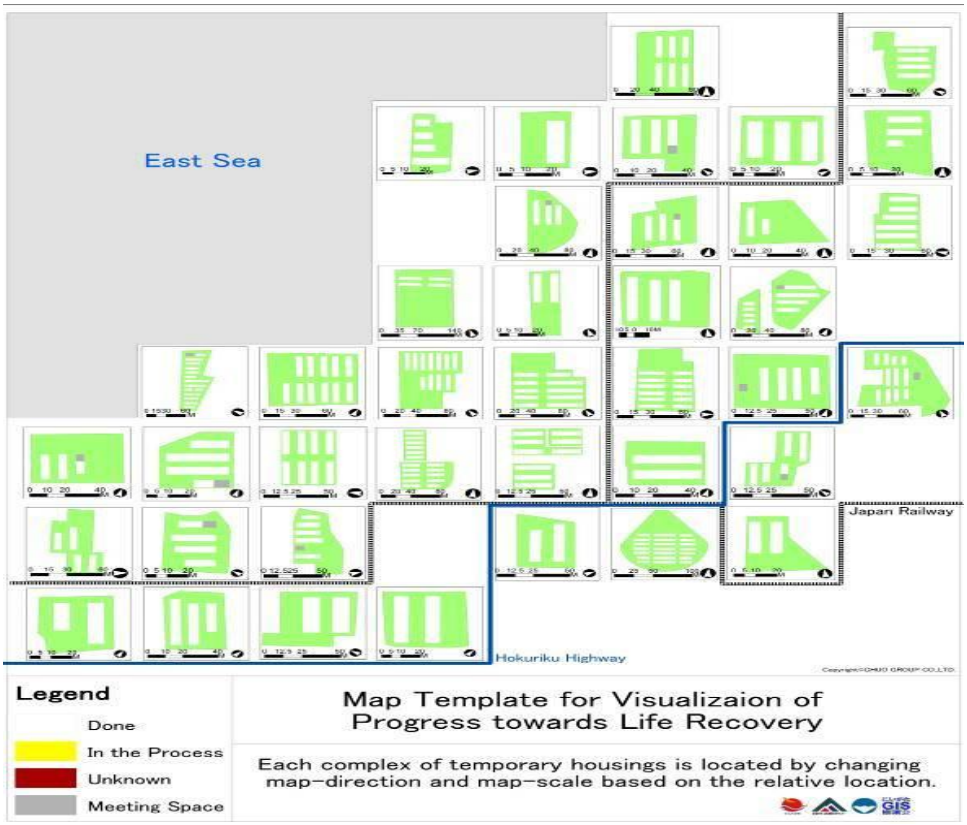

Figure7. Map Template to Visualize Progress of Life Recovery in Temporary Housings

By using this map template, we actually visualized the current status of victims' life recovery progress following three layers as proposed in this research. This visualization helped local responders to make rational decisions at important time phase, for example in the phase to design new support programs, to merge the temporary housing facilities and so on.

(1) Visualization of overall recovery status for temporarily housing

This map spatially visualizes information which shows the overall progress towards recover and any issues which are outstanding. This allows local responders to gain an overall understanding of the progress of various administrative support programs being carried out. By this visualization, local responders can make decisions in terms of merging of temporary housing facilities with small numbers of occupants effectively.

(2) Visualization of temporary housing recovery schedule on a housing complex scale

In this map, one temporary housing complex was considered as one unit, and the occupancy statuses of temporary housing were visualized according to expectations of reconstruction progress. This map can help local responders to design the maintenance plan in advance, for example snow removal operations and control of quality of water in water tanks.

(3) Visualization of reconstruction policy on a household basis

This map visualizes outstanding issues and reconstruction progress statuses on a household-by-household basis. Based on this map, many kinds of local responders carried out the discussion to solve the issues for each individual household. In this case, they browse the individual problems and individual status of current victims' lives with the application developed in this research as needed. Figure8 shows the victims who had family issues in the way of life recovery, and the victims who had physical or mental health issues. The red point in these maps address the victims have such kinds of problems.

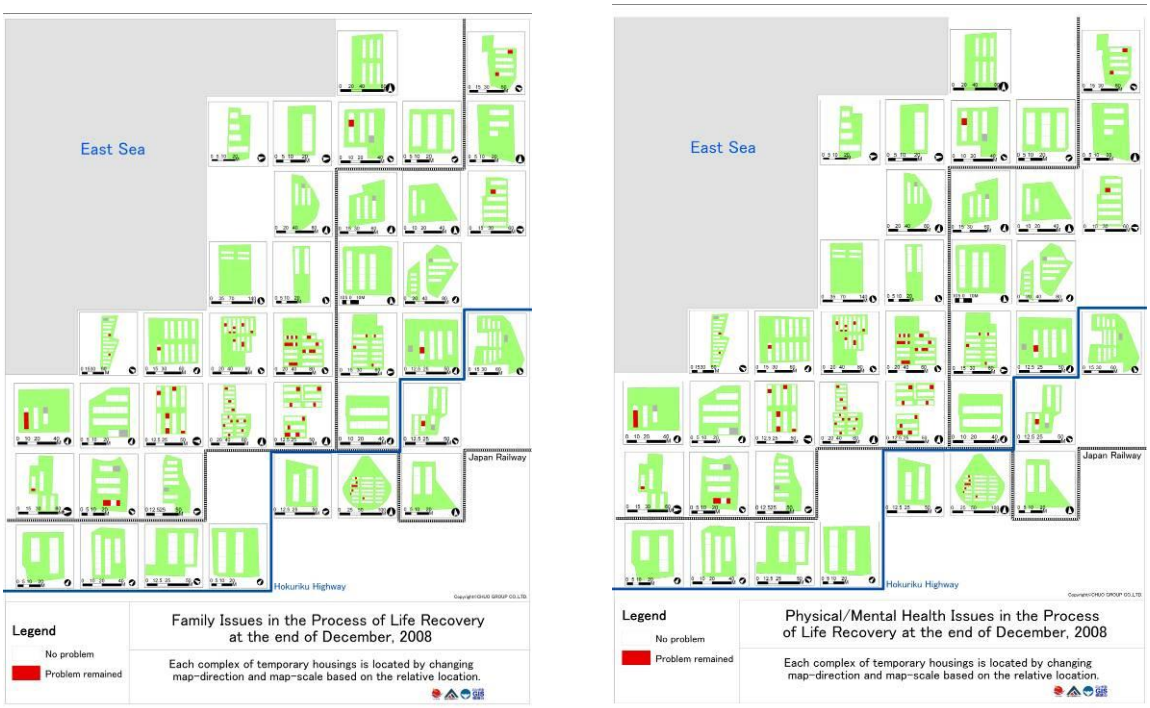

Figure 8. Visualization Map of Victims with Family and Physical/Mental Health Issues

6. Conclusion

In this research, we insisted the necessity of an integrated database which can manage the status of victims' life recovery progress, and designed this integrated database as Victims Master Database. Following this design, we actually developed VMDB at Kashiwazaki City after 2007 Niigataken Chuetsu-oki Earthquake. Before this disaster, there is no master database such as VMDB in Japan. By applying this VMDB at the site of disaster response, the local responders carried out their work with VMDB, and VMDB has gotten rich following their work continuously. By using this VMDB, they identified the victims who did not take actions for applying to the administrative support programs, and they promoted them to apply to the programs.

However, some victims, who cannot make progress in their life recovery process by themselves, have many kinds of problems. These problems relied on their characteristics. As a solving method to this issue, we proposed a new visualization technology using GIS which develops the Common Operational Picture in three layers. By development of COP, Kashiwazaki city designed the supportive plan in advance, and solved the individual problems through the discussion with many kinds of responders based on the COP.

Needless to say, all victims have not recovery their lives completely even if temporary housings were closed. Kashiwazaki city have continuously assist such victims, taking their individual circumstances into account. Following this issue, we aim to improve our application and the scheme of VMDB in the near future. And also, we should apply our concept described in this paper to other future cases and should standardize the VMDB and this developed application. When we achieve this standardization, we believe in contributing significantly to implementation of effective and rational life recovery support for victims.

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基于本体论的灾情调查知识管理

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【摘要】研究如何在救援现场移动数据采集系统中，通过本体论方法实现知识库的智能管理。利用灾情调查数据规范，实现了调查数据的智能管理。利用网络本体语言（Web Ontology Language——OWL）抽象了灾情调查数据规范的本体模型，通过本体推理，采集系统能够自动根据灾害类别向调查人员派发调查表和背景数据，所研究的基于本体论的灾情调查知识管理方法能够辅助指挥员准确快速地做出决策并启动后续救援行动。

【摘要】本体论 知识管理，应急响应，灾情调查

ONTOLOGY‐BASED KNOWLEDGE MANAGEMENT IN DISASTERINVESTIGATION

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Key words

Ontology‐based Knowledge management, Emergency Response, Disaster Investigation

Abstract

The focus of this paper is ontology‐based knowledge management in the framework of a mobile field data investigation system for rescue operation. We present a data service, combining prior domain knowledge about planning the large‐scale disaster operations. For description the knowledge, we represented the ontology of disaster investigation by OWL. Then the survey tables and background recourses are provided

by ontological reasoning and sent to field Investigators. In this way, headquarter can increase the speed of make decision and lunch rescue following operations.

1 Introduction

Collecting data of disaster area as soon as possible is a key step for emergency response and rescue. Currently, IT is not limited to operation control headquarter any more. As the mobile information technology deploying at a disaster site, the work of disaster integration need a large amount of data as decision supporting, including electric maps and materials of disaster area. More important a serial of invitation forms are selected according to the judgment of operation director before investigators setting out. By contrast traditional time‐cost procession model, we proposed a new ontology data service, which generates a task data package from knowledge base on ontology reasoning. In this way, task data can be prepared more effectively and preciously. Smart managing data also is convenient for pull task to all team members' mobile device through wireless communication network no matter where they are. This is meaningful to quickly deploy rescue teams.

This paper is divided into five parts. After making a survey on the related research work about emergency field data management and ontology engineering in section 2, we abstract a concepts view of disaster investigation in section 3. Then, section 4 introduces properties and restrictions of concepts. In last section we explain the logic view of ontological reasoning to implement the data management.

2 Relative works

Ontology is a formal description for sharing the conception model between information systems[1]. This means ontology has four features: Conceptualization，Explicit，Formal， Share。From application, Ontology is a semantic basis of communication (co‐operation and information exchange) between agents (people, machine and information system). In another words, A formal rule provide by ontology can be used in knowledge sharing and reusing [2] [3]. In recent, ontology is descript by semantic web. Lot of effort has been directed towards creating markup languages for ontology specifications, which includes XML, RDF [4], DAML/OIL [5] and OWL [6]. OWL is the new standard proposed by W3C for capturing the semantics of documents on the web.

Because the restriction of ontology explains the complex logic relationship between conceptions, there has been a main application domain that built a decision support system based on formal logic rezoning. Many systems have been implemented in above way. Such as, SHARE project has employed ontology service for fire rescue [7]. Then, using this ontology, Xiang Li [8] implement a prototype emergency evacuation planning system. Wei Xu [9] makes a full research in Crisis management using ontology, in which tempo‐spatial knowledge management is mentioned emphatically. Our following work extract concepts towards the requirement of disaster investigation at first, then implement the task planning based on the ontology.

3 Conception model

This section focuses on building the conception and hierarchy of investigation knowledge. In investigation operation, director analyses the status by the type and lose of disaster, then design the detail plan of investigation. The detail plan is constructed by bellowing parts: effective area, response plan, survey tables, staffs arrangement. After rough reports are sent back according to certain period, each level administrative

department should sum up those reports and submit to upper institution before the deadline in the regulation. Based on the Ministry of Civil Affairs of China emergency regulations, we extract a concept model (DIC) shown in Fig.1

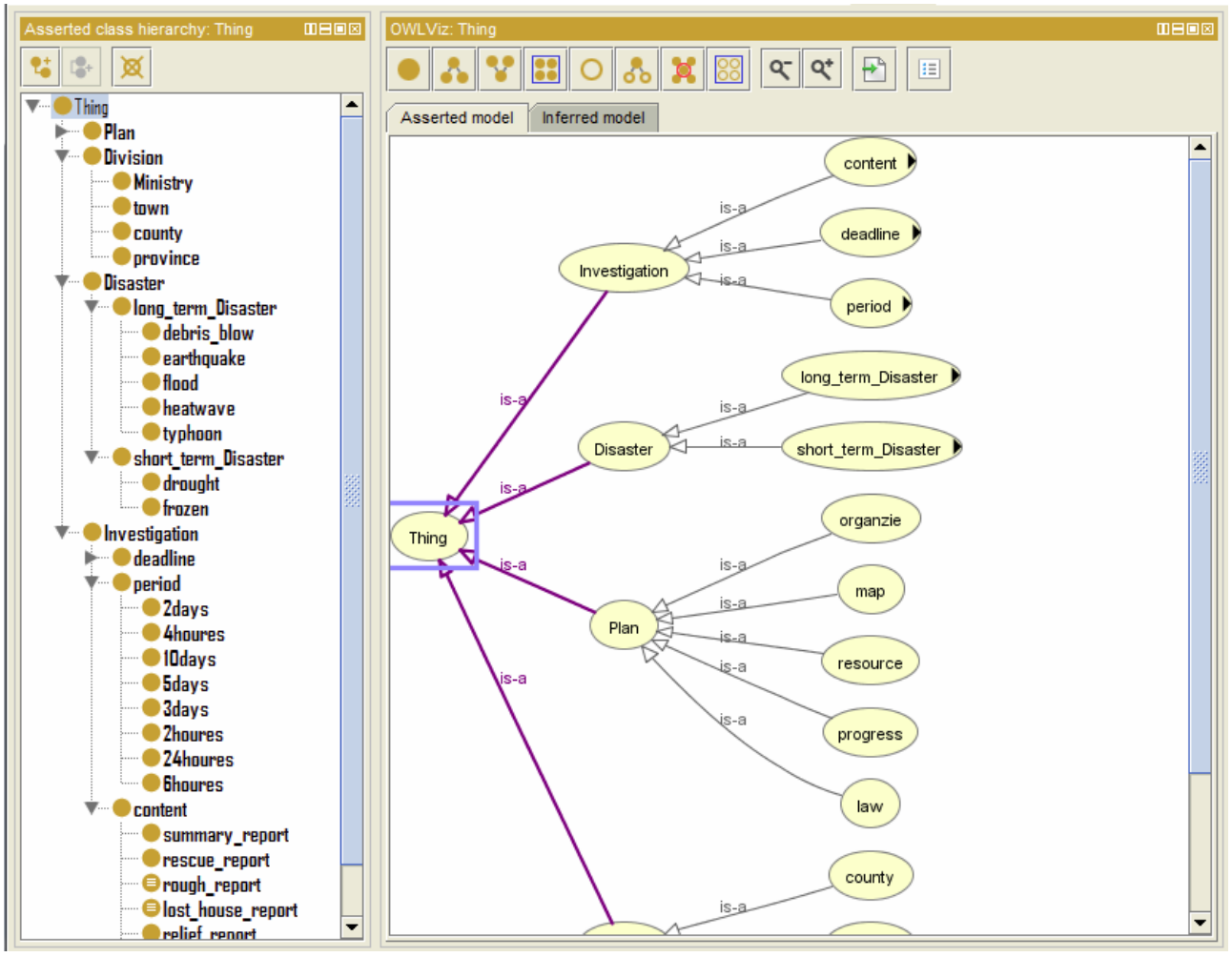

Figure 1 Concept diagram of Disaster Investigation conception model

DIC divides four domain concepts: Plan, Division, Disaster and Investigation.

Disaster descript the facts of disaster event, which is the hypothesis of deploy investigation operation. As different disaster need different survey table, we divide two sub-object (long_term_disaster and short_term_disaster) by urgency.

Division descripts the institution who should participate in the investigation operation. We extract 4 sub-conceptions such as ministry, province, county and town in proper order. Lower Level division has responsibility to report to survey result to upper division.

Plan represents the emergency respond plans are established by every level division. We take it as a knowledge base, which is divided into map, resource, law, procession, work organization and so on. If the operation is decided, data management service will pick up corresponding items form knowledge base.

Investigation descripts the field survey task, which can be represented as (T, P, R). T is the submit deadline, P is the Period between next submit, and R is report data. As standard, we summarized all survey forms to

rough_report, verified_report, summary_report, lose_house_report, lost_people_report, rescue_report and relief_report. In our application, a task list which contains above 3 items will be generated and publish to investigators.

4 Properties and restrictions

In schema web, data property represents restrict between two objects. We extract a serials

restrict, shown in Fig.2, which are the basis of ontology reasoning.

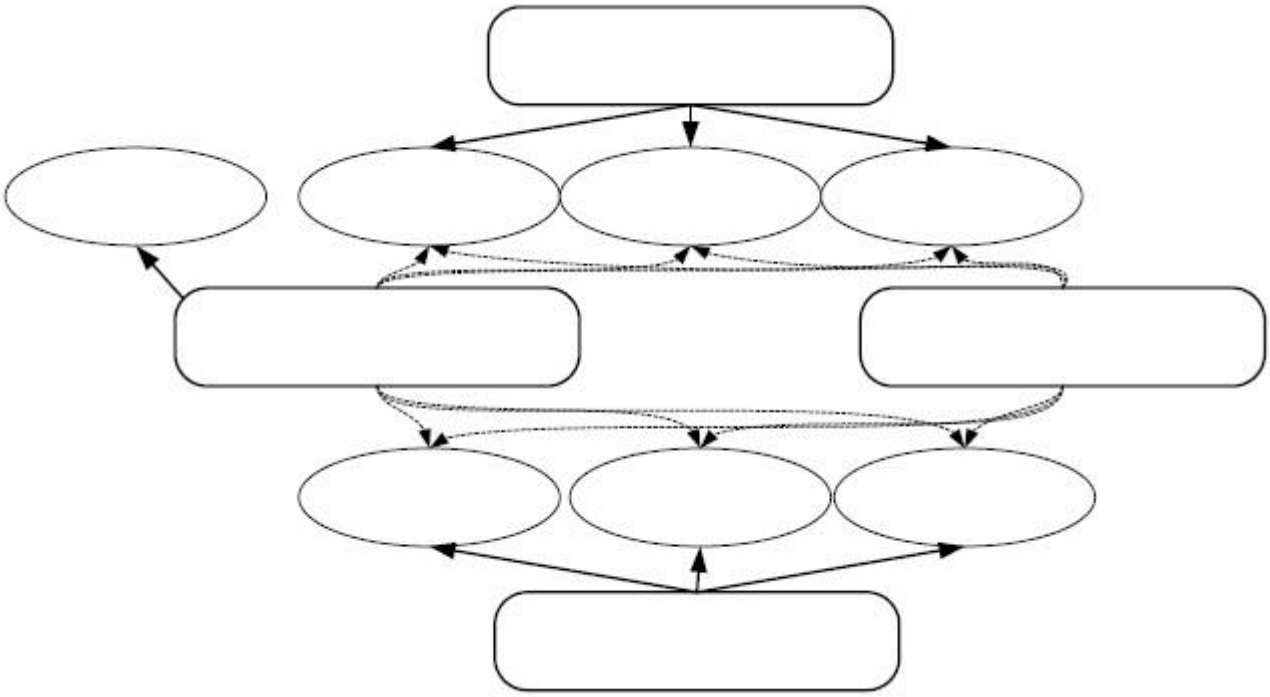

Figure 2 Restrict diagram of Disaster Investigation conception model

Disaster relates three properties (Disaster_type, Urgent_level and Death_Toll) which define the fact of the disaster. Besides Division includes three properties (Report_to, Count_from and Establish by) which define the agent of investigation and emergent respond. By above property, we build a template of reasoning (shown as Table.1)

Table 1 a formal template of DIC restriction

Disaster and (Death_Toll max ?n) and (Disaster_type some ?a) □ Content
Division and (Content_type some ?b) and (Report_to some ?c) and (Count_From some ?d)□time
Division and (Content_type some ?b) and (Report_to some ?c) and (Count_From some ?d)□period
n denote some integer,
a denote object set of disaster {flood, earthquake …},
b denote object set of content { rough_report, verified_report, …}
c, d denote object set of division{ ministry, province, county and town, …}

5 Applications

The ontology of disaster investigation is descript by owl (segment is shown in table 2). We apply DIC to build a reason system, which takes the fact of disaster as input and outputs an investigation task list. The input is contracted by administrative division, disaster type and death toll. Beside the output list include following items: report time，report period，report division, survey tables and emergency respond plan). Our work has been adopted by NERSS's Rescue and Respond System. As the whole system put into operation, it will play an active role in speed up the large scale rescue activities.

```
<!-- http://www.semanticweb.org/ontologies/2010/2/Ontology1267940289785.owl#12_AM -->
- <owl:Class rdf:about="#12_AM">
  - <rdfs:subClassOf>
    - <owl:Class>
      - <owl:intersectionOf rdf:parseType="Collection">
          <rdf:Description rdf:about="#deadline" />
        - <owl:Class>
          - <owl:complementOf>
            - <owl:Restriction>
                <owl:onProperty rdf:resource="#Death_Toll" />
                <owl:onClass rdf:resource="#Disaster" />
                <owl:minQualifiedCardinality rdf:datatype="http://www.w3.org/2001/XMLSchema#nonNegativeInteger">10</owl:minQualifiedCardinality>
              </owl:Restriction>
            </owl:complementOf>
          </owl:Class>
        - <owl:Restriction>
            <owl:onProperty rdf:resource="#Content_Is" />
            <owl:someValuesFrom rdf:resource="#verify_report" />
          </owl:Restriction>
        - <owl:Restriction>
            <owl:onProperty rdf:resource="#Count_From" />
            <owl:someValuesFrom rdf:resource="#province" />
          </owl:Restriction>
        - <owl:Restriction>
            <owl:onProperty rdf:resource="#Report_To" />
            <owl:someValuesFrom rdf:resource="#department" />
          </owl:Restriction>
        </owl:intersectionOf>
      </owl:Class>
    </rdfs:subClassOf>
  </owl:Class>
<!-- http://www.semanticweb.org/ontologies/2010/2/Ontology1267940289785.owl#15_Jul -->
```

Figure 3 a segment of owl file of Disaster Investigation Model

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