TIEMS USA Chapter President, Kay Goss

TIEMS USA Chapter Vice President, Brent Woodworth with Eric McBride

Cyber Terrorism Workshop
By Gerry McCusker

Workshop by Martin Masiuk on "What is the New Normal"

Articles in this issue

This issue is dedicated to

2016 TIEMS Annual Conference held in San Diego

✓ **TIEMS 2016 Annual Conference**

✓ **Emergency management perspective of the European migrant crisis**

✓ **The usefulness and practical applications of the concept of resilience in disaster management**

✓ **A new discussion on emergency management: The construction of emergency quality management systems**

✓ **Stress tests are not only for banks and nuclear power plants**

✓ **Total systematic field solution for emergency cases**

✓ **And more.......**

The International Emergency Management Society

Newsletter – Special Edition

TIEMS network constitutes a large international multidisciplinary group of experts, with different educational backgrounds and various experiences. Their knowledge and experience are important to share with other experts worldwide. TIEMS has therefore decided to issue this additional newsletter, which we now call TIEMS Newsletter – Special Edition. This is the fourth issue, which we have dedicated to the results of the 2016 TIEMS Annual Conference held in San Diego. We invite other conferences and workshops, and RTD projects to use the opportunity to present the conference and workshop presentations and RTD projects to present articles of their results in the upcoming Special Edition Newsletters. We plan to have an issue three times a year. Please, give us feedback, and send us new articles for publication.

Alex Fullick

TIEMS Scientific Newsletter Editor

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Message from TIEMS President

TIEMS 2016 Annual Conference took place in San Diego, USA, 13 – 15 September this year, with the main topic: *Innovation and Urban Planning for Emergency Resilience in Large Cities.* It was a broad and varied program with excellent speakers and workshops resulting in active and meaningful discussions and conclusions. An integrated social program with good food and vine gave also a good framework for excellent networking during the conference. The summary of the conference is found below, reported by the host of the conference, Thomas Robertson, who is TIEMS Regional Director for North America.

This was the first time TIEMS streamed TIEMS conference program on-line, thanks a lot to George Markowsky. He will also be TIEMS responsible host for TIEMS USA Chapter 2017 Annual Conference in Maine, USA. The conference presentations and discussions will be put on-line YouTube, and it will be announced on TIEMS web-site when it is on-line. This TIEMS Newsletter Special Issue, publish the full papers delivered for the conference, while all power point presentations will be uploaded to TIEMS Library and can be viewed there as well as on the YouTube channel.

City of San Diego Office of Homeland Security was TIEMS co-organizer for the conference and many thanks goes to John Valencia and his colleagues for all their help in preparations and announcement of the conference, and providing the San Diego Library for the event.

The last day of the conference, the delegates were invited on a tour to visit San Diego State University (SDSU), where Professor Dr. Eric Frost gave an inspiring lecture on their work at their Vizualization Center. His students was also helping TIEMS during the conference. I like to thank both Eric Frost and his students, and TIEMS plans to cooperate further in the future with SDSU.

This was TIEMS 23rd Annual Conference, and Thomas Robertson and his wife Linda's preparations and hard work, supported and helped by TIEMS USA Chapter Board was instrumental in making the conference a great success. Thank you!

TIEMS believes that one way to improve disaster preparedness and reduce consequences of disasters, is to recognize and stimulate those who do excellent work within emergency and disaster management. TIEMS has therefore instituted some awards, which are granted during TIEMS Annual Conferences. I like to congratulate the winners of TIEMS awards for 2015 – 2016, which are all listed in the conclusions of the conference below. I also like thank TIEMS China and Korea Chapters and the International Equipment Center in Hangzhou for their generous donations to TIEMS to support TIEMS awards and the conference.

TIEMS 2017 Annual Conference is planned to be hold in India, but time and place has not yet been decided. However, it will soon be announced on TIEMS web-site. TIEMS USA Chapter will also continue with their local annual conferences, in order to furher develop and grow TIEMS USA Chapter. The next year's USA Chapter Annual Conference will be arranged June 12 – 16, 2017, at the University of Maine, Orono, Maine, USA, with Professor Dr. George Markowsky as TIEMS host.

I finally like to thank all participants making TIEMS 2016 Annual Conference a great success!

Oslo 13th October 2016
K. Harald Drager, TIEMS President

TIEMS 2016 Annual Conference Summary
September 13 to 15, 2016
San Diego, California, USA

Innovation and Urban Planning for Emergency Resilience in Large Cities

Our TIEMS 2106 Annual Conference was held September 13 – 15 2016 at the San Diego Central Library, with the collaboration and support of San Diego Mayor Kevin L. Faulconer, the City of San Diego Department of Homeland Security, and San Diego State University. Attendees from 11 countries and 9 US municipalities were engaged and enlightened by 20 presentations of exceptional quality and breadth, an 8-person panel on evolving emergency management challenges, and a special interactive workshop featuring a crisis communication simulation.

Discussions and networking continued over three days of lunches and a Tuesday evening reception at our 9th floor Central Library meeting venue and terrace, overlooking the beautiful city of San Diego. The TIEMS Annual Gala Dinner was held on the San Diego Bay, overlooking the lights of the downtown skyline and Coronado Island, and on Thursday afternoon we took a tour of the San Diego State Visualization Center, exploring the innovative use of social media and other technologies to improve emergency preparation and response.

In addition to providing an exceptional opportunity to share experiences, insights, and knowledge from around the world, the conference gave us an excellent opportunity to see how San Diego and Tijuana have dealt with emergency management through innovative urban planning and very effective collaboration across departments and borders. We also found excellent opportunities for TIEMS collaboration with San Diego State University, including internship opportunities (which began during the conference, and we expect to expand), and helping TIEMS member organizations apply technical innovation to their emergency management activities.

The conference was made possible through the generous collaboration and support of City of San Diego Office of Homeland Security, particularly through the efforts of John Valencia, Executive Director, Tiffany Vinson, and Jeff Pack. They arranged for us to use the City of San Diego Central Library, which provided a beautiful facility and very responsive facilities and AV support from Sherwood Hartwell. We very much appreciate the sponsorship of Jack Zhang of **Beijing Harmony Technologies**, and Laixing Wang of **Xianheng International** and the International Emergency Rescue Equipment Center.

Congratulations to the following, who were awarded Best Paper Awards. Each was awarded a certificate and 120 Euros, generously donated by the **TIEMS China Chapter**. While there were many excellent presentations made at the conference, only authors who submitted full text papers were eligible for these awards. The winners:

- **TIEMS 2016 Best Paper Award – Importance to the Field**: George M. Karagiannis, "Emergency Management Aspects of the European Migration Crisis"

- **TIEMS 2016 Best Paper Award – Practical Application**: Jaroslav Pejcoch, "Stress Test Not Only for Banks and Nuclear Power Plants"
- **TIEMS 2016 Best Paper Award - Creativity**: LI Xuanye, "Total Systematic Field Solution for Emergency Cases".

The **TIEMS 2016 President's Outstanding Achievement Award** was given to Carmelo DiMauro and Vittorio Rosato, for their outstanding and excellent work in arranging TIEMS 2015 Annual Conference in Rome, Italy.

We look forward and invite you to next year's **2017 TIEMS USA Conference**, planned for June 12 – 16, 2017, at the University of Maine, Orono, Maine, USA!

This year we tested an additional way for the global emergency management community to participate in our conference – online streaming. Both audio and slide images were streamed for selected presentations, and recordings were made for future access. The test was successful, and a number of people around the world were able to virtually attend. We are now considering offering virtual attendance as an option for future conferences.

Tuesday's session was opened by TIEMS President **K. Harald Drager**, who welcomed attendees and provided a perspective on the evolving challenges in emergency management, emphasizing the importance of increased attention to preparedness, and TIEMS's role in improving preparedness through knowledge sharing, research and development projects, and education, training, and certification.

The next presentation was by **John Valencia**, Executive Director, City of San Diego Department of Homeland Security and **Gary Hayslip**, Chief Information Security Officer, City of San Diego. After welcoming us to their fair city, they provided an overview of San Diego's approach to security and emergency management, emphasizing close collaboration with Tijuana, Mexico as part of an expanded metro region. Gary provided startling statistics on cyber threats to the City of San Diego, and described extensive activities to minimize the impact of these threats.

We were next treated to a particularly moving presentation and performance by **Nathaniel Forbes**, Director of Forbes Calamity Prevention, on Food and Disasters: The Impact of Hunger. He used recorded accounts and videos, as well as spoken words, to convey to our minds and hearts our interconnectedness as a global community, and the sometimes heart-breaking local impacts of the global economy.

Kay Goss, CEM, President of TIEMS USA Chapter and CEO of World Disaster Management, described how international collaboration has made an impact on global preparedness, international cooperation, and the evolution of the practice and cultivation of the profession of emergency management.
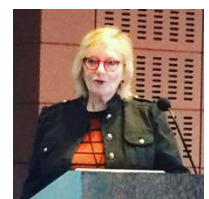
As noted throughout the conference, the world is rapidly urbanizing, and losses due to natural disasters and climate change are on the rise. **Dr. Josef Leitmann** of the World

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Bank made the case that investing in urban resilience would not only make our cities safer, but also prevent a reversal of the gains made in lifting our urban poor out of poverty.

Dr. George Karagiannis of the Technical University of Crete presented a perceptive analysis of the emergency management response to the European migrant crisis. The disruptions caused by the extreme wave of immigration (since 2015, over one million immigrants have traveled through Greece) have exposed lack of preparedness, resource limitations, problems coordinating NGOs, and the strong influence of international politics on the situation.
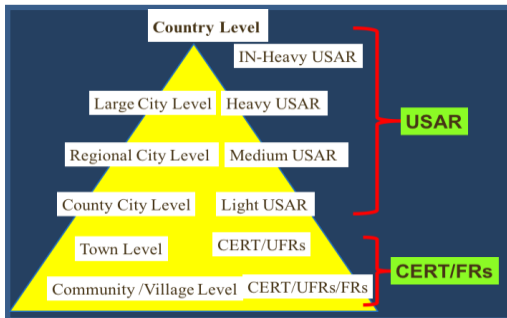
Dr. Guosheng Qu, TIEMS Vice President, Professor and leader of Urban Search and Rescue (USAR) teams, presented a framework for emergency resilience for large cities, that complements USAR teams and First Responders with Community Emergency Response Teams (CERTs), a concept developed in Mexico and the US, and recently introduced in China. TIEMS is establishing a CERT Task Force Group, to help spread CERT throughout the global community.

The economic advantage of investments in planning and preparation versus disaster response is often cited, as is the challenge of motivating these expenditures when disasters are in a hypothetical future. **Matt Campbell**, FEMA National Coordinator for Community Planning and Capacity Building, presented examples of Post Disaster Recovery Planning, which has been able to create improved community resilience using recent disasters to inform and motivate investments in preparation and planning.
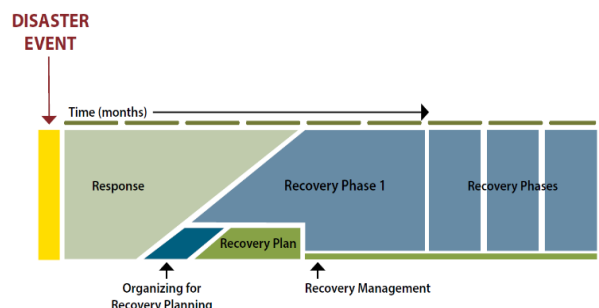
Wednesday's session was kicked off by **Carl Taylor** of XCH Global, who used his experience in analyzing disasters across the world to help us step back and observe a number of significant and important ways the unexpected crops up during disasters. Of course disasters themselves are usually unexpected, however emergency managers are often surprised because of factors such as: mistaken beliefs of invincibility; surge requirements beyond worse fears; the critical role of media, and how often they get it wrong; and powerful symbols that seem trivial at first.

Next **Ms. Li Yi** of the National Disaster Reduction Center of China presented work performed by Dr. Yang PeiGuo modeling urban vulnerability to floods, based on historical disaster loss
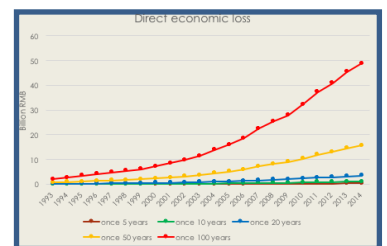
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data, correlated with rainfall measurements and social and economic data associated with affected areas. A case study of Beijing showed a strong correlation between rainfall measurements and loss rates, allowing a model to be constructed that estimated how maximum 2-day rainfall affected size of population impacted, missing and dead people, crop losses, collapsed or damaged houses, and overall economic loss.

Our next session was a special workshop organized by **Martin Masiuk**, Publisher of Domestic Preparedness Journal, on "What is the New Normal?" Evolving Management Challenges". This workshop featured panelists from the US Border Patrol, Coast Guard, San Diego Cyber Center, Harbor Police, and private industry, discussing challenges and operational approaches to deal with the new slants on terrorism, illegal immigration, and crime that are now part of our new normal.

TIEMS President **Harald Drager** convened the 2016 TIEMS Annual General Meeting. After introducing Board members present and a determination that a quorum of the TIEMS membership was present, previous minutes and annual budgets were approved, and elections were held for three directors that were up for election this year. Neil Dufty was re-elected Regional Director for Australia, New Zealand, and Oceania; Jean-Paul Monet was elected Regional Director for Europe; and K. Harald Drager was re-elected President of TIEMS. Congratulations to all candidates!
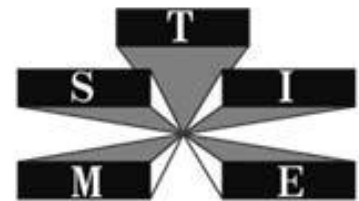
Next, **Gerry McCusker** of Engage ORM led a special workshop in which we formed crisis communication response teams, which were presented with an unfolding crisis featuring a population primed by Hollywood disaster film advertisements, panicked social media messages, earthquake app hackers, and crisis communicators with a real challenge on their hands! The workshop provided an informative and chilling view of the "new normal" brought about by social media and cyber terrorism.

Dr. Murray Turoff, New Jersey Institute of Technology, presented the results of a survey he made of emergency management practitioners and academics, asking them to prioritize proposed courses for an academic degree in emergency management (EM) with a concentration in information systems. The responses to this survey not only ranked courses, but also provided the respondent's views on the state of EM as an activity and as a profession. Among the themes uncovered were: it is challenging to establish educational programs in EM; the importance of organization and organizational collaboration in EM; the limitations of academic education versus experience; trade-offs in saving people versus property versus environment; the criticality of infrastructure protection; the importance of cascading effects; and the criticality and challenge of turning information from social media into intelligence.

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Our next presentation made by **Brent Woodworth**, TIEMS USA Chapter Vice President and L.A. Emergency Preparedness Foundation, and **Eric McBride**, Assistant Chief of the San Bernardino Police Department. Assistant Chief McBride gave a detailed and revealing account of before and after two shooters entered the Inland Regional Center and killed 14 people and wounded 22 others.

The account showed many examples of effective and heroic operation, and the opportunity in any situation like this, to learn new lessons. Brent related the crucial role his organization had in engaging local business to support the work of the responders and victims, by proving needed logistical support.

Laixing WANG and **Jed GAO**, of Xianheng International Corporation and the International Emergency Rescue Equipment Center (IEREC), gave us an overview of the IEREC in Hangzhou, China, an ambitious facility opened in November, 2014, that supports: academic and occupational meetings and exhibitions; community training, including disaster escape experience for school children; and exhibition of rescue equipment solutions including USAR, marine rescue, electric emergencies, high-speed train events, environmental protection, and airport rescue.

Thursday's session was opened by **Mark Benthien** of the Southern California Earthquake Center, Los Angeles. The Earthquake Center brings together over 700 scientists and students from more than 100 research institutions to synthesize research on earthquake system science. An important outreach activity of the Center is the Great ShakeOut Earthquake Drills, which in 2015 reached more than 43 million people worldwide and 21 million people in the US. These drills are based not only on earthquake experience, but also on social science research into what motivates people to get prepared.

In our next presentation, **Xuanye LI**, from the Longyan Haidexin Automobile Co., explained his company's approach to a total systematic field solution for emergency cases. This approach works to insure success in dealing with emergencies by addressing: human safety and support; effective command, control, and information; adequate facilities; and sufficient material supplies. These needs are provided through a wide range of networked vehicles and subsystems offered by Haidexin, such as their Integrated Detector Vehicle, Emergency Communication Vehicle, Mobile Command Platform, and Power Supply Vehicle.

Our next speaker was **Kevin Miller** from the California Governor's Office of Emergency Services, who discussed

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tsunami preparedness using "playbooks" incorporating evacuation lines based on *maximum potential tsunami flood elevation*, calculated using a model called FASTER. FASTER uses Forecasted Amplitude, Storm surge or existing ocean conditions, maximum Tidal height, forecasted Error potential, site amplified Run-up potential based on historical data, as well as local non-storm and non-tidal anomalies in sea level. This use of playbooks standardizes response, which improves inter-organization collaboration, and because it takes into account real-time forecasts, it helps improve safety while reducing over-evacuation.

Our next presentation was by **Bin WEN**, who introduced the TIEMS China Chapter and described their activities. The TIEMS China Chapter was established in April of 2009, and has since held six annual conferences, the last of which had 650 attendees from government, academia, and industry. Bin Wen extended a warm welcome to everyone, to attend their 2016 Annual Conference ibeing held November 1-6, 2016, in Zhuhai, China. Bin Wen also described the China Emergency Response Alliance (CERA), started by the Xinxing Cathay company, which is working with the TIEMS China Chapter to better link enterprises and government agencies in the field of emergency response.

TIEMS Secretary **Jaroslav Pejcoch** of T-Soft, next suggested we extend the idea of stress tests, already used for nuclear power plants and banks, to general emergency preparedness. He pointed out how a stress tests differ from the usual audits and checks, by introducing specific scenarios to gage the reaction of the people who will actually be responding to an emergency. The results of these stress tests go beyond just a graded result, by providing an assessment of routine versus stressed operations, and enabling a fruitful conversation about how risk can be further mitigated and resiliency increased.

Our next speaker was **Arthur Nash**, University of Alaska Fairbanks, who gave us a fascinating look at the special concerns of emergency management in Alaska. In the last 25 years, Alaska has experienced coastal and arctic windstorms, river floods, evacuation due to land erosion, wildfires, volcanoes, and earthquakes. Because of extreme cold, foraging wildlife, remote communities, and other difficult conditions, special provisions for personal warmth, food/water, and self-sufficiency must be considered. This has led, for example, to cost-effective, efficient, innovative solutions for cooking and heat from biomass. Family and community preparedness is particularly important in Alaska, and community education is a key element of emergency resilience.
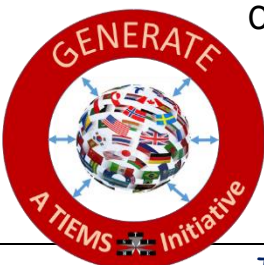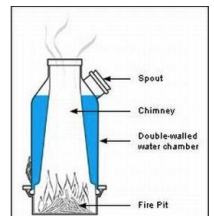
Our final presentation of the morning was by **Dr. Thomas Robertson**, TIEMS Regional Director for North America. Dr. Robertson reviewed the TIEMS Global Educational Network for Emergency Resilience and Training Excellence (GENERATE) initiative, whose goal is to create a network of educators, practitioners, and students contributing to and benefiting from an online platform for learning, certification, and

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sharing experiences. Design work has been underway for the initiative, organizational participants recruited, and partial funding has been identified as part of on-going projects. TIEMS continues to seek partners and organizations who share the goals of GENERATE, to join us in this activity.

Our conference concluded with a tour of San Diego State University's (SDSU's) Visualization Center. **Dr. Eric Frost**, Director of SDSU's Graduate Program in Homeland Security and the Visualization Center, provided an overview of the work in his program, with an emphasis on innovative use of remote sensing and social media to support homeland security. His graduate program has put together impressive technical capabilities, and his students are eager to find internships providing interesting challenges and potential pathways to future work. TIEMS looks forward to working with SDSU, through internships and as a participant in our GENERATE initiative.

Emergency management perspective of the European migrant crisis

George M. Karagiannis

Technical University of Crete, Greece[1]

Abstract

The European migration crisis began in 2015, when an unprecedented number of refugees and irregular migrants made their way to the European Union from Africa, Western and South Asia, and the Western Balkans. Over 1 million people in 2015, and around 180,000 in the first third of 2016, have crossed illegally the border of the European Union, either escaping conflict or in search of better economic prospects.

Irregular migrants generally enter the European Union from the Mediterranean, the Western Balkans, Greece's border with Albania, the EU's Eastern borders, the Black Sea and West Africa. With over 6,000 islands and 8,500 miles of coastline, Greece is the migrants' primary entry point. In the first half of 2016, over 150,000 people have arrived on Greek islands from Turkey aboard unseaworthy boats. Mass rescue operations are launched whenever small, overloaded boats capsize near the coast, while an unknown number of migrants have perished in the Mediterranean. Those who make it to shore are in need of shelter, food, water, clothes and basic health care.

This paper discusses the emergency management aspects of the European Migrant Crisis, with a focus on Greece, which has been on the front line of the emergency. Although many of the same support functions are activated, the nature of this crisis is affected to a large extent by political decisions as European countries have been divided over how best to deal with the massive influx of resettling people. Response efforts are complicated by international politics, security concerns, identification of migrants, the potential for terrorists infiltrating Europe posing as refugees, legal concerns about refugee status, and Greece's sovereign debt crisis. Needs assessment, shelter management and bulk distributions are thwarted by cultural issues, while many migrants are transiting towards other countries.

Introduction

Starting in 2010, the so-called "Arab Spring" was a revolutionary wave of demonstrations and protests in the Arab world, which led to major insurgencies in Syria, Libya and Yemen, and fueled tensions throughout the Middle East and North Africa (commonly referred to in the humanitarian community as the MENA region). Combined with the instability in post-war Iraq and Afghanistan, these conflicts have exacerbated the humanitarian situation in the region. The United Nations High Commissioner for Refugees describes the situation as a complex emergency of an unprecedented scale (UNHCR, 2016a).

Besides the devastation suffered by the war-torn countries, the protracted violence and instability have spawned a massive migratory wave. Since 2011, more than 4 million people have fled Syria to escape the civil war (UNHCR, 2016b). In addition, the prolonged conflict in Iraq has displaced 4.5 million people, while approximately 270,000 more have left the country (UNHCR, 2016c). Furthermore, although 4.8 million Afghans have been repatriated

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since 2002, there are still some 250,000 refugees as of August 2016 (UNHCR, 2016d). The countries nearest the affected areas have been most affected. For instance, Turkey alone is hosting 2.7 million Syrians registered with the United Nations (UN), while 600,000 more have sought safety in Jordan (UNHCR, 2016b). Europe has also been affected, as a rising number of refugees and migrants attempted to cross illegally the border of the European Union.

Being the largest forced displacement Europe has seen since World War II, this population movement has spawned a major geopolitical and humanitarian crisis as European countries struggled to cope with the influx of migrants. This paper focuses on the European Migrant Crisis from an emergency management perspective. Its purpose is not to analyze the crisis in full detail, rather to identify those aspects which are related to emergency management and capture lessons about planning for and responding to similar emergencies. It is structured in five parts. The next section provides an overview of the situation, including political, legal and operational concerns. The third and fourth sections focus on Greece, the primary destination of irregular migrants traveling to the European Union, and outline the country's emergency management capabilities and the challenges of responding to the crisis. The last section summarizes the findings.

A complex emergency

Although irregular immigration has been an ongoing concern for European countries, the prolonged conflict in the MENA region has sharply increased the number of those seeking safety on European soil. Migrants attempt to enter the European Union from the Mediterranean coast, the Western Balkans, Albania, the Black Sea, and Europe's eastern borders (Table 1). The numbers were higher in 2011, the year of the Arab Spring, and nearly tripled in 2014, when the conflicts in Syria and Libya intensified. Yet, 2015 has seen a seventeen-fold increase in the number of people attempting to escape to the European Union through the Eastern Mediterranean and the Western Balkans.

Table 1: Detections of illegal crossings of the EU border, by route (FRONTEX, 2015; 2016)

Route	2009	2010	2011	2012	2013	2014	2015
Central Mediterranean (Italy, Malta)	11,043	4,450	64,261	15,151	45,298	170,664	153,946
Eastern Mediterranean (Greece, Bulgaria, Cyprus)	39,975	55,688	57,025	37.224	24,799	50,834	885,386
Western Balkans	3,089	2,371	4,658	6.391			
Albania to Greece	40,250	35,297	5,269	5.502			
Western Mediterranean	6,642	5,003	8,448	6.397	6,838	7,272	7,164
Eastern borders							

Black Sea							
Western Africa	1,335	1,052	1,049	1.597	1,316	1,275	1,920
	1	0	0	1	148	433	68
	2,244	196	340	174	283	276	874
	20	3	1	0	4	10	9
Other							
Total	104,599	104,060	141,051	72,437	107,365	282,962	1,822,337

From an emergency management perspective, this situation has all the makings of a major disaster. A large number of people have been affected by a dangerous event which has deprived them of their homes and livelihoods. The affected population is therefore in dire need of immediate coverage of their basic needs, shelter, food, water, clothing and health care. However, this crisis also has a geopolitical and humanitarian component, which differentiates it from a natural disaster, a hazardous materials release or a terrorist attack on several levels.

Political issues and international response
This massive exodus, which started in August 2015, has highlighted that irregular immigration is more than a regional issue. In addition, this phenomenon has brought to the surface geopolitical issues, such as border control (Samers, 2004), open internal borders and free movement (Favell, 2008). As migrants made their way north, many European Union (EU) countries responded by temporarily reinstating border restrictions, which had been abolished in 1995 by the Schengen Agreement (Antenore, 2016). Some, including Austria, Hungary, Slovenia and Greece, have either built or are planning to build fences at parts of their border (Tasch, 2016).

The response of the EU has sluggish at first, and the crisis showcased the lack of preparedness to respond to events of this scale. Ironically, the European Union had only recently launched its Integrated Political Crisis Response arrangements, which came with an upgrade of its Emergency Response Coordination Center, located in Brussels. Yet, the crisis created political tensions among Member-States, as European leaders were divided over how to respond (The Economist, 2015). The Valletta Summit on Migration resulted in the EU establishing an Emergency Trust Fund to assist African countries addressing the migrant crisis (Times of Malta, 2015). Furthermore, the EU negotiated a controversial agreement with Turkey, which came into effect on March 20, 2016, stipulating that migrants arriving in Greece will be sent back to Turkey if they do not apply for asylum or their request is rejected (BBC News, 2016).

In addition to political action, the EU's response was also focused on reinforcing border patrol. Prior to the EU's response, border patrol was handled on a national level, with Italy's Operation Mare Nostrum ("Our Sea") covering most of the Central Mediterranean. When this operation was shut down due to its growing economic burden, the EU launched Operations Triton and Sophia in an effort to stem the migrant influx and provide search and rescue to migrants crossing the Mediterranean (Kirchgaessner, Traynor & Kingsley, 2015). Last, at the request of Greece, Turkey and Germany, NATO deployed a maritime force in the Aegean Sea to support Greece, Turkey and the EU by providing reconnaissance, monitoring and surveillance (NATO, 2016).

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Politics and international relations have arguably played a significant role in Europe's response, as the EU has been struggling to counter the effects of the largest population movement since World War II. Besides geopolitical issues, another complicating factor originated at the legal conglomerate which applied.

Law and legal issues
As in any complex emergency, the legal framework spans across several bodies of law, including international humanitarian law, human rights law, refugee and internally displaced person (IDP) law, European Union law, and the institutional mandates of several intergovernmental organizations. Although a detailed legal analysis of the situation is well beyond the realm of this paper, the most important of the legal issues related to the crisis are briefly discussed below. Under international law, the primary responsibility for emergency management, including disaster relief and humanitarian assistance, rests with the sovereign government of the affected country (IFRC, 2007). Here, the migrants find themselves in a country other than the one affected by the emergency. Sovereign governments are also responsible for protecting their citizens when located abroad. Yet, in this situation, the migrants are citizens of failed states or countries at war.

In addition, in the context of the European Migrant Crisis, IDP law does not apply, because the migrants have crossed the border of their home country. Refugee law applies when a person requests asylum, and requires the government of the country where the request for asylum was filed to protect the asylum-seeker. However, only a minority of the migrants have requested asylum. In addition, European Union Regulation No. 604/2013 (also referred to as the Dublin Regulation), which determines the Member State responsible for examining an application for international protection, was partially suspended by Hungary when the country became overburdened with large numbers of asylum requests (Than & Nasralla, 2015).

Operational issues
In addition to political and legal issues, several operations concerns have contributed to the "fog and friction" of this crisis. First, the displaced population is several times larger than the number of people affected from the worst disasters in history. Approximately 770,000 people were displaced in the United States as a result of Hurricane Katrina in 2005 (The White House, 2007). More than twice as many attempted to cross the EU's border in 2015 alone. Second, the response is indicative of a European-wide lack of preparedness (Barnard, 2015). Third, the demands generated by this crisis were quite different than those of typical disaster relief operations. The following two sections attempt to elucidate the impact of these operational impediments on the response, by focusing on Greece, the primary destination of irregular migrants traveling to the European Union.

Greece in focus
Given their geographical proximity to the conflict areas and the EU's border, Greece, Cyprus, Italy, and Malta have been mostly affected by the situation. As illustrated in Table 1, the number of people attempting to enter the European Union through the Eastern Mediterranean route has skyrocketed in 2015. Of the approximately 885,000 who used this route in 2015, about 856,000 traveled from the Turkish coast to several Greek islands, and the trend continues in 2016 (UNHCR, 2016f). Migratory movements are often facilitated by organized crime groups, which increasingly use unsafe boats, leading to several shipwrecks as surveillance and rescue capabilities are stretched to the limit (FRONTEX, 2015). It is

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estimated that more than 3,100 people have lost their lives at sea while attempting to sail across the Mediterranean.

With over 6,000 islands (of which 227 are inhabited), a coastline of approximately 8,500 miles (or about half the coastline of Africa), and a surface area of 131 km^2 (or slightly smaller than Alabama), Greece has by far the lowest landmass-to-shoreline ratio in Europe. This makes border security around the Aegean islands a daunting task. For instance, Lesvos is an island with a population of 88,000, located at the southeast edge of the Aegean Sea. It is separated from Turkey with a narrow channel, approximately 7-9 nautical miles wide. Over 90,000 migrants have arrived to Lesvos during the first 7 months of 2016 (UNHCR, 2016f).

Washing ashore on Greek islands aboard half-sunken boats after several days at sea, the migrants were in dire need of food, water, clothes, shelter and even medical attention, as many collapsed from exhaustion as they set foot on land. Yet Greece's limited crisis response capabilities were further deteriorated by the sovereign debt crisis which had been tormenting the country since 2009. The following sections outline the underlying pathologies of the Greek emergency management system, and point out the impact of the economic crisis on the country's capabilities to address the migrant influx.

Emergency management in Greece

Emergency management (also referred to as civil protection in Europe) efforts in Greece have traditionally focused on the country's two main natural hazards: earthquakes and wildland fires. "Xenokrates" is the code name for Greece's "General Civil Protection Plan". It is essentially a meta-plan, a framework for the development of emergency operations plans throughout all levels of government. Emergency planning is hazard-based, with each level of government being required by law to develop and maintain a different plan for each hazard, despite this practice having been proven to lead to duplication of effort and confusion (Karagiannis & Synolakis, 2015).

In addition, emergency preparedness is piecemeal at best. Emergency services (such as the Police, Fire Service and Coast Guard) have a hierarchical, top-down, and military-like organizational structure, with centralized decision-making and resource management. They are quite compartmented, each having jurisdiction over one or more emergency response functions, while interagency coordination remains minimal. Various branches of the military are also involved in disaster response. On the other hand, civil protection is a distinct function at every level of government. Local and regional civil protection agencies are autonomous, reporting directly to the Chief Elected Official (Mayor or Prefect). Therefore, they have no administrative ties to the national civil protection agency, responsible for implementing the country's emergency management policy, developing national response plans and coordinating the response to national-level emergencies. Furthermore, civil protection legislation is rather soft, emphasizing coordination instead of decision-making. Although the Chief Elected Official (Mayor or Prefect) is responsible for the coordination of emergency management in their jurisdiction, there is no legal basis for decision-making authority, with the exception of evacuation in wildland fires.

What is most important, the migrant crisis was well beyond the mission of civil protection. Until April 2016, two other agencies shared jurisdiction over irregular immigration. The Asylum Service was responsible for receiving and processing requests for international protection under refugee law. The First Reception Service was responsible for the

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identification, registration and medical care of, as well as provision of information and relief to irregular immigrants. The capabilities of both were limited, even compared to pre-2015 needs, and were rapidly overwhelmed with the escalation of the crisis in the second half of 2015. In April 2016, the Greek Parliament passed a law merging the Asylum and First Reception Service into a single agency.

The Greek economic crisis
The Greek sovereign debt crisis, which began in 2009, compounded the preexisting administrative medley and deteriorated Greece's emergency management capabilities. Caused by structural weaknesses in the Greek economy, and triggered by the Great Recession of 2007-08, this crisis has brought a decline in per capita income, a rise in unemployment, political instability, and widespread austerity as Greece has entered in four bailout programs.

Notwithstanding its economic impact, which is beyond the realm of this paper, two aspects of the Greek sovereign debt crisis are relevant to the Greek response to the European Migrant Crisis. First, the economic crisis led to a sharp decreased in all public spending, including in emergency services and civil protection capabilities. This has arguably reduced Greece's emergency management capabilities, and local media often reported the moribund state of police patrol cars and fire engines. Second, the country's political landscape has changed radically since the onset of the economic crisis. Elections and resignations of politicians have contributed to political instability: from 2009 to August 2016, Greece has seen five parliamentary elections, one presidential election, one referendum, and seven Prime Ministers. This political instability hampered decision-making when it was most critical, and arguably undermined the response to the migrant crisis.

Crisis response: fog and friction
The peak of the migrant influx started in the summer of 2015, amid critical negotiations over the Greek sovereign debt between the Greek government, the European Union and the International Monetary Fund. With a weakened emergency management capabilities and while struggling with major structural and economic reforms, the country was called to respond to flow of irregular migrants the likes of which Europe had not seen since World War II. The following sub-sections outline the operational constraints which hampered the response. Unpredictability

Emergencies, such as natural hazards, hazardous materials releases and terrorist attacks, are unpredictable by definition. Emergency managers often rely on models of hazard phenomena, developed by scientists, for estimates of the probability of occurrence of a hazard and its expected intensity (Karagiannis & Synolakis, 2014). This information is used to establish the expected losses from known hazards and threats, and subsequently determine the estimated needs and response objectives (Karagiannis & Synolakis, in press). Here, the response needs and objectives are proportional to the number of migrants, which has been virtually impossible to predict. For example, the average daily number of migrant arrivals to Greek islands over an eight-month period was 2,247 people, while the standard deviation over the same time period was 2,370 (Figure 1). From a statistical point of view, the data is erratic. For instance, on October 20, there were 10,006 new arrivals; 5 days later, on October 25, the number had dropped to 4,311.

Daily arrivals to the Greek Islands
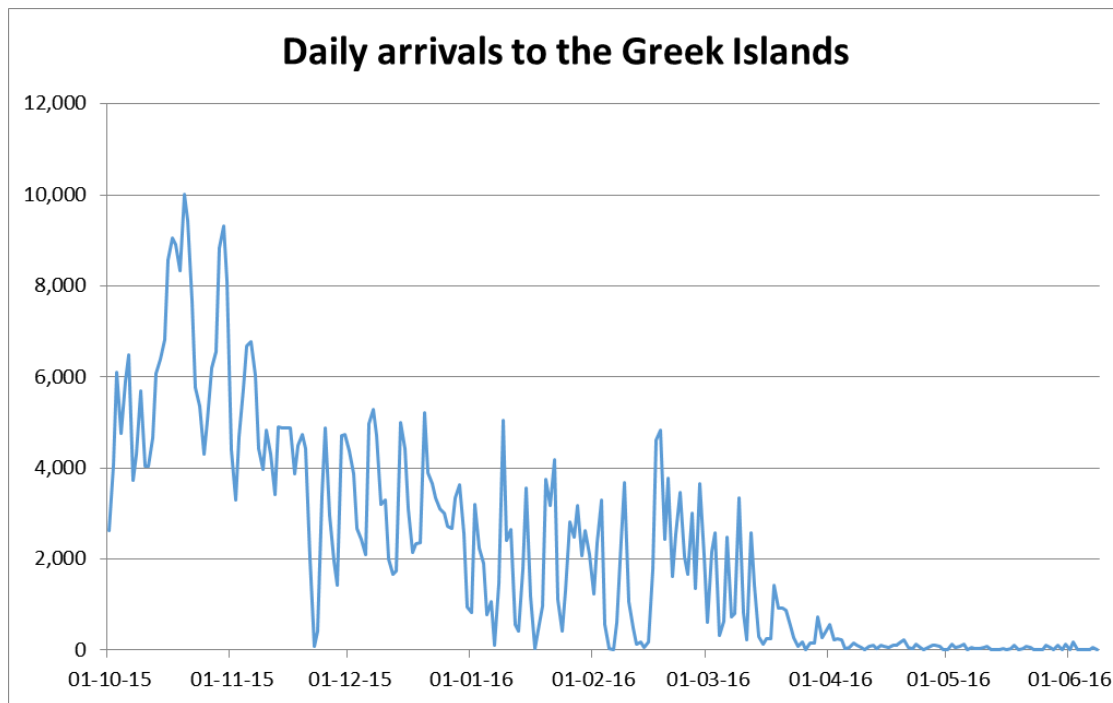
Figure 1: Line graph of the number of daily arrivals or migrants to Greek islands from October 2015 to June 2016 (UNHCR, 2016f)

Despite the difficulty in developing a statistical interpretation of the data, two factors seem to influence the number of arrivals, weather and international politics. Illegal border-crossing detections had typically been most frequent during the summer months, with peaks between May and October. However, in 2015, the pattern changed, with departures in waves whenever the weather conditions at the departure areas are conducive. A regression analysis of the number of daily arrivals over weather conditions has yet to be conducted, and may yield useful insight in planning for similar emergencies. On the other hand, the role of international politics is more conspicuous, as the number of daily arrivals sharply decreased after the EUTurkey agreement came into effect on May 20, 2015. Specifically, the average of daily arrivals on Greek islands dropped from 3,254 (from October 1 to May 19) to 121 (from May 20 to June 8), as Turkey's efforts arguably contributed to stemming the flow of migrants.

Lack of preparedness and initial action
The unpredictability of the situation does not deny the well-established fact that conflicts result in widespread population displacement and migratory movements towards areas with better (perceived) security and economic prospects. Yet, not only European countries did little to pursue a political solution to the Syrian crisis, devoted limited resources to humanitarian assistance to Syria, Lebanon and Jordan, and failed to prepare domestically for the eventuality of the massive influx of migrants (Barnard, 2015). In Greece, news media reported in September 2012 that four 'detention centers' would be established in Chios, Lesvos, Samos and Rhodes, while a special contingency plan was drafted for the provision of temporary shelter to 20,000 people for 15 days (Kathimerini, 2012). The scope of this contingency was extremely limited, considering that the United Nations High Commissioner for Refugees had registered at the time over 250,000 Syrian refugees in Jordan, Lebanon, Iraq and Turkey (UNHCR, 2012). In addition, with hindsight, the

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reception centers were designed for a limited number of migrants and proved inadequate for the massive influx that ensued.

For example, the reception center located in Kos, an island in the Eastern Aegean Sea, had often had to accommodate small numbers of irregular immigrants arriving from the coast of Turkey. However, more than 50,000 people arrived in Kos in July 2015. This caused a major strain on the already understaffed Health Center, Police Precinct and Coast Guard Station of the island. Reports of Police brutality caused the Greek Government to deploy more Police Officers to the island. There was no provision for providing immigrants with essential humanitarian aid (shelter, food, water, non-food items). Water and food were provided haphazardly, often at the initiative of the island's population. Images of poorly dressed immigrants sleeping in the streets of Kos became viral on social media and news outlets, while the tourism industry of the island took a major hit.

Identification and registration of the irregular migrants was a concern from the onset of the crisis, and was one of the very first tasks assigned to the First Reception Service. Most irregular migrants arrived without any identification documents, and later information indicated they were instructed to throw them at sea by the smugglers who arranged for their travel. Identification became a challenge due to the large numbers of irregular immigrants who had to be registered over a short period of time. The issue gained momentum in the early fall of 2015, when some officials expressed concerns about the risk of terrorists concealing themselves in groups of irregular migrants to travel undetected. Identification and registration were extensively scrutinized in the aftermath of the Paris terrorist attacks in November 2015, when it was discovered that at least two suspects had traveled through Greece three months prior to the attack, although not as irregular migrants.

Emergency shelters were hastily set up in sport venues (such as stadiums and basketball arenas), school gymnasiums and tent camps. However, know-how about disaster shelter management was limited. Until then, tent camps were the primary emergency shelter type in Greece, as the need had typically arisen in the aftermath of earthquakes. Camp layouts used exclusively a military-style grid design, which is known to emergency managers for a wide range of problems, such as increased population density, poor sense of ownership, no community cohesion, and even security concerns (UNHCR, 2007). As hasty shelters were set up to accommodate increasing numbers of migrants on several islands, a number of shelter design and management problems became apparent, including overcrowded shelters, health and hygiene issues, and even fire safety concerns. Yet, more migrants were making their way on Greek islands, and most shelters were accommodating many more residents than their nominal capacity allowed.

Temporary shelter and bulk distributions
Eventually, the Greek government relocated some 20,000 migrants from the islands to planned sites in the mainland. At the same time, informal settlements grew spontaneously on several locations, including Idomeni in northern Greece, the ports of Piraeus and Kavala, and Victoria Square in Athens. The living conditions there were inadequate, even by humanitarian standards, and the Greek government eventually closed these settlements and relocated the occupants to planned temporary accommodation sites. The evacuations were conducted by the Hellenic Police, and were relatively uneventful. Although most migrants were transported to planned sites, some left the spontaneous camps for fear of being stranded in the planned sites. The emergency shelters on the islands were

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progressively replaced by temporary camps with better quality tents and layouts, organized either by the Greek government (formally known as hotspots) or Non-Governmental Organizations (NGOs). Some migrants even stayed on rental apartments or hotel rooms paid by their families (IFRC, 2016). The planned sites are managed by the Greek military (Army or Navy) or various branches of the Greek government (including the First Reception Service). Although the living conditions are generally better than the emergency shelters and spontaneous settlements, some sites still accommodate far more people than their nominal capacity (Figure 2). The level of services provided is variable, but remains well below the acceptable standard in post-disaster emergency shelters in Europe. Poor quality in tents, water, sanitation and hygiene conditions impact on the health of the migrants in some camps.
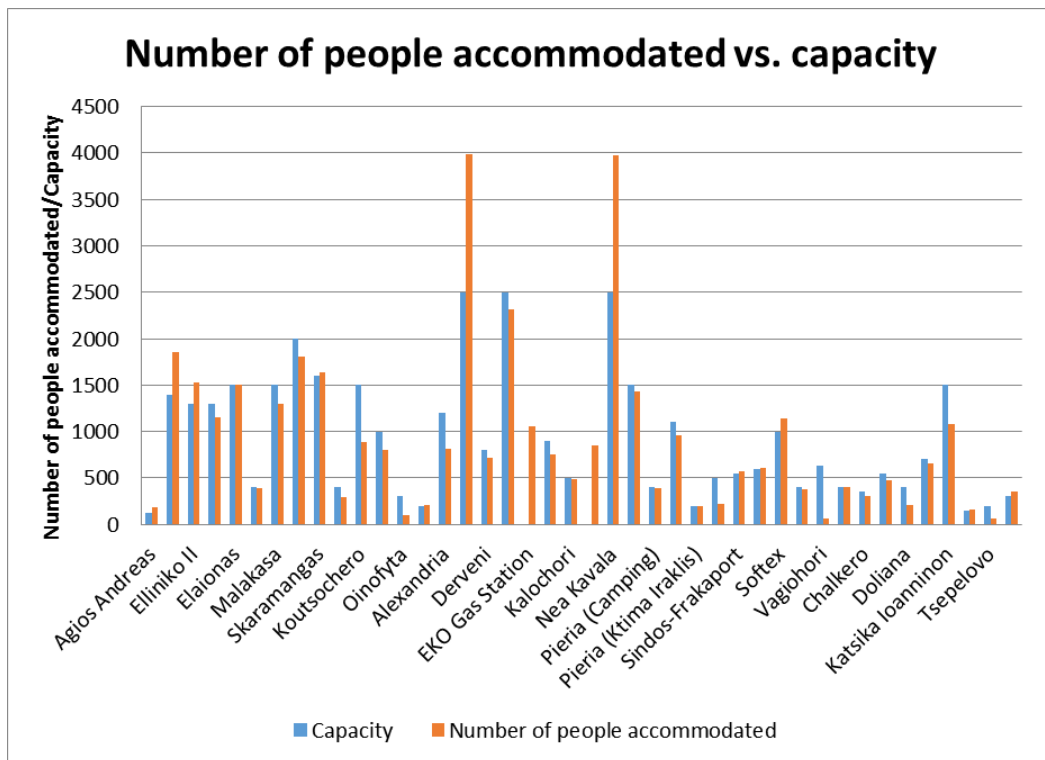
Figure 2: Number of people accommodated in each planned site vs. site capacity, June 2016
(UNCHR, 2016e)

The design of disaster shelters is usually based on the assumption that the clients are residents of a disaster-affected area, whose homes have been damaged and are looking for a place to stay until they can either get back to their homes or find alternative housing. In this case, however, the migrants have been in constant survival mode and their only interest is to keep moving towards northern European countries. However, due to the border closures, they stay in the camps longer. Therefore, shelter management is a challenge, as the migrants have no or a very limited interest to improve their living conditions, including solid waste management and hygiene. Several NGOs have implemented information campaigns in a number of sites in an effort to improve basic hygiene.

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Healthcare is another concern. The change in the demographic profile of the migrant population (from predominantly adult males in the beginning of the crisis, to many more women, children, elderly, families and people with disabilities subsequently) has also changed their health needs. In addition, the living conditions in the camps expose the residents to health hazards, including communicable diseases, with some confirmed Hepatitis A cases in northern Greece. The need to include cultural considerations in camp layout design, and to address the special health needs of vulnerable groups (women, children, elderly, people with disabilities) has also been highlighted in operational plans (IFRC, 2016). For example, during Ramadan, the schedule and contents of meals delivered in the camps had to be aligned with the predominant religious practice, fasting from sunrise to sunset. Furthermore, although it has been feared that the Greek population would be hostile towards the migrants, tensions between the indigenous and migrant populations have been very limited.

Besides healthcare and cultural concerns, coordination, information management and operational planning have arguably been, by and large, the greatest challenge throughout the crisis. Existing coordination structures proved inadequate, mainly due to the lack of contingency planning. For example, there was no formal health information reporting system from the camps to a central body until May 2016 (IFRC, 2016). The sheer number of responding organizations also contributed to the coordination conundrum. From a public administration point of view, the issue is cutting across several functional and geographic jurisdictions, just like natural disasters, yet this crisis was outside the jurisdiction of emergency management arrangements. The Greek government established an InterMinisterial Steering Committee composed of the Ministries of Defense, Interior, Health, and Transport. Coordination is further complicated by the international dimension of the crisis, which falls under the jurisdiction of several international organizations. For instance, the UNHCR has been negotiating a formal coordination role with the Ministry of Interior, while the Hellenic Red Cross has delegated the coordination of the activities of the International Red Cross Movement in Greece to the International Federation of the Red Cross and Red Crescent Societies (IFRC, 2016).

The sheer number of responding organizations also contributed to the coordination ordeal. The UN has identified 56 governmental and non-governmental organizations involved in the crisis (UNHCR, 2016f), but many more have swarmed the islands and the mainland since the onset of the crisis. The Greek government never published data on the number of NGOs and their activities. Coordination between the government and non-governmental actors has been extremely problematic at first, with coordination meetings being held among NGOs without the presence of delegates from government agencies having jurisdiction. The situation has improved progressively but slowly, with the government including representatives of major humanitarian organizations (such as the Hellenic Red Cross) in coordination structures.

Conclusion

This paper is a first attempt at capturing lessons for emergency management identified from the response to the European Migrant Crisis in Greece. The country has been on the front line of what has been dubbed as the largest population movement in Europe since World War II. Since 2015, over 1,000,000 irregular migrants have traveled to Greece, and about 55,000 are still accommodated in temporary shelters allover the country. It is estimated that more than 3,000 have died in the Mediterranean while trying to make it to Europe aboard unseaworthy boats. Europe's lack of preparedness to respond to the crisis

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has been conspicuous from the outset. Greece was no exception, but underlying weaknesses in the country's emergency management structure and the Greek sovereign debt crisis have arguably contributed to the problem. Identification and registration have been concerns since the beginning of the crisis, and developed into major issues in the aftermath of the Paris terrorist attacks in November 2015, when it was feared that terrorists might pose as irregular migrants to infiltrate European countries and evade capture. Emergency shelters soon proved inadequate, as living conditions were lower than minimum accepted standards. The Greek government responded by relocating migrants in planned accommodation sites, managed by the Greek military and various government agencies. As the population profile changed to include more vulnerable groups, healthcare and hygiene also became areas of concern. Cultural considerations had to be included in the operational plans, considering the heterogeneity of the migrant population and the risk of hostility from the host communities. Last, coordination has been a major challenge from the outset, due to the cross-cutting nature of the crisis, the lack of preparedness, and the presence of large numbers of NGOs on the field.

References

Antenore, B. (2016). Can the Schengen Agreement Survive the EU Refugee Crisis? The European Institute, Washington DC, USA. http://www.europeaninstitute.org/index.php/eihttp://www.europeaninstitute.org/index.php/ei-blog/276-february-2016/2129-can-the-schengen-agreement-survive-the-eu-refugee-crisis-2-18blog/276-february-2016/2129-can-the-schengen-agreement-survive-the-eu-refugee-crisis-2http://www.europeaninstitute.org/index.php/ei-blog/276-february-2016/2129-can-the-schengen-agreement-survive-the-eu-refugee-crisis-2-1818. Last accessed August 08, 2016.

Barnard, A. (2015). Exodus of Syrians Highlights Political Failure of the West. The New York Times, September 4. http://www.nytimes.com/2015/09/05/world/middleeast/exodus-ofhttp://www.nytimes.com/2015/09/05/world/middleeast/exodus-of-syrians-highlights-political-failure-of-the-west.html?_r=0syrians-highlights-political-failure-of-the-west.html?_r=0. Last accessed August 09, 2016.

BBC News (2016). Migrant crisis: EU-Turkey deal comes into effect. BBC News, March 20. http://www.bbc.com/news/world-europe-35854413. Last accessed August 08, 2016.

FRONTEX (2015). Annual Risk Analysis 2015, European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union, Warsaw, Poland.

FRONTEX (2016). Annual Risk Analysis 2016, European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union, Warsaw, Poland.

Favell, A. (2008). The new face of East-West migration in Europe. J. Ethn. & Migr. St., Vol. 34, No. 5, pp. 701-716.

IFRC (2016). Emergency Plan of Action – Greece: Population Movement (Revision 2), International Federation of Red Cross and Red Crescent Societies, Geneva. http://adore.ifrc.org/Download.aspx?FileId=131514. Last accessed August 12, 2016.

IFRC (2007). Law and legal issues in international disaster response: a desk study, International Federation of Red Cross and Red Crescent Societies, Geneva.

Kathimerini (2012). Detention centers in the Eastern Aegean. Kathimerini, September 18, in Greek. http://www.kathimerini.gr/468509/article/epikairothta/politikh/kentra-krathshs-sto-anhttp://www.kathimerini.gr/468509/article/epikairothta/politikh/kentra-krathshs-sto-an-aigaioaigaio. Last accessed August 10, 2016.

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Karagiannis, G.M. & Synolakis, C.E. (in press). Collaborative incident planning and the common operational picture. In I. Kotsireas, A. Nagurney & P. Pardalos (Eds.). Dynamics of Disasters – Key Concepts, Models, Algorithms and Insights. Berlin, Springer.

Karagiannis, G.M. & Synolakis, C.E. (2015). Tsunami Disaster Risk Management in Greece. In Proceedings of the ASCE Coastal Structures and Solutions to Coastal Disasters Joint Conference 2015, Boston, MA, USA.

Karagiannis, G.M. & Synolakis, C.E. (2014). Using risk analysis and hazard numerical simulation models to support the design, conduct and evaluation of disaster exercises. In Proceedings of the 5th International Disaster and Risk Conference, Davos, Switzerland.

Kirchgaessner, S., Traynor, I. & Kingsley, P. (2015). Two more migrant boats issue distress calls in Mediterranean. The Guardian, April 20. https://www.theguardian.com/world/2015/apr/20/two-more-mediterranean-migrant-boatshttps://www.theguardian.com/world/2015/apr/20/two-more-mediterranean-migrant-boats-issue-distress-calls-as-eu-ministers-meet/issue-distress-calls-as-eu-ministers-meet/ Last accessed August 08, 2016.

NATO (2016). Assistance for the refugee and migrant crisis in the Aegean Sea. North Atlantic Treaty Organization, Brussels. http://www.nato.int/cps/en/natohq/topics_128746.htm Last accessed August 08, 2016.

Samers, M. (2004). An Emerging Geopolitics of 'Illegal' Immigration in the European Union. Eur. J. Migr. & Law, Vol. 6, No. 1, pp. 27-45.

Tasch, B. (2016). This map shows how much the refugee crisis is dividing Europe. Business Insider. http://www.businessinsider.com/map-refugees-europe-migrants-2016-2. Last accessed August 08, 2016.

Times of Malta (2015). Migration summit: "We are in a race against time to save Schengen" – Tusk. http://www.timesofmalta.com/articles/view/20151112/local/watch-valletta-summithttp://www.timesofmalta.com/articles/view/20151112/local/watch-valletta-summit-concluding-press-conference.591885concluding-press-conference.591885. Last accessed August 08, 2016.

Than, K. & Nasralla, S. (2015). Defying EU, Hungary suspends rules on asylum seekers. Reuters, June 23, 2015. http://uk.reuters.com/article/uk-europe-migrants-austria-hungaryhttp://uk.reuters.com/article/uk-europe-migrants-austria-hungary-idUKKBN0P31ZB20150623/idUKKBN0P31ZB20150623/ Last accessed August 08, 2016.

The Economist (2015). Migration creates a deepening gulf between East and West. http://www.economist.com/news/europe/21664770-political-tensions-across-central-europehttp://www.economist.com/news/europe/21664770-political-tensions-across-central-europe-are-rising-solutions-prove-elusive-migration-drivingare-rising-solutions-prove-elusive-migration-driving. Last accessed August 08, 2016.

The White House (2007). The Federal Response to Hurricane Katrina: Lessons Learned. The White House, Washington DC, USA.

UNHCR (2007). Handbook for Emergencies, Third edition, United Nations High Commissioner for Refugees, Geneva.

UNHCR (2012). As Syrian refugee numbers top quarter of a million, UN Refugee Chief António Guterres and Special Envoy, Angelina Jolie, visit Jordan's Za'atari refugee camp. United Nations High Commissioner for Refugees, Geneva, September 11. http://www.unhcr.org/504f21a69.html. Last accessed August 10, 2016.

UNHCR (2016a). Middle East and North Africa, United Nations High Commissioner for Refugees, Geneva. http://www.unhcr.org/pages/4a02db416.html. Last accessed August 08, 2016.

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E-mail: secretariat@tiems.info

UNHCR (2016b). Syria Emergency. United Nations High Commissioner for Refugees, Geneva. http://www.unhcr.org/en-us/syria-emergency.html. Last accessed August 08, 2016.
UNHCR (2016c). Iraq Emergency. United Nations High Commissioner for Refugees, Geneva. http://www.unhcr.org/en-us/iraq-emergency.html. Last accessed August 08, 2016.
UNHCR (2016d). Afghanistan. United Nations High Commissioner for Refugees, Geneva. http://reporting.unhcr.org/node/4505. Last accessed August 08, 2016.
UNHCR (2016e). Site profiles – Greece. United Nations High Commissioner for Refugees, Geneva. http://data.unhcr.org/mediterranean/download.php?id=1428. Last accessed August 08, 2016.
UNHCR (2016f). Refugees/Migrants Emergency Response – Mediterranean. United Nations High Commissioner for Refugees, Geneva.
http://data.unhcr.org/mediterranean/regional.php.
Last accessed August 09, 2016.

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The usefulness and practical applications of the concept of resilience in disaster management

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Executive Summary

This White Paper examines the usefulness of the concept of resilience in disaster science and management. It is divided in two part: The first part is dedicated to State of Science and it is basically a literature review on how the concept of resilience has been explored in social science researches, as well as different meanings and possible applications attributed to it in the field of disaster management. Even though divergent and even conflict definitions were found among different scientific perspectives, it is clear that discussion around these theme have brought some useful insights, contributions and changes in the way disasters are understood and managed.

The second part complements the State of Science by analyzing three different guidelines developed by US federal organizations aiming to transform the concept of resilience into practical actions (State of Practice). The objective is to better understand how the concept of resilience has been operationalized, its challenges and different ways of appropriating the concept accordantly to the expertise and vocation of each organization.

In the conclusion, the conception and usage of resilience within these selected guidelines are analyzed and compared, showing that different concepts of resilience produce distinct formulation of policies, orientations and actions to make communities more resilient to disasters. Even considering those differences, resilience seems to be contributing mainly to the pursuit a new approach based in something positive that is directly linked to development, community capacities, different levels of responsibility and complex interdependency among government, private sector, academia, civil society, individuals and the environment.

This theme, however, requires long-term field studies to follow-up the implementation of this guidelines by local governments, NGOs and community leaders to better understand the link between theory and practice in the implementation of local resilience projects.

State of Science

The origin of the term resilience in disaster science is not clear. Some authors say it was borrowed from Engineering as an analogy to some materials that "were able to store strain energy and deflect elastically under a load without breaking or being de-formed" (Klein, Nicholls & Thomalla, 2004 apud Gordon, 1978), or the 'bouncing back' theory. Others say it has its origins in the study of psychology, during the 1940's, to analyze the negative effect of adverse life events on children such as divorce, war and abuse (Manyena, 2006; Koslowski & Longstaff, 2015). Others attribute to Holling (1973) and his breakthrough article entitle "Resilience and Stability of Ecological Systems" the credits for giving resilience a worldwide notoriety, not only in the field of ecology, but in many other fields of science including disasters and emergency management (Mayunga, 2007; Peacock et al., 2010; Adger, 2000).

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Far more controversial than its origins is the meaning attributed to resilience in disaster studies. As a natural-born multidisciplinary field of study, disaster science receive contributions from many disciplines and theoretical approaches. The abundance of different points of view towards the same object makes even the concept of disaster itself blurry and controversial. However, agreeing with Antony Oliver-Smith (1999), "the intellectual vitality of a field of research does not necessarily depend on a conceptual or definition consensus", since these conflicting definitions can also contribute to push science boundaries to another level and update some old concepts to new realities in an ever changing world. Also, since disasters are increasing in number and intensity, "the world cannot wait for the perfect definition before it begins to tackle the dangers and uncertainties from which we must bounce back or forward" (Koslowski & Longstaff, 2015).

For the purpose of this white paper, before analyzing the concept of resilience *per se*, it is important to delimitate a conceptual framework to understand the causes of disasters. This because depending on the point of view, resilience can be weighted and interpreted in different ways.

For example, the 'functionalist perspective' understands *disaster* as a unforeseen, unpredictable and natural phenomenon that randomly disrupt the "normal" social life. Is to say that the cause of a disaster is a exogenous factor (hurricane, tornado, earthquake, flood and etc) that suddenly interrupts a normal and well-functioning community. This perspective is related to the "preparedness and response" paradigm, which reactively manages disasters and emergencies as they occur. Within this paradigm, resilience would be seen as product of hazard-oriented actions, like hurricane early warning systems and structural retrofitting for earthquakes, than management issues related to social processes, vulnerabilities, economic growth and unsustainable development.

Contrasting to the definition above, there is the 'social-vulnerability perspective', which understands disasters as the consequence of a development model that increases risk by creating and maintaining social, economic, environmental and political vulnerabilities. When these vulnerabilities interact with natural and technological hazards they become more explicit, exposed and exaggerated. In other words, "disasters are more a consequence of social-economic than natural factors" (O'Keefe, Westagate & Wisner, 1976). As found in Lavell (2000) "Risk, as a product of the interconnectedness of hazards and vulnerabilities, is a dynamic and ever changing social construction, which can be found and experienced differently in terms of territoriality and social conditions".

According to this theoretical framework, if in one hand we are responsible for 'constructing' the foundations of disasters, on the other we can also 'deconstruct', or at least minimize, the risk of disasters by addressing underlining factors that generate vulnerabilities in the first place. Within this framework, resilience can be seen as a process, which should be integrated into development plans to gradually decrease vulnerabilities and minimize the creation of new risks.

To contribute to this daunting task, many projects aiming to increase community resilience have popped-up all over the world, especially after 2005 when 168 countries endorsed the UN's Hyogo Framework for Action (Matyas & Pellin, 2014). These tendency or option to use the term resilience can be seen also in the Sendai Framework for Disaster Risk Reduction (2015) which will be used by the UN to promote disaster risk reduction around the world until 2030. As found in Masys (2015, pg.v) "Resilience, resilient communities, and resilient

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livelihoods are becoming a focus of local, regional, national and global governments, and agencies".

However, even though the term resilience has been exhaustively studied and used in many disaster risk reduction documents and projects, it is still "not clear how this concept should be operationalized and what its determinant factors are" (Mayunga, 2012), and whether it is actually bringing innovation or practical contributions to the field. Some authors would even call resiliency a fad word (Aguirre & Best, 2010) or just an expression that means no more than "in-vulnerable", a new bottle for old wines (Dombrowsky, 2010), bringing no contributions at all to understand how disasters can be mitigated or avoided.

Most of the critique to resiliency as a valid concept in disaster science and management is based in its lack of clarity, vagueness and sometimes ambiguous meaning depending on the context, as well as "affinity with and lucid usage by a multiplicity of disciplines" (Manyena, 2006). Some authors predicts that the danger is "that 'resilience' provides a new term, but no new action on the ground" (Matyas & Pellin, 2014) referring to the discussion promoted by the UN on elaborating the post-2015 international policy landscape. Fekete, Hufschmidt & Kruse (2014), when comparing the concepts of resilience with the concept of vulnerability state that "without an explicit operational definition, resilience has only a broad meaning, and remains a vague concept rather than a practical policy or management tool".

Even though there is some degree of skepticism, interesting discussions and researches in disaster science are contributing to elucidate how the concept of resilience can be useful for both policy and practice. Some authors, like Mayunga (2007), Peacock et al (2010) and Cutter et al.(2010), have attempted to develop indicators and models to measure the effectiveness of projects and policies designed to improve community resilience whether by a capital-based approach index (Mayunga, 2007), social capital (Peacock et al. 2010) or composite indicators for disaster resilience at place (Cutter et al, 2010). Kendra and Wachtendorf (2003) propose some principles of resiliency by studying the Emergency Operations Center that collapse during the terrorist attack of the World Trade Center. Klein, Nicholls & Thomalla (2004) explore the value and utility of the concept of resiliency in the context of disaster risk reduction in mega-coastal cities. Aldunce, Beilin, Howden, & Handmer (2015) put forth a field study to understand how practitioners conceptualize and implement the concept of resilience in Australia and so forth.

This list of researches is long and literature on the concept of resilience itself is also vast. Many reviews have been already done and almost all of them show the evolution of the concept through time and among different disciplines. Starting with Holling (1973), resilience was defined as "the ability of an ecosystem to absorb changes and still persist". This idea of an ecosystem or a community that can undergo through a period of stress, or temporary change, and "bounce back" to its normal functions was maintained by almost of scholars, who latter extended or added some more features to the concept. For example:

> Quality of people, communities, agencies, and infrastructure that reduce vulnerability. Not just the absence of vulnerability rather the capacity to prevent or mitigate loss and then secondly, if damage does occur to maintain normal condition as far as possible, and thirdly to manage recovery from the impact.
>
> (Buckle, 2006)

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Resilience is the capacity or ability of a community to anticipate, prepare for, respond to, and recover quickly from impacts of disaster.

(Mayunga, 2007)

Resilience is a measure of how well people and societies can adapt to a changed reality and capitalize on the new possibilities offered.

(Paton & Johnston, 2006)

In the Hyogo Framework for Action, which has as subtitle "*Building the Resilience of Nations and Communities to Disasters*", resilience is defined as:

"The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures."

So, resilience evolved from the ability of "bouncing back" and recovering normal functions in the aftermath of a disaster to 'resist', 'anticipate', 'learn', 'improve', 'mitigate', 'prepare', 'respond', 'rebuild', 'recovery' and 'adapt', just to mention a few verbs related to resilience in the most recent literature. No wonder that resilience has gain so many attention! It cover practically everything related to disaster risk reduction and emergency management.

This complexity of theories and concepts of resilience points out to the necessity of looking disasters in a multi, inter and even transdisciplinary way, considering not only the observable and measurable context or the ability of a community to prepare, respond and recovery from disasters, but also "the essential and non-essential elements of community systems able to adapt to and survive the shocks" (Manyena, 2006). These elements are crucial to understand resilience in all its dimensions and different levels and to design more efficient projects with clear and well defined goals.

Obviously no single project nor research can cover all elements and dimensions of resilience, as well as all needs in a disaster response, all dimensions of a sustainable recovery nor addresses all vulnerabilities in a certain community. However, resilience brings a new approach to disaster management and, for some researches and organizations, it is even starting a new paradigm by shifting a hazards-centered approach to a more development oriented framework for action. Even though the term 'bouncing back', 'resist', 'cope' and 'absorb negative impacts' to return to 'normal' within the shortest possible time, tend to emphasize a reactive stance (Manyena, 2006), generally associated to the prepare and respond paradigm, resilience also brings innovation, or new way of seeing disaster management. Rather than just reducing vulnerabilities, resilience proposes to construct something positive, focused in development, local knowledge and community capacities. It does offers considerable scope for enhanced policy through reflection on functional persistence, self-organization, social learning and flexibility (Matyas & Pellin, 2014), adaptive behavior and capacities (Comfort, 1999; Norris et al.,2008) creativity and improvisation (Kendra & Wachtendorf, 2001) and community-centered strategies to foster technical capacities and promote social wellbeing.

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As found in Lavell (2013) "emphasis where disasters and risk are concerned is constantly placed on losses, hazard, exposure and vulnerability, but rarely on the positive social and economic attributes that can result from effectively managing risk". In the same document, Lavell also points out that "there are Ministries of Disasters and Emergency Management not Ministries of Resilience and Sustainability, for example. In contrast, other sectors or areas have Ministries of Health not Ministries of Illness or Ministries of Public Safety not Ministries of Crime". This would suggest that risk reduction sector "reflects an imaginary of protection against external shocks and threats that is reflected in its conventional use of terminology" (Lavell, 2013). In other words, the terminology used so far implies that disasters are caused by external hazards and not by an internal social process deeply related to development. However, new paradigms demand new words, new expressions, and resilience seems to be filling this gap by representing a new way of thinking and practicing disaster risk management.

In the report entitled "Disaster Resilience: A National Imperative", by the Committee on Increasing National Resilience to Hazards and Disasters (The National Academies, 2012) resilience is recognized as new path to disaster management in the US:

> As a nation we have two choices. We can maintain the status quo and move along as we have for decades […]. Or, we can embark on a new path—one that also recognizes and rewards the values of resilience to the individual, household, community, and nation. Such a path requires a commitment to a new vision that includes shared responsibility for resilience and one that puts resilience in the forefront of many of our public policies that have both direct and indirect effects on enhancing resilience.

To tread this 'new path', many agencies and international organizations have put forth documents and guidelines to transform the concept of resilience into practice. The second part of this White Paper (State of Practice) is dedicated to analyze three main documents intended to fulfill this task. These documents were chosen by their nationwide reach and reliability of the publishing agencies behind the ideas, concepts and orientations. By doing this analysis, I intent to contribute to the discussion of how to operationalize the concept of resilience and how useful it is to foment practical actions towards safer communities.

State of Practice
This part of the White Paper is fully dedicated to assay three main documents produced and developed by US federal agencies and organizations with the objective of providing guidelines to make communities more resilient to disasters. The three documents selected are:

1) "Community Resilience Task Force Recommendations", by the Department of Homeland Security;

2) "Disaster Resilience: A National Imperative", by the Committee on Increasing National Resilience to Hazards and Disasters (2012);

3) "Community Resilience Planning Guide for Buildings and Infrastructure Systems" (2015) by the National Institute of Standards and Technology.

Since those are extensive and detailed documents, I try mainly to identify the concept of resilience they are using and the main orientations they are giving to turn the concept of resilience into real action.

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Community Resilience Task Force Recommendations

This document was published by the Department of Homeland Security (DHS) and consists in eleven recommendations to improve community resilience to disasters. In 2010, the Quadrennial Homeland Security Review Report defined *Resilience* as "one of three foundational elements essential to a comprehensive approach to homeland security" and "Ensuring Resilience to Disasters as one of five missions of the Department" (pg.3).

To accomplish this mission, the DHS understood that their main role was to enable and mobilize American communities to foster resilience at the local level, linking resilience to preparedness and risk reduction in a more integrated and explicit way.
In this document, resilience is defined as the "ability to resist, absorb, recover from or successfully adapt to adversity or a change in conditions". It also has two extended definitions (pg.8):

1) Ability of systems, infrastructures, government, business and citizenry to resist, absorb, recover from, or adapt to an adverse occurrence that may cause harm, destruction, or loss of national significance;

2) Capacity of an organization to recognize threats and hazards and make adjustments that will improve future protection efforts and risk reduction measures seen as an outcome, related to disaster itself and risk reduction measures.

These definitions of resilience are intimately related to the organizational culture of the DHS, which tends to focus on hazard prevention, response and recovery rather than the development process that causes vulnerabilities and increases the risk of disasters. The implication to practice is that both concepts and orientations to practice are always related to emergencies or catastrophic events itself, not considering underlining factors and dynamic pressures that, if not tackled by federal actions, will continually create unsafe conditions and risk of disasters. Like in Wisner et al. (1994) "it is the *vulnerability of people* that is crucial to understanding disasters and disaster preparedness" and not the unsafe conditions that are more of a symptom than a cause of disasters.

However, the recommendations made in this document are directly responsible for the next two documents analyzed in the section, especially:

Recommendation 1.1: Build a Shared Understanding of the Shared Responsibility. DHS should take the lead in working with key stakeholder groups to develop and share models for resilience—illustrations of resilience in operational settings— within the context of each group. The purpose is to motivate stakeholders to learn from each other and to do what they can to enhance resilience without waiting for external intervention.

Recommendation 3.3: Enable Community-Based Resilient Infrastructure Initiatives. DHS should transform its critical infrastructure planning approach to more effectively enable and facilitate communities in their efforts to build and sustain resilient critical infrastructures.

Disaster Resilience: A National Imperative

This document was written by the Committee on Increasing National Resilience to Hazards and Disasters (Committee on Science, Engineering, and Public Policy) of the National Academies, one of the most respectful research organizations in the US. As mentioned

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above, they understand resilience as a new path for disaster risk reduction, or a new paradigm that "requires bold decisions and actions that may pit short-term interests against longer-term goals" (pg. vii). This document is very incisive in stating that a new approach to manage risk and disasters is needed in order to have "stability, progress, and well-being of the nation"(pg.19), beginning by its title that says clearly that disaster resilience should be a "A National Imperative", as opposite to the response-centered approach that waits a disaster to happen to take actions.

Resilience in this report is defined as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" (pg.16), which covers all disaster's phase (mitigation, preparedness, response and recovery) and implies a focus on the ability of a community to deal specific with hazards, rather than improve overall social-economic conditions, what could be interpreted as a hazards-centered approach. However, further on, the document makes an analogy suggesting that resilience is part of a process to improve community's assets, wealth and social capital (pg.17):

> [...] increasing resilience to disasters just as individuals take preventive measures to protect the human body against illness and disease. A healthy body is not simply a composite of individual functioning systems. All the systems work together. In a similar way, the dynamic physical, social, political, economic, and environmental systems in resilient communities work and function together.

The concept of resilience they use and the statement above imply that resilience here is understood both as an outcome and as a process. The implication to practice is that not only measures that are strict related to hazards and disaster risk are suggested to increase community resilience, but also actions that can improve underlining factors that make communities vulnerable to disasters as "economic stability and growth, commerce, education, communication, population wellness, energy, and transportation" (pg.17) as we can see below.

After acknowledging that the federal approach to disasters has been most of all reactive, focusing only in responding to disaster rather than "on coherent assessment, planning, and evaluation to increase disaster resilience"(pg.20), this document calls up for a "new national framework for a culture of disaster resilience". This 'new framework' is constructed by the authors in a very solid, clear and crescent way, giving to the reader the impression of a long-term process.

It is divided in eight chapters that bring different but complementary perspectives that form all together a huge block of detailed information to build resilient communities. The first chapter is dedicated to the definition and importance of resilience as a pillar to safe and sustainable development. The other chapters are practical orientations to put resilience into practice and cover almost everything that can be done before, during and after a disaster to increase community resilience. It covers: risk perception; concepts and components of risk; risk assessment at local, state and federal levels; responsibilities and challenges of each actor in reducing disaster risk; risk management; tools for forecasting hazards and warning systems; tools and actions for mitigation, preparedness, response and recovery; metrics for monitoring progress toward resilience; creating local and community capacity; identifying government policies and practices to build resilience; communication strategies for disaster reduction; responsibilities between communities and all levels of government in building resilience and more.

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Even though all actions described above are risk orientated in the title, some of them focus in underlining factors that generate risks or that have an indirect impact in the generation of vulnerabilities at local, state and federal levels.

In the last chapter, the document summarizes all those actions mentioned above into six recommendations as below:

Recommendation 1: Federal agencies should incorporate national resilience as a guiding principle to inform the mission and actions of the federal government and the programs it supports at all levels.

Recommendation 2: The public and private sectors in a community should work cooperatively to encourage commitment to and investment in a risk management strategy that includes complementary structural and non-structural risk-reduction and risk-spreading measures or tools.

Recommendation 3: A national resource of disaster-related data should be established that documents injuries, loss of life, property loss, and impacts on economic activity. Such a database will support efforts to develop more quantitative risk models and better understand structural and social vulnerability to disasters.

Recommendation 4: The Department of Homeland Security in conjunction with other federal agencies, state and local partners, and professional groups should develop a National Resilience Scorecard.

Recommendation 5: Federal, state, and local governments should support the creation and maintenance of broad-based community resilience.

Recommendation 6: All federal agencies should ensure that they are promoting and coordinating national resilience in their programs and policies. A resilience policy review and self-assessment within agencies and strong communication among agencies are keys to achieving this kind of coordination.

All those recommendations come together with comments and suggestions for their implementation.

The great value of this document lays in its ability to describe almost all dimensions and levels of responsibility to develop a culture of resilience nationwide and make clear connections among them through the chapters. It gives resilience a central role in the sustainable development process as the key to grow and prosper without creating more vulnerabilities, which could increase the risk of disasters and undermine the development. By the other hand, such complete and complex approach can discourage disasters managers in taking such herculean tasks, since without a huge amount of federal support and resources it makes impracticable to implement this holist approach.

Community Resilience Planning Guide for Buildings and Infrastructure Systems

The definition of resilience adopted in this document is "the ability of communities to prepare for anticipated hazards, adapt to changing conditions and withstand and recovery rapidly from disruptions". It is a hazard-centered concept related to the preparedness and response paradigm, which considers resilience as a final outcome, or a goal to be reached, rather them a developmental process. It also defines community in a geopolitical

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perspective as "[a]place designated by geographical boundaries that functions under the jurisdiction of a governance structure, such as a town, city, or county". Both definitions have implications in the model adopted to reach resilience. First, the funds and human resources are channeled to predetermined institutions and infrastructures rather than non-structural components like educational programs, capacity building or other people centered strategies (human capital). Secondly, by defining community as cities, counties or states, it excludes also social capital that, as found in Dynes (2010) "is less affected, can be quickly repaired, and provides an essential resource in accomplishing critical tasks" during a disaster. However, this perspective is in line up with the objectives of this guide, which is contributing to resilience through augmenting physical capital, or the built environment and physical structures that are essential for a community to prepare, respond and recovery from a disaster.

This six-step guide is designed for local governments and is intended to give directions for resilience planning and action with the participation of communities through the whole process, including the private sector and civil society organizations. It is essentially different from the other two documents since it focuses on "the roles buildings and physical infrastructure systems play in assuring social functions resume when needed after a hazard event" (pg.3). Even though it focuses in the physical infrastructure for resilience, it emphasizes the role of the built environment in supporting cultural, social, economic and political systems and its importance to community resilience.

The language adopted is easy and assessable, showing its intention to be used not only by experts and experienced emergency managers, but by pretty much anyone interested in making its own community resilient from disasters.

The orientations are very simple, but well explained in details, and the methodology encompasses six steps resumed below:

1) *Form a collaborative team*: Identifying leaders, organizations, team members and key stakeholders to form a team that will develop and implement the resilience plan. In this step "leadership by a dedicated community official is needed to provide continuity, elevate the importance of resilience, provide authority for convening stakeholders, and engage public support. The recent designation of a Chief Resilience Officer in many cities illustrates the type of leadership needed."

2) *Understand the situation*: Identifying social characteristics and needs and assess built environment and social institutions that give support to essential social functions and activities, making a clear link between both.

3) *Determine goals and objectives*: Stablishing long-term community resilience goals "by developing performance goals for the built environment and the supported social functions, strategies for achieving those goals, and priorities for administrative and construction solutions".

4) *Plan development*: Identifying gaps between expectations and the reality of current buildings performance and infrastructure systems, as well as possible administrative and construction solutions in line with the local development plan.

5) *Plan preparation, review and approval*: Prepare the plan with a clear and simple language, summarize the main important information, assemble a team to

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review the plan and approve it within the community. After the approval of the plan, it should be adopted by the community's governing body.

6)   *Plan implementation and maintenance*: Keep track and document the whole process of implementing strategies and solutions of the plan. It also requires "continued active outreach and communication with the stakeholders involved in the plan's development and adoption – and with the broader community – through a variety of mechanisms".

One difficult that may arise during the implementation of this six steps is related to the awareness of the population and how sensitize the political environment is for disaster risk reduction. If there is not much information and educational programs to increase the local risk perception nor politicians, civil society and private companies sensitized enough to understand how disasters can have a negative impact in the community, the whole process can be jeopardize in Step 1. So, before forming a collaborative team, the document should stress the importance of a public and government risk awareness too.

However, this approach to build (literally) resilience also have a very positive side, since it is more practical, focused in exclusively in one issue that will directly impact community resilience and it is easier to implement and see palpable results.

Conclusion
As explored in the State of Science, the concept of resilience can assume different meanings and be applied at different levels. Conflicts and discussions about resilience led to a number of scientific researches that not only are helping defining the concept, but mainly contributing to the formulation of policies and practices to augment local capacity to prevent, mitigate, prepare, respond and recovery from disasters. The discussions around resilience also contributes to pursuit a new approach based in something positive that is directly linked to development, community capacities and complex interdependency among government organizations, private sector, academia, civil society, individuals and the environment.

However, this lack of consensus and different meanings attributed to *resilience* have implications to the formulations of policies and practices. The analysis of three different guidelines to apply resilience into practice made explicit that different concepts produce distinct outcomes for policy making, orientations and actions to make communities more resilient to disasters. As stated in Fekete, Hufschmidt & Kruse (2014 apud Zhou et al. 2010) "after decades of resilience research and a rising body of literature applying this concept to disaster risk sciences, divergent definitions and highly varied methodological approaches exist".

Considering this, it is expected that the three guidelines analyzed in the State of Practice should reflect the ideas behind each organization accordantly to their mandates in the field of disaster management. In this way, resilience was used both in restricted sense to describe specific attributes and as a group of factors that contributes to local risk management depending on the actions each institution is allowed and willing to take.

For example, when resilience is defined as an outcome, the practical actions associated with it tend to be more hazard oriented, linked to the preparedness and response phases and with concentration of resources into physical capital and built environment (Manyena,

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2006), in other words, more towards predetermined institutions and infrastructures related to the response and preparedness phases. This approach can be find in the "Community Resilience Task Force Recommendations", produced by DHS (2011) which is a guidelines focused more in the incident and in the hazards, rather than the social, economic, political and environmental processes that make a community more vulnerable to disasters. It is certainly in line up with DHS mandate to mitigate the impact of disasters, increase the effectiveness of a response and accelerate the speed of local recovery, but it does not change the drivers that create and accumulate risks.

On the other hand, when resilience is understand as a process, resources tend to be concentrated in human capacities and social capital, as well as in risk assessment to identify causes or processes that create vulnerabilities and possible solutions to them, and not only the visible consequences. This approach can be found in the "Disaster Resilience: A National Imperative", by the Committee on Increasing National Resilience to Hazards and Disasters (2012), which fits better to a scientific body that has as mandate a complete and complex analysis of an object, in this case *resilience* . However, this framework for action calls for such complex and complete tasks that make it difficult to imagine that it could be reached, especially considering the urgency of dealing with disasters. Beyond the complexity and different dimensions and actors involved in resilience, it also brings up some assumptions that have to be tested scientifically to better understand, for example, to which extend the overall economic wealth of a community can directly influence its resilience to disasters? Or, what needs to change in the structure of governmental institutions to effectively include resilience in developmental plans?

The third document analyzed in the State of Practice, tries to bring a balance between this two different approaches. When looking at the title: "Community Resilience Planning Guide for Buildings and Infrastructure Systems" it seems that the focus is only in the built environment. However, reading the whole document, it is implicit that the overall local vulnerabilities and other invisible social and cultural characteristics are manifested concretely in the physical environment. If the concept of resilience could be included in the development planning and structural changes of the built environment, especially if driven by communities themselves, it could also change perception and culture. As the own guide defines himself: "it is a tool that will help communities unify disaster risk management, emergency response planning, and long-term community and economic development planning". It supports that goal by "addressing the role buildings and infrastructure systems play in assuring the health and vitality of the social and economic fabric of the community".

The lack of a national policy to foment resilient communities in the US can lead to the development of different documents and guidelines that will approach resilience in different ways. It could be beneficial since, as examined in the state of science, resilience has many dimensions and levels to be considered and, depending on the vocation of each institution, specific attributes of resilience could be implemented with better quality accordantly to their expertise. On the other hand, if it is not done with a minimum of coordination, these guidelines and orientations can be fragmented, leading to schizophrenic practice poorly connected to each other. Also, these different interpretations and applications of the already controversial concept of resilience can make it more difficult to monitor and evaluate projects implemented throughout the nation, as well as make implement agencies accountable for the results (or lack of results) they produce.

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Bibliography

Adger, W. (1999). Social Vulnerability to Climate Change and Extremes in Coastal Vietnam. *World Development*, 27(2), 249-269.

Aguirre, B. & Best, E. (2010). How Not to Learn: Resilience in the Study of Disaster. *Disaster Research Center*. University of Delaware

Aldunce, P., Beilin, R., Howden, M. & Handmer, J. (2015). Resilience for disaster risk management in a changing climate: Practitioners' frames and practices. *Global Environmental Change* 30 (1–11).

Elsevier.

Buckle, P. (2006). Assessing Social Resilience. Douglas Paton and David Johnston. *Disaster Resilience*.

Chapter 6. Springfield, Ill.

Comfort, L. (1999). Shared Risk: Complex Systems in Seismic Response. *Pergamon*. New York.

Department of Homeland Security (2011). *Community Resilience Task Force Recommendations*.

Homeland Security Advisory Council. Washignton, DC: U.S.

Dynes, R. (2006). Social Capital: Dealing With Community Emergencies. *Journal of Homeland Security Affairs*. VOL. II, NO. 2.

Fekete, A., Hufschmidt, G., & Kruse, S. (2014). Benefits and Challenges of Resilience and Vulnerability for Disaster Risk Management. International Journal of Disaster Risk Science, 5(1), 3–20.

Lavell, A. (1993). Ciencias Sociales y Desastres Naturales en America Latina: Un Encuentro Inconcluso. Revista EURE (Vol. XXI, N° 58), pp. 73-84, Santiago de Chile.

Lavell, A. (2000). Sobre la Gestión del Riesgo: Apuntes hacía una Definición. Latin American Social

Science Faculty (FLACSO) and The Network for the Social Study of Disaster Prevention in Latin America-LA RED. San Jose, Costa Rica.

Lavell, A. & Maskrey, A. (2013). The Future of Disaster Risk Management. *FLACSO (Latin American Social Science Faculty) and UNISDR (United Nations Office for Disaster Risk Reduction)*. San José, Costa Rica.

Kendra, J. and Wachtendorf, T (2001). Elements of Community Resilience in the World Trade Center Attack. *Disaster Research Center*. University of Delaware.

Klein, R. and. Nicholls, R. J. and Thomalla, F. (2004). Resilience To Natural Hazards: How Useful Is This Concept? *EVA Working Paper* No. 9. *DINAS-COAST Working Paper No.* 14.Potsdam Institute for Climate Impact Research, Potsdam, Germany.

Koslowski & Longstaff (2015). Resilience Undefined: A Framework for Interdisciplinary

The International Emergency Management Society (www.tiems.org)
Rue Des Deux Eglises 39, B - 1000 Brussels, Belgium, Tel: +32 2 286 80 38, Fax: +32 2 286 80 39
E-mail: secretariat@tiems.info

Communication and Application to Real-World Problems. Masys, A. *Disaster Management: Enabling Resilience*. Chapter 1. Cham. Switzerland. Springer.

Mayunga, J.S. (2007). Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. *Department of Landscape Architecture and Urban Planning, Hazard*

Reduction & Recovery Center. Texas A&M University

Manyena, S. (2006). The concept of resilience revisited. *Disasters*, 30(4). Wiley.

Masys, A. (2015). *Disaster Management: Enabling Resilience*. Cham. Switzerland. Springer.

Mileti, D.S. (1999). Disasters by Design: A Reassessment of Natural Hazards in the United States.

Joseph Henry Press. Washington D.C.

National Institute for Standards and Technology (2015). Community Resilience Planning Guide for Buildings and Infrastructure Systems (NIST Special Publication 1190 Volume 1). Washignton, DC: US. U.S. Department of Commerce.

Norris, F. H., S. P. Stevens, B. Pfefferbaum, K. F. Wyche, and R. L. Pfefferbaum. 2008. "Community

Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness." *American Journal of Community Psychology* 41(1- 2).

O'Keefe, P., Westagate, K. & Wisner, B. (1976). Taking the Naturalness out of Natural Disasters.

Nature, Vol 260.

Oliver-Smith, A. (1999). "What is a Disaster?": Anthropological Perspectives on a Persistent Question. *The Angry Earth*. University of Florida.

Peacock, W, Brody, S., Seitz, W., Merrell, W., Vedlitz, A., Zahran, S., Harriss, R., Stickney,R. (2010)

Advancing the Resilience of Coastal Localities: Developing, Implementing and Sustaining the Use of

Coastal Resilience Indicators: A Final Report. *Hazard Reduction and Recovery Center*. College of Architecture. Texas A&M University.

The National Academies (2012). *Disaster Resilience: A National Imperative*. Washington, D.C: The National Academies Press.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (1994). At Risk: Natural Hazards, People Vulnerability and Disasters. London: Routledge.

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A new discussion on emergency management: The construction of emergency quality management systems

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Abstract

As to the situations of various frequently-happened crisis and poor social emergency management ability in China, the key way to solve the problems is how to realize the source control and process management. To effectively reverse the plight, this paper compiles the emergency quality standards with universal applicability by developing an emergency management system, so as to realize the whole process management in the links of hazard source control, crisis warning, crisis disposition, recovery reconstruction, and continuous improvement and to strengthen the evaluation responsibility of government departments to take emergency quality management as routine and standard work, thus to improve the emergency management ability of the whole society.

Key words: Emergency management process; Emergency quality management standards; Government evaluation

In the last 10 years, with the economic globalization and comprehensive transformation of Chinese society, all kinds of production safety accidents, public health, and public security events occur frequently, which bring a great challenge to the social stability and harmonious development. The fact shows that emergencies can occur in all walks of life, and a lack of scientific management ideas and effective management standards might bring about more losses to an organization in the face of these emergencies. By reviewing the current emergency management status of all kinds of organizations, it can be found that there exist some problems in both emergency management theory and practice.

First, the lack of unified understanding on emergency management. Second, the lack of specific guide specification to improve the ability of emergency management. Through a lot of basic investigation, it is found that although all kinds of social organizations are aware of the importance of emergency management, they are not explicit about for how to carry out their own emergency management and improve the emergency management ability, thus the social organization of emergency management level is limited and all kinds of emergencies still occur frequently, and has the increase trend though there has been a lot of researches on emergency management. Based on this background, the research includes the relatively mature quality management system of the quality management research field in the emergency management through theoretical analysis, and puts forward "emergency quality management" and its system, so as to explore the specific approaches for improving the ability of emergency management in China, and provide new thought for performance evaluation of emergency management.

1. Overview of Emergency Quality Management

As the urgent demand of the age, emergency management must promote its development by using advanced concepts and effective means, change the non-normalized management into the normalized management, in order to realize the promotion of the emergency response capacity and reduction of the loss. Facts have proved that the old empirical

management mode has not adapted to the modern society, and emergency management must transform from "extensive" to "intensive", and lay emphasis on management, method and quality.

1.1. Basis of emergency quality management: quality management

ISO standard in quality management is a widely used standard in industry field, but its application in education, health care, public sector and other different fields indicates its universal practicability. ISO9000 standard in the quality management, which aims to enhance customer satisfaction, establishes eight fundamental principles of quality management. It is the intercommunity of the basic principles and the basic ideas of emergency management that makes quality management become the theoretical basis of emergency quality management. Eight fundamental principles of quality management are as follows: first, focus on customers. Second, the process method. Third, the leadership. Fourth, the decision-making method based on facts. Fifth, full participation. Sixth, the systematic method of management. Seventh, continuous improvement. Eighth, mutually beneficial supplier relationship. The intercommunity of above-mentioned quality management and emergency management indicates that it is scientific and reasonable to apply the developed quality management theory to emergency management field, and emergency quality management is thus resulted.

1.2. Connotation of emergency quality management

Emergency quality management is the management for emergencies using the core concepts of quality management, such as process management and customer-oriented of ISO standard, etc. The development of new field and new ideas is of great significance to the performance of emergency management.

The basic connotation of "emergency quality management", which is put forward based on related concepts and methods of the ISO9000 series quality management standards, is to apply the concept of the quality management system to the practice of all kinds of organization in dealing with the emergencies, establish a perfect emergency quality management system, improve the organizations' ability to handle emergencies, reduce the damage by the emergencies to the organization operation, and then effectively reduce the incident's impact on the whole society through the strict quality standard and evaluation system.

2. Basic Content of Emergency Quality Management

2.1. Basic idea

2.1.1. Transformation from abnormal to normal management

Emergency quality management requires normalized risk management, instead of the abnormal management after the outbreak of the emergency. For the emergency management, emergency quality management system will be divided into each working step, and integrated into whole normal production process of the organization to make the emergency management and the routine work as an whole, being prevention-oriented and continuous working on it, so as to change the abnormal to normal management.

2.1.2. Transformation from remedy to prevention

Emergency quality management requires to change remedial working mode after emergency occurs into prevention, and prevention comes first, so as to control the risk

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source and take precautions. This requires, first of all, to find out all factors which may affect the quality or lead to the crisis, make reasonable classification, and eliminate them one by one through scientific management methods to ensure all production and business operation activities manageable.

2.1.3. Transformation from fuzzy management into standard management
Emergency management requires the transformation from fuzzy management in the past into standard management. The old emergency management is usually just that of an individual's perspective or to say leadership management, not everyone is involved. While emergency quality management system establishes a coherent emergency management module, controls every work link through process management and has strict requirements on the working processes of all employees, so that each employee can form a clear emergency management context in their mind, and realize the transformation from fuzzy management to the standard management.

2.2. Working steps
Based on the above analysis, organizations need to have an efficient management in each link of the emergency management by following the corresponding process and specifications. Only by scientific and comprehensive management of the emergencies occurrence and each developing stage can the effective emergency management be improved. Specifically, the goal will be achieved by the following steps:

2.2.1. Setting up the risk awareness
Risk awareness is the starting point of emergency management, and the risk awareness of staff must be vigorously strengthened in order to achieve normalization, and related cultivation mechanisms must be established not only in the leadership, but also in the frontline staff at the same time, which is an important part of emergency management strategy. The correct risk awareness is the precondition of emergency quality management, only when the activities are carried out under the correct risk awareness can the emergency quality documents of organizations be implemented.

Usually most of unsafe behaviors are related to the quality, training, and education of people [3]. Therefore, related training mechanism should be established in the grassroots level and the general public, to make normalized emergency management a reality. This requires the joint efforts of the whole society, carrying out corresponding risk awareness training education activities according to different populations and forming prevention and preparation thought against risks in the context of the whole society. Specifically, first of all, carrying out widespread and popular education and publicity to the social public; Second, popularizing correct risk awareness through the organizations at all levels which the social public belongs to; Third, prevention consciousness of the leaders in different organizations is strengthened by the industry leading organs and relevant government departments; Fourth, responsibility consciousness training for civil servants at different grades is performed by qualified institutions, experts and personnel in superior governmental departments. Through the training activities at the above levels, the right and effective risk awareness will be formed in the whole society for sure in the near future.

2.2.2. Setting up emergency quality management system
Emergency management emphasizes the whole process management of advance prevention, in-process control and ex post summary, only when the standardized

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management is carried out in each stage can they "face the emergencies fearlessly". The qualification and standardization characteristics of emergency management under the new situation requires the setup of emergency quality management system. Only by the standardization of emergency management through the effective implementation of emergency quality management standard can the emergencies be prevented from the source and the ubiquitous threats be avoided.

2.2.2.1. Pre-plan management

Pre-plan is an important part of emergency quality management system (The specific application scope of the pre-plan should be stipulated) and is the format file formed for the disposal of hazards source (that is the possible risks might be occurred inside the organizations). Therefore, the organizations should make professionals formulate corresponding Level 3 pre-plan system on the basis of systematic classification of potential risks, and carry out the quality of emergency management accordingly. Budget management should include the following contents: pre-plan compilation, resource management, pre-plan evaluation, pre-plan exercises, and pre-plan update, etc. Among them, the establishment of organization command system, definition of responsibility, management process design, safeguard measures planning are the key contents of the emergency pre-plan, and also the difficulties of the compilation and management of entire plan [4].

2.2.2.2. Risk source management

Risk source is the root of emergencies, and the permanent cure is just the target of emergency quality management. The effective management to the risk source means that organizations conduct the monitoring to the whole operation process by means of daily supervision, including risk identification, vulnerability analysis and risk analysis, and then evaluate the organization's emergency capability according to the analyses, in order to make clear the advantages, disadvantages, needs and deficiencies of emergency management[5], the problem to be solved is to determine possible events [6] according to the variation tendency of the relevant information.

In this process, the grass-roots staff should especially pay attention to the prevention of hidden risks in the daily work process [7]. Specifically, the risk source management can be realized through the following steps: information collection—risk source recognition; Information analysis—risk source confirmation; Information processing—risk source control; Information update—risk source re-recognition. Among them, the risk source recognition is the key step, where the symptoms of latent crisis can be recognized and identified by fan detection system or information processing system [8]. Information analysis should compare and analyze the collected information with the measuring standard of the organization to further assess the probability and frequency of the incidents occurred, as well as determine the possible risk therefrom and provide reliable basis for decision makers and authorities through the accurate assessment to the information [9]. Based on this, the organization can make corresponding disposal decision according to the information analysis results and achieve the objectives of risk source control. The continuous operation of above processes can realize information updates and open up of new cycle.

2.2.2.3. Emergency disposal

Emergency disposal process begins with the start of pre-plan, and ends with the effective containment of risk source. Details are as follows: First, emergency response. To minimize losses, institutions at all levels of the organization should make a decision promptly,

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quickly start the emergency plan, adjust the organization to the emergency state, and at the same time, organizations should seek the possibility to transfer the crisis into a favorable turn; Second, the command and coordination. Emergency command institute is the soul of the emergency disposal process, which must form a perfect calm decision atmosphere, have a comprehensive understanding of the event, make decisive decision, control the situation, transfer the emergency resources, and make comprehensive management for the whole emergency cooperation system; Third, Information management. Provide timely and accurate information to the decision makers and give appropriate information to the members of the organization and the public at the same time. It includes two aspects as follows, namely, information collection and release. The collected information is the important resources for managers to effectively control incidents, and the information released is the basis for the people involved to adjust their psychological expectations.

2.2.2.4. Post-Emergency Management
In order to make the damaged organizations and affected units return to a normal track as soon as possible, the restoration and reconstruction process after the emergencies are of great importance.

The details are: First, assessment and learning. Past experience can be the guide for the future. Comprehensive and objective assessment report can be taken as the reference to the rewards and punishment, and also the best materials for re-education and retraining. Second, the recovery of organization. This is a process of eliminating the consequences, which usually go through a long period. The damaged organization should make comprehensive analysis of the losses, including economic loss (recessive and dominant), life casualties and degree of psychological barriers.

2.2.2.5. Continuous improvement
Continuous improvement means the end of old round emergency management and the beginning of a new round one. In the increasingly interlinked modern society, organizations are faced with the internal and external environment changes, which requires the organization focus on the changes constantly as the reference and basis for new policies formation.

3. Practice of Emergency Quality Management
The advance of emergency quality management model will change the status quo of only government departments as the leading roles of emergency management, and make all kinds of organizations and their members and the social public the one main body of the mode. Only the emergency management with all staff participation may dissolve the risk to a greatest extent and avoid emergencies.

3.1. First step: risk source analysis of the organization
Organizations must first analyze their current emergency situations of production, management and offices, existing problems and situations faced, so as to determine the emphasis of the emergency management. Emergency management based on the fact will contribute to the improvement of emergency quality management ability of the organizations, grasp the focus of work and at the same time avoid unnecessary resource wastes. Organizations shall conduct a comprehensive analysis on each link of their own, stipulate right code of conduct, determine reasonable workflow, analyse possible factors that may lead the organizations to risky situations in the process, and carry out the

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supervision, so as to find abnormity timely and correctly, and realize effective emergency quality management.

The specific steps are as follows: (1) Data collecting. Collecting the materials of reports related with daily production, articles of association, institutional framework, the responsibilities, authorities and scopes of work of the various functional departments, and post responsibility system to ensure well basic preparation. (2) Preliminary investigation by organizational labor division. Making proper division of labor of the major responsible personnel and other workers, and carrying out investigation on the actual situations of the past and current operating conditions, personnel situation, management status and internal control of the organization. (3) Re-analysis based on the previous step analysis to find out possible maladies and further seize the cause and the performance for them. (4) Comprehensive analysis on possible risk source. This work is based on the results from the former step with the small problems being adjusted and major defects rectified immediately, so as to avoid the loss to the subsequent production and life of organizations.

3.2. Second step: The establishment of emergency management standard system from bottom up

Based on the above-mentioned risk source, relevant departments should form an emergency files to manage the risk source, which is the basis for carrying out emergency management and guidance document for emergency quality management activities. Therefore, the compilation of standards should adhere to the scientific and practical principles, comply with the characteristics of universality, closed ability, stability, sustainable improvement and controllable tracking [10] of emergency quality management working process, so as to realize the whole process management in every stage of emergencies.

> 3.2.1. Drawing up third-level emergency management standard to form third level emergency management files (i.e., emergency management operation document). The formation path is: the frontline staffs comb the respective working process according to their own work, make personal safety production specifications, and on this basis form an emergency manual. The details are to perform the post risk source identification, risk assessment, risk control, emergency disposal measures design and determination of the hardware conditions and emergency supplies required by the risk control accordingly. The above contents can form the third level emergency management standard file, which is required to be strongly operable, concise, easy to learn, easy to understand, easy to remember and easy to use.

> 3.2.2. Drawing up second-level emergency management standard to form second level emergency management files (i.e., emergency management procedure document). The formation path is: on the basis of third level standard document, forming the special contingency plans in accordance with the classification of risk source, i.e. the second level emergency management standard files. The file is strongly operable, and has a comprehensive consideration of the allocation of personnel and goods and materials, thus forming the corresponding emergency drilling standard.

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3.2.3. Drawing up first-level emergency management standard to form first level emergency management standard specification (i.e., emergency management original document). The formation path is: forming overall emergency management specification of the industry, i.e. the first level emergency management files, on the basis of second and third level standard files. The file is required to be widely applicable, and can guide the emergency management of organizations effectively.

3.2.4. Drawing up emergency management working standard system for management level to form emergency management working manual (i.e., emergency management responsibility files). The formation path is: forming corresponding emergency management working standards focused on policy makers and middle managers to clarify their responsibilities and improve the management efficiency of organizations, on the basis of third-level emergency management standard documents. The files is required to be clear responsibility, and smooth communication channels between managers in different levels and different departments.

3.2.5. Drawing up emergency management review standard to form emergency management review files, used to evaluate the effect of emergency quality management. The review standard is divided into internal and external standards. Internal review standards are used to perform regular evaluation tests on the emergency management of organizations themselves, and external review standards are used as the basis for government and other social organizations to evaluate the emergency management of the enterprise. The files is required to set relevant parameters and all indexes should be specific, clear and practical.

3.3. Third step: Full implementation of emergency management standard system to ensure cyclic improvement and continuous enhancement of the emergency management

After forming emergency management manual and working standards and conducting the targeted training on personnel to make them master the thought and content of emergency quality management standards, organizations can carry out routine work management strictly hereunder. For the problems in the work, timely rectification should be made in accordance with the standards and at the same time the emergency quality management standard should be revised regularly.

In order to ensure the effective operation of emergency quality management system, two "in place" should be ensured: one is recognition in place; the other is management evaluation in place. Carrying out corrective and preventive activities and giving full play of internal review is an important link in ensuring the efficient operation of the emergency quality management system. Internal review is the verification process of the conformity and effectiveness of emergency quality management system performed by the personnel with training and review qualification. For the problems found in internal review, corrective and preventive measures should be taken to continuously improve the quality. The function performance of internal review has an important relationship with the actual effect of emergency management quality standard system.

At the same time, in order to have effective implementation and execution of all aspects of the emergency quality standards in the organizations, the staffs should fully understand their responsibilities through related trainings, that is all staff know when and how to do

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the right thing, which will help members of organizations make emergency decision of rapid processing in a short period. Given that emergency quality management standard has definition to each process of emergency management, persons in different posts perform their respective responsibilities, and "Specialty" is more critical in the relationship of "Specialty" and "entirety" in emergency quality management. Therefore, the organizations should have proper training with the basic understanding of the process, namely targeted professional knowledge education to different parts of the standards. What needs to be emphasized is that the senior managers of the organization should systematically master the professional knowledge of all kinds of emergency management.

3.4. Fourth step: Carrying out comprehensive external evaluation of emergency quality management system, to realize the improvement of emergency management ability

After the emergency quality management standards are drawn up, the specific implementation process and effect should also have objective external evaluation in addition to the internal supervision and review of organizations. As an external evaluation main body, the government shall be independent from the organization's authority and conduct a comprehensive evaluation of emergency quality management [11]. While the supervision of the government is not only the inspection and management of government or government departments, but should be a kind of effect, or a daily specification. Government evaluation should go deep into the establishment and implementation process of emergency quality standard system of the whole enterprises, and become an essential link in the whole standard system.

During the process of supervising and evaluating the emergency quality management standards, government should apply the PDCA (P -plan, D–doing, S -studying, A - action) process management and management review method in the quality management standard, to improve the efficiency of supervision and evaluation and continuously improve and perfect the emergency quality management standards. With the assistance of professionals and the principles of dynamics, integrity, comparability, oriented type, flexibility and expansibility, qualitative and quantitative combination and target-orientation[12], emergency command mechanism should formulate specific standards and rules of emergency supervision and evaluation of quality management, and take personnel training of emergency management quality to responsible personnel, extend it to each staff, and eventually form a perfect supervision and evaluation system.

In particular, government evaluation is the comprehensive evaluation on the establishment, implementation and effect of organization's quality management system by government departments, which is the effective tools and methods of emergency quality management in the management, evaluation and supervision of different organizations. In the process of emergency disposal, the public is difficult to fully understand the organization's emergency treatment, while the government agencies have the ability to carry out investigation and evaluation of the information collection, risk forecast and processing, decision-making correctness, resource allocation effect and efficiency, and so on.

Therefore, government shall plays the role in the external review on the emergency quality management, appoint special person or specialized agencies to have timely investigation of the loopholes and problems in the emergency quality management of the organization, establish an impartial and practical external review team for emergency

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quality management to form a complete evaluation process. Based on industrial characteristics, the emergency management standard system of organization is composed of tertiary, secondary, primary documents, and government evaluation should also form corresponding standards. At the same time, the formation of governmental evaluation standards should be of intuition, pertinence, effectiveness and operability, and specific typical and quantifiable indicators should be selected for the evaluation, such as the amount of budget fund, capital utilization rate, material purchasing quantity, risk control rate, etc. They should have classified extraction after identification of specific indicators and thus forming a set of standardized evaluation system that can be used in all kinds of organizations. The specific methods of the government in evaluating the emergency quality management of all kinds of organization are presented as follows:

First of all, the government will inspect whether the organization has established the emergency quality management system through standardized indicators. In accordance with industrial standards, the government will mainly inspect the key links and essential resources (including personnel, equipment, etc.) of emergency quality management, and review whether the organizations have basic framework of emergency quality management.

Secondly, the government will evaluate whether the emergency quality management system of the organization meets the requirements. The government shall give a comprehensive and thorough review on the emergency management system of organizations, grade the organization's actual situation by strictly following the evaluation standards, and determine whether the organization's quality management system is in line with the requirements of specifications.

Thirdly, the government will appraise the working performances of the organization at different stages through periodic evaluations. The government shall determine the beneficial experience on emergency work of the organization assessed, point out the deficiencies and defects, and provide the corresponding improvements. Target oriented principle requires that the government shall take the performance improvement as the goal, rather than in pursuit of punishment in the process of emergency management assessment.

Fourthly, the government will supervise the improvement of organizations' emergency quality management system. The government shall point out the problems existing in the emergency quality management system through professional review, put forward improvement opinions according to the beneficial experience of emergency management in the industries and supervise the improvement of emergency management of organizations.

4. Summary
To sum up, the emergency quality management system should start from the risk source and go deep into the management process, realize the standardization, normalization and systemization of emergency management to form a unified, multi-functional, responsive and efficient emergency mechanism, train the organizations to master the right way to manage and respond to emergencies, help managers and members of the organizations to recognize the actual existing problems, and find the crux of the organization, thus hold back the risk from the source.

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There is no doubt that emergency quality management will open up a new situation of emergency management. This new concept and working mode will effectively avoid the shortcomings of past management after the event, and predictable management thoughts run through the whole course of working links via standardized quality system to minimize risk possibility. So to speak, the core and key of emergency quality management is to minimize the possible risk in each link of daily work to reduce the possibility of risk occurrence, and in this way the earnings obtained by the organizations will be much superior to the emergency disposal after the outbreak of emergencies. The formation of emergency quality management concept and emergency management system and standards established hereunder are of great significance to the future emergency quality management in our country.

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References
[1] Wu Xiaoying, Pu Aiping. Quality control system and enforcement in the public sector according to the ISO9000 standard [J].Journal of Party School of the Zhejiang Committee of the CCP.2009(5).
[2] Song Yanjun. TQM, ISO900 and service quality control [M]. Beijing: China Machine Press.2005,56.
[3] Tang Chengpei.System and Method of Emergency Management of Unexpected Public Events for Small and Medium-sized Cities [M]. Shanghai:Tongji University Publishing House, 2007, 168
[4] Zhong Kaibin, Zhang Jia.On the establishment and management of emergency [J]. Gansu Social Sciences, 2006(3)
[5] Liu Tiemin. Construction of emergence system and pre-arranged planning of emergence [M]. Shantou: Enterprise Management Publishing House, 2004, 60.

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[6] Chen An, Chen Ning and Ni Huihui. Theory and method of modern emergence management [M]. Beijing:Science Press, 2009, 36.

[7] Zhou Yongsheng.Crisis management in modern enterprises [M]. Shanghai: Fudan University Press, 2007, 122.

[8]   Xue Lan.Crisis Management in China:the Challenge of the Transition [M]. Beijing:Tsinghua University Press, 2003, 64

[9]   He Wenjiong.Risk management[M].Beijing:China financial and economic Publishing House. 2005, Di113-135 page

[10]   Yu Qiang.A study on emergency management flow [J]. Journal of Changchun University,2009(7)

[11]   Hu Shuigen, Yu Xiaofeng, ect. On public crisis management [M]. Hangzhou: Jiejiang University Press. 2008, 28.

[12]   Xu Hao,Yang Zonglong. Study on crisis management of local government capacity evaluation [J]. Chinese Public Administration. 2007(5).

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Stress tests are not only for banks and nuclear power plants

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Abstract

After Fukushima, the world - intimidated by such a disaster, introduced stress tests. Each nuclear power plant had to undergo a careful analysis how resilient or vulnerable it was, taking into account some hard scenarios. Stress tests have been used for some time also in banking … to assure that a specific bank is strong enough to survive bad times in economy. Even that for the nuclear power plant the stress test means something completely different then for the bank, there is something common. It is a method differing from usual audits and checks. It means an introduction of specific scenarios and investigation of the probable reaction to it. It means to ask the question: "How are we doing?", "How would we be doing in hard times?". In broader view it means to run an exercise with people who really perform the management and with the real data. The findings, followed by proper means for risk mitigation and better preparedness definitely increase the resiliency of the organization to the future possible crisis. It works with power plants and banks … so it should work elsewhere. And it does. In the paper the stress test method to increase the preparedness of organization will be described, touching the "classical" disasters and also the modern areas as a cyber security.

Introduction

The area of security and crisis management is wide and multidisciplinary. On the other hand this discipline is sort of overshadowed by other more actual and "more interesting" issues of daily life. It comes to the stage lights only after something serious happens, or at least threatens. When everything was over, many declare that seeing various signals, it was clear what was going to happen, it was clear what to do and what not to do to prevent the situation to get worse. And that it was necessary to act immediately and not to hesitate and wait. One of Czech proverbs says: "After the battle everyone is general" and indeed – those who survived past crisis become all hardened and when the next one comes, they behave more wisely, decisively, quickly and effectively.

Based on years of experience in building information systems for crisis management decision support, we are convinced (after all, nothing revolutionary) - that the most important factor in emergency preparedness is the people. Especially their knowledge, skills and ability to act the adequate way. In this paper, we focus on the top management team of the organization, whether it is state, regional government, a large company, utility or a bank, or on the other side a village or small business, which, however, due to the nature of its activities can significantly affect public safety or environment.

The way of operation of the senior management team is usually optimized and tuned to meet the daily business defined by the organization's goals. In such a context, relations and positions of individual team members are being permanently refined. The information is being updated; the knowledge of the capabilities of other team members, resources availability and the right path to solve a particular issue is brought up to date. Sometimes,

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admittedly, the official written procedures may not correspond to the reality and it necessarily raises the question – which one is the correct one?

The smoothly running processes might be interrupted by some disaster, when the situation gets out of normal. For example, when there is an incident that could escalate into a crisis situation. In this case, an uncommon action is required from the management. The action for which we have no adequate information and sometimes there is a lack of necessary personal qualities of the people involved. The management team, which works perfectly in normal conditions, may fail completely in the crisis situation due to different reasons. First, because of lack of information, knowledge and experience, inadequate communication, and finally, due to the personal qualities of its members. (There are known cases where the city mayor, performing perfectly in "peaceful" times collapsed during a flood or other emergency situation and had to be replaced in his role by another person).

It is useful from time to time to ask a question: "How are we doing?" A simple question, but difficult way to the answer (if we ignore the variants as "well", "so-so", "difficult to say"…). It is hard to find a suitable metric, how to quantify the Preparedness - how to use the metrics to compare one organization to the other, or how to compare the state of the same organization at different times and situations. As a standard approach to this matter we may use an audit that at least judges the quality of its processes, the level of documentation, available resources and knowledge of people. Then, the audit results entitle us to believe that we have everything under control, that we have all the information necessary, that all residual risks are covered and there are contingency plans and perhaps even the IT support to them. However, experience shows that such "paper-based" preparation is not enough and in a crisis situation everything can be different. The information may not be current, there is no time and will to read disaster manuals and generally the situation itself is different from the one described in the plans. It turns out that at the moment the competent people, equipped with adequate powers are a key-winning factor.

Crisis Staff meeting is something other than a management discussion. We are facing an unusual situation, under time pressure, we do not have enough information, or what we have is inconsistent. Other subjects come into game; colleagues react differently than usual, yet it is necessary to make decisions that may have far-reaching consequences later. There are many indications in critical situation, which suggest possible further development, but we do not notice them. This leads to subsequent considerations - if we suspected that it would be like this, we would have acted differently.

The best method to become an experienced crisis manager is to live thru the crisis. If we do not want to wait to "be trained" by a real crisis, and on the other hand, we believe a formal audit is not quite sufficient way to show "How are we doing," we still have a chance to increase our preparedness for crisis situations. The second best method is an exercise. And it does not need to go thru the real evacuation, flue curtains, cut off electricity and transportation of masqueraded injured, although these exercises have their place and are usually well performed.

In many cases, we only need the open discussion on possible scenarios - manager game at a table where all the information inputs and outputs can be simulated. The important thing is that this game must be attended by the proper players – i.e. top management,

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members of the Crisis Staff and representatives from key structures of the organization, which would play a role in any crisis situation. Their replacement by deputies and experts would bring perhaps an interesting discussion, but the simulated evolution may differ significantly from reality. And most importantly – the experience, information and awareness need to get into the proper heads to use in any real situation.

With nuclear power plants and banks, where we have witnessed a series of stress tests caused by awareness of the potential risks and the need to answer the question "How are we doing?" It was motivated mainly politically - to assure the society we are doing our best to mitigate the risk and minimize the potential impact of disaster. We can apply such a method for other organizations, on which depends the life, health, property, environment, integrity of state or territory, and the like. True, we could perform a stress test in the form of an audit - as was done with plants and banks. However, if we add the exercise, it will achieve multiple benefits, as it will be shown in the following.
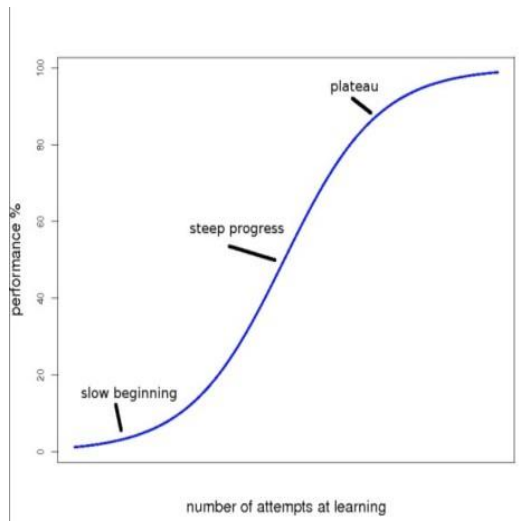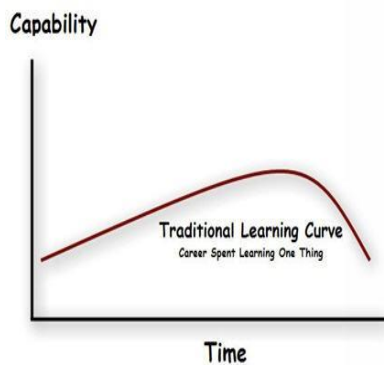
What is the stress test
The very term STRESS TEST may not be the most appropriate name of what is really happening. It may evoke effort in the fitness center, but as it was already used for the nuclear power plants and banks, most of the people understand the meaning in the context described here. A more appropriate explanation would be perhaps the "Assessment of preparedness for emergency situations", but let's extend the Stress Test to other areas as it is short and well understood.

For simplicity, we will consider socially responsible organizations that are aware of their importance to the society and environment and who care about emergency preparedness due to special law or their activities are based on a comprehensive risk management, Business continuity or general sense of responsibility.

The impulse to perform stress testing may be, for example, the real event that happened "at home" or somewhere else, setting up of new management, change of owners or stakeholders, change in legislation, a request from a parent company level, fluctuation of employees, identification of new threats or the like. Time by time we need to ask "How are we doing." Ideally, however, such activity is a standard part of organization's life and is performed periodically.

In our concept, the basic mean to perform stress test is the exercise. It is seemingly standard activity, which is commonly done in the military, in the fire rescue system or (in latter times) in centers for cyber defense.

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Learning curves (Hannah Wells, Paul Sturch, Gordon Muir - *Urology Department, King's College Hospital, London, UK*)

By using periodic exercises we can achieve the transformation of classical learning curve (when, after some time, no matter how well the person or team has learned, things are forgotten) to the more desirable situation, when we can reach and maintain certain level of knowledge and preparedness. By the periodical exercises we may also cope with the fact, that the circumstances are constantly changing and people fluctuate - so the overall practical applicability of the learning process decreases. Curve can be transformed so that the knowledge and skills are constantly extended, strengthened and updated. This is true for the organization, which begins such a process, and also for the situations with a new team in place, for example, as a result of elections, turnover, organizational changes and the like. Exercising will help them get quickly to the required level.

The stress test is carried out in three stages:

1. Preparation of (consolidation of information available and scenarios draft)
2. Realization (selected scenarios exercise)
3. Evaluation

So that the test had a sense, it is desirable that all involved "players" attended it. It means those who in any crisis situation will make decisions, provide resources, perform operational tasks, process information, and prepare documents for decision, preparing information for the partner organizations, the public and its own employees. Leaving the test only to experts, analysts and auditors, we lose its main benefits - synchronization between different actors, building the knowledge of the real possibilities, identification of potential problems and dead ends. The presence of the right persons helps to get a feel for the early detection of a crisis from faint and non-structured signals and strengthens the ability to effectively implement adequate measures to prevent it.

Although the actual execution of exercises (manager game) may be the explicit and popular focus of the entire stress test, the significant activities happen before and after it.

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Preparatory phase

In the preparatory phase, we form the conditions for the subsequent exercises. This means in particular a scenario and information environment, which is his necessary to "play" the exercise.

According to the purpose of the exercise the scenario may be simple, composed of several basic steps that are developed on the spot during its execution. Other scenario may be complex and detailed, with a number of cooperating roles and plenty of accompanying documents. Working on each step raises a discussion and thus a number of imperfections is discovered that can be remedied in the preparatory phase, before the actual execution. In the preparatory stage, we are raising awareness about the real possibilities, resources available, possible adverse trends of the situation development and the organization's ability to meet them. Very often happens, that resources or opportunities are discovered, which are not mentioned in the current crisis plans. They might not be utilized during the real crisis, which would unnecessarily worsen the position of the organization.

The scenario includes the important steps and milestones that need to be followed by practice and also a set of input impulses (Injects) that "push" the story forward. These inputs can be realized by conventional means (printed text), or we can use the up-to-date technologies such as e-mail, SMS, telephone, mobile applications, simulated TV or radio broadcasts or outputs from the information and control systems and Internet of Things domains. The scenario also contains the expected timing of individual steps, which is then mapped to real time during the exercise execution. The scenario "designed time" does need to equal to the "game time". There might be time scale operations which allow to execute several days scenario in one day or vice versa – to have several hours to exercise several critical minutes in the crisis situation.

The second area of preparation is the consolidation of information to create a common situation picture. The aim is to achieve that the information coming from different sources can be displayed in a consistent and meaningful way for various kinds of the exercise attendees. Usually it makes sense to use location data, maps and diagrams or graphs and ensure permanent synchronicity of the picture to the time-based data from many sources. An important part of the preparation is the integration of models which shows the development of situation in time (e.g., flood model, model of water supply, heat supply, industrial accidents impact, computer networks under attack …). During the exercise, there should be a possibility to view the situation at any point in time. In a real situation, it is possible to use models for prediction of further development. It is clear; that the same tool-set can be used to support the real crisis management. The only difference would be the non-predicted scenario and no possibility to "rewind" and try again. But all the recordings and further analysis are there.

Realization phase

For the exercise execution, the person of a top importance is the moderator. He or she should have extensive practical experience, should know number of "stories" that have ever occurred or could occur. Moderator is a person, who can motivate the team to play. Moderator is supposed to give the attendees and the Organization a feedback, should assist with the explanation and running procedure in the scenario, and brings the input impulses. The scenario may be in basics known to the players prior to the exercise; they may acquire some knowledge during the preparation. But certainly there will be

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unannounced inserts, which will require a reaction of attendees without preliminary knowledge. Unrevealed (or secret) inserts will require some unpredicted activities to be performed by attendees, based on their current ability to act in a context of the actual scenario development.

Exercise can be performed entirely in the virtual space, "at the table" wherever it makes sense. But it is possible to link it to one or more coordinated exercises with other components (cyber infrastructure control, rescue system, security system ...). Outputs from these collaborating exercises serve as injects to the top scenarios and the information is passed as input to the common picture of the situation.

There is a need to properly record the exercise execution - including video, documents, injects, monitored values, logs of all operations and everything else, which was brought in front of eyes of participants at any moment.

Making mistakes during exercises is no mistake. On the contrary: any identified deficiencies lead to the fact that in a real crisis situation the response of organization will be more qualified and effective.

Evaluation phase

Data for the evaluation are being collected during the exercise. Besides the objective information (video and audio recording, environment monitoring,...) there are subjective information, produced mainly by evaluators or inspectors. Any simple metrics, saved for example as the school grades, might be later evaluated in context with other data.

The most valuable output from the execution are the measures to be taken to improve the current preparedness level. The performance level of individual scenario steps often cannot be precisely measured, but is assessed by the evaluator's judgment. Even in such situation, it is possible to build at least simple metrics that allow comparing individual exercises in different time, to measure the personal progress or to compare similar organizations. The intention of stress test in our concept is not to bring some official verdict to the legal authorities or public, but to offer an internal feedback to the organization, how to improve its ability to deal with catastrophes at the top management level.

A part of the evaluation can be also the assessment of how the personal profiles of attendees and team relations affect the solution of various situations. We may find correlation of HR system results to the persons and team behavior during the stress test. But we may also find gaps, which would otherwise remain undiscovered until the critical situation strikes. Based on those findings we may improve our standard operation procedures, communication system and resource management to fit to our biggest asset – management team.

The whole evaluation process helps to monitor, document and improve the level of preparedness of the organization in time.

Tools for stress tests preparation and execution

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The stress test might be in principle designed and driven by a paper and pencil. Even more – when we exercise the really tough scenarios, we need to take into account that we might have not many more tools. No computers, no phones, no electric network. But for the preparation, execution, monitoring and evaluation of the exercise the IT support appears to be very useful.
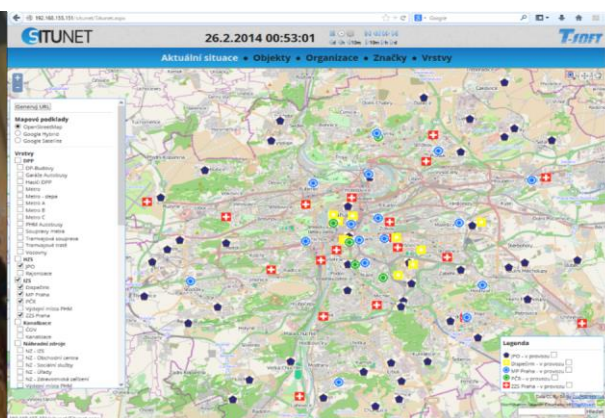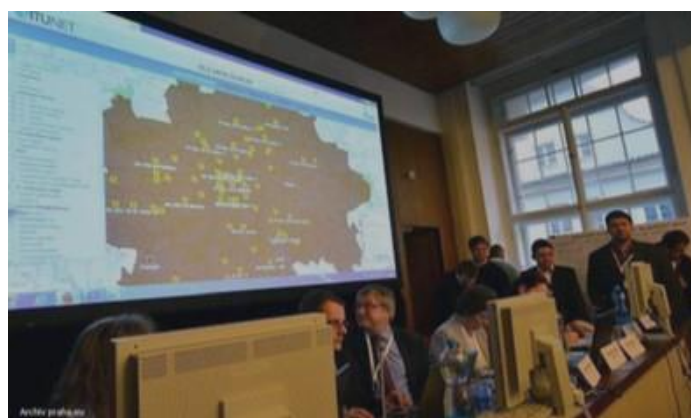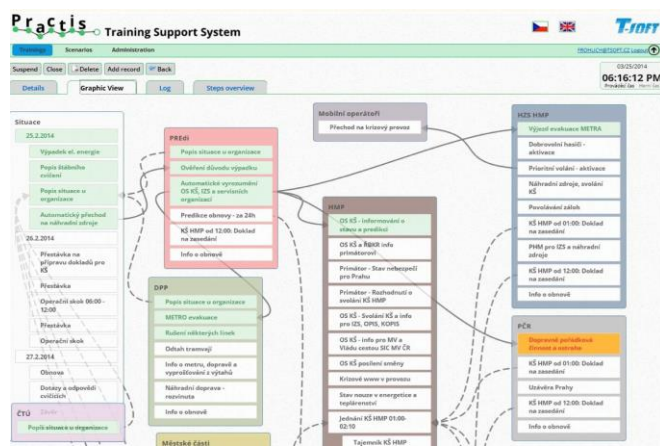
At the low-end, we may use word processor, spread sheet, e-mail, phone and so on, at the high end we may find useful something as 3D holographic projection and drone-recorded situation, but there is still something in the middle, which can bring integrated and structured approach to the preparatory team, to all participants of the exercise, to evaluators, inspectors and all of those who formulate the conclusions and measures to implement. And last, but not least – the integrated knowledge, which is being built and updated by periodical exercises, is an ideal base for the real crisis plan.

For the preparation, execution and evaluation of the stress test we developed specialized software tools. They support design of scenarios and consolidation of various documents and other information resources, which form the information base of organization for emergency purposes. These tools will also facilitate the exercise execution and the in particular the stage of evaluation.

The first tool is PRACTIS (www.tsoft.cz/en/practis), which helps to design structured scenarios. It allows to maintain all the needed attributes as participant's roles, timing (both real time and "game time"), insert the performance assessment by evaluators and attach all the relevant documents required in each step. All the information is interlinked and accessible in preparatory phase, during exercise and in evaluation. PRACTIS allows a clear graphical display of the links between scenario steps, visible from the perspective of various actors. During exercise it serves as an organizational system that tracks planned steps, records their performance, time, rating, and other events during the managerial game. Two time lines allow the long-term scenarios to execute in a much shorter time, and vice versa.

The basic skeleton of the script can be known to exercisers, but hidden injects may be introduced during exercise, which enables to moderate direction where steps are driven by intention of the moderator. Beside the previously prepared steps, the scenario may be changed and developed on-site, if it is in favor of the more optimal result. The modified scenarios become after that an excellent material for modifications of standard processes.

Integrated documents, including the exercise recordings, provide an excellent support for evaluators and offer the material for the follow-up education and training of personnel.

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PRACTIS thus helps various users to orientate in time and in the scenario. To view a common picture of the situation we have SITUNET system (www.tsoft.cz/en/situnet). We can imagine it as a window into the situation where, in principle, we can see all the up-to-date information. However, this window can vary in time, area, kind of information … We can choose to see a set of information on the common background (usually a map, but they may also be tables, graphs...). The actual context may be visualized differently for different kind of participants, but the key is that all the information is actual and synchronized to the selected time.

The preparation of information to be able to act in the common operation picture usually takes a lot of effort. The unification of formats, access services, symbols, styles, notification methods and other display modes brings a consolidated view that can be used further in a daily life and especially during critical situations. After an exercise the most current information is there.

SITUNET works with time, so you may "travel in time" and see results of the models and the inserted information so far. When used in a real operation, it displays the time evolution of key data inputs - again for subsequent analysis and optimization.

These systems can then be used in the exercise, but they can become a standard means for the crisis staffs in real emergencies. In this case, it is possible to interconnect them with existing information systems (document management, emergency procedures, organizational charts, process systems etc.) to utilize as much as possible of the organization's resources.

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Nowadays, no system can work without access from mobile devices, so there is a possibility to share the work procedures, task lists and other useful information by smartphone. Mobile availability and connectivity can help to increase the awareness of people about risks and how to behave in crisis situations. In critical situations it may become an important tool for massive communication with people and broadcasting important authorized information.
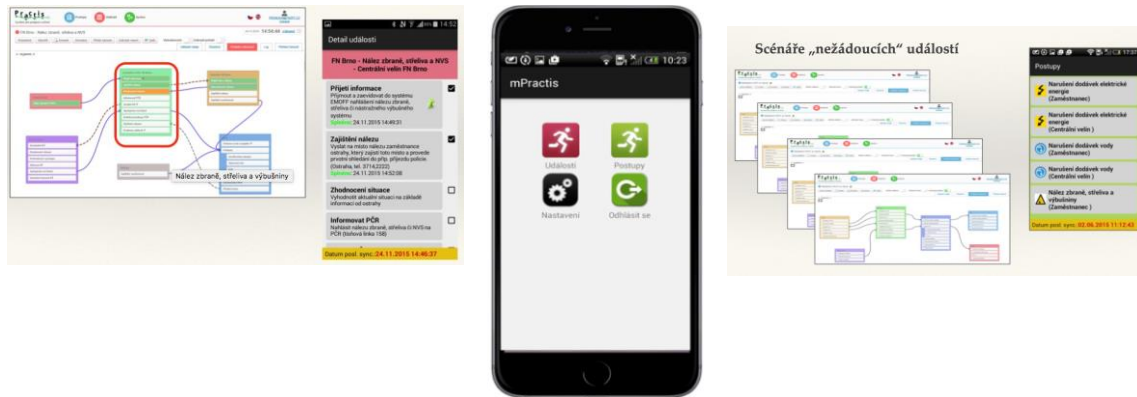
Conclusion

The stress test is a tool to determine how an organization is prepared for emergency situations - to answer the question "How are we doing?"

The idea is understandable and there is no reason why to limit it only to nuclear power plants and banks, where it was already initiated by severe problems. The preparedness is verified by exercising of the management team, which simulates scenarios possible to happen during crisis situations. Stress test examines the accuracy and completeness of processes, clarifies the roles and responsibilities of individuals and at the same time indicates their real abilities in a crisis. After the test the management team can better understand the symptoms of negative developments and improve response to critical situations. The results is improving the continuity and reducing potential damage in case of negative development. For the preparation and implementation of stress tests are available modern software tools, which support the creation of scenarios and their use during exercise.

Stress tests, if properly implemented, will unite teams in the organization. It enhances knowledge, understanding and mutual trust of their members. Stress tests complement the natural follow-up audit activities. Especially in times of cyber and hybrid threats, stress tests may contribute to strengthening the resilience of the state, regions or businesses, both at the national or international level.

The stress tests could be a natural contribution to the TIEMS GENERATE project as they could help to form international and interdisciplinary teams and also prepare high quality moderators for design and execution of exercises worldwide.

Literature

1. *PEJČOCH J, What you really need to be prepared, In 2015 TIEMS Annual Conference, 30th September - 2nd October, 2015, Rome, Italy*

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2. SCHANZE JOCHEN, ZEMAN EVZEN, MARSALEK JIRI (Eds.): Flood Risk Management: Hazards, Vulnerability and Mitigation Measures, ISBN 978-1-4020-4598-1
3. https://en.wikipedia.org/wiki/Preparedness
4. ISO 22301:2012 Societal Security – Business Continuity Management Systems Requirements:
   http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=5003 8
5. CONKLING, TED: Pre-accident investigation: An introduction to Organizational Safety, Ashgate 2012, ISBN: 978-1-4094-4783-2

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Total systematic field solution for emergency cases

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Abstract

In this article, we elaborate the complexity and perniciousness in emergency cases, and simply analyze the solution and early warning system for emergency cases. We mainly introduce Haidexin's total systematic field solution towards emergency cases, which is the foundation of on-the-spot emergency solution in China.

Keyword: Emergency Cases, System, Haidexin

1. Introduction

The evolution of human beings is a battle between human society and nature disasters. Nowadays, enhancing the emergency management abilities has become the top one issue for the governments to take care of the frequent and compound types of emergency cases all round the world. The maturity of handling emergency cases has significant impacts on economy and social stability.

2. The complexity and perniciousness in emergency cases

Emergency cases always happen very unexpectedly, they come with perniciousness, which can cause casualties, property loss and other kinds of negative impact. These are integrated and inestimable. Meanwhile, they can last for a long period. For example, the Japan earthquake leaded to 100 thousand deaths in 2011, people disappeared included. Resulted in 350-billion US dollars direct financial loss and over 500 private industries were bankrupt. It's reported that Japanese government had allocated 180-billion US dollars to help reconstruct the disaster areas. The influence of nuclear leak in Fukushima is going to be inestimable even the earthquake has passed for 5 years. Fukushima is still regarded as a Ghost Town in people's eyes.

The emergency cases such as earthquake, flood, tornado, typhoon and geological disaster can cause not only casualty, but also trigger house collapse, facility damage, water or electricity cut off, traffic stop. And even communication outage between disaster area and external environment. For instance, the 74 days sustained rainfall of Taining county, Sanming city, Fujian province in May 2016 leaded to 100-thousand square meters debris flow in Chitan village. There were 3,228 people being transferred to safe places. The accident had caused traffic stop, electricity supply cut off and communication outage. Recently, the *Nepartak* typhoon happened in Taiwan had stopped the high-speed train for a whole day. 15 airlines and 182 shifts had been cancelled. Offshore ships cannot keep working. 116673 families had suffered electricity supply cut off and 400-thousand families did not have water supply. The communication outage and traffic stop had seriously affected the judgment and reactions of the external emergency rescue teams. Therefore, the superior quality of communication facilities, emergency system and transportation equipment appear to be important obviously in bombshell.

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3. Early warning and rescue system in emergency cases

After we have realized the wide-extensive consequences and serious harm in emergency cases, we need to do something to make a better world. We can reduce the negative impacts of disasters furthest by establishing disaster risk assessment mechanism, predicting natural disaster possibility, investigating disaster inducement and advocating self and mutual medical aid knowledge.

As chart 1 shows, the formation of emergency response system is a huge one. It consists a great diversity of subsystem. The process of rescue is always complicated. People get involved in rescue activities usually come from different areas, industries and fields, which determines the social character of emergency rescue. Centralized leadership will be the best way to make things efficiently. Utilize "Internet Plus" thought to integrate the latest technologies can accelerate the response speed in emergency rescue. It is very important to provide basic necessities of life for the people afflicted by a natural disaster, which refers to that the unimpeded communication should be guaranteed. The forewarning function occurs during the rescue process if the emergency rescue platform realizes information sharing. The distribution of materials should be well prepared in advance by using GIS (Geographic Information System) to locate the disaster position. To some extent, the equipped level of emergency system determines the rescue efficiency. That makes our property and personnel security being rescued successfully possible.

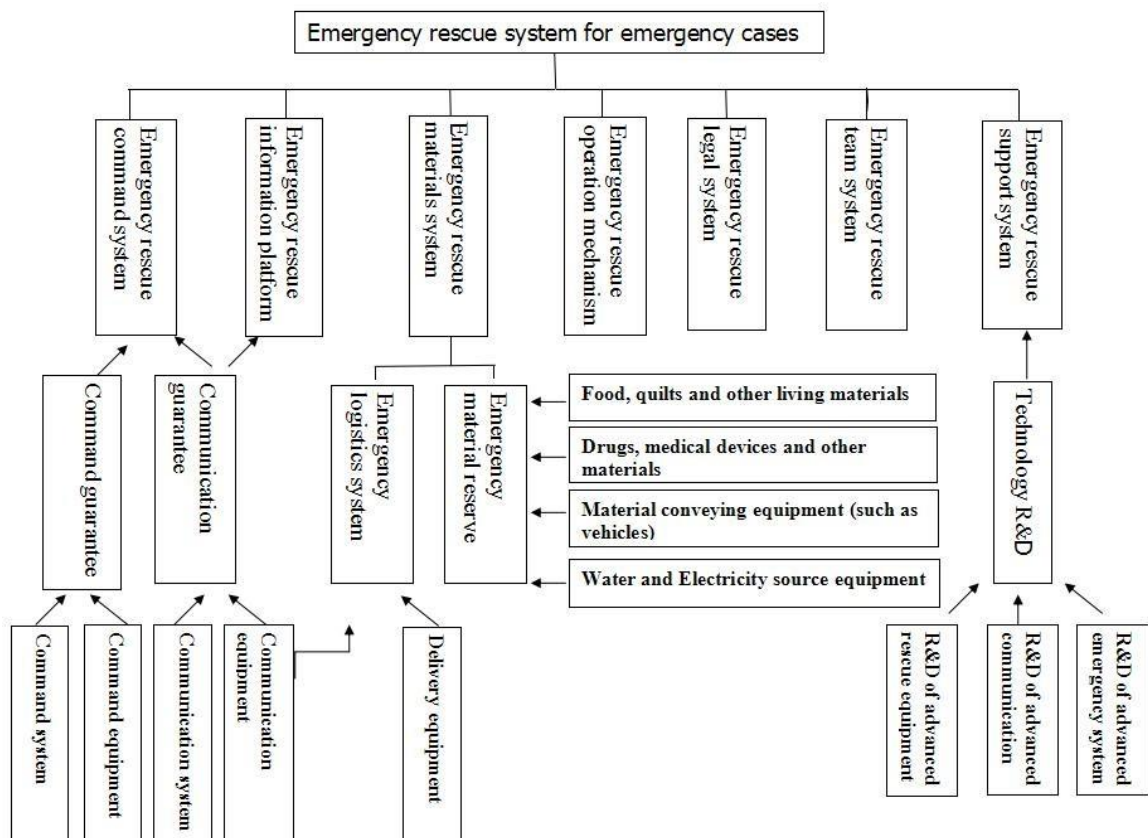
Fig. 1 The formation of emergency response system

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4. Haidexin systematic total field solution

Longyan Haidexin Automobile Co., Ltd is a subsidiary of Tellhow Sci-Tech Co., Ltd (Stock code 600590), which is China's leading mobile emergency vehicle program special service supplier with more than 280 patents. We are absorbed in mobile emergency equipment overall solutions more than 20 years, wholeheartedly provide to meet the individual requirements, intimate value products, services and solutions for the user.

4.1. Main structure of Haidexin systematic total field solution

According to the emergency field cases' characters and rescue functions' requirements, Haidexin Company has figured out its systematic total field solution by integrating all the products it has manufactured with continuous creation.
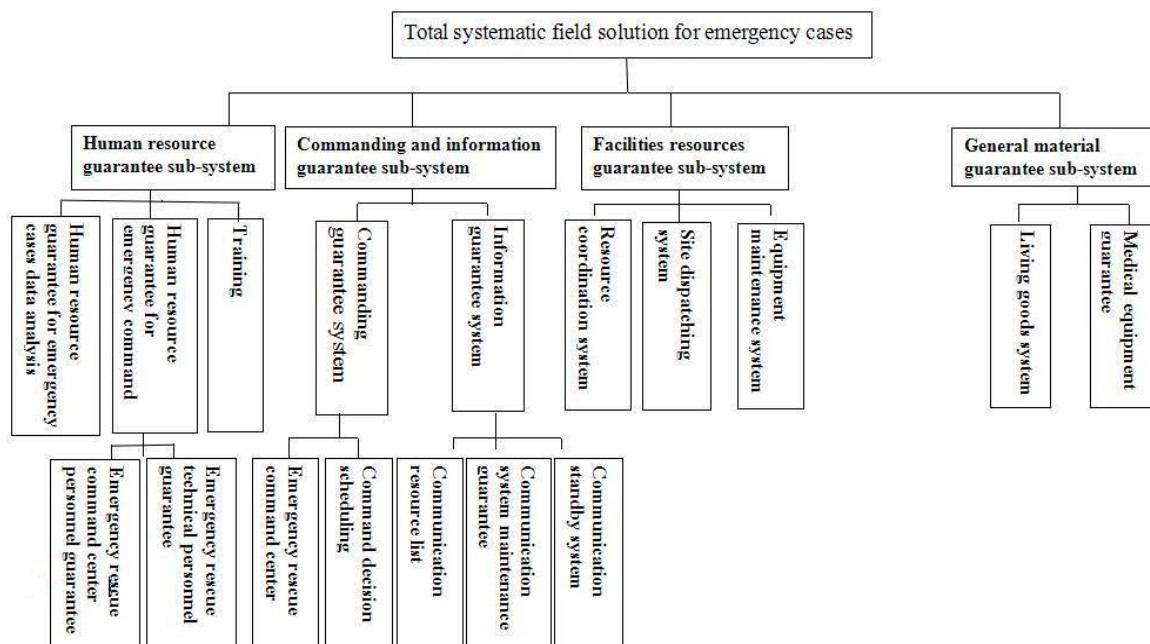

Fig 2. Haidexin systematic total field solution

This solution program focuses on taking care of people, materials, technology and information comprehensively in emergency cases. It contains different types of sub-systems. For example, human resource guarantee, commanding and information guarantee, technical facilities guarantee and general materials guarantee etc. Each sub-system has is specific function:

4.1.1 Human resource guarantee sub-system

All of the rescue activities should be organized and implemented by people. The functions of human resource guarantee system include the manning, technology level, assignment of responsibility, districts, contact information. We make full use of these functions in order to realize data searching, statistics and analysis.

Human resource guarantee is the priority of emergency rescue issues. The decision maker can make a wise decision by getting the right information of emergency personnel's conditions. Make sure the emergency staff composition (emergency center commander and field center commander staffs included), contact information, scope of position and professional ability requirements are being considered well. Make sure the emergency cases can be well taken care of by professional staffs. High efficient training system should be guaranteed in order to make full use of all the emergency equipment and take care of the unexpected malfunctions well.

4.1.2 Commanding and information guarantee sub-system

Information is the basic element of decision-making. Meanwhile, commanding is the "heart" of emergency system. The sufficient information communication and efficient commanding system are the key point to enhance the efficiency of emergency rescue. The functions of commanding and information guarantee sub-system contain information collection, information transfer unobstructed, prompt, effective and adequate. We are establishing a linked and mobile commanding and information guarantee sub-system by using Internet technology, hand-held terminal, satellite-oriented communication vehicles etc. Haidexin Company has created its own emergency communication linked measure that provides communication resources list, formulates emergency communication maintenance system, confirms all the emergency agencies are notified and kept informed.

4.1.3 Facilities resources guarantee sub-system

The technical facilities are very important to emergency rescue activities that include rock drills, flood drainage, generators, communication facilities and different types of outdoor rescue vehicles. The emergency field rescue can be guaranteed if those facilities have good care and maintenance at ordinary times.

Haidexin Company has various emergency facilities to deal with complex emergency situation, including multi-functional integrated inflatable, power generation, lighting vehicle, multi-functional integrated rescue equipment tools vehicle, drainage vehicle, power supply vehicle, heavy truck and so on. Through the establishment of emergency equipment management system, setting up and improving the emergency equipment update, debugging, dispatching management system, emergency equipment and resource integration, establishing emergency equipment library. Haidexin strenuously improves the technical content of emergency equipment, adjust or increase the variety and quantity of professional emergency equipment, forming a rational layout, all kinds of professional emergency equipment resources system.

4.2 Key technology and equipment

4.2.1 Intelligent service system of mobile emergency vehicle

After Haidexin's 10 years of research, the Internet technology is successfully applied to the mobile emergency vehicle service system, R&D the Intellectual Service System. The system applied mobile emergency vehicle analysis and back office services, making the intellectual service and depth of application for emergency special vehicles from data acquisition, real-time online analysis, abnormal alarm, running status detection, record of events and remote communication.

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The intellectual service system of mobile emergency vehicle is mainly the application of networking technology, through a variety of sensing technologies (RFID, sensors, cameras, laser scanners), a variety of communication means (wired, wireless, shortwave, ultrashort wave, etc.) to realize remote diagnosis, reminder, alarm, and remote intelligent service. The system can better achieve the networking function, to enhance the protective effect of *anti-matter* by *Internet Plus*.

Intellectual service system of mobile emergency vehicle includes three elements: communication system, service system, two-dimensional code system. Communication system achieves fast and smooth information exchange by the 3G network communications and wireless communications system. The service system includes daily maintenance reminders and fault emergency processing plan to provide efficient and attentive after-service for customers. Two-dimensional code system is through storage vehicle configuration information and maintenance information by two-dimensional code, after docking with the phone app, to enable to obtain the basic situation of the vehicle for customers from the mobile app intelligence applications, achieving mobility, real-time, fast and convenient anytime, anywhere to get related information of the vehicle.

Intellectual service system of mobile emergency vehicle has four major features: embedded open architecture software system, real-time monitoring system for the operating conditions, the application of the two-dimensional code system and mobile phone system APP, which aims to achieve data acquisition, online analysis, operation monitoring, fault warning and other functions by system linkage. The system is based on the *Internet Plus* technology, which can receive timely technology support from all kinds of emergency expert, improve the effect of decision-making, benefit by mutual discussion, develop platform thinking for the integration of resources, play a synergistic effect, but also must guard against risks of network system and data security.

4.2.2 Command center of mobile emergency power supply vehicle
Haidexin established the world's first mobile emergency power supply vehicle command center, which aims to transfer power supply vehicles into emergency relief operations in fast response speed when occurs in emergency cases and natural disasters.

As an emergency rescue platform, command center is the systematization platform of from top to bottom, the implementation of the enterprise internal emergency department's interconnection and interoperability, and become an important force in the emergency management information market.

Command center mainly makes up software, equipment, support system, released terminal and other parts. Its center software composes by the integrated application system and database system, realized command center of risk analysis, information reporting, monitoring, prediction and early warning, comprehensive judgments, assistant decision-making, comprehensive coordination and summary assessment and other function by software.

4.2.3 Haidexin brand magnetic suspension flywheel energy storage UPS vehicle
Haidexin ace power supply vehicle - Haidexin brand Magnetic suspension flywheel energy storage UPS vehicle is divided into a split type and integrated type, which uses

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the world's most advanced physical storage flywheel UPS as the core component, providing zero milliseconds not intermittent and high quality power supply for load, to overcome the vibration technical problems caused by highly integrated, discards the defect at least two power supply vehicle can achieve zero power switching power supply seconds to realize the magnetic suspension flywheel, UPS and generator set running on a vehicle. It is characterized in that the system uses physical storage mode, no pollution, low carbon energy saving, constant flywheel speed, low friction and low noise, which is China first power supply vehicle that highly integrated UPS maglev flywheel and uninterruptible power supply in a vehicle. The vehicles play an important role on Boao Forum for Asia annual conference 2016 and other occasions.

5. Practical application areas and field cases

So far, Haidexin has provided high standard products and rescue solution for power, nuclear power, military, civil defense, communication, national rescue team, water, transportation and other multiple domain users, such as MSFW Energy Storage UPS Vehicle, Power Semi-trailer, Transformer Vehicle, Emergency Rescue Lighting Vehicle, Kitchen Vehicle, Communication Command vehicle, Equipment Vehicle, and Drainage Vehicle. It was designated emergency power supply vehicle service supplier for 2014 Asia Pacific Economic Cooperation (APEC).

Haidexin has served the Beijing Olympic Games, Guangzhou Asian Games, Shandong ABG, Nanjing Youth Olympic Games, the annual meeting of Boao Forum for Asia and other large-scale activities, and actively participated in the Wenchuan earthquake rescue, South anti ice and protecting electric power supply in 2008, Shanxi Wangjialing coal mine flooding accident rescue, NEPARTAK typhoon protecting electric power supply, on-site support and protect emergency services for users in the major conferences, activities, natural disasters and accidents.

Haidexin provides rescue disposal products for emergency cases and plays an important role. Take *NEPARTAK* typhoon in 2016 for example, the parts of Fujian Province the occurred the historical maximum rainstorm and catastrophic flood, caused significant economic losses and casualties in Fujian Province. In Fujian province's 9 cities, 56 counties, 585 townships, 654.6 thousand people were affected, 6 cities flooded, 9,700 houses collapsed, emergency transfer 506.7 thousand people, with 83 people deaths, 22 missing people and almost 10 billion Yuan direct economic losses; there were 303 suspend production of industrial and mining enterprises, 5 airports shut down, flights canceled about 390 sorties, 3 interrupted railroads, 341 CRH outage, 4973 bus schedule of highway passenger run outage, 5 highway regulation, 41 interrupted national and provincial trunk; 10 kV line has 293 trip, 7810 sets of distribution transformer blackout, 547 thousand blackout low voltage power users; the water gates, embankments, hydrological stations, electromechanical well, hydropower station and other water conservancy facilities has 6118 places damaged.

The torrential rain in 16 townships Fuzhou Minqing County is the rare in history, and the disaster situation is unprecedented. 69 people deaths in Fujian Province, there were 60 people deaths in Minqing of Fuzhou, the parts of basic medical and health institutions in Minqing is unable to provide medical services due to communication and power outages. Many medical emergency rescue teams, Provincial Hospital, Union

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Hospital, First Affiliated Hospital, First Hospital of Fuzhou, Second Hospital of Fuzhou and Minqing Hospital established 8 temporary medical emergency places in Minqing for emergency rescue. Haidexin power supply vehicle fully provided emergency guarantee power supply for these places, and provided electricity protection for the patients and the affected people.

A total of 60sets power supply vehicles produced by Haidexin is sent during this typhoon, more than 50 hours of continuous power supply for damaged land in July 8 to 11. The main power supply safeguard units are hospital, army temporary headquarter, government emergency command center, main communications room, on-the-spot rescue equipment electricity, temporary settlements. Take the main power 400kW power supply vehicle for example, a vehicle can provide a temporary command center of rescue team at the county level, all on-the-spot rescue equipment (large cutting machines, pumps, mobile command platform, etc.) of a rescue team at the county level, township government emergency command center, communication core room at the county level, and temporary resettlement about 1500 people temporary electricity.

References

Ke Ma & Yan Liu, *Uncertainty of emergency risk events and innovation in emergency management* [J]. Social Science Front, 2011, 8：1-5.

Typhoon Nepartak leaves 2 deaths 66 injured in Taiwan Once 400 thousand households power outage and 2700 households without water http://www.pcpop.com/doc/3/3042/3042638.shtml

Wen Du, *The research of emergency response system for catastrophic emergency* [D], Henan: Henan Polytechnic University, 2012.12

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The next TIEMS Special Edition Newsletter is planned for February - March 2017.

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Next issues of TIEMS Newsletters are planned for February - March 2017 and contributions are welcome. Please, contact one of the editors or TIEMS Secretariat if you have news, articles of interest or like to list coming events of interest for the global emergency and disaster community or like to advertise in this issue.

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