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**Enhancing Situational Awareness and
Communication During Flood Crisis Events Using
Social Media Framework:
The Case of Bosnia and Herzegovina**

By

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This Thesis is dedicated to my father AbdulWahab Matar, my mother Ata (Čurčić) Matar, my brother Nasim, my sister Suzan, my wife Silvija and kids Muhamed and Tija.

ABSTRACT

The current thesis approaches the issue of using social media for the case of Bosnia and Herzegovina for the recurring flood crisis events. The current status of using and interacting with social media , through studying the literature of the previous facts and results towards using social media by governmental and public representatives have been investigated.

Different experiences were found related to countries that are experiencing flood events and their uses of social media. On the other hand it was found that little or no information were presented for the uses of social media for crises events in Bosnia and Herzegovina case. It was found that the reasons for not having current implementation of a solution is related to the complex governmental structure that are present in the Bosnian state government, entities of Bosnia and Herzegovina, Brčko District, cantons and regions.

Further investigations were initiated to identify the current uses, needs and obstacles towards the use of social media tools and services as a medium for increasing situational awareness and communication in Bosnia and Herzegovina. The considerations of the previous investigation were with respect to governmental complex structure and public needs. The results of the investigation managed to outline the current challenges with respect for each investigated sector. The outputs of the previous investigations have been used as inputs to direct and guide the system design of the proposed new system framework that is aiming for enhancing situational awareness and communication during flood crisis events using social media framework.

The system design and functionalities have focused on providing sharing environment for the complex government structure and public needs with a direct focus on not distracting the current used structure and public ethnical segregations. The system framework has been tested and the reflection of governmental attitude and public results has been encouraging towards adopting this framework for future flood events in Bosnia and Herzegovina.

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LIST OF ABBREVIATIONS

5G	5th Generation for mobile wireless telecommunication systems
ACELG	the Australian Centre of Excellence for Local Government
ANOVA	Analysis of Variance
ARC	American Red Cross
BAM	Bosnia and Herzegovina convertible mark – currency
BiH	Bosnia and Herzegovina
CSA	Civil Service Agency
DEFRA	The UK government Department for Environment, Food & Rural Affairs
DFD	Data Flow Diagram
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
FDD	Functional Decomposition Diagram
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Products
ICT	Information and Communication Technology
IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
IT	Information Technology
ITU	International Telecommunication Union (UN)
LMS	Learning Management Systems
LTE	Long Term Evolution
MS	Microsoft
NGO	Non-governmental Organization
OCC	Operation and Communication Center
OHR	Office of the High Representative
PC	Personal Computer
RS	Republic of Srpska
RSS	RDF Site Summary
SM	Social Media
SMS	Short Message Services
SPSS	Statistical Product and Service Solutions
UK	United Kingdom
UML	Unified Modelling Language
USA	United States of America
USAID	United States Agency for International Development
WHO	World Health Organization
WiMAX	Worldwide Interoperability for Microwave Access
WSDLC	Waterfall System Development Life Cycle

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DECLARATION

This work was produced by the author unless otherwise stated and duly acknowledged.

Signed: *Zadi Mator*

Date:

CHAPTER 1: Introduction and Overview

1.1. Foreword

The climate and environmental change has affected many nations by producing different challenges that each nation has to prepare and consider for the current and the future. Some of these changes came as blessing, while other came with disastrous effects and results. Bosnia and Herzegovina has not been exceptional to the environmental change, and it faced many occurrences of devastating flood crisis. The floods affected many regions in Bosnia and Herzegovina, as the country is well known for its richness in water source of rivers and lakes that has been formed due to the geographical appearance of mountains that are mostly defining the country's geography (Naida Anđelić, Dilista Hrkaš, Avdo Sarić, 1994).

The occurrences of floods are expected in some regions in Bosnia, especially in the winter season and early spring, but the recent floods that occurred in 2014 have brought a wider scope for flood crisis consideration affecting Bosnia. The huge and sudden impact of these floods have defected the rescue and response operations and resulted in a major disaster that cause a major threat to the lives and assets (IFRC, 2014).

The lack of preparedness to such unexpected event, compiled with the absence of expertise in facing such hazards, and deficiency in reaching and informing the public along with the lack of cohesion between the different entities in Bosnia was the result that magnified the Bosnian flood crisis. The first major flood threat happened in the year of 2010 after Bosnia got its independence from Yugoslavia although the state of Bosnia at the time of Yugoslavia had a major flood crisis in May 1965 in Doboj (Hidrološki Godišnjak, 1965). The recent flood that happened in 2014 in May was the most severe and had the most devastating effect on the public and other sectors.

The occurrences of the floods are not expected; however, Bosnian government and other participating entities should have had a better prevention, protection, mitigation and response operations. Bosnian government have compiled a framework and an emergency centre for dealing with floods crisis and emergencies (MSB, 2008), but the devastating results of the crisis showed that there is a major defect in the current used system and framework. Many frameworks that have been developed by countries that faced such challenges and crisis are present, and these frameworks are tested. However, to use these frameworks there should be

careful consideration towards different factors that include the geographical structure of Bosnia and Herzegovina, The different governmental entities, the available tools and assets for rescue operations, the information and communication technology infrastructure and the awareness and readiness of the public on using technologies that are oriented towards crisis event. If these factors plus other factors are implemented, it is believed that Bosnian government and public will be safer and more prepared for such events (CCI, 2015). Moreover, it is believed that the rescue operations will be more efficient when incorporating the use of ICT tools and applications that are available.

There are different tools that are used during crisis events, but they should be used within a framework that will be well known for the participating entities and for the public. It is not enough to use the tools, there should be a systematic plan and consideration for the vital data and information that will be needed for each participating entity and there should be special attention towards educating the public on how to be an effective member within the framework using different ICT tools.

1.2. Motivations

Bosnia and Herzegovina are facing different challenges that are hindering the development process in the country. The recurrences of floods that occurred recently are adding more challenges to the Bosnian government and public. Bosnia and Herzegovina should expect more floods to occur and they need to bring their efforts with other ruling entities in the country in order to minimize the effect of these crisis. The efforts can be unified within a well-structured framework that will consider the availability of ICT in order to bring the public to interact, minimize the risk and be part of the solution. Such framework is currently not available, and for that reason this research was initiated to explore the extent of these challenges in Bosnia and Herzegovina on a wider scope, and to define the main requirements for building dynamic framework that can be oriented towards these challenges of flood crisis event.

1.3. Research Aim and Objectives

The aim of this research is to increase public and governmental awareness and provide effective communication towards flood hazards and threats, through the use of social media services by providing a dedicated framework that complies with governmental structure diversity in Bosnia and Herzegovina

This was accomplished by aiming to achieve the following objectives:

- Investigating the current governmental and public practices during flood crisis events, and defining the challenges in terms of governmental structure, cooperation and communication and its effect on flood rescue activities and public response.
- Designing a Framework Structure to address the current deficiencies towards flood crisis awareness, communication and cooperation between different governmental entities, and between the governmental and public services in Bosnia and Herzegovina
- Evaluating the designed framework as a solution for providing flood awareness and communication in Bosnia and Herzegovina and defining the challenges and opportunities.

This research methodology was action research based. Hence, the researcher was part of the process in order to become capable of evaluating and diagnosing the problem and to reflect on it by providing solutions (Hussey & Hussey, 1997). Bryman defined action research as ‘an approach in which the action researcher and a client collaborate in the diagnosis of a problem and in the development of a solution based on the diagnoses (Bryman, 2004). This research project is working with different governmental entities that have operations in the flood crisis event. The work and approval for being part of this research came from the fact that the researcher is working as senior advisor at the Ministry of Communications and Transport of Bosnia and Herzegovina and he has direct access and collaboration with the emergency centre as well as collaboration with other governmental entities that are related with flood crisis events.

1.4. Original Contributions to Knowledge

This research study has provided a number of original contributions to knowledge, specifically to the field of “crisis, situational awareness and social media” framework and designs of unified framework for the Bosnia and Herzegovina, which is lacking serious participation in the field of research. The following points are presented as contributions to knowledge:

- The main contribution of this research is the design of Unified Framework for Crisis and Media that has addressed the challenges and deficiencies that are hindering the current practices towards flood crisis, and incorporated the public in being active members within the Unified Framework.

- The investigation results of evaluating the deficiencies and impracticality in the current framework for flood crisis used in Bosnia is also considered a contribution, as such study has not been done before for Bosnia and Herzegovina.
- Results derived from the investigation and analysis of the preparedness, mitigation and operations are considered a contribution as they have helped into identifying the main requirements of this research and they have helped in filling the gap in literature that can be used in the future by any organization and future research.
- Methodological approaches in this research plus the designed framework has been considered contribution as they can be used for further research into different regions or in other research disciplines.

1.5. Published Papers

- “Matar, S., Matar, N., Balachandran, W., & Hunaiti, Z., “Investigating Social media management, adoption and challenges - the case of Bosnia and Herzegovina”, European Journal of Business and Management, Vol 8, No 24 (2016), ISSN (Paper)2222-1905 ISSN (Online)2222-2839
- Matar, S., Matar, N., Balachandran, W., & Hunaiti, Z. ,“Social media platforms and its applications in natural disaster and crisis events – the case of Bosnia & Herzegovina” ,Journal of Information & Knowledge Management · June 2016, ISSN 2224-5758 (Paper) ISSN 2224- 896X (Online) Vol.6, No.5, 2016
- Matar, N., Matar, S., “A Unified Social Media Framework Design Against Floods Threats - The Case of Bosnia and Herzegovina”, Journal of Theoretical and Applied Information Technology, ISSN: 1992-8645 E-ISSN: 1817-3195, Vol.97.No 1, (March 15-2017)

1.6. Structure of the Thesis

The structure of this thesis will be organized as follows:

Chapter One: Provides an overview of the entire dissertation.

Chapter Two: Outlines the background of the project by reviewing the literature regarding its five theoretical corner stone's: (1) Flood hazards; (2) Crisis frameworks; (3) Crisis

communication and the use of social media; (4) Defining challenges and risks and (5) Bosnia government flood crisis status and challenges. The findings in these areas are used to develop a framework that outline the necessity for unified flood crisis framework incorporating social media to create and effective structure for the participation of public in such events and to fill research gaps in this field.

Chapter Three: will presents the current preparedness status from different governmental sectors and public that are involved in tasks associated with crisis events. Moreover, this chapter will include explanation to define the methodology used to perform the survey used in that study. Results of the survey are going to be presented and briefly discussed with regard to each participating sector, and a general conclusion will be drawn that presents the facts about the current status and preparedness for facing flood crisis events in Bosnia and Herzegovina.

Chapter Four: Will presents the need for incorporating social media in different sector, and will survey each tool that can be used with respect for different sectors and the public. Information will be obtained through a questionnaire that is going to be designed for such purposes. A discussion of results will be presented and outlined for the use as inputs in the Framework design phase.

Chapter Five: Presents the structural design and protocol of the novel framework for unified crisis and social media system using different methods (such as functional decomposition diagram, data flow diagram and UML). An explanation will present the technologies used to develop the novel framework that will reveal and define how the system is constructed to perform the desired functionality in the unified crisis and social media framework.

Chapter Six: Presents the evaluation stage involved with expert participants from the field of crisis and emergency framework, in order to provide a feedback on their expectation of the designed framework and to outline their remarks on the system in order to perform improvements on the design.

Chapter Seven: Presents the conclusion of this research study and suggests different enhancements and aims for future work.

CHAPTER 2: Literature Review and Background

2.1 Introduction

The impact of climate change has been shown through the occurrences of many natural disorders that caused hazards to human safety in terms of life or assets. One of the most pronounced natural disorders are floods, and they are considered one of the most widespread climatic hazards as they includes multiple threats to human health and safety (IPCC, 2012).

The frequent occurrence of flooding in many parts of the world put it as the most widespread environmental hazard, where in 2012 the International Federation of Red Cross and Red Crescent Societies published its annual World Disaster Report, identifying floods as the most frequent natural disaster (47% - a percentage similar to their (45%) average for the decade) (IFRC, 2012, p261). It is estimated that in 2013 there were 32 million victims affected by hydrological disaster, which counts for (33.2%) of total disaster victims, accountable for (46.5%) of the overall reported number of people killed and (44.9%) of total damage for the same year (Guha-Sapir, Hoyois and Below, 2014, p22).

There has been little systematic work on defining the challenges and vulnerability of the health and emergency systems that are supposed to respond to such risks and challenges as the flood hazards are expected to increase as a result of climate change. The occurrences of floods can take many forms as they include; flash floods, Riverine floods, rainwater accumulation due to the poorly-drained surroundings, and sea floods that are caused because of tidal and high waves that hit the adjoining lands. In terms of inland and coastal flooding, they are mainly associated with windstorm events, as it has been noticed clearly that floods vary in extent and impact according to different factors such as depth, speed of flow, spatial extent and content, speed of onset, duration and seasonality (Few et al., 2004).

The consequences of floods might vary and the floods with severe results are called “flood disaster”. As indicated by Few, with the current situation of having limitations in making strong projections towards the future rates of climate change and its effects, the increasing prognostic evidence of heightened global risk of inland and coastal flooding is rising. He also stated that the expectation in the next 100 years is to have flooding as common and more intense in different areas, especially areas that are considered low-lying coastal sites or areas that are currently experiencing high rainfall. Making precise prediction of locations with high risk floods due to the climate change is not feasible, as part of the problem is associated with

floods having different risk dynamics such as multiple social, technical and environmental drivers.

2.2 Flood Hazards

The hydrologic cycle or what is also known as “Water cycle” describes the continuous movement of water which circulates throughout the earth and its atmosphere. Sometimes this cycle, according to weather conditions can send considerably more water on area than it can properly handle, which cause flooding. The term flood cannot be precisely defined as it can take different forms (Parker, 2000), different sources use their definition for the inundation phenomena. The Centre for Research on the Epidemiology of Disasters defines a flood as “a significant rise of water level in a stream, lake, reservoir or coastal region” (Guha-Sapir, Hoyois, Below, 2014, p36).

The European Union (EU) defines a flood as a temporary covering by water of land not normally covered by water (EU, 2007), no matter what definition we use here, both of them points out to the abnormality of water level rise, a phenomena that has an impact on human and their livelihood. The primary cause of floods is intensive rainfall for long duration of time on a saturated soil or dry one which has poor absorption ability. Raining for long duration can increase rise in river levels which in turn can cause rivers to submerge surrounding lands for days or weeks at a time.

2.2.1 Types of Hazards

Flood hazards can be caused by more than just rain, they can happen anywhere, whether people live next to a river, dam or coastal area and at any time of year. Making a connection between intense rainfall and flooding is not definitively straightforward, as flood outcome can depend also on other river basin and flow regime characteristics, such as its depth, where it can be from few centimetres to several meters, and it can contain ruins, pollutants and sewage. Also, they can develop fast in onset as a flash flood or develop slow, flow at very high velocity or be still (Douben, & van Os, 2004). There are several types of hazards that are widely recognized:

2.2.1.1 Riverine flooding

Riverine or what is also called river flooding appears when a river or stream overflows their banks as a result of intense rainfall which flow into them. In 1998 heavy monsoon rains

caused unprecedented severe flooding in Bangladesh, exceeding previous record flood in 1988 (Nishat et al., 2000). Sixty eight per cent of Bangladesh, which is about 1.00.250Sq.km was covered by waters from Brahmaputra, Ganges and Meghan rivers (FFWC, 2013, p7.), causing enormous damages to properties and considerable loss of life.

2.2.1.2 Flash flooding

Flash floods are caused by localized heavy rainfall events and are usually associated with large scale flooding (Marchi, et al., 2010). They can be also produced by dam or levee breakage, or releases of an ice block flooding. They usually appear within six hours of the causative event and without warning. In June 2013 North India suffered from intensive rainfall leading to floods and landslides in the state of Uttarakhand which is considered as a Hindu holy place. It is estimated that over 100.000 people were declared homeless and over 5700 people have died (BBC, 2013).

2.2.1.3 Storm Surge

Storm surge occur when high winds pushing sea water in coastal areas causing it to accumulate up there. This happen due to the action of intense low pressure system inside a storm or hurricane's eye which causes the sea level elevation upwards forming a dome as there is less air pressing down on the sea. A strong wind pushes this dome of water onto the coast, while the rising sea floor holds up the water's run off and it comes ashore as fatal storm surge. Recent major storm surge that has caused widespread devastation along the central Gulf Coast of the US is hurricane Katrina (England et.al. 2005). This category 3 hurricane has produced the highest storm surge ever recorded on the US coast, a striking 28 feet along a 20 mile stretch of Mississippi coast, penetrating at least six miles inland in many portions of coastline and up to 12 miles inland along bays and rivers.

2.2.1.4 Snowmelt

Snowmelt flooding happens due to temperature rise above freezing, which cause snow to melt while soil is saturated with water or still frozen under deep snow cover. Also, ice jams can cause additional problems such as upstream flooding, while when the ice jam breaks it causes flash floods. Snowmelt flooding mainly takes place during spring time and it is considered as relatively slow phenomenon and its rates are usually comparable to light or moderate rainfall (NWS, 2016).

2.2.1.5 Dry Wash

Major rainfalls in dry areas and canyons can quickly cause flooding. This is caused due to the dry land that cannot absorb rainfall that falls on such land, causing water to accumulate and to rush to low lying ground while carrying mud and debris on its path (NWS, 2016)..

2.2.1.6 Levee Failure

The levee failures from Lake Pontchartrain combined with strong winds, heavy rainfall and storm surge has led to flooding of 80% of New Orleans, leaving some parts of the city under 20 feet of water. High water levels have resulted in damaging thousands of homes, businesses and roadways in the city. (England et.al. 2005)

2.2.1.7 Groundwater flooding

Groundwater flooding is caused by increased amount of groundwater at the surface, and it is considered as a seasonal phenomenon. This kind of flooding occurs when the water zone of saturation or what is called the water table reaches ground level, water starts to emerge on the surface ground, flooding basements and other sub-surface infrastructures (Macdonald et al. 2008). The water table is affected by three sources of groundwater (Jacobs, 2007.), where flooding is a particular risk:

- Rise of groundwater level due to prolonged extreme rainfall; when extreme rainfall is added to saturated soil with a high water table can cause groundwater levels to rise and flood considerable areas for long periods.
- Rise of groundwater level due to high in bank river levels; this flooding occurs when the in bank river water level is at a higher elevation than the surrounding floodplain. This is a specific problem for large river basins with a broad catchment
- Rise of groundwater level due to diversion by artificial obstructions; placing foundation into the ground, creates leak-proof barrier, arresting groundwater up gradient and causing the groundwater levels to rise.

2.3 Crisis Framework

A framework is conceptual structure, practices and criteria which is proposed to give guidance and foundation for dealing with common type of assignment or challenge. Frameworks help us understand how to coordinate, share information and work with different parties together for achieving a common goal. For the purpose of this research study, three

major frameworks have been selected and surveyed due to their importance and use in the field of crisis management and flood risks. Other frameworks are present too, but they are largely relying on the selected three frameworks that are presented in this chapter. The presented frameworks are different in some aspects due to their comprehensiveness and intention of use. The following section will present the three main frameworks and will outline their differences:

- A. The National Preparedness Framework of the United State of America
- B. The National Flood Emergency Framework for England
- C. The EU Directive on the assessment and management of flood risks

2.3.1 National preparedness – United States of America

The United States Department of Homeland Security – Federal Emergency Management Agency (FEMA) puts a great deal of effort for keeping its nation safe, while ensuring they develop after an incident occurs. The five preparedness mission areas, known as National Planning Frameworks are (FEMA, 2014):

- a. National prevention framework,
- b. National protection framework,
- c. National Mitigation framework,
- d. National Response framework,
- e. National Recovery framework.

Each mission area has its own set of core capabilities that determine definitive segments for achieving determined goals. In all five mission areas core capabilities there are 3 common capabilities that apply to all of them (FEMA, 2014); they are:

- i. Planning – applies to all mission areas,
- ii. Public information and Warning – applies to all mission areas,
- iii. Operational coordination – applies to all mission areas.

2.3.2 The National Flood Emergency Framework for England

The UK government Department for Environment, Food & Rural Affairs (DEFRA) has an overall national responsibility for policy on flood and coastal erosion risk management. They also provide financing for flood risk management authorities through dedicated grants to the Environment Agency and local authorities. DEFRA has adopted the National Flood emergency framework for England. This framework sets out the Government's strategic approach to achieving goals that will lessen flood disaster and is a resource for all involved in

flood emergency planning at local and national levels. This framework brings together different information, instructions and main policies that are needed during flood crises. It focuses on three main phases of managing flood emergency (DEFRA, 2013);

- a) Preparation phase,
- b) Response phase,
- c) Recovery phase.

2.3.3 The EU Directive on the assessment and management of flood risks

The Directive 2007/60/EC was adopted with intent to establish a framework for the assessment and management of flood risks, aiming to reduce the likelihood and the impact of floods on human health, the environment, cultural heritage and economic wellbeing. This framework points out the major areas that need to be addressed by all EU member states concerning flooding (EU, 2007), such as:

- a) Preliminary flood risk assessment,
- b) Flood hazard maps and flood risk maps,
- c) Flood risk management plans focusing on prevention, protection and preparedness measures.

2.3.4 Differences in Framework

Form the presented frameworks; it is obvious that these frameworks have many similar phases for facing crisis and they hold some differences within. Table 2.1 presents the phases of each framework and crisis. Also they compare their availability with respect for each of the three presented frameworks.

Table 2.1 Similarities and differences within the crisis frameworks

Mission areas	USA framework	UK framework	EU framework
Preparation		✓	✓
Prevention	✓		✓
Protection	✓		✓
Mitigation	✓		
Response	✓	✓	
Recovery	✓	✓	

To enforce the successful use of any crisis framework with all its different action plans and routines that are assigned to different collaborative parties, there should be an effective communication technology and framework. Different technological innovations are present to support the communication in crisis events, and one of the main tools that are being utilized is the use of social media frameworks. The next section will present the different issues related to the communication and use of social media in crisis events.

2.4 Crisis Communication and the use of Social Media

The presence of social media and their increasing popularity have changed the perception and the way people receive and share information. The term “Social Media” refers to the set of web tools and services that are utilized for sharing information, ideas and opinions frequently in an interactive manner and mass collaboration too. There are a large set of social media tools that have been used during crisis events in many different cases and they will be presented in the next section of this literature chapter.

The use of mobile communication technologies such as Short Message Services (SMS), Amateur radio (Ham Radio) and Smartphone applications is not considered a social media as they are not publically accessible and interactive. However, in our discussion of social media tools they will be included for their usefulness to the risk and crisis community as medium to distribute safety and preparedness information. The main features of social media are the speed at which interactions take place, the dependence on user-generated content, the focus on conversation and the low barriers to access.

The many features that are provided by social media are having significant suggestion for crisis communicators and managers to include and use the different suite of new tools with which to connect the public and reach wider spectators. However, it is important to understand that the inclusion of social media also creates a number of new challenges and obstacles related to information accuracy, privacy, security and control of the message. Also, crisis communication is not an end in itself but rather it supports the larger emergency response as many organizational and governmental agencies that deal with crisis communication are also involved in crisis response.

2.4.1 Methods of Governmental Communications

During crisis events, governmental agencies and public tend to share and deliver information using different available means, ranging from low-tech capabilities as handwritten flyers or messages painted on buildings during floods, to high-tech means such as internet and social media. Choosing the right methods for communication is very important for reaching the affected population in a timely manner, especially that the working infrastructure may be damaged or unreachable during emergencies such as floods (McNulty & Rennick, 2013; CDC, 2014).

The official lines of services used by governmental agencies have two communication channels to be used as mean of passing information from sender to recipient:

A. Written communication

This is the kind of communication that uses symbols as mean of communication and has a wider reach as one-to-many communication. Some of traditional written communication forms are operating policies, letters, memos, manuals, notices, announcements and many other forms. In crisis events this type of communication can take a form of:

- i. Media releases are written statements prepared by the authorities to give information about a crisis event and are distributed to media and other interested parties.
- ii. E-mail distribution and broadcast faxes are means of electronic distributions of written statements that are sent as newsletters or by fax machines to registered users and they allow fast spread of information among users.
- iii. Websites are used as an online portal for governmental agencies, where they post and share information to public and other interested organizations in cost effective way.
- iv. Social Media is being most lately used to generate content both by government and public, where many organizations such as FEMA and CDC are using social media to establishing their presence on the internet as a way to provide timely information to the public (CDC, 2014).

B. Oral communication

This is the kind of communication that is executed through spoken words, and it's most common forms are face to face conversation, speeches, telephone conversations, video, radio, television, voice over internet and videoconferencing. In crisis events this type of communication can take a form of:

- i. Press conferences are mainly held as a way to announce or give more information about circumstances to general public and media, and it can be a one or two way communication.
- ii. Telephone Call Centres provide a toll-free numbers such as 112 or 911 for public to call civil emergency groups for help and instructions during a crisis event.
- iii. Video releases are used mostly to give visual and oral information of an event or instructions that can be of a help as “How to” or as recorded Press release to be published on social media or websites.
- iv. Television and Radio releases are traditional means for transmitting oral communication using electronic broadcasting of content. They are still favoured by older audience and are massively used during crisis events as a mean for the government to push information and instructions especially using low battery consuming radio devices.

2.4.2 Crisis communicators

Recent practices during crisis events are showing that crisis communicators are having more interest in the use of social media as communication tool. This adoption and interest can be ascribed to the feature of social media that is making of those web tools a key source of information for the public in crisis events, apart from having the information coming from official channels or not. As an example, the American Red Cross conducted a survey in 2009 that found that the use of social media sites and services are the fourth most popular source of emergency information after (Television, Radio, Internet news sites). Moreover, the survey found that a growing number of people are using social media as a way of receiving information and communicating with crisis managers and first responders. The same study has found that (69%) of respondents believe that emergency response organisations should monitor their websites and social media frequently in order for them to respond on time for any needs for help (American Red Cross, 2010). Moreover, it was found that (49%) of respondents believed that their request for help on the social media site of the emergency response organization is considered by the organization and that they are probably acting on this request (Wardell & Yee, 2011).

The use of social media technologies have led to changes in common expectations of crisis communicators and emergency responders in many different places and with many different crisis events. The growing status of social media use in crisis events has been demonstrated in many different countries such as (USA, India, Haiti, Chile, New Zealand, Egypt and Syria) plus many other locations. In addition to what has been mentioned, it was noted in many different occasions that the use of social media was spreading the breaking news of a crisis sooner than the traditional media sources and this feature is the key value of crisis communication along with being truthful and trustworthy. However, if the official government crises communicators fail to make efficient use of social media channels it will keep them behind and at a disadvantage position in managing and interacting with the crisis event.

2.4.3 Cases on social media use during crisis events

The use of social media to communicate during crisis event is becoming very popular and well utilized. The following examples are some of the crisis incidents that used social media tools effectively.

2.4.3.1 The Virginia Tech University shootings, April 2007

At the event of this crisis, the mobile phone networks were largely overloaded because of the huge traffic that took place during the incident. Students' trapped at that event used social media networking services to reach out to their families and friends in order to share information. Online users belonging to the same community were able to check the accuracy of the information and correctly identified all of the 32 victims of the shooting incident before having the names publicly released to the media (Winerman, 2009).

2.4.3.2 The earthquake in Sichuan province, China, May 2008

After one minute of the earthquake in Sichuan, the Tianya forum that is popularly used in China was largely update with messages from Chinese citizens using the site to find information about their homes and families and to participate in help activities. It was recorded that after 10 minutes of the earthquake there were about 56 discussion threads active (Winerman, 2009).

2.4.3.3 The Mumbai attacks, November 2008

During the Mumbai attacks the social media networks also participated in providing information that were used to help people by giving them emergency phone numbers, spotting locations of hospitals needing blood donations, locating family and friends and identifying the victims. However, in this particular case it was noted that false social media posts have also added to distributing rumours and misinformation (Busari, Stephanie, 2008).

2.4.3.4 The 2010 Haiti earthquake

After the earthquake took place the first information that reached were photos sent to twitter and Facebook by different people that were on the ground providing information before the conventional media. Moreover, many different media channels around the globe turned to social media sites to supplement their own information (Bunz, 2010). Moreover, the survivors used social media sites to send their locations using Facebook and text messages, and this information were highly valuable for rescue teams. Also the use of an open source platform “Ushahidi” during the crisis enabled better support for crisis management. Ushahidi enabled crowd sourcing information posted using social media in support of the crisis. Such capability enabled the workers to be linked with equipment and those provided them (Ushahidi, 2015).

It is important to understand that the social media for crisis communication is not a replacement for the current communication methods, rather it should complement them. The use of traditional media sources is still considered important to a considerable percentage of population that are not commonly using social media, such as older people and poor that can't afford using such services. However, implementing the use of social media along with traditional media strategy can reinforce traditional communication by adding the elements of speed and interactivity to information delivery. However, it is important to understand that each organization must develop significant methodology to determine the efficiency, precision and worth of social networks as risk and crisis communication tool.

2.4.4 Social media tools uses in Crisis

There are different tools available on the Web sites that are used for crisis communications. In a research project funded by the European Commission under FP7 for the Contribution of Social Media in Crisis Management – (COSMIC) they have identified several new media applications that are primarily categorized as social networking website, web tools, crowd sourcing applications and mobile tools, some of which are mentioned later. Each application

offers different level of support, based on the suitability of application for use in a crisis which varies on a case by case basis. (Watson et. al., 2013)

This section will present the most common social media tools that can be used for effective crisis communication and management. Also the inclusion of mobile and radio technologies will be presented as mentioned earlier.

- **Social Networking Site:** are Web platforms that users can create profiles and interact with other users and share different contents, locations and events.

They are useful for: Those sites are becoming very popular and a huge number of users worldwide and organizations can use these sites to post information and reach and interact with wider audience in the event of crisis. Each organization that is related to crisis event should create a site that can be used by to gain information from another organizations or the public. An example of such use in Facebook is: <http://www.facebook.com/FEMA>

Examples: (www.facebook.com, www.plus.google.com, www.Linkedin.com).

- **Collaborative projects:** Those web sites are usually called Wikis, and they are special web sites that enable volunteer users to collaborate and add information to the site using their web browsers.

They are useful for: Using them as a platform to combine the organizational and personal efforts for crisis communication and management. Also it can be used for promoting the organizational events and describe the activities and provide links to related content. An example of a similar work can be seen on the following URL: https://crisiscommons.org/wiki/Main_Page/

Examples (www.wikipedia.org).

- **Content Communities:** Those sites are used for sharing different contents like video and pictures and they enable users to post comments on the uploaded content.

They are useful for: Organizations can create channels for posting video and pictures for crisis communication and for sharing safety instructions and increase preparedness and awareness. Moreover, they can be effectively used during the crisis event as crisis communication medium using updates from the sight and interview with first responders or posting pictures for maps and rescue points or procedures.

Examples (www.YouTube.com , <http://www.ustream.tv>, www.flickr.com)

- **Blogs and Micro-blogs:** Those sites provide the ability for users to post information to the sites as journals, and they enable collaborative and interactive discussion between users.

They are useful for: organizations can use them as a centre for social media operations. They can be used for posting links to other social media sites, distributing news, statistics, articles and providing interaction.

Examples: (www.blogger.com, www.wordpress.org, www.twitter.com, www.tumblr.com)

- **Mobile Technologies:** The uses of mobile phone have enabled the use of different services such as SMS and multimedia messages. However, the currently used Smartphones are having a wider scope of use through the uses of different applications that are connected directly to the web, location identification through the use of GPS and sending multimedia by the use of camera and recording capability of video and audio. Many applications are being developed for the use in crisis events, and the following site lists some of the applications that are used on the iPads and iPhones (<http://www.missionmode.com/blog/15-disaster-and-crisis-apps-for-iphone-and-ipad/>). Another important technology is the use of “Ham Radio”, and this technology proved to be more robust than the mobile network. This technology was used in many different incidents and rescue operations worldwide, and it proved to be very effective technology, and in some cases more effective than the use of mobile network.

They are useful for: Organizations can create special applications that are used on the mobile phones for the events of crisis in order to provide direct communication with them. Moreover, many organizations have provided a mobile version of their websites that can be used with Smartphone and have its full features. In addition organizations can create dedicated groups for Ham or mobile networks for sending information, SMS or Multimedia messages for a wide scope of users.

Examples: (<http://www.echolink.org/>)

2.4.5 Governmental use of social media for crisis communication and management

Most of the information available on the web regarding social media and crisis communications are related to different activities that are posted by journalist, citizens, and humanitarian organizations. The literature shows little information that is related to organized governmental use of social media channels. However, different governmental organizations have realized the importance of adopting the use of social media technology and they are integrating it into their communication strategies.

It is important to know that such processes are still in their early stages of adoption due to the current reputation of social media technologies and the reality that governments must compete

with a range of policy constraints and challenges related to the adoption of use of these tools. However, the current governmental uses of social media have been defined as (Passive and Dynamic), and the Crowd-Sourced crisis mapping that will be presented and explained in the following section.

2.4.5.1 Passive, Dynamic use of social media and content analysis

The use of social media by governmental organizations has been defined into two categories that are passive and dynamic use. In the passive use, the government broadcasts information and monitors social media sites to receive feedback from users. The information is used as a bottom up information and awareness tool and they are used as one-way communication tool. In the dynamic approach, the government is more involved in using social media for crisis communication and management, and the use of social media plays important role in the response and recovery efforts. Moreover, it is used as a two-way communication tools, and a tool to influence the community as a resource in response efforts. Most of the currently available cases for governmental use of social media are passive. However, if more attention is paid to the values and expanding nature of the tools and services provided by social media, it is expected that many governmental organizations will upgrade their use of social media to include more dynamic features and services. Currently there are different efforts from some countries to include the use of social media in more dynamic perspective, such as the case with Canadian experience with “Health Canada” as they used (YouTube, Facebook, Twitter, RSS feeds). (Cloutier, 2011). Also, the American experience with the Federal Emergency Management Agency (FEMA) as they used (YouTube, Facebook, Twitter, and Mobile Technologies.) (Lindsay, Bruce, 2011).

In terms of extracting values from the data gathered by using social media, the social media analytics strategy is used for that matter in many cases. The older approach was using statistical and mathematical methods for extracting meaning from the gathered data. However, the use of computer systems has facilitated extracting large and distributed data using the analytics approach. The social media analytics strategy is concerned with the development and evaluation of informatics tools and frameworks in order to collect, monitor, analyze, summarize and visualize social media data. This process is aimed to facilitate conversation and interaction in order to extract useful patterns and intelligence from the data found in social media (Zeng, Chen, Lusch, & Li, 2010). Social media analytics consist of three different stages (Capture, Understand and Present) (Figure 2.1).

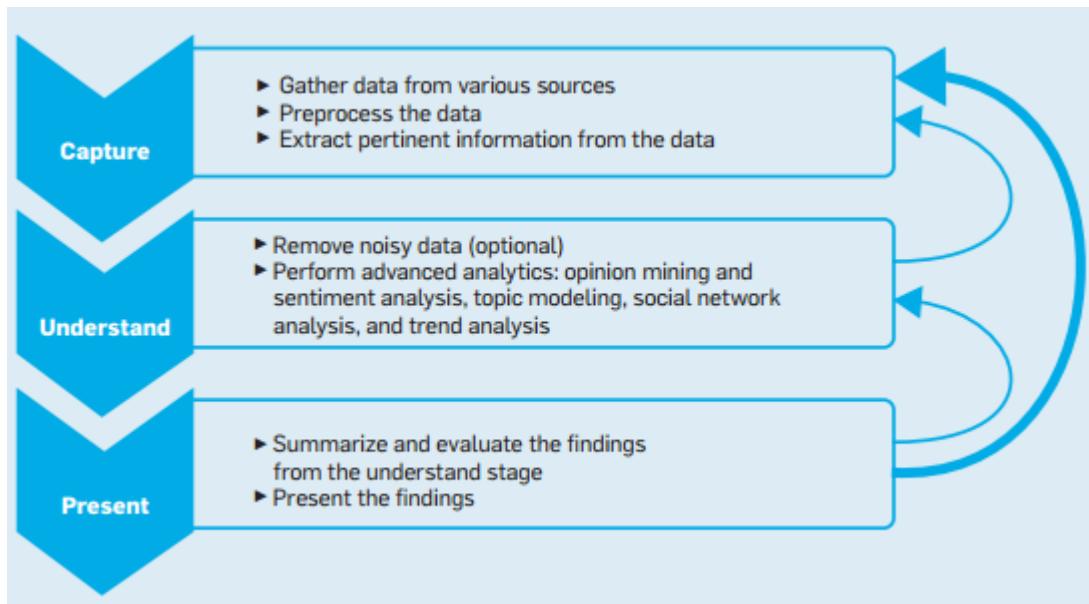


Figure 2.1: Three phases of social media analytics (Fan, & Gordon, 2014)

The Capture phase involves having relevant social media data that is obtained continuously and iteratively by monitoring or listening to different social media sources, archiving related data and extracting appropriate information. The Understand phase consists of selecting appropriate data for modelling while eliminating noisy low-quality data using different advanced data analytic methods on data. The Present phase is concerned with displaying results from different analytics that are summarized, evaluated, and presented for users in an easy-to-understand format (Fan, & Gordon, 2014).

It is important to understand that some overlap can occur between phases, as for example the understand phase can build models that can be used in capture phase. Moreover, using visual analytics methodologies can enhance human decisions that counterparts the understand phase and assist in present phase. In terms of social media analytics technologies, it includes different modelling and analytical techniques that are derived from different fields. Those technologies are used in understanding, analysing and presenting large amounts of social media data (Chen, Chiang, & Storey, 2012). Some techniques support different phases of social media analytics, such as (sentiment analysis and trend analysis) that support the understand phase. The sentiment analysis uses computational linguistics, natural language processing, and other methods of text analytics to automatically extract user sentiment (Pang & Lee, 2008). Trend analysis is used for prediction of future consequences and behaviours based on data that is collected over time. On the other hand, topic modelling and social network analysis are used in understand, capture and present phase. Topic modelling is used

to examine large forms of captured text in order to detect main themes or topics, using different advanced statistics and machine-learning techniques (Feldman & Sanger, 2007). Network analysis is used with social network graph in order to facilitate understanding underlying structure, connections, and theoretical properties, and to identify virtual and importance nodes within the network. Moreover, the visual analytics can be used in the Understand and Present phases (Figure 2.2).



Figure 2.2: Visual analysis dashboard (Fan & Gordon, 2014)

The visual analytics is defined as “the science of analytical reasoning facilitated by interactive visual interfaces.” (Fan & Gordon, 2014). Moreover, visual analytics can be understood as a collection of different techniques that custom graphical interfaces to present summarized, diverse information that benefit users to visually inspect and understand the results of the core computational processes.. As it was shown in this section, that many techniques and models could be used to capture, analyse and present the information that can save time, and provide accurate information that will assist in better managing, decision-making and communicating during crisis events.

2.4.5.2 Crowd-Sourced crisis mapping

This term is associated with social media resources as it means to bringing the information that are posted through the social media sites during a crisis event into a live crisis map that resembles the situation and what is happening on the ground. Mapping the crisis is achievable

through the different sources of information that are posted through the use of social media and mobile network (Meier, Patrick, 2009). One of the most widely used open source systems for crowd-sourcing is called (Ushahidi). This system is capable of gathering the information from different sites and to transform them to a dynamic and interactive map. Another application for Crowd sourcing is called UN-ASIGN, developed by the GEO PICTURES project which is aimed to save lives, environment and properties from affected area by natural disasters. This application provides near real time input of pictures, that are automatically time stamped and geo-referenced with GPS for outdoor use, while the application also include positioning via cellular and Wi-Fi networks .

The crowd-sourcing was used during the Haiti earthquake in 2010, and it was used by the United Nations Office for the Coordination of Humanitarian Affairs in Libya in 2011(Meier, Patrick, 2011). The use of Ushahidi in Libya was for the purpose of getting more information about how the crisis was unfolding, and they created the following web site (*LibyaCrisisMap.net*) to gather the needed information (IRIN, 2011).

2.5 Potential opportunities

Different studies related to crisis communication and the uses of social media technologies have listed many benefits for adopting those technologies. Those benefits are distributed between governmental agencies services and the public. The following are the four major opportunities that have been identified as the most recurring opportunities displayed in different research studies.

2.5.1. Enabling more effective crisis communication

If the use of social media is presented to be as a complementary to the traditional media systems, then additional benefits are expected especially the increase size of audience. Also such adoption will ensure that information reaches in a real-time, also the update and modification resulting from the change in crisis situation is presented directly. Moreover, using social media can enable a direct communication channel with the public either as passive or dynamic methods that were presented previously in this chapter. Having such feature can increase the efficiency and accuracy of information processing from and to the public.

Also an important feature that are provided using social media, is that these tools can be controlled in their information release using different functionalities based on group

permissions and membership status to produce the information to specific groups or selected members only. In addition, they provide the functionalities related to monitoring all posts that enables controlling the misbehaviour or misinformation that can be posted on such sites such as false news or terroristic propaganda that may amplify the social, political and economic impact of disasters (Burns & Slovic, 2012). The use of social media is a valuable addition to crisis communications, but it is important to understand that it is not always an easy task to be performed and supervised, as it should be planed according to a well-defined strategy.

2.5.2 Reducing damage and loss of life in the incident of a crisis

If the governmental agencies decide to adopt social media for crisis communication, they must ensure having large number of subscribers and followers before the event of the crisis. There are many different methods to attract users to such sites, and it is important to include many organizations from private and public sectors to be part of this site in order to ensure a wider scope of participations. Governmental, public and private organizations can later focus on educating the public to the potential crisis events and to inform them how to act in such events in order to increase risk awareness and preparedness that will result in minimizing the damage and loses in lives and assets (Shari, Veil, Tara Burhner, Michael, Palenchar., 2011). Moreover, it is important to consider that when people interact with such service prior the case of crisis, they will have more reliability to the information posted during the crisis, and they will interact better in such events as they are aware of the presented services.

2.5.3 Enhancing governmental relation with community and interactions; Leading to constructing trust and confidence

The effective use of social media services by the governmental agencies is expected to enhance the trust in public institutions and to raise the public participation level and engagement. Building the public trust is not due to the social media communication during crisis, rather it is expected to expand to other services and facilities provided by the government (John Carlo Bertot et al., 2012). The major features of social media services that can enhance such participation and engagement by the public is that, they are clear and informal. However, there is a major obstacle that the governmental adoption of social media faces and that's the public perception of governmental communication as public have a low expectation for governmental engagement and discussion (Waters & Jensen, 2011).

In order to raise above this challenge the governmental agencies should have a regular routine towards posting updates related to organization's operations on social media. Such actions are believed to promote for better cooperation from the public that will result in better respond during crisis events. Moreover, the governmental agencies can provide different activities for connecting with the public through promoting for the use of blogs, performing discussions, and providing feedback for users queries and questions. It is believed if such actions are set according to a well-defined governmental strategy for reaching the public, the result will be positive participation that will pursue posted and suggested guidance coming from the governmental agencies and a better trust will be formed to governmental response capabilities.

2.5.4 Raising Situational Awareness among Governmental Sectors and Public

The term situational awareness is used to define a state of understanding towards what is happening around the person, enabling prediction of how the state will change with time and being combined with the dynamics of the surrounding environment. The situational awareness is considered a mental process that can be enhanced by using technology to provide access, analysis and present information related to existing conditions and change over time (Conrado et al., 2016). According to Homeland Security Act of 2002 –USA, they define situational awareness as “information gathered from a variety of sources that, when communicated to emergency managers and decision makers, can form the basis for incident management decision-making”. Raising awareness for public and governmental sector employees and services towards the threats, actions and needed procedures is considered a necessity for effective mitigation of crisis impact.

The use of social media enables the users to search for information, verify information, and perform inquiries all of which are helping in establishing general situational awareness (Alsaedi, Burnap & Rana, 2015). Different tool are available as open-source such as (iCoast, Google Earth, MapQuest, TweetDeck, Geofeedia, Social Mention, and HootSuite), these tools provide features to establish the search on keywords, geographical locations, content, trending topics and popular Hashtags plus having some more advance features that are related to searching contents. In addition there are tools that offer analytical algorithms that are used to generate prediction, modelling and decision support such as (Zemanta, SAGE (Situational Awareness Geospatial Enterprise), General Dynamics', Calais , IBM InfoSphere, TIGR

(Tactical Ground Reporting System), U.S. Northern Command's (USNORTHCOM) , (Palantir and the Department of Energy's RaptorX) (Homeland Security, 2014).

Situational awareness activities also fall within two areas that are crowd-sourcing and monitoring. Crowd-sourcing or what is known as active "listening", enables the public to provide, find and produce new information. Monitoring includes passive information search based on different degrees of specificity depending on a mission or a goal. Accordingly the previous features if they were integrated with traditional data, social media can help emergency responders achieve and maintain situational awareness in real-time (Rogstadius et al., 2013). This will assist with decision-making, planning, and resource allocation. Moreover, law enforcement agencies can observe social media precisely for intelligence or information that can assist in resolving of an incident, event or a case to bring better understanding that can enhance the situational awareness. Thus providing effective situational awareness can include the following activities:

A. Rumour Management

In crisis events any information can spread fast without being verified, which can result in misleading conduct that can leverage the hazard or the impact of the crisis on the public safety or governmental activities. In the same context, the use of social media can spread the misinformation quickly across multiple networks, groups, and locations due to the viral nature of social media. This fast spread of misinformation can lead to ineffective decision making, unsafe actions, and incorrect directions (Homeland Security, 2014). Controlling the spread of misinformation is not an easy task and it cannot be completely stopped, however, the public safety officials can regularly control and correct rumours through activities that include vigorous and constant engagement with the public and response partners. Such activities demand active listening for precise or valid information as well as reactive monitoring for general situational awareness (Conrado et al., 2016).

B. Needs Identification and Planning

After any crisis event, it is mainly hard to organize activities related to volunteer, donations and resources. The different needs during such events can be unmet due to misidentification in needs or available resources, moreover, in many cases it was found that there is no definite method or practice employed to match needs with appropriate resources. On the other hand, the availability of resources and assistance stay unemployed if they do not attend to specific or previously known need (Yin et al., 2012).

Filling the gaps in information and resources can be achieved using social media to share resources, requests and empower coordination. In terms of resources needs, the use of social media can provide a method through which governmental entities, organizations and public can passively and actively search for and identify needs using engagement, discussion and targeted messaging and questioning. In addition, for resources availability, social media can be used to assist individuals, groups, agencies, governmental entities, and organization to make their available resources known. Thus identifying resources needs and matching it with resources availability will assist in better planning for crisis events.

C. Information Analysis

Social media can provide a big mass of information that may be useful in its raw form. However, using analysis can be helpful in contextualizing the information within the target operations and workflow. Moreover, social media when jointed with other data, it can construct new intelligence (Homeland Security, 2014).

D. Defining Baseline (Normal) and Event Detection

Being able of measuring the changes in any information, topic, status or event, needs to have first a baseline established. Later step is to perform monitoring of activities and trends to establish what is considered normal for a given situation, demographic or group. The last step is to identify thresholds for variable change and to define the level of concern. Establishing a baseline and defining thresholds requires constant maintenance and consideration (Homeland Security, 2014). Social media with all the features it provides can help in early identification of oncoming events, trends or issues and help in defining baseline and setting thresholds (Yin et al., 2012).

E. Trend Analysis

Different Social media services and tools enable performing analysis of trends using different variables such as (Keyword, location or any specified variable). In the same context, social media can be used to defining emerging threats, events, and hazards through the combination of keywords and geo-location information (Alsaedi, Burnap & Rana, 2015). As one example on trends analysis, was provided by Google through the online tools named (Google Flu Trends). This tool was able of estimating flu activity in near real-time as Figure 2.3 shows the trends in actual flu activity in the USA in orange

colour, this data was provided by (Center for disease control and prevention) and the flu activity estimate provided by Google since 2004 marked in blue colour.

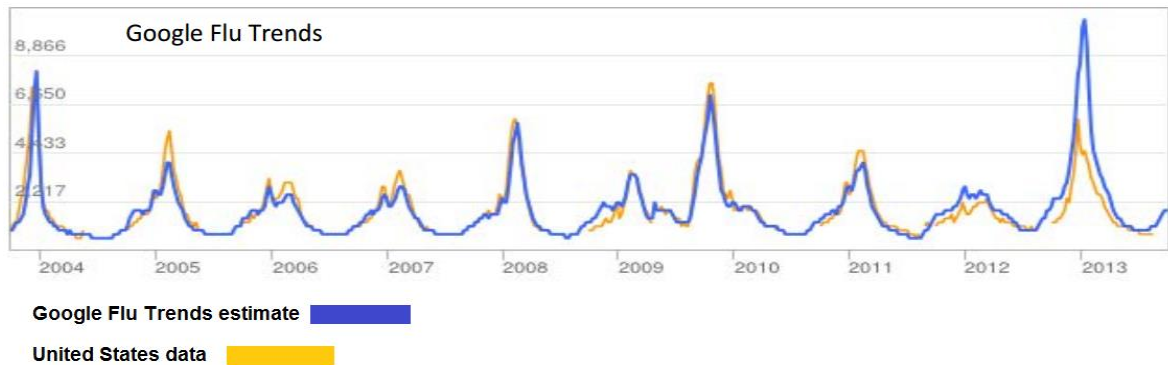


Figure 2.3: Flu estimation using trend analysis, source (Homeland Security, 2014)

F. Enhanced Decision Support

The use and incorporation of social media tools and services provides additional information that can be used in all phases of the disaster life cycle. In such events, decision making occurs fast and dynamic and outcomes can modify severely depending on certain variables. The use of social media in such events can provide means to get real-time data and information in order to provide better support for decision-making in the rapid changing environment of disaster response (Alsaedi, Burnap & Rana, 2015). Moreover, if the data obtained from social media is merged with other information channels it can prove positive for enhancing situational awareness (Homeland Security, 2014).

2.6 Defining Challenges and risks

There are many challenges and risks that are facing the adoption of social media by the governmental agencies. The surveyed literature managed to define some major challenges that are hindering the adoption. The following section will present five of the major challenges and will discuss each of them.

2.6.1 Policy and legislative requirements

One of the main defined challenges is the policy legislative requirements by the governmental sectors, as many evidence through the literature and common practices have confirmed the ridged nature of governmental processes, actions and routines. Such nature is treated as one of the major challenges towards adopting social media within governmental framework of

communications. It is well understood that such inflexibility in governmental adoption is due to the strategies, procedures, configuration and frameworks that are presented to provide protection, dependence, security, ownership of rights, contribution and ownership of records (John Carlo Bertot et al., 2010).

However, many governmental agencies started or are in the process to adopt the practices of e-government, and such advancement in the electronic use of services will demand the change in current legislations and processes that are hindering the adoption of social media as a tool for communication with the public. However, the current governmental practices show that there are two major issues that are creating the concerns for adopting social media that are *privacy* and *security*.

In terms of privacy, many governmental agencies are not keen to provide information of their work or employees in the social media sites, as they are found not confident about what kind of personal information they are officially allowed to supply, or whom this information can be disclosed and for what purposes it can be used. Resolving doubts and clearing such issues will improve the governmental ability to smooth the progress of adopting social media.

In terms of security it is well understood that the social media sites are exposed to different cyber threats. Such threats can range from virus attacks, hacking, malware and Trojans to other more advanced attacks such as tapping, denial of service and distributed denial of services attacks. Thus threats are being addressed by the organizations that are providing the social media sites, and it is into their interest that their sites do not spread threats, malware or be out of service. However, it is important that governmental organizations have standards for the security level that is provided by such services, and to see what level of security is matching their demand by which service. Moreover, governmental agencies can have their own sites with intended services, and they can use social media for marketing of their services.

2.6.2 Liability and Accountability Issues

There is a high concern regarding the use of social media and organizational liability. Any violation that occurs from social media adoption could force the governmental agency to face liabilities (Wardell and Yee, 2011). Moreover, there are different issues of liability that governmental agencies need to consider. First they need to consider their own liability, the liability of other organizations and private citizens, and finally the liability created by private social media source. Regarding the first two issues, the governmental agencies need to revise

their laws and policies in order to clarify their part when using social media. The third issue has been approached by some governmental agencies as they managed to contact social media providers in order to clear their terms of use and how this affects liability.

2.6.3 Resource and capacity constraints

The use and adoption of social media for crisis communication is different in terms of resources and capacity from the use of traditional media. The social media provides a wide range of services that offers more resources to be engaged with or provided, as it depends on the nature of use of social media as passive or dynamic. Also it depends on the governmental capacity to offer such resources and to be able to monitor or engage in two-way communications.

It is very important to have a well-defined strategy for dealing with different resources available on the web, and to be able to master the use of such resources by governmental communicators during the crisis. In some cases the government can't afford the capacity to deal with different resources, thus they work with trusted organizations or volunteers to handle the technicalities of such tasks and operations according to well defined governmental strategy and with their direct supervision. Such cases occurred during large crisis events as volunteering organizations used different tools such as (Ushahidi, OpenStreetMap, Google Map Maker, Crisis Commons, Stand by Task Force and Crisis Mappers) offered to perform crisis mapping and information monitoring and to coordinate their work with different governmental entities (Meier, Patrick, 2011).

There are wide range of tools that can be used for different purposes when working with social media, and it is important to have strategy and tools for keeping the records that can be used for different purposes such as learning from past actions and perform better services and operations. Table 2.2 lists some of the strategies and tools that can be used:

Table 2.2: Strategies and tools that can be used with social media

No.	Strategy / Tool	Use
1	Keeping Records on its native social media application	Although some governmental agencies leave their data on the social media site, but it is better to have a copy of the posted data for future use. Also it can be used for analysing the posts and responses in order to provide better services in the future. Moreover,

		they can be used for liability and accountability issues.
2	Cloud-based backup systems	Those tools are very important to be used with social media sites in order to create sites backups, although a backup data is maintained by all social media sites. Those tools can be used in case of hacking the system and there is a need to restore the previous data. An example of such systems that is dedicated for social media backups is “Backupify”
3	Cloud-based information services	Those systems are very useful as they working with different varieties of social media sites. They can be used to consolidate different social media data into one portable file that can be exported to variety of different control and analysis systems. An example of such service is “Social Safe and Archive Social”.
4	Social media monitoring or dashboard tool	There are many tools that offer the services of combining data from different sources for the purposes of monitoring and categorizing such data. Those tools are very useful in cases of crisis, and they have been used in different cases of crisis event. An example of such tools is “HootSuite”
5	Reporting tools that come with your social media application	Many features are available within the social media tool being used. Such features provide valuable information, as for example in Facebook the use of “Activity Logs”, captures all the information that takes place on your site. Moreover, the capture data can be exported using different formats to be used in another application or for analysis.
6	Analytic tools	Those services are available online, and they are used to perform analysis on your site/ social media site. An example of such services is “Google Analytics”.
7	Cloud-based reporting tools	Those tools are provided online, and they can be

		used to collect different information from different social media sites in order to tell a story. They are very useful for capturing different sets of online information about events or conferences. An example of such tools is “Storify”.
8	RSS feed	RSS is a free service that can be used to submit information gathered from different sites into a specific or defined email accounts.
9	Excel Spreadsheets	They are widely used, and they can be used for arranging, categorizing information from social media sites. Moreover they can be used for performing statistical analysis on data to extract information. Excel has many valuable features that can be used with the data gathered from social media sites.
10	Screen Shots	This feature is very important to be used for keeping social media posts, as it provides an exact representation of the content as it appeared in the social media site. These file are easily accessible and they can be used for liability and accountability purposes.

2.6.4 Information: quantity, quality and control

The common practices during crisis event shows that social media sites are overwhelmed with hundreds or thousands of posts during the first moments and hours of the incident. Such massive quantity needs a good strategy and capacity to deal and react to the posted information as it provides challenges to using social media for communications during crisis events. However, there are different solutions such as (TweetChat, Twubs, SolarChat, Hootsuite and TweetGrid), that can be adopted by governmental agencies to be able to track, categorize and evaluate the posted information (Wardell and Yee, 2011). It is important to train governmental personnel on the user of such tools in order to provide valuable analysis for the posted information in order to have a better understanding.

Another important issue that is very difficult to deal with is the quality of information posted to social media sites. Such difficulties arise from the fact that it is hard to verify the true identity and reliability of users and posted information. Moreover, it is hard to neglect the fact that some persons or malevolent groups can post false information to create more chaos and disorder during crisis event, in order to hinder response efforts (Lindsay, Bruce, 2011). However, there are different strategies that can be adopted to improve confidence in the reliability of information collected using social media as advised by (Wardell and Yee, 2011). The strategy suggests the following actions to be performed:

- a. Put effort in verifying information from multiple sources
- b. Request users to support their claims with photos and videos if possible.
- c. Ensure to have information from persons with good reputation.
- d. To react to the event after a considerable time after seeing the first mention of an even, in order to be able to ensure the validity.

2.6.5 Influencing social networking platforms

Social networking platforms have a full control over the information posted on their sites, and this gives a little control on the governmental side. Any person that is subscribing to such sites can post any information directly. However, there are different features that are associated with the management of the social media account, such as deleting the posts or blocking the users. Moreover, governmental agencies can set different rules for posting the information on their account that each user needs to follow. In the same matter private sector has created different range of policies to respond to social media networks when those are used to spread information that harm their reputation. Such activities and policies can be defined by governmental agencies to be used with public sector.

The previous sections have presented the latest information regarding social media technology and their use within crisis communication and management. The next section will shed the light on the case of Bosnia and Herzegovina, and will present the latest threats that affected the Bosnian nation, and will seek to provide evidence from literature on the severity of flood crisis, the used framework, the barriers of crisis framework, social media use in Bosnia, Governmental use of social media and what are the current opportunities and challenges. Moreover, it will provide the gap in knowledge and justification for this research study.

2.7 Bosnian Government Flood Crisis Status and Challenges

The following section will provide information on Bosnia and Herzegovina, the flood crisis severity, the used frameworks and the barriers and challenges of implementations. Moreover, the use of social media in the cases of flood crisis will be presented and discussed, and finally overcoming the threats and defining the needs of the Bosnian flood crisis.

2.7.1 Introduction

Bosnia and Herzegovina is a country in South-eastern Europe on the Balkan Peninsula. It borders with Croatia up to the north and partly to the south-west, also it borders Montenegro to the southeast and Serbia to the east. Bosnia and Herzegovina have 20 kilometres of coastline at the Adriatic Sea. The geography of Bosnia and Herzegovina is mostly mountains, including the central Dinaric Alps which are considered the fifth most rough and broadly mountainous area of Europe spreading in an east-west direction, and getting higher towards the south.

During the late 1980s and early 1990s, Yugoslavia encountered a period of severe political and economic turmoil, leading to widespread public dissatisfaction with the political system and calling for more autonomy within Yugoslavia by nationalist groups, representing the main three ethnic groups; (43.38 %) Bosniak, (31.18 %) Serb and (17.36%) Croat, and three religions; (42.76%) Muslim, (29.39 %) Orthodox and (13.56%) Roman Catholic (Census, 1991), which has led to its disintegration in 1991.

Bosnia and Herzegovina declared sovereignty in October 1991 and independence from the former Yugoslavia on 3 March 1992. This declaration was met with resistance by Serbs in those regions and in what was left of Yugoslavia (Serbia and Montenegro). War soon consumed the region, awful ethnic cleansing operation from 1992 to 1995 killed more than 100,000 people, while two million people, which is more than half the population, were violently displaced from their homes and around 20,000 women were reported being raped as a result of the war. A peace agreement between the warring parties was initiated after an international intervention of NATO forces (Berridge, 1997 p. 111), leading to signing a peace agreement “The Dayton peace treaty” in Paris on 14th of December 1995. The peace treaty maintained Bosnia and Herzegovina’s international borderline and formed a multi-ethnic and parliamentary system government which is in charge of foreign affairs, defence, diplomatic and fiscal policy. The Treaty also institutionalizing a second tier of government which is responsible for overseeing most government functions, and is formed of two entities and one

district, the Bosniak and Bosnian Croat Federation of Bosnia and Herzegovina (FBiH), and the Bosnian Serb-led Republic of Srpska (RS) and Brčko District, Figure (2.2).

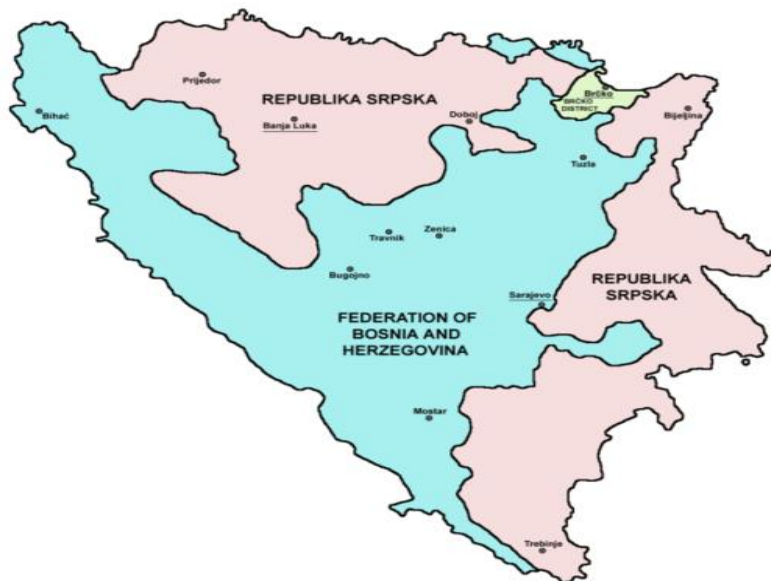


Figure 2.4: Bosnia and Herzegovina with entity lines of FBiH, RS and Brčko District
Source: http://en.wikipedia.org/wiki/Bosnia_and_Herzegovina

The Dayton peace treaty ended the war in Bosnia and Herzegovina, but it also instituted the country as a weak, much decentralized and ethnically divided country in which an Office of the High Representative (OHR) – which is an ad-hoc international institution in charge of overseeing the implementation of civilian aspects of the Dayton peace agreement, remain authorized to force laws and to discharge local officials in order to safeguard the peace. In spite of the fact that the vast majority of people continue on wishing a sustainable peace, they hold to various ideas about the best arrangement of the country, while some even question its future existence.

2.7.2 Bosnia Flood Crises

Riverine Floods are not a rare phenomenon in Bosnia and Herzegovina, as many cities were built along its river banks. In April 2003 the International Bank for Reconstruction and Development published a report “Water Resources Management in South Eastern Europe.”, where they confirmed that Bosnia and Herzegovina is under permanent flood risk which is threatening (4%) of its total area and (60%) of its lowland area (World Bank, 2003).

Back in year 1896 a disastrous flood of Drina River affected many settlements along its banks. According to chroniclers, the recorded water level of Drina in Višegrad was 17m, while near Zvornik it was 8.4m above average, also it was recorded that the water level of

Drina River reached 1m above the fence of the famous bridge of Mehmed Paša Sokolović in Višegrad (ISRBC, 2014b). This flood was also recorded in an epic novel, awarded the Nobel Prize for Literature in 1961 by Andrić Ivo in 1945 “The Bridge on the Drina”. Bosnia and Herzegovina has many river streams, among which 7 are considered main rivers streams which belongs to the Black Sea and the Adriatic Basin. These Rivers are:

1. Sava River, located in the northern part of Bosnia and Herzegovina. It is the largest river of the country, where 331 km out of 945 km goes along its natural border with Croatia and belongs to the Black Sea basin.
2. Drina River, located in the eastern part of Bosnia and Herzegovina and flows into the Sava River. It is 345 km long and part of it forms natural border with Serbia.
3. Bosna River, which gave its name to the country is 273 km long, originates in Sarajevo the capital of Bosnia and Herzegovina and flows into the Sava River.
4. Vrbas River, located in the western part of Bosnia and Herzegovina. It is 240 km long and flows into Sava River.
5. Neretva River, located in the southern part of Bosnia and Herzegovina. It is the only major river out of seven in Bosnia and Herzegovina that flows into the Adriatic Sea basin. It is 218 km long out of which the last 22 km flows through Croatia. Its average discharge is 341 m³/s.
6. Una River, located in the north-western part of Bosnia and Herzegovina. 214 km long and flows into Sava River. Part of it forms natural border with Croatia.
7. Sana River, located in the north-western part of Bosnia and Herzegovina. It is 140 km long and flows into Una River.

2.7.3 Doboј floods of 1965

On the 13th of May 1965 Doboј was hit by a severe disaster, where in a very short period of time the Bosna River flooded the city and left behind unforeseeable consequences of devastation and misery. It is estimated that 470 hectares of land, on which there was 1.480 residential buildings and more that 10.0000 person was directly affected. Other surrounding villages, industrial buildings and businesses, schools, municipal buildings were also severely damaged.

2.7.4 Floods of December 2010

At the end of November and beginning of December 2010, Bosnia and Herzegovina experienced heavy rain falls, which caused an increase in water levels in all rivers and their tributaries, resulting in massive floods on the entire territory (FHMZBIH, 2011). The rainfall was considered as the heaviest the country has experienced in more than 100 years and the authorities declared a state of emergency in response to the crises. The flooding caused severe material damage to a large number of residential, commercial, critical infrastructures, and other facilities and it also led to other havoc on agricultural land and plantations.

2.7.5 Floods of May 2014

Catastrophic floods that occurred in May 2014 inundated large areas of three countries of ex-Yugoslavia, where Bosnia and Herzegovina and Serbia suffered the greatest damage. Rains that began on the 13th of May 2014 and continued for three days were brought by a low pressure cyclone which moved across the Adriatic to South Eastern Europe. This rainstorm caused unprecedented floods along the Sava River basin, its tributaries and other rivers in Bosnia, it is estimated that one third of the country was flooded with water levels reaching the highest levels ever recorded in 120 years of record keeping.

The researcher was directly involved on behalf of the Ministry of Communications and Transport of BiH as part of the response team in the emergency situation room of the Operation and Communication Center 112 (OCC 112) of BiH for 19 days. During this period, the crisis revealed many problems that were not encounter and made the country incapable of responding properly and in a timely manner. According to the Recovery Needs Assessment (RNA) of the post disaster that was conducted by the authorities of Bosnia and Herzegovina, it was found that the May 2014 flood caused a destruction which is estimated to have the equivalent of nearly 15 percent of GDP of Bosnia and Herzegovina which is 3.98 Billion BAM out of which (9.3 %) of GDP in damages (1,493,070,000 BAM) and (5.6 %) of GDP of losses (2,491,700,000 BAM). (RNA, 2014). The three most vulnerable sectors that suffered damage and losses according to RNA report are:

- Livelihoods and employments with 1.55 Billion BAM.
- Housing and household items with 886.4 Million BAM.
- Transport and Communications with 680 Million BAM.

In the first days of the disaster, only limited information was available, and the public had to find communication alternatives. Such alternatives were the use of Social media.

2.7.6 Bosnian Crisis Framework

Implementing a system for protection and rescue of people and assets is a broad and cross cutting issue which requires defining a framework for dealing with crisis situations and involvement of different actors, ranging from community based organizations up to state level government and regional and international bodies. In a report published by (WHO, 2013) under the title of “Floods in the WHO European Region”, they surveyed 53 European countries and managed to define 50 that were threatened by flood disasters and among these countries was Bosnia and Herzegovina. The survey managed to define the triggers that activate the emergency plan of each country in the case of flood crisis. The definition provided by Bosnia and Herzegovina according to the report was:

(Shortage of safe water and/or houses flooded with water; extensive flooding endangering population settlements, infrastructure, roads, railways, etc.)

Many countries have their national planes for protection and rescue of people and property in the event of natural or other disasters, but what is common among them is their ultimate goal in preventing, protecting and recovering from a disaster with minimum life casualties and asset losses. The approach that BiH has taken in organizing their frameworks for protection and rescue in the event of natural or other disasters is most similar to the US National Planning Frameworks in the phases of prevention, protection, response and recovery (Table 2.3). On the other hand, the National flood emergency framework for England shares the response and recovery phase with both the USA and BiH. Also, the EU Directive on the assessment and management of flood risks have the prevention and protection phases as same as the USA and BiH.

Table 2.3: comparison of different frameworks

Mission areas	USA framework	UK framework	EU framework	BiH framework
Preparation		✓	✓	
Prevention	✓		✓	✓
Protection	✓		✓	✓
Mitigation	✓			
Response	✓	✓		✓
Recovery	✓	✓		✓

What is worth mentioning that only the UK and EU have designated frameworks on floods, while the USA and BiH have their national planning frameworks for dealing with all kinds of natural and other disasters. Another fact that was published by the same report (WHO, 2013), outlined that Bosnia and Herzegovina had an emergency plan and framework adapted for some selected regions and not all the participating entities and cantons in the country (WHO, 2013).

Bosnia and Herzegovina's Council of Ministers adopted the Framework Law on the protection and rescue of people and property in the event of natural or other disasters in 2008 (Službeni glasnik BiH, 2008). Meanwhile, the Federation of BiH adopted its framework in 2003, and updated it in 2010 (Službene novine Federacije BiH, 2003), while the Republic of Srpska adopted its framework law in 2012 (Službeni glasnik RS, 2012).

Unfortunately, these frameworks are not fully harmonized with each other, even though the state level framework demands from each entity to harmonize their framework with the state level. The authority that is responsible for triggering the emergency in the cases of floods is divided between (Water Agencies and regional Government Organizations) with no clear definition for responsibilities. Thus, the country of Bosnia and Herzegovina did not manage to provide any information regarding the alert level in the report presented by the WHO in 2013.

The incompetency, dispersion and lack of organization of the Bosnian entities and cantons has resulted in that the present system of protection and rescue at all levels of its organization to be considered very complex and insufficiently functional, and as such it is not suiting the needs of society that is necessary to timely inform and protect citizens in the event of natural and other disaster. For example, the current framework of RS with its methodologies and plans, instead of being harmonized with the state level, it is harmonized with the framework structure of the neighbouring country of Serbia. On the other hand, the Cantonal and municipal laws of protection and rescue in the Federation of BiH are not harmonized with the Federation framework. Also, the issue of interlaced jurisdiction between the state and entity levels as well as the entity and the municipal levels, is adding more functional and financial complexity to the current system of protection and rescue in Bosnia and Herzegovina. Also, the inspection over the implementation of the frameworks at all levels is not being conducted effectively and in some cases at all. The next section will present the current defined challenges emerging from the current situation in the country of Bosnia and Herzegovina

2.7.7 Bosnian protection and rescue agencies

The complexity of the governmental administrative levels of Bosnia and Herzegovina, (2 entities (*Federation of BiH and Republic of Srpska*), one District (*Brcko District*), 10 cantons in the *Federation of BiH* and 5 Regions in *RS*) is reflected on the agencies dealing with protection and rescue. These agencies are presented in Table 2.4.

Table 2.4: Civil protection authorities in BiH with their jurisdictions

Administrative level	Institution / Agency	Jurisdiction
<p>1. State level</p>	<p>Operation and Communication Center 112</p>	<p>Is part of the department of protection and rescue at the ministry of security of BiH. Their jurisdiction is reflected in implementing international obligations and cooperation activities related to civil protection and coordinating activities at the level of BiH entities as well as adoption of programs and plans for protection and rescue for BiH.</p> <p>The 112 number should be part of the single EU emergency number. Due to legal obstacles in terms of state level and entities jurisdictions, this number is not yet in function.</p>
<p>2. Federation of BiH (FBiH)</p>	<p>Operation and Communication center 121 of FBiH</p>	<p>This center is part of the Civil protection Authority of FBiH, and it works as coordination point for 10 cantonal civil protection authorities on the territory of the FBiH. The delegation of tasks from cantonal levels to FBiH is based on the subsidiarity.</p> <p>The 121 number is the old emergency number that was used in the Ex-Yugoslavia, and till this date it is used until the introduction of the 112 number.</p>

<p>3. Republic of Srpska (RS)</p>	<p>Operation and Communication center 121 of RS</p>	<p>This center is part of the Civil protection Authority of RS, and it works as coordination point for 5 regional civil protection authorities on the territory of the RS. The delegation of tasks from regional levels to RS is based on the subsidiarity.</p> <p>The 121 number is the old emergency number that was used in the Ex-Yugoslavia, and till this date it is used until the introduction of the 112 number.</p>
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2.7.8 Barriers of Crisis management Framework in Bosnia and Herzegovina

Investigating the current literature has revealed many different obstacles that are present and hindering the current efficiency of crisis framework. Most of the emerging obstacles have been classified and categorized into four main challenges that are presented and discussed in this section.

A. Political challenges

The complex legislative structure that was constituted after the Dayton peace agreement resulted in creating a climate of governmental crisis which is affecting the future progress of the country. Different jurisdiction, laws and procedures among thirteen different governmental levels that are not harmonized between each other have made things more complicated. Such a structure, combined with the ethnic conflict situation left unresolved after the war, stopped the establishment of a democratic structure in BiH. (Sofia Sebastian, 2007).

The ethnic affiliation is considered the main principle of how the future Bosnian country should look like. The Bosniaks are advocating a centralized country that is fully integrated with the International community, such as its neighbouring countries of Serbia, Croatia and Montenegro, while Serbs and Croats are against this idea. The Bosnian Serbs want to preserve their current autonomy through the entity of Republic of Srpska, which acts like a “state within a state” with all the policies carried out independently of the State government. The Bosnian Croats on the other hand which are mostly settled in the Federation of BiH with the Bosniaks, hold the view that they are not equal to other two ethnical groups and argue that “if one of the three peoples

possesses (more exactly, was given) an entity with a clearly demarcated territory that bears its name and is called a republic, then the Bosnian Croats too have a right to form their own entity along similar lines.” (Krešimir Zubak, 2010).

What is worth mentioning that the Federation of BiH is divided in 10 cantons, some of which are ethnically mixed, and are considered as a second-level local self-government units, with their own parliaments and courts. To overcome such political stalemates, a reform of the Dayton Peace Agreement which holds the constitution of Bosnia and Herzegovina is needed (Stefan Ralchev, 2009), but there is an absent of political will to do so. As what is considered as one of the biggest obstacles before the constitutional reforms is that both the entities as well as the three major ethnic groups have the right to veto any decision or legislative act in BiH that they feel does not accord with their interests, turning it into ethnic veto. Most of the problems that the country face could be resolved if political authorities have the will to do so.

Today the political system is not functioning well and the political difficulties have not been settled yet, which is making the ethno-political system vulnerable to deadlocks, weakening centralized institutions and destabilizing the country and possible the region. An evidence of this came to be true during the May 2014 flood disaster, as due to different jurisdiction, laws and procedures among thirteen different governmental levels that are not harmonized with the state level framework law on protection and rescue from natural or other disasters in BiH got more complicated during crises events. The state of emergency for the affected regions was not declared on the same time, rather it was declared on the 15th of May by the FBiH entity, while in the RS entity on the 17th of May. Such different and complicated procedures for declaring the state of emergency imposed obstacles in perform actions and task towards the protection and rescue of people and material goods from flood disaster (ICPDR & ISRBC, 2015).

B. Communication and coordination challenges

Lack of political will in BiH has its negative effect on communication and coordination activities during disaster events. The framework law on the protection and rescue of people and properties from natural disasters and other accidents, foresees BiH Ministry of Security to set down communication procedures among the institutions and bodies of Bosnia and Herzegovina and between the institutions and bodies of Bosnia and Herzegovina and the Entities and the Brčko District of BiH in

the event of a natural or other disaster, as well as the public information procedures and activities.

During disaster response, especially in large-scale emergency event, there is an increased need for constant communication and coordination activities between different levels of disaster responding agencies, in order to save lives and other community resources (George Haddow & Kim Haddow, 2009). Sadly, such collaboration is challenging not only because of the complexity of incidents, but because of diverse composition of people and agencies working together, with different competencies and skills they have. Lack of transparency, delays, retention and changes in communication and coordination activities occur frequently among disaster responding centres at different governmental levels in BiH and as such, disrupt planning and rescue efforts more broadly, leading to more casualties, conflicting information, financial implications and duplication of efforts.

In lights of the May 2014 flood disaster, an interview was taken by the Assistant Minister for search and rescue operations of the BiH Ministry of Security, Dr. Samir Agić, who said that “the existing search and rescue efforts were ineffective because coordination was poor ‘due to the way the country is organized’ and because ‘we have a decentralized law on search and rescue but the entities have never harmonized’” (Antonio Cortiñas, 2014). Also, insufficient coordination among government crisis headquarters from one side and other national and international humanitarian organizations led to serious problems in requesting, accepting and distributing humanitarian aid in Bosnia and Herzegovina. There was no unified communication system for dealing with national and international aid, border crossings and other humanitarian warehouses were crammed with humanitarian aid that was waiting to be released from custom and transported to the affected region (CCI, 2015; Zurich, 2015).

C. Lack of Situational Awareness in Government and Public

During crisis or natural disaster people tend to look for different sources of information in an effort to protect their lives and minimize the impact of such event on them. The case of May flood 2014 showed that governmental agencies in Bosnia and Herzegovina had no systems in place to facilitate sharing of situational awareness during prevention, protection, response and recovery activities among public as well as other agencies. To construct and share generic situational awareness there should be coordinated sharing of data and information with other responders and public

especially when dealing with non-sensitive information, which can bring more benefit than damage.

The absence of an early warning and informing system that could have warned media and public of possible threat in the affected region made things more challenging (Zurich, 2015). This means that the majority of people had no information available of road closure, shelters and hospitals which lead to problems in evacuations and shelter planning as well as providing the necessary medical assistance. Media and public were not promptly informed about possible floods, even though the OCC112 centre on May 13, did send a note informing the civil protection authorities in both entities of BiH about possible flooding in the region. Such information was not forwarded further to the operational levels of civil authorities nor was publicly accessible to media, even though they could have used different means of communications to ensure that warnings will reach public so they can take precautions and allowing them to maintain situational awareness, whereas such left the public vulnerable to direct impact of the disaster (CCI, 2015). Also government crisis headquarters were not capable of following and dealing with huge amount of information posted on Social Media about the current situation in the affected places, leaving the public susceptible to rumours and false information.

D. Qualified personnel and equipment needs

Disaster response centres should serve as an effective and efficient facility for coordinating emergency efforts. The diverse nature of disasters requires different competence and qualification of emergency personnel with adequate equipment, who are ready to respond in short notice to a disaster event. Many appointed emergency management officers in BiH act politically based on their entity belonging, forgetting that they need to act as professional emergency responders. This is due to their political orientation or the fear from political consequences that they might have from their government. So, instead of having qualified personnel, governments seek to recruit politically suitable personnel who are to a great extent incompetent or do not have the needed background for dealing with disaster events. Even though, the Framework Law on the Protection and Rescue foresees BiH Council of Ministers to establish a specialized mixed protection and rescue unit, from specialized civil protection units and services of the Entities and other BiH institutions to act in case of a disaster, and to participate in international exercises, relief operations and other activities. Unfortunately, and till now, this specialized mixed protection and rescue

unit was not formed because of political unwillingness and pressure to prohibit the establishment of this unit.

When it comes to the equipment that are used by the emergency centres, they are purchased by different government levels, as they have their own budget and plans that are not harmonized with other government levels, and this also hampers the use of such equipment and its interoperability in disaster events.

2.7.9 Social media use in Bosnian Crisis

The use of social media networks in Bosnia and Herzegovina has increased remarkably over the recent years, likewise the number of those who have a computer. According to the ITU report of the Broadband Commission, there are (67.9%) or what is equivalent of 2,628,846 internet users in BiH (ITU, 2014). The social media in BiH, without doubt is seen as a key tool used to share different kinds of information and attract users to engage in generating debates and discussions. In terms of using social media during crisis events, the following section will present the past and current status of using social media by governmental agencies and the public during flood crisis events.

2.7.9.1 Social media use by governmental and civil protection agencies

As it has been mention previously that many governmental agencies in the developed countries are having social media accounts that are registered and verified in order to provide their services and communicate effectively with public in crisis and non-crisis events. In the case of BiH government, such practices are not available, and the use of social media is not utilized at any level or among any governmental entity. Surveying the literature, searching within social media tools and services did not reveal any official information regarding the use of social media during floods crisis events. However, on the State level, the Operation and Communication Center -112 of the Ministry of security has its own Facebook¹ account that is not verified, and mainly used to publish some of the PR activities taken by the ministry regarding civil protection and some limited posts about disaster events. On the other hands, the civil protection agencies on the entity level do not have any social media accounts, even though they have their own Web pages on the Internet. The only way they communicate with the public by means of the internet, is by posting late reactive announcements on their Web pages.

¹ <https://www.facebook.com/OKCBIH112>

What is worth mentioning is that there are some government institutions in Bosnia and Herzegovina that use Facebook, Twitter and YouTube for posting job announcements such as the Civil Service Agency of BiH with 7000+ followers on Facebook², and the Ministry of Security with 4.800+ followers on Facebook³ and more than 100 published YouTube⁴ videos. It is obvious from such different actions that the Bosnian government does not have any policies, plans and frameworks for using and incorporating social media within their protocols of communication. Having a social media policy for government is considered very important, and governments in Bosnia and Herzegovina can benefit from a study conducted by the Center for technology in Government - University at Albany, where they have identified eight essential elements for designing social media policy for governmental use (Jana Hrdinová et al., 2010), covering the following aspects: 1) employee access, 2) account management, 3) acceptable use, 4) employee conduct, 5) content, 6) security, 7) legal issues, and 8) citizen conduct.

The unavailability of a common trusted framework for social media communication by the government agencies have led the public to initiate different activities that were created to provide information of flood threats and to provide helpful information that can be used for mitigating the threats. The next section will outline such efforts.

2.7.9.2 Social media use by the public.

Many different practices have shown that social media is considered to be the main mass-communication means used by people in an event of natural disaster (Erica Goldfine, 2011). The recurring events of natural disasters that affected Bosnia and Herzegovina recently have led people to turn to the use of social media to get more information, as they could not get enough detailed or satisfactory information from the government (CCI, 2015). Most of the social media sites that are published by the public during crisis events are self-organized and published using their social media profiles texts, videos and shared other links of what they have witnessed or just read across the internet. On the other hand, there are some social media sites that are designated to communities with names that give a clue to other of sharing disaster information of these events. Some of the social media accounts that have been used during the Bosnian floods crisis are as following Table 2.5:

² <https://www.facebook.com/adsbih>

³ <https://www.facebook.com/modbih>

⁴ <https://www.youtube.com/channel/UCv3W32Uo2Wz5aSBbHn-hzZw>

Table 2.5: Social media account used during BiH flood in 2014.

Facebook	Twitter hashtags	YouTube
https://www.facebook.com/fl oodinbosnia	#Bosniafloods	Flood in BiH https://www.youtube.com/watch?v=E18 x2eFnkFM
https://www.facebook.com/B osniaFloods	#Bosnia	Landslide destroys house in Bosnia as heavy floods hit Balkans https://www.youtube.com/watch?v=4fO ACddweIg
https://www.facebook.com/p oplaveba	#poplave	Balkan floods - Serbia,Bosnia,Croatia https://www.youtube.com/watch?v=H- UsmoiI2EO
https://www.facebook.com/p oplavedoboj	#poplave2014	City in Bosnia gets flooded in 5 minutes https://www.youtube.com/watch?v=WE XOh_fhtLg
https://www.facebook.com/P oplavebih	#helpbosnia	Historic Floods: Worst Flooding in more than a Century hits Eastern Europe (May 19, 2014) https://www.youtube.com/watch?v=k- UNtSix7Qs

It is expected to see more of these private social media sites that are oriented towards flood crisis in BiH in the near future, as the Bosnian flood crisis is becoming a recurring event. Having more sites and efforts is not the correct procedures for facing crisis in Bosnian without the real involvement of governmental agencies. The previous sites are acting as sites for sharing information, and such unregistered and unverified sites can lead to more threats in different cases such as spreading false information and rumours. The next section will shed the light for the threats and the needs of using social media by the governmental agencies and the need to involve the public in such operations and procedures.

2.7.10 Overcoming Flood Crisis Threats and Defining Needs

The government of Bosnia and Herzegovina has decentralized governmental structure that is distributed between two entities, Brčko District, cantons and regions as it has been outlined

previously. Such structure has brought many challenges that are causing ineffectiveness and lack of efforts in facing and dealing with flood hazards and crisis events in Bosnia and Herzegovina (Edward Joseph and Srecko Latal, 2014). The most crucial barriers that are facing Bosnia and Herzegovina framework have been addressed in previous sections. To provide a comprehensive solution, the efforts of change need to be around the four main challenges.

In terms of the first identified challenge (Political Challenges), it is believed that there are many solutions and frameworks that have been presented for the Bosnian government and its associated entities and cantons, but the problem is still present as there is no will of change and cooperation by some parties that are seeking to have a future independence from Bosnia and Herzegovina (Murat Önsoy, 2011). Moreover, this research study identifies the political challenges in Bosnia and Herzegovina as out of the scope of this research. Secondly, the challenges of (Lack of Qualified Personnel and Equipment Needs), is identified as out of the scope of this research study, as it is hard to provide training for different personnel according to different frameworks that are present in Bosnia and Herzegovina, especially that such frameworks are lacking conformity between each other (CCI, 2015).

The challenges of (Communication and Coordination Challenges) and (Lack of situational awareness in Government and public) are the only identified barriers that can be utilized effectively according to the current structural diversity in the Bosnian government. The work towards defining a communication framework that will act as complimentary system towards enhancing the efforts of managing flood crisis is the main aim of this research study. Such solution can be of a great benefit for the case of Bosnia and Herzegovina, especially with the presence of social media networks that are freely available and reachable by all. Moreover, identifying and creating a communication framework between the different entities will not require changes of any political or procedural framework of any party in the Bosnian government, and this is why it is believed that such framework can be appreciated by all parties that are facing the same threat of flood hazards.

In addition, it is important to define a trusted solution for the Bosnian government and the public as many different efforts have started to present channels for mass communication with the public, and the creation of such unauthorized channels can lead to mass disaster or hazards. The problem with such channels are due to the channels activity of spreading information that are not posted by experts, or rumours that can make the situation worse (Oh

et al., 2013). Thus it is important to define a communication framework using social media for the Bosnian government that can assist in maximizing the benefits and coordination for all the entities and the public. The next step for this research study is to investigate the current obstacles and barriers of governmental entities in Bosnia and Herzegovina towards adopting social media as a medium for communication with the public during crisis events.

2.7.11 Flood crises research efforts and the case of Bosnia and Herzegovina

The literature is growing with different research studies that are related to crisis informatics with range of perspectives on social media in crisis management and communication. Moreover, the research stream was able to utilize the used and emerging technologies starting from explicit media practices like photo sharing (Liu et al., 2008) to more sophisticated roles of using mobile media in social support and emotional resilience (Hjorth & Kim, 2011). Different research studies focused on variety of aspects that are related to the uses, challenges and promises of social media in (crisis / flood crisis) and hazardous events, as presented in section (2.4.3.) of this chapter. Other research studies provided in-depth analysis of the dynamics and features of using social media during crisis events (Murthy & Longwell, 2012; Toriumi, & Matsuo, 2011; Sinnappan, Farrell, & Stewart, 2010), while other research undertook the issues related to trust and accuracy of information in such cases (Spiro et al., 2012; Starbird, Muzny, & Palen, 2012). It was found that most of the research and development in crisis response is related to supporting situational awareness (Imran et al., 2013), providing communication medium (Subba, & Bui, 2017; Zhu, Anagondahalli, & Zhang, 2017) and crisis management (Watson, & Rodrigues, 2017; Andrews, 2017). In terms of governmental and public manifestation to the use of social media in (crisis/ flood crisis) events it was found that different research studies introduced success practices, methodologies and models for enhancing the cooperation, processes and communication between the different governmental sectors and the public (Avery, (2017; Dashti, Palen, Heris, Anderson, Anderson, & Anderson, 2014). Also the role of using social media analytics has been investigated in producing better understanding, monitoring and engagement in crisis management and communication activities (Gui, Kou, Pine, & Chen, 2017; Fan, & Gordon, 2014).

The previously investigated research results provide valuable lessons, gaps and themes that are related to technology, processes and policies associated with using social media and crisis events. Those gaps and lessons are presented in Table 2.6 categorized based on themes.

Table 2.6: Lessons learned from the literature

Major Theme	Lessons and Gaps
Technology, Tools and Features	<ul style="list-style-type: none"> • It was found that in terms of social media tools the most commonly used tools are Facebook and twitter, due to their activity feed algorithm and visibility of posts. • It is import to investigate the ability of social media used during crisis events to target specific demographics and/or geographic points • Incorporating social media within 911, 311, and 211 governmental agencies and services • Selecting and using social media tools that are able to publish messaging across various platforms concurrently • The favourite social media services were found to be the once maintain flexibility with technological advances • Matching resources and aid, is an important aspect for crisis events. This concern has many challenges that can be addressed using proper social media services. • It is important to investigate the Hardware during crisis events such as (battery power/electricity for mobile, etc.)
Standards, Training, and Guidance	<ul style="list-style-type: none"> • For crisis events and the use of social media it is important to consider the development of standards for: <ul style="list-style-type: none"> ○ Level of service by response organizations ○ Level of service by technology solutions ○ Method of coordination between organizations and partners ○ Training materials ○ Standards of use ○ Continuity of operations • The Incorporation of social media (services, policies and procedures) within incident structure and emergency operations centre protocol

	<ul style="list-style-type: none"> • The development of guidance on best practices and standards • Providing training on guidance, best practices, and standards
Policy and Process	<ul style="list-style-type: none"> • Providing considerations towards Process related to enabling association between ad hoc or nonstandard technology partners and governmental entities • Providing considerations for process that are using nonstandard resources and/or solutions • Providing the ability to permit and/or start non-traditional partner groups to support response efforts during crisis events • Providing a channel to delivery information and guidance to nongovernmental, non-profit, and non-traditional support on government requirements, policies, procedures, and available resources • Inclusion of social media in existing communications and technology policies and directives
Partnerships	<ul style="list-style-type: none"> • The importance of clear Identification of roles, tasks, and protocols for association between government and non-traditional partners • The consideration of developing permits for non-traditional partners and ad hoc volunteers • Reducing the duplication of services and efforts, through providing provision of response efforts and resources between government, nongovernmental, non-profit and non-traditional organizations • Building partnerships between technology providers and practitioners in order to detect technology requirements for existing technological solutions
Compliance and Requirements	<ul style="list-style-type: none"> • The importance of having social media services and practices complied with existing laws, regulations, and

	<p>other requirements</p> <ul style="list-style-type: none"> • Developing new compliances , laws ,regulations and requirements
Fund	<ul style="list-style-type: none"> • Providing funding for staffing, support, technology, training, exercises, program development, etc.
Data	<ul style="list-style-type: none"> • Management of information, including validation and inspection • Taking considerations for discoverability of information, resources, and efforts • Enabling standardization of vocabulary for data sharing • Identification of cross-utilization opportunities (e.g., same data source for multiple deployment efforts) • Providing discoverability and integration of public works and private sector data

The previous Table 2.6 shows that different lessons learned from the literature and this research study will adapt directives and recommendations that are related to the aim, objectives, scope, time-frame, budget and services provided by the framework proposed in this research as defined in chapter 1 and will be used in system framework design. What makes this research different other than having Bosnia and Herzegovina as a case study that was not investigated before in this context, is the governmental nature and structure found in Bosnia and Herzegovina and the ability of defining a structure that will provide the ability for a number of social media service to operate in one place to provided services for flood crisis events.

2.8. Summary

This chapter presented the background status and literature review on using social media during crisis events. It started by presenting the crisis framework that are used for managing crisis events, and it outlined the three major frameworks that are used by USA, UK and EU. Next the chapter presented the crisis communication concept and the use of social media as a new trend in crisis management frameworks. The importance of social media use within crisis was outlined; also the risks and threats of adopting this technology were presented too. Moreover, different cases for using social media within crisis events were presented, and the

most effective social media tools for such events were defined. The governmental act and opportunities for incorporating social media were presented and defined according to the practices as passive or dynamic use. The case of Bosnia and Herzegovina was next, and it outlined the recurring problem of Bosnia and Herzegovina recurring flood events. Also the problems and barriers with the adopted crisis framework with respect to the structure of Bosnia and Herzegovina government were presented.

It was apparent from cases presented in this chapter, that many countries are becoming more aware of the potential use of social media in crisis events. Countries such as the USA and UK used social media within framework that is well established for crisis events, where they managed to include social media as an adjuvant tool for communications and enhancing of situational awareness and decision support during crisis events. On the other hand, the practices of using social media by Bosnian government and the public during crisis events were presented, where it was evident that the use of social media did not follow any framework, although the country has defined framework law on the protection and rescue of people and property in the event of natural or other disasters, but the use of social media was native in nature and not complying with the governmental structure and diversity of its entities. Moreover it was clear that they have used social media as an advertise mean for events conducted by governmental agencies that have social media accounts.

The current threats and the needs for the Bosnian government to overcome the failures in managing and dealing with flood crisis events were presented. The section outlined the communication challenge and situational awareness as the appropriate field to be investigated in this research study in order to define appropriate solution for the Bosnian governmental entities and public on how to act and respond to crisis events based on a predefined framework. However, it is clear that the current information obtained from the literature is not sufficient to build a solution or propose a communication and situational awareness framework for Bosnia and Herzegovina governmental entities. Thus, the next task will investigate the barriers towards adopting social media by governmental entities, and the public response towards adopting social media services for crisis events.

CHAPTER 3: An Investigation of Social Media Status in local Governments in Bosnia and Herzegovina

3.1. Introduction

Chapter two presented different valuable information that is related towards crisis events, procedures, frameworks and social media. The available information on Bosnia and Herzegovina is considered insufficient for proposing a framework or providing a solution for the flood crisis threats that are recurring every year. A deeper investigation and understanding is considered a necessity, as such information is not found in the literature due to lack of research on the subject of flood crisis in Bosnia and Herzegovina and social media usage. The unanswered question which emerges from the literature is:

What are the current status and challenges of using social media by governmental entities in Bosnia and Herzegovina?

In order to be able to answer this question, this study has prepared questionnaire that will define the exact usage and adoption of social media in Bosnian government. The questionnaire will define the views, understanding and perceptions of Bosnian government managers about the addition that social media is making and the potential it can make through communicating with public, enhancing the planning, enhancing the organization and delivery of governmental services. The questionnaire defines the benefits, risks and challenges to governmental entities in using social media. Moreover, it defines the areas that the use of social media can bring better services to that sector.

The design of the questionnaire is provided in a way that can be used as a benchmark for outlining the changes that might be captured in any section in the governmental entity by the future surveys as stated by (Purser, 2012). Moreover, it will identify the main challenges and opportunities for using social media during crisis events. The answers to the questionnaire are believed to assist in filling the gap in literature and to gain insight knowledge of the situation on the ground prior to indenting any solution.

3.2. Methodology

As stated earlier, the objective of this chapter was to evaluate the current status and define the challenges of social media usage in governmental agencies in Bosnia and Herzegovina. The approach was based on surveying the governmental agencies using a questionnaire that

was built based on different resources that are exploring the same context. The categories used in this questionnaire were adopted from the Australian Centre of Excellence for Local Government (ACELG) (Purser, 2012). Different questions were added and edited from three major studies by (Kelly, William, 2014; Louis-Marie et al., 2011; UN OCHA, 2013), that fits into the used categories. The questionnaire has been considered suitable for this research study, as it provided the needed investigation scope for social media usage. Moreover, the questionnaire was used widely with Australian governmental agencies and it proved its reliability and validity for investigating social media adoption (Purser, 2012).

The questionnaire was edited and customized in order to comply with the investigation objective of this research study. The questionnaire has different closed and open ended questions in order to investigate and describe different factors related to this research study. In terms of open ended questions, the participants were encouraged to provide their answers in full description as possible using their comprehension and language. The information were collected and analysed for close ended question, while for open ended questions they were firstly coded using a coding frame based on (20%) of the total responses and they are presented in this study as the percentage of the total items mentioned. Moreover, in terms of the open question used in the survey, MS Excel was used in order to define codes, relationships and exclude themes that are considered answers for the questions being posted in the questionnaire. In terms of statistical significance, the results provided in this study are statistically significant at (95%) confidence level and the differences between responses were (+/- 5). The responses that are related to open type question are considered indicatively.

The list of governmental agencies that are distributed among the Federation, Republic of Srpska, and Brčko District was obtained from the Ministry of security. A list of more than 80 governmental agencies was obtained, and each of these agencies' was contacted via an email that presents the importance of this study and the used questionnaire. The participants were made aware that their participation is voluntarily, and the data will be used for research purposes only. The responses came from 26 agencies only with a total of 104 responses and the data were analysed using Microsoft Excel 2013. The obtained information was considered fundamental as it helped in filling the gap in literature and to assist in creating better judgments for solutions and future recommendations.

3.3. Study Outcomes and Discussions

This section will present the results of the questionnaire along with discussion for the results obtained. A copy of the used questionnaire is attached in appendix A.

3.3.1. Use of social media by Governmental Agencies

Question 1: What is your governmental entity’s current position on social media?

The first question in this category is showing that the participants were asked to identify their current governmental agencies position on using social media (Table 3.1). The highest value of (42%) came for participants that assured that their governmental agency is using social media on a daily bases and is relying on its use. The second highest value (23%) came for the participants that mentioned that the authority has some experience with social media. The third highest value (19%) came for the participants that assured that their governmental entity is planning to use social media but they did not start yet. A value of (8%) of participants selected that their governmental entity has not considered the use of social media at all. Finally the lowest value of (4%) came for participants that selected that their governmental authorities have just started to use social media.

Table 3.1: Governmental entities current position on social media






	Response	Chart	Percent
A	The authority is using social media on a daily bases and is relying on its use.		42%
B	The authority has some experience with social media		23%
C	The authority is planning to use social media in the near future but hasn’t started yet		19%
D	The authority has not considered using social media at all		8%
E	The authority has just started to use social media		4%
F	The authority has been introduced to the use of social media and decided against it for the moment		4%

The different variations between the governmental authorities are showing that the majority of cases of Bosnia and Herzegovina entities at different levels are looking positively towards using social media within their governmental tasks.

Question 2: Your organization doesn't use social media, why is that? Please write in all of the reasons

The results from the second question (Table 3.2) are showing the results from the participants that mentioned that they are not currently using social media. The question was of open type question and the results were coded using MS Excel.

Table 3.2: Reasons for not using social media

	Response	Chart	Frequency
A	Lack of IT training and authenticity of information		22%
B	Technical challenges		17%
C	Staffing issues		11%
D	Inadequate interconnectivity of all objects of importance for the protection and rescue		11%
E	Unreliability in emergency situations		6%



The derived themes are showing that the highest value of (22%) mentioned that (the lack of IT training and authenticity of information) is the main reason for not considering the use of social media within their governmental authorities. In a different research study conducted by (Fresenko, 2010), he mentioned that governmental agencies may face different challenges towards adopting social media and he listed the training among the main challenges as the lack of training can result in not being able of providing accurate information for the public. Another challenge that had the value of (17%) was related towards (technical challenges) that might face the governmental agency.

A research study by (Aaron Martin, René van Bavel, 2013) also shows that technical challenges are one of the main obstacles for effectively using social media within governmental agencies. A value of (11%) of respondent mentioned that (staffing issues) and (inadequate interconnectivity of all objects of importance for the protection and rescue) are considered as a challenges, as for the effective use of social media dedicated persons should be available that understands the use of social media from technical perspective, ethical and job policies and procedures (Ramanigopal, Palaniappan, Hemalatha, 2012). A value of (6%) of participants mentioned that the use of social media can cause unreliability in emergency situation. Investigating this issue in the literature, it showed that different research had different concern either related to the technical unreliability or reliability of use. A research study by (Appleby, 2013) showed that the use of social media can cause disasters and spread of rumours as during the earthquake in Japan and Italy (Natassa Antoniou and Mario Ciaramicoli, 2013).

Question 3: In your opinion, which form of communication allows your organizational entity to best manage its reputation with public?

Table 3.3 shows that the majority of participants are more reliant on using social media (81%), as different platform are used and the younger generation are more attached to such media. Having and keeping positive reputation with public is very significant to emergency response governmental entities and organizations, as they work hard to build a trust and credibility.

Table 3.3: Communication forms and organizational reputation

	Responses	Chart	Percent
A	Social Media		81%
B	Traditional Media		19%

It is important to understand that when supervising reputation, crisis managers look for influencing the public awareness of their governmental entity or organization. Thus, straight interaction with public enables their governmental authorities and organization the opportunity to create a positive assessment for the provided services and to resolve and improve situations. Organizations reputation is mainly formed by predicting on how the public evaluate organization’s ability to resolve problems and meet public’s expectations (Coombs, 2012).







According to (Schultz, Utz, & Goritz, 2011), they mentioned that using twitter in crisis event have led to higher reputation than using crisis communication via blogs and traditional newspapers. Moreover, it has been found that the public evaluates organizations capability to meet their expectations using indirect contact through receiving reports that are delivered using traditional media, online blogs and social media (Coombs, 2012). Moreover, the interactive nature of social media platforms and systems help the users in creating personal connection that facilitates positive attitudes with the governmental entities and organizations and supports word-of-mouth intention (Yang, & Kang, 2009). Thus the participants in this research have shown positive attitude towards the values of practical reputation management using social media as the finest communication tool for this purpose.

Question4: How frequently is information from your organization posted on social media?

In Table 3.4 data are presented in regards of the frequent update of information for the participating governmental authorities using social media. The highest value came for the (monthly) option with a value of (39%) of participants. The second highest option came for

(several days per week, weekly, rarely/intermittently) with (17%). The third highest value came for (once per day, more than once per day) with (6%).

Table 3.4: The frequency of information updates using social media

	Responses	Chart	Percent
A	Monthly		39%
B	Serveral days per week		17%
C	Weekly		17%
D	Rarely/ Intermittently		17%
E	Once per day		6%
F	More than once per day		6%

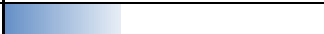
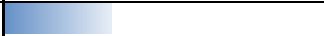






It is important to understand that governmental entities need to have continued practices of feeding information to their followers once they have established a presence on social media. Such practices will ensure having active participation and trust from the public (Kelly, William, 2014).

3.3.2. Ownership of social media inside governmental agency

Question 1: What (was / could be) the driving force for your governmental agency to consider the use of social media?

The results of the first question as indicated in Table 3.5 are showing that (33%) of participants are seeing that other authorities in Bosnian government are considered the driving force to consider the use of social media.

Table 3.5: Driving forces for considering the use of social media

	Response	Chart	Frequency
A	Other authorities in Bosnian Government		33%
B	The community		30%
C	Other staff		18%
D	Authorities outside Bosnian Government		12%
E	Communications staff		6%
F	IT/Web staff		0%
G	GM/CEO		0%
H	Other:		0%

This shows that governmental authorities in Bosnia and Herzegovina are encouraged to use social media through the use of other agencies, as they can refer to those agencies and ask for help or sharing of information. Moreover, the results show that (30%) of the driving force is coming from the community. The community is a major force, and the use of social media has proven to bring different benefits for the community, which makes it appealing for the governmental agencies to provide its services using social media networks in order to




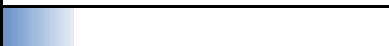
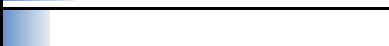
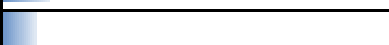
provide the services for the largest scale of the community (USAID, 2014). The results show that (18%) of staff working in the governmental authorities are the reason and driving force for considering the use of social media in their governmental authorities. Moreover a research study by Kosonen and Kianto (2009) showed that employees in organizations have realized that the open nature of social media have encouraged informal collaboration and supported knowledge sharing among workers and with the public.

The results are showing that the past experiences and benefits of using social media in authorities outside Bosnian government have been a driving force for some governmental authorities in Bosnia and Herzegovina. The literature is full of success stories for using social media by different sectors such as (Governmental, Business, Communication, Education, Marketing...etc.). Such stories and practices are found encouraging other businesses to start using social media (Sandeep Patnaik, Gallup & Robinson, Pennington, 2011). The lowest value (6%) was recorded for the communications staff as a driving force for using social media by the governmental agency. The use of social media as effective tool for communication with public and other organizations is well acknowledged in different research studies either in normal events or during crisis events due to the effective services they provide towards communication (Wendling, Radisch and Jacobzone, 2013).

Question 2: What (is/ would be) your main purpose for establishing a presence on Social Media

The main purposes for establishing a presence on social media for governmental entities in Bosnia and Herzegovina are presented in Table 3.6. The highest value came for the option of (public relations) with (35%) of participants selecting that option. The second highest value came for the option of (Community risk communication) with (23%). The third highest value was for the option of (crisis management, monitoring the organizations reputation) with (15%). The fourth highest value was for the (communicating with employees) and the final option of (Networking with other organizations) had (4%).

Table 3.6: Reasons for establishing presence on social media

	Responses	Chart	Percent
A	Public Relations		35%
B	Community Risk Communication		23%
C	Crisis Management		15%
D	Monitoring the Organization's Reputation		15%
E	Communicating with employees		8%
F	Networking with other organizations		4%

According to (Kelly, William, 2014), he presents the importance of creating conversation with the public and having public relations as they will have more trust and respond in the cases of emergency and crisis events. Moreover, it is important to understand how to use different tools that fits the use of certain communication needs that are associated with crisis event and its nature, as many participants are looking positively on using social media for (community risk communication). In the same scope of community risk communications, different solutions are provided that can enhance the distribution and management of communication. An example of such approaches is seen by using Twitter and Next door, which enabled managing the distributed messages based on groups that are allocated geographically or logically (Kelly, William, 2014). Moreover, in terms of crisis management, different tools are available that can be used to manage the crisis in different scope and stages as it was described in the literature chapter of this study. In terms of Monitoring organization's reputation, it has been proved that enhancing the communication with the public and building the trust will enable the social media managers of evaluating organization's reputation. Also providing communication with employee is important as they will ensure better engagement and availability of information and resources especially in the cases of crisis event.







Networking with other organizations is also very important, although it represents the minimal concern of participants in Bosnia and Herzegovina. More effort should be addressed towards encouraging the cooperation with other organizations, especially that large organizations and different NGO's are being available through social media networks. A good case of cooperation with the public and other organizations is the American Red Cross (ARC) that is using different variety of social media tools to engage actively with the public and other organizations that serves the community. According to ARC, they reported that the use of social media enabled them to have a larger coverage towards the public, faster

services to the public and received positive and negative feedbacks from the public that enabled them to improve their organization (Briones, Kuch, Liu, & Jin, 2011).

Question 3. Who (is / would be) responsible for social media within your authority?

The results for this question in Table 3.7 came with the highest value of (27%) of participants selected that their (public relation department, management representative) are the ones responsible for managing and monitoring social media in their governmental agency. The choice for public relation department came as they are the link between the governmental agency and the public in their daily activities and services, thus they are the most appropriate to handle this position (Viskovich, 2012). On the other hand the participants that chosen management representative have been found focusing more on the ethical issues, privacy and vision of the governmental agency as they are the most qualified persons to post updates and information on the social media based on the participants view.

Table 3.7: The persons responsible for social media within governmental entity

	Response	Chart	frequency
A	Public Relations department - PR		27%
B	Management representative		27%
C	IT department		23%
D	Web team		12%
E	Other:		12%
F	Communications department		0%

The results are showing that some participants (23%) are having the IT department be responsible for the social media networks, as they are the most capable of dealing with various systems and develop multimedia that is needed for the posts or sites and monitor security issues. A value of (12%) of participants selected web team as the once responsible for social media, as they have the sufficient skills to work with different web systems. A value of (12%) of participants has mentioned that other persons or departments are responsible for monitoring and managing social media networks. The variations in options and the displayed results are showing that the Bosnian governmental entities are having different considerations as some entities are focusing on the policy issues , the other are more oriented towards technology, the third are focusing on communication. This bring the need to investigate the third category in this survey and to understand more about the policy procedures related to the use of social media.

3.3.3 Social media policy

Question 1: What is your governmental entity's status in terms of having social media policy?

The results in Table 3.8 are showing that the majority of participants (77%) are not having any type of policies that would regulate the social media use. The problem of not having a defined policy is considered a serious problem even in more developed countries such as the study performed by (Jim Macnamara, 2011). The study stated that (65%) of Australian public and private organizations are not having any kind of policy for regulating the use of social media. A (19%) of participants stated that they have developed a policy, while (4%) stated that they are currently developing policy for the use with social media.

Table 3.8: Governmental entity's status towards social media

	Response	Chart	Frequency
A	We don't have		77%
B	We have one		19%
C	We are developing one		4%

The absence of policy is considered a threat to the governmental authorities as they expose their activities and users that are visiting those sites to different types of threats and risks (David Hill, 2014).

Question 2: What expresses your governmental entity's social media policy position?

In terms of having policy for the use of social media (Table 3.9), (67%) of participants has selected that they have developed their own social media policy. A value of (17%) selected that they are using existing social media policy and they are customizing it to comply with their authority's vision and responsibilities.

Table 3.9: Governmental entity's social media policy position

	Response	Chart	Frequency
A	We have developed our own social media policy		67%
B	We used existing social media policy and modified it slightly to comply with our authority's vision and responsibilities		17%
C	We used existing social media policy as a framework and modified it widely to meet our needs		17%











The same (17%) have selected that they are using existing social media policy and the policy have been modified widely to meet their needs. However, there are different aspects that

need to be considered for creating a policy by satisfying the eight elements of the social media policy as mentioned in the literature chapter of this study (Jana Hrdinová et al., 2010).

Question 3: What type of social media policy do you have or currently developing

The results in Table 3.10 are showing that the majority of participants (83%) are providing community guidelines for the services that are presented by each governmental entity. Moreover, they are providing copyright policy for their employees with (50%) of participants selected that option. In terms of privacy policy (33%) of participants are providing information for managing the privacy issues of employees. However, it is seen by the results that the rest of important policies have been neglected that can cause threats and risks for the government and the public.

Table 3.10: Types of social media policies used

	Response	Chart	Frequency
A	community guidelines	 83%	83%
B	copyright policy	 50%	50%
C	privacy policy	 33%	33%
D	terms of use policy	 0%	0%
E	Security Policy	 0%	0%
F	anti-trust policy	 0%	0%
G	blogging guidelines/blog moderation policy	 0%	0%
H	crisis communication plan policy	 0%	0%
I	business continuity plan policy	 0%	0%
J	employee code of conduct policy	 0%	0%

A serious consideration should be given for the rest of the policies as (security policy, terms of use policy, anti-trust policy, blogging godliness/moderation policy, crisis communication policy, business continuity plan policy and employee code of conduct policy) as having a clear policies will defend or mitigate the cyber-attacks that can result in denial of service, loss of data, misuse of data and expose of confidential data. Moreover, they will help in defining the consequences of putting the services or data in danger, and will define a crisis plan that is necessary for the case of Bosnia and Herzegovina against the flood threats (Jim Macnamara, 2011).

3.3.4. Staff use of social media

Question 1: Are your governmental entity staffs able to officially use social media to communicate with the community?

The value of (65%) of participants in Table 3.11 is showing that the communication is limited to specific staff members in terms of the official use of social media to communicate with the community. On the other hand, (31%) of participants have selected that everyone can communicate with the community via social media. This procedure of letting everyone to communicate with the public can create different problems and threats, as specialized people need to communicate with public in order to ensure the adaptation of policy related to information and procedures related to the governmental entity.

Table 3.11: Use of social media to communicate with the community

	Response	Chart	Frequency
A	The communication is limited to specific staff members		65%
B	Everyone can communicate with the community via social media		31%
C	Other:		4%

A value of (4%) selected the option (Others) and they have added that this issues has not been regulated yet, which means there are no clear policy for using or not using social media, and in such events employees can be liable in case of creating threats or having risking for the organization (Jim Macnamara, 2011).

Question 2: Is it possible for governmental entity staff to access social media sites (e.g. Twitter and Facebook, YouTube) for personal use at work?

In terms of allowing employees to use social media (Table 3.12), (65%) of participants selected (Yes), while (31%) said (No). Moreover, (4%) selected the option I don't know.

Table 3.12: Access of Social media sites

	Response	Chart	Frequency
A	Yes		65%
B	No		31%
C	Don't know		4%

The results show that the largest value is allowing their employees to use social media services, and as found in this research that (77%) of participants are not using any policy; this creates a real concern towards the possible threats to be encountered by such governmental entities. On the other hand, depriving the services completely is a waste of resources that can be manipulated for the good of governmental entity and the public.

Question 3: Are the governmental entity staffs aware of having any policy regarding the personal use of social media in terms of making comments which could reflect on the authority?

The results in Table 3.13 are showing that (35%) of participants did not consider having any policy to show and guide their employee on the acceptable use of social media. A (27%) of participants selected the option of (I don't know), as they are not aware if they are having any policy available. A (23%) of participants selected that they are considering the issues of having policies. A (12%) selected (We have policy), and (4%) of participants selected that they considered having a policy and they determined not to proceed with a policy.

Table 3.13: Social media policies awareness towards personal use

	Response	Chart	Frequency
A	We didn't consider it		35%
B	Don't know		27%
C	We are considering the issues		23%
D	We have policy		12%
E	We considered it and determined not to proceed with a policy		4%
F	We are developing policy		0%

The results are showing that the majority are not aware of having any policy for their use of social media which can cause different threats and troubles for the governmental entity and the employees. A study by (Thomas, Jan and Mark, 2013) was based on a survey that found that governance for social media compliance remains fragmented and more efforts are needed in order to develop better use and engagement that is consider effective and safe.

Question 4: Does your governmental entity provide social media training for your staff?

In terms of providing training for employees on the effective and safe use of social media, the majority of respondent (95%) answered (No) (Table 3.14). It is important to understand that employees and management need to learn how to use and interact with social media appropriately, in order to be able to identify and respond to fraudulent activities, and to be able of addressing the legal issues surrounding social media.

Table 3.14: Providing social media training

	Response	Chart	Frequency
A	No		96%
B	Yes		4%




The use, functionality and power of social media continue to grow which puts larger needs for adequate training. It is understood that the use of different social media networks make it hard to manage information spreading, however, they provide two-way symmetrical communication that can provide shared understanding, provides instant feedback, and enhances validity, responsibility, and transparency- all important qualities for excellent public relations and public information credibility (Wright, and Hinson, 2008e). Moreover,

focused and specialized training is a necessity for employees in order to cooperate and utilize the social media features and functionalities to its fullest potential, as the research results shows that the vast majority of employees and governmental officials who use social media learned it on the job or from personal interest. In addition to what has been said it was found that among the best six practices that reduce social media risks is to have valid training on the use of social media systems, moreover the research performed by (Thomas, Jan and Mark, 2013) on more than 33 governmental and public sector companies revealed that (37%) of those organizations provide valid social media training.

Question 5: Does your governmental agency provide its representatives with a Smartphone, iPad, or equivalent tablet style device for authority use with social media?

Table 3.15 are showing that the majority of participants (88%) answered (No) for governmental agency to provide its representatives with a mobile device that can be used anytime/anywhere.

Table 3.15: Providing representatives of governmental entities with mobile devices

	Response	Chart	Frequency
A	No		88%
B	Yes		12%
C	Don't know		0%

This high value shows that the general attitude in Bosnian governmental agencies is not adapting the use of social media and its benefits toward the being in contact with the public. It is well understood that not all agencies need a 24/7 connection with the public, but the recent cases of Bosnian floods showed that there are a lack of commitment into connecting and coordinating with the public and other agencies through the use of social media as alternative for the traditional communication mediums that were ineffective during the crisis events (Pasic, 2014).

3.3.5. Social media evaluation

Question 1: For each social media tool in the list, choose if your governmental agency is aware, currently uses or likely to use in the future.

The results in Table 3.16 are showing that most of the participants are not aware of different social media systems that can be used during crisis events and the three highly ranked systems are (Extranet Wikis, Mobile Applications and Augmented Reality). In terms of the aware option, the three highly ranked systems are (Facebook, YouTube and SMS

Communication). The option we currently use it had the following three highly ranked systems (Facebook, YouTube, and SMS Communication). The option we are likely to use it in the future had the following three highly ranked systems (Microblogging, SMS Communication, and Planning Alerts).

Table 3.16: Social media tools awareness




	Questions	Not Aware	Aware	We use it	likely to use it in future
A	Microblogging (e.g. Twitter)	54%	19%	4%	23%
B	Social networking (e.g. Facebook, Google+ or Myspace)	0%	65%	27%	8%
C	Professional networking (e.g. LinkedIn)	73%	15%	0%	12%
D	Photo/picture sharing (e.g. Flickr or Picasa)	73%	15%	0%	12%
E	Augmented reality (e.g. Layar)	85%	4%	0%	12%
F	Video sharing (e.g. YouTube/Vimeo etc)	0%	69%	19%	12%
G	Presentation sharing/viewing (e.g. Slideshare)	62%	23%	8%	8%
H	Extranet Wikis (Not Wikipedia)	96%	4%	0%	0%
I	Online forums like Google or Yahoo groups	46%	38%	4%	12%
J	Mobile apps (e.g. Snap Send Solve)	92%	4%	0%	4%
K	SMS communication	0%	54%	27%	19%
L	Internal microblogging (e.g. Yammer)	77%	12%	0%	12%
M	DA Apps (e.g. Planning Alerts)	69%	15%	0%	15%

The current results from this table will help to address the systems that need to be included and used with the provided system architecture of the proposed system structure prototype.

Question 2: Does your governmental agency measure the effectiveness of your social media use in a formal way?

The results in Table 3.17 are showing that the majority of participants (81%) do not measure the effectiveness of their governmental agency’s social media use in a formal way. This result is expected as most of the governmental agencies are not having policies for using social media and the same is expected for measuring the effectiveness of social media use. However, a study by (Green, & Patel, 2013) suggests a complete framework for assessing social media use that can be fully adopted for the social media usage in Bosnian governmental entities.



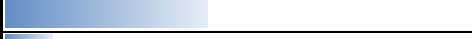

Table 3.17: Measuring social media effectiveness

	Response	Chart	Frequency
A	No		81%
B	Don't know		19%
C	Yes		0%

Question 3: How does your governmental entity measure the effectiveness of social media use? Please describe any formal or informal evaluation techniques that are used to assess the effectiveness of the tools you use.

This question was of open type questions, the results in Table 3.18 show that (88%) of participants agreed that one of the methods to measure the effectiveness is by number of participants in their pages either by subscribers or any person that likes or adds comments from outside the group. The second highest value of (77%) was for number of likes, as this is indication for the popularity of the topic. The third highest value was (46%) for number of subscribers to the group, and the lowest value of (8%) for number of shares. However, all of the previous mentioned responses are not considered formal nor valid measurements if they are to be used for final judgment or assessment without considering other factors.

Table 3.18: Measuring governmental entities effective use of social media

	Responses	Chart	Frequency
A	number of participants		88%
B	number of likes		77%
C	number of subscribers		46%
D	number of share		8%

According to (Green, & Patel, 2013) the measurements of social media engagement is one part of the measurement process, as it should include (setting concrete, meaningful goals, understanding your community, measuring the quantity and quality of engagement, demonstrating impact).

3.3.6. Opportunities and effective use of social media

Question 1: Can you bring a case of using social media that resulted in positive feedback for your governmental entity in terms of (Events used for, Information used during, Type of information, Media used, Accepted an provided feedback, Collaboration with others)? Please give as much detail as you can.

In Figure 3.1 (38%) of participants managed to provide valid cases of using social media within their governmental entity.

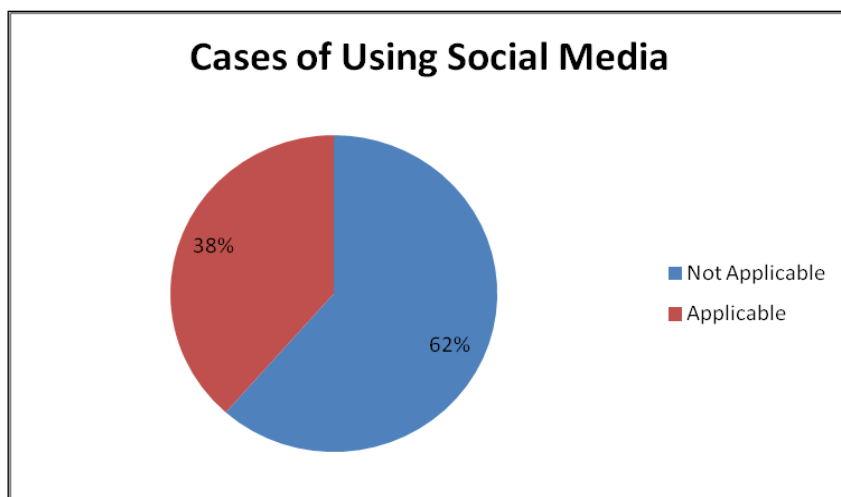
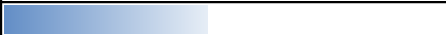








Figure 3.1: Cases of using social media

The results of figure 3.1 are showing the actual effective use of social media in Bosnian governmental sectors. The results of this question were categorized according to respondents' responses as this question was of partially categorized question (Anthony and Nancy, 2006). The following categories were identified (Events used for, Information used during, Type of information, Media used, Accepted and provided feedback, Collaboration with others) and the results are presented in the following tables.

In Table 3.19 we have the results for two different categories that were identified from participants' responses for social media usage. The first category (Event used for) shows that (45%) of participants mentioned that they used their social media for providing different types of information for public. A (36%) of participants mentioned that they provided information for public that are related to flood crisis events. A (9%) of participants mentioned they provided information for public related to mines and related precaution and procedures. A (9%) of participants mentioned that they used social media for publicizing about social work events oriented towards the public.

Table 3.19: (Event used for/information used during) category answers








Responses categories	Responses	Chart	Frequency
Event Used For			
	All		45%
	Floods		36%
	Mines		9%
	Social Work		9%
during			
	Post-Crisis		90%
	During		40%
	Pre-Crisis		30%

The second category (information used during) shows the timing of publicizing the information for the public use. A (90%) mentioned that they provided information on post-crisis event. A (40%) mentioned that they provided information during the crisis event, and (30%) mentioned that they provided information pre-crisis event. The results shows that there should be more consideration for the categories of (pre-crisis and during crisis) events, as having precaution measurements' and lifesaving procedures using social media have been proven to be effective using social media systems(Heath, 2006; Palen, Vieweg, Sutton, Liu & Hughes, 2007; Gonzalez-Herrero, & Smith, 2008).

Data in Table 3.20 are showing the results of two categories, the first category (Type of information) show that (70%) of participants have used social media for informing the public about different information and events. On the other hand (30%) mentioned that they used their social media sites for informing the public and seeking volunteering help from the public. The value of volunteering work and the inclusion of social media is well addressed by (Sladowski, Hientz & MacKenzie, 2013).





The second category shows the media used by the governmental entities. The highest value was for Facebook web site, as (60%) of participants mentioned the use of Facebook only. On the other hand (10%) mentioned Facebook and Twitter, and (10%) mentioned Facebook and YouTube. A (10%) mentioned that they used their own web sites, and (10%) mentioned that they used some other types of social media web sites without identifying names for those systems. It is clear that the use of Facebook in total will score (80%) among all participants. Moreover, the values show that the usage of other social media is minimal and there is no utilization of the social media systems, as each media provides different services and functionalities that can be valuable for the public and the governmental entities services (Gary, 2011).

Table 3.20: (Type of information, Media used) category answers

Responses categories	Responses	Chart	Frequency
Type of Information			
	Informing		70%
	Seeking help and informing		30%
Used			
	Facebook		60%
	Facebook/Twitter		10%
	Facebook/YouTube		10%
	Web Site		10%
	Not Defined		10%

Data in Table 3.21 are showing the results of two categories (Accepted and Provided Feedback, Collaboration with other Entities). The results for the first category shows that most of the participants did not Accept or provide any feedback from or for public (70%). On the other hand, (30%) of participants mentioned that they allowed the features of providing and accepting direct feedback from the public. Having more information on the values of using feedback on the quality of services and interaction with the governmental agency and contents is provided and discussed by (Treem, & Leonardi, 2012,).

Table 3.21: (Accepted and provided feedback/Collaboration with other entities) category answers.

Responses categories	Responses	Chart	Frequency
Accepted and provided Feedback			
	No		70%
	Yes		30%
Collaboration with other entities			
	No		90%
	Yes		10%

The second category shows that (90%) of participants are not using their social media sites to communicate and collaborate with other governmental entities. Only (10%) of participants mentioned that they do collaborate with other entities. The use of social media for collaboration with other organizations have been addressed by (Treem, & Leonardi, 2012), as they provided the important consequences to organizational communication processes as the social media provides new types of behaviours that were not addressed or achieved before












the use of such technologies. The study showed that social media usage in and between organization have uncovered four comparatively reliable affordances enabled by the use of social media technologies that are (edit ability, persistence, visibility and association).

Question 2: For your governmental entity, what are the best areas that social media has the most value?

In terms of social media values for the governmental entities, the results in Table 3.22 are showing that (62%) of participants selected the option of (Events announcements) as the main value for using social media within their governmental entity. The event announcement is a valuable feature of using social media and a main research that was provided on this topic was performed by Psallidas, Becker, Naaman, and Gravano., 2013.

The work of the previous researchers was oriented towards event identification task in social media under two different scenarios that are (planned and unknown events). Their work attempted to characterize the key factors in the identification process, by including the nature of social media content and the behaviour and characteristics of event content over time. The work of these researchers can be used to enhance the utilization of social media for event announcement and identification for the public. A (50%) of participants mentioned that the main value of using social media is for (Works information), as to inform the public on the current and future works of the governmental agencies. A (42%) selected that the main value is for (General community engagement). A value of 38% selected the (Customer services) as their main value. A (31%) selected the (project based community consultation) as the main value. A (12%) of participants selected the (Corporate communications) as their value.

Table 3.22: Best areas of social media values

	Responses	Chart	Frequency
A	Events announcements		62%
B	Works information		50%
C	General community engagement		42%
D	Customer services		38%
E	Project based community consultation		31%
F	Corporate communications		12%
G	In-house training and development		12%
H	Economic development		8%
I	None		4%
J	Development application tracking		0%
K	Other specify		0%

The value of corporate communication have been addressed by (Laura Matthews, 2010), as she emphasized that social media has resulted in evolution of corporate communication that created better opportunities for significant conversation, successful campaigns and understanding industry deals. In terms of in-house training and development (12%) of participants selected that option. The value and possible usage of social media for in-house training and development using different social media systems have been addressed by Lauby, in (2012). In terms of economic development (8%) of participants selected this option. According to (Isabelle Poirier, 2010) the meaning of economic development is to social media tools to communicate that your region (agency) is knowable. The research performed by Intelegia in 2010, which was refereed by (Isabelle Poirier, 2010) has showed that the (Key Facts on the Use Social Media for Economic Development) for more than 2 million pages and gave percent on the usage of each social media system that are also included in this research study. Lastly, a value of (4%) selected (None) of the current values are used, moreover, they did not specify any value in the (others) option available in the used questionnaire.

Question 3: What are the main opportunities for your governmental agency to take up social media? Please describe the opportunities as possible - type NA if not available (open Question)

Figure 3.2 show that equal values of participants are having different views about having social media opportunities for their governmental agency. The results shows that half of the participants are looking positively towards including and using social media systems and they are aware of the available opportunities, while the rest of participants need to be introduced to the opportunities and possible use of social media through training and successful use cases.

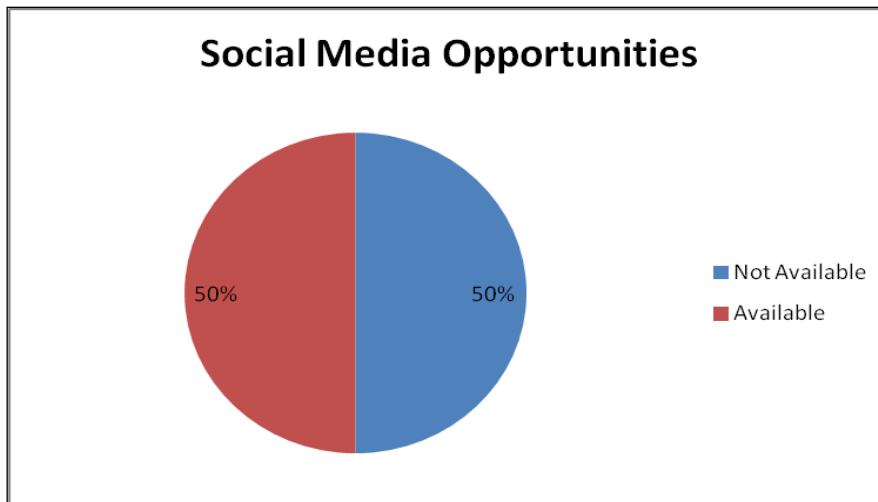


Figure 3.2: Social media opportunities

The results in Table 3.23 are showing the answers that were categorized using MS Excel for the possible opportunities of using social media. All the participants mentioned that social media provides better communication as it can be dedicated to one or distributed to massive users instead of the one to one traditional method of communication. A value of (62%) of participants mentioned that the use of social media can provide better flow of information, as the information can be categorized and can be assigned to specialized personnel to distribute, track and modify the information posted using social media. A value of (31%) mentioned that the use of social media can enhance the coordination with other entities as many social media systems provide the options of creating dedicating groups and maintaining the privacy of information and participants (Caroline, Sheedy, 2011; Lin, Yongtao; Kathryn, Ranjit, 2012). A value of (15%) mentioned that the use of social media can provide better transparency with the public. Moreover, providing transparency can ensures having equal and sustained public access to governmental information (Carlo Bertot, Jaeger, & Grimes, 2012).






Table 3.23: Social media opportunities

	Responses	Chart	Frequency
A	Better Communication	100	100%
B	Better Flow of information		62%
C	Enhancing Cordination with other entities		31%
D	Tranperancy		15%

Question 4: In your opinion, social media is most beneficial when used for:

Table 3.24 present participant answers regarding see social media benefits for. The highest value was for the option of (Timely/Real time information) with (23%). The second option was (unfiltered direct communication) with (21%). The third option was for (crisis management) with (19%) and the same value was for the option of (public relations). The final option was (Risk management) with (18%).

Table 3.24: Social media benefits

	Responses	Chart	Percent
A	Timely/ Real time information		23%
B	Unfiltered, direct communication		21%
C	Crisis Management		19%
D	Pubic Relations		19%
E	Risk Management		18%

Looking at the previous results it is seen that all the option had a near value results, which shows the equal importance of the benefits considered for using social media that were presented in the literature chapter of this study, as well as many options and benefits have been presented earlier in this chapter.

3.3.7. Barriers and risks of using social media

Question 1: What are the main barriers for your governmental agency to take up social media? Please describe the barriers as possible - type NA if not available.

All the responses from the participants were classified into 3 different categories using MS Excel (Table 3.25), which are (technical barriers, Lack of Resources Barriers, Feedback Barriers). The highest value was for technical with (60%), next the lack of resources with a value of (39%) and finally the feedback barriers with (2%). The detailed information about each category is presented in Tables 3.26, 3.27 and 3.28.

Table 3.25: Barriers Categories percent




	Response	Chart	Frequency
A	Technical		60%
B	Lack of Resources		39%
C	Feedback		2%

Table 3.26 shows the information related to the (Technical Barriers). The highest value in this category was for the (Generally Defined) Technical barriers, as the users did not specify which or what barriers are within their concern. The second highest value was (19%) for

respondents that mentioned (Security) barriers that included virus attacks, Denial of Services, spreading rumours and change of information. The third highest value was (12%) for the issues related with record keeping and classification, as they need to have a system or procedures that will enable them to classify and keep the information of various types (Text, Audio, pictures, Video). Keeping this information for later use can be helpful for statistical purposes, reports, support better management decision making and to improve efficiency and productivity (Franks, 2009). Moreover, the participants mentioned that they don't have the tools or the knowledge on how to keep records that are generated from multiple platforms.

Table 3.26: Technical barriers answers

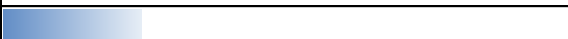


	Technical Responses	Chart	Frequency
A	Generally Defined		28%
B	Security		19%
C	Record Keeping		12%

Table 3.27 shows the information related to the (Resources Barriers). The highest value of (18%) was related for the (Lack of knowledge) on how to utilize the services and functionalities to its full potential towards promoting their services to the public with respect to the technical challenges mentioned previously. The second highest value of (11%) was related to the (Lack of time), as the participants mentioned that the used social media services and systems need continuous engagement, supervision, monitoring and update which requires lots of time and effort that are currently not planned within their governmental entity. The third highest value of (9%) was generally defined without mentioning any specific or particular barrier or challenge of resources. The final response with a value of (2%) was related to financial barriers that are related towards hiring dedicated persons for managing social media, implementing security procedures and having systems for record keeping and categorizing.

Table 3.27: Lack of resources category answers

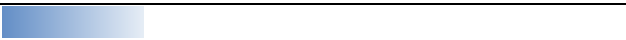

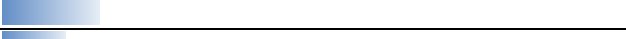


	Resouces Responses	Chart	Frequency
A	lack of knowledge		18%
B	lack of time		11%
C	Generally Defined		9%
D	Financial		2%

Table 3.28 shows the information related to the (Feedback Barriers). The barrier of providing feedback had a response of (2%), as the participants mentioned that they don't have a policy for providing immediate feedbacks for the public. Moreover, for some governmental entities

it is a serious barrier as they need to provide persons that will keep the service running for 24/7 in order to provide information for public especially in the cases of crisis.

Table 3.28: Feedback category answers

Feedback Responses	Chart	Frequency
A Feedback		2%

Question 2: What are the risks that your governmental entity needs to consider before using social media? Please explain the risks as possible - type NA if not available (OPEN QUESTION)

Figure 3.3 shows participants’ responses related to governmental entity’s consideration before using social media. The figure shows that participants concerns are divided into three different categories that are (Technical, Community and Accuracy) concerns. The highest concern with a value of (54%) is technical, the second concern with a (24%) is community and the final concern with a (22%) is related to accuracy concerns. The detailed answers that formed the previous categories are presented in Tables 3.29, 3.30 and 3.31.

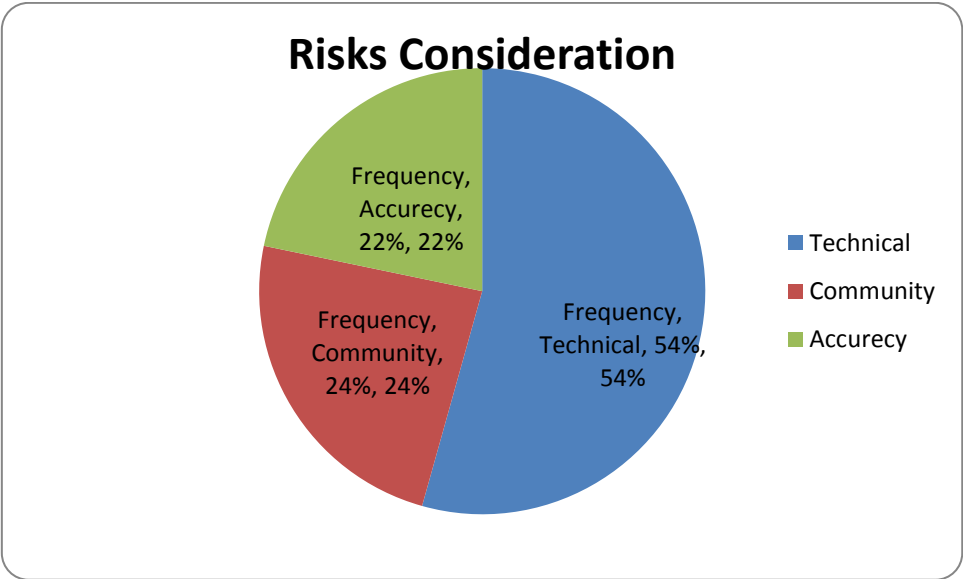


Figure 3.3: Risk’s consideration

Table 3.29 shows the responses for the (Technical) category. The highest value of (33%) is related to security concerns that need to be addressed before adopting social media usage within the governmental agency. The second highest value of (20%) was related to information management, as the governmental agencies need to have policy and procedures

on how to manage different type of information. The last response of (2%) was related to the lack of time challenge that needs to be considered before having social media usage.

Table 3.29: Technical risks category answers

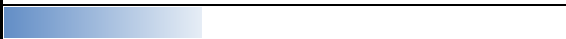

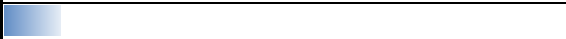
	Responses Technical	Chart	Frequency
A	Security		33%
B	Information Management		20%
C	lack of time		2%

Table 3.30 shows the responses for the (Community) category. The highest value was related to providing the feedback for the public that are connected to the social media site. The participants mentioned that they need to have a policy for the process of providing feedback that includes privacy of information, users and providing legitimate information that will be used correctly. Moreover, a value of (4%) mentioned that they need to understand the expectations of the public in order to ensure a useful usage of their social media sites and efforts, as such information have not been surveyed nor it is available through the literature in relation to Bosnian and Herzegovina case.

Table 3.30: Community risks category answers

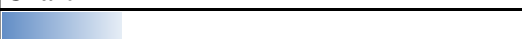
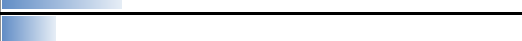
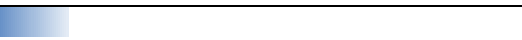

	Responses -Community	Chart	Frequency
A	Feedback		20%
B	Expectations		4%

Table 3.31 shows the responses for the (Accuracy) category. The highest value was for the accuracy of data posted on social media (13%), while a value of (9 %) was for communication, were they mentioned that communication through social media cannot be reliable in cases of crisis.

Table 3.31: Accuracy risks category answers

	Responses -Accurecy	Chart	Frequency
A	Data		13%
B	Communication		9%

3.3.8. Use of social media in an emergency

Question 1: Recent research studies have highlighted the possibility of governmental entities to use social media as an emergency management tool. Has your governmental entity considered how you might use social media in an emergency situation? Please describe as possible

Figure 3.4 shows the result of participants' consideration for using social media in crisis event. The results show that (46%) of participants are considering using social media for such event, while (54%) do not. The detailed answers that formed the previous categories are presented in Tables (3.32 and 3.33).

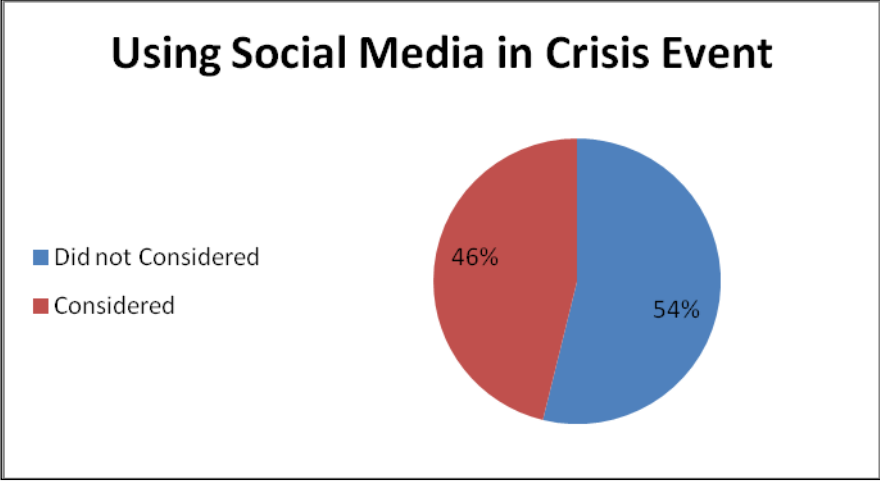


Figure 3.4: Using social media in crisis events



Table 3.32 shows the detailed responses of participants that are considering the use of social media, and they added that the social media can be used for (Informing the public) with (89%) and for (Coordinating with other entities) with (11%). The coordination and collaboration with other entities is ranking the lowest value, and this low value can be ascribed to the political situation and segregation in governmental structure as described in literature review chapter of this study.

Table 3.32: Using social media for category answers

	Responses - Using social media for	Char	Frequency
A	Informing the public		89%
B	Coordinating with other entities		11%

Table 3.33 shows the results of the category (Informing the public) and the result was divided between two responses that are (Crisis Status) with (75%) and (Rescue Activities) with (25%). The results shows that the current activities using social media are more oriented towards providing information regarding the status, and the use of social media is not properly utilized within its power to provide rescue activities in Bosnia and Herzegovina.

Table 3.33: Informing the public category answers

	Responses - Informing the public	Char	Frequency
A	Crisis Status		75%
B	Rescue Activities		25%

Question 2: Thinking about the opportunities for social media use in governmental entities for managing flood crisis in Bosnia and Herzegovina, what does your governmental entity think of social media on the following scale?

1 = Social media is mainly useful as a broadcast communication tool, to tell people what they need to know

5 = Social media is useful for broadcast information but its main strength is as a community engagement tool, to develop a dialogue with the community on a range of topics

The following Table 3.34 show that most of the participants believe are oriented towards having social media as a useful tool for broadcast of information and its strength is in community engagement that fosters the development of dialogue with the community.






Table 3.34: Mean results for social media considerations

MEAN	MODE	StDev	StErr
3.5	5	1.4	0.3

Question 3: Vulnerable populations (elderly, disabled, hearing impaired, etc.) are more reliant on social media for communication than other members of the public.

Table 3.35 shows the answers related to vulnerable populations and their reliant on social media for communication. The highest value of (44%) show that majority of participants do not agree that using social media is more beneficial for communication if compared with traditional media approach. The second option with a (40%) show, that participants choose the option of (Strongly Disagree). A value of (8%) of participants had shown their agreement, while a minimum (4%) was for the options of (Neither Agree nor Disagree, Strongly Agree)

Table 3.35: Vulnerable populations and their reliance on social media

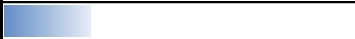




	Response	Chart	Percent
A	Disagree		44%
B	Strongly Disagree		40%
C	Agree		8%
D	Neither Agree nor Disagree		4%
E	Strongly Agree		4%

It is important to understand that when using social media that there are different tools that can be used to spread and distribute information. A good strategy should consider the entire community and to reach all the public sectors, including those that do not use the internet. Thus, susceptible populations, such as disabled, the elderly, and vision impaired may not be easily reached using social media. A current consideration from emergency management professionals is showing that the majority do not believe that susceptible populations are more reliant on social media than other member of the public (Kelly, William, 2014). These results go along with these current research findings that confidently confirm the results.

Question 4: In your opinion, the biggest risk when using social media during a crisis situation is (explain):

Table 3.36 shows participants results on their considerations for the biggest risk when using social media during a crisis situation. The highest value of (28%) was for the option of (Followers posting misinformation). The second highest value of (21%) was for the option of (Reputation management). The third highest value of (20%) was for the option (Using social media as the primary tool for public information). The fourth highest value of (18%) was for the option of (Making decisions based upon unverified information). The last option of (Focusing on timely communication rather than accurate information) had the (13%).

Table 3.36: Risks using social media during crisis situations

	Responses	Chart	Percent
A	Followers posting misinformation		28%
B	Reputation management		21%
C	Using social media as the primary tool for public information		20%
D	Making decisions based upon unverified information		18%
E	Focusing on timely communication rather than accurate information		13%

The current increased utilization of different social media tools during crisis events shows that the likelihood of spreading misinformation is also increasing. The spread of


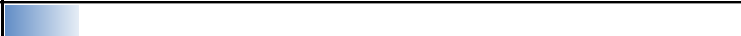
misinformation can hinder the emergency response as the inaccurate information can prove to be very dangerous to public safety. As example the Rim Fire in California forced officials to request the public to stop using social media for fire updates due to the spread of misinformation (Rory Carrol, 2013). Thus, governmental agencies and organizations that cannot control misinformation they will experience issues with their credibility towards the public which will affect their reputation.

Another important concern resulted from the participants selection was the reluctant of some information officials to use social media as their primary communication tool. Such behaviour will result in ignoring available multiple communication methods as part of a large crisis communication strategy. Another concern by participants was expressed towards the distribution of information using social media, which can tempt officials to make decisions based on unverified information that can lead to more challenges, obstacles towards the provided services and public safety. Moreover, it has been noticed that during the first phases of the crisis event, the social media activity is becoming at its highest levels which leads many governmental entity that are not prepared or short staffed to be unable to correct any misinformation or to protect the governmental entity's reputation. Moreover, many public users or organizations will focus on timely information rather than correct information which might take time to be corrected or updated by social media officials.

Question 5: Does your organization have resources in place during a crisis to verify the validity of information gathered on social media?

Table 3.37 shows the answers related towards organizations preparation in have the needed resources to verify the validity of information gathered on social media. The highest value of (89%) was for the option of (No) and (11%) only for (Yes). The results show that the majority of participating governmental entities are not prepared at all for verifying information gathered on social media. The speed of information spread using social media does not give enough time for safety authorities to verify the accuracy or validity. Such problems are seen when using crowd-sourcing, as much information is collected from different variety of sources in order to provide common picture that can enhance the situational awareness (Rosenberg, 2011). Thus the governmental entities should be prepared with proper resources to face different situations in a timely manner in order to ensure fast and accurate response for the public.


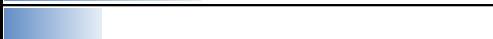
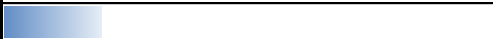
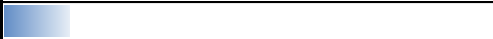

Table 3.37: Resources used during crisis to verify validity using social media

	Response	Chart	Percent
A	No		89%
B	Yes		11%

Question 6: In your opinion, during which phase of the Emergency Management Cycle is social media most effective for communicating risk to the public:

Table 3.38 shows the results of the phases that are mostly considered by participants in the emergency management cycles using social media. The highest value of (42%) is for the option of (Equally useful in all phases) closed by participants. The second highest value of (19%) is for the options of (Response phase, Preparedness phase). The third highest value of (12%) is for the option of (Prevention-Mitigation phase). The final option of (Recovery phase) had (8%).

Table 3.38: Social media effectiveness and emergency management cycle



	Responses	Chart	Percent
A	Equally useful in all phases		42%
B	Response phase		19%
C	Preparedness phase		19%
D	Prevention-mitigation Phase		12%
E	Recovery phase		8%

The majority of participants are seeing that the social media is active and effective in all phases as it provides different tools that are useful through the different services provided for all the phases of emergency management cycle. The other selection is seen by participants according to the services they are using, and thus their selection is more oriented towards specific phases as described by (Adamski, Shayne, 2013) in similar research results. It is believed that if participants have been using a variety of selection, they would have seen that the social media is effective in all emergency management cycle (Kelly, William, 2014).

Question 7: Does your governmental entity use social media to educate the public on emergency preparedness procedures, such as earthquake preparedness, crime prevention tips, public health issues, etc.?

Table 3.39 shows the results of governmental entities participating in this study towards educating the public for emergency preparedness. The majority of participants with (96%) answered (No). Not educating the public towards possible, potential and recurrent crisis event will create a gap between the public and the governmental entities that are using social media.

Table 3.39: Using social media and educating the public

	Responses	Chart	Percent
A	No		96%
B	Yes		4%




The governmental entities should encourage the public to be interactive with their social media sites through providing useful information and updating the information regularly on the possible actions and procedures to be taken prior to the crisis event. Such activities will ensure better response during the crisis and will create awareness and trust to the procedures posted through social media (Kelly, William, 2014). The current provided information needs to be considered towards educating the public.

3.3.9. Coordination Challenges of Using Social Media in Crisis Events

Question1: Does your governmental entity work with other authorities for coordinating and sharing information for informing the public in the case of crisis events?

Table 3.40 show the answers related towards using social media in coordination with other governmental entities for informing the public in the cases of crisis event. The highest value of (73%) of participants answered no. Taking this result in relation to the previous results related to collaboration and coordination between governmental entities in Bosnia and Herzegovina reflects the current situation of disharmonized and unplanned activities and possibilities that are possible between the governmental entities. A value of (19%) reflected that they don't know if there is any coordination with other governmental entities, while (8%) selected that they have some kind of governmental coordination with other entities.

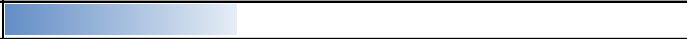
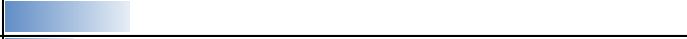

Table 3.40: Working with other governmental entities for informing the public in crisis events

	Response	Chart	Frequency
A	No		73%
B	I Don't Know		19%
C	Yes		8%

Question 2: Do you believe your governmental entity is willing to coordinate the efforts of using social media with other governmental entities in the Bosnian government (all levels) for public safety and common good?

In terms of willingness for future cooperation and coordination of efforts (Table 3.41), a value of (46%) of governmental entities selected (Yes) as answer. A value of (31%) selected (I don't know) and a value of (23%) answered (No).

Table 3.41: Coordinating the efforts with other governmental entities.

	Response	Chart	Frequency
A	Yes		46%
B	I Don't Know		31%
C	No		23%

The two last value are showing that more than half the participants are either hesitant for confirming the coordination willingness or rejecting the coordination efforts, and this shows that there are some serious challenges that needs to be considered, the next question sheds the light on those challenges.

Question 3: What are the main challenges towards coordinating the efforts of social media between the different Bosnian governmental entities?

Table 3.42 shows the current identified challenges for establishing effort coordination between Bosnian governmental entities. The participants' answers were grouped into 4 main categories. The detailed information with respect for each category is displayed in the following tables

Table 3.42 Main categories challenges towards coordinating the efforts

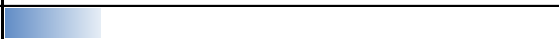
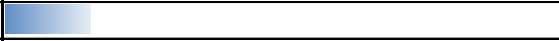
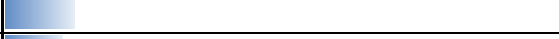





	Response Category	Chart	Percent
A	Structural Differences		28%
B	Cooperation		27%
C	Organizational / Operational		24%
D	Situational		21%

Table 3.43 shows the responses that are related to the (Structural Differences) category. The highest response with (92%) was selected by the participants for the option of (Coordination is a low priority), the high value shows that managers in governmental entities believe that coordination is not really necessary and therefore, do not follow through with commitments. The same value of (92%) of participants selected the option of (Highly centralize and bureaucratic organization) as a current challenge as they believe that coordination will be delayed by entities and agencies that must gain approval from their superiors before accepting to inter-organizational aims or to make commitments of time and resources (Steets et al., 2012). The third highest value was (85%) of participants' selection for the option of (Different expectations at different levels of government or organizations) (Linden, 2002). This option shows that most participants are agreeing that having different expectations about which entity must or should be provided with services and how those services are going to be provided for the public is a major challenge. Moreover, it is complicated to perform such harmonization without altering or updating political interests.

Table 3.43: Structural differences category results

	Structural Differences- Responses	Chart	Percent
A	Coordination is a low priority		92%
B	Highly centralized and bureaucratic organizations		92%
C	Different expectations at different levels of government or organizations		85%
D	Unilateral donor actions		81%

The final option in this category was (Unilateral donor actions) and the participants with (81%) agreed that it is a current challenge. In different crisis events donors might act unilaterally, as politicizing aids, or allocate funds for specific population or purposes can challenge the efforts of establishing coordination between governmental entities (Louis-Marie et al., 2011).

Table 3.44 shows the result of the (Cooperation) category. The highest value in this category is (100%) for the option of (Threats to Autonomy). Many organizations are having fears towards the threats that coordination can bring of decreasing their freedom to choose over their own programs (Anne. and Per., 2005), and thus all the participants are agreeing that this option is having the highest consensus in this category. The second highest value of (88%) was for the option of (Fragmentation). The fragmentation is considered a challenge towards coordination as it happens within the human response system due to the variety of authorizations, policies, measures, beliefs and values that are available (Lema & Ruby, 2007). The third highest value of (77%) is for the option of (Disagreement among operational agencies). This challenge is important as It has been found that many individuals or groups that are responsible for providing resources during crisis events are having frequent disagreements towards the needs to be met, services to be provided, programming approaches, etc. (Dawes, & Pardo, 2002). The fourth highest value in this category is for the option of (Lack of trust) with (65%) of participants having this option as a challenge. The lack of trust between agencies or persons can be due to different reasons, such as a history of poor relations or never have worked with other governmental entities as the case in many governmental entities in Bosnia and Herzegovina. These issues can create suspicion and doubt and therefore it can direct them to see each other as threat, competitors or untrustworthy (Vlaar, Van den Bosch & Volberda, 2007).

Table 3.44: Cooperation category results





	Cooperation - Responses	Chart	Percent
A	Threats to Autonomy		100%
B	Fragmentation		88%
C	Disagreement among operational agencies		77%
D	Lack of trust		65%

Table 3.45 shows the responses that are related to the (Organizational / Operational) category. The highest value in this category is for the options of (Lack of coordination skills, knowledge and experience) with (88%) of participants are agreeing on this challenge to hinder coordination. This challenge is mostly seen within organizations that do not understand the requirement and the dynamics of coordination, field representatives without good guidance and skills that either aggravate or are aggravated by efforts to coordinate (Vlaar, Van den Bosch, & Volberda, 2007). The second highest value of (69%) of participants that agreed that (Ineffective or inappropriate leadership) is considered a challenge towards coordination.

According to (Anne. and Per., 2005) coordination efforts are destroyed if the leadership is repressive, imposing their choices and schedule on the body. Thus the lack of leadership skills or resources will reduce the value and quality of coordination efforts. The third highest value was for the option of (Lack of resources or insufficient access to resources) with (58%) of participants agreeing on this challenge. This challenge is mostly vivid in organizations that are having few resources to contribute, thus those organizations are not very keen to participate in coordinating efforts with other organizations (Linden, 2002). The fourth highest value in this category is (42%) for the option of (Staff turnover) among the participants in this study. The recurrent turnover of staff in organizations makes a challenge for coordination as it affects the policy continuity, coordination agreements and institutional memory. Moreover, the trust between organizations or individuals depends on rising levels of familiarity and contact among organizations or individuals, which generally suffers with high turnover rates (Hopp, and Van Oyen, 2004). The last option (Technical Challenges) in this category had (38%) of participants agreeing on this challenge. Technical challenges are many, and they can vary from simple such as working with the system properly, managing information systems up to more advanced issues such as security, backup, information categorizing and retrieval (Ezz, Papazafeiropoulou, & Serrano, 2009).

Table 3.45: Organizational/Operational category results









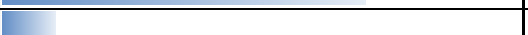
	Organizational / Operational - Responses	Chart	Percent
A	Lack of coordination skills, knowledge, and experience		88%
B	Ineffective or inappropriate leadership		69%
C	Lack of resources or insufficient access to resources		58%
D	Staff turnover		42%
E	Technical Challenges		38%

Table 3.46 shows the responses that are related to the (Situational) category. The highest value in this category is for the option (Absence of consensus) with (96%) of participants agreeing on this challenge. The differences between governmental entities and organizations can happen due to different issues such as (the right of some governmental entities and organizations to be involved, which governmental entity should operate in a given geographical area, which governmental entity should offer specific services, which beneficiaries are going to be served by each governmental entity and absence of conformity on strategies and priorities) (Kellermanns, Walter, Lechner, & Floyd, 2005). The second highest value of (85%) was for the option of (Diffusion of credit). In some cases when the governmental entities or organizations are having coordination efforts, the praise for acknowledgement of individual contributions can get lost or diffused. Moreover, recognition can be in some cases the only reward that members of governmental entity or organization get, an in a coordinated effort this type of reward can get lost. The third highest value of (77%) is for the option of (Costs and benefits are not certain). Due to the lack of information on the use of social media within governmental entities, different governmental entities believe that the costs of coordination will be high, not taking into consideration that the cost of not having such coordination can result in higher costs in the future (Schachter, 2007).

Table 3.46: Situational category results

	Situational - Responses	Chart	Percent
A	Absence of consensus		96%
B	Diffusion of credit		85%
C	Costs and benefits are not certain		77%
D	Client representative		8%

The final option in this category was (Client representative) and it had (8%). Some governmental entities are having serious worries from client representative groups that can

control their governmental entities services, especially that different social media systems can have direct interactivity with the public.

3.4. Summary

This study showed the current status of social media adoption in governmental entities in Bosnia and Herzegovina. Such information has not been published previously, and this study is believed to be among the first studies that are enriching the literature with such information. The previous results and discussion showed that the governmental agencies in Bosnia and Herzegovina are not currently very active in using social media for promoting their services to the public. More efforts are needed as the current use of social media is not planned or mature to be used effectively in crisis events or for effective promotion of governmental services.

On the governmental sector it was found that participants were divided into different groups and by investigating their response and interaction with the system framework it was found that 27% of participants came from the PR department, while other 27% from management representatives. Both groups were considered as responsible for managing and monitoring social media at their governmental agency, with a difference that the later one were focusing on ethical issues and privacy and vision more, and were considered by participants the most qualified persons to post updated and information. On the other hand, it was found that IT departments (23%) are considered to be responsible for managing social media networks due to their expertise in dealing with different platforms as well as being able to develop multimedia content. Web teams had a value of (12%) and they were considered as the one having enough skills to work with different social media platform.

The current use of social media has been found not being supported by proper training with 22% stating that lack of IT training is one of the main reasons for not using social media tools. Moreover, 81% stated that they do not have policies, frameworks or procedures that regulate the use of social media, and many current and future obstacles, risks and barriers have been identified towards adopting social media by those governmental agencies. However, despite the current negative status of social media adoption and usage in Bosnia and Herzegovina, this research managed to identify current opportunities that are believed to be chances for better utilization of social media by the governmental entities, where 88%

have stated that their government authority is introduced to social media, while 42% are using it on daily basis. In addition to what has been mentioned, this research managed to identify the view of Bosnian governmental agencies on the usage of social media in crisis events, with a 38% who said that establishing social media presence would be used for community risk communication and crisis management, while 35% as public relation tool. Moreover, the coordination challenges with other governmental entities on using social media in crisis events have been broadly identified. Also it was found that for providing information on social media, 90% of the information is provided in the post crisis phase, while 30% in pri and 40% in during crisis events.

All the previous presented information has not been defined in the literature, and it is believed that the current outcome will enrich the literature with new and updated information. The current social media status in governmental agencies in Bosnian and Herzegovina are not sufficient to be used for designing a unified social media framework that will be utilized by governmental agencies for crisis events, another inputs are needed that are related to the public perception and usage of social media in the country. The following chapter will present the further steps in this research, in order to have reliable inputs for the system design.

CHAPTER 4: Investigating Social Media Status and Preferences for Public Usage during Crisis Events in Bosnia and Herzegovina.

4.1. Introduction

Based on the previous findings from defining the status of social media usage by the governmental agencies in Bosnia and Herzegovina it was noticed that the adoption level is still low. Those facts have been highlighted in Chapter 3 and they are going to serve as one part of the needed inputs for our system design. However, before moving into proposing any solution against low social media adoption in the country, it is important to fully stand on the causes for this decline. Therefore this chapter has introduced steps and methods that have been performed towards having comprehensive understanding towards social media usage in the region. These results are believed to serve in filling the current gap in literature review regarding Bosnia and Herzegovina. They have also been used towards having a concrete judgment on the requirements of system design phase. The following section will present the systematic approach methodology towards defining the social media usage status in this research study.

4.2. Methodology

The investigation of social media status in Bosnia and Herzegovina has used a questionnaire with a close ended questions in order to capture data as no up-to-date information are available on social media usage in Bosnia and Herzegovina. The questions were chosen from different studies that investigated social media usage in the same context as needed by this research study. This section will discuss the methodologies used with this phase of investigation and will present and discuss the outcomes that will serve in enriching the literature and will serve as input for the social media unified framework that will be presented in this research study.

4.2.1. Questionnaire Methodological Approach

This approach was adopted from a number of research initiatives across the world, which relied on evaluating social media usage by public (Kimberly Coudreaut, 2012; Sweetser & Kelleher, 2011; BIGresearch, 2007; Madden & Zickuhr, 2011). Different questions have been added and modified from the previous resources in order to serve the context of this research phase and region being investigated. A copy of the questionnaire is attached in appendix B.

4.2.1.1. Pilot Testing the Questionnaire

Prior to the distribution of the questionnaire, a pilot study was undertaken in order to evaluate its credibility for the study. The pilot was conducted on Ministry of Communications and Transport staff and Centre 112 working at the State level in Bosnia and Herzegovina Government. The approval of arranging this test was based on meeting Ministry's assistant and discussing the importance of this study and its effects on Bosnia and Herzegovina, which resulted in approval for initiating the investigation.

The questionnaire was prepared in a consistent format according to Brunel University rules and regulations. Hard copies were distributed among the Staff members and a total response of 49 members was gathered and the data were digitized into electronic format Excel file. The gathered data were tested using Cronbach's Alpha formula for measuring numerical coefficient of reliability. Computation of alpha is based on the reliability of a test relative to other tests with same number of items, and measuring the same construct of interest (Cronbach, 1951; Hatcher, 1994). The results were encouraging, yielding a value of .96, which is beyond the .70 that serves as a benchmark for considering survey questions sufficiently reliable for an in- depth examination of issues related to this research.

4.2.1.2. Distributing Questionnaires for the Public

In order to reach larger number of participants, different approaches have been considered in this phase of research. The first step was converting the questionnaire into electronic format using the service provided by (Google Docs). The second step was contacting the Civil Service Agency of BiH (CSA-BiH) that is responsible for recruiting, training and developing civil servants in BiH institutions. The CSA-BiH was contacted by the researcher via email requesting their help in providing contact information (e-mails) for the public registered in their database. The approval was granted after verifying the researcher's status as active staff member in the Ministry of Communications and Transport and Centre 112. Moreover, the response to provide such information was made due to the importance of this study to the Government of Bosnia and Herzegovina. The approval for providing the information for this research study is attached in Appendix C.

The CSA-BiH provided this research study with more than 13,800 email address. The third source for obtaining contact address was through using the Ministry's list address which provided more than 800 email address. The fourth source of contacts were from the personal email list and social media groups available for Bosnia and Herzegovina region. The total

number of contacts was approximately 15,000 people. In order to be able to send large amount of contact list, the e-Government centre was contacted and have been requested to provide a larger capacity for sending email addresses from their mail server. The request was approved and they provide the capacity of 500 e-mails per mail. The e-mail was prepared, which presented the importance of this study to the region and expressed that their participation is totally voluntarily. The URL for the questionnaire was provided with the e-mail. The number of respondents that participated in filling the questionnaire was 1,639, and the questionnaire was made active from 06.April 2015 to 20 May 2015. The data were gathered and digitize into Excel file. The data were analysed using statistical software package (SPSS) and are presented in outcome and discussion section of this research study.

4.2.1.3. Analysing Questionnaires for the Public

The data were analysed using different techniques based on the type of data generated from the questionnaire and the type of relationships needed to be understood in order to outline the correct and meaningful results. The pilot testing of questionnaire was performed using Cronbach's Alpha formula for measuring numerical coefficient of reliability as it has been mentioned previously. The type of analysis for data that was collected from the questionnaire was based on finding frequencies, standard deviation, percent, cross tabulation, T-independent test for determining significant differences between the means in two unrelated groups, and ANOVA test of variances. The used analysis methods were found satisfactory for this study as they provided outcomes that enabled better understanding for the results and data being collected and analysed.

4.3. Study Outcomes and Discussion

Table 4.1 shows that the women participants are more active in filling the questionnaire if compared with male participants, as their value was (56.1%). Such results have been reported in different studies as women are more active in participating in filling questionnaires than men (Curtin, Presser & Singer, 2000; Moore & Tarnai, 2002; Singer, van Hoewyk, & Maher, 2000).

Table 4.1: Participation Gender value

Gender	Frequency	Percent
Female	919	56.1
Male	720	43.9

The persons that participated in filling the questionnaire are mostly persons that are working in the governmental and public sectors that finished their studies. Thus the value of the age group of (18-24) is the lowest in all age groups (Table 4.2). In terms of age group of (25-34) of participants the results show that the highest value of (43.6%) is for this group. The second highest group with a value of (36.5%) is for the group of (35-44) and the studies shows that younger people are more likely to participate than older people, and the same reason goes for the age group of (45-54) and (55 and older), (Goyder, 1986; Moore & Tarnai, 2002).

Table 4.2: Participation's Age

Age	Frequency	Percent
18-24	39	2.4
25-34	715	43.6
35-44	599	36.5
45-54	206	12.6
55 and older	80	4.9

Table 4.3 shows the education level of participants, and the highest value of (60%) goes for the University degree as the results shows that most of the participants are educated. Many studies shows that educated people are more likely to participate in such studies in compared with less educated and less affluent people (Curtin, Presser & Singer, 2000; Goyder, Warriner, & Miller, 2002; Singer, van Hoewyk, & Maher, 2000).

Table 4.3: Participation's Education

Education	Frequency	Percent
Higher education - 2 year	70	4.3
MA	455	27.8
PhD	53	3.2
Secondary education	78	4.8
University degree	983	60

Table 4.4 shows the participation percent in terms of ethnicity. The results shows that the Bosniac ethnicity have been the mostly interested in participating in this study with a value of (53.6%), while the second highest value is (21.1%) for the Bosnian Serbs as they are the

second largest population in Bosnia and Herzegovina. The third highest value of (12.1%) is for the Croat, while a (6.7%) did not specify their ethnicity. The lowest value is for the (others) option that included other registered ethnicities mainly gypsies. The displayed value is somehow relative to the value of ethnicities in Bosnia and Herzegovina as provided by a recent study by (Timo, Marina and Paul, 2012).

Table 4.4: Participation's Ethnicity

Ethnicity	Frequency	Percent
Bosniac	879	53.6
Croat	199	12.1
Non biased	109	6.7
Others	106	6.5
Serb	346	21.1

The previous results show that this study managed to cover a wide spectrum of working adults' ethnicities in Bosnia and Herzegovina which gives more authenticity to the results provided by this study without having the results reflecting one ethnicity in favour of other.

Table 4.5 shows the results of administrative-territorial belonging in Bosnia and Herzegovina. The results for the 15 territory are named by canton for Bosnian Federation, while they are called region for Bosnian Serbs republic. The results show that the highest percent of participation is for the Sarajevo (49.7%). This result is expected as Sarajevo canton is the capital of Bosnia and Herzegovina as well as the Bosnian federation and most of the governmental/public entities and authorities are located in Sarajevo. In terms of regions, the highest value is for Pale with (6.9%) of Bosnian Serbs participating from this region. The value provided also indicates the concentration of governmental/public entities and authorities in Bosnia and Herzegovina among all different cantons and regions (Stojanović, 2012).

Table 4.5: Participation's Administrative – Territorial Belonging

Administrative-territorial belonging:	Frequency	Percent
Bosansko-podrinjski Canton	17	1
Hercegovačko-Neretvanski Canton	95	5.8
Livanjski Canton (Canton 10)	9	0.5
Posavski kanton	9	0.5
Regija Doboј	21	1.3

Regija Trebinje	13	0.8
Region Banja Luka	117	7.1
Region Bijeljina	68	4.1
Region Pale	113	6.9
Sarajevski Canton	815	49.7
Srednjobosanski Canton	71	4.3
Tuzlanski Canton	101	6.2
Unsko-sanski Canton	47	2.9
Zapadno-hercegovački Canton	12	0.7
Zenicko-dobojski Canton	131	8

Table 4.6 show participants view on the use of social media in Bosnia and Herzegovina. The highest value of (84.2%) was for the option of (Social media websites are growing in popularity). This high value is reflecting the actual behaviour towards social media worldwide and it has been reported by different studies as reflected by (Kaplan & Haenlein, 2010). In terms of considering social media websites as fun to use (75.8%) selected that option. According to (Brandtzæg & Heim, 2009), he suggested 11 different reasons that give insight into the personal incentives that drive people to use social media networks, among those 11 reasons the option of (Social Media is Fun to use) was considered as one of the reasons.

Table 4.6: Participation's Attitude towards Social Media

Please indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc.	Mean	Std. Deviation	%
Social media websites are growing in popularity	4.21	0.836	84.2
Social media websites are fun to use	3.79	0.906	75.8
Social media websites are waste of time	3.11	0.991	62.2
Social media websites are for someone like me	2.99	1.03	59.8
Social media websites are a passing fad	2.66	1.045	53.2

The third highest value of (62.2%) was for the option of (Social media websites are waste of time). This result reflects the views of participants on the use of social media as it can be a waste of time in many occasions. Moreover, a study by (DeCamp & Cunningham, 2013) suggested that use of social media can be a source of waste of time for physicians and he

mentioned several cases and reasons related to medical profession. In the same scope, according to (Van Zyl, 2009) he suggested that the unplanned usage and management of Social Media in organizations can lead to a waste of precious time that can be used for organizational work and development. On the other hand he suggested that if the ability to manage knowledge is found by using social media it will enhance the organizational work by providing different opportunities.

The fourth highest value of (59.8%) is for the option of (Social media websites are for someone like me). The results shows that more than half of the participants are having positive attitude towards the different services provided by social media, as those services are needed by the participants either by their work or social life. Different studies are suggesting that the use of social media is beneficial for users in different levels and scopes ranging from personal to professional work settings, thus many users are attached to the use of social media services and features (Asur & Huberman, 2010; Gilbert & Karahalios, 2009). In terms of having social media as a passing fad, a value of (53.2%) of participants believes that social media usage is a passing fad. This value is not strange as many technological services and innovations have proved to be a passing fad as the future will present new services and technologies. A recent study by (Mergel, 2013) suggested three main factors are influencing the adoption decisions of social media that are (Representation, Engagement and Networking) and those factors are the settings that will affect the social media usage in the future.

Table 4.7 shows that the majority of participants are engaged in using social media with a value of (86.6%). This high result can be ascribed to different reasons that are the age and the educational level in this research outcome. The participants in this study are mostly in the (24-44) age rank according to (Table 4.2) results, and mostly are having university and higher degrees according to (Table 4.3) results. The previous results are found related to the recent statistical results provided by (Duggan & Brenner, 2013) on the demographic of social media users, as it proves that the younger generation and people with educational level are more keen on using social media services and networks.

Table 4.7: Participation's Ownership of Media Accounts

Do you have an account on any social networking website (like Facebook, Twitter, Myspace, YouTube...etc.)?	Frequency	Percent
Yes	1419	86.6
No	220	13.4

Table 4.8 shows participants usage of different social media services. The highest value of (82.80%) is for the use of Facebook. Different studies have also reflected that Facebook is the most used social media platform due to the wide range of features it provides within one platform (Hanna, Rohm & Crittenden, 2011; Quan-Haase & Young, 2010). Viber has been found to be the second highest service that is used within mobile communication tools and services by the participants. Although it is known that another application called WhatsApp is the dominant application in mobile data communications in many countries, the results for WhatsApp in Bosnia and Herzegovina has the value of (28.7%). However, such preferences are mainly associated with needed features that are provided by such applications, and another feature that is in favour of Viber is the use of Viber Desktop that can be used by PC devices to communicate with mobile phones. In a recent study by (Jason, 2014) it showed that Viber has better engagement and use if compared with WhatsApp in the following countries (Ireland, Vietnam, Turkey). Moreover, there are some features that were supported earlier by Viber and that's what made it more appealing to users such as (Supporting VoIP, Better security features against (Account Hijacking, Spoofing and Manipulation)) as reported by (Schrittwieser et al., 2012).

Table 4.8: Participation's Usage of Social Media Services

Which social network do you use?	Responses		Percent of Cases
	N	Percent	
(Facebook)	1354	17.10%	82.80%
(Viber)	1281	16.20%	78.30%
(Skype)	1150	14.50%	70.30%
(YouTube)	939	11.90%	57.40%
(Google+)	664	8.40%	40.60%
(LinkedIn)	561	7.10%	34.30%
(Wikipedia)	560	7.10%	34.20%
(WhatsUp)	470	5.90%	28.70%
(Other)	331	4.20%	20.20%
(Twitter)	293	3.70%	17.90%
(Instagram)	266	3.40%	16.30%
(Flicker)	40	0.50%	2.40%
Total	7909	100.00%	483.40%

The third highest value of (70.3%) was for the Skype application. Skype has been known for providing the video conferencing, and this application is favoured by many users around the world. It was one of the earliest applications that provided the feature of Video conferencing even before the development of current mobile application and services. Also the current mobiles are using a special version that works with their devices and operating systems (Sisalem, Kuthan & Ott, 2013).

The fourth highest value of (57.4%) is for YouTube service. The popularity of YouTube usage is for sharing Video/Audio and Pictures in Video format. Moreover, YouTube provides features that are related to classifying video, groups and users which proves to be beneficial within different contexts and users (Kulkarni & Devetsikiotis, 2010). In terms of using Google+ the results showed that (40.6%) of participants are using it. Google+ provides different features for their users such as the ability to post photos and status for interest based groups and communities with different type of relationships that include circles of interest, multi-person instant messaging, text and video chats, event, location tagging and the ability to edit and upload images to private cloud-base albums (Cohen, 2013). In terms of using (LinkedIn, Wikipedia) they have resulted in a very near value of (34.3% and 34.2%) respectively. The use of LinkedIn is for providing a connection with users of similar interests for sharing different type contents. The use of Wikipedia is for providing different information on different topics. The lower value of usage to those services can be justified as many of the previous social media services are providing the same abilities and services. According to (Amanda et al., 2010) her research showed that among young adults (18-29) the value of Facebook users is (71%), while for LinkedIn it is (7%), while for adults of (30 and over) the value for Facebook users are (75%) while for LinkedIn it is (19%), in terms of all adults (18 and over) the value is (73%) for Facebook and (14%) for LinkedIn. The option (Others) was meant for other social media and web services that are used and it had the value of (20.2%). The list of answers for others included mainly private blogs that are used in Bosnia and Herzegovina for sharing interest, news and files of different types. In terms of using Twitter it had the value of (17.9%). A similar study by (Amanda et al., 2010) has reported a near percentage for adults' usage of twitter, as it is shown in the following Figure 4.1:

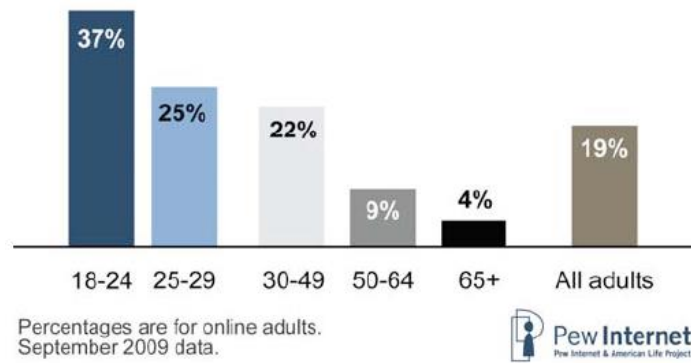


Figure 4.1: Percentages for online adults by Pew Internet Sep. 2009.

Despite this low value of Twitter usage, the use of this service has proved to be very beneficial during crisis events and emergencies for spreading breaking news and updates on the status of the event especially in the events related to (Sports, Disasters, Politics and Business) as it has been mentioned by (Petrovic et al., 2013). In terms of using Instagram the value shows that (16.3%) of participants are using this service, as it is mainly dedicated for sharing pictures among different users and groups.

The use of Instagram is not very popular as the features provided by Instagram can be found in different popular social media services related to photo and video sharing, tagging, classifying and distributing. Other features related to photos that enable photo manipulation and editing then posting to other social media services is the main driver of using Instagram if comparing features to other available services (Brown, 2013). In terms of using Flickr, it had the value of (2.4%), which is the lowest value among all previous social media services. It is important to note that both Flickr and Instagram are used for photo editing; however, Flickr has been known more to be used by professional photographers if compared to Instagram. On the other hand, Instagram has provided more filters for image editing and provided the ability to be linked with other social media through the use of hash tags which is not supported by Flickr. Moreover, Instagram is supported by Facebook and it provides direct previews for the images and the ability to tag images using Twitter. Finally, working with Instagram is considered more interactive and less intimidating which makes it easier for users who use social media to keep up with friends feels at ease using it (Brown, 2013).

Table 4.9 shows participants' time usage of social media services in a week. The highest value of social media usage is (46.8%) for the time group of (1-5h) weekly. The world average value of social media usage is (11 hours) weekly according to (Kemp, 2015) and thus

it fits in the fourth category of the displayed results. This results shows that the use of social media is not very developed in Bosnia and Herzegovina compared with the world average.

Table 4.9: Participation’s Time Usage of Social Media Services

In a typical week, about how much time do you spend using social networking websites?	Frequency	Percent
Less than 1 h	326	19.9
1 – 5 h	767	46.8
6 – 10 h	315	19.2
10 - 15 h	130	7.9
More than 15 h	101	6.2

The previous Table 4.10 investigates how participants’ time is used on social media. The highest value of (87.1%) is for the option of (Reading content posted by other). The second highest value of (12.8%) is for (Posting personal information or comments), while the lowest value of (0.2%) is for the option of (Reading local news). The results of Table 4.10 along with the previous Table 4.9 show that users in Bosnia and Herzegovina are not very engaged in posting different posts and media, and thus they have more of a passive approach towards using social media services.

Table 4.10: Participation’s Time Usage of social Media Services

Is your time on social media website primarily spent	Frequency	Value
Reading content posted by others	1427	87.1
Posting personal information or comments	209	12.8
Reading local news	3	0.2
Total	1639	100

Table 4.11 shows participants’ reasons for using social media in relation to their gender and age groups identified in this research study. The reason (Connecting with family and friends) shows that female are keener on this reason for using social media with a value of (96%). In terms of age groups, the results show that the age groups of (25-34, 55 and older) are having

the highest value of 93% for this reason. The reason (Sharing images and Videos) shows that female are more interested in sharing this type of contents with a value of (63%) as a reason for using social media. In terms of age group, the highest value of (58%) is for the (18-24). This result can be justified as the age group of (18-24) are generally more active and having more activities that are captured through images and videos. The reason (Obtain information on news and current events) shows that male participants are more interested in using social media for information on news and current events with a value of (69%), while the female participants had the value of (45%).

Table 4.11: Participation’s Reasons of Using Social Media Services

Reasons for using social networking sites		Male	Female	18-24	25-34	35-44	45-54	55 and older
Frequency 100%		583	836	25	688	456	196	54
Reasons								
1	Connecting with family and friends	92%	96%	88%	93%	86%	88%	93%
2	Sharing images and Videos	58%	63%	58%	52%	40%	40%	34%
3	Obtain information on news and current events	69%	45%	43%	49%	42%	34%	27%
4	Organize parties or other shared activities	26%	21%	33%	35%	12%	9%	4%
5	Follow or find out about particular brands or businesses in general	26%	22%	27%	32%	19%	15%	4%
6	Find out about entertainment events	21%	23%	42%	12%	17%	3%	2%
7	Follow particular brands to access offers and promotions	16%	27%	32%	21%	17%	17%	17%
8	Research products or services you might want to buy	18%	26%	23%	21%	12%	12%	3%
9	Research holiday destinations or travel offers	24%	28%	31%	16%	14%	23%	27%
10	Play internet games	14%	21%	21%	18%	8%	7%	21%

11	Meeting people with the same interests	8%	4%	17%	12%	8%	6%	12%
12	Meet new friends	14%	6%	19%	11%	14%	12%	8%
13	Provide reviews and write blogs about products you have bought	5%	8%	6%	3%	5%	3%	2%
14	Follow celebrities	9%	14%	21%	8%	3%	7%	2%
15	Engage with a Government representative or department	8%	4%	4%	8%	6%	8%	9%
16	Find potential dates	3%	3%	5%	4%	7%	4%	2%
17	Pressure from family and friends to use them	6%	4%	2%	3%	3%	5%	6%

In terms of the age groups, the highest value of (49%) went for the age group (25-34). The reason (Organize parties or other shared activities) had the highest value of (26%) for males. In terms of the age groups, the highest value was (35%) for the age group of (25-34). The reason (Follow or find out about particular brands or businesses in general) had the highest value of (26%) for males. In terms of the age group the result shows that the age group of (25-35) is having the highest value of (32%). The reason (Find out about entertainment events) had the highest value of (23%) for females. In terms of the age group the highest value of (42%) was for the age group of (18-24). The reason (follow particular brands to access offers and promotions) had the highest value of (27%) for female participants. In terms of the age group, it had the highest value of (32%) for the group of (18-24). The reason (Research products or services you might want to buy) had the highest value of (26%) for females. The age group for the same reason had the highest value of (23%) for the group of (18-24). The reason (Research holiday destinations or travel offers) had the highest value of (28%) for female participants. In terms of the age group, the highest value was for the age group of (18-24). The reason (Play internet games) had the highest value of (21%) for females. In terms of the age group it had the highest value of (21%) for the age groups of (18-24, 55 and older). The reason (meeting people with the same interests) had the highest value of (8%) for the males. In terms of the age groups, the highest value of (17%) was for the age group of (18-24). The reason (meet new friends) had the highest value of (14%) for male. In terms of age groups, the highest value of (19%) is for the group (18-24). The reason (Provide reviews and

write blogs about products you have bought) had the highest value of (8%) for females. The age group of (18-24) had the highest value of (6%). The reason (Follow celebrities) had the highest value of (14%) for females. In term of the age group, the highest value of (21%) was for the group of (18-24). The reason (Engage with government representative or department) had the highest value of (8%) for male.

The age group of (45-54) had the highest value of (8%). The reason (Find potential dates) had an equal value of (3%) for males and females. In terms of age group, the highest value of (7%) was for group of (35-44). The reason (Pressure from family and friends to use them) had the highest value of (6%) for males. In terms of the age grope the highest value of (6%) was for the group of (55 and older). The previous table shows that the three highest reasons for using social media with gender and age group classification are the three first reasons of (Connecting with family and friends, Sharing images and videos, Obtain information on news and current events). All the three previous reasons are good reasons that acting as driving force for future use of any provided solution using social media in the events of emergencies such as flood emergencies in Bosnia and Herzegovina.

Table 4.12 shows participants preferences for information during crisis event. The highest value for this question was for the option of (Local news (radio and TV) Channels), with a value of (45.90%). On the other hand the result for local online news scored the second highest value of (28.30%) for participants in this research study. The results show that near half of the participants are favouring traditional media in cases of disasters. However, number studies are showing that there are differences between the preferences of traditional news and local online news that are varied according to the country and their perspective of the credibility of information for both mediums. On one hand, some researchers are having the traditional media as more secure and credible (Kim, 2006), while on the other hand the social media is faster, dynamic and allows participation and feedback (Johnson & Kaye, 2004). In terms of prefer ability it was found that it is associated with countries, as some favoured traditional, other countries favoured online news and other countries were found equal (Lu, & Andrews, 2006). Despite the current results, the online audiences are increasing as reported by (Hilligoss & Rieh, 2008). The third highest value of (14.2%) was for the online news sources such as (Yahoo, MSN, AOL...etc.). The results shows that little value of participants are related to international online news and this value can be justified based on the language barrier as many persons in Bosnia don't speak English proficiently (Bal, 2012). This barrier is

a direct result to their educational system that lets students chooses other languages such as (German, Turkish, English, and Arabic) (MONKS-SBK, 2014).

Table 4.12: Participation’s Preferences for the Information during Flood crisis Event

In the case of flood crisis event where would you go first for information about the situation in general?			
		Frequency	Percent
1	Local news (Radio and TV) channel	752	45.90%
2	Local online news	464	28.30%
3	Online news source (Yahoo, MSN, AOL, forums, etc.)	232	14.20%
4	Center for civil protection 121	46	2.80%
5	Governmental Social media web sites for rescue and protection	42	2.60%
6	Other	32	2.00%
7	Center – 112	28	1.70%
8	National news (Radio and TV) channel	24	1.50%
9	National online news	19	1.20%

The Center for civil protection 121, which is responsible for the entities level and cantonal level in Bosnia and Herzegovina, had a value of (2.8 %). The governmental social media web sites for rescue and protection had the value of (2.6%) from all participants. This low value is justified as most of the governmental sites are not up-to-date, they are not dynamic and mostly they are not functional during crisis event as it has been mentioned in the literature review chapter of this research study. The other option had the value of (2%) and the participants mentioned the following sites and services with respect to the order based on the frequency of appearance in their answers (Google (33%), All available sources (28%), Yahoo (16%), individuals (15%), Flix (5%), Facebook (2%), Twitter (1%)). The Center-112 which is found to provide services on the state level had the value of (1.7%). The difference between the two centres that are working on (entities and cantonal) level and the state level are in favourite of the (entities and cantonal) level as they are more in contact with the public based on the region they are located, thus public have more trust and concern with the information that are released by centre 121. In terms of national news (Radio and TV) channels, they had low value of (1.5%) and for the national online news the value of (1.2%). The justification for

such low value can be based on different factors such as the language barrier and believing that such media are not in direct contact with the event which makes the public trust shift to more local mediums.

Table 4.13 shows participants preferences for secondary source of information during flood crisis events. The highest value is for the local news (radio and TV) channels with a value of (24.4%). The previous option is still in both preferences is scoring the highest value. This reflects public attitude towards traditional media with the current barriers of language that are mainly found in international and online social media and website. The second highest value is for the local online news with a value of (21.5%). This score is also the second highest value for participants’ preferences of primary information source during flood crisis events. The third highest value is for the online news sources (yahoo, MSN, AOL, Forum, etc.) with a value of (20.1%). The same option scored the third highest value in the primary preferences shown in Table 4.12. However, it is clear that there is differences in value with more participants are favouring the online news sources as secondary option for seeking information during flood crisis events.

Table 4.13: Participation’s Second Preferences for Information during Flood Crisis Event

If you did not find the information you were seeking where would you go next?			
		Frequency	Percent
1	Local news (Radio and TV) channel	383	24.4%
2	Local online news	353	21.5%
3	Online news source (Yahoo, MSN, AOL, forums, etc.)	330	20.1%
4	Governmental Social media web sites for rescue and protection	136	8.3%
5	Center for civil protection 121	110	6.7%
6	National online news	105	6.4%
7	Center – 112	101	6.2%
8	National news (Radio and TV) channel	74	4.5%
9	Other	33	2.0%

The fourth highest value is for Governmental Social media web sites for rescue and protection with a value of (8.3%). This option was the fifth in participants’ preferences in Table 4.12. The result shows that this option has a higher rank if compared with centre for civil protection 121 in Table 4.12. This can be justified as in case of crisis event, public will search for information in Center 121, if they fail to have such information they will go and search for more specified

and dedicated governmental web sites and services. The fifth highest value is for centre for civil protection Center 121 with a value of (6.7%). This option was in the fourth rank and dropped to the fifth rank, however the value in this table is higher than the result obtained in Table 4.12. The sixth highest value of (6.4%) goes for National online news. This result is very interesting as in Table 4.12, it ranked the lowest value of all available options, and as secondary preferences it ranks the fifth highest value.

The seventh highest value is for Center-112 with a value of (6.2%), and the same rank is seen in Table 4.12, but with a lower value as primary source of information. The national news (Radio and TV) channels had the same rank as in Table 4.12, but with a higher value of (4.5%) as secondary source of information. The lowest value in this table is for the (other) option as it had the value of (2%). What it interesting in this result that this option had been ranked the sixth place in Table 4.12 and now it is having the last rank. This result shows that participants are having a pattern for searching information as if they are not able to find information during their regular preferences; they will conduct a more specialized search for information from more renowned and official web sites and services that are related to government or such agencies. The same discussion of such public pattern search for information has been revealed by a study by (Bonnan-White, Shulman, Bielecke, 2014). In terms of the results specified by (other) , the following sites and services with respect to the order base on the frequency of appearances in their answers (People near to the event (30%), Facebook (21%), All available resources (18%), Social network (15%), Google (15%).

Table 4.14 shows the credibility results for information sources. The highest value of (82.4%) is for the center-112 as the most credible source of information. Center-112 is responsible for the crisis event and emergencies on the state level of Bosnia and Herzegovina and thus there is a general believe that the information provided on state level are considered the most credible. The Second highest value of (81.8%) is for the Center-121 that is on entity and cantonal level in Bosnia and Herzegovina. Center 121 is also responsible for emergency events that are on entity and cantonal level, and participants are considering their information as credible during crises and emergency events. The third highest value of (75.4%) is for the local news (radio and TV) channels. The fourth highest value of (74.8%) was for the Governmental social media web sites for rescue and protection. The fifth highest value of (73.6%) was for local online news. The sixth highest value of (72.2%) is for the National news (Radio and TV) channels. The National Online News had the value of (70.2%) and the Online News sources such as (Yahoo, MSN, AOL, Forums...etc.) had the value of (68%).

Table 4.14: Participation's Credibility Results for Information Sources

Choose the circle which best represents your view on the credibility of each of the following in providing information about this situation		Mean	Std. Deviation	%
1	Center – 112	4.12	0.929	82.4%
2	Center for civil protection 121	4.09	0.921	81.8%
3	Local news (Radio and TV) channel	3.77	0.998	75.4%
4	Governmental Social media web sites for rescue and protection	3.74	1.066	74.8%
5	Local online news	3.68	0.97	73.6%
6	National news (Radio and TV) channel	3.61	0.941	72.2%
7	National online news	3.51	0.957	70.2%
8	Online news source (Yahoo, MSN, AOL, forums, etc.)	3.4	0.939	68%

From the previous two Tables 4.12 and 4.13 it shows that the primary and the secondary sources of information are not the once that are most credible according to the results found in Table 4.14. This can be justified based on the current practices of Center-112 and Center-121 as they are not fast in responding and updating their information during crisis event as it has been mentioned in the literature review chapter of this study. In a similar study that focused on credibility of various information by (Flanagin & Metzger, 2000), they reported that they found that respondents considered Internet information to be as credible as that obtained from television, radio, and magazines, but not as credible as newspaper information. Moreover, they reported that credibility between different types of information such as (news and entertainment) have been found different across media channels. In addition, the study revealed that the levels of experiences and the way that participants perceived the credibility of information are related to whether they verified information. It is believed that the same factors that have been found in the previous study can be generalized to the credibility of information and the used technologies in the case of Bosnia and Herzegovina.

Table 4.15 shows participants' responses on following center-112 as the previous table showed it is the most credible source of information during flood crisis events. The results showed that (75.8%) of participants are willing to sign up and be part of future solution for facing flood crisis in Bosnia and Herzegovina. Such results are considered motivating for this

research study, as this study is going to provide a solution for sharing information through a dedicated centralized system for facing flood crisis events in Bosnia and Herzegovina.

Table 4.15: Participation’s Response on Following Center – 112

Regardless of if you currently use social media websites, would you set up social media accounts to follow the Center 112 in the event of flood crisis to get information?	Response	Frequency	Percent
	Yes	1242	75.8%
	No	397	24.2%
	Total	1639	100%

Table 4.16 shows participants response on having social media accounts with respect to gender. This table shows that female participants are keener on using social media as the results shows and as it was shown in Table 4.1. However, the results shows that a slight difference are between male and female in not using social media, as the result of female participant is (7.3%) and for male are (6.1%). This difference is not large but still it is outlined by this research study result. Moreover, the result of participants that are using social media in this research study is (86.6%) from all working adults in Bosnia and Herzegovina. In terms of results within groups, the results are also in favour of female participants with a lower resistance of (13%) for female and (14%) for males. In a recent study by (Sensis, 2015) it showed that the use of internet and social media is also in a favour of female with a small difference in value compared with male achievements.

Table 4.16: Participation’s social Media Account Percent in Terms of Gender

Do you have an account on any social networking website (like Facebook, Twitter, MySpace, YouTube ... etc .)?		Yes	No	Total	
Gender	Female	Count	799	120	919
		% of Total	48.70%	7.30%	56.10%
		% of Group	87%	13%	100%
	Male	Count	620	100	720
		% of Total	37.80%	6.10%	43.90%

		% of Group	86%	14%	100%
Total		Count	1419	220	1639
		% of Total	86.60%	13.40%	100.00%

Table 4.17 shows the detailed value of age groups in terms of using social media. The previous values have been shown in Table 4.2. However, the current table shows that the highest value of not using social media is within the age group of (35-44). In addition it shows that the least resistance towards social media usage is within the age group of (18-24) and the second lowest value of (1.7%) is for the age group of (55 and older). The age groups between (25-54) are showing more resistance towards social media as such ages are considered to be more involved in task and work responsibilities'. In terms of results according to the age group, the highest resistance is coming from the (55 and older) with a value of (35%), then going into ascending order with respect to the presented age groups. Moreover, different results are shown by different countries based on different factors such as the GDP, lifestyle and education (Madden & Zickuhr, (2011).

Table 4.17: Participation's Social Media Account Percent in Terms of Age

Do you have an account on any social networking website (like Facebook, Twitter, MySpace, YouTube,...etc.)?		Yes	No	Total	
Which category below includes your age?	18-24	Count	38	1	39
		% of Total	2.30%	0.10%	2.40%
		% of Group	97.45%	2.5%	100%
	25-34	Count	662	53	715
		% of Total	40.40%	3.20%	43.60%
		% of Group	92.5%	7.5%	100%
	35-44	Count	519	80	599
		% of Total	31.70%	4.90%	36.50%
		% of Group	86.6%	13.4%	100%
	45-54	Count	148	58	206
		% of Total	9.00%	3.50%	12.60%

		% of Group	71.8%	28.2%	100%
	55 and older	Count	52	28	80
		% of Total	3.20%	1.70%	4.90%
		% of Group	65%	35%	100%
Total		Count	1419	220	1639
		% of Total	86.60%	13.40%	100.00%

Table 4.18 shows the results of social media adoption with respect to ethnicity in Bosnia and Herzegovina. The table shows additional information in terms of not using social media by participants as a value of total that is the highest among Bosniac ethnicity. However, the value according to groups reveals that the most resistance from participants in this research study is coming from Serbs with the highest value of (16.5%) followed by Croat with a value of (16%). The lowest resistance is coming from the option others with a value of (8.5%). The current results show that there are differences in terms of ethnicity use of social media among participants in Bosnia and Herzegovina. The differences can be justified based on the telecommunication services that are provided based on each ethnicity as they are located in ethnically distributed area (Tarik, Azra & Arnela, 2015). More information about the exact social media usage will be presented in the subsequent tables that are showing the results and differences using One Way ANOVA analysis test.

Table 4.18: Participation's Social Media Account Percent in Terms of Ethnicity

Do you have an account on any social networking website (like Facebook, Twitter, MySpace, YouTube,...etc.)?		Yes	No	Total	
What is your ethnicity	Bosniac	Count	772	107	879
		% of Total	47.10%	6.50%	53.60%
		% of Group	87.8%	12.2%	100%
	Croat	Count	167	32	199
		% of Total	10.20%	2.00%	12.10%
		% of	84%	16%	100%

	Group				
	Non biased	Count	94	15	109
		% of Total	5.70%	0.90%	6.70%
		% of Group	86.3%	13.7	100%
	Others	Count	97	9	106
		% of Total	5.90%	0.50%	6.50%
		% of Group	91.5%	8.5%	100%
	Serb	Count	289	57	346
		% of Total	17.60%	3.50%	21.10%
		% of Group	83.5%	16.5%	100%
Total	Count	1419	220	1639	
	% of Total	86.60%	13.40%	100.00%	

Table 4.19 shows the participation Social Media account value in terms of administrative territorial belongings. The table shows different value for participants that have been displayed previously with respect to value of total. On the other hand the current table shows the value according to groups, and based on the results that (Bosansko-podrinjski Canton, Livanjski Canton, Unsko-Sanski Canton) are having no resistance to social media usage. However, in order to have confidence that the previous group numbers are representative statistically, the results of participants larger than 50 will be discussed (Niles Robert, 2006). According to the mentioned criteria the following cantons and entities will be compared (Hercegovacko-Neretvanski Canton, Region Banja Luka, Region Bijeljina, Region Pale, Sarajevski Canton, Srednjobosanski Canton, Tuzlanski Canton, Unsko-sanski Canton, Zenicko-dobojski Canton). The lowest resistance are coming from (Srednjobosanski Canton) with a value of (7%), on the other hand the largest resistance is coming from (Region Pale) with a value of (20%). The results are showing that more resistance are coming from the

(Regions) with an average value of (14.8%) compared to (Cantons) average value of (10%) and as it has been described previously that regions are govern by Bosnian Serbs, while cantons are mainly populated with Bosniac.

To justify the previous value according to the regional territories is not an aim for this research study as it is beyond research objectives. Moreover, the literature and governmental studies are not providing any information through the literature in this regard. Therefore, this study will use the current found information to provide an evidence of the current use in Bosnia and Herzegovina and to enrich the current literature on the status of using social media in the provided regions.

Table 4.19: Participation's Social Media Account percent in Terms of Administrative Territorial Belongings

Do you have an account on any social networking website (like Facebook, Twitter, Myspace, YouTube...etc.)?		Yes	No	Total	
Administrative-territorial belonging:	Bosansko-podrinjski Canton	Count	17	0	17
		% of Total	1.00%	0.00%	1.00%
		% of Group	100%	0%	100%
	Hercegovacko-Neretvanski Canton	Count	84	11	95
		% of Total	5.10%	0.70%	5.80%
		% of Group	88%	12%	100%
	Livnjski Canton (Canton 10)	Count	9	0	9
		% of Total	0.50%	0.00%	0.50%
		% of Group	100%	0%	100%
	Posavski kanton	Count	8	1	9
		% of Total	0.50%	0.10%	0.50%
		% of Group	89%	11%	100%
	Regija Doboj	Count	15	6	21
		% of Total	0.90%	0.40%	1.30%
		% of Group	71.5%	28.5%	100%
	Regija Trebinje	Count	11	2	13
		% of Total	0.70%	0.10%	0.80%
		% of Group	84.6%	15.4%	100%

Region Banja Luka	Count	97	20	117
	% of Total	5.90%	1.20%	7.10%
	% of Group	83%	17%	100%
Region Bijeljina	Count	63	5	68
	% of Total	3.80%	0.30%	4.10%
	% of Group	92.6%	7.4%	100%
Region Pale	Count	90	23	113
	% of Total	5.50%	1.40%	6.90%
	% of Group	80%	20%	100%
Sarajevski Canton	Count	701	114	815
	% of Total	42.80%	7.00%	49.70%
	% of Group	86%	14%	100%
Srednjobosanski Canton	Count	66	5	71
	% of Total	4.00%	0.30%	4.30%
	% of Group	93%	7%	100%
Tuzlanski Canton	Count	89	12	101
	% of Total	5.40%	0.70%	6.20%
	% of Group	88%	12%	100%
Unsko-sanski Canton	Count	46	1	47
	% of Total	2.80%	0.10%	2.90%
	% of Group	98%	2%	100%
Zapadno-hercegovački Canton	Count	10	2	12
	% of Total	0.60%	0.10%	0.70%
	% of Group	83%	17%	100%
Zenicko-dobojski Canton	Count	113	18	131
	% of Total	6.90%	1.10%	8.00%
	% of Group	86%	14%	100%
Total	Count	1419	220	1639
	% of Total	86.60%	13.40%	100.00%

Table 4.20 shows the results of education groups with respect to using social media among participants. The current table provides information in terms of groups and the highest result

for resistance of towards using social media among groups came for participants that have their (Secondary Education) with a value of (19.3%). The second highest value of (15%) came for the PhD group. However, according to (Goyder, Warriner & Miller, 2002) the result shows that educated people are more likely to use social media if compared with less educated if we are taking into consideration the age groups, as the results shows also that older adults are less interested in using social media according to the findings presented by (Amanda, 2010).

Table 4.20: Participation's Social Media Account percent in Terms of Educational Level

Do you have an account on any social networking website (like Facebook, Twitter, Myspace, YouTube...etc.)?		Yes	No	Total	
Education	Higher education - 2 year	Count	63	7	70
		% of Total	3.80%	0.40%	4.30%
		% of Group	90%	10%	100%
	MA	Count	408	47	455
		% of Total	24.90%	2.90%	27.80%
		% of Group	89.6%	10.4%	100%
	PhD	Count	45	8	53
		% of Total	2.70%	0.50%	3.20%
		% of Group	85%	15%	100%
	Secondary education	Count	63	15	78
		% of Total	3.80%	0.90%	4.80%
		% of Group	80.7%	19.3%	100%
	University degree	Count	840	143	983
		% of Total	51.30%	8.70%	60.00%
		% of Group	85.4%	14.6%	100%
Total		Count	1419	220	1639
		% of Total	86.60%	13.40%	100.00%

Table 4.21 shows the results of independent t-test that is used as inferential statistical test to determine if there is a statistically significant difference between the mean of two unrelated groups that is the gender in this table. The null hypothesis for all the questions has been

defined as (there is no difference between the genders) in terms of their options towards social media usage. The results for most of the defined options came as true as assumed by the null hypothesis. However, the last option that is (Social media websites are growing in popularity) showed a difference in terms of gender of the participants. The result came from the calculated T-independent test significance, which shows that the significance of (0.047) is smaller, than (0.05). Based on this result, we conclude that there are differences in opinions between genders in this option only with respect to the results of T-Independent Test provided by this category.

Table 4.21: Independent Sample T-test Result for Participants Opinions on Social Media with Respect for Genders

Please indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc.	Gender	n	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Social media websites are fun to use	Male	720	3.81	0.934	0.720	1637	0.472
	Female	919	3.78	0.884			
Social media websites are waste of time	Male	720	3.09	0.995	-0.829	1637	0.407
	Female	919	3.13	0.988			
Social media websites are for someone like me	Male	720	2.98	1.047	-0.294	1637	0.769
	Female	919	3.00	1.017			
Social media websites are a passing fad	Male	720	2.70	1.064	1.161	1637	0.246
	Female	919	2.64	1.029			
Social media websites are growing in popularity	Male	720	4.17	0.829	-1.985	1637	0.047*
	Female	919	4.25	0.840			

Table 4.22 shows the result of independent t-test for gender groups and their differences of credibility for information sources. The null hypothesis for all the questions has been defined as (there is no difference between the credibility of information) in terms of their gender differences. The results show that most of the options have no differences in credibility of terms of gender except for the (Local online news). This option showed that there are differences in terms of gender as the result for the independent-t test significance was (0.000)

that is smaller than (0.05). Based on this result the conclusion come as there are differences in opinions between genders in terms of information credibility for local online news.

Table 4.22: Independent Sample T-test Result for Participants Opinions on Information Sources Credibility Options

Now please choose the circle which best represents your view on the credibility of each of the following in providing information about this situation	Gender	n	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Local news (Radio and TV) channel	Male	720	3.81	1.011	1.555	1637	0.120
	Female	919	3.74	0.987			
National news (Radio and TV) channel	Male	720	3.57	0.954	-1.363	1637	0.173
	Female	919	3.63	0.931			
Local online news	Male	720	3.78	0.950	3.931	1637	0.000*
	Female	919	3.59	0.978			
National online news	Male	720	3.49	1.006	-0.816	1637	0.415
	Female	919	3.53	0.916			
Online news source (Yahoo, MSN, AOL, forums, etc.)	Male	720	3.35	0.942	-1.959	1637	0.050
	Female	919	3.44	0.935			
Center for civil protection 121	Male	720	4.14	.879	1.952	1637	0.051
	Female	919	4.05	0.952			
Center – 112	Male	720	4.19	0.877	2.967	1637	0.003
	Female	919	4.06	0.963			
Governmental Social media web sites for rescue and protection	Male	720	3.78	1.066	1.378	1637	0.168
	Female	919	3.71	1.065			

Table 4.23 shows the results for educational level groups with respect for social media acceptance. For identifying the differences the One-Way-ANOVA statistical test was used. The One-Way-ANOVA is used to compare the means between the groups and to determine whether any of those means are significantly different from each other as it specifically tests the null hypothesis. The null hypothesis for this test was set as (there are no differences in educational level groups in terms of social media acceptance). All the results came against the

null hypothesis as the significance value was smaller than (0.05) except for the option of (Social media websites are growing in popularity) which had a significance result of (0.926). Thus it is concluded that the option of social media websites are growing in popularity is not agreed between different educational levels.

Table 4.23: One-Way-ANOVA Results for identifying the differences in education group with respect to Social Media Acceptance.

Please indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc	Education	N	Mean	Std. Deviation	F	Sig.
Social media websites are fun to use	Higher education	70	4.43	0.791	10.627	0.000*
	PhD	53	3.57	0.866		
	Secondary education	78	3.92	0.864		
	MA	455	3.74	0.887		
	University degree	983	3.77	0.911		
	Total	1639	3.79	0.906		
Social media websites are waste of time	Higher education	70	2.74	0.958	2.721	0.028*
	PhD	53	3.21	0.927		
	Secondary education	78	3.19	1.129		
	MA	455	3.11	0.980		
	University degree	983	3.12	0.987		
	Total	1639	3.11	0.991		
Social media websites are for someone like me	Higher education	70	3.27	0.679	3.121	0.014*

	PhD	53	2.85	0.907		
	Secondary education	78	3.18	1.125		
	MA	455	3.04	1.038		
	University degree	983	2.94	1.041		
	Total	1639	2.99	1.030		
Social media websites are a passing fad	Higher education	70	3.31	1.015	7.790	0.000*
	PhD	53	2.49	0.933		
	Secondary education	78	2.73	1.159		
	MA	455	2.60	1.029		
	University degree	983	2.65	1.036		
	Total	1639	2.66	1.045		
Social media websites are growing in popularity	Higher education	70	4.21	0.611	0.222	0.926
	PhD	53	4.25	0.806		
	Secondary education	78	4.14	1.003		
	MA	455	4.23	0.827		
	University degree	983	4.21	0.842		
	Total	1639	4.21	0.836		

Table 4.24 shows the differences in education group with respect to credibility of information sources using One-Way-ANOVA test. The null hypothesis for these options was set as (there is no differences in educational groups in terms of credibility of information sources). The One-Way-ANOVA result shows that the options (Local news (Radio and TV) channel; Local

online news; National online news; Center – 112; Governmental Social media web sites for rescue and protection) are not supporting the null hypothesis as the result of significance is smaller than (0.05). On the other hand, the options that supported the null hypothesis are (National news (Radio and TV) channel; Online news source (Yahoo, MSN, AOL, forums, etc.); Center for civil protection 121).

Table 4.24: One-Way-ANOVA Results for identifying the differences in education group with respect to Social Media Acceptance.

Choose the circle which best represents your view on the credibility of each of the following in providing information about this situation:	Education	N	Mean	Std. Deviation	F	Sig.
Local news (Radio and TV) channel	Higher education	70	4.29	1.051	7.180	0.000*
	PhD	53	3.51	1.154		
	Secondary education	78	3.71	1.021		
	MA	455	3.67	1.023		
	University degree	983	3.80	0.959		
	Total	1639	3.77	0.998		
National news (Radio and TV) channel	Higher education	70	3.76	0.875	1.131	0.340
	PhD	53	3.58	0.929		
	Secondary education	78	3.55	0.892		
	MA	455	3.55	0.960		
	University degree	983	3.63	0.941		
	Total	1639	3.61	0.941		

Local online news	Higher education	70	4.16	1.112	7.104	0.000**
	PhD	53	3.51	1.103		
	Secondary education	78	3.64	1.151		
	MA	455	3.55	0.996		
	University degree	983	3.71	0.910		
	Total	1639	3.68	0.970		
National online news	Higher education	70	4.11	1.136	9.188	0.000*
	PhD	53	3.55	0.932		
	Secondary education	78	3.60	0.843		
	MA	455	3.39	0.976		
	University degree	983	3.51	0.928		
	Total	1639	3.51	0.957		
Online news source (Yahoo, MSN, AOL, forums, etc.)	Higher education	70	3.31	0.790	0.838	0.501
	PhD	53	3.47	0.799		
	Secondary education	78	3.45	1.052		
	MA	455	3.35	0.928		
	University degree	983	3.43	0.951		
	Total	1639	3.40	0.939		
Center for civil protection 121	Higher education	70	3.99	0.712	2.053	0.085

	PhD	53	4.11	0.847		
	Secondary education	78	3.92	1.042		
	MA	455	4.03	0.929		
	University degree	983	4.14	0.923		
	Total	1639	4.09	0.921		
Center – 112	Higher education	70	4.34	0.866	4.812	0.001*
	PhD	53	4.23	0.869		
	Secondary education	78	3.77	1.068		
	MA	455	4.06	0.935		
	University degree	983	4.15	0.914		
	Total	1639	4.12	0.929		
Governmental Social media web sites for rescue and protection	Higher education	70	4.33	0.880	8.090	0.000*
	PhD	53	3.89	0.847		
	Secondary education	78	3.42	1.201		
	MA	455	3.66	1.061		
	University degree	983	3.76	1.064		
	Total	1639	3.74	1.066		

Table 4.25 shows the differences in age group with respect to acceptance of social media using One-Way-ANOVA test. The null hypothesis for these options was set as (there is no differences in age groups in terms of accepting social media services). The One-Way-ANOVA result shows that there are some differences for some of the presented options. For

example the options that are supporting the null hypothesis are (Social media websites are a passing fad; Social media websites are growing in popularity). The options that proved to go against the null hypothesis are based on the value of significance that is smaller than (0.05) are: (Social media websites are fun to use; Social media websites are waste of time; Social media websites are for someone like me). The use of One-Way-ANOVA has managed to identify the exact responses for each option which gives more insights on the participants view for using social media, which provides a better understanding for future consideration for the use of social media in any provided solution related to this research study.

Table 4.25: One-way-ANOVA Results for identifying the differences in age group with respect of Social Media acceptance

Indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc.	Age	N	Mean	Std. Deviation	F	Sig.
Social media websites are fun to use	18-24	39	4.18	0.790	9.462	0.000*
	25-34	715	3.91	0.869		
	35-44	599	3.72	0.898		
	45-54	206	3.58	0.973		
	55 and more	80	3.64	0.984		
	Total	1639	3.79	0.906		
Social media websites are waste of time	18-24	39	3.00	1.192	3.501	0.007*
	25-34	715	3.20	0.968		
	35-44	599	3.09	0.985		
	45-54	206	3.00	1.002		
	55 and more	80	2.86	1.040		
	Total	1639	3.11	0.991		
Social media websites are for someone like me	18-24	39	3.64	1.135	12.990	0.000*
	25-34	715	3.08	1.027		
	35-44	599	3.00	0.974		
	45-54	206	2.69	1.027		
	55 and more	80	2.59	1.122		

	Total	1639	2.99	1.030		
Social media websites are a passing fad	18-24	39	2.72	1.276	1.644	0.161
	25-34	715	2.70	1.050		
	35-44	599	2.68	1.008		
	45-54	206	2.52	1.049		
	55 and more	80	2.51	1.125		
	Total	1639	2.66	1.045		
Social media websites are growing in popularity	18-24	39	4.49	0.721	2.305	0.056
	25-34	715	4.25	0.821		
	35-44	599	4.18	0.850		
	45-54	206	4.19	0.825		
	55 and more	80	4.06	0.905		
	Total	1639	4.21	0.836		

Table 4.26 shows the differences in age group with respect to credibility of information sources using One-Way-ANOVA test. The null hypothesis for these options was set as (there is no differences in age groups in terms of credibility of information sources). The One-Way-ANOVA result shows that there are some differences for some of the presented options. For example the options that have been found supporting the null hypothesis are (Local news (Radio and TV) channel; National news (Radio and TV) channel; [Local online news]; National online news; Center – 112; Governmental Social media web sites for rescue and protection). On the other hand the options that did not support the hypothesis as their value of significance were less than (0.05) are (Online news source (Yahoo, MSN, AOL, forums, etc.); Center for civil protection 121). The justifications for the last two options are based on the English language proficiency towards online news sources that varies between participants and the trust for centre of civil protection 121. The English language proficiency is considered an obstacle in Bosnia and Herzegovina as it has been presented earlier in this chapter. Moreover, the different ethnicities and their resistance for the state level authorities is another obstacle that has been proven by the presented results, as the centre 121 is associated with state level while centre 112 is for entity and cantonal level.

Table 4.26: One-Way-ANOVA Results for identifying the differences in age group with respect to credibility of information sources

Which best represents your view on the credibility of each of the following in providing information about this situation	Age	N	Mean	Std. Deviation	F	Sig.
Local news (Radio and TV) channel	18-24	39	3.87	1.128	1.543	0.187
	25-34	715	3.72	1.002		
	35-44	599	3.77	1.011		
	45-54	206	3.88	0.971		
	55 and more	80	3.89	0.842		
	Total	1639	3.77	0.998		
National news (Radio and TV) channel	18-24	39	3.54	1.120	1.153	0.330
	25-34	715	3.57	0.949		
	35-44	599	3.60	0.934		
	45-54	206	3.68	0.955		
	55 and more	80	3.76	0.783		
	Total	1639	3.61	0.941		
[Local online news]	18-24	39	3.74	1.292	1.768	0.133
	25-34	715	3.64	0.968		
	35-44	599	3.66	0.937		
	45-54	206	3.83	0.954		
	55 and more	80	3.70	1.072		
	Total	1639	3.68	0.970		
National online news	18-24	39	3.51	1.048	1.194	0.312
	25-34	715	3.51	0.985		
	35-44	599	3.47	0.935		
	45-54	206	3.64	0.904		
	55 and more	80	3.53	0.941		

	more					
	Total	1639	3.51	0.957		
Online news source (Yahoo, MSN, AOL, forums, etc.)	18-24	39	3.56	1.095	2.645	0.032*
	25-34	715	3.33	0.955		
	35-44	599	3.43	0.891		
	45-54	206	3.55	0.897		
	55 and more	80	3.36	1.117		
	Total	1639	3.40	0.939		
Center for civil protection 121	18-24	39	3.92	0.870	2.669	0.031*
	25-34	715	4.05	.877		
	35-44	599	4.10	0.931		
	45-54	206	4.27	0.938		
	55 and more	80	4.04	1.152		
	Total	1639	4.09	0.921		
Center – 112	18-24	39	3.92	0.870	1.607	0.170
	25-34	715	4.10	0.909		
	35-44	599	4.13	0.912		
	45-54	206	4.23	0.975		
	55 and more	80	4.00	1.102		
	Total	1639	4.12	0.929		
Governmental Social media web sites for rescue and protection	18-24	39	3.90	0.968	1.569	0.180
	25-34	715	3.71	1.058		
	35-44	599	3.71	1.083		
	45-54	206	3.89	1.060		
	55 and more	80	3.83	1.053		
	Total	1639	3.74	1.066		

Table 4.27 shows the differences in ethnical groups with respect to acceptance of social media using One-Way-ANOVA test. The null hypothesis for these options was set as (there is no differences in between ethnical groups in terms of acceptance of social media). Most of the previous options supported the null hypotheses as the result of significance was larger than (0.05) except for the option (Social media websites are waste of time) that obtained a smaller value of (0.011) that is smaller than (0.05). This result shows that not all ethnical groups are having the same view on social media as being waste of time although high value of participants looked at social media as a source of wasting time as it was shown in Table 4.6 of this chapter.

Table 4.27: One-Way-ANOVA Results for identifying the differences in Ethnical groups with respect to acceptance of social media

Indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc.	Ethnicity	N	Mean	Std. Deviation	F	Sig.
[Social media websites are fun to use	Bosniac	879	3.80	0.912	0.965	0.426
	Serb	346	3.79	0.865		
	Croat	199	3.81	0.918		
	Non biased	109	3.63	0.920		
	Others	106	3.85	0.954		
	Total	1639	3.79	0.906		
Social media websites are waste of time	Bosniac	879	3.15	0.986	3.299	0.011*
	Serb	346	3.00	0.959		
	Croat	199	2.98	1.002		
	Non biased	109	3.27	0.939		
	Others	106	3.22	1.121		
	Total	1639	3.11	0.991		
Social media websites are for someone like me	Bosniac	879	2.98	1.022	1.376	0.240
	Serb	346	2.97	0.998		
	Croat	199	3.06	1.108		
	Non	109	2.86	1.014		

	biased					
	Others	106	3.15	1.058		
	Total	1639	2.99	1.030		
Social media websites are a passing fad	Bosniac	879	2.68	1.057	0.241	0.915
	Serb	346	2.65	1.020		
	Croat	199	2.63	1.025		
	Non biased	109	2.64	1.014		
	Others	106	2.60	1.110		
	Total	1639	2.66	1.045		
Social media websites are growing in popularity	Bosniac	879	4.22	0.823	0.571	0.684
	Serb	346	4.21	0.839		
	Croat	199	4.16	0.884		
	Non biased	109	4.20	0.836		
	Others	106	4.31	0.844		
	Total	1639	4.21	0.836		

Table 4.28 shows the differences in ethnical groups with respect to credibility of information sources using One-Way-ANOVA test. The null hypothesis for these options was set as (there is no differences in between ethnical groups in terms of information sources credibility). The options that supported the null hypothesis as they had their significance value larger than (0.05) are (Online news source (Yahoo, MSN, AOL, forums, etc.); Center for civil protection 121; Center – 112; Governmental Social media web sites for rescue and protection). On the other hand the options that were found not supporting the hypothesis as their significance value were less than (0.05) are (Local news (Radio and TV) channel; National news (Radio and TV) channel; Local online news; National online news). The results of the last options are showing that there are differences in terms of credibility of information as some information sources are being addressed on state level that are not considered very credible for entity level, or in some cases the national online news are not being looked at as credible as they have their source of information from Bosnian state level agencies. It is common to see that the media and social media channels are being adopted and presented on ethnical bases in

Bosnia and Herzegovina, and those sources of media and information are not trusted by other ethnic groups in the same country.

Table 4.28: One-Way-ANOVA Results for identifying the differences in Ethnic groups with respect to credibility of information sources.

Please choose the circle which best represents your view on the credibility of each of the following in providing information about this situation:	Ethnicity	N	Mean	Std. Deviation	F	Sig
Local news (Radio and TV) channel	Bosniac	879	3.85	0.983	4.083	0.003*
	Serb	346	3.77	0.956		
	Croat	199	3.63	1.035		
	Non biased	109	3.53	1.024		
	Others	106	3.66	1.094		
	Total	1639	3.77	0.998		
National news (Radio and TV) channel	Bosniac	879	3.70	0.899	8.470	0.000*
	Serb	346	3.37	0.987		
	Croat	199	3.69	0.939		
	Non biased	109	3.50	0.968		
	Others	106	3.58	0.975		
	Total	1639	3.61	0.941		
Local online news	Bosniac	879	3.74	0.934	10.256	0.000*
	Serb	346	3.76	0.869		
	Croat	199	3.59	1.025		
	Non biased	109	3.17	1.151		
	Others	106	3.55	1.097		
	Total	1639	3.68	0.970		
National online news	Bosniac	879	3.59	0.938	7.222	0.000*

	Serb	346	3.27	0.991		
	Croat	199	3.58	0.911		
	Non biased	109	3.48	0.958		
	Others	106	3.52	0.968		
	Total	1639	3.51	0.957		
Online news source (Yahoo, MSN, AOL, forums, etc.)	Bosniac	879	3.41	0.941	0.405	0.805
	Serb	346	3.37	0.931		
	Croat	199	3.46	0.957		
	Non biased	109	3.39	0.980		
	Others	106	3.34	0.882		
	Total	1639	3.40	0.939		
Center for civil protection 121	Bosniac	879	4.13	0.863	0.981	0.417
	Serb	346	4.02	0.982		
	Croat	199	4.09	0.994		
	Non biased	109	4.10	0.912		
	Others	106	4.03	1.046		
	Total	1639	4.09	0.921		
Center – 112	Bosniac	879	4.17	0.896	1.630	0.164
	Serb	346	4.04	0.947		
	Croat	199	4.09	0.975		
	Non biased	109	4.12	0.910		
	Others	106	4.01	1.046		
	Total	1639	4.12	0.929		
Governmental Social media web sites for rescue and protection]	Bosniac	879	3.79	1.051	1.373	0.241
	Serb	346	3.72	1.071		
	Croat	199	3.71	1.107		
	Non biased	109	3.57	1.117		

	Others	106	3.67	1.030		
	Total	1639	3.74	1.066		

Table 4.29 shows the results for identifying participants' believability in providing information about the situation with respect to information sources. The results were grouped for each information source into a group of five in order to outline their current view on the provided sources of information. The results shows that the highest value of participants ranks are within the mean rank of (5 and 6) for the sources of (Local news (Radio and TV) channel; National news (Radio and TV) channel; National online news; Online news source (Yahoo, MSN, AOL, forums, etc.)). Two sources of information achieved highest value in the rank of (7 and 8) that are (Local online news; Governmental Social media web sites for rescue and protection). Moreover, two groups achieved the highest value for the rank of (9 and 10) that are for the sources of (Center for civil protection 121; Center – 112). The previous information shows that users are having highest trust for information distributed by centre for civil protection 121 and centre 112 as they are the specialized centres in cases of risks and emergencies.

Table 4.29: Results for identifying participant's believability in providing information about the situation with respect to information sources

Rank the following in order of believability in providing information about the situation (please select one response per line)	Rank										
	1	2	3	4	5	6	7	8	9	10	
[Local news (Radio and TV) channel	Frequency	44	67	99	128	283	198	253	225	151	191
	Percent	2.7	4.1	6	7.8	17.3	12.1	15.4	13.7	9.2	11.7
Five Groups		6.8		13.8		29.4		29.1		20.9	
National news (Radio and TV) channel	Frequency	41	70	124	153	316	216	273	224	158	64
	Percent	2.5	4.3	7.6	9.3	19.3	13.2	16.7	13.7	9.6	3.9
Five Groups		6.8		16.9		32.5		30.4		13.5	

Local online news	Frequency	39	69	112	140	280	210	255	244	195	95
	Percent	2.4	4.2	6.8	8.5	17.1	12.8	15.6	14.9	11.9	5.8
Five Groups		6.6		15.3		29.9		30.5		17.7	
National online news	Frequency	40	69	139	151	339	229	256	239	133	44
	Percent	2.4	4.2	8.5	9.2	20.7	14	15.6	14.6	8.1	2.7
Five Groups		6.6		17.7		34.7		30.2		10.8	
Online news source (Yahoo, MSN, AOL, forums, etc.)	Frequency	47	101	136	156	337	217	282	199	123	41
	Percent	2.9	6.2	8.3	9.5	20.6	13.2	17.2	12.1	7.5	2.5
Five Groups		9.1		17.8		33.8		29.3		10	
Center for civil protection 121	Frequency	46	55	82	73	215	165	183	275	307	238
	Percent	2.8	3.4	5	4.5	13.1	10.1	11.2	16.8	18.7	14.5
Five Groups		6.2		9.5		23.2		27		33.2	
Center – 112	Frequency	47	57	87	72	211	141	184	248	308	284
	Percent	2.9	3.5	5.3	4.4	12.9	8.6	11.2	15.1	18.8	17.3
Five Groups		8.4		9.7		20.5		26.3		36.1	
Governmental Social media web sites for rescue and protection	Frequency	76	71	98	102	252	164	201	263	247	165
	Percent	4.6	4.3	6	6.2	15.4	10	12.3	16	15.1	10.1
Five Groups		8.9		12.2		25.4		28.3		25.2	

4.4. Summary

This chapter presented the status of social media usage by the public in Bosnia and Herzegovina. Different factors have been taken as each provided important information to be used in the design phase of this research. The information presented in this chapter will be

used to update the current literature on Bosnia and Herzegovina with respect to the social media used.

This chapter found that social media popularity is growing in the region, and that more users are attached to the tools and services being provided. It was also found that the use of social media is not popular as in the developed countries but it is being positively growing as many different age groups are participating in being part of this social technology. Moreover, the results showed that the educated people have shown more interest in using this technology if compared to the less educated.

The presented results showed that most of the users are mainly attached to local groups due to the language challenges that are the main obstacle in using such technologies in the region. Moreover, it was found that the driving force for using social media is for connecting with family and friends and for sharing images and videos. In terms of seeking information in crisis event, the local news (Radio and TV) channels and local online news have obtained the highest rank as no current developed solution is presented using social media. The opportunities for developing social media solution has been defined to be through the use of centre 112 and centre 121 as they are considered the most credible sources of information during crisis event and emergencies in the region. Moreover, the social media usage has been defined for entities and all the cantons to be above (83%). In addition to what has been presented, the analysis results showed that there is a main concern between the different ethical groups as they act differently to information sources as being from state level, entity and cantonal level. The results in this chapter regarding the ethnical segregation act currently available in Bosnia and Herzegovina are showing that there is a need for special design consideration that will endorse the current attitudes in a way that will not interfere with the spread of information during crisis event.

The information that have been found from Chapters 3 and 4 are believed to be sufficient as input for presenting a prototype solution for sharing information during crisis event in a manner that utilizes the current preferences for technological solutions and systems with respect to the current view of information sources readabilities and act. Chapter five will present the criteria for design from Chapters 3 and 4, along with justification for system design.

CHAPTER 5: Designing the Framework for Unified Crisis and Social Media Information System

5.1. Introduction

The previous chapters four provided important information for defining the current status of social media usage in local governments sectors and the status and preferences for public usage of social media during crisis events in Bosnia and Herzegovina. The new findings from the previous research objectives have shown that lack of concrete and direct usage of social media tools and systems by governmental agencies revealed the obstacles and opportunities for engaging those tools for better information sharing and distribution during crisis events for the public safety. This research has managed to use the outputs from the previous chapters as inputs for the system design that has been used as technological platform and framework towards assisting entities, cantons and public in better utilization and adoption for social media services during crisis events.

It is important to outline that different factor and requirements from the previous chapter are beyond the technical and design scope of this research. Those factors are defined as the ones related to technical instrument, policies and procedures currently practised by different entities and cantons related to social media adoption. Hence, this research will provide recommendations' that can be adopted towards better utilization of social media in the conclusion and recommendation chapter of this study. The main interest in this chapter is to provide a solution that satisfies the requirements of the main stake holders in crisis events (governmental, public) and to minimize the resistance towards this technological platform. The main aim of the system is to put emphasis on building a collaborative environment for better utilization of the information and resources among governmental and public sector in order to overcome the predicament of the current practises and threats during crisis event.

5.2. Methodological Approach for Designing the Systems Framework

Architecture

The methodological approaches for the system framework development during the system design phase were based on the Waterfall System Development Life Cycle (WSDLC) model (Avison & Fitzgerald, 2003). This model was chosen for its simplicity and clarity of methods, as it is widely used in commercial software development, where the requirements are well

known and defined. The framework model is structured using five different phases that are used in this research study. The phases are shown in the following diagram (Figure 5.1).

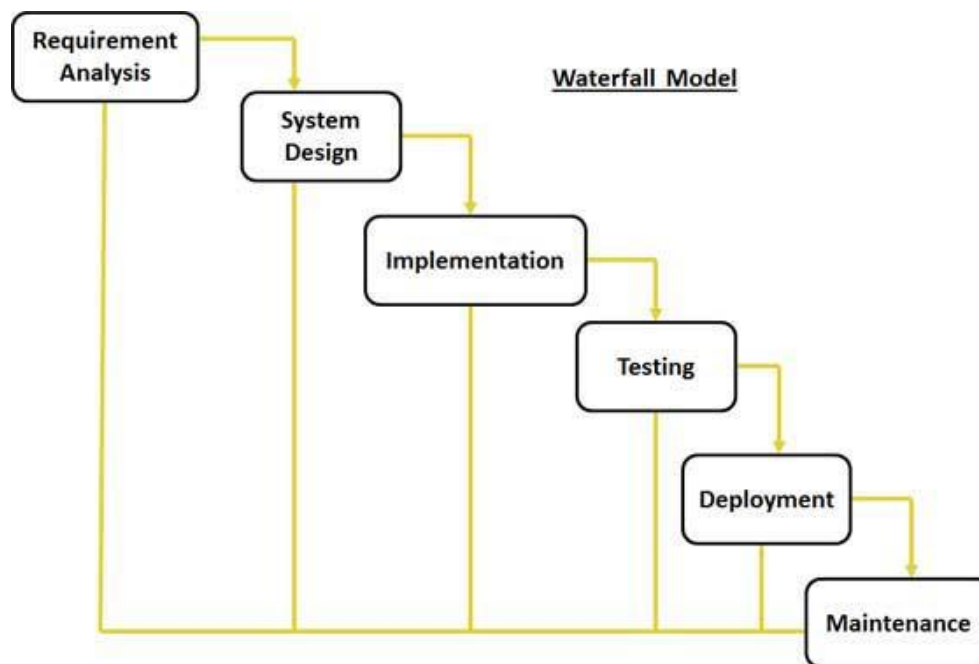


Figure 5.1: Phases of the research design

The previous phases as illustrated in Figure 5.1 will be used to build, construct and customize the system framework using (Joomla) content management software as environment for providing the needed services. The selection of (Joomla) as environment was based on different factors that are:

- It is (Open Source) content management system, that is freely available and does not need financial consideration
- It provides different set of plug-ins that enable the connect with social media systems
- It provides high scalability to design requirements and structure
- It provides accessibility feature for different users requirements
- It provides the ability to connect to mobile through adjustable themes
- It supports multilingual features
- It provides the ability to modify the functionality through building new components

The next sections will discuss the previously presented system development life cycle phases with respect to the research study. Each phase will discuss the methods used with respect to each presented section.

5.3. Defining Requirements and Criteria

This section is going to provide the used criteria in constructing the design phase. The outcomes from Chapters 3 and 4 have been analysed and the technical requirements have been extracted and justified with respect to the information presented in these chapters. The information related with requirements is divided into 4 different categories and they will be presented with respect to the defined structures.

5.3.1. General System Framework Requirements Category

This category will present the criteria and justifications related to general system framework that have been defined by the studies in the previous two chapters and they have been classified as general requirements services.

- ***Criterion 1: The system framework should be accessible anytime anywhere using the internet.***

Most governmental agencies in BiH are connected to the internet and they have access to different services and tools that are available online based on the findings defined in Table 3.1. In terms of the public, the report published by (Bosnia and Herzegovina Internet Usage and Telecommunications Report, 2013) shows that (67.9%) of the population are having access to internet services. The current findings show that both the governmental agencies and public are ready to utilize the services provided by internet against flood crisis using social media services and tools. Moreover, the system should enhance the public relations and risk communication that can be provided using the internet as defined in Table 3.2.

- ***Criterion 2: The system framework should provide the ability for mobile phone to access and use the system***

It is considered an important consideration as the majority of mobile users are directly connected to the internet through the services provided by BiH telecom. Moreover, during crisis events it is expected that all users to have their mobile phones. In terms of the governmental agency representative, this is considered an important issue, as they need to be fully aware and connected online with the systems and participants in emergency and crisis events as defined in Table 3.5.

- ***Criterion 3: The system framework should focus on providing the services for flood crisis***

The current research focus is on the flood crisis in BiH, and the highest demand came as for having a service that can be used during all crisis events. However, this research aim and objectives were oriented towards flood crisis event and it was also defined in this research study as the first option for crisis event as outlined in Table 3.19.

- ***Criterion 4: The system should be able of providing content management***

The system should provide content management services in order to enable better flow of information, enhance coordination with other entities and provide transparency as defined in Table 3.23. Moreover, managing content will provide resources for all governmental entities which will address the challenge of lack of resources defined in Table 3.25. It will address the challenges related to Technical risks as defined in Table 3.29. The services that must be provided by the system are related to (Add, Edit, Delete) the content, Archiving services as defined as a major obstacle in Table 3.26, provide search capability and featuring articles and contents based on their importance.

- ***Criterion 5: The system framework should promote the use of different social media systems***

The previous results presented in Table 3.1 showed that majority of governmental agencies are using or in the consideration phase for using social media services with a high of (92%) and a value of (42%) are currently defined as active users of social media. Most of the governmental agencies with a (82%) believe that the use of social media services for communication allows their organization to have better management of its reputation with public. In addition, an (85%) of governmental agencies believe that social media will provide better risk communication as they post information on (Daily/ Monthly) bases according to Table 3.5. The uses of different social media tools have been defined by the information posted in the list of social media systems published in Table 3.13. In terms of the public use of social media, the results in Table 4.6 showed that the majority of users are having positive attitude towards using social media systems, and a (86.6%) are currently using this technologies as shown in Table 4.7.

- ***Criterion 6: The system framework should provide different access levels and privileges for its users***

The system framework includes different governmental entities and public participations, thus it is important to support users with different accessibility options in order to provide them with better management and use of content with respect for each person's role in the framework. The defined roles for the system framework are based on the requirements and criteria defined in this research study, and they are grouped into two categories that are:

1. Front-End Groups

- a. **Registered Users:** This group enables users to login to the Frontend interface of the system. Users in this category cannot contribute with content; however, they can access to other areas, like a forum or download sections defined by the system. This access level will be dedicated for the public users that do not want to have much interaction with the system framework and functionalities.
- b. **Author Users:** This group enables users to add content to the system without publishing it directly. The contents add by this category users are entitled for review by other group users in order to review and decide if the content illegible for publishing or not. This access level will be dedicated for the public users.
- c. **Editor Users:** This group enables users to add and edit any content from the Frontend not just their own. These group of users have the permission to edit contents that have not been published, but they cannot publish or change the publishing status of any articles, even their own. This option will be dedicated for the governmental entities users.
- d. **Publisher Users:** This group enables user to add, post, edit and publish any content from the Front-end having the content as their own or related to the previous users. Publishers can review all articles, edit and change publishing options they can also regulate when an article is ready for publication, making it visible to Registered, Author and the Unregistered Public. This option will be dedicated for the governmental entities users defined by the entities and cantons in BiH.

2. Administration Groups

- a. **Manager:** This group enables users to access content and other system information from the Backend side of the system. Managers are allowed to access

the administrator interface with having limited rights and access that are generally limited to content management. Managers are allowed to create and edit any content, and to have access to limited Backend features like adding, deleting and editing Sections and Categories, editing the Front Page and Menu. Managers do not have any privileges to access the “Mechanics” of Joomla, such as accessing user management or to install components and modules. Moreover, if Managers logs to the Frontend interface, they are treated like Publishers, with the same rights and access. This option will be dedicated for the governmental entities users defined by the entities and cantons in BiH. .

- b. **Administrator:** This group enables users to access to largely administration functions. Administrator users have all the privileges of managers with additional privileges related to setting options on, and install/delete components, modules and plug-in. Moreover, they can access and view the site statistics. However, they are not allowed to edit or install Site Templates or to edit Global site configurations. Moreover, if they access Frontend, they are treated as Publishers. Administrators have the privileges of accessing the User Manager list, they can add any users to the system except for super administrators. This option will be dedicated for the governmental entities users defined by the entities and cantons in BiH.
- c. **Super Administrator-** This group enables users to access to all administration functions and they can create or edit another Super Administrator account. If super administrators log into the frontend interface they will be treated as publishers. This option will be dedicated for the state level users and the researcher himself, in order to be able to supervise, monitor and assist other users in their tasks and functionalities.

- ***Criterion 7: The system framework should promote sharing information needed between governmental entities and the public***

The system framework should consider sharing information between different entities in the Bosnian Government using different access levels, also sharing the needed information with the public with respect for their roles in the system framework. Including such features will ensure having better trust between organizations as it will minimize the cooperation challenges defined in Table 3.44, minimize challenged defined as Organizational/Operational Cooperation Table 3.45, minimize situational challenges defined in Table 3.46.

- ***Criterion 8: The System framework should consider evaluating resources added by the public***

Enabling the public to interact with the systems functionalities and users managing the system will ensure better engagement and use of the system during crisis event. However, with such interaction level the systems framework should be able to address different threats that might occur to the system during crisis event, and the system should address those threats defined in Table 3.36.

- ***Criterion 9: The System framework should provide customizability for its users***

The most important customizability options that need to be provided are the language and templates. The language issues should be supported as different entities in BiH use Cyrillic alphabet that is not similar to Latin alphabet. Also, each entity shall be supported with different template that reflects its current political and demographical standings in order to encourage the use of the system and minimize any ethnicity related obstacles that are currently challenging the cooperation as defined in Table 3.44 and Table 3.46.

- ***Criterion 10 :The system framework should promote for different authorities to participate in the unified system***

The system framework should enable different authorities to participate in the system as many authorities are encouraged by other authorities use. Moreover, the use of unified system can insure that different data and information can be usable for different authorities in cases of crisis event as such information can be shared or archived for later studies and investigations as defined in Table 3.6. In addition to what has been mentioned, the system needs to enable the coordination activities between different entities as defined in Table 3.28, as the majority of participants showed positive attitude for coordinating with other entities (Table 3.32).

- ***Criterion 11: The System framework should consider the Emergency Management Cycle***

The most provided information by organizations during crisis event was during (Post-Crisis), according to Table 3.19, and the services provided was related to informing the public about the crisis as shown in Table 3.20. The system should consider and include information about the other phases of crisis, as they are considered very critical in relation to the crisis event and operations. The system should provide

information for the public in the during-crisis and pre-crisis event as they can be very effective in minimizing and preventing the high impact of risk event and incidents.

- ***Criterion 12: The system framework should provide training for its staff on the uses of the system***

The system framework should be able of providing training for staff on their roles and responsibilities for social media system in order for them to overcome technical challenges as defined in Table 3.2. Moreover, the training should focus on providing good public relation and communication during crisis event as defined in Table 3.7.

- ***Criterion 13: The systems framework should provide policy of use for its users***

The system framework should reflect having a good policy and provide a policy template that can be used by participating organizations to insure the healthy and safe usage of social media. This research study found that most of the participants are not having such policy that is considered an important issue to be considered as shown in Table 3.5.

- ***Criterion 14: The system framework should measure the effectiveness of it functionalities in formal way***

It is important to consider evaluating the effectiveness of services and tools in order to enhance the usage of the system services and functionality as defined in Table 3.14, as the current ways used by the governmental agencies and presented in this study are not effective ways to measure the effectiveness of those tools as presented in Table 3.15. Moreover, assessing the effectiveness of use and interaction can provide better solutions and enhance the presented tools, services and structure used.

5.3.2. Administrative State Level Requirements Category

This category will present the criteria and justifications for the Administrative state level functionalities and services that are related to the unified system framework as defined by the previous studies in Chapters 3 and 4.

- ***Criterion 1: The system framework should provide state level users with higher privileges***

The state level personnel's are considered the highest administrative authority in the Bosnian governmental structure. They need to have higher privileges in order to be able to support governmental representative from entities and cantons in the

government. Moreover, the results related to credibility of information sources in Table 4.14, shows that majority of public considers the state level information to be of a high credibility. It is believed that having such organized governmental structure will enhance the cooperation between entities and cantons and will help to address the obstacles defined in Table 3.42. They will have privileges related to:

- i. ***Managing contents on state level:*** They will be able to add, edit, delete an archive any news or publish articles that are considered on state level.
 - ii. ***Managing Entity and Cantons level users:*** They will have the privileges to create users account with higher access levels that are suitable for entity and cantonal activities.
 - iii. ***Manage site services and functionalities:*** They will have the privileges to install, modify and configure global site configuration options that are related to their state level services and functionalities.
- ***Criterion 2: The system framework should provide State level users with the capability to share and provide general information related to crisis event and rescue procedures***

The general information related to crisis event in terms of preparation, confrontation and the aftermath should be provided by the state level in order to unify the procedures and activities. The state level is considered higher governmental authority if compared with entities and cantons, and thus the general information should be their responsibility in order to minimize the conflicts, absence of procedures and repetition among entities and cantons. This procedure will help in addressing the challenges defined in Table 3.42 that are related to coordinating the efforts.

5.3.3. Entity & Canton Requirements Category

This category will present the criteria and justifications for the entity and cantonal functionalities and services, which are related to the unified system framework. The requirements are based on the previous studies in Chapter 3 and 4.

- ***Criterion 1: The system framework should provide Entity and Canton users with higher privileges to add specific users***

Each entity or canton has to provide representatives for the system framework in different areas that are not limited to managing users, content and contacts between other governmental administrations and the public. Adding the qualified person will be canton's responsibility as they are the most capable to define their own

representative in order to ensure better workflow and conformity with laws and regulations of that entity. This system requirement is clear in the findings related to Table 3.45, as different methods of addressing those challenges by giving entities and cantons higher privileges will help minimize or remove those obstacles and challenges.

- ***Criterion 2: The system framework should provide content management functionalities for entity and canton users.***

The system should provide content management for entity and canton users, as they are responsible for providing; editing and updating the information for the region they are representing. Moreover, each entity and canton is the one most capable to provide information about the crisis event in their region, as they are in direct contact and effect with the event. Providing them with this feature will help in addressing different issues such as:

- i. Security and information management obstacles defined in Table 3.29
- ii. Feedback and Expectations defined in Table 3.30
- iii. Data and Communication defined in Table 3.31

- ***Criterion 3: The system framework should provide entities and cantons with capabilities to inform the public***

Informing the public on the status and activities related to crisis event with respect to the crisis management cycle will ensure minimizing the effect and the losses related to such event. Moreover, the results found in this research study shows that there is a need for connecting with the public through informing the public and coordinating with other governmental entities as shown in Table 3.32. In addition to what has been mentioned the results in Table 3.33 it shows that the system should consider informing the public on the crisis status and rescue activities.

- ***Criterion 4: The system framework should provide cantons and entities with capabilities to share contents and contact other entities***

Sharing contents by entities and cantons is to consider important feature to include, as such feature will enable them of specifying the share scope which will ensure better management and access level of resources that will provide better cooperation and security and this has been defined as a current challenge in Table 3.42. Moreover, enabling this scope of cooperation will ensure to minimize the obstacle of making

decisions based upon unverified information in such shared environment as addressed in Table 3.36. The sharing of content can be specified on the level of user rights and the contact can be performed by enabling forums and emails.

5.3.4. Public Requirements Category

- ***Criterion 1: The system framework should provide the public with information related to Crisis events***

The system should provide different type of content for the public, as there are different needs and demands for different kind of information and services for the public as it has been shown in Table 4.11. One of the demands is to put tutorials and instructions for users on the phases of crisis events in order to help the users be proactive during the crisis event phases, which will minimize the impact of the crisis on the public and belongings. Moreover, having tutorials and procedures can ensure having better rescue activities and better support from the government as such procedures will minimize the burden of rescue and guidance on the governmental entities, which will reflect positively on the public safety and rescue efforts. In addition, the public should be provided with information for the crisis status and rescue activities, in order to act accordingly. The information should be provided and updated regularly.

- ***Criterion 2: The system framework should provide the public with the ability to register to the system for crisis event***

The system should provide the ability for the public to register to the site if they choose to be active members and be part of the solution provided during crisis event. Such option will increase the trust with the governmental agencies participating in this solution and will share the effort of the rescue activities with the public in order to have relationship that is more dynamic. The registered users will be able of choosing the entity and canton they belong to in order to be more active in their region as defined in Table 4.27. Moreover, they will be able of posting and informing the agencies and cantonal members for any emergency or crisis potential. In terms of the governmental agencies, having registered public users will enhance the cooperation between the public and the governmental agencies through the collaborative efforts, and will minimize the effort of rescue and provide better options for services during crisis event.

- ***Criterion 3: The system framework should provide the public with the ability to connect to dedicated social media groups for crisis event***

The system should enable the public users to connect with social media in order to have additional benefits and functionalities to the system, as the majority of users are connected to social media as shown in Table 4.7. Moreover, allowing users to connect to social media will enhance the reporting activities of the used system for crisis event, as most of the used social media systems will inform the list of friends on the news and activities posted by the site.

- ***Criterion 4: The system framework should provide the public with the ability to define their status during the event***

The system framework needs to have a feature that enables the public users of reporting their status during or after the crisis in order for their family to check on their status. This feature is needed as the most people will need to have more information on the status of their relative through the governmental agencies and hotlines that are provided, which will result in adding more burden on the reporting activities and will make the line busy for other users. Enabling this feature will make a better opportunity for the public users to get information that are trusted and accurate about their families. Moreover, the driving force for using social media is for connecting with family and friends, which is a main concern during crisis event as shown in Table 4.11.

- ***Criterion 4: The system framework should provide the public with the ability to evaluate the services***

The system should enable the public users to evaluate its services and operations in order to provide feedbacks that can be used for enhancing the system and provide better services in the future. Such consideration can ensure better performance that will result in minimizing and mitigating the effect of the crisis event and have a better future preparation. Moreover, this will enable a better cooperation between the governmental agencies and the public as it has been shown in Table 4.11.

5.4. System Design

In an attempt to address the inadequacy of the current practices towards flood crisis in BiH, the system structure was designed to add collaborative efforts and flexibility to governmental

agencies in their efforts to address the current challenges and to bridge the gap of lack of information and feedbacks with the public during flood crisis events. The system’s operational methodology was built based on a selected content management system (Joomla) and merging social media services that provide flexibility, and widely used for their effective services based on the survey result presented for the public preferences of social media tools in Chapter four of this research study. The design of the system used two different approaches for presenting the system design; the structural and the object-oriented approach. The reasons for choosing two different methods are for selecting useful aspects provided by each method in the system design representation. The structural approach is suitable for presenting the conceptual structural design, and for representing the data flow diagram in the system, while the object-oriented approach is suitable for presenting the aspect of behavioural interaction with the system and showing the sequence of execution with each interaction (Mohammad Rob, 2004). The system was designed taking into consideration the user roles that each has to perform within the system. The system has defined seven types of users as specified earlier in the requirements section of this study (Figure 5.2).



Figure 5.2: Types of users defined in the system framework

In terms of operational system architecture, the system was built using three different tiers for providing the processes and functionalities for the users of the system. The following Figure 5.3 illustrates the tiers used.



Figure 5.3: Tiers of the operational system architecture

- **Interface Tier:** Represents all the interfaces formed by the system for the users to interact with the system either as frontend users or as backend users.
- **Application Tier:** Represents the system processes and functionalities that different user can use or perform, based on the privilege level each has within the system roles.
- **Database Tier:** Represent all the data that are generated by application layer or saved by the users and the data include, user profiles, articles, news, pictures, and videos.

In terms of connectivity, the structural behaviour of the system will act as a central unified crisis event framework for sharing resources and facilitate communication among themselves and the public. Different governmental agencies can connect to the system and start sharing and using the available resources as shown in Figure 5.4.

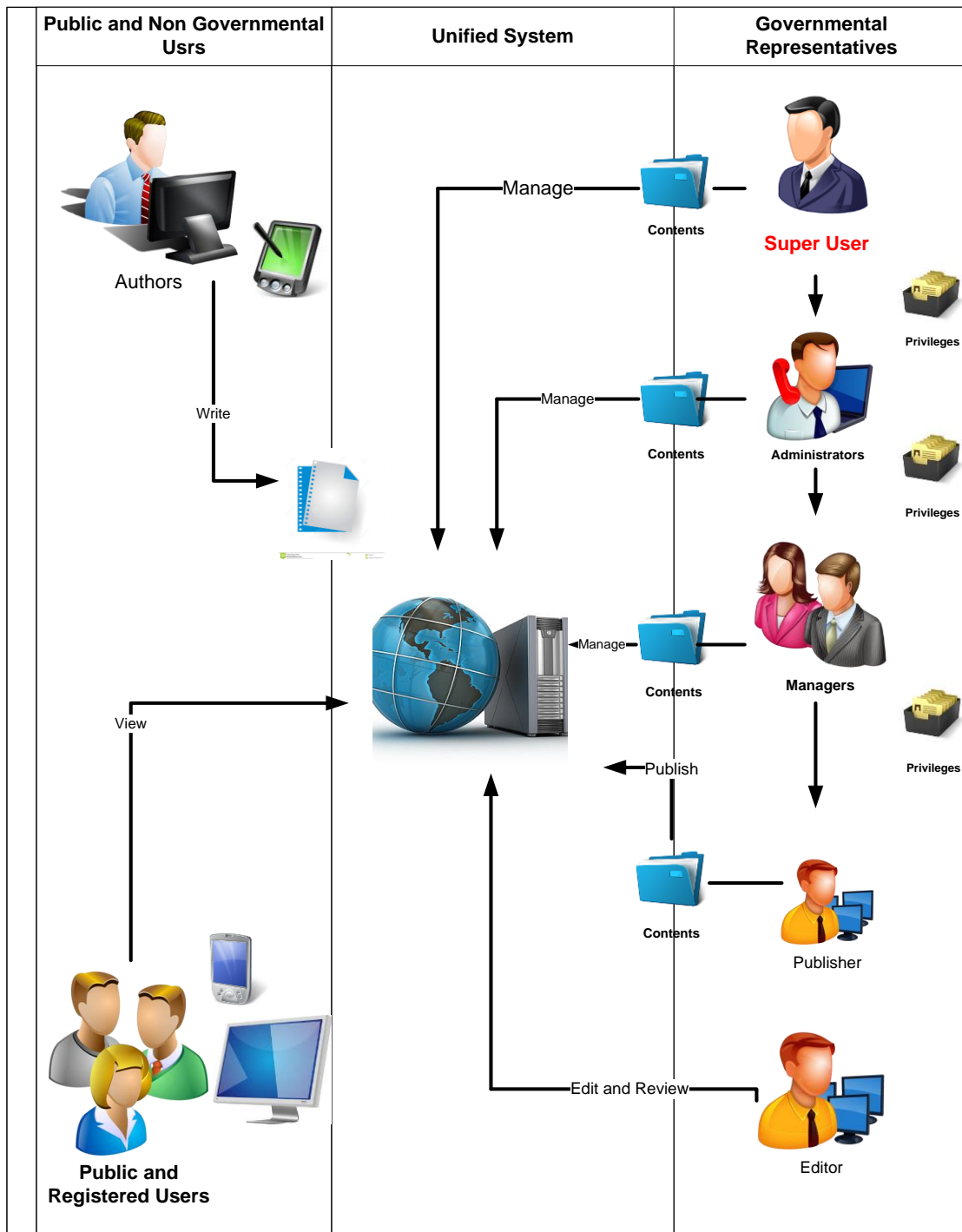


Figure 5.4: Connectivity and structural behavior of the system

In order to be able to present the systems' functionality and processes in an appropriate manner, the system discussion will be through the roles of each user within the system.

5.5. Systems Functionalities

This section will present users associated functionalities based on their previous role classification as governmental and non-governmental users. This section will start by presenting the governmental users.

5.5.1. Super Administrators

They are responsible for tracking the system's functionality, granting privilege for state and entity level users. They are also responsible for creating contents and define the site structures as advised by the entity and cantonal level users. Moreover, they are responsible for defining the general site themes and for installing and defining the needed components. The following functional decomposition diagram – FDD, illustrates the activities related to the super administrator role (Figure 5.5), which will give a better understanding to the new systems functionalities.

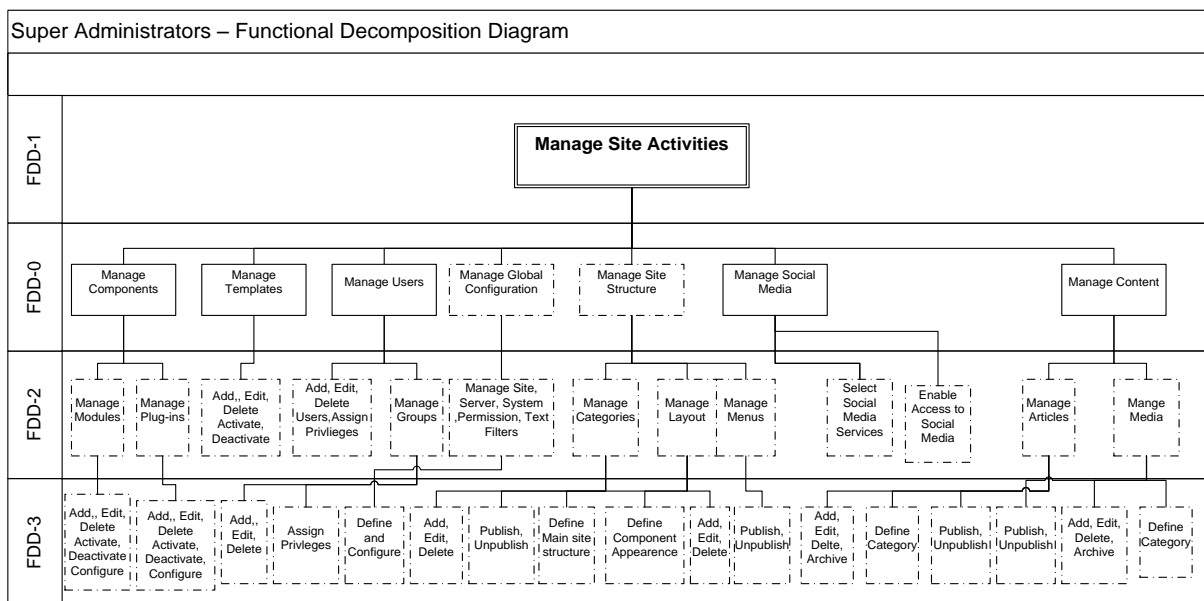


Figure 5.5: FDD illustration of Super Administrators role

From Figure 5.5, it can be seen that the new system framework provides different functionalities and services showing that each has a specific role in the system. The following discussion will prescribe the processes and usability of each process within the system.

- A. **Manage Components:** This functionality will enable Super Administrators to add different Joomla CMS extensions that are needed to extend the functionality of the system. Those components and plugins are provided and categorized into different sections, in order to make better navigation and use. They are rated based on

popularity of use, and they are supported with feedbacks from different users. The selection of the needed extensions will be based on the functionality of the components and its possible use and services to the flood crisis event in BiH. The list of available components categories are the once available on the Joomla official site (<http://extensions.joomla.org/>). Super Administrators will have the privileges of installing, activating, deactivating and configuring the components and plugins. The following use case diagram will illustrate the activities that are related to managing extensions (Figure 5.6).

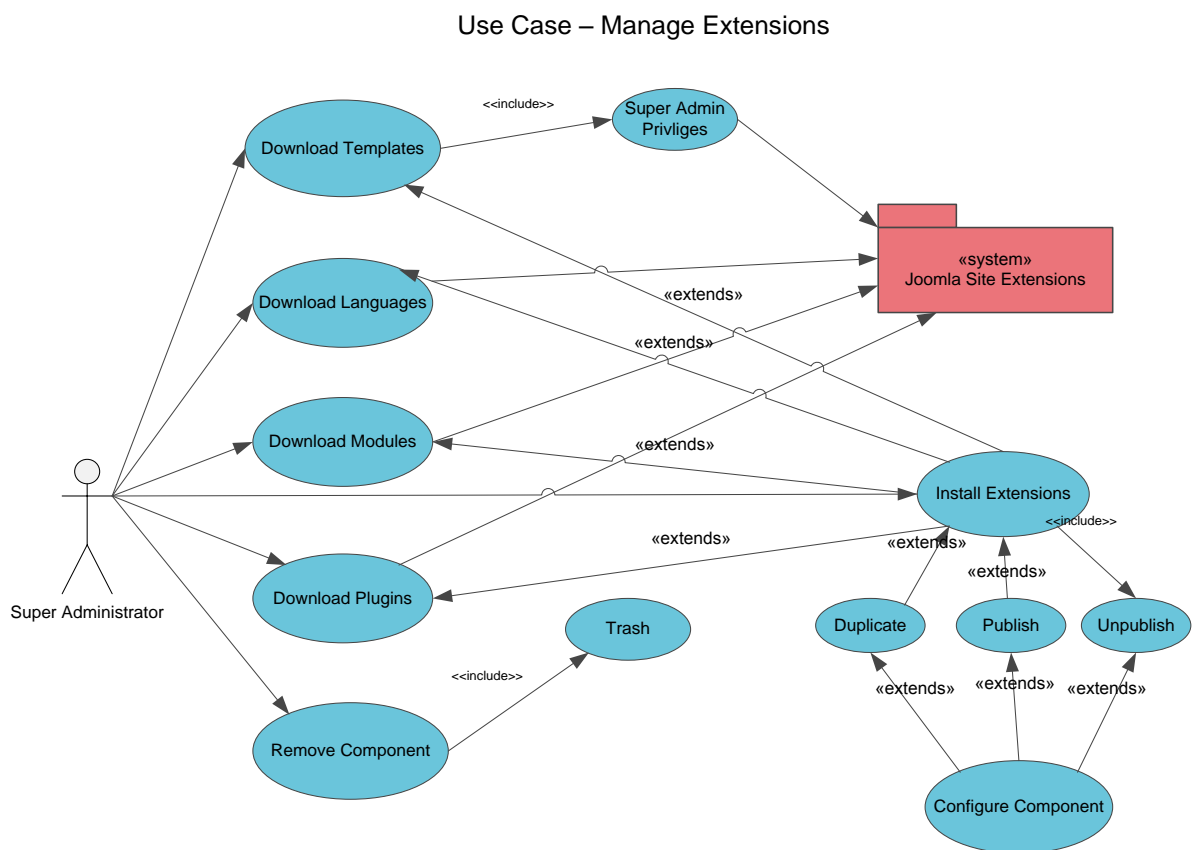


Figure 5.6: Use Case Activities for Manage Extension

B. **Manage Templates:** This functionality will enable super administrators to define and use different templates that are available for the system. Moreover, they will have privileges to add, delete and define the layout of the used template and the possibility of configuring it using CSS. The following use case diagram will show the activities related to super administrator's role in managing templates (Figure 5.7).

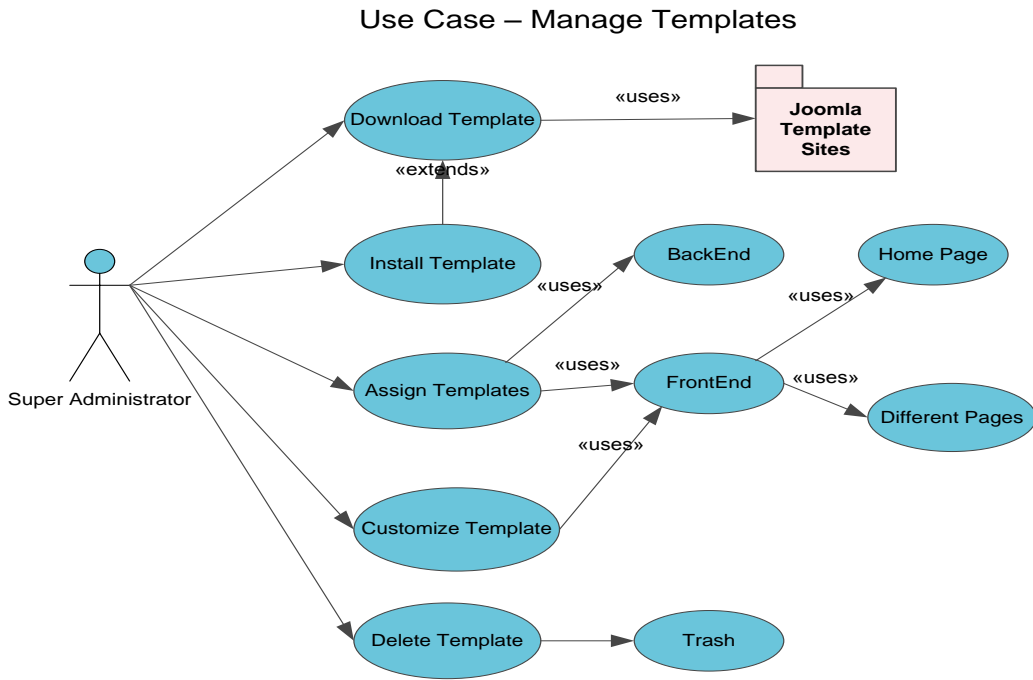


Figure 5.7: Case Activities for Manage Templates

C. **Manage Users:** This functionality will enable super administrators to manage users and groups in the system. They will have the highest privileges to add, delete, update and assign privileges for other users in the system and control their access. They will be responsible for creating administrators for entity and canton users, and they will have the privileges to customize the access privileges for any user or group in the system. The following Data Flow Diagram (DFD), shows the user registration and privilege processes for the Super administrator and the different users in the system (Figure 5.8).

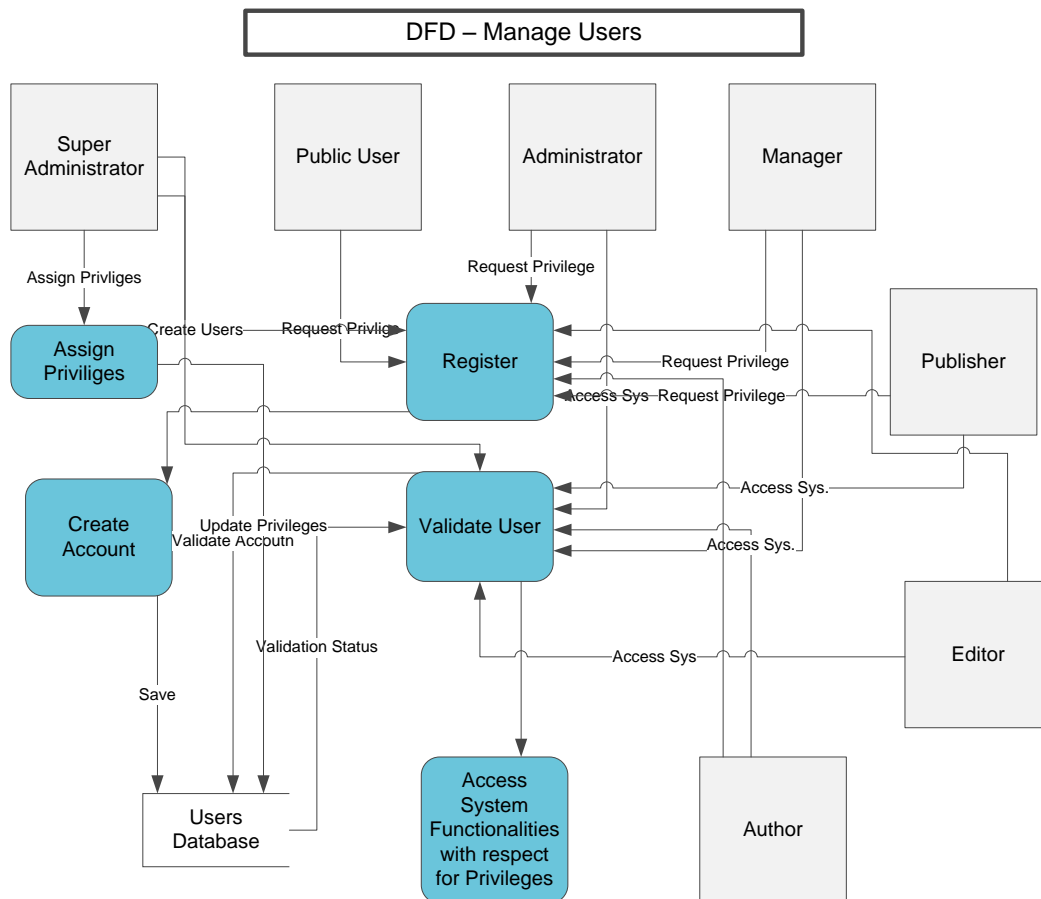


Figure 5.8: Use Case Activities for Manage Users

D. **Manage Global Configuration:** This option will enable super administrators to configure different options in the systems that are related to (Site, System, Server, Permissions and Text filters). In terms of Site configuration, they will be able of configuring the following options

- i. Site Name,
- ii. Site Status,
- iii. Offline Message,
- iv. Default Editor,
- v. Default Access Level,
- vi. Site Meta data.

In terms of system configuration, they will be able of configuring the following options:

- i. Cache settings,
- ii. Session Settings.

In terms of Server settings, they will be able of configuring the following options:

- i. Temp Folder path Settings,
- ii. Location Settings (Time-Zone),
- iii. FTP Settings,
- iv. Proxy Settings.

In Terms of permission and text filters, they will enable the super administrators to configure different permissions for the users in the system, and will have the privileges to define and customize the needed text filters that control the content format and displays in the site.

E. **Manage Site Structure:** This feature will enable super administrators to change and configure Categories, Layouts and Menus. Categories are used for defining and saving different site articles and information. Layouts are used to define the main layout structure of the site. Menus will be connected with different articles and components that are used by the system. These features will define the general site structure functionality and appearance for the added services and related contents. The following diagram (Figure 5.9) shows the exact processes and data flow for the Manage site structure functionalities using (DFD).

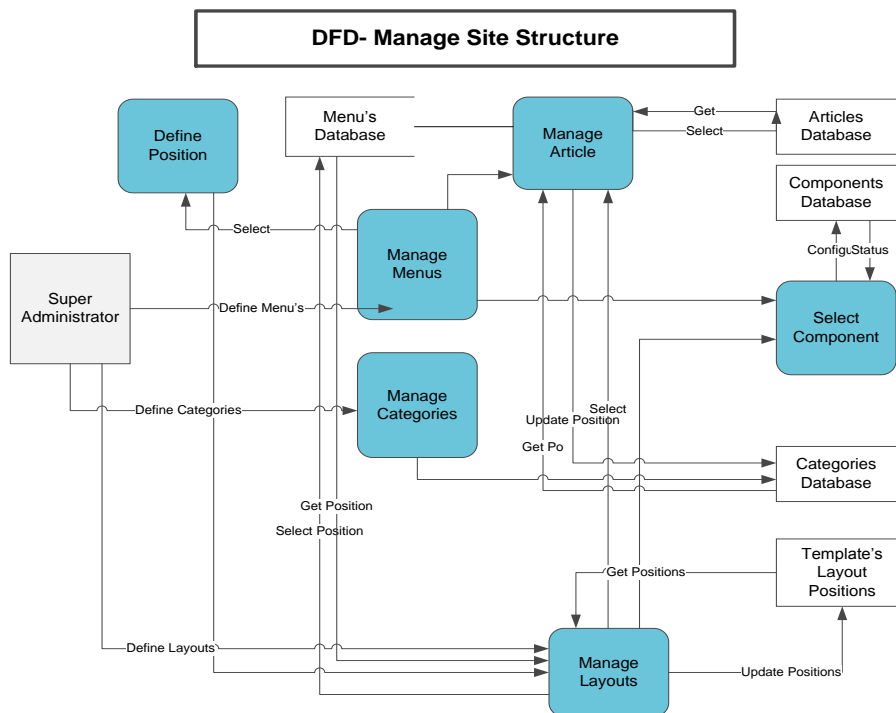


Figure 5.9: Manage Site Structure functionality

F. **Manage Social Media:** This feature will enable super administrators to define the related social media services that will be selected and used. Super administrator will have the privileges to configure and create related social media groups and connect them to the system. The list of social media used is based on the research results for the most used social media services by governmental agencies and the public. The following use case diagram (Figure 5.10) shows the activities related to manage social media.

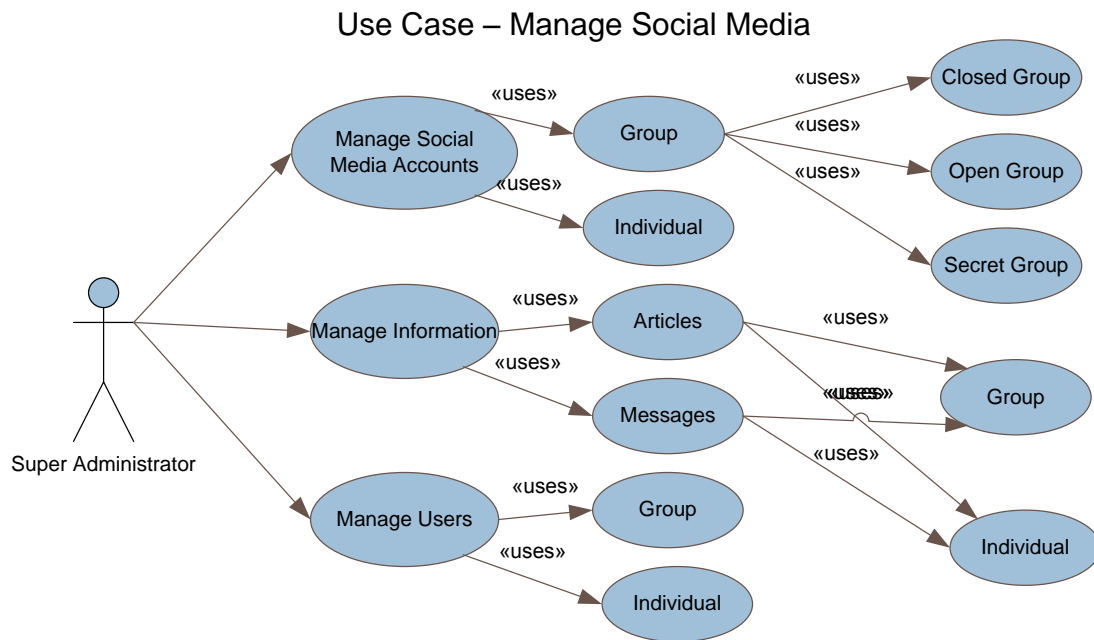


Figure 5.10: Activities for Manage Social Media

G. **Manage Contents:** This feature enables Super Administrators to add content to the site. Contents can be of different type such as articles, pictures, videos. Super Administrator will have the privilege to add, edit, delete, and archive the articles and media files. Moreover, they need to define the category of the contents and defining the scope as (public, registered and super users). In addition, they will have the feature of publishing and un-publishing the articles used. The following DFD, (Figure 5.11) shows the involved processes and data for performing different management activities on the system's content.

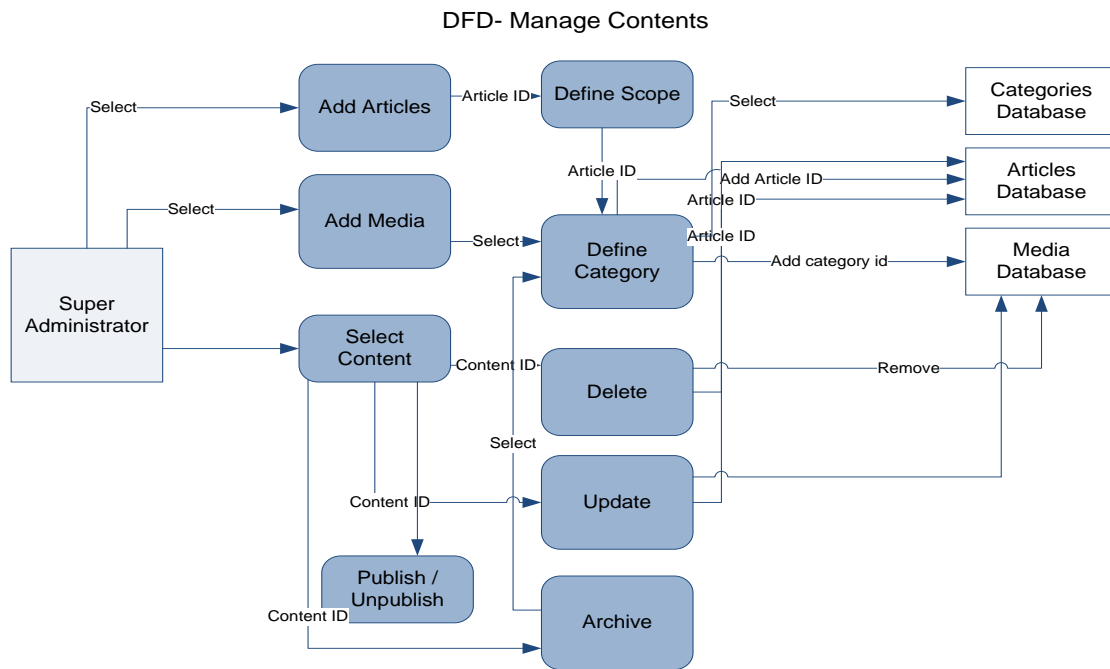


Figure 5.11: Management activities for Manage Contents

5.5.2. Administrators

Administrators are responsible for tracking the system’s functionality based on state, entity and canton level. They are responsible for granting privilege for managers, publishers, editors and authors. Administrators will be able of adding and installing components and different add-ins. They are not allowed to change, edit and install templates. The following FDD illustrates the activities related to administrator role, which will give a better understanding to the new systems functionalities (Figure 5.12).

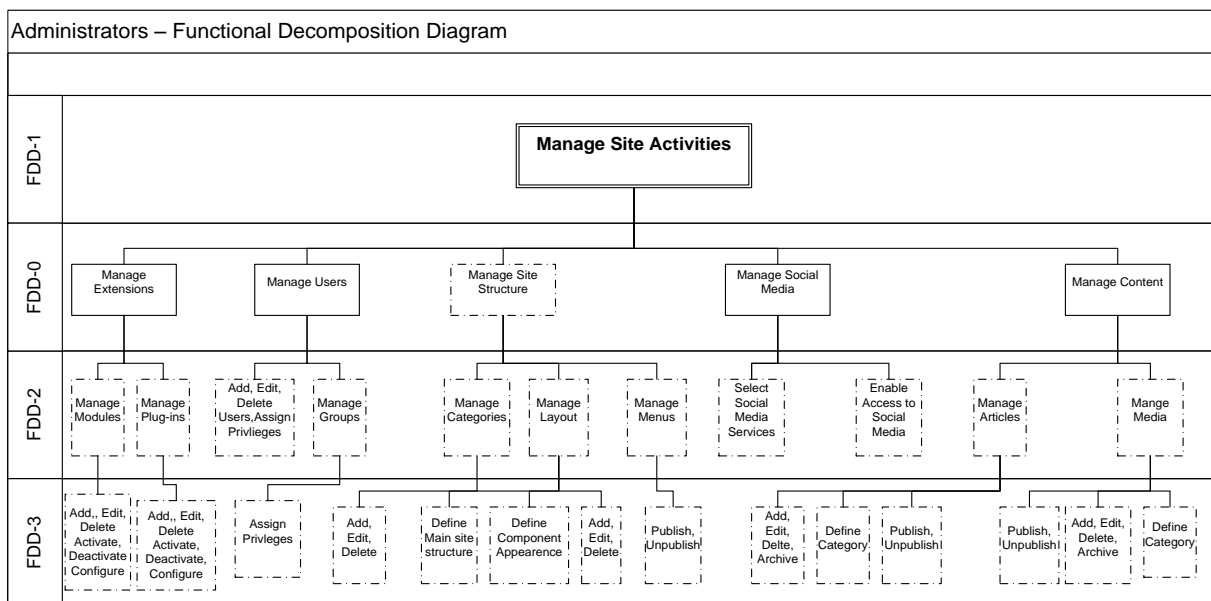


Figure 5.12: FDD illustration of Administrators role

From Figure 5.12, it is seen that the system framework provides different functionalities that differs from super administrators' activities as discussed previously. The same privileges that have been discussed previously are allocated for administrator users; the following section will present DFD and UML for showing the differences and similarities in the granted privileges.

- A. **Manage Extensions:** Administrators have most of the privileges to manage different types of extensions and to configure them according to their needs. Working with templates is the only exception for administrators' privileges in terms of managing exceptions when compared to the Super Administrators privilege (Figure 5.6).
- B. **Manage Users:** This Feature will enable administrators to create different type of users' even users with administrator privileges. They have the same privileges as super administrators, but they cannot create super administrator accounts (see Figure 5.8). The following Use Case Diagram (Figure 5.13) shows the processes related to managing users by administrators.

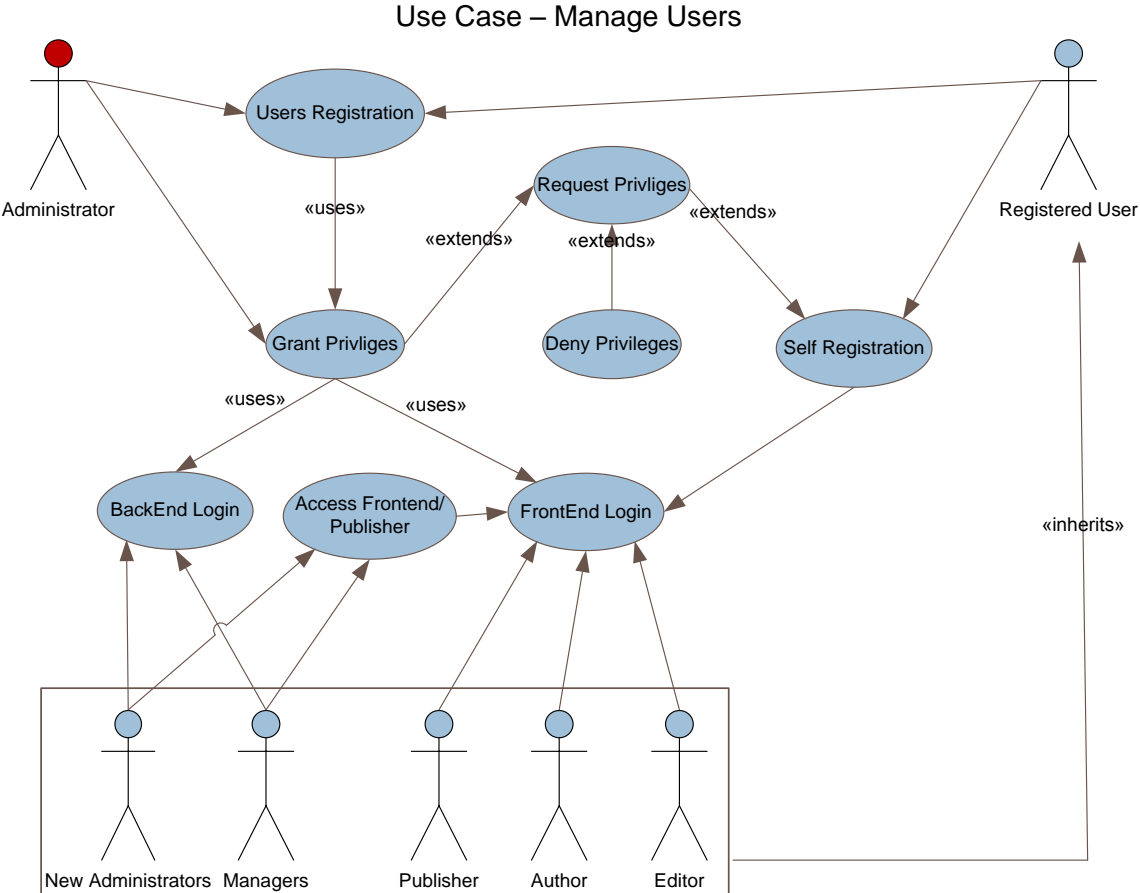


Figure 5.13: Manage Users privilege by Administrators

C. Manage Site Structure: This feature will enable administrators to change and configure Categories, Layouts and Menus, the same privileges that are practised by super administrators (see Figure 5.9). The following Use Case Diagram (Figure 5.14) shows the activities that are associated with the privileges of managing site structure.

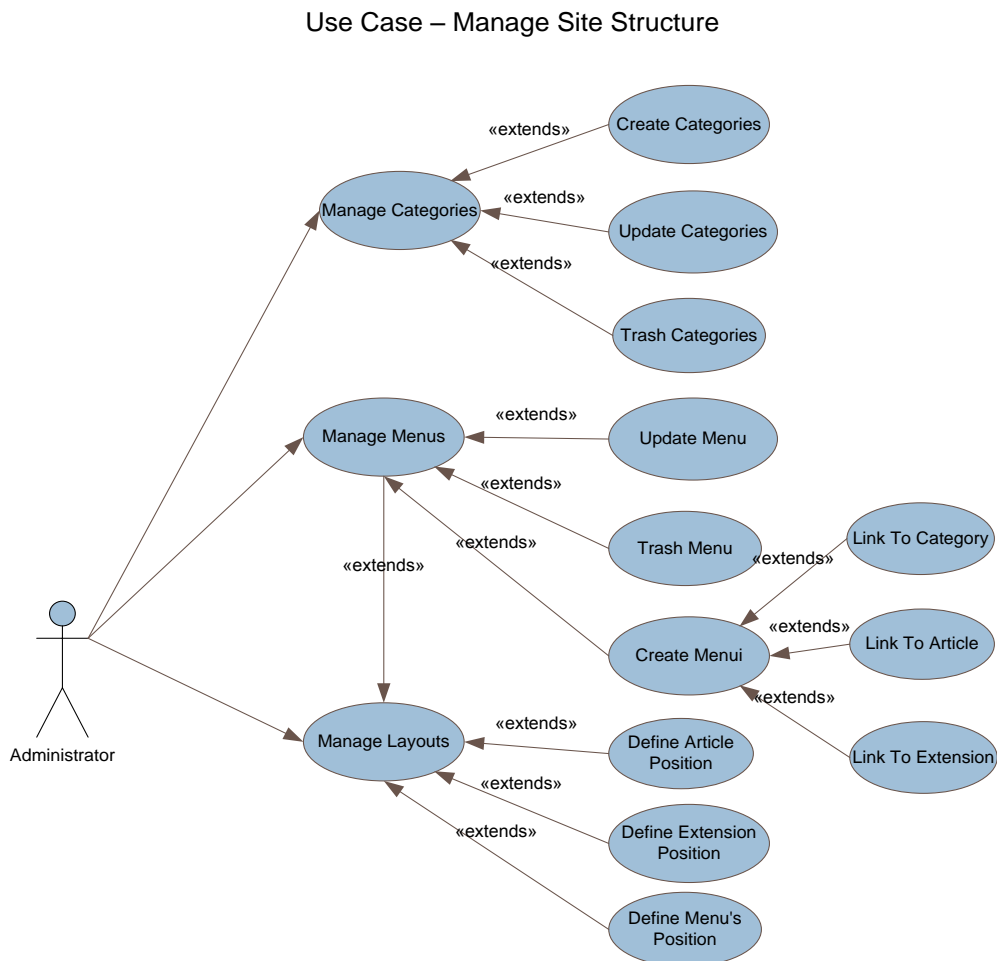


Figure 5.14: Manage site structure privilege by Administrators

D. Manage Social Media: The privileges that are associated with managers are the same as super administrator (see Figure 5.10). Figure 5.15 shows the management of social media services using DFD in order to show how the information and services are passed and allocated to users.

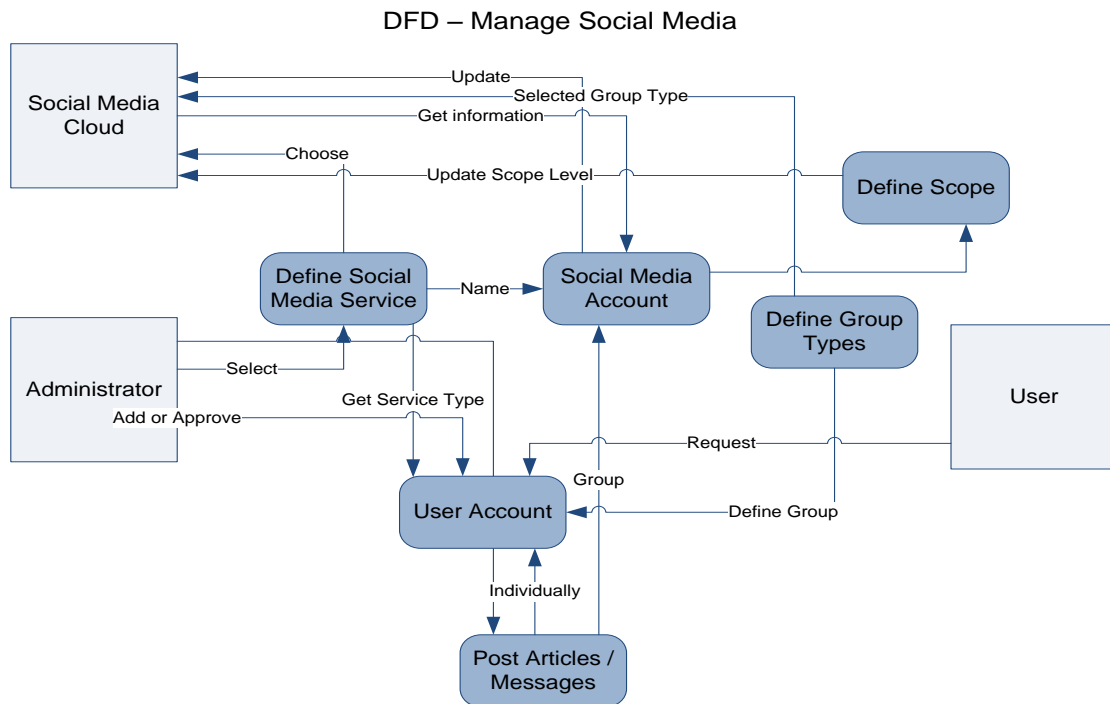


Figure 5.15: Social media management by Administrators

E. Manage Content: The privileges associated with administrators for managing contents are the same as super administrator (see Figure 5.11). However, the following Use Case Diagram (Figure 5.16) shows the activities involved from a different perspective without involving data in the processes.

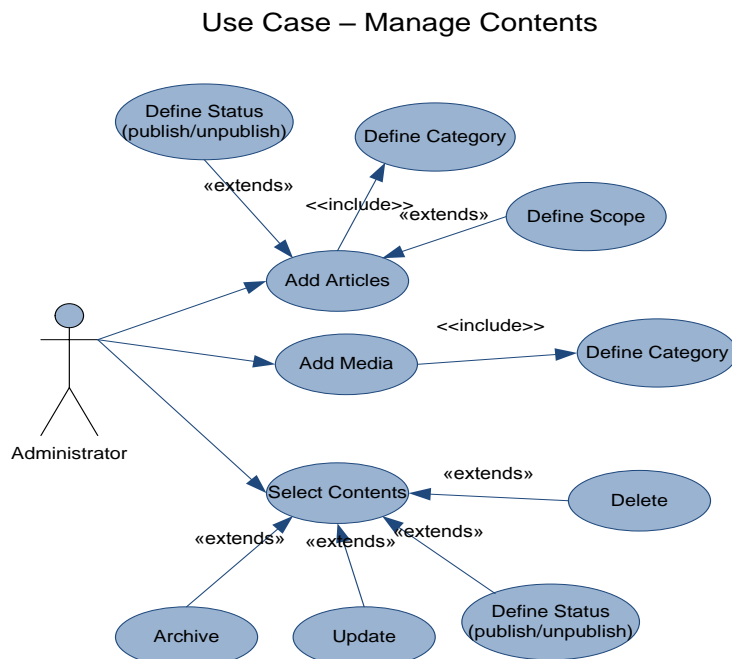


Figure 5.16: Use Case - Manage Contents for Administrators role

5.5.3. Managers

Managers are responsible for tracking some of the main system’s functionalities. They are responsible for managing categories, contents and some basic features that are related to components installed. They will not have features that are related to managing users or accounts. The Following FDD (Figure 5.17) shows the activities related to Managers role, which will give a better understanding to the new systems functionalities.

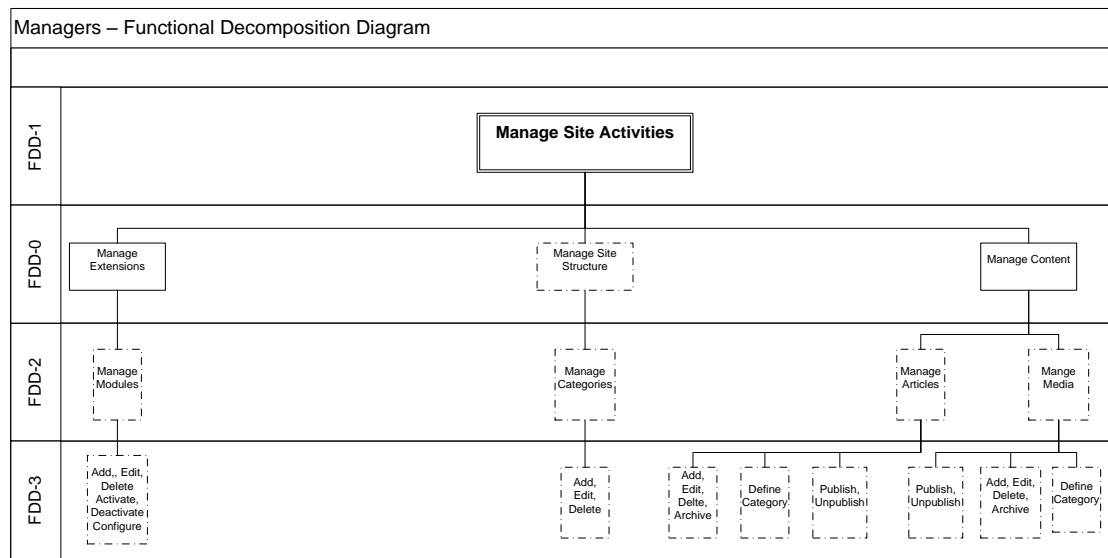


Figure 5.17: FDD illustration of Managers role

From Figure 5.17, it is shown that the system framework provides minimal functionalities for managers. The following discussion will provide the scope of privileges that are associated with manager with respect to the offered functionalities. The following section will present DFD and UML for showing the differences and similarities in the granted privileges.

A. **Manage Extensions:** This feature will enable managers to manage some of the basic functionalities that are associated with Site components. They will be able to select some of the components that are previously installed by (Super administrators, Administrators) and manage some of its features (see Figure 5.6). The following functionalities will be associated with the Manager role:

- i. Download Extensions
- ii. Manage Extensions

B. **Manage Site Structure:** Managers do not have many privileges associated with changing site structure. They are allowed to create, update and trash categories (see Figure 5.14).

C. Manage Contents: Managers have all the privileges to work with contents by either managing articles or media added to site such as super administrator (Figure 5.11). Managers' role is more related to supervising contents added by different users that have privileges to add content to the system.

5.5.4. Publishers

Publishers are responsible for tracking some of the minor system's functionalities. They are not allowed to login to the systems backend as they have their privileges to the frontend of the system. They are responsible for observing contents and some basic features that are related to articles management. The Following FDD (Figure 5.18) shows the activities related to publishers role, which will give a better understanding to the new systems functionalities.

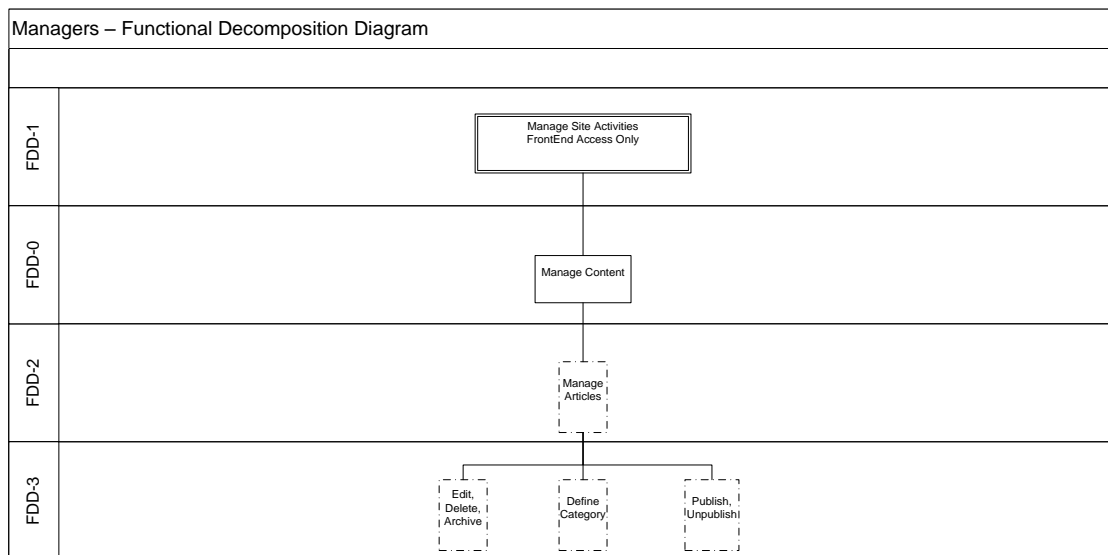


Figure 5.18: FDD illustration of publishers' role

A. Manage Content: This feature will enable publishers to manage articles that are published using the frontend access to the system (Figure 5.19). Moreover, it is important to note that users with higher privileges will have the publisher privileges if they login to the frontend of the site. The following Use Case Diagram shows the associated activities.

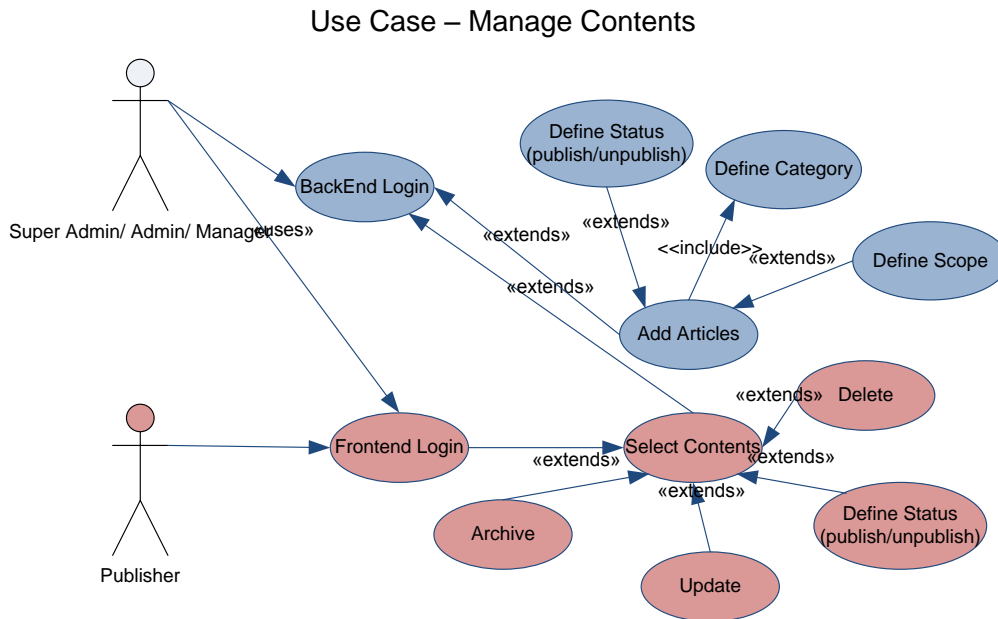


Figure 5.19: Manage Contents for Publisher & admin roles

5.5.5. Editors

Editors will be able of using the frontend of the system only. Their privileges are related with published articles and they will be able of editing contents.

- A. **Manage Articles:** This feature will enable editors of editing the published articles only. They will not have any other privileges.

5.5.6. Authors

Authors will be able of using the frontend of the system only. Their privileges are related with published articles that are related to their account. The process of publishing any article will start by sending the article to (Super Admin, Admin or Manager) by any medium such as (email or storage device). Later, this article will be published and associated with the author account. Next, its author can edit the articles or any users that has edit privileges. The Following FDD (Figure 5.20) shows the activities related to editor's role, which will give a better understanding to the new systems functionalities.

Use Case – Manage Contents

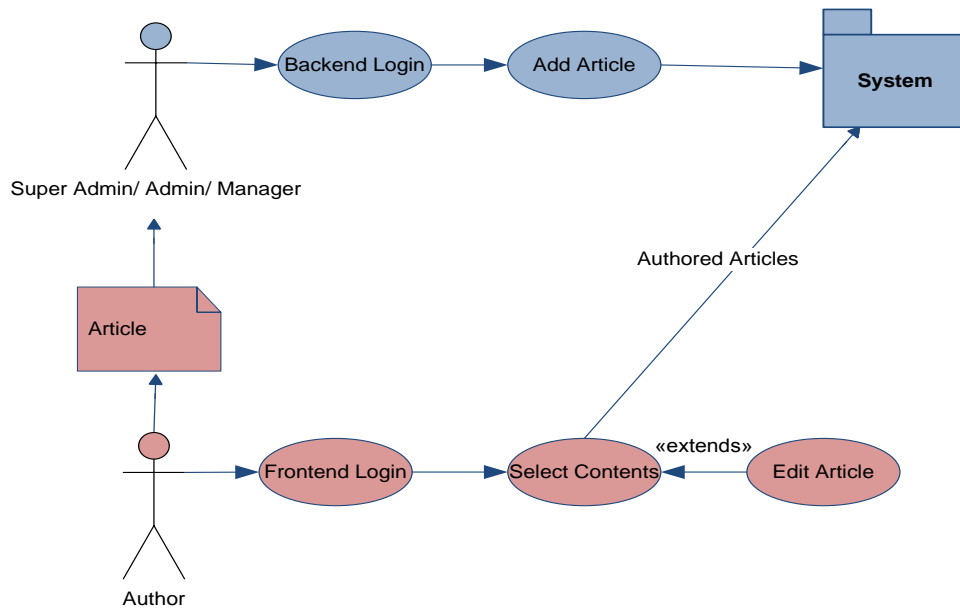


Figure 5.20: Manage Contents for Author & Admin roles

To sum up with the previously discussed roles of each user in the system, Figure 5.21 shows the framework design of the proposed structure.

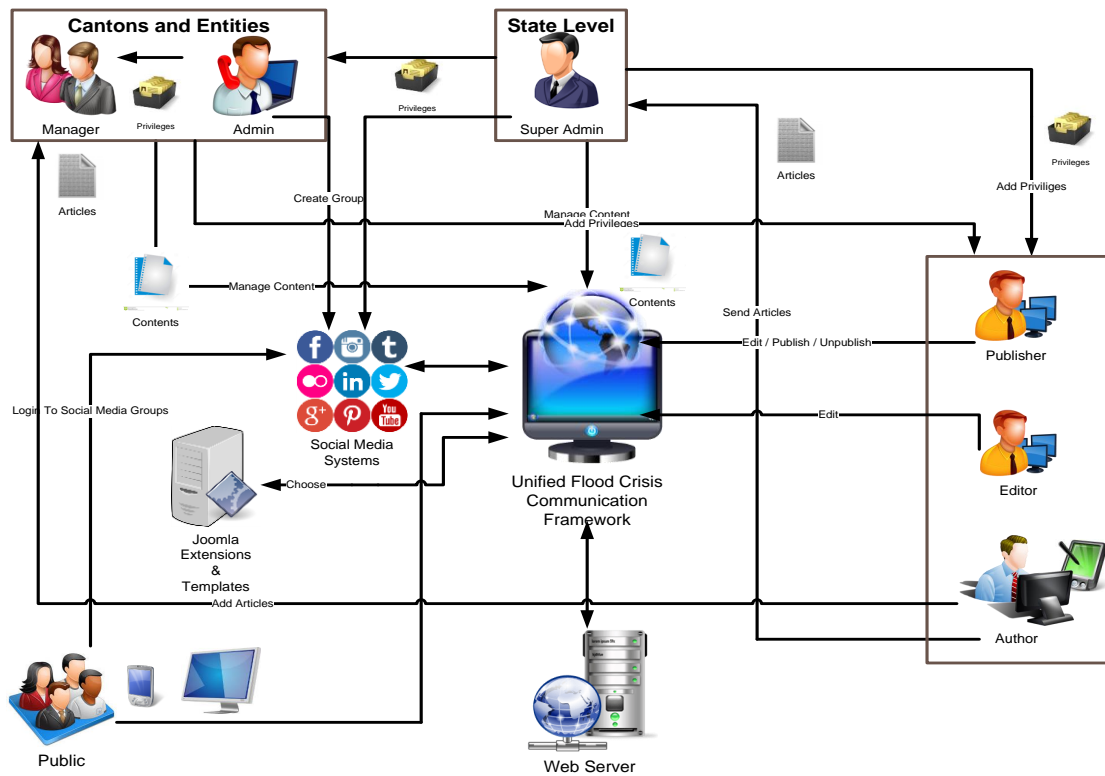


Figure 5.21: Unified flood crisis communication framework

Based on Figure 5.21, the system's functionality will be initiated by super administrators creating the main systems structure that is based on state level for BiH. The site structure will include state level categories, menus, layouts, templates and site's main files and tutorials. Super Administrators will also be responsible for creating social media accounts that are related to flood crisis event. They will also be responsible for choosing and installing extensions that can be used on state level for managing communication and information during flood crisis events

Super administrators will grant administrators account privileges for each entity and canton. Administrators will use the granted privileges and will therefore create managers accounts that will assist them in managing the communication and information with the public and other entities. Administrators will also have the privileges to install extensions that they can find suitable for their needs and policies for sharing and displaying information. Moreover, they will have the privileges to create their own social media accounts and to define their own categories. Managers' accounts will have the privileges to create publishers, editors and authors' accounts. Managers will be responsible for monitoring activities posted on the web site and will report directly to administrators. Managers will be the most active users among the administrative accounts while the super administrators and administrators will be responsible for policies and defining the needed activities by the system.

Publishers will be responsible for monitoring the articles and approving them for being published. Moreover, they will have the rights to edit, delete or update any article. Editors, will be responsible for editing the posted articles. Authors will have the privileges to submit articles for administrative staff, and if published they will have the rights to edit their own articles. The granted users' privileges and the chosen components are believed to shape the functionality and services of the system framework.

The framework is offering the previous privileges in order to control and organize the work on the proposed framework. The following section will present the implementation phase of the system framework with more focus on the operational structure and services alignment with the course design criteria.

5.6. System Implementation

Based on the output structure of the system design phase, the system was built using two important components that are Joomla 3.4 as the main open source application for managing the contents and users, plus different third party components, modules and plug-ins for

supporting and extending the system with different services and functionalities. The system construction had two different phases that are:

A. Constructing Systems Main Structure

B. Setting the Required Services and Functionalities

The system’s construction process was related with the design of different categories and articles that were associated with each site that was built for the state level governmental representation, Federation of BiH, Republic of Srpska, Canton Sarajevo, Canton Hercegovacko-neretvanski, Canton Unsko-Sanski, Canton Tuzla and Region of Banja Luka (Figure 5.22). The systems framework managed to provide different web sites within one unified system structure as shown in Figure 5.22.

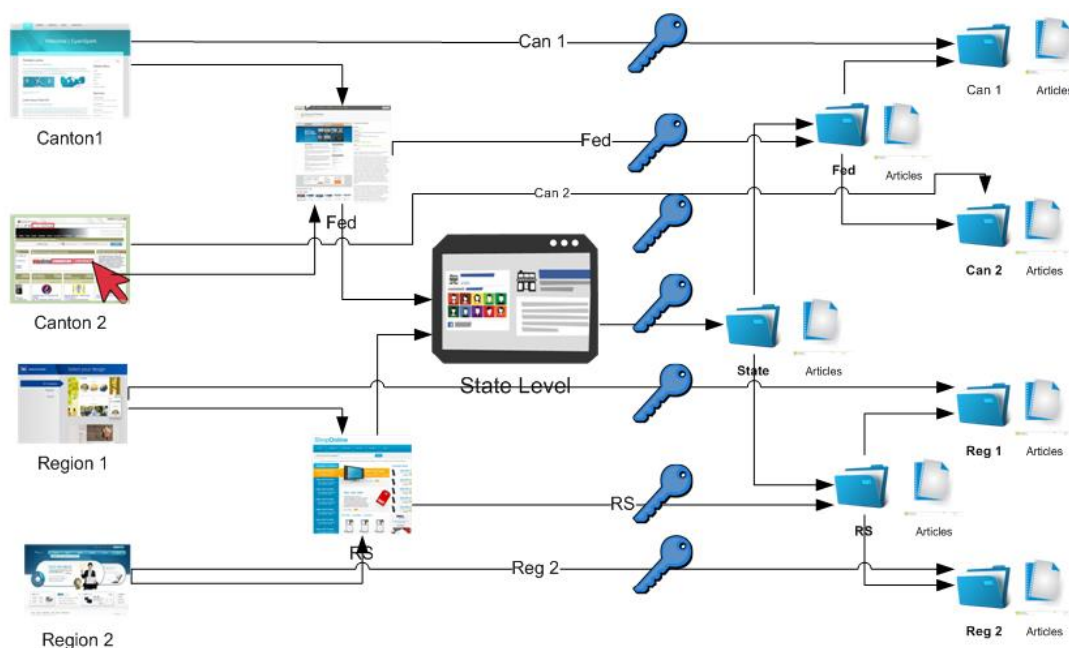


Figure 5.22: Different web sites within the unified system structure

From Figure 5.22, the framework shows that the created sites are sharing the categories based on their privileges and hierarchical structure. The privileges that are associated with those categories are the once associated with each user defined in the system as discussed previously. The second task included setting the required services and functionalities. This task was based on the defined criteria in this study, thus different services that are required for setting privilege, defining tasks, sharing content and connecting with different social media were selected. The selection and inclusion of those (Components, modules and plug-ins) was based on the type of services needed for the system framework. Different types of those services were found as open source and some were bought. The use of those services was based on the requirement of each governmental entity in the framework, thus the state level

that is responsible for all the governmental entities had the majority of those services, while the other had the services that they requested for. However, the public users can make use of all the services that are provided within the state level and they can use the once provided by their region. Figure 5.23 illustrates the distribution of services and functionalities within the system framework.

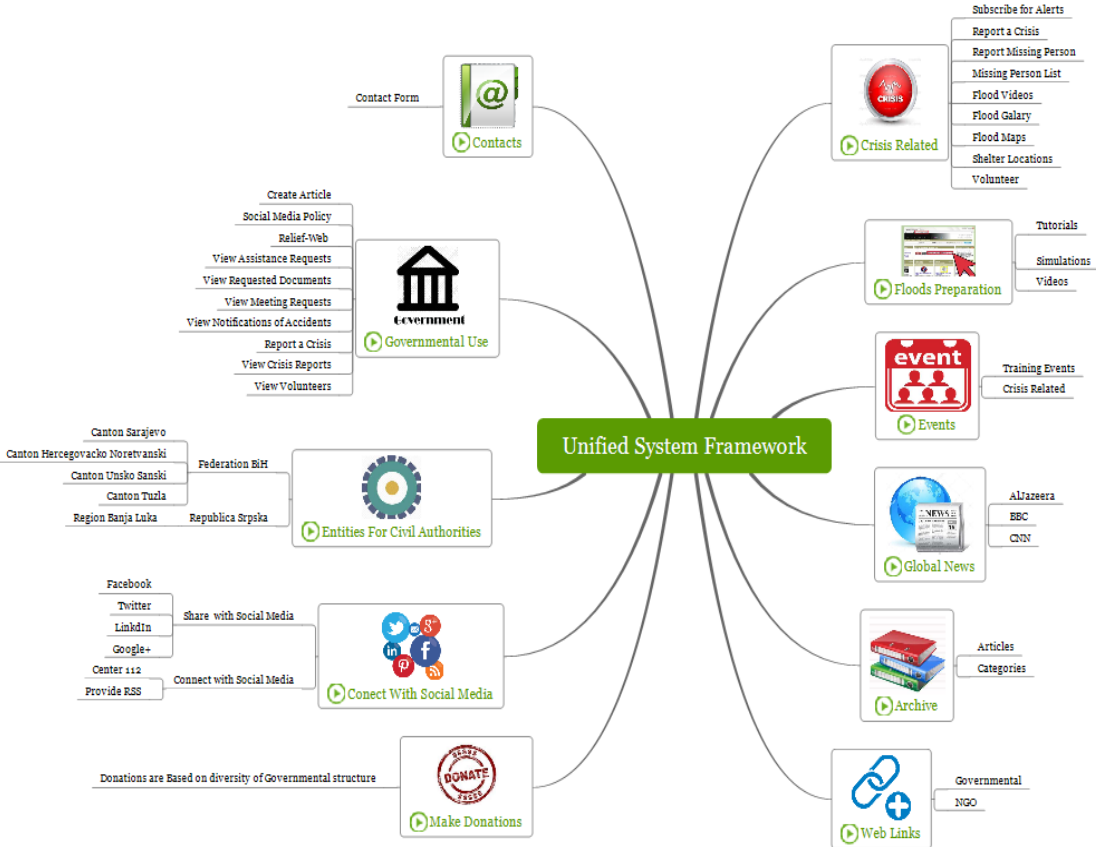


Figure 5.23: Distribution of services within the framework

Figure 5.23 show all the functionalities and features that were added for the system framework. However, the sections of the system that are oriented towards the other site services did not use all the features, as some of them were included based on the needs. (Figure 5.24) shows the main systems web page.



Figure 5.24: Main web page of the proposed system – www.bihfloods.com

From this page (Figure 5.24), the users can use all the services and functionalities added to the site, and they can browse all the articles and news added to the system. Moreover, the site's template support being displayed on Tablets and Mobile Phones as it adjusts automatically to the dimensions of the used device as shown in Figure 5.25.



Figure 5.25: Web template supported by mobile phones

5.6.1. Systems Functionalities

The following section will present and discuss the added services and functionalities of the unified system framework with respect to the order of the added services as shown in Figure 5.24.

5.6.1.1. Crisis Related Services

This menu item gathers all the services and functionalities related towards public interaction with crisis and it includes:

- a. *Subscribe for Alerts*: This service enables public to subscribe for alert that are related to floods based on their region that they belong to Figure 5.26. The service was created using JEvent Component that provided this functionality for the framework.

#	List Name	Subscribe	ID	Archive
1	Flood Alerts - State Level	<input checked="" type="radio"/> Yes <input type="radio"/> No	1	
2	Flood Alerts - Federation Level	<input checked="" type="radio"/> Yes <input type="radio"/> No	2	
3	Flood Alerts - Republica Srpska	<input checked="" type="radio"/> Yes <input type="radio"/> No	3	
4	Flood Alerts -Hercegovacko-Neretvanski Canton	<input checked="" type="radio"/> Yes <input type="radio"/> No	4	
5	Flood Alerts - Sarajevo Canton	<input checked="" type="radio"/> Yes <input type="radio"/> No	5	
6	Flood Alerts -Tuzlanski Canton	<input checked="" type="radio"/> Yes <input type="radio"/> No	6	
7	Flood Alerts - Unsko-Sanski Canton	<input checked="" type="radio"/> Yes <input type="radio"/> No	7	
8	Flood Alerts - Region Banja Luka	<input checked="" type="radio"/> Yes <input type="radio"/> No	8	

[Select All](#) | [None](#)

Figure 5.26: Subscribe for alerts menu item

Based on this service, users can register by adding their name and email, and choose the region to be alerted upon using their emails.

- b. *Report a Crisis*: This service enables the public to report about any crisis that is related to floods in their region (Figure 5.27). They can also upload a picture if they are using their mobile phones or video. This service was created using component RSforms that enabled this functionality. Figure 5.27 shows the form used.

Figure 5.27: Report a crisis menu item

- c. *Report Missing Person*: This service has been provided for public to report any missing person, as this problem is recurring problem in any flood crisis. The user can add information and specify description or picture for the missing person. This service was added using RSform component.
- d. *Missing Person List*: This service enables the public to view the list of missing persons (Figure 5.28). Moreover, they can view detailed information about any missing person as posted by the person reporting the incident. The following Figure 5.28 show the use of this service.

This file contains the information of the reporter and ther missing person	
Reporters Name	Dr. Dr.
Reporters Phone	00.000000
Reporters Email	0000@yahoo.com
Report Date	06.01.2016
Missing Person name	0000. 0000
Missing Person Gender	Male
Missing Person Age	1->3
Missing Person Description	He was wearing blue jeans, and white hat, leather jacket.
Missing Person Last Seen Location	Ilidza
Missing Person Last Seen Date	016-01-05 10:51:33
Missing Person Picture	Persons Pictuer

Figure 5.28: Missing person list

- e. *Flood Videos*: This service will provide the public with list of videos recorded and posted on YouTube for floods in BiH. This service was provided using Phoca Gallery Component.

- f. Flood Gallery: This service will show the users the photos related to floods in BiH (Figure 5.29). The used component for enabling such functionality is Phoca Gallery. The following figure shows the used service.

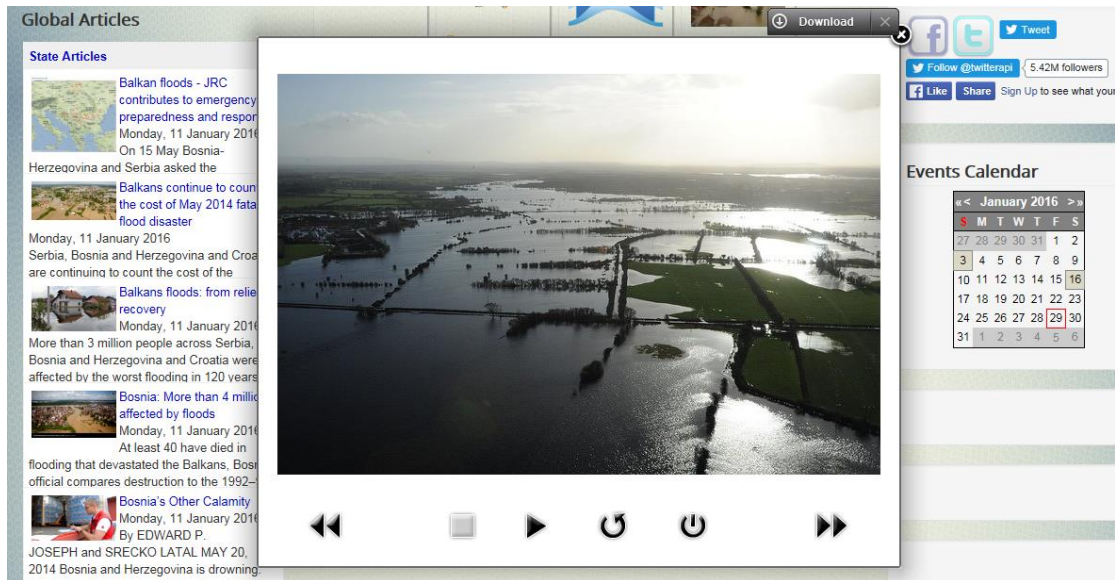


Figure 5.29: Flood Gallery photos

- g. Flood Maps: This service enables the public to view and download maps that shows the expected flood locations in all BiH. They can view them as pictures or download them as PDF.
- h. Shelter Locations: This service enabled users to view the shelter locations defined by the government in BiH (Figure 5.30). This service used Google Maps and it was added using Phoca Maps component. The following figure shows this service.

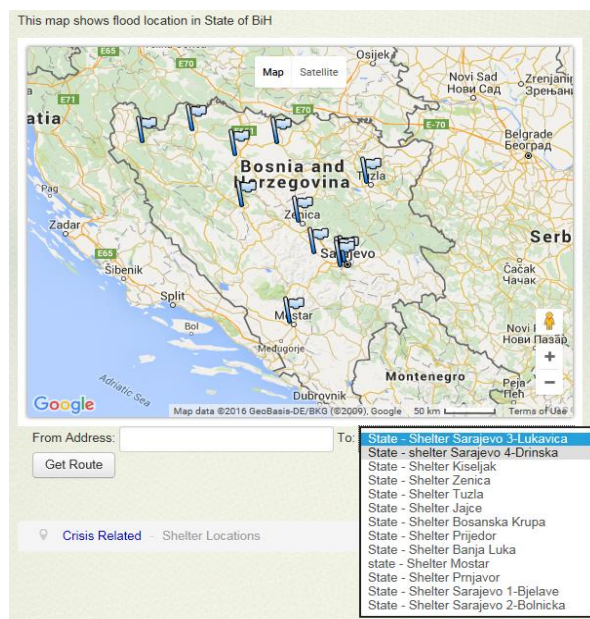


Figure 5.30: Main shelter locations

Moreover, users can have the exact root defined for any shelter location by setting the (From Address) field and selecting the shelter location as shown in Figure 5.31.

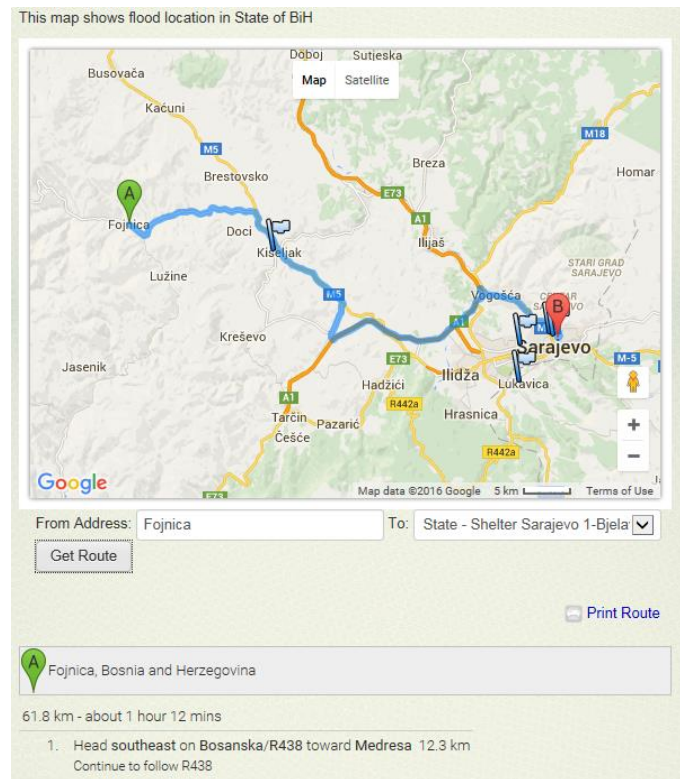


Figure 5.31: Shelter location with root map

- i. *Volunteer*: This service enables the public to volunteer and specify their field of expertise. Moreover, they can define the region they would volunteer for, and define the days that they are available.

5.6.1.2. Entities of Civil Authorities

This menu item enables users to navigate to other sites that are related to the unified system's framework, such as, Federation of BiH, Republic of Srpska, cantons and regions (Figure 5.32). Each page displays information that are related to the political structure or region they belong to, as different users might favour following the news, information and updates related to their region only. In terms of political segregation, the country of BiH is divided into, state level that has Federation of BiH and Republic of Srpska. Under the Federation of BiH there are ten cantons of which four different cantons approved to be part of this system framework that are (Hercegovačko-neretvanski Canton, Sarajevski Canton, Tuzlanski Canton, Unsko-sanski Canton). On the other hand, under Republic of Srpska the Region of Banja Luka

approved to be part of this system framework. Figure 5.32 shows part of the systems sub-navigation to the related sites in the framework.



Figure 5.32: Websites sub navigation

Thus, users can navigate to any canton or region that are part of this system and view the information that is related specifically to it. Figure 5.33 shows the website of Sarajevo Canton.

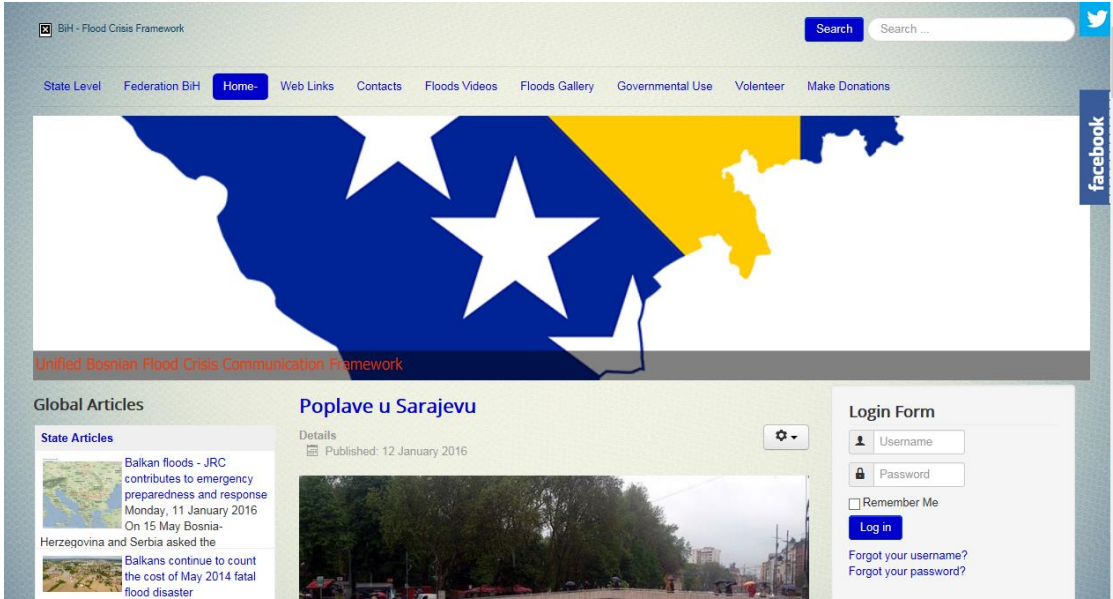


Figure 5.33: Website of Sarajevo Canton

From Figure 5.33, it is seen that the menu structure is different from the States level main web site (Figure 5.24). This difference is due to the required services by this canton, and as many services are provided in the state level. However, it is possible for system administrator of Sarajevo Canton to add more services using different set of components, modules and plug-ins as they have the privileges to do so. Moreover, there are some services that are provided for entities and cantons on the governmental level that are not available on state level and they will be presented later in this chapter.

5.6.1.3. Floods Preparations

This menu item enables users to navigate through different services and information for the public to be prepared for floods events (Figure 5.24). First, it gives information about floods, flood warning and the importance of having a plan. Next, it provides templates that have been adopted from (FEMA.org) for preparing a plan on the following basis:

- For parents
- For kids
- For transit commuters
- For your wallet
- Critical documents and valuables
- Steps to make a plan
- Steps to make a plan (Cards)
- Tips on emergency alerts and warnings

The use of those forms have been adopted for research purposes and in a later stage of using this prototype framework they are going to be translated to Bosnian language to make the best use of it. Figure 5.34 shows one of the used forms by FEMA.

Ready **FEMA**

Family Communication Plan

Let them know you're OK!

Pick the same person for each family member to contact. It might be easier to reach someone who's out of town.

Emergencies can happen at any time. Does your family know how to get in touch with each other if you are not all together?

Before an emergency happens, have a family discussion to determine who would be your out-of-state point of contact, and where you would meet away from your home — both in the neighborhood and within your town.

Important Information

Fill in this information and keep a copy in a safe place, such as your purse or briefcase, your car, your office, and your disaster kit. Be sure to look it over every year and keep it up to date.

Out-of-Town Contact

Name:

Home:

Cell:

Email:

Facebook:

Twitter:

Neighborhood Meeting Place:

Regional Meeting Place:

Figure 5.34: FEMA's Family communications plan

The use of different tools and simulations have been included in the site, such as the floods scenario that shows a scenario of floods devastating power and results that can be used to educate the public on the severeness and seriousness of how floods can affect public safety and health. Those services have been embedded from governmental agencies that are specialized in flood services such as Floods Smart (<http://www.floodsmart.gov>) and Public Health Emergency (<http://www.phe.gov>), thus enabled the reuse of their provided services within the proposed framework. Another service that was added to the framework is a simulator that can be used to define the cost of flooding and a simulator for Floods Levee. Figure 5.35 shows the simulator service.



Figure 5.35: FEMA's application for estimating costs of flooding

Additional service that was made available for the public is video tutorial on preparedness for floods. A complete playlist of videos were added to the framework, Figure 5.36 shows the used service.



Figure 5.36: Public Health Emergency’s videos for flood preparation

Those services have been used from different sources that enabled the sharing and use, and it is believed that reusing such services within the framework would enable better performance of reliable information sources and quality.

5.6.1.4. Events

This service will enable the public to view the events proposed by the framework (Figure 5.37). Those events can include meetings, trainings and workshops. The public can view the past events or upcoming events, or even search for events. Figure 5.37 shows the Events services added to the framework.

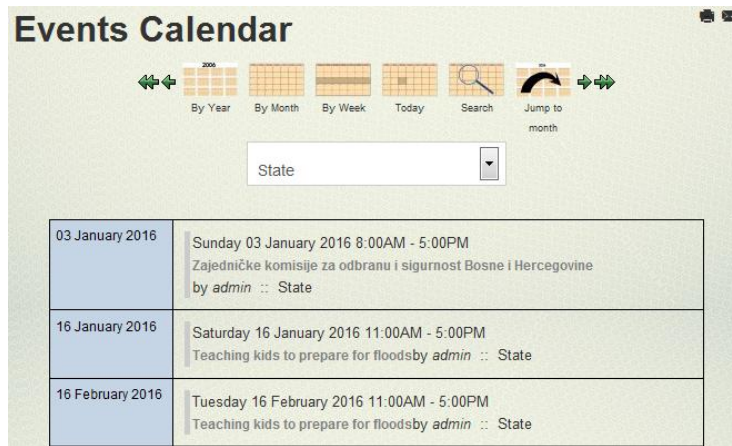


Figure 5.37: Events calendar for the framework

From Figure 5.37, users can check for events on a (Yearly, Monthly, Weekly, Daily) basis. The following Figure 5.38 shows the events view based on monthly basis.



Figure 5.38: Events calendar for the framework

5.6.1.4. Global News

This menu item is used by the public to view different news headings that are posted by several news agencies (Figure 5.24). The system framework manages to utilize the RSS feeds posted by those news sites and provided them for the public that are using the system. This service helps the public to have verified news sources from top rated news agencies without the need to connect to different sites. The following figure shows the service used.

5.6.1.5. Archive

This menu item enables users to view and search all the articles and categories that have been archived by the system framework (Figure 5.24). Having this feature added can help different users in searching for articles or using those articles for future studies and research. The current practices in governmental agencies in BiH are not providing archiving services. Thus this feature can promote for better utilization and use of previous events, experiences and incidents.

5.6.1.6. WebLinks

This service provides users with different web links for important governmental agencies that are related to flood crisis (Figure 5.24). Figure 5.39 shows the current added web links.

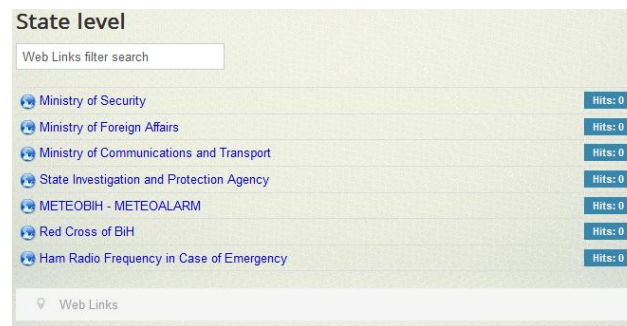


Figure 5.39: State level Web links

5.6.1.7. Contacts

This feature is added for users to be able to contact the governmental representative and sending a message using contact forms (Figure 5.24).

5.6.1.7. Make Donations

This service is added for the public to send their donations to any governmental structure representation in BiH (Figure 5.24). The service added information for bank account, and the future use of this service can include payments using PayPal, Visa and MasterCard gateways.

5.6.1.8. Governmental Use

This menu item is not for public use and it will be shown just for registered users that belong to governmental agencies in the system framework. This menu item has different services on “State level” that differs from the other governmental agencies in Bosnian governmental

structure. The state level is responsible for cooperating and collaborating with other governmental agencies as described in the literature review in Chapter two of this study, thus it has more of controlling and monitoring services. This section will start by presenting the “State level” services and next it will provide the other agencies services.

- a. Create Article: This service enables registered users to create articles that are saved in special category selected by system administrator (Figure 5.40). Those created articles are later edited, published and managed by users according to their responsibilities on the system framework and as explained earlier in section 5.5 in this chapter.
- b. Social Media Policy: This service provides the governmental agencies with social media policy that can be used by all parties in the system framework. However, this policy can be modified by any party to suit their exact needs, although it has been made comprehensive for BiH status
- c. Relief-Web: This service connects the framework with the relief-web site (<http://reliefweb.int/country/bih>) that provides information about relief services and campaigns that are oriented towards several regions, and the displayed page is specific for BiH

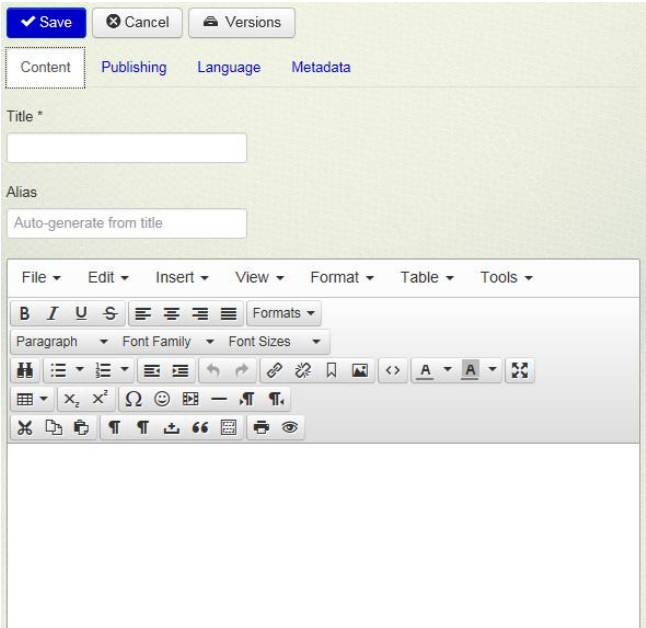


Figure 5.40: Creating articles for registered users

- d. **View Assistance Request:** This service enables users on state level to view the entire assistance request sent by (Federation of BiH, Republic of Srpska or cantons). They can use search for finding specific request and they can view the detailed request on site or download it as PDF.
- e. **View Notifications of Accidents:** This service enables users on state level to view all notifications of accidents submitted by other governmental agencies in BiH. It is important to note that those forms and fields are created based on official forms that are used in BiH.
- f. **View Requested Documents:** This service enables the state level user to view requests made by other governmental agencies for official documents.
- g. **View Meeting Requests:** This service enables state level users to view meeting requests made by other governmental agencies.
- h. **Report a Crisis:** This service enables the state level to report a crisis for other governmental agencies in the system framework (Figure 5.41). Using this service the state can report for any crisis of any type with specifying details and supporting documents or actions.

Figure 5.41: Form used for reporting a crisis.

- i. **View Crisis Reports:** This service enables state level to view crisis reports sent by other governmental agencies in BiH (Figure 5.42). Figure 5.42 shows the result of using this service.

Search	<input type="text"/>	Go	Reset
Crisis Reported			
Reporters Name :Said Haso	Crisis Location :Sarajevo Ilidza	Download PDF	
Reporters Name :Malik Hasanbegovic	Crisis Location :Sarajevo, pijacna 73	Download PDF	
Reporters Name :Sanela Teljagic	Crisis Location :Bosanska Krupa, Ulica br.23	Download PDF	

Figure 5.42: Crisis reported

- j. **View Volunteers:** This service enables state level users to view and search for volunteers to work on different regions and with different skills (Figure 5.43).

Search	<input type="text"/>	Go	Reset
Volunteers List			
Role Applying for :HAM Radio Operator	Volunteering Location : Canton Sarajevo Unsko Sanski Canton	Download PDF	
Role Applying for :Driver	Volunteering Location : Canton Sarajevo	Download PDF	
Role Applying for :Nursing	Volunteering Location : State of BiH Federation Canton Sarajevo Tuzlanski Canton	Download PDF	

Figure 5.43: Volunteers list

The governmental services that are related to Federation of BiH, Republic of Srpska and cantons are:

- Create Article
- Request Assistance
- Notify Accident
- Request a Documents
- Request for Meeting
- View Volunteers

All the previous forms have been created based on official paper forms that have been used for those services. However, enabling those services in electronic format using the system framework proves to be more efficient in communication and respond in timely manner.

5.6.1.9. Social Media Services

The system framework included different social media services for enabling effective share and distribution of information. Social media tools are different in their functionality and used services, and each has a unique feature that can be used during crisis event as described in

literature chapter of this research study. The following list of services has been included in the system framework in order to provide utilization for the services of social media.

- a. **Sharing Articles:** This service was provided through incorporating plug-in that enables the share of articles with different social media services such as (Facebook, Twitter, Linked-in, Tumblr, Stumble, Buffer, Pin it, G+1 and Google +) (Figure 5.44). Thus any user that has social media account from the listed services can share the provided information from this framework without the need to register to the site. This feature will enable a wider spread of the services and information used within the system's framework.



Figure 5.44: Use of social media services for sharing articles

- b. **Rating Content:** This service was made available in order to rate the content of the system framework based on number of likes for each article or content.
- c. **Commenting Service:** This service was made available for users to post comment on the used system framework (Figure 5.45). The use of this feature helps in enhancing the services and functionalities in the system framework. Figure 5.45 displays the used comment service.



Figure 5.45: Comment service available for users

- d. Connecting with Social Media Accounts: This service enabled the system framework to connect with different social media accounts (Figure 5.46). This service enables users to view the content of any social media account without the need to register to that site. Moreover, any posts that are added within social media pages in automatically displayed in the system framework. The use of this service proved to be effective to the system framework as the system connected with all the posts of Center 112 Facebook account. Figure 5.46 shows the use of this service within the system’s framework.

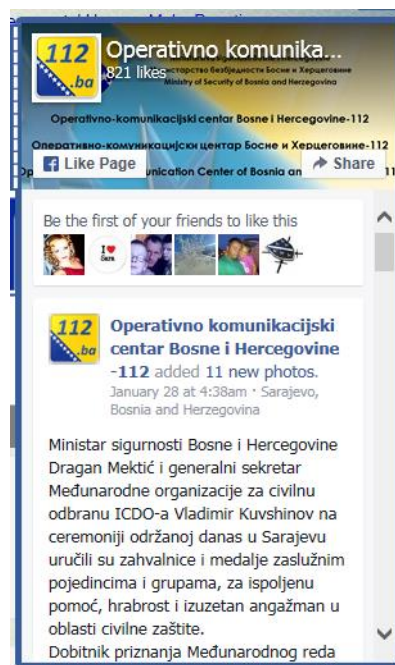


Figure 5.46: Connecting Center 112 social media account with the framework

- e. **Redirecting Services:** This service would redirect the users for social media account that are related to flood crisis services. This service would connect the users to the social media accounts that belong to the system framework, thus giving the option for users to follow the system framework using social media accounts.
- f. **Using Video Service:** This feature enabled the system framework to be connected with different video channels and lists on YouTube. This service was used to display floods video for BiH.
- g. **Using Twitter Services:** This service enabled the site to connect with the services provided by twitter for sharing news and information (Figure 5.47). The site can follow any agency that posts tweets related with floods or rescue activities. Moreover, they can use the re-tweet service for sharing and spreading the information using the system's framework. Figure 5.47 shows the twitter module service.



Figure 5.47: Twitter module service used with the framework

- h. **RSS Feeds:** This service enabled connecting different news feeds with the system framework. This service was used with global news menu in the system framework to provide feeds from Aljazeera, CNN and BBC news feeds. Moreover, the framework provides the RSS feeds for other websites to include the information and articles provided by system framework.

The proposed system was tested on a local web server using (WAMP Server) and altered for many times by the researcher, during which different conflicts were fixed, and many browser compatibility issues were resolved. The system was uploaded to a temporary domain on the internet using the free services provided by (Frihost.com) for the purpose of the pilot test phase.

5.7. Pilot Testing the System Framework

After the system was uploaded to a temporary domain, the system was tested again by the researcher, and at this stage, the system was considered ready for the pilot test phase. At this stage the site structure was created based on the previous requirements defined in Chapters 3 and 4. A number of 4 governmental representatives working in different governmental entities were approached in different ministries in BiH and they were asked to participate voluntarily in the system framework. The researcher grouped the volunteering users and explained to them about the system purposes and available functionalities. Each user was given different user names and privileges according to the specified privileges in this chapter study in order to test and use the system's framework from different scopes. At this stage of research, the researcher acted as site admin for state level and assisted the other users in their tasks, especially with the once associated with adding different functionalities. Moreover, the researcher was involved in monitoring and supervising the activities in the system and participants, he also assisted in uploading resources for the site content. Through this role, the researcher was able to collect feedback from the participants' side that assisted in enhancing and updating different systems functionalities. With the actual use of the system that lasted for three months, the participants were gathered in order to express their experience with the systems design and functionalities. Their feedback was mostly related to enhancing some functionalities and interface design. The common feedbacks were considered, and the system was altered and updated. Some of the feedback presented by the participants was:

- The systems display on mobile phone needs to be enhanced as some of the menus are not properly displayed.
- The display of crisis report elements must be arranged properly to reflect the order of the items in the presented form.
- The link to region Banja Luka region is not displaying its template properly.
- The display of Shelter Maps is not proper on mobile phones.
- The archive needs to display the articles and categories in ascending / descending order based on time of creation and not alphabetically.
- The submenu items in Unsko-sanski Canton are not displayed properly on mobile phones.
- Error is displayed when using share for Facebook command on Articles.

The new updates were presented and used in the final version of the system framework. The updated system is currently operating in a new domain that supports larger storage capacity

and bandwidth. The tested system was removed from the temporary domain, and all the data associated with the system framework was transferred into the new domain <http://www.bihfloods.com/>.

5.8. Summary

Following the identification of the main requirements for the system from Chapters 3 and 4, the system was designed with an emphasis on major requirements towards providing the ability of better communication with the public and among governmental agencies. Moreover, the system provided sharing resources among different governmental agencies in BiH to bring a collaborative effort to compensate the lack of cooperation currently practiced within governmental agencies in BiH.

The system has also provided a method towards enhancing public's engagement with the system framework through the use of different effective social media services and functionalities. This approach provided broader engagement and utilization of services that proved effective during crisis events.

The system was tested and updated for overcoming conflicts and bugs, and it was uploaded to a temporary internet domain for the reasons of initiating a pilot test study. For pilot test study, four governmental representative from different sectors participated in using the system framework with having different privileges. They assisted in enhancing the systems services by defining incompatibility issues and enhancing format of presented information. Users' comments were addressed and considered in the new system's framework design, which was used in the next phase of research project for full evaluation of the system. Next chapter will discuss and present the findings of the evaluation phase which will provide measurements to the benefits of the proposed framework with regard to the governmental structure found in Bosnia and Herzegovina.

CHAPTER 6: Framework Evaluation

6.1. Introduction

The previous phase of designing, building and pilot testing the system was achieved successfully. Thus, the next step in this research study was to implement system evaluation phase in order to measure the benefits and outline the challenges that are present with respect to the governmental structure found in BiH. The research needed to test if the presented framework with respect to the inputs considered during the design phase is capable of enhancing the communication and utilization of services and functionalities that are provided for governmental entities on one side and for public on the other side with respect to flood crisis events. The system was shifted from the previous domain that was used for test purposes, and a new domain was reserved. Governmental personal and public users from different entities and cantons were approached to participate in this research study in order to use and evaluate the presented framework. The interaction with the system's framework was based on the scenario of floods event during the spring of 2014 in order to simulate a real event to gain proper usage and evaluation of the framework.

The usage phase for the framework lasted three months in order to have a proper time for users to interact with the provided services with respect to their granted privileges' as described previously in this research study. The subsequent phase was to evaluate the presented system framework from different aspects due to the different role presented within the framework. The results were presented in the result section of this chapter. The methodological approaches used during this research phase follow.

6.2. Methodology

The evaluation for the system framework was divided into three different phases, each of which is found to ensure a better merge between the users, the system and the data. The presentation of the used methods will be based on those phases with respect to their instigation in the research. The phases are preparation phase, activation phase and termination phase.

6.2.1. The Preparation Phase:

This phase included all the activities that were initiated after the pilot test phase in order to prepare for the activation of the system evaluation. It included the following activities:

- a. System shift phase:* The system was shifted from its test location on (<http://www.frihost.com/>) to a new domain location on (<http://www.bihfloods.com/>). The new domain was selected based on different options such as, support for latest edition of Joomla, PHP, MySQL, higher bandwidth, better hosting options for hosting files and data.
- b. Preparing user accounts:* The accounts for governmental users that belong to different entities and cantons were created in order to make the process of arranging, monitoring and distributing system privileges and services easier process.
- c. Obtaining participants approval:* Different governmental personals were approached formally and informally to participate voluntarily in system framework. The ethical issues related to their participation and this research study was introduced. Each user that approved to be part of this system was given the needed privileges' to use the system framework.
- d. Informing the public:* Two different approaches were used to inform the public to participate in using and evaluating the system framework. The first approach was informal using verbal and face-to-face communication with relatives, friends, colleagues and co-workers. The second approach was formal using different approaches that included request for voluntarily participation such as:
 - Email lists with more than 15,000 users (The same list that was used for assessing the needs of system design)
 - Social Media Groups and Forums in BiH
 - University Students unions
- e. Designing evaluation questionnaire:* In order to assess the interaction with the system framework two different questionnaires were designed. The first questionnaire was oriented for public assessment of the system framework, while the other was for governmental personnel assessment. The first questionnaire was designed and questions were defined based on different categories that were adopted from studies that are aimed to evaluate the services presented to the public by the government (Papadomichelaki & Mentzas, 2012; Lin, Fofanah & Liang, 2011; Macintosh and Whyte, 2008; Alshawi, Alalwany and Alahmari, 2007 ; Wang, Bretschneider & Gant,

,2005). The questionnaire that was developed was tailored to fit the input requirements defined for BiH Flood Crisis events defined in Chapter four. Copies of the questionnaire are attached in Appendix D. The evaluation of the public interaction with the system framework was based on eight different categories:

- System Structure
- Learnability of System Framework
- System Functionalities
- Helpfulness of the System Framework
- Rating Services
 - Crisis Related
 - Floods Awareness
 - Site General Services
 - Use of Social Media
 - Connecting with Government
- Navigation-ability of the System Framework
- Quality of System Interface
- Overall Acceptability of the system

The second questionnaire designed for governmental evaluation of the system framework was based on different studies that evaluated the use of provided e-services for the government (Linke & Zerfass, 2012; Macnamara & Zerfass, 2012; Wright, and Hinson, 2011c; Fink & Zerfass, 2010). Copies of the questionnaire are attached in Appendix E. The questions were edited and tailored with respect to the requirements defined in Chapter 3 in order to fit the purpose of this research investigation phase. The evaluation of the governmental interaction with system's framework was based on seven different categories:

- Used System Role
- System Structure
- Usability
- Effectiveness
- Communication
- Awareness
- Overall Acceptability of the system

f. Validity and Reliability of Questionnaires

In order to define the validity and reliability of the designed questionnaires two approaches were used. The first approach for defining validity was the (Face Validity) approach, and it is defined by (Barnett, Ridgers, Zask & Salmon, 2015.; Holden, 2010) as “The degree to which test respondents view the content of a test and its items as relevant to the context in which the test is being administered.” Thus the two questionnaires were submitted to 6 professors in different specializations related to (IT, Quality Management, E-Government, and Human Computer Interaction). The face validity for the designed questionnaire resulted in enhancing the questionnaires by updating the categories and questions to eliminate the redundancy and to clear the meaning. The second approach was to test the reliability of the questionnaires with respect to the defined scale used by pilot testing the questionnaires. The participants for the public questionnaire were 61, while for the governmental where 37. In order to test the questionnaires internal consistency Cronbach’s Alpha was used to examine the answers representing the different stages defined in the questionnaire.

The results of analysing the pilot test showed that the Cronbach’s alphas for all categories in the public questionnaire were (0.91) and in the governmental questionnaire were (0.89). The reliability scores for all categories in both questionnaires fell within the range of Alpha 0.84 and 0.94. According to (Jordan, Hofer (2001); Hillway (1969)) the acceptable reliability coefficient is dependent on the condition of use and it should not be less than (0.7). Moreover, according to Gable (1986), he defined it "The typical results for good cognitive measures to have reliabilities in the high .80s or low .90s, where even good affective instruments frequently report reliabilities as low as .70". The presented values in this study show that both questionnaires have acceptable reliability for the intended use. Table 6.1 shows the questionnaires categories and their values from using Cronbach Alpha for the questions that are presented with lickert scale answers. (See appendix D. for the questions in the questionnaire)

Table 6.1: Cronbach Alpha values for questionnaires categories

Public Questionnaire	Cronbach Alpha	Governmental Questionnaire	Cronbach Alpha
System Structure	0.92	Used System Role	0.92
Learn ability of System Framework	0.92	System Structure	0.92
System Functionalities	0.92	Usability	0.85
Helpfulness of the System Framework	0.89	Effectiveness	0.89
Rating Services	0.89	Communication	0.84
Navigation-ability of the System Framework	0.92	Awareness	0.91
Quality of System Interface	0.94		
Total	0.91	Total	0.89

6.2.2. Activation Phase

This phase is considered the second phase of the system evaluation, and included the interaction of users with the system. It enclosed the following activities:

- a) **Monitoring Activities:** This activity was initiated with the use of the system in order to monitor all the activities that are performed by the system framework. The monitoring has helped the researcher to identify and assist in defining the final layout of the system framework. Moreover, it helped in having better understanding of the interaction level of users during the activation phase.
- b) **Assisting Governmental Users:** The researcher assisted different governmental users in working with some desired packages and plugins in the system framework. Different packages have been installed and tested, while some other packages were not being able to use due to research scope restriction, financial restriction or governmental restrictions.
- c) **Correcting Mistakes and Enhancements:** During this phase, some mistakes of broken links have been fixed, and form layouts have been corrected for ease of use and displayed on mobile phones.

6.2.3. Termination Phase:

This phase is considered the last in the evaluation process. It included the following activities:

- a) *Distributing the questionnaires:* The questionnaires were designed online using Google + forms and they have been attached to the system framework for evaluating the use. Users visiting the site have been asked to participate in evaluating the system framework.
- b) *Grouping and categorizing the data:* The data were assembled and digitized on excel sheet, prepared for analysis using excel and SPSS.
- c) *Making analysis and comparisons:* Two different approaches were used for analysing the data, as they were classified as close ended (quantitative) and open ended questions (qualitative). For the close questions, the data were analysed using different techniques such as finding frequencies, standard deviation, value, Chi-Square, T-test, ANOVA test of variances, and charts. In terms of open-ended questions, the coding technique was used, and it comes in 3 different options that are (Manual Coding, Query-Based Coding and Auto-Coding). The manual method was chosen as it was found more convenient for smaller number of data sources. The coding process included text search, text frequencies and defining the context. The coding process enabled producing the results in quantitative manner that provided better understanding for the context of this research study.

By performing the above-mentioned phases, the evaluation phase was declared complete. The following section will present the output of this study, with respect to the questionnaires distributed for governmental personnel and public.

6.3. Study Outcomes

This section will present the results of evaluating the system framework by public and governmental users that interacted with the system for 3 months. Different analysis approaches have been used with respect to the diversity of questions used in the study. The results will be presented for public users first, followed by the relations of questions and their effects results. The following section will present the results related to the governmental users' interaction with the system framework.

6.3.1. Public Questionnaire Results - Quantitative

The actual response for the questionnaire came from 317 public users. The data was digitized into SPSS file and analysed based on defining the, frequencies, mean, standard deviation and percentages with respect to each question in the study. The results will be presented based on the categories presented in the questionnaire. In terms of average distribution, it was classified as:

- High degree of approval: include paragraphs that got the mean averages greater than (3.66) and the largest percentage (73.2%).
- The degree of approval medium: It includes a set paragraphs which range mean to the calculation of (2.34-3.66) and percentage (46.8% -73.2%).
- Low degree of approval: include paragraphs that group got less than mean averages (2.34) and a lower percentage of (46.8%).

A. Hardware Usage

Table 6.2: Public hardware preferences to navigate the system

How did you navigate the system framework?		Frequency	Percent
Hardware Used	PC	254	80.1%
	Smart Phone	41	12.9%
	Tablet Devices	22	6.9%
	Total	317	100%

B. System Structure Evaluation

Table 6.3: System structure evaluation results.

Do you believe that the current site structure with respect to the governmental structure is useful in terms of:	Mean	Std. Deviation	%	Degree
Distribution of region dedicated information	4.78	0.593	95.6%	High
Public Communication	4.86	0.425	97.2%	High
Public Awareness	4.83	0.453	96.6%	High
Information reach ability	4.79	0.487	95.8%	High
Did the services of the system appear to be organized logically on the screen	4.73	0.546	94.6%	High
Distribution of region dedicated services	4.7	0.642	94%	High

Ease of use and navigation with respect for flood crisis phases	4.66	0.672	93.2%	High
Service Effectiveness	4.64	0.695	92.8%	High
Average	4.74	0.56	94.9%	High

C. System Framework Learn ability

Table 6.4: System framework learn ability evaluation results

Learnability of system framework in relation to floods	Mean	Std. Deviation	%	Degree
Did you understand the services first time?	4.88	0.344	97.6%	High
Was it easy to find the required information on flood crisis using system framework?	4.84	0.431	96.8%	High
When using the system was it clear what you were expected to do in relation to flood crisis?	4.75	0.524	95%	High
Did the System behave in the way you expected in relation to flood crisis?	4.75	0.524	95%	High
Did the System have distracting features in relation to flood crisis events?	1.11	0.386	22.2%	low
Average	4.066	0.4418	81.32%	High

D. System Framework Functionalities

Table 6.5: System Framework Functionality Evaluation Results

System Framework Functionality in Relation To Flood Crisis	Mean	Std. Deviation	%	Degree
Have the presented system services and functionalities manage to raise flood awareness for you	4.82	0.446	96.4%	High
Was it clear what the different parts of the system services were in relation to flood crisis?	4.79	0.476	95.8%	High
Did the system allow you to perform the needed services in relation to flood crisis	4.78	0.503	95.6%	High

Was it clear where governmental personnel could be contacted	4.69	0.636	93.8%	High
Have the system services and functionalities manage to enhance the communication with the governmental representatives	4.69	0.655	93.8%	High
Was it clear how governmental personnel could be contacted?	4.68	0.617	93.6%	High
Was it clear why governmental personnel could be contacted	4.61	0.697	92.2%	High
Did you get relevant feedback from the government side when necessary?	4.43	0.878	88.6%	High
Average	4.68	0.61	93.72%	High

E. System Framework Helpfulness

Table 6.6: System Framework Helpfulness Evaluation Results

Helpfulness of the system in relation to flood crisis	Mean	Std. Deviation	%	Degree
Were there sufficient instructions for handling flood events	4.76	0.516	95.2%	High
Were appropriate help services available for flood events?	4.73	0.601	94.6%	High
Did you feel the System helped you if you got confused during flood crisis?	4.71	0.548	94.2%	High
Was it clear what actions you could take at any stage of flood event?	4.71	0.605	94.2%	High
Did system alerts and messages indicate what to do during flood crisis?	4.68	0.649	93.6%	High
Did the system inform you of about the threats related to flood crisis	4.65	0.605	93%	High
Average	4.70	0.587	94.13%	High

F. System Framework Rating Services (Crisis Related)

Table 6.7: System Framework Rating Services

How would you rate the use and effectiveness of provided services and functionalities for flood crisis event in BiH - Crisis Related	Mean	Std. Deviation	%	Degree
Shelter Locations	4.94	0.244	98.8%	High
Subscribing for Alerts	4.92	0.288	98.4%	High
Report Missing Person	4.87	0.38	97.4%	High
Missing person List	4.86	0.384	97.2%	High
Report a crisis	4.85	0.469	97%	High
Flood Maps	4.84	0.478	96.8%	High
Flood Gallery	4.79	0.643	95.8%	High
Volunteers	4.77	0.546	95.4%	High
Flood Videos	4.72	0.751	94.4%	High
Connecting with METEOALARAM website	4.08	1.396	81.6%	High
Average	4.764	0.5579	95.28%	High

G. System Framework Rating Services (Flood Awareness)

Table 6.8: System Framework Rating Services of Flood Awareness

How would you rate the use and effectiveness of provided services and functionalities for flood crisis event in BiH -Flood Awareness	Mean	Std. Deviation	%	Degree
Planning for floods	4.92	0.297	98.4%	High
Information about floods	4.89	0.352	97.8%	High
Preparedness Video	4.78	0.525	95.6%	High
The Cost of Flooding	4.64	0.898	92.8%	High
Levee Simulator	4.5	0.895	90%	High
Flood Risk Scenarios	4.42	0.888	88.4%	High
Average	4.69	0.6425	93.83%	High

H. System Framework Rating Services (Site General Services)

Table 6.9: System Framework Rating Service of Site General Services

How would you rate the use and effectiveness of provided services and functionalities for flood crisis event in BiH -Site General Services	Mean	Std. Deviation	%	Degree
Region Weather information	4.87	0.342	97.4%	High
Flood Alert Warning Sign	4.81	0.447	96.2%	High
Global News	4.74	0.587	94.8%	High
Events Calendar	4.73	0.596	94.6%	High
Search feature	4.71	0.605	94.2%	High
Global Articles	4.7	0.676	94%	High
Contacts	4.67	0.681	93.4%	High
Commenting on Articles	4.66	0.62	93.2%	High
WebLinks	4.63	0.665	92.6%	High
Donations	4.38	1.038	87.6%	High
Printing / Email Articles	4.16	1.234	83.2%	High
Show Online Users	3.34	1.517	66.8%	High
Archive	3.2	1.677	64%	High
Average	4.430	0.82	88.61%	High

I. System Framework Rating Services (Use of Social Media)

Table 6.10: System Framework Rating Services use of Social Media

How would you rate the use and effectiveness of provided services and functionalities for flood crisis event in BiH -Use of Social Media	Mean	Std. Deviation	%	Degree
Sharing articles on social media	4.79	0.647	95.8%	High
Connecting with Center 112	4.7	0.747	94%	High
Connecting Through Twitter	4.61	0.878	92.2%	High
Connecting with Facebook Group Oriented for flood crisis in BiH	4.43	1.012	88.6%	High
Average	4.6325	0.821	92.65%	High

J. System Framework Rating Services (Connecting with Government)

Table 6.11: System Framework Rating Services of Connecting with Government

How would you rate the use and effectiveness of provided services and functionalities for flood crisis event in BiH -Connecting with Government	Mean	Std. Deviation	%	Degree
Reading information related to your region	4.74	0.635	94.8%	High
Contacting Governmental representative	4.62	0.726	92.4%	High
Connecting with governmental agencies through Web links	4.57	0.86	91.4%	High
Receiving feedback from governmental representatives	4.31	1.188	86.2%	High
Average	4.56	0.85225	91.2%	High

K. System Framework Navigation-ability

Table 6.12: System Framework Navigation-ability

Navigation-ability of the System	Mean	Std. Deviation	%	Degree
Was there a consistent procedure for moving around the system?	4.91	0.35	98.2%	High
Were you able to choose the route you wished to take in terms of governmental structure in BiH?	4.9	0.373	98%	High
Was it clear to you where you were in the system web page?	4.87	0.377	97.4%	High
Were you certain how to proceed within the system services?	4.81	0.413	96.2%	High
Did the organization of the system fit your perception of the required services?	4.53	0.789	90.6%	High
Average	4.804	0.4604	96.08%	High

L. System Framework Quality

Table 6.13: System Framework Quality

System Quality	Mean	Std. Deviation	%	Degree
Were the icons and symbols easy to recognize and understand?	4.78	0.49	95.6%	High
Did you find that the information was presented consistently?	4.78	0.517	95.6%	High
Was the language clear?	4.77	0.62	95.4%	High
Were the multimedia components (such as graphics and text) complementary?	4.76	0.523	95.2%	High
If there was visual material, was the size of it suitable for the screen?	4.75	0.587	95%	High
Was it possible to print certain parts of information you wanted to keep?	4.74	0.576	94.8%	High
Did you find the information was presented attractively?	4.68	0.748	93.6%	High
Average	4.75	0.58	95.%	High

M. System Classification

Table 6.14: System Framework Classification

What do you think the system was trying to be?	Mean	Std. Deviation	%	Degree
Flood Awareness and preparedness System	4.8	0.492	96%	High
Floods Communication Framework System	4.71	2.256	94.2%	High
Average	4.755	1.374	95.1%	High

N. Satisfaction with System Framework

Table 6.15: System Framework Satisfaction

		Frequency	Percent
Did you enjoy using the System?	Yes	300	94.6%

	No	17	5.4%
	Total	317	100%

Table 6.16: System Framework Satisfaction

		Frequency	Percent
Would you use such system framework again?	Yes	298	94%
	No	19	6%
	Total	317	100%

Table 6.17: System Framework Satisfaction

		Frequency	Percent
Would you recommend the system framework for other users?	Yes	303	95.6%
	No	14	4.4%
	Total	317	100%

6.3.2. Public Questionnaire Relations Results

This section will present the results of relations among questions defined previously, in order to outline and have better understanding of the results.

A. **Relation-1:** *(Hardware Used) x (Framework Use Satisfaction)*

Table 6.18: Correlation and Chi2 results for Hardware use and Framework Satisfaction

			Did you enjoy using the System?		Total
			Yes	No	
Hardware Used	PC	Count	244	10	254
		% of Total	77.00%	3.20%	80.10%
	Smart Phone	Count	37	4	41
		% of Total	11.70%	1.30%	12.90%
	Tablet Devices	Count	19	3	22
		% of Total	6.00%	0.90%	6.90%
Total		Count	300	17	317
		% of Total	94.60%	5.40%	100.00%
P-Value			0.063		

B. Relation-2: (*Framework Use Satisfaction*) x (*System Structure Evaluation*)

Table 6.19: Independent Sample T-Test for Framework use Satisfaction and System Structure Evaluation

Did you enjoy using the System?		N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
System Structure Evaluation	Yes	300	4.7938	0.36144	9.587	315	0.000*
	No	17	3.9076	0.51493			

C. Relation-3: (*System Structure Evaluation*) x (*Hardware Used*)

Table 6.20: One Way ANOVA for Framework Structure Evaluation and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Structure Evaluation	PC	254	4.78	0.403	5.018	0.007*
	Smart Phone	41	4.70	0.434		
	Tablet Device	22	4.49	0.516		
	Total	317	4.75	0.421		

D. Relation-4: (*System Framework Learnability*) x (*Hardware Used*)

Table 6.21: One Way ANOVA for Framework Learnability and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Learnability	PC	254	4.08	0.233	4.8	0.009*
	Smart Phone	41	4.05	0.257		
	Tablet Device	22	3.90	0.551		
	Total	317	4.07	0.273		

E. Relation-5: (System Framework Functionalities) x (Hardware Used)

Table 6.22: One Way ANOVA for Framework Functionalities and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Functionalities	PC	254	4.73	0.418	6.433	0.002*
	Smart Phone	41	4.60	0.541		
	Tablet Device	22	4.38	0.767		
	Total	317	4.69	0.474		

F. Relation-6: (System Framework Helpfulness) x (Hardware Used)

Table 6.23: One Way ANOVA for Framework Helpfulness and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Helpfulness	PC	254	4.74	0.369	6.462	0.002*
	Smart Phone	41	4.62	0.493		
	Tablet Device	22	4.44	0.676		
	Total	317	4.71	0.421		

G. Relation-7: (System Framework Rating (Crisis Related)) x (Hardware Used)

Table 6.24: One Way ANOVA for Framework Rating (Crisis Related) and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Rating Services (Crisis Related)	PC	254	4.79	0.334	3.013	0.051
	Smart Phone	41	4.70	0.389		
	Tablet Device	22	4.62	0.447		
	Total	317	4.76	0.353		

H. Relation-8: (*System Framework Rating (Site General Services) x (Hardware Used)*)

Table 6.25: One Way ANOVA for Framework Rating (Site General Services) and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Rating Services (Site General Services)	PC	254	4.48	0.446	8.842	0.000*
	Smart Phone	41	4.29	0.544		
	Tablet Device	22	4.10	0.588		
	Total	317	4.43	0.482		

I. Relation-9: (*System Framework Rating (Flood Awareness) x (Hardware Used)*)

Table 6.26: 6.26: One Way ANOVA for Framework Rating (Flood Awareness) and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Rating Services (Flood Awareness)	PC	254	4.71	0.387	1.922	0.148
	Smart Phone	41	4.57	0.540		
	Tablet Device	22	4.69	0.486		
	Total	317	4.69	0.418		

J. Relation-10: (*System Framework Rating (Use of Social Media) x (Hardware Used)*)

Table 6.27: One Way ANOVA for Framework Rating (Use of Social Media) and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Rating Services (Use of Social Media)	PC	254	4.68	0.548	5.233	0.006*
	Smart Phone	41	4.55	0.710		
	Tablet Device	22	4.26	0.911		
	Total	317	4.63	0.609		

K. Relation-11: (System Framework Rating (Connecting with Government)) \times (Hardware Used)

Table 6.28: One Way ANOVA for Framework Rating (Connecting with Government) and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Rating Services (Connecting with Government)	PC	254	4.59	0.557	1.79	0.169
	Smart Phone	41	4.49	0.888		
	Tablet Device	22	4.34	0.888		
	Total	317	4.56	0.636		

L. Relation-12: (System Framework Navigation-ability) \times (Hardware Used)

Table 6.29: One Way ANOVA for System Framework Navigation-ability and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Navigation-ability	PC	254	4.84	0.287	9.356	0.000*
	Smart Phone	41	4.73	0.409		
	Tablet Device	22	4.55	0.512		
	Total	317	4.81	0.333		

M. Relation-13: (System Framework Quality) \times (Hardware Used)

Table 6.30: One Way ANOVA for System Framework Quality and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Framework Quality	PC	254	4.81	0.376	19.298	0.000*
	Smart Phone	41	4.67	0.524		
	Tablet Device	22	4.25	0.590		

	Total	317	4.75	0.438		
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N. Relation-14: (System Classification) x (Hardware Used)

Table 6.31: One Way ANOVA for System Classification and Hardware Used

		N	Mean	Std. Deviation	F	Sig.
System Classification	PC	254	4.82	1.280	2.971	0.053
	Smart Phone	41	4.65	0.551		
	Tablet Device	22	4.20	0.527		
	Total	317	4.75	1.181		

6.3.3. Public Questionnaire Results – Qualitative

A. Three Best Aspects of the System Framework Design

Table 6.32: System Framework Best Aspects

What are the 3 best aspects of the system?	<i>Identified Result</i>	<i>Percent</i>
What are the 3 best aspects of the system?	Providing Service for floods	23.1%
	Sharing information	20.4%
	Using Social Media	19.3%
	Raise Awareness towards floods	14.2%
	Flood preparation	9.2%
	Connecting with Government	5.0%
	Connecting people	3.9%
	All services in one location	3.6%
	Adjustable for Mobile	1.1%
	Ease of Use	0.4%
	Participated in answering this question	

B. The Three Worst Aspect of the System Design

Table 6.33: System Framework Worst Aspects

What are the 3 negative aspects of the system design?	<i>Identified Result</i>	<i>Percent</i>
	System lack of content for a region	24.8%
	Lack of governmental representation- other entities	19.4%
	Lack of Services	17.8%
	System lack of content for governmental representatives	9.3%
	System used Layout- mainly first page	9.3%
	System lack of content for a situation	4.7%
	System performance -latency in response	3.9%
	Lack of sufficient services to connect with government	3.9%
	System used Multimedia	3.1%
Participated in answering this question		21%

C. Changes for making the system better

Table 6.34: System Framework change Demands

What changes would you make to the system to make it better for the user?	<i>Identified Result</i>	<i>Percent</i>
	Languages	34%
	More Services	24%
	Mobile Technologies	20%
	Connect more Governmental Authorities	15%
Participated in answering this question		13%

D. Changes for making the system better (More Services)

Table 6.35: More Services Identified Options

(More Services)	<i>Identified Result</i>	<i>Percent</i>
	Chat services	40%
	Discussion Services	40%
	Flood Mapping	10%
	General	10%

Participated in answering this question	40% out of 13%
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E. Irritating feature Of the System Design

Table 6.36: System Framework Irritating Features

Did you find any design feature of the System Framework irritating?	<i>Identified Result</i>	<i>Percent</i>
	Presentation	80%
	System Response	20%
Participated in answering this question		3%

6.3.4. Governmental Questionnaire Results - Quantitative

The actual response for the questionnaire came from 48 governmental users. The data was digitized into SPSS file and analysed based on defining the, frequencies, mean, standard deviation and percentages with respect to each question in the study. The results will be presented based on the categories presented in the questionnaire. In terms of average distribution it was classified as:

- High degree of approval: include paragraphs that got the mean averages greater than (3.66) and the largest percentage (73.2%).
- The degree of approval medium: It includes a set paragraphs which range mean to the calculation of (2.34-3.66) and percentage (46.8% -73.2%).
- Low degree of approval: include paragraphs that group got less than mean averages (2.34) and a lower percentage of (46.8%).

A. Hardware Usage

Table 6.37: Governmental Hardware Preferences to Navigate the System

How did you navigate the system framework?		Frequency	Percent
Hardware Used	PC	37	77.1%
	Smart Phone	9	18.8%
	Tablet Device	2	4.2%
	Total	48	100%

B. System Framework used Role

Table 6.38: Governmental Roles Participation in System Framework

Suitable Roles	Frequency	Percent
Operator at Centre 121	16	33.6%
Associate for communications & IT	10	21%
Governmental Associate	8	16%
Governmental Officer	4	8.4%
On duty operator	4	8.4%
Assistant Directors	3	6.3%
Senior Advisors	3	6.3%
Total	48	100%

C. Framework and Roles Relation

Table 6.39: Governmental roles and Suitability for System Framework

	Response	Frequency	Percent
1.2 Do you believe that your current job can be related to the system framework provided services and functionalities?	Yes	48	100%

D. Framework used Roles

Table 6.40: Governmental used Roles in System Framework

Suitable Roles	Response	Frequency	Percent
Administrator	Yes	44	91.7%
	No	4	8.3%
Manager	Yes	34	70.8%
	No	14	29.2%
Publisher	Yes	26	54.2%
	No	22	45.8%
Editor	Yes	23	47.9%

	No	25	52.1%
Author	Yes	32	66.7%
	No	16	33.3%
	Total	48	100%

E. Governmental Participating Authorities

Table 6.41: Governmental Participating Authorities in System Framework

Participating Authority	Frequency	Percent
Canton Hercegovacko - neretvanski	1	2.1%
Canton Sarajevo	8	16.7%
Canton Tuzla	2	4.2%
Canton Unsko-sanski	1	2.1%
Federation level	11	22.9%
Region Banja Luka	1	2.1%
Republica Srpska	4	8.3%
State level	20	41.7%
Total	48	100%

F. System Framework Acceptance

Table 6.42: System Framework Acceptance by Governmental Users

Framework Acceptance		Frequency	Percent
Did you enjoy using the System?	Yes	46	95.8%
	No	2	4.2%
Would you use such system framework again?	Yes	40	83.3%
	No	8	16.7%
Would you recommend the system framework for other users?	Yes	43	89.6%
	No	5	10.4%
	Total	48	100%

G. Framework Structure Acceptance

Table 6.43: Framework Structure Acceptance by Governmental Users

The provided system structure has managed to	Mean	Std. Deviation	%	Degree
Provided Flexibility in Choosing and selecting the needed Services	4.83	0.377	96.6%	High
Provided better services for public with respect to the diversity of BiH public ethnicity	4.79	0.582	95.8%	High
Managed to provide Unified Framework for public awareness and communication	4.75	0.438	95%	High
Provided a structure that can adapt other governmental authorities to participate in the framework	4.75	0.526	95%	High
Provided the needed services with respect to the system structure	4.71	0.544	94.2%	High
Provide Services with respect to Flood Crisis Phases	4.69	0.589	93.8%	High
Simulate the structural diversity in BiH government Structure	4.52	0.652	90.4%	High
Average	4.72	0.529714	94.4%	High

H. System Framework Usability

Table 6.44: Framework Structure Usability by Governmental Users

In regard for the usability of the system I believe	Mean	Std. Deviation	%	Degree
The presented system framework interface and layout is easy to use	4.83	0.377	96.6%	High
The use of social media services in the system are clear and useful	4.79	0.459	95.8%	High
The used services are well integrated and sufficient	4.56	0.681	91.2%	High

I would like to use this system for flood crisis communication and awareness in BiH	4.48	0.772	89.6%	High
The framework is unnecessarily complex to use	1.79	1.271	35.8%	Low
Average	4.09	0.712	81.8%	High

I. System Framework Effectiveness (General)

Table 6.45: Framework Structure Effectiveness Evaluation by Governmental Users

With respect to the used services rate the following	Mean	Std. Deviation	%	Degree
The System Framework was effective through the distributed user privileges	4.83	0.377	96.6%	High
The system framework is reachable for majority of the public in BiH	4.79	0.41	95.8%	High
The System framework manage to utilize social media effectively for flood crisis in BiH	4.75	0.484	95%	High
The system managed to effectively utilize volunteering services	4.69	0.512	93.8%	High
The system Framework was effective is grouping news sources for the public	4.69	0.512	93.8%	High
The system managed to provide sufficient tools for government to government communication	4.52	0.85	90.4%	High
The System managed to provide sufficient tools for Government to Public communication	4.4	0.984	88%	High
Average	4.66	0.589	93.34%	High

J. System Framework Effectiveness (Government to Government)

Table 6.46: Framework Structure Effectiveness in Government to Government Services

Rate the effectiveness of the following services in terms of government to government cooperation	Mean	Std. Deviation	%	Degree
Subscribing for Alerts	4.87	0.334	97.4%	High
Define Shelter Locations	4.83	0.377	96.6%	High
Sharing unified Social Media Policy	4.81	0.394	96.2%	High
Meeting Request	4.79	0.41	95.8%	High
Creating Articles	4.77	0.425	95.4%	High
Reporting a Crisis	4.77	0.425	95.4%	High
Requested Documents	4.77	0.425	95.4%	High
Viewing Volunteers	4.75	0.438	95%	High
Missing Person Lists	4.75	0.438	95%	High
Viewing a Crisis Report	4.75	0.438	95%	High
Assistance Requests	4.71	0.544	94.2%	High
Notifications of Accidents	4.71	0.582	94.2%	High
Sharing Video Galleries	4.62	0.677	92.4%	High
Governmental Picture / Videos	4.6	0.676	92%	High
Governmental Calendar	4.52	0.684	90.4%	High
Average	4.73	0.484	94.69%	High

K. System Framework Effectiveness (Government to Public)

Table 6.47: Framework Structure Effectiveness in Government to Public Services

Rate the effectiveness of the following services in terms of government to Public cooperation	Mean	Std. Deviation	%	Degree
Flood Maps	4.83	0.377	96.6%	High
Connecting with Social Media -Facebook	4.83	0.377	96.6%	High
Report a Crisis	4.81	0.394	96.2%	High
Posting Articles	4.81	0.394	96.2%	High

Missing Person Lists	4.81	0.394	96.2%	High
Subscribing to Alerts	4.81	0.394	96.2%	High
Shelter Locations	4.79	0.41	95.8%	High
Volunteers	4.75	0.438	95%	High
Report Missing Person	4.73	0.449	94.6%	High
Connecting with Social Media -Twitter	4.69	0.624	93.8%	High
Contacts	4.67	0.63	93.4%	High
Global News	4.63	0.64	92.6%	High
Floods Tutorials and Simulations	4.63	0.733	92.6%	High
Flood Galleries	4.58	0.613	91.6%	High
Flood Videos	4.58	0.613	91.6%	High
Connecting with Social Media – RSS Feeds	4.58	0.794	91.6%	High
Web Links	4.49	0.621	89.8%	High
Events	4.48	0.743	89.6%	High
Donations	4.13	1.003	82.6%	High
Archive	3.35	1.176	67%	Medium
Average	4.59	0.590	91.98%	High

L. System Framework Communication

Table 6.48: Framework Structure Communication Satisfaction with Provided Services

The system framework enhanced the communication activities with respect to the traditional approach by providing	Mean	Std. Deviation	%	Degree
Post Flood Crisis Communication	4.85	0.357	97%	High
During Flood Crisis Communication	4.81	0.445	96.2%	High
Different Social media services	4.81	0.394	96.2%	High
Using different medium for communications (Tablet/PC/ Mobile)	4.77	0.425	95.4%	High
Pre-Flood Crisis Communication	4.75	0.438	95%	High
Feedbacks	4.58	0.539	91.6%	High
Just in Time Communication Channels	4.5	0.772	90%	High
Average	4.72	0.481	94.48%	High

M. System Framework Communication Tools

Table 6.49: Framework Structure Communication Satisfaction with Provided Tools

Which of the following tools were effective for providing communication channels with respect for flood crisis	Mean	Std. Deviation	%	Degree
Social media services	4.85	0.357	97%	High
Email Subscription for Alerts	4.81	0.394	96.2%	High
Events	4.73	0.449	94.6%	High
Forms	4.69	0.689	93.8%	High
Contacts	4.58	0.539	91.6%	High
Articles	4.5	0.899	90%	High
Web Links	4.44	0.769	88.8%	High
Average	4.65	0.585	93.14%	High

N. System Framework Awareness

Table 6.50: Framework Structure Awareness Satisfaction with Provided Services

The system framework has raised my awareness Towards	Mean	Std. Deviation	%	Degree
Importance of Governmental Collaboration	4.71	0.651	94.2%	High
Public Needs During Flood Crisis in BiH	4.54	0.713	90.8%	High
Flood Crisis Impact on the public BiH	4.52	0.714	90.4%	High
Flood Crisis Governmental overall Activities	4.46	0.922	89.2%	High
Average	4.55	0.75	91.15%	High

O. System Framework Major Role

Table 6.51: Framework Structure Major Role

What do you think the system was trying to be?	Mean	Std. Deviation	%	Degree
Flood Awareness and preparedness System	4.75	0.438	95%	High
Floods Communication Framework System	4.52	0.772	90.4%	High
Average	4.635	0.605	92.7%	High

6.3.5. Governmental Questionnaire Relations Results

This section will present the results of relations among questions defined previously, in order to outline and have better understanding of the results.

A. Relation-1 : (Hardware Used) x (Framework Use Satisfaction-A)

Table 6.52: Correlation and Chi2 results for Hardware use and Framework Satisfaction

A			Did you enjoy using the System?		Total
			Yes	No	
How did you navigate the system?	PC	N	36	1	37
		%	75.00%	2.10%	77.10%
	Smart Phone	N	8	1	9
		%	16.70%	2.10%	18.80%
	Tablet Device	N	2	0	2
		%	4.20%	0.00%	4.20%
Total		N	46	2	48
		%	95.80%	4.20%	100.00%
P-Value			0.503		

B. Relation-2 : (Hardware Used) x (Framework Use Satisfaction-B)

Table 6.53: Correlation and Chi2 results for Hardware use and Framework Satisfaction

B			Would you use such system framework again?		Total
			Yes	No	
How did you navigate the system?	PC	N	32	5	37
		%	66.70%	10.40%	77.10%
	Smart Phone	N	6	3	9
		%	12.50%	6.20%	18.80%
	Tablet Device	N	2	0	2
		%	4.20%	0.00%	4.20%
Total		N	40	8	48
		%	83.30%	16.70%	100.00%

P-Value	0.292
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C. Relation-3 : *(Hardware Used) x (Framework Use Satisfaction-C)*

Table 6.54: Correlation and Chi2 results for Hardware use and Framework Satisfaction

C			Would you recommend the system framework for other users?		Total
			Yes	No	
How did you navigate the system?	PC	N	33	4	37
		%	68.80%	8.30%	77.10%
	Smart Phone	N	8	1	9
		%	16.70%	2.10%	18.80%
	Tablet Device	N	2	0	2
		%	4.20%	0.00%	4.20%
Total		N	43	5	48
		%	89.60%	10.40%	100.00%
P-Value			0.885		

D. Relation-4 : *(Hardware Used) x (Framework Structure Acceptance)*

Table 6.55: One Way ANOVA results for Hardware use and Framework Structure Acceptance

	How did you navigate the system?	N	Mean	Std. Deviation	F	Sig.
Framework Structure Acceptance	PC	37	4.73	0.369	0.224	0.8
	Smart Phone	9	4.67	0.440		
	Tablet Device	2	4.86	0.000		
	Total	48	4.72	0.373		

E. Relation-5 : *(Hardware Used) x (System Framework Usability)*

Table 6.56: One Way ANOVA results for Hardware use and System Framework Usability

	How did you navigate the system?	N	Mean	Std. Deviation	F	Sig.
System	PC	37	4.14	0.408	1.045	0.36

Framework Usability	Smart Phone	9	3.93	0.283		
	Tablet Device	2	4.00	0.283		
	Total	48	4.09	0.387		

F. Relation-6 : (Hardware Used) x (System Framework Effectiveness (Government to Government))

Table 6.57: One Way ANOVA results for Hardware use and System Framework Effectiveness (G2G)

	How did you navigate the system?	N	Mean	Std. Deviation	F	Sig.
System Framework Effectiveness (Government to Government)	PC	37	4.78	0.362	1.641	0.205
	Smart Phone	9	4.53	0.489		
	Tablet Device	2	4.90	0.047		
	Total	48	4.74	0.389		

G. Relation-7: (Hardware Used) x (System Framework Major Role)

Table 6.58: One Way ANOVA results for Hardware use and System Framework Major Role

	How did you navigate the system?	N	Mean	Std. Deviation	F	Sig.
System Framework Major Role	PC	37	4.66	0.374	1.802	0.177
	Smart Phone	9	4.44	0.583		
	Tablet Device	2	5.00	0.000		
	Total	48	4.64	0.422		

H. Relation-8 : (Job Roles) x (System Framework Role- Administrator)

Table 6.59: Correlation and Chi2 results for Job Roles use and System Framework Role - Administrator

			Role 1- Administrator		Total
			No	Yes	
What is your current job role	All Job Roles	N	0	44	1
		%	0.00%	91.70%	91.70%
	Associate for General Affairs and	N	1	0	1

	Human Resources	%	2.10%	0.00%	2.10%
	IT technician	N	1	0	1
		%	2.10%	0.00%	2.10%
	Senior Associate for International Cooperation and Coordination	N	1	0	1
		%	2.10%	0.00%	2.10%
	The head of the Cantonal Operations Center	N	1	0	1
		%	2.10%	0.00%	2.10%
	Total	N	4	44	48
		%	8.30%	91.70%	100.00%
P-Value			0.034*		

I. Relation-9 : (Job Roles) x (System Framework Role- Manager)

Table 6.60: Correlation and Chi2 results for Job Roles use and System Framework Role - Manager

			Role 2 - Manager		Total	
			No	Yes		
What is your current job role	All Job Roles	N	0	34	1	
		%	0.00%	70.80%	70.80%	
	An employee in the sector for fire fighting	N	1	0	1	
		%	2.10%	0.00%	2.10%	
	Associate for communications	N	1	0	1	
		%	2.10%	0.00%	2.10%	
	IT technician	N	3	1	4	
		%	6.30%	2.10%	8.40%	
	On duty operator	N	3	0	3	
		%	6.20%	0.00%	6.20%	
	Operator at centre 121	N	6	4	9	
		%	12.50%	18.70%	31.10%	
	Total		N	14	34	48
			%	29.20%	70.80%	100.00%
	P-Value			0.461		

J. Relation-10 : (Job Roles) x (System Framework Role- Publisher)

Table 6.61: Correlation and Chi2 results for Job Roles use and System Framework Role - Publisher

		Role 3- Publisher		Total		
		0	1			
What is your current job role	All Job Roles	N	0	26	26	
		%	0.00%	54.20%	54.20%	
	Associate for General Affairs and Human Resources	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Associate for IT	N	1	1	2	2
		%	2.10%	2.10%	4.20%	4.20%
	Associate for Telecommunications	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	IT Operator	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Officer in the sector of civil protection	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Official at the Department of Operations	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	On duty operator	N	2	1	3	3
		%	4.20%	2.10%	6.20%	6.20%
	Operator at 112 center	N	4	2	6	6
		%	8.30%	4.20%	12.50%	12.50%
	Operator at service 121	N	2	3	5	5
		%	4.20%	6.20%	10.40%	10.40%
	Operator in the operations center of civil protection	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Operator of Information and Communication Technologies	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Senior Advisor for Telecommunications	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%
	Senior associate for Cybernetics and safety	N	1	0	1	1
		%	2.10%	0.00%	2.10%	2.10%

Senior Associate for International Cooperation and Coordination	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior associate for mining in the Cantonal Administration civil protection	N	1	0	1
	%	2.10%	0.00%	2.10%
Total	N	22	26	48
	%	45.80%	54.20%	100.00%
P-Value		0.413		

K. Relation-11 : (Job Roles) x (System Framework Role- Editor)

Table 6.62: Correlation and Chi2 results for Job Roles use and System Framework Role - Editor

		Role 4- Editor			Total
		No	Yes		
What is your current job role	All Job Roles	N	0	23	23
		%	0%	47.90%	47.90%
	An employee in the sector for fire fighting	N	1	0	1
		%	2.10%	0.00%	2.10%
	Assistant Director of Planning and Training	N	1	0	1
		%	2.10%	0.00%	2.10%
	Associate for General Affairs and Human Resources	N	1	0	1
		%	2.10%	0.00%	2.10%
	Associate for IT	N	1	1	2
		%	2.10%	2.10%	4.20%
	Associate for measures of protection and rescue	N	1	0	1
		%	2.10%	0.00%	2.10%
	Associate for Telecommunications	N	1	0	1
		%	2.10%	0.00%	2.10%
	IT Operator	N	1	0	1
		%	2.10%	0.00%	2.10%
	Officer in the sector of civil protection	N	1	0	1
		%	2.10%	0.00%	2.10%
	Official at the Department of	N	1	0	1
		%	2.10%	0.00%	2.10%

Operations	%	2.10%	0.00%	2.10%
On duty operator	N	2	1	3
	%	4.20%	2.10%	6.20%
Operator at 112 center	N	4	2	6
	%	8.30%	4.20%	12.50%
Operator at center 121	N	2	2	4
	%	4.20%	4.20%	8.30%
Operator in the operations center of civil protection	N	1	0	1
	%	2.10%	0.00%	2.10%
Operator of Information and Communication Technologies	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior Advisor for Telecommunications	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior associate for Cybernetics and safety	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior Associate for Information Technology	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior Associate for International Cooperation and Coordination	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior associate for mining in the Cantonal Administration civil protection	N	1	0	1
	%	2.10%	0.00%	2.10%
Senior associate for telecommunications	N	1	0	1
	%	2.10%	0.00%	2.10%
Total	N	25	23	48
	%	52.10%	47.90%	100.00%
P-Value		0.373		

L. **Relation-12** : (Job Roles) x (System Framework Role- Author)

Table 6.63: Correlation and Chi2 results for Job Roles use and System Framework Role - Author

		Role 5-Author		Total	
		No	Yes		
What is your current job role	An employee in the sector for fire fighting	N	0	32	
		%	0.00%	66.70%	
	Associate for communications	N	1	0	1
		%	2.10%	0.00%	2.10%
	Associate for Communications	N	1	0	1
		%	2.10%	0.00%	2.10%
	Associate for IT	N	1	1	2
		%	2.10%	2.10%	4.20%
	Officer in the sector of civil protection	N	1	0	1
		%	2.10%	0.00%	2.10%
	On duty operator	N	1	2	3
		%	2.10%	4.20%	6.20%
	Operator at 112 center	N	2	4	6
		%	4.20%	8.30%	12.50%
	Operator at center 121	N	2	2	4
		%	4.20%	4.20%	8.30%
	Operator at service 121	N	2	3	5
		%	4.20%	6.20%	10.40%
	Senior Adviser for telecommunications	N	1	0	1
		%	2.10%	0.00%	2.10%
Senior associate for Cybernetics and safety	N	1	0	1	
	%	2.10%	0.00%	2.10%	
Total		N	16	32	
		%	33.30%	66.70%	
P-Value		0.725			

M. Relation-13 : (System Framework Satisfaction-A) x (System Framework Role-Administrator)

Table 6.64: Correlation and Chi2 results for System Framework Satisfaction use and System Framework Role – Administrator

A			Role 1- Administrator		Total
			No	Yes	
Did you enjoy using the System?	Yes	N	4	42	46
		%	8.30%	87.50%	95.80%
	No	N	0	2	2
		%	0.00%	4.20%	4.20%
Total		N	4	44	48
		%	8.30%	91.70%	100.00%
P-Value			0.663		

N. Relation-14 : (System Framework Satisfaction-A) x (System Framework Role-Manager)

Table 6.65: Correlation and Chi2 results for System Framework Satisfaction use and System Framework Role - Manager

A			Role 2 - Manager		Total
			No	Yes	
Did you enjoy using the System?	Yes	N	14	32	46
		%	29.20%	66.70%	95.80%
	No	N	0	2	2
		%	0.00%	4.20%	4.20%
Total		N	14	34	48
		%	29.20%	70.80%	100.00%
P-Value			0.354		

O. Relation-15 : (System Framework Satisfaction-A) x (System Framework Role-Publisher)

Table 6.66: Correlation and Chi2 results for System Framework Satisfaction use and System Framework Role - Publisher

A			Role 3- Publisher		Total
			No	Yes	

Did you enjoy using the System?	Yes	N	21	25	46
		%	43.80%	52.10%	95.80%
	No	N	1	1	2
		%	2.10%	2.10%	4.20%
Total		N	22	26	48
		%	45.80%	54.20%	100.00%
P-Value			0.904		

P. Relation-16 : (System Framework Satisfaction-A) x (System Framework Role- Editor)

Table 6.67: Correlation and Chi2 results for System Framework Satisfaction use and System Framework Role – Editor

A			Role 4- Editor		Total
			0	1	
Did you enjoy using the System?	Yes	N	24	22	46
		%	50.00%	45.80%	95.80%
	No	N	1	1	2
		%	2.10%	2.10%	4.20%
Total		N	25	23	48
		%	52.10%	47.90%	100.00%
P-Value			0.952		

Q. Relation-17 : (System Framework Satisfaction-A) x (System Framework Role- Author)

Table 6.68: Correlation and Chi2 results for System Framework Satisfaction use and System Framework Role - Auhtor

A			Role 5-Author		Total
			No	Yes	
Did you enjoy using the System?	Yes	N	14	32	46
		%	29.20%	66.70%	95.80%
	No	N	2	0	2
		%	4.20%	0.00%	4.20%
Total		N	16	32	48
		%	33.30%	66.70%	100.00%
P-Value			0.106		

R. **Relation-18** : (System Framework Satisfaction-B) x (System Framework Role-Administrator)

Table 6.69: Correlation and Chi2 results for System Framework Satisfaction – B use and System Framework Role – Administrator

B			Role 1- Administrator		Total
			No	Yes	
Would you use such system framework again?	Yes	N	4	36	40
		%	8.30%	75.00%	83.30%
	No	N	0	8	8
		%	0.00%	16.70%	16.70%
Total		N	4	44	48
		%	8.30%	91.70%	100.00%
P-Value			0.35		

S. **Relation-19** : (System Framework Satisfaction-B) x (System Framework Role-Manager)

Table 6.70: Correlation and Chi2 results for System Framework Satisfaction – B use and System Framework Role - Manager

B			Role 2 - Manager		Total
			No	Yes	
Would you use such system framework again?	Yes	N	11	29	40
		%	22.90%	60.40%	83.30%
	No	N	3	5	8
		%	6.20%	10.40%	16.70%
Total		N	14	34	48
		%	29.20%	70.80%	100.00%
P-Value			0.57		

T. **Relation-20** : (System Framework Satisfaction-B) x (System Framework Role-Publisher)

Table 6.71: Correlation and Chi2 results for System Framework Satisfaction – B use and System Framework Role - Publisher

B	Role 3- Publisher	Total
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			No	Yes	
Would you use such system framework again?	Yes	N	19	21	40
		%	39.60%	43.80%	83.30%
	No	N	3	5	8
		%	6.20%	10.40%	16.70%
Total		N	22	26	48
		%	45.80%	54.20%	100.00%
P-Value			0.604		

U. Relation-21 : (System Framework Satisfaction-B) x (System Framework Role- Editor)

Table 6.72: Correlation and Chi2 result for System Framework Satisfaction – B use and System Framework Role - Editor

B			Role 4- Editor		Total
			No	Yes	
Would you use such system framework again?	Yes	N	22	18	40
		%	45.80%	37.50%	83.30%
	No	N	3	5	8
		%	6.20%	10.40%	16.70%
Total		N	25	23	48
		%	52.10%	47.90%	100.00%
P-Value			0.366		

V. Relation-22: (System Framework Satisfaction-B) x (System Framework Role- Author)

Table 6.73: Correlation and Chi2 results for System Framework Satisfaction – B use and System Framework Role - Author

B			Role 5-Author		Total
			No	Yes	
Would you use such system framework again?	Yes	N	11	29	40
		%	22.90%	60.40%	83.30%
	No	N	5	3	8
		%	10.40%	6.20%	16.70%
Total		N	16	32	48
		%	33.30%	66.70%	100.00%
P-Value			0.55		

W. Relation-23: *(System Framework Satisfaction-C) x (System Framework Role-Administrator)*

Table 6.74: Correlation and Chi2 results for System Framework Satisfaction – C use and System Framework Role - Administrator

C			Role 1- Administrator		Total
			No	Yes	
Would you recommend the system framework for other users?	Yes	N	4	39	43
		%	8.30%	81.20%	89.60%
	No	N	0	5	5
		%	0.00%	10.40%	10.40%
Total		N	4	44	48
		%	8.30%	91.70%	100.00%
P-Value			0.476		

X. Relation-24 : *(System Framework Satisfaction-C) x (System Framework Role-Manager)*

Table 6.75: Correlation and Chi2 results for System Framework Satisfaction – C use and system Framework Role - Manager

C			Role 2 - Manager		Total
			No	Yes	
Would you recommend the system framework for other users?	Yes	N	13	30	43
		%	27.10%	62.50%	89.60%
	No	N	1	4	5
		%	2.10%	8.30%	10.40%
Total		N	14	34	48
		%	29.20%	70.80%	100.00%
P-Value			0.634		

Y. Relation-25 : *(System Framework Satisfaction-C) x (System Framework Role- Publisher)*

Table 6.76: Correlation and Chi2 results for System Framework Satisfaction – C use and System Framework Role - Publisher

C			Role 3- Publisher		Total
			No	Yes	
Would you recommend the system framework for other users?	Yes	N	20	23	43
		%	41.70%	47.90%	89.60%
	No	N	2	3	5
		%	4.20%	6.20%	10.40%
Total		N	22	26	48
		%	45.80%	54.20%	100.00%
P-Value			0.782		

Z. Relation-26 : *(System Framework Satisfaction-C) x (System Framework Role- Editor)*

Table 6.77: Correlation and Chi2 results for System Framework Satisfaction - C use and System Framework Role - Editor

C			Role 4- Editor		Total
			No	Yes	
Would you recommend the system framework for other users?	Yes	N	23	20	43
		%	47.90%	41.70%	89.60%
	No	N	2	3	5
		%	4.20%	6.20%	10.40%
Total		N	25	23	48
		%	52.10%	47.90%	100.00%
P-Value			0.568		

AA. Relation-27: *(System Framework Satisfaction-C) x (System Framework Role- Author)*

Table 6.78: Correlation and Chi2 results for System Framework Satisfaction – C use and System Framework Role - Author

C			Role 5-Author		Total
			No	Yes	
Would you recommend the	Yes	N	11	32	43

system framework for other users?		%	22.90%	66.70%	89.60%
	No	N	5	0	5
		%	10.40%	0.00%	10.40%
Total		N	16	32	48
		%	33.30%	66.70%	100.00%
P-Value			0.001*		

BB. Relation-28: *(System Framework Effectiveness(G2G)) x (System Framework Major Role)*

Table 6.79: Person Correlation results for System Framework Effectiveness (G2G) use and System Framework Major Role

		System Framework Effectiveness (Government to Government)
System Framework Major Role	Pearson Correlation	.608**

CC. Relation-29: *(Governmental Categories Questionnaire) x (System Framework Role- Administrator)*

Table 6.80: Independent Sample T-Test for Governmental Categories Questionnaire and System Framework Role - Administrator

	Role 1- Administrator	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Framework Structure Acceptance	Yes	44	4.74	0.357	1.241	46	0.221
	No	4	4.50	0.528			
System Framework Usability	Yes	44	4.12	0.387	1.601	46	0.116
	No	4	3.80	0.283			
System Framework Effectiveness (Government to Government)	Yes	44	4.74	0.397	0.457	46	0.65
	No	4	4.65	0.310			
System Framework	Yes	44	4.61	0.429	-	46	0.24

Major Role	No	4	4.88	0.250	1.191-		
System Framework Awareness	Yes	44	4.57	0.530	0.738	46	0.464
	No	4	4.38	0.250			
System Framework Effectiveness (Government to Public)	Yes	44	4.61	0.411	0.323	46	0.748
	No	4	4.54	0.229			
System Framework Effectiveness (General)	Yes	44	4.66	0.462	-	46	0.585
	No	4	4.79	0.247			
System Framework Communication Tools	Yes	44	4.65	0.455	-	46	0.666
	No	4	4.75	0.214			
System Framework Communication	Yes	44	4.74	0.324	1.225	46	0.227
	No	4	4.54	0.338			

DD. Relation-30: (Governmental Categories Questionnaire) x (System Framework Role- Manager)

Table 6.81: Independent Sample T-Test for Governmental Categories Questionnaire and System Framework Role - Manager

	Role 2 - Manager	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Framework Structure Acceptance	Yes	34	4.75	0.342	0.922	46	0.362
	No	14	4.64	0.444			
System Framework Usability	Yes	34	4.08	0.323	-	46	0.798
	No	14	4.11	0.525			
System Framework Effectiveness (Government to Government)	Yes	34	4.76	0.370	0.583	46	0.563
	No	14	4.68	0.441			
System Framework Major Role	Yes	34	4.69	0.348	1.443	46	0.156
	No	14	4.50	0.555			
System Framework	Yes	34	4.60	0.404	0.959	46	0.343

Awareness	No	14	4.45	0.722			
System Framework Effectiveness (Government to Public)	Yes	34	4.60	0.380	0.048	46	0.962
	No	14	4.60	0.453			
System Framework Effectiveness (General)	Yes	34	4.73	0.383	1.576	46	0.122
	No	14	4.51	0.562			
System Framework Communication Tools	Yes	34	4.66	0.461	0.047	46	0.963
	No	14	4.65	0.399			
System Framework Communication	Yes	34	4.75	0.303	0.854	46	0.397
	No	14	4.66	0.383			

EE. Relation-31 : (Governmental Categories Questionnaire) x (System Framework Role- Publisher)

Table 6.82: Independent Sample T-Test for Governmental Categories Questionnaire and System Framework Role - Publisher

	Role 3- Publisher	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Framework Structure Acceptance	Yes	26	4.69	0.383	-	46	0.578
	No	22	4.75	0.367	0.560-		
System Framework Usability	Yes	26	4.14	0.348	0.909	46	0.368
	No	22	4.04	0.430			
System Framework Effectiveness (Government to Government)	Yes	26	4.70	0.386	-	46	0.55
	No	22	4.77	0.398	0.603-		
System Framework Major Role	Yes	26	4.63	0.460	-	46	0.989
	No	22	4.64	0.384	0.014-		
System Framework Awareness	Yes	26	4.51	0.577	-	46	0.49
	No	22	4.61	0.435	0.695-		
System Framework	Yes	26	4.57	0.415	-	46	0.562

Effectiveness (Government to Public)	No	22	4.64	0.383	0.584-		
System Framework Effectiveness (General)	Yes	26	4.58	0.470	-	46	0.133
	No	22	4.77	0.406			
System Framework Communication Tools	Yes	26	4.64	0.456	-	46	0.731
	No	22	4.68	0.430			
System Framework Communication	Yes	26	4.71	0.365	-	46	0.693
	No	22	4.75	0.282			

FF.Relation-32 : *(Governmental Categories Questionnaire) x (System Framework Role-Editor)*

Table 6.83: Independent Sample T-Test for Governmental Categories Questionnaire and System Framework Role - Editor

	Role 4- Editor	N	Mean	Std. Deviation	t	df	Sig. (2- tailed)
Framework Structure Acceptance	Yes	23	4.65	0.422	-	46	0.229
	No	25	4.78	0.317			
System Framework Usability	Yes	23	4.14	0.397	0.812	46	0.421
	No	25	4.05	0.380			
System Framework Effectiveness (Government to Government)	Yes	23	4.69	0.422	-	46	0.49
	No	25	4.77	0.360			
System Framework Major Role	Yes	23	4.63	0.482	-	46	0.938
	No	25	4.64	0.369			
System Framework	Yes	23	4.53	0.604	-	46	0.753

Awareness	No	25	4.58	0.425	0.316-		
System Framework Effectiveness (Government to Public)	Yes	23	4.51	0.415	-	46	0.147
	No	25	4.68	0.371	1.477-		
System Framework Effectiveness (General)	Yes	23	4.57	0.514	-	46	0.134
	No	25	4.76	0.364	1.525-		
System Framework Communication Tools	Yes	23	4.68	0.437	0.382	46	0.704
	No	25	4.63	0.450			
System Framework Communication	Yes	23	4.67	0.379	-	46	0.264
	No	25	4.78	0.268	1.130-		

GG. Relation-33: (Governmental Categories Questionnaire) x (System Framework Role- Author)

Table 6.84: Independent Sample T-Test for Governmental Categories Questionnaire and System Framework Role – Author

	Role 5- Author	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Framework Structure Acceptance	Yes	32	4.69	0.413	-	46	0.395
	No	16	4.79	0.276	0.858-		
System Framework Usability	Yes	32	4.04	0.411	-	46	0.173
	No	16	4.20	0.318	1.385-		
System Framework Effectiveness (Government to Government)	Yes	32	4.72	0.408	-	46	0.674
	No	16	4.77	0.357	0.424-		
System Framework Major Role	Yes	32	4.70	0.437	1.598	46	0.117
	No	16	4.50	0.365			
System Framework	Yes	32	4.53	0.595	-	46	0.625

Awareness	No	16	4.61	0.302	0.493-		
System Framework Effectiveness (Government to Public)	Yes	32	4.57	0.417	-	46	0.524
	No	16	4.65	0.363			
System Framework Effectiveness (General)	Yes	32	4.65	0.481	-	46	0.677
	No	16	4.71	0.385			
System Framework Communication Tools	Yes	32	4.72	0.412	1.477	46	0.147
	No	16	4.53	0.477			
System Framework Communication	Yes	32	4.73	0.334	0.177	46	0.861
	No	16	4.71	0.322			

6.3.6. Governmental Questionnaire Results – Qualitative

A. Three Best Aspects of the System Framework Design

Table 6.85: System Framework Best Aspects

What are the 3 best aspects of the system?	<i>Identified Result</i>	<i>Percent</i>
What are the 3 best aspects of the system?	Flood Services in one place	26.1%
	Incorporation of Social Media	21.7%
	Effective use of different contents	17.4%
	Providing communication channels	13.0%
	Simplicity	8.7%
	Raising Awareness (Public)	7.2%
	The ability to include different governmental representation	5.8%
	Participated in answering this question	83.3%

B. Three Worst Aspects of the System Framework Design

Table 6.86: System Framework Worst Aspects

What are the 3 worst aspects of the system design?	<i>Identified Result</i>	<i>Percent</i>
	Content issues	45.9%
	More governmental representation	21.6%
	Lack of services	13.5%
	Need Continuous Update	10.8%
	Lack of Collaborative Services	5.4%
Participated in answering this question		77%

Table 6.87: System Framework Worst Aspects – Content Issues

Content Issues	<i>Identified Result</i>	<i>Percent</i>
	languages	35.3%
	Contact information	29.4%
	Site Layout	17.6%
	Size of files	11.8%
Participated in answering this question		54%

Table 6.88: System Framework Worst Aspects – Lack of Services

Lack of Services	<i>Identified Result</i>	<i>Percent</i>
	Mobile Technologies	80%
	Including other crisis situations	20%
Participated in answering this question		10%

C. Irritating Features of the System Framework Design

Table 6.89: System Framework Irritating Features

Did you find any design feature of the System Framework irritating?	<i>Identified Result</i>	<i>Percent</i>
	First Page Layout	75%
	Flood Simulator layout	25%
Participated in answering this question		8%

D. Changes to Make better System Framework Design (Governmental Use)

Table 6.90: System Framework Needed Changes for Government

What changes would you make to the system to make it better for governmental use?	<i>Identified Result</i>	<i>Percent</i>
	Add more Governmental Representation	43.8%
	Including mobile services	31.3%
	Support with different languages	12.5%
	Include different crisis types	12.5%
Participated in answering this question		31.3%

E. Changes to Make better System Framework Design (Public Use)

Table 6.91: System Framework Needed Changes for Public

What changes would you make to the system to make it better for public us	<i>Identified Result</i>	<i>Percent</i>
	Support with local languages	30%
	Adding support for mobile services and applications	25%
	Adding more collaborative services	20%
	publishing governmental services on the site	15%
Participated in answering this question		33.3%

6.4. Study Outcomes Discussion

This section will provide discussion for the previous defined results with respect to public and governmental users.

6.4.1. Public Questionnaire Results Discussion

This section will discuss the general results that have been defined by the public answering the research questionnaire with respect to the used categories.

A. Hardware Usage

This category investigates the used hardware for navigating the system framework, in order to outline the usage of devices which will guide the future enhancements and provided services. The results in Table 6.2 show that most of the public users navigated the system using their PC devices (80.1%). The second highest value came for using Smart Phones with (12.9%), while it was (6.9%) for using tablet device. This result shows that users in BiH still prefer navigating websites using PC and this may be due to different factors that are mainly related

to size of screen and the faster processing power of the used devices. The result of mobile usage in Bosnia is within the world average usage of mobile web site navigation, as it was reported as (14%) by (Internet Society, 2015).

B. System Structure Evaluation

This category investigated the provided structure that was based on the inputs defined from the previous studies outlined in Chapters 3 and 4 that guided the system framework design with respect to the governmental structure organization. The results in Table 6.3 show that the majority of users with an average of (94.9%) and StDiv of (0.56) agreed that the provided System Structure was useful in terms of the provided structure with respect to the governmental structure. The usefulness was investigated in terms of distribution of information, communication, public awareness, information reach ability, distribution of information, distribution of services, service and information navigation with respect for flood crisis phases and service effectiveness. The previous result shows that the provided system structure managed to provide effective services and information with respect to governmental organization in BiH.

C. System Framework Learn ability

This category investigated the system framework Learn ability with respect to the provided services and information with consideration to the flood crisis events in BiH. The results in Table 6.4 show that majority of users with an average of (81.32%) and Std. Deviation of (0.44) agreed that the system framework structure and services were easy to navigate and interact with respect to flood crisis events. However, (22%) of users reported that there are some distracting features, those features will be investigated and outlined in later tables in order to define the exact features that are preferred by users in accordance with different devices that user use to reach the framework.

D. System Framework Functionalities

This category investigated the provided system framework functionalities and their effects on awareness, communication and services with respect to flood crisis and governmental structure. The results in Table 6.5 show that majority of users with an average of (93.7%) and Standard Deviation of (0.61) had a positive response towards the provided system functionalities and its distribution with respect to the governmental structure and flood crisis events. Most of the provided functionalities that have been defined and provided by the

system framework were outlined by the user requirements defined in Chapters 3 and 4 in this research study.

E. System Framework Helpfulness

This category investigated the helpfulness of the provided services through the defined framework structure in cases of flood crisis events in BiH. The helpfulness was investigated in terms of providing sufficient information for handling flood events, the presence of appropriate help services, the ability of the system in resolving confusion and defining the needed actions during flood crisis, the ability of providing warnings and alerts. The results in Table 6.6 show that the majority of users with average of (94%) and Standard Deviation of (0.587) agreed positively that the used system framework managed to provide help for public during flood crisis events.

F. System Framework Rating Services (Crisis Related)

This category investigated the effectiveness of the provided services for flood crisis event in BiH. The services were grouped in different menus with respect for the services provided. The results in Table 6.7 are related to (Crisis Related) menu services and it shows positive attitude for the provided services with a value of (95.2%) and Standard Deviation of (0.557). The results show that the 3 most appreciated services are (Shelter Locations), (Subscribing for Alerts) and (Report Missing Person). The previously defined services have managed to provide comprehensive services that are used in (Pre-During-Post) flood crisis with all the regions and parts in BiH that have not been provided elsewhere in any public or governmental website in BiH.

G. System Framework Rating Services (Flood Awareness)

This category investigates the (Flood Awareness) services that have been provided by the system framework. The (Flood Awareness) have been defined as a menu in the system framework and it provides different information, simulations and services to raise the awareness of flood crisis impact on public in BiH. The results in Table 6.8 show that majority of users with a value of (93.8%) and Standard Deviation of (0.642) have positive attitude towards the provided service in this category. The best 3 services have been identified as (Planning for floods), (information about Floods) and (Preparedness Video Tutorials). The planning for floods is a set of templates that can be used in floods events for better personal management and planning of flood events. Those templates have been designed and provided by (FEMA Organization). The information about floods is a general tutorial about the floods,

their effects, warning signs and the need for planning. The preparedness video are a set of video tutorial provided by (Public Health Emergency Governmental Organization-USA: www.Phe.gov) that provides tutorial on preparedness for crisis events. The provided system framework managed to connect with those services and provide them for public in BiH.

H. System Framework Rating Services (Site General Services)

This category investigates (Site's General Service) that include all the services provided for the users and their effectiveness for flood crisis events. The results in Table 6.9 show that most users are positive for the provided services with a value of (88.6%) and Standard Deviation of (0.82). The three highest services were (Region Weather Information, Flood Alert Warning Sign, and Global News). The region weather information brings information about weather forecast for BiH for 4 days. The flood alert warning sign, is a special graphical alert sign that shows 3 different colours that represent flood alert status. Green stands for safe, orange stands for flood alert, and red for severe flood alert. The global news is a service that provides the latest articles from different cantons and entities in one place, which enables all users to easily navigate and read those news and articles. On the other hand, the least appreciated services by the public were (Show online users, and Archive). The show online users had a value of (66.8%) while the archive of past news and articles had (64%).

I. System Framework Rating Services (Use of Social Media)

This category investigates the effectiveness of different social media services that are used within the system framework and provided for public use for flood crisis events. The results in Table 6.10 show that majority of users appreciate the social media service provided by the system framework with (92.6%) and Standard Deviation of (0.821). The most appreciated service was (Sharing articles on social media). This service enabled users to share any article posted by the system framework to different social media platforms like (Facebook, Twitter, G+, LinkedIn Tumblr, Buffer, Pin-i). This service enabled users to stay in contact with their social media services and sharing the system framework news and information. The second appreciated service was connecting with the centre 112 that is responsible for sharing news and updates on the crisis events in BiH. The third appreciated service was connecting through twitter as this service is found very effective in sharing tweets or news feeds. The forth-appreciated service was connecting with Facebook group that has been created to support the system framework with social media services.

J. System Framework Rating Services (Connecting with Government)

This category investigates the effectiveness of system services that are used for connecting the public with governmental representatives. The services were provided based on the regions connected to the framework. The results in (Table 6.11) show that majority of users (91%) and with Standard Deviation of (0.852) had a positive attitude towards the provided services. The services main focus in this category was to provide information for the public with respect to the regions defined in BiH, and enabling better communication channels with governmental representatives that is considered a major demand in different crisis events (Kavanaugh et al., 2012)

K. System Framework Navigation-ability

This category investigates the Navigation-ability of the system framework, as it was structured with respect to the BiH governmental. The results in Table 6.12 show that majority of users (96%) and with Standard Deviation of (0.460) agreed that the system framework provided clear and effective Navigation-ability. The Navigation-ability of the system evaluated consistent procedure for moving around the system, the ability to choose route, clearness of users' position within the structure, proceeding with the system and organization of system framework. In the upcoming sections more investigation will be addressed in order to outline any differences with the used device and outline the changes if found.

L. System Framework Quality

This category investigates the quality of the system framework in relation to presenting, printing and interacting with posted articles and multimedia. The results in Table 6.13 show that majority of users (95%) and with Standard Deviation of (0.58) have a positive opinion towards the quality of the system. However, more information will be presented later in this chapter with respect to the hardware used in navigating the system framework and the perceived quality, (see section 6.4.2.).

M. System Classification

This category investigates users' classification for the system framework. The results in Table 6.14 show that the majority of user (96%) and with Standard Deviation of (0.492) classified the system as (Flood Awareness and Preparedness System). On the other hand the system was classified as (Floods Communication Framework) by (94.2%). The results show that the system managed to provide a good framework for flood awareness and communication in BiH as perceived by public users.

N. Satisfaction with System Framework

This category investigates if users enjoyed working with the provided system framework. The results in Table 6.15 show that (94.6%) of users that interacted with the system enjoyed working with the system framework. The results in Table 6.16 show that (94%) of users are willing to use and interact with the system again and finally the results in Table 6.17 show that (95.6%) are willing to recommend the system framework to other users. More investigation will be provided for system satisfaction and it will be related to the hardware used in navigating the system framework.

6.4.2. Public Questionnaire Relations Discussion

This section (Table 6.92) will present the discussion of relations among questions from the public questionnaire defined previously, in order to outline and have better understanding of the results.

Table 6.92: Different Framework categories for the public questionnaire in relation with the Hardware used

Categories	Hardware Used
<i>Framework Use Satisfaction</i>	This relation investigates the effect of hardware used to navigate the system framework and the satisfaction rate. A correlation and Chi2 test were used to identify any differences in terms of device used. The results of P-Value in Table 6.18 were (0.063) which is larger than (0.05) and it shows that there is no differences in satisfaction level with respect to the used devices.
<i>System Structure Evaluation</i>	This relation investigates the effect of system structure evaluation against the hardware used to navigate the system. One Way ANOVA test were used to identify any differences and the result in Table 6.20 show that Significance value (0.007) is less than (0.05), which concludes that there is difference in system structure evaluation with respect to the hardware used to navigate the system. Moreover, the results in Table 6.20 show that the largest mean is for the (PC) which shows that the best system structure evaluation came from users that used PC. However, it is important to indicate that there is no large differences in mean values for (Smart Phone and Tablet devices) if compared with (PC) use, and this differences in evaluating the structure does not affect the user satisfaction as shown in (Relation 1) discussion.

<p><i>System Framework Learn ability</i></p>	<p>This relation investigated the differences in system framework learn ability against hardware used to navigate the system. One way ANOVA test were used and the result in Table 6.21. show that the significance value is (0.009) which is less than (0.05) that concludes having differences in system learn ability evaluation with respect to the used hardware. Moreover, the results in Table 6.21 show that the higher mean is for users using (PC) devices.</p>
<p><i>System Framework Functionalities</i></p>	<p>This relation investigates system framework functionalities against the used hardware to navigate the system framework. One way ANOVA test was used and the result in Table 6.22 show that significance value (0.002) is less than (0.05) which shows that there is a difference in evaluating framework functionalities with respect to hardware use. The results in Table 6.22 show that the highest mean value is for (PC) users.</p>
<p><i>System Framework Helpfulness</i></p>	<p>This relation investigates system framework helpfulness evaluation against the used hardware to navigate the system framework. One way ANOVA test was used and the results in Table 6.23 show that the significance value (0.002) which is less than (0.05) and thus there is a difference in evaluating framework helpfulness with respect to the hardware used. The results in Table 6.23 show that the highest mean if for users that navigated the system using their (PC's).</p>
<p><i>System Framework Rating (Crisis Related)</i></p>	<p>This relation investigates system framework rating for crisis related services against the hardware used. One Way ANOVA test was used and the results in Table 6.24 show that significance value (0.051) is larger than (0.05) which concludes that there is no difference in evaluating crisis related services with respect to the hardware used.</p>
<p><i>System Framework Rating (Site General Services)</i></p>	<p>This relation investigates system framework rating for site general services against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.25 show that significance value (0.000) is less than (0.05) which concludes that there is a difference in terms of evaluating site general services with respect to the hardware used. The mean of (4.48) and standard deviation (0.446) shows that the results are in favour of PC users.</p>

<p><i>System Framework Rating (Flood Awareness)</i></p>	<p>This relation investigates system framework rating for flood awareness services against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.26 show that significance value (0.148) is greater than (0.05) which concludes that there is no difference in terms of flood awareness services rating and hardware used.</p>
<p><i>System Framework Rating (Use of Social Media)</i></p>	<p>This relation investigates system framework rating for use of social media against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.27 show that significance value (0.006) is less than (0.05) which concludes that there is a difference in terms of social media evaluation and hardware usage. The mean of (4.68) and standard deviation (0.548) shows that the results are in favour of PC users. However, it is important to notice that despite the differences in hardware usage and evaluation, the mean and standard deviation differences are minimal between the defined categories.</p>
<p><i>System Framework Rating (Connecting with Government)</i></p>	<p>This relation investigates system framework rating for connecting with government against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.28 show that significance value (0.169) is greater than (0.05) which concludes that there are no differences in terms of connecting with government and the used devices.</p>
<p><i>System Framework Navigation-ability</i></p>	<p>This relation investigates system framework Navigation-ability against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.29 show that significance value (0.000) is less than (0.05) which concludes that there is a difference in terms of system framework Navigation-ability with used devices. The mean of (4.84) and standard deviation (0.287) shows that the results are in favour of PC users.</p>
<p><i>System Framework Quality</i></p>	<p>This relation investigates system framework quality against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.30 show that significance value (0.000) is less than (0.05) which concludes that there is a difference in terms of system framework quality with used devices. The mean of (4.81) and standard</p>

	deviation (0.376) shows that the results are in favour of PC users.
<i>System Classification</i>	This relation investigates system framework classification as (Awareness, communication) against hardware used to navigate the system framework. One Way ANOVA test was used and the results in Table 6.31 show that significance value (0.053) is greater than (0.05) which concludes that there are no differences in terms of framework classification and the used devices

In terms of investigating the relations between questionnaire categories, it was initiated in order to define any differences that could enrich the understanding of system framework design and the usability of the system in cases of flood crisis in BiH. The results from the above relations (section 6.4.2) show that from 13 different relations there are some slight differences between 9 of them, and they are as following:

1. *(Framework Use Satisfaction) x (System Structure Evaluation)*
2. *(System Structure Evaluation) x (Hardware Used)*
3. *(System Framework Learn ability) x (Hardware Used)*
4. *(System Framework Functionalities) x (Hardware Used)*
5. *(System Framework Helpfulness) x (Hardware Used)*
6. *(System Framework Rating (Site General Services)) x (Hardware Used)*
7. *(System Framework Rating (Use of Social Media)) x (Hardware Used)*
8. *(System Framework Navigation-ability) x (Hardware Used)*
9. *(System Framework Quality) x (Hardware Used)*

The differences in those categories were slight for the Hardware used in navigating the system framework, and all the answers came in favour of using PC. However, it is important to note that the small differences are due to factors related to the presentation of the system framework. Such differences have been reported in different research studies that have compared the usability and effectiveness using different devices (Black, Spencer, 2015). Moreover, the functionality and the proposed structure had a general satisfaction and no differences have been found at that level. It is also important to highlight in regard of using hardware, that minor power cuts might affect the system availability and communications for certain time, depending on the region affected, by means of its telecommunication infrastructure and the online services provided through the system, whether they are based on social media platforms or built-in on local servers, especially if no alternative emergency

power sources are available. Moreover, what is considered real threat during natural disasters are major power cuts that are considered serious critical infrastructure incidents that can last from several days to months, and they should be addressed adequately on all levels of authorities in accordance with the European Programme for Critical Infrastructure Protection that foreseen more proactive approach in protecting the electricity grid.

The previous results gives positive indications for the proposed system framework services and functionalities provided for the public users in BiH with respect for flood crisis events. The next section will discuss the results from the governmental participation in the system framework and will outline the differences and challenges.

6.4.3. Public Questionnaire Results – Qualitative

This section will discuss the results obtained from the qualitative public questionnaire presented in this research study.

A. Three best aspects of the system framework design

This question investigated the 3 best aspects of the system framework perceived by public users. The results in Table 6.32 show that (93.4%) of users that answered the questionnaire, participated in answering this question. Different perceived benefits have been identified by the presented question, which will help to have better understanding for the effects of having such system for flood crisis in BiH. The results show that the most frequent answer for this question was (providing services for floods) (23.1%) of all participants. The second highest value was for (Sharing information) with a value of (20.4%). The third highest value was for (using social media) (19.3%), while raising awareness towards floods was (14.2%). Providing flood preparation had a value of (9.2%), while for connecting with government a value of (5.0%). The value for (connecting with people) was (3.9%) and for having all services in one location was (3.6%). The last two identified benefits were (Having the system adjustable for mobile use) (1.1%) and (Ease of use) (0.4%). All the previous results are looked at positively as they match the intention of this research study in providing a unified platform for raising awareness and enhancing communication towards flood events in BiH. Moreover, it gives insight on the future enhancements for the system as it needs to concentrate more on providing communication services for the public and government communication and raising the awareness and practices of having public-to-public communication.

B. Three worst aspects of the system framework design

This question investigates the 3 worst aspects of the system framework in order to help enhance the system framework for future use. The results in Table 6.33 show that (21%) of users that answered the questionnaire, participated in answering this question. This result shows that the system is generally perceived positively as less participants are having arguments towards the system framework if compared with the result of participation in Table 6.32. The results in Table 6.33 show that the main negativity for the system framework was (System lack of content for a region) (24.8%). The reason for lack of information was due to the participation level by participants from governmental side, as the invitation was sent for most governmental representatives from them State, Federation of BiH and Republic Srpska entities to participate in the system framework. The ones that participated are 4 cantons and one region from a group of 15 different cantons and regions. On the other hand, the invitation for participation for public was also sent and broadcasted for all public in BiH and thus many public users coming from cantons and regions that had no representation on the system framework viewed this side as negativity in the system framework.

The previous reason had its effect on the second highest value for this category that had (19.4%) for the (lack of governmental representations for other entities). The two previous results can give indications that around (19%) to (24%) of users that used the system were from different cantons and regions that are not represented by governmental users in the system framework. The third highest value of (17.8%) was for (lack of services). Different users mentioned lack of services in general term while some participants were specific and concentrated on services that are provided by mobile technologies, HAM radio and other interactive maps services. However, it is important to know that many services can be adopted once the system framework is adopted by government in BiH with the availability of technical and financial support as the current system framework is for research purposes only.

The fourth negativity of system framework is for the (System lack of content for governmental representatives) and (System used layout – Main page layout) (9.3%). The system lack of content for governmental representatives is associated with governmental users' participation level. However, this point shed the light for future enhancement as to have a clear policy on what, who and where the governmental representatives information should be available. Moreover, in terms of first page layout it was held with lots of information about the state level and grouping other information from two entities and cantons. The first page content and

layout will be changed in future edition of the system framework based on professionals review in the field of Human Computer Interaction specialists.

The fifth ranked negativity in this category was for (lack of sufficient services to connect with government) (3.9%). The services that was mentioned by participants are related to mobile technologies, and the availability of 24/7 chat line for emergencies. Having those services in this framework prototype were not available, but it can be provided if the system is adapted by the government in BiH as to have official representation. The last ranked negativity is for (system used multimedia) was (3.1%). As different users mentioned that the used multimedia of (Video and Simulators) should have been produced in Bosnian language. However, it is believed that such materials are very important and can be developed for Bosnian case by professionals in that field in the future as the production of such material is beyond the scope of this research project and financial capabilities. But it is also important to acknowledge that the system framework has been found capable of reusing other learning objects from different sites and services that can be found helpful for many users in the current situation.

C. Changes for making the system framework better

This question investigated what changes the system framework needs to provide better services for the public in BiH with respect for flood crisis. The results in Table 6.34 show that (13%) of participants answered this question. The main change for system framework was for (supporting the site with different languages) (34%). Although the site presented the information in English language for research and evaluation purpose, the site will support the use of different languages in the future, as many public users use different alphabet in BiH. Moreover, many users that are interested in the status of BiH during crisis events are found working abroad and the new generation adopted languages of the countries they are residing in. Thus, having the site supported with different languages will ensure better engagement and sharing for information and providing the possibility to help in the relief activities or donations for their country. The second main change was adding more services to the system framework (24%). Those services have been identified and presented in Table 6.35 as:

- Chat services (40%),
- Discussion Services (such as forums) (40%),
- Flood Mapping Services (10%),
- General undefined services (10%).

The third main change in system framework is to support it with mobile technologies (20%). The use of mobile technologies and services requires financial support and governmental approval in BiH, thus it is planned to support the framework with such services if the framework is to be adopted by the BiH government in the future. The fourth demand for enhancing the system framework is to support it with more governmental authorities representatives (15%). The framework showed its flexibility in adding different governmental authorities, thus in the future many authorities can be added to the system such as (Fire Department, Police, Hospital and different companies). However, adding authorities is not considered the hard part of providing such services, rather having the approval from the government and dedication to such system is what can affect the success of such services.

6.4.4. Governmental Questionnaire Results Discussion

This section will discuss the general results that have been defined by the governmental users answering the research questionnaire with respect to the used categories.

A. Hardware Usage

This category investigates the used hardware for navigating the system framework by governmental users in BiH. The results in Table 6.37 show the most governmental representatives navigated the system using their PC devices (77.1%). The second highest value came for using Smart Phones (18.8%), while it was (4.2%) for using tablet device. This result shows that governmental representatives in BiH are in favour of navigating web systems using their PCs'. This result can be understood as different factors related to size of screen and the faster processing power of the used devices. However, if comparing the value between the public and governmental personal in terms of using their smart phones, it is clear that governmental personals are having higher value. This difference can be related to the mobility of governmental personal and not being able to use their PC's in the field of work. The result for tablet devices is still small if compared between the government and public users.

B. System Framework used Role

This category investigates the governmental user classifications that used the system framework. The results in Table 6.38 show that most of the governmental representatives came from (Operators at Center 121) (33.6%). This high value comes due to their related job specification with the proposed system framework functionalities and services. The second highest participation of (21%) came from users with (IT and Communications) knowledge

and skills. The third highest value came from (Governmental Associates) (16.8%). The fourth highest value of (8.4%) was for (Governmental Officers, and On-Duty Operator). The fifth highest value of (6.3%) came from (Assistant Directors, Senior Advisors). Results in this tables shows that users that are directly involved in rescue operations and users with IT skills and background are keener to use the system if compared with users that have managerial responsibilities. This change in interest and engagement with web and social applications is not a positive side being practiced by managerial personals as many skills have been regarded as necessary in the 21 century (Trilling, & Fadel, 2009).

C. Framework and Roles Relation

This category investigates the relation between the participants' job specifications and activities with respect for the roles provided by the system framework. The results in Table 6.39 show that all the participants agreed that the framework managed to provide the services and functionalities that overlap with their existing job roles in the governmental sector. This result is regarded as positive, as the system structure with respect to the provided services managed to cover wide job specification with the services and privileges.

D. Framework used Roles Suitability

This category investigated the system framework roles used by governmental users and their suitability with their job description. The results in Table 6.40 show that the highest value of prefer ability and suitability with users' job description is for (Administrator managers, Authors). On the other hand (Publishers and Editors) had the lowest interest among the provided users' roles by the system framework. This can be related that the mentioned 2 roles require more attention and engagement with contents added to the system. Moreover, the specified role does not have any privileges to change the layout or to control the services provided.

E. Governmental Participating Authorities

This category investigates the participating authorities' engagement value with the system framework. The results in Table 6.41 show that the highest value of participation comes from state level followed by federation and canton Sarajevo. This higher interest from the mentioned governmental entities can be related to their direct concern with flood crisis as the majority of public are distributed into the mentioned entities and they are affected severely with crisis event. On the other hand, the entities that scored lower participation were found

not to have serious threats by flood crisis, and thus it resulted in less participation and interest in the provided framework.

F. System Framework Acceptance

This category investigate framework acceptance by governmental personnel. The results in Table 6.42 show that (95.8%) of users enjoyed using the system framework. A value of (83.3%) assured that they would use the system framework again, and a value of (89.6%) selected the option of recommending the system framework for other users. All the previous questions show high value of acceptance towards the system framework. The previous results are considered positive indication of having the system provide good services for flood crisis in BiH.

G. Framework Structure Acceptance

This category investigated the structure acceptance from several points of view that are all related to flood crisis events. The results in Table 6.43 show that this category had a high value of acceptance with a value of (94.4%) and Standard Deviation of (0.529). A value of (96.6%) agreed that the system managed to provide flexibility in terms of selecting and installing the appropriate services for the system framework. A value of (95.8%) agrees that the system managed to provide services in a good way for public with respect to their diversity of BiH ethnicity. A value of (95%) agreed that the provided system framework managed to provide unified framework for public awareness and communication. A value of (95%) agreed that the provided system structure is found capable of adapting different governmental authorities to be part of the system. A value of (94.3) agreed that the provided system managed to be aligned with the provided system structure. A value of (93.8%) agreed that the system services were provided with respect to flood crisis in BiH. A value of (90.4%) agreed that the provided system structure managed to simulate the structural diversity in BiH governmental structure. All the previous results are positive towards accepting the system structure framework

H. System Framework Usability

This category investigates the system framework usability by the governmental users. The results in Table 6.44 show that the average acceptance for system usability is (81.8%) with standard deviation of (0.712). In terms of the usability of system interface and layout, users agreed positively were (96.6%) that the provided interface and structure are easy to use. A value of (95.8%) agreed that the used social media services were clear and useful. In terms of

the usability of integrated services and their sufficiency the users agreed positively were (91.2%). In terms of system usability for flood awareness and communication, it had positive agreement of (89.6%). The last question in this category scored (35.8%) that the system was complex to use. All the results in this category are showing positive attitude of accepting the system usability and acknowledging its use.

I. System Framework Effectiveness (General)

This category investigated the system framework effectiveness from different aspect. The results in Table 6.45 show that this category had a positive agreement on its effectiveness of (93.3%) and with Standard Deviation of (0.589). This category investigated the system framework effectiveness through the provided user privileges and it had a positive agreement of (96.6%). Moreover, it investigated the system reach ability for the majority of public in BiH and it had a positive agreement of (95.8%). In terms of having the system managing and utilizing social media effectively, it had a value of (95%). Moreover, it investigated managing volunteering services effectively and it had positive agreement of (93.8%). In terms of effectiveness of grouping news sources for public use, it had a positive agreement of (93.8%). Investigating the efficiency of providing sufficient tolls for government-to-government communication, it had a positive agreement of (90.4%). The lowest value for this category was for the efficiency of provided tools by system framework for government to public communication (88%). Although the value of (88%) is high, many users believed that different services can promote better communication with public by involving the use of mobile technologies and applications. However, this research has the same believe, but due to financial and regulatory constraints, this research study was not able to use and utilize the required services for government-to-government or public communications.

J. System Framework Effectiveness (Government to Government)

This category investigates the effectiveness of services provided in terms of government to government cooperation. The results in Table 6.46 show that most of the provided services had a high value among users. The three most appreciated services were (Subscribing for Alert, Define shelter locations, Sharing unified social media policy). The service subscribing for alerts enabled governmental users to manage public users and to manage the alert services by sending email messages for users on possible flood threats and the needed procedures. In terms of defining shelter locations, it enabled governmental users to collaborate their efforts in defining shelter locations in all regions in BiH. The service sharing unified social media policy enabled governmental users of having social media policy that is unified among all

entities, which helped in bridging the gap in defining the policy and procedures of using social media in governmental entities in BiH. On the other hand, the three services that ranked the lowest value in this category were (sharing video galleries, governmental pictures/ video, governmental calendar). The option of sharing video / pictures galleries ranked the lowest as many public are sharing those materials and it is not ranked as governmental specific service. In terms of governmental calendar, it had the lowest value in this category due to political bureaucracy practices that are currently found in BiH government.

K. System Framework Effectiveness (Government to Public)

This category investigates the effectiveness of the provided system services in terms of government to public cooperation. The results in Table 6.47 show that the three most appreciated services are (Flood Maps, Connecting with Social Media, Report a Crisis). The previous three services are considered a necessity and they are not implemented or available in any governmental website or service. Moreover, the uses of flood maps are very helpful for the public in identifying the risk regions. The service of connecting with social media is also considered important as majority of users are in favour of using this service and it provides flexibility in spreading the information among different platforms. In terms of report a crisis, it enables the public to work on individual level for report a crisis and ask for immediate assistance, and it proves to be better than using a hotline that can be jammed by the number of calls during crisis. Moreover, the use of reporting a crisis can be used by the government to summarize the risk activities, and for future investigation and study. On the other hand, the services that ranked the lowest value in this category were (Events, Donations and Archive). In term of events, it had lower agreement in this category as different users mentioned in Table 6.91 that it many governmental services can be published directly on the site. In terms of donation, different users agreed that it needs to be made online using services of (VISA, MaterCard and PayPall). The service Archive had the lowest value of (67%) as the governmental users believes that archive is not a useful feature for the public, and it is better utilized by the governmental entities for research and investigations issues.

L. System Framework Communication

This category investigates the communication activities with respect to the traditional approach of communication. The results in Table 6.48 show that the majority of participants have had a positive attitude towards the communication provided by the system framework (94.4%) and with standard deviation of (0.481). The category investigated the services provided with respect to the events of (pre, during and post) flood crisis communication. The

highest value was for the system enhancing the post flood crisis communication with (97%). In addition, the value for during flood crisis communication had a value of (96.2%) agreement among governmental users. The same value of (96.2%) was achieved for the option of providing different social media services. In terms of providing different medium for communication and its effect on enhancing communication, opportunities for flood crisis had the value of (95.4%) agreement. The pre-flood communication had the value of (95%) agreement on the effectiveness of communication. In terms of feedback services for enabling better communication it had agreement of (91.6%). Finally, the just in time communication channels had a value of (90%). The overall results show a major agreement for the services provided for communication in cases of flood events. However, this research study is restricted by some constraints that are financial or legislative in nature that restricted the system framework from providing mobile services and channels.

M. System Framework Communication Tools

This category investigates the effectiveness of the provided communication services for flood events. The results in Table 6.49 show that the most appreciated service is using social media with a value of (97%) agreement of governmental users. The use of social media enabled many users to share the information and form groups to communicate. Moreover, most of the used social media services enables different forms of communication, either directly through chat services and messages or indirectly through distributing the information (Carlson et al., 2016). The second most appreciated service is email subscription for alerts (96.2%). The subscribe for alerts provided a basic alert email message to users that are subscribed to the system. However, it is believed that more advanced alert options can be included in future system development based on the alert specification and adaptation published in (Koch, 2016) as the system structure supports such operations. The third appreciated service had a value of (94.6%) and it was for the events service. This service enabled the governmental users to communicate their event with other governmental entities and the public. The use of forms had a value of (93.8%) as it restricted the communication using forms. The forms were used for different services with governmental entities and the public. In terms of contact, it had a value of (91.6%) as users were made able of contacting governmental representatives directly through this service. The use of Articles had a value of (90%), the article service displayed the information on floods, and additional plug-in were added to it to enable posting discussions and comments. This feature enabled many users to communicate their opinion and to have responds and feedback from governmental representatives. The use of web links service

enabled the public to communicate with different governmental agencies representatives in case of flood events. The presence of this service grouped the needed agencies in cases of flood events in one place, which made the communication more convenient in crisis events.

N. System Framework Awareness

This category investigates the effect of using system framework on the awareness for flood crisis events. The results in Table 6.50 show that most of the participants (91.1%) and with standard deviation of (0.75) have agreed that their experience with the framework had positive impact on raising awareness for flood events and associated activities. The highest value in this category was (94.2%) and it is related to raising awareness for the importance of governmental collaboration. In the same context (Kaewkitipong, Chen & Ractham, 2016), mentioned in his research that the collaboration of manager in sharing information with respect to flood crisis phases had a positive impact on the rescue activities and overall process of dealing with flood events. A value of (90.8%) agreed that the use of system framework raised their awareness towards the public needs during flood crisis in BiH. In terms of having the system framework raise the awareness of governmental representatives towards flood impact on the public in BiH, it had the value of (90.4%). A value of (89.2%) was found for the system framework raising awareness for flood crisis governmental overall activities.

O. System Framework Major Role

This table investigates governmental users' perception on the system framework major roles in relation to flood crisis in BiH. The results in Table 6.51 show that majority of users (95%) perceive the system structure as oriented towards raising flood awareness and preparation. A value of (90.4%) perceives the system as flood communication framework system. The results of the two questions shows that the majority of governmental users see the system as providing those two important aspects related to flood crisis with an average of (92.7%) and standard deviation of (0.605).

6.4.5. Governmental Questionnaire Relations Discussion

This section will present the discussion related to governmental categories relation in order to define any related results between categories. In Table 6.93 different categories from the Governmental Questionnaire are presented in relation to the Hardware used.

Table 6.93: Different Framework categories for the governmental questionnaire in relation with the Hardware used

Categories	Hardware
<p>Framework use satisfaction-Enjoying using the system</p>	<p>This relation investigates the effect of framework use satisfaction- (enjoying using the system) against hardware used in order to define if there is direct effect based on the proposed structure. A correlation and Chi2 test were used to identify any differences and the result in Table 6.52 show that the P-Value is (0.503) and is greater than (0.05) and thus it concludes that there is no difference in satisfaction level with respect to the used hardware by governmental personnel. In terms of highest value for hardware usage, it comes in favour of using PC with value of (77.1%).</p>
<p>Framework use satisfaction - Using the system framework again</p>	<p>This relation investigates the effect of framework use satisfaction- (using the system framework again) against hardware used in order to define if there are direct effect based on the proposed structure. A correlation and Chi2 test were used to identify any differences and the result in Table 6.53 show that the P-Value is (0.292) and is greater than (0.05) and thus it concludes that there is no difference in satisfaction level related to using the system framework again with respect to the used hardware by governmental personnel.</p>
<p>Framework use satisfaction - Recommending the system framework for other users</p>	<p>This relation investigates the effect of framework use satisfaction- (recommending the system framework for other users) against hardware used in order to define if there is direct effect based on the proposed structure. A correlation and Chi2 test were used to identify any differences and the result in Table 6.54 show that the P-Value is (0.885) and is greater than (0.05) and thus it concludes that there is no difference in satisfaction level related to recommending the system framework with respect to the used hardware by governmental personnel</p>
<p>Framework Structure Acceptance</p>	<p>This relation investigates system framework acceptance evaluation against the used hardware to navigate the system framework. One Way ANOVA test was used, and the results in Table 6.55 show that the significance value of (0.8) is greater than (0.05) and thus</p>

	there is no difference in evaluating framework acceptance with respect to the hardware used. The results in Table 6.40 show that the highest mean for users that navigated the system was for the option of using their (PC's).
System Framework Usability	This relation investigates system framework usability evaluation against the used hardware to navigate the system framework. One-Way ANOVA test was used, and the results in Table 6.56 show that the significance value of (0.36) is greater than (0.05) and thus there is no difference in evaluating framework usability with respect to the hardware used.
System Framework Effectiveness (Government to Government)	This relation investigates system framework effectiveness in government-to-government evaluation against the used hardware to navigate the system framework. One-Way ANOVA test was used, and the results in Table 6.57 show that the significance value of (0.205) is greater than (0.05) and thus there is no difference in evaluating framework effectiveness in government-to-government with respect to the hardware used.
System Framework Major Role	This relation investigates a system framework major role that was made available to governmental users against the used hardware to navigate the system framework. One-Way ANOVA test was used, and the results in Table 6.58 show that the significance value of (0.117) is greater than (0.05) and thus there is no difference in evaluating framework major roles with respect to the hardware used.

On the other hand, in Table 6.94, we present different framework categories for system framework roles in relation to the defined jobs

Table 6.94: Different Framework categories for the system framework roles in relation with the defined jobs

Categories	Job Roles
System Framework Role- Administrator	This relation investigates system framework roles of administrator against the defined job roles by governmental participants. Correlation and Chi2 test were used, and the results in Table 6.59 show that the significance value of (0.034) is less than (0.05) and

	<p>thus there is difference in evaluating framework roles with respect to users' governmental roles and positions. The results show that most roles found that the administration role is suitable for their current working activities with a (91.7%) of governmental working roles. However, the roles that are purely technician or administrative found that this role with the activities it provides is not suitable for them.</p>
<p>System Framework Role- Manager</p>	<p>This relation investigates system framework roles of manager against the defined job roles by governmental participants. Correlation and Chi2 test were used, and the results in Table 6.60 show that the significance value of (0.461) is greater than (0.05) and thus there is no difference in evaluating framework roles of manager with respect to users' governmental roles and positions. The results show that the majority of roles (70.8%) found that the manager role is suitable for their current working activities. The manager roles as it has been explained previously in Chapter 5, gives less control and privileges of working with site contents. Thus, some participants found this role as not suitable due to the lack of control (such as participants from the Center-112). On the other hand, some participants found that the provided role is more general in activities and responsibilities (such as it technician, associate for communication, on duty operator and employee in the sector of fire fighting).</p>
<p>System Framework Role- Publisher</p>	<p>This relation investigates system framework roles of publisher against the defined job roles by governmental participants. Correlation and Chi2 test were used, and the results in Table 6.61 show that the significance value of (0.413) is greater than (0.05) and thus there is no difference in evaluating framework roles of publisher with respect to users' governmental roles and positions. The results shows that the almost half of the governmental participants (54.2%) found that the publisher role is suitable for their current working activities. The publisher role in the system framework gives privileges of publishing other works and</p>

	supervising what is going to be published from articles only. They do not have any control over the components installation or site configurations. The results show that this role has not been found suitable for (IT technician, operators, senior associates, managers and advisors).
System Framework Role- Editor	This relation investigates system framework roles of editor against the defined job roles by governmental participants. Correlation and Chi2 test were used, and the results in Table 6.62 show that the significance value of (0.373) is greater than (0.05) and thus there is no difference in evaluating framework roles of editor with respect to users' governmental roles and positions. The results show that the less than half of the governmental participants (47.9%) found that the editor role is suitable for their current working activities. The editor role in the system framework gives privileges of editing other's works and controlling the contents of articles. The results show that this role has not been found suitable for (IT technician, operators and senior members in governmental roles).

Last, in Table 6.95 we will present the system framework satisfaction with the system framework roles.

Table 6.95: Different Framework categories for the system framework satisfaction in relation with the system framework roles

Categories	System Framework Roles
<i>System Framework Satisfaction-(Enjoy Using the System)</i>	This relation investigated the satisfaction with system framework (enjoying using the system) against the system provided roles in order to identify any relation available. A Correlation and Chi2 test were used to investigate the relation. The results shown in (Table 6.64 through Table 6.68) show that the significance values for all relations (tables) are larger than (0.05) which indicates that there is no difference in users' satisfaction of enjoying the system framework with the defined system roles.
<i>System Framework</i>	This relation investigated the satisfaction with system framework

<p><i>Satisfaction- satisfaction with system framework (Using the framework again)</i></p>	<p>(Using the framework again) against the system provided roles in order to identify any relation available. A Correlation and Chi2 test were used to investigate the relation. The results shown in (Table 6.69 through Table 6.73) show that the significance values for all relations (tables) are larger than (0.05) which indicates that there is no difference in users' satisfaction of using the system again with the defined system roles.</p>
<p><i>System Framework Satisfaction- (Recommending the system)</i></p>	<p>This relation investigated the satisfaction with system framework (recommending the system) against the system provided roles in order to identify any relation available. A Correlation and Chi2 test were used to investigate the relation. The results shown in (Table 6.74 through Table 6.77) for the roles of (Administrator, Manager, Publisher, Editor) show that the significance values for all relations (tables) are larger than (0.05) which indicates that there is no difference in users' attitude of recommending the system with the defined system roles. However, the results in Table 6.78 show that the significance value of (0.001) is smaller than (0.05) which indicates a difference in users' framework satisfaction with the role of Author.</p>
<p><i>System Framework Effectiveness (G2G)</i></p>	<p>This relation investigates the relation between the system framework provided roles against the system effectiveness in terms of government-to-government cooperation. Pearson correlation was used to measure the strength of the linear relationship between the two defined variables. The result in Table 6.79 show that there is a strong relation between the defined variables as the result of Pearson Correlation was (0.608). Thus, from the derived result it concludes that the system framework effectiveness was positively related with the provided system framework roles.</p>
<p><i>Governmental Categories Questionnaire</i></p>	<p>The relation defined in (Table 6.80 through Table 6.84) investigates the system framework roles against the defined governmental questionnaire categories. Independent Sample T-Test was used to define the relations. The results for in all tables</p>

	show that the significance value is larger than (0.05), which indicates there is no difference between the job roles with respect for the defined categories in the questionnaire. The previous results show that there is no negative influence of using different job roles with respect to the system framework structure and intention of use.
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6.4.6. Governmental Questionnaire Results – Qualitative

This section will provide the discussion for the results obtained from the qualitative analysis of governmental questionnaire.

A. Three Best Aspects of the System Framework Design

Table 6.85 presents the 3 best aspects of the system framework as perceived by governmental users that interacted with the system framework. The results in Table 6.85 show that (83.3%) of users that answered the questionnaire answered this question too. The most appreciated aspect as perceived by users was for (having Flood services in one place) with a value of (26.1%). Having flood services and information in one place can enhance the interactivity and trust for usability of the system framework. Moreover, at such events of flood crisis, it is important to have fast information, respond and interaction as time is a critical factor in saving lives or assets. The use of social media within system framework had the value of (21.7%). Different governmental agencies worldwide use social media, and the previous result gives positive indication of the perceived value of using those services by governmental representatives in BiH. The third main aspect was the (Effective use of different content) with a value of (17.4%).

The system framework used different contents for the purpose of raising awareness and providing better communication between the public and the government. The system used articles, social media services, pictures, videos and simulations and each served a specific roles and service towards flood crisis in BiH. Moreover, users agreed that the system managed to provide communication channels with a value of (13.0%). The communication channels were provide using different methods, using forms, emails and messages that are provided with respect to the type of services provided by system framework. The fifth main positive aspect of the system is related to its simplicity with a value of (8.7%). It terms of raising awareness of the public, it had the value of (7.2%) as the governmental representatives saw that the system was able of raising awareness towards floods in BiH. The final positive

aspect of the system framework was (the ability of system framework to include different governmental representations) (5.8%). The system framework structure provided flexibility in adding different governmental entities and associated with chosen services and activities that serve the region in best manner.

B. Three Negative Aspects of the System Framework Design

Table 6.86 presents the 3 negative aspects of the system framework as perceived by governmental users that interacted with the system framework. The results in (Table 6.86) shows that (77%) of users that answered the questionnaire answered this question too. The main system negativity was associated with content with a value of (45.9%). The content issues were identified in Table 6.87 by 54% of participants as

- Languages with a value of (35.3%)
- Contact information with a value of (29.4%)
- Site layout with a value (17.6%)
- Size of files with a value of (11.8%)

Some of the previous content negativities have been identified by public users too, such as the language negativity that will be addressed in the future enhancement of the system framework. In terms of contact information, the site will adopt policy for providing contact information and it was identified in the public negativities defined in Table 6.87. In terms of site layout, it had (17.6%) and public users referred to it too. The size of files had (11.8%) and it was mainly associated with maps that were added to the system framework. Those maps are high definition, and they take time to download if the connection speed is low. However, the system can adopt new technology for displaying the maps using Google maps and interactive map technology in future enhancements of the system framework. The second main negativity in this category was (more governmental representation) (21.6%). This negativity is not related to the system as it is related to the participation level during the use phase of the system framework, as many governmental users chose not to use the system framework, as it is not official and used for research purposes. This resistance for change and enhancement is found in many governmental sectors in BiH and associated with many third world countries (Cochrane, Duffy & Selby, 2003). The third negativity was identified as (lack of services) (13.5%). The lacks of services were identified in (Table 6.88) as:

- Mobile Technologies 80%
- Include other crises (20%)

The inclusion of mobile technology and services were defined by public too. However, it is important to know that using mobile technologies was beyond the financial capabilities and governmental regulations in BiH for this research study. However, it is believed that such systems can be adopted in future enhancement of the system framework if the system is to be adopted officially for flood crisis in BiH. The forth negativity identified was (the need for continuous update) (10.8%). This negativity is associated with governmental user practices; however, this result gave indication for needed policy to be included in future system enhancement and use. The final negativity in this category is for (lack of collaborative services) (5.4%). The type of collaborative services are required are associated with having forums for governmental users participation. This feature can be included in the future enhancement of the system framework.

C. Irritating Features of the System Framework Design

Table 6.89 presents the features of the system framework that was identified as irritating. The results in Table 6.89 show that (10%) of users participated in filling this question. The highest irritating feature that was identified was related to (first page layout) (75%). Public users referred to the same feature, and it will be addressed in future system enhancement. The second irritating feature was related to (flood simulator layout) (8%). The flood simulator will be enhanced in future enhancement of the system framework.

D. Changes to Make better System Framework Design (Governmental Use)

Table 6.90 shows the results for the needed changed in system framework for enhancing its use for governmental entities in BiH. The results in Table 6.90 show that (31.3%) answered this question. The results show that the main demand is for (Adding more governmental representation) (43.8%). The second main demand is for (including mobile services) (31.3%). The third main demand is for (supporting the system with different languages) (12.5%). The final demand in this category is for (including different crisis types) (12.5%).

E. Changes to Make better System Framework Design (Public Use)

Table 6.91 shows the results for the needed changes in system framework for enhancing the public to government use of the system. The results in Table 6.91 show that (33.3%) answered this question. The results show that the main demand is for (support with local languages) (30%). The second demand is for (support for mobile services and applications) (25%). The third demand is for (Adding more collaborative services) (20%). The type of collaborative services that was mentioned is the use of (Forums, Chat). The forth demand was for (publishing governmental services) on the system framework (15%).

6.5. Summary

The evaluation phase has consisted of different phases that started with systems initiation on a dedicated web domain and ended by evaluating participants' (public, government) interaction with the system framework. The analysis of questionnaires was based on the types of questions used in this study, as it contained quantitative and qualitative questions. The questionnaires validity was tested and they were found suitable for the investigation phase in this research. Different test were used based on the questions type and categories defined, as eight different categories were used for public, and seven for governmental users. The proposed categories focused on investigating the system framework from different aspects in order to define the strength and weaknesses in the system framework structure and usability with respect for flood crisis in BiH.

The results showed positive interaction level by users with the system framework and it outlined some negativity that is related to the services, layout and information presented by the framework. Some major negativity that was outlined is also related to research scope, financial and governmental constraints of using mobile services and technologies. However, the results are looked at as positive indications and guidelines for future enhancement on the framework and the used services. The next chapter will present the conclusion on the system framework, recommendations and future work.

CHAPTER 7: Conclusions and Suggestions for Further Work

This thesis presents the research work carried out towards enhancing the awareness and communication between the public and governmental entities in BiH with respect to flood crisis events by means of using different social media platforms. The research started by investigating the status from public and governmental perspective in order to define the current demands and threats in facing flood events. The output of the investigation has led to designing a unified awareness and communication framework for flood crisis using social media that has not been presented before. The system framework provided flexibility towards representing the governmental structure diversity in BiH, and the ability to share resources among State level, two entities of BiH (Federation of BiH and Republic of Srpska), cantons and regions with respect to the public that are served by those entities.

The system framework content, services and structure focused on raising awareness and providing a medium for communication among participants in relation to threats and preparation for flood events using different technologies. The framework utilized many services that were provided for flood crisis by different organizations and agencies that are concerned with flood crisis using Web 2.0 technologies such as using social media services, content management system and RSS feeds. This chapter presents the general outcomes of the research and pinpoints the major conclusion from each task. First, it discusses the conclusions from the start of the research to the end. Second, it presents the different uses that could derive a potential benefits from the outcomes of this research. Third, it lists a group of suggestions for future work to develop the idea and enhance the uses of the system framework design.

7.1. Conclusions

The major conclusions are as follows:

- The results in Chapter 3 for investigating the status of using social media with governmental entities show that the adoption of social media services is still low in BiH (42%) with low engagement in updating and sharing information. On the other hand, despite this low adoption it is looked at social media services in positive manner in terms of spreading information for the public and for risk communication. Moreover, it showed that the main challenges towards adopting social media were

related to lack of training, authenticity of the information, security, lack of resources and technical challenges.

The results have also showed that most of the persons that are currently operating and using social media are not experienced users in this field as most of them work in public relations and managerial positions with low engagement of IT specialists. In the same scope of challenges, it was found that most of the governmental entities (77%) that are using social media are not having social media policy for defining the use of services and information in correct manner with respect to different cases and threats. There is no formal way for measuring the effectiveness of using such services towards the operation and services provided by governmental entities. The main method adopted by the number of participants and lacks any regard for the discussions and comments.

In terms of the driving force for using social media, the results showed that the use of this service by BIH institution for protection and rescue from all administrative levels and the public are considered the main challenge. This result should be looked at in positive way, as it is believed that this research experience and output will have positive impact on raising the use of social media services by the governmental entities. In terms of using social media with previous crisis events, the results showed minimal use of (38%) and the concentration was more on post-crisis event on informing the public with information that are already published by other media and no consideration for educating the public or raising awareness for such crisis events. In this regard it was noticed that the main concentration was on using Facebook without exploration for other social media services, which is a result for not employing qualified personals to harness and use different technologies for flood crisis. The same drawback was noticed in employing social media for governmental collaboration and cooperation, as most of participating entities showed that social media is not employed for such cases.

In terms of the real value of using social media, the results showed that social media is used in its basic setting for sharing information, while different innovative uses that can be used to develop the operations and activities are minimal or no use. These minimal engagements are related to not having experts, vision and policy for using social media services. Most users agreed that social media is positive in providing communication and sharing timely information that is best used in crisis events. In

terms of governmental challenges for collaboration, the main challenges were identified as diversity in governmental structure, lack of cooperation between entities. Those challenges were related to lack of priority for coordination, highly centralized and bureaucratic organizations, different expectation at different level, unilateral donor actions. Moreover, the lack of cooperation was investigated and it showed that the main reasons are related to (threats of autonomy, fragmentation, disagreement and lack of trust). In the same scope the organizational and operational challenges were identified as (lack of coordination skills and experience, ineffective or inappropriate leadership, lack of resources or insufficient access to resources and staff turnover). The latter challenges that were identified for governmental entities were related to situational challenges and it identified the following reasons (absence of consensus, diffusion of credit and cost and benefits are not certain).

From what has been presented in Chapter 3, it was obvious that using various social media platforms by governmental agencies is vital in the dissemination of news and updates during crisis events, as lot of people nowadays use mobile devices that have an internet access, allowing them to receive information faster and easier compared to using traditional media. Government can choose to re-share or republish information from traditional media or other social media sites, as a way of informing the public and reaching out others. Still difficulties could be encountered, as in case when they need to adapt different media formats for the use of specific social media platform, which can be hard to do and time consuming.

- The results obtained in Chapter 4, related to investigating social media usage and preferences for public uses in BiH during flood crisis, showed that there is a good engagement with social media services in general (86%) of surveyed sample. The three major services that were identified were (Facebook, Viber and YouTube). The main reasons for using those platforms were identified as (Connecting with Family and Friends) with minimal regard for other reasons such as (connecting with government, searching for information and events). The results also showed that there is a variation in using social media with regard to educational level as public users with university degree showed more interest in using such services. Same variations were found in terms of defined age groups as the age groups between 25 and 44 had the highest users of such services.

The results showed that the main source of information for the public during crisis events are local news (TV and Radio Channels) with minimal use of (2.6%) for governmental websites and social media services. This low value can be related to the ineffective services provided by governmental entities due to the challenges that were identified in this research study. On the other hand, in terms of credibility of information, it was found that most credible information sources during flood events are related to (Centre 112 and Centre for civil protection 121). Moreover, on that issue, the results showed that (75.8%) of public users that participated in the study are motivated to connect to centre112 for obtaining information during flood crisis events. Moreover the results showed that there is a main concern between the different ethnical groups as they act differently to information sources as being from state level, entity and cantonal level.

The results in Chapter 4 regarding the ethnical segregation-act in Bosnia and Herzegovina are showing that there is a need for special design consideration that needs to endorse the current attitudes in a way that will not interfere with the spread of information during crisis events.

- In terms of system framework design, the system was designed based on the defined results from investigating governmental and public challenges and needs in using social media with respect to flood crisis events. The framework focused on providing a structure and services that are oriented to overcome the shortcoming found in other platforms that are used by governmental entities in BiH. Furthermore, it focused on raising the awareness and providing better communication and content representation services by engaging social media services. The system has provided an easy method for connecting different governmental entities in a unified structure with preserving each governmental entity's privacy and flexibility in controlling the provided services, privileges and content.

The provided structure design focused on mapping the current governmental structure diversity in BiH and enabled different services to ensure effective cooperation that will results in better services for the public in times of floods. To ensure active participation by public who are residing in the regions served by the governmental entities in BiH to ensure better utilization of services through forming a community that will result in better communication and cooperation in cases of flood crisis. The system framework provided different privilege levels that have been used with each

governmental entity, in order to organize and provide effective workflow and use of services and content. Those privileges enables the governmental entities to engage the public with reporting services and adding content to the site after having the content controlled and supervised. The outcome from the pilot test has enhanced the technical aspect and functionality of the system with respect to the defined inputs in the system design. The results of the pilot test were addressed before the evaluation of system's impact on governmental and public users.

- In terms of evaluating the systems performance towards the inputs that were defined previously in Chapters three and four, the evaluation assessed the impact of the system framework on raising awareness and communication during flood threats and crisis in BiH. The evaluation results showed an encouraging attitude from participants' side either as governmental or public, and some enhancements needs have been reported towards the system framework services and use. The needs for improvements have been addressed in the future work section of this chapter. Thus, this research study has concluded that the system framework design with respect to the defined inputs was able to achieve the aim proposed by this research study.

7.2. Suggestions for Future Work

As a main achievement from the research work, the design of unified framework system as a prototype solution for raising awareness and enhancing communication using social media platforms during crisis event in BiH was accomplished. However, this prototype Framework system can be used for further research activities, in order to ensure better incorporation and utilization of social media and Web 2.0 services that will result in better engagement towards flood crisis events in BiH or other countries that are having similar settings. Therefore, the following further work could be carried out:

- Enhancing the system framework interface layouts, which are used for different system users; as it was pointed out by governmental users and public. Further research can be initiated by human-computer interaction research towards enhancing the framework's interface, especially the display of content on Mobile Phones used on fields during crisis events. Having such research can enhance the system's usability while retaining the same functionalities, as the system interface is treated as a separate system entity.

- The system's framework evaluation was tested with 8 governmental representative entities, due to the burden of having a collaborative agreement from different governmental entities to initiate such research study. A further research would be beneficial by having different governmental entities involved, plus attaching some NGO's that are related to relief and crisis events and run the evaluation towards the participants from those contributing sectors.
- Supporting the system with different local Cyrillic and Latin alphabets, as well as international languages, in order to support the engagement of wider Bosnian population and international supporting bodies in the relief activities in BiH. It was found that many populations of Bosnian nationals are living abroad and having the site capable of presenting the services and information in different alphabets and languages is more convenient for the future generations.
- Supporting the system framework with additional features that are related towards enhancing the collaboration of users in the system framework by enabling forum services, chat, local radio stations and collaborative maps. Having such services will ensure forming an effective community that can share resources and work together to mitigate the threats of flood crisis events.
- Supporting the framework with mobile and radio services to enhance the usability and effectiveness of the framework. The current framework design is capable of including those services from technical aspect. However, it was found that using those services requires governmental authorization and financial support that are beyond the capability of the researcher. Thus, the researcher will work hard to enable those services through collaborative efforts with local and international, NGO's to gain financial support and governmental authorization in using such services.
- Investigating the system framework with elderly users and users with disabilities as they are considered the most vulnerable during crisis events. The investigation will concentrate on the usability and type of services needed. At a later stage the services can be assessed and the framework can be modified to support such needs.
- The current research investigated the use of the system framework with flood crisis, the future trends will focus on investigating the needs in using the system framework

for other types of crisis and defining the requirements in changing the system structure, services and operations.

- In terms of security of the system and securing personal information, a secure socket layer can be used for protecting the information transfer for sensitive data that are related to governmental activities and processes. It is important to establish a cyber security policy referring to the phases of emergency management cycle, also it is vital to constantly educate system users about cyber threats and to follow global trends in the field of protection against cybercrime.
- Due to the country's geographical diversity and spread of flood region's the ICT infrastructure is faced with different challenges. A research on using the system framework through the employment of WiMAX, LTE and 5G technologies would bring benefits to the country, as the major population in BiH are found in different rural areas. Also the employment of such technologies is considered cheap in comparison with the broadband installation which can be beneficial towards courtiers with different financial challenges (Nhlanhla Mlitwa & Maghmuda Ockards, 2008).

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APPENDIX A

Bosnia and Herzegovina's Civil Protection Authorities Questionnaire

Dear Participant,

This questionnaire is a part of a research study of Electronic & Computer Engineering (PhD) at the School of Engineering and Design in the University of Brunel, UK. The purpose of this questionnaire is to investigate the current stand of using social media in Bosnia and Herzegovina's civil protection authorities in order to define problems and be able to provide solutions in the future steps of this research.

This research study and its methodological approach, inputs and output results will all serve for better enhancement of understanding of the current situation of using social media in Bosnian governmental agencies. Thus we are so pleased to have you as one of our major and effective role players in participating in this research study through answering this questionnaire.

The survey will take about 10 minutes to complete. If you would rather not answer a question, you may leave it blank, but the results of this research will be most useful if you answer all the questions.

Your participation is greatly appreciated. If you have any questions or queries feel free to contact me at the following addresses:

Sadi.matar@brunel.ac.uk / Sadi.Matar@gmail.com

Mobile: +387 61 235 597

Kind Regards

Šadi Matar

Authority's Name: _____

The information will be available only for this research and will be treated as confidential. No use of this information will in any way identify you as a participant. Please use the enclosed envelope to send your questionnaire to: Šadi Matar, Pijačna 79, Sarajevo 71000 or by e-mail on: sadi.matar@brunel.ac.uk / sadi.matar@gmail.com

Please return your completed survey not later than 31. March 2015.

1 What is your governmental entity's current position on social media? Pick one only

A	The authority is using social media on a daily bases and is relying on its use.
B	The authority has some experience with social media
C	The authority has just started to use social media
D	The authority is planning to use social media in the near future but hasn't started yet
E	The authority has been introduced to the use of social media and decided against it for the moment >> <i>Skip to: Q2</i>
F	The authority has not considered using social media at all >> <i>Skip to: Q2</i>

2. Your organization doesn't use social media, why is that? Please write in all of the reasons

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3. In your opinion, which form of communication allows your organizational entity to best manage its reputation with public?

A	Social Media
B	Traditional Media

4. How frequently is information from your organization posted on social media?

A	More than once per day
B	Once per day
C	Several days per week
D	Weekly
E	Monthly
F	Rarely / Intermittently

5. What (was / could be) the driving force for your governmental agency to consider the use of social media? Pick the MAIN driver

A	The community
B	GM/CEO
C	Communications staff
D	Other authorities in Bosnian Government
E	Authorities outside Bosnian Government
F	IT/Web staff
G	Other staff
H	Other:

6. What (is/ would be) your main purpose for establishing a presence on Social Media

A	Crisis management
B	Public relations
C	Communicating with employees
D	Community risk Communication
E	Monitor the organization's reputation
F	Networking with other organizations

7. Who (is / would be) responsible for social media within your authority? Please pick one

A	Management representative
B	Communications department
C	IT department
D	Public Relations department - PR
E	Web team
F	Other:

8. What is your governmental entity's status in terms of having social media policy?

A	We have one
B	We are developing one
C	We don't have

9. What expresses your governmental entity's social media policy position?

A	We used existing social media policy and modified it slightly to comply with our authority's vision and responsibilities
B	We used existing social media policy as a framework and modified it widely to meet our needs
C	We have developed our own social media policy

10. What type of social media policy do you have or currently developing

A	Privacy policy
B	Copyright policy
C	Security policy
D	Anti/trust policy
E	Terms of use policy
F	Community guidelines
G	Business continuity plan policy
H	Employee code of conduct policy
I	Crisis communication plan policy
J	Blogging guidelines/blog moderation policy

11. Are your governmental entity staffs able to officially use social media to communicate with the community?

A	The communication is limited to specific staff members
B	Everyone can communicate with the community via social media
C	Other:

12. Is it possible for governmental entity staff to access social sites (e.g. Twitter and Facebook, YouTube) for personal use at work?

A	Yes
B	No
C	Don't know

13. Are the governmental entity staffs aware of having any policy regarding the personal use of social media in terms of making comments which could reflect on the authority

A	We have policy
B	We are developing policy
C	We are considering the issues
D	We didn't consider it
E	We considered it and determined not to proceed with a policy
F	Don't know

14. Does your governmental entity provide social media training for your staff?

A	Yes
B	No

15. Does your governmental agency provide its representatives with a Smartphone, iPad, or equivalent tablet style device for authority use with social media?

A	Yes
B	No
C	Don't know

16. For each social media tool in the list, choose if your authority is aware, currently uses or likely to use in the future. Tick all that apply.

Questions	Aware	We currently use that type of Social Media tool	We are likely to use it in future
a. Microblogging (e.g. Twitter)			
b. Social networking (e.g. Facebook, Google+ or Myspace)			

c. Professional networking (e.g. LinkedIn)			
d. Photo/picture sharing (e.g. Flickr or Picasa)			
e. Augmented reality (e.g. Layar)			
f. Video sharing (e.g. YouTube/Vimeo etc)			
g. Presentation sharing/viewing (e.g. Slideshare)			
h. Extranet Wikis (Not Wikipedia)			
i. Online forums like Google or Yahoo groups			
j. Mobile apps (e.g. Snap Send Solve)			
k. SMS communication			
l. Internal microblogging (e.g. Yammer)			
m. DA Apps (e.g. Planning Alerts)			

17. Does your governmental agency measure the effectiveness of your council's social media use in a formal way?

A	Yes
B	No
C	Don't know

18. How does your governmental entity measure the effectiveness of social media use? Please describe any formal or informal evaluation techniques that are used to assess the effectiveness of the tools you use.

19. Can you bring a case of using social media that resulted in positive feedback for your governmental entity in terms of ((Events used for, Information used during, Type of information, Media used, Accepted an provided feedback, Collaboration with others)? Please give as much detail as you can.

20. For your governmental entity, what are the best areas that social media has the most value?

a.	Customer services
b.	Events announcements
c.	Corporate communications
d.	General community engagement
e.	Project based community consultation
f.	Works information
g.	Development application tracking
h.	Economic development
i.	In-house training and development
j.	Other specify
k.	None

21. What are the main opportunities for the authority to take up social media? Please describe the opportunities as possible - type NA if not available.

22. In your opinion, social media is beneficial when used for:

23. What are the main barriers for your governmental agency to take up social media? Please describe the barriers as possible - type NA if not available.

24. What are the risks that the governmental entity needs to consider before using social media? Please explain the risks as possible - type NA if not available.

25. Recent research studies have highlighted the possibility of governmental entities to use social media as an emergency management tool. Has your authority considered how you might use social media in an emergency situation? Please describe as possible

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26. Thinking about the opportunities for social media use in governmental entities for managing flood crisis in Bosnia and Herzegovina, what does your authority think of social media on the following scale?

1 = Social media is mainly useful as a broadcast communication tool, to tell people what they need to know

5 = Social media is useful for broadcast information but its main strength is as a community engagement tool, to develop a dialogue with the community on a range of topics

	1 – Broadcast communication	2	3	4	5- Community Engagement
Authority's use of Social media is...	○	○	○	○	○

27. Vulnerable populations (elderly, disabled, hearing impaired, etc.) are more reliant on social media for communication than other members of the public.

<i>Strongly agree</i>	<i>Agree</i>	<i>Neither agree nor disagree</i>	<i>Disagree</i>	<i>Strongly disagree</i>
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28. In your opinion, the biggest risk when using social media during a crisis situation is (explain):

--

29. Does your organization have resources in place during a crisis to verify the validity of information gathered on social media?

A	Yes
B	No

30. In your opinion, during which phase of the Emergency Management Cycle is social media most effective for communicating risk to the public:

A	<i>Preparedness phase</i>
B	<i>Prevention-mitigation Phase</i>
C	<i>Response phase</i>
D	<i>Recovery phase</i>
E	<i>Equally useful in all phases</i>

31. Does your governmental entity use social media to educate the public on emergency preparedness procedures, such as earthquake preparedness, crime prevention tips, public health issues, etc.?

A	Yes
B	No

32. Does your governmental entity work with other authorities for coordinating and sharing information for informing the public in the case of crisis events?

A	Yes
B	No
C	Don't know

33. Do you believe your governmental entity is willing to coordinate the efforts of using social media with other governmental entities in the Bosnian government (all levels) for public safety and common good?

A	Yes
B	No
C	Don't know

34. What are the main challenges towards coordinating the efforts of social media between the different Bosnian governmental entities?

--

We welcome other comments, including elaboration upon any answer above - however; please do not disclose confidential information.

Thank you for completing this questionnaire.

APPENDIX B

The use of Social Media during crisis situations in Bosnia and Herzegovina (1639)

This survey is conducted for the purpose of my PhD research program. Requested information will be used only for the stated purpose. The study does not seek personal data, and as such, guarantees complete anonymity.

Thank you for participating in the survey and please answer the questions accurately and honestly as you can.

* Required

Education level: *

- Secondary education
- Higher education - 2 year
- University degree
- MA
- PhD

Which category below includes your age? *

- 18-24
- 25-34
- 35-44
- 45-54
- 55 and older

What is your ethnicity? *

- Bosniac
- Serb
- Croat
- Others
- Non biased

Administrative-territorial belonging: *

- Unsko-sanski Canton
- Posavski Canton
- Tuzlanski Canton
- Zenicko-dobojski Canton
- Bosansko-podrinjski Canton
- Srednjobosanski Canton
- Hercegovacko-neretvanski Canton
- Zapandno-hercegovacki Canton
- Sarajevski Canton
- Livanjski Canton (Canton 10)
- Region Banja Luka
- Region Dobojski

- Region Bijeljina
- Region Pale
- Region Trebinje

Gender: *

- Female
- Male

Please indicate how you feel about social media websites such as Facebook, Twitter, Myspace, etc. *

	Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree
Social media websites are fun to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media websites are waste of time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media websites are for someone like me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media websites are a passing fad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media websites are growing in popularity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have an account on any social networking website (like Facebook, Twitter, MySpace, YouTube, ...etc.)? *

- Yes
- No

Which social network do you use? *

- | | |
|-----------------------------------|---|
| <input type="checkbox"/> Facebook | <input type="checkbox"/> WhatsApp |
| <input type="checkbox"/> Twitter | <input type="checkbox"/> Flickr |
| <input type="checkbox"/> LinkedIn | <input type="checkbox"/> Wikipedia |
| <input type="checkbox"/> Google+ | <input type="checkbox"/> Instagram |
| <input type="checkbox"/> YouTube | <input type="checkbox"/> I have my own blog |
| <input type="checkbox"/> Viber | <input type="checkbox"/> I read other blogs |
| <input type="checkbox"/> Skype | <input type="checkbox"/> Other: |

In a typical week, about how much time do you spend using social networking websites? *

- Less than 1 h
- 1 – 5 h
- 6 – 10 h
- 10 - 15 h
- More than 15 h

Is your time on social media website primarily spent *

- Posting personal information or comments
- Reading content posted by others
- Other:

In the case of flood crisis event where would you go first for information about the situation in general? *

- Local news (Radio and TV) channel
- National news (Radio and TV) channel
- Local online news

- National online news
- Online news source (Yahoo, MSN, AOL, forums, etc.)
- Center for civil protection 121
- Center – 112
- Governmental Social media web sites for rescue and protection
- Other:

If you did not find the information you were seeking where would you go next? *

- Local news (Radio and TV) channel
- National news (Radio and TV) channel
- Local online news
- National online news
- Online news source (Yahoo, MSN, AOL, forums, etc.)
- Center for civil protection 121
- Center – 112
- Governmental Social media web sites for rescue and protection
- Other:

Now please choose the circle which best represents your view on the credibility of each of the following in providing information about this situation: *

	Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree
Local news (Radio and TV) channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National news (Radio and TV) channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local online news	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National online news	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online news source (Yahoo, MSN, AOL, forums, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Center for civil protection 121	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Center – 112	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental Social media web sites for rescue and protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rank the following in order of believability in providing information about the situation (please select one response per line) *

	1=Least Believable	2	3	4	5	6	7	8	9	10
Local news (Radio and TV) channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National news (Radio and TV) channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Local online news	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

National online news	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online news source (Yahoo, MSN, AOL, forums, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Center for civil protection 121	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Center – 112	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental Social media web sites for rescue and protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Finally, regardless of if you currently use social media websites, would you set up social media accounts to follow the Center 112 in the event of flood crisis to get information? *

- Yes
- No

APPENDIX C

From: Šadi Matar [<mailto:Sadi.Matar@mkt.gov.ba>]
Sent: Wednesday, April 08, 2015 3:22 PM
To: Undisclosed recipients:
Subject: Molba
Importance: High

Poštovani,

Obraćam Vam se u nadi da ćete mi izaći u susret i da ćete popuniti anketu koja mi je potrebna za izradu završnog rada na doktorskom studiji a tiče se upotrebe socijalnih mreža u kriznim situacijama (poplave).

Podaci koji se traže koristit će se isključivo u navedenu svrhu. U istraživanju se ne traže lični (osobni) podaci, i kao takvo, garantira potpunu anonimnost.

Link upitnika:

<https://docs.google.com/forms/d/1qg3bokh8p7KFUKVHmUVv3BjXT94aRCYm4HBpYjThidQ/view/form>

Unaprijed Vam se zahvaljujem.

S poštovanjem,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society

Ministry of Communications and Transport
Trg BiH br.3, Sarajevo 71000
Bosnia and Herzegovina
tel: (+387-33-707-643)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

From: Kemal Bajramovic [<mailto:kemal.bajramovic@gmail.com>]
Sent: Tuesday, April 07, 2015 11:10
To: Šadi Matar
Subject:

Evo e-mail adresa. Molim te koristi samo i isključivo za potrebe istraživanja za doktorsku disertaciju i nemoj prosljeđivati trećim licima.

Lp,

Kemo

From: Šadi Matar
Sent: Tuesday, April 07, 2015 11:10
To: Kemal Bajramović
Subject: RE: Molba Upitnik

OK, a reci mi hoće li biti problem da ti pošalješ na adrese koje imaš registrovane za Newsletter-u?.

I to mi puno znači u datom momentu.

Pozdrav,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society
Ministry of Communications and Transport
Trg BiH br.3, Sarajevo 71000
Bosnia and Herzegovina
tel: (+387-33-707-643)
fax: (+387-33-707-691)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

From: Kemal Bajramović
Sent: Tuesday, April 07, 2015 11:06
To: Šadi Matar
Subject: RE: Molba Upitnik

Može se uraditi targeting tako da samo ljudi iz BiH dobiju informaciju u *newsfeed*-u.

From: Šadi Matar
Sent: Tuesday, April 07, 2015 10:58 AM
To: Kemal Bajramović
Subject: RE: Molba Upitnik

Hvala ti Kemale za ovu informaciju, meni je potrebno da ljudi koji su u BiH to popune, zato nisam siguran kako bi ta opcija prosla. A I svakako racunam da cu dobiti dovoljan broj ako mi ludi kojima saljete Newsletter odgovore.

Hvala ti

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society

Ministry of Communications and Transport
Trg BiH br.3, Sarajevo 71000
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fax: (+387-33-707-691)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

From: Kemal Bajramović
Sent: Tuesday, April 07, 2015 10:56
To: Šadi Matar
Subject: RE: Molba Upitnik

Također bih ti preporučio da uradiš *boost* facebook post-a. Za 10 USD možeš imati veliki *reach*.

From: Šadi Matar
Sent: Tuesday, April 07, 2015 9:44 AM
To: Kemal Bajramović
Subject: Molba Upitnik
Importance: High

Poštovani,

Obraćam Vam se u nadi da ćete mi izaći u susret i omogućiti da objavim anketu koja mi je potrebna za izradu završnog rada na doktorskom studiji a tiče se upotrebe socijalnih mreža u kriznim situacijama (poplave), pomoću vaše mailing liste državnih službenika, kojom raspolazete za sve institucije BiH.

Podaci koji se traže koristit će se isključivo u navedenu svrhu. U istraživanju se ne traže lični (osobni) podaci, i kao takvo, garantira potpunu anonimnost.

Link upitnika:

<https://docs.google.com/forms/d/1qg3bokh8p7KFUKVHmUVv3BjXT94aRCYm4HBpYjThidQ/viewform>

Unaprijed Vam se zahvaljujem.

S poštovanjem,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society

Ministry of Communications and Transport
Trg BiH br.3, Sarajevo 71000
Bosnia and Herzegovina
tel: (+387-33-707-643)
fax: (+387-33-707-691)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

Translation in English for the above e-mail corespondance

From: Šadi Matar [<mailto:Sadi.Matar@mkt.gov.ba>]

Sent: Wednesday, April 08, 2015 3:22 PM

To: Undisclosed recipients:

Subject: Molba

Importance: High

Dear all,

This is a kind request, hoping that you will help me in fill out a survey which I need for constructing my doctoral study thesis, concerning the use of social networks in crisis situations (floods).

Requested information will be used solely for this purpose. The study does not seek personal data, and as such, guarantees complete anonymity.

link of the questionnaire:

<https://docs.google.com/forms/d/1qg3bokh8p7KFUKVHmUVv3BjXT94aRCYm4HBpYjThidQ/viewform>

Thank you very much

Best regards,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society

Ministry of Communications and Transport

Trg BiH br.3, Sarajevo 71000
Bosnia and Herzegovina
tel: (+387-33-707-643)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

From: Kemal Bajramovic [mailto:kemal.bajramovic@gmail.com]
Sent: Tuesday, April 07, 2015 11:10
To: Šadi Matar
Subject:

Here's e-mail addresses. Please use only and exclusively for the purposes of research for your doctoral thesis and do not passed on to third parties.

Lp,

Kemo

From: Šadi Matar
Sent: Tuesday, April 07, 2015 11:10
To: Kemal Bajramović
Subject: RE: Molba Upitnik

OK, tell me if it will be a problem for you to send e-mails to the addresses that you have in the registry for the Newsletter ?.

That would mean a lot to me at the moment.

Thanks,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society
Ministry of Communications and Transport
Trg BiH br.3, Sarajevo 71000
Bosnia and Herzegovina
tel: (+387-33-707-643)
fax: (+387-33-707-691)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

From: Kemal Bajramović
Sent: Tuesday, April 07, 2015 11:06
To: Šadi Matar
Subject: RE: Molba Upitnik

It can be done targeting so that only the people of Bosnia and Herzegovina, obtain information in newsfeed.

From: Šadi Matar
Sent: Tuesday, April 07, 2015 10:58 AM
To: Kemal Bajramović
Subject: RE: Molba Upitnik

Thank you Kemal for this information, I need people who are in BiH to fill the questioner, so I'm not sure how this option is managed. And I certainly count on that to get enough responses if I contact the people who are registered with the Newsletter.

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society

Ministry of Communications and Transport
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<http://www.mkt.gov.ba>

From: Kemal Bajramović
Sent: Tuesday, April 07, 2015 10:56
To: Šadi Matar
Subject: RE: Molba Upitnik

I would also recommend that you do boost facebook post . For \$ 10 you can have a great reach.

From: Šadi Matar
Sent: Tuesday, April 07, 2015 9:44 AM
To: Kemal Bajramović

Subject: Molba Upitnik

Importance: High

Dear all,

This is a kind request, hoping that you will allow me to publish a survey that I need for the preparing my doctoral research study concerning the use of social networks in crisis situations (floods), using your mailing list of civil servants, which you have for all BiH institutions.

Requested information will be used solely for this purpose. The study does not seek personal (personal) data, and as such, guarantees complete anonymity.

Link questionnaire:

<https://docs.google.com/forms/d/1qg3bokh8p7KFUKVHmUVv3BjXT94aRCYm4HBpYjThidQ/viewform>

Thank you very much

Best regards,

M.Sc. Šadi Matar, dipl.el.ing
MCP, MCTS, MCITP
Senior Advisor for Information Society
Ministry of Communications and Transport
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fax: (+387-33-707-691)
e-mail: sadi.matar@mkt.gov.ba
<http://www.mkt.gov.ba>

APPENDIX D

Evaluating BiH Flood System Framework

Dear Participant,

This questionnaire is a part of a research study of Electronic & Computer Engineering (PhD) at the School of Engineering and Design in the University of Brunel, UK. The purpose of this questionnaire is to evaluate BiH flood system framework which I am proposing as my PhD thesis for civil protection authorities in order to overcome problems and be able to provide solutions in the future steps of this research.

This research study and its methodological approach, inputs and output results will all serve for better enhancement of understanding of the current situation of using social media in Bosnia by public and governmental agencies. Thus we are so pleased to have you as one of our major and effective role players in participating in this research study through answering this questionnaire.

The survey will take about 7 minutes to complete. If you would rather not answer a question, you may leave it blank, but the results of this research will be most useful if you answer all the questions.

Your participation is greatly appreciated. If you have any questions or queries feel free to contact me at the following addresses: Sadi.matar@brunel.ac.uk / Sadi.Matar@gmail.com

The information will be available only for this research and will be treated as confidential. No use of this information will in any way identify you as a participant.

* Required

How did you navigate the system?

- PC
- Tablet
- Smart Phone

System Structure

Do you believe that the current site structure with respect to the governmental structure is useful in terms of

	Strongly Disagree	Disagree	Neutral	Agree	Highly Agree
Distribution of region dedicated information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distribution of region dedicated services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of use and navigation with respect	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

for flood crisis phases					
Did the services of the system appear to be organized logically on the screen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information reachability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Service Effectiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Awareness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Learnability of system framework in relation to floods

	Always	Usually	Half the time	Seldom	Never
Did the System behave in the way you expected in relation to flood crisis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When using the system was it clear what you were expected to do in relation to flood crisis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was it easy to find the required information on flood crisis using system framework?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you understand the services first time?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did the System have distracting features in relation to flood crisis events?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

System Framework Functionality in Relation to Flood Crisis

(The System should meet the needs and requirements of users when carrying out tasks)

	Always	Usually	Half the time	Seldom	Never
Did the system allow you to perform the needed services in relation to flood crisis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was it clear what the different parts of the system services were in relation to flood crisis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was it clear how governmental personnel could be contacted?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was it clear where governmental personnel could be contacted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Was it clear why governmental personnel could be contacted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you get relevant feedback from the government side when necessary?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have the presented system services and functionalities manage to raise flood awareness for you	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have the system services and functionalities manage to enhance the communication with the governmental representatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Helpfulness of the system in relation to flood crisis

(Informative, easy to use, relevant guidance and support should be provided by the System)

	Always	Usually	Half the time	Seldom	Never
Were appropriate help services available for flood events?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was it clear what actions you could take at any stage of flood event?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did the system inform you of about the threats related to flood crisis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were there sufficient instructions for handling flood events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you feel the System helped you if you got confused during flood crisis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did system alerts and messages indicate what to do during flood crisis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Rating Services

(Rating for the service that was provided through the system framework for use during flood crisis events)

Crisis Related

Subscribing for Alerts*

Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Report a crisis*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Report Missing Person*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Missing person List*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Flood Videos*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Flood Gallery*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Flood Maps*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Shelter Locations*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Volunteers*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Connecting with METEOALARAM website*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>

Floods Awareness

Information about floods*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Planning for floods*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Flood Risk Scenarios*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
The Cost of Flooding*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Levee Simulator*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>
Preparedness Video*				
Not Useful 1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 Very Useful <input type="radio"/>

Sites General Services

Events Calendar*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Global News*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Archive*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Web Links*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Contacts*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Donations*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Flood Alert Warning Sign*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Global Articles*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Region Weather information*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Show Online Users*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Printing / Email Articles*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Search feature*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Commenting on Articles*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Use of Social Media Within the System					
Sharing articles on social media*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Connecting Through Twitter*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	
Connecting with Facebook Group Oriented for flood crisis in BiH*					
Not Useful 1	2	3	4	5 Very Useful	
○	○	○	○	○	

Connecting with Center 112*

Not Useful 1 2 3 4 5 Very Useful

Connecting with the Government

Contacting Governmental representative*

Not Useful 1 2 3 4 5 Very Useful

Receiving feedback from governmental representatives*

Not Useful 1 2 3 4 5 Very Useful

Reading information related to your region*

Not Useful 1 2 3 4 5 Very Useful

Connecting with governmental agencies through web links*

Not Useful 1 2 3 4 5 Very Useful

Navigability of the system

	Always	Most of the time	Some of the Time	Never	Not Applicable
Was it clear to you where you were in the system web page?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were you certain how to proceed within the system services?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was there a consistent procedure for moving around the system?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did the organization of the system fit your perception of the required services?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were you able to choose the route you wished to take in terms of governmental structure in BiH?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quality of the system interface

(The interface should be sufficiently flexible in structure, in the way information is presented and in terms of the user can do?)

	Always	Usually	Half the time	Seldom	Never
Did you find the information was presented attractively?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did you find that the information was presented consistently?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were the icons and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

symbols easy to recognize and understand?

Was the language clear?

Were the multimedia components (such as graphics and text) complementary?

If there was visual material, was the size of it suitable for the screen?

Was it possible to print certain parts of information you wanted to keep?

The following page contains a few questions to allow to express your overall opinion of the system framework and its potential as a communication and awareness system.

What are the 3 best aspects of the system?*

What are the 3 worst aspects of the system design?*

What do you think the system was trying to be? (Please tick) *

Strongly Agree Agree Neutral Disagree Strongly Disagree

Floods

Communication

Framework System

Flood Awareness and preparedness System

Did you find any design feature of the System Framework irritating?*

Did you make any re-occurring errors; could you name them?*

What changes would you make to the system to make it better for the user?*

Is there anything about the system you would like to add?*

Did you enjoy using the System?*

- Yes
- No

Would you use such system framework again?*

- Yes
- No

Would you recommend the system framework for other users?*

- Yes
- No

APPENDIX E

Bosnia and Herzegovina's Civil Protection Authorities Questionnaire (48)

Dear Participant,

This questionnaire is a part of a research study of Electronic & Computer Engineering (PhD) at the School of Engineering and Design in the University of Brunel, UK. The purpose of this questionnaire is to investigate the current stand of using social media in Bosnia and Herzegovina's civil protection authorities in order to define problems and be able to provide solutions in the future steps of this research.

This research study and its methodological approach, inputs and output results will all serve for better enhancement of understanding of the current situation of using social media in Bosnian governmental agencies. Thus we are so pleased to have you as one of our major and effective role players in participating in this research study through answering this questionnaire.

The survey will take about 10 minutes to complete. If you would rather not answer a question, you may leave it blank, but the results of this research will be most useful if you answer all the questions.

Your participation is greatly appreciated. If you have any questions or queries feel free to contact me at the following addresses:

Sadi.matar@brunel.ac.uk / Sadi.Matar@gmail.com

Mobile: +387 61 235 597

Kind Regards

Šadi Matar

Please return your completed survey not later than 31. March 2016.

* Required

How did you navigate the system? *

- PC
- Tablet
- Smart Phone

1. Used System Role

1.1 What is your current job role *

1.2 Do you believe that your current job can be related to the system framework provided

services and functionalities? *

- Yes
- No

1.3 With respect to the system’s user privileges what is the most suitable role for your participation with respect for your current job description (Check the one that apply) *

- Administrator
- Manager
- Publishers
- Editors
- Authors

1.4 Participating Authority *

- State level
- Federation level
- Republica Srpska
- Canton Sarajevo
- Canton Unsko sanski
- Canton Hercegovacko neretvanski
- Canton Tuzla
- Region Banja Luka

2. Structure

2.1 The provided system structure has managed to*

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Simulate the structural diversity in BiH government Structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provided the needed services with respect to the system structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide Services with respect to Flood Crisis Phases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provided better services for public with respect to the diversity of BiH public ethnicity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provided Flexibility in Choosing and selecting the needed Services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed to provide Unified Framework for public awareness and communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provided a structure that can adapt other governmental authorities to participate in the framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Usability

3.1 In regard for the usability of the system I believe *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
I would like to use this system for flood crisis communication and awareness in BiH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The framework is unnecessarily complex to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The used services are well integrated and sufficient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The presented system framework interface and layout is easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The use of social media services in the system are clear and useful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Effectiveness

4.1 With respect to the used services rate the following *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
The system managed to provide sufficient tools for government to government communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The System Framework was effective through the distributed user privileges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The System managed to provide sufficient tools for Government to Public communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The System framework manage to utilize social media effectively for flood crisis in BiH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system framework is reachable for majority of the public in BiH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system Framework was effective is grouping news sources for the public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The system managed to effectively utilize volunteering services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4.2 Rate the effectiveness of the following services in terms of government to government cooperation *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Creating Articles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing unified Social Media Policy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assistance Requests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Notifications of Accidents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requested Documents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meeting Request	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reporting a Crisis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viewing a Crisis Report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viewing Volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing Person Lists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Define Shelter Locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Subscribing for Alerts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental Picture / Videos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing Video Galleries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Governmental Calendar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4.3 Rate the effectiveness of the following services in terms of government to Public cooperation*

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Posting Articles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connecting with Social Media -Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connecting with Social Media -Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Connecting with Social Media – RSS Feeds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Subscribing to Alerts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Report a Crisis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Report Missing Person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Missing Person Lists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood Videos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood Galleries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood Maps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shelter Locations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volunteers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floods Tutorials and Simulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Global News	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Archive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Donations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Communication

5.1 The system framework enhanced the communication activities with respect to the traditional approach by providing *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Just in Time Communication Channels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Different Social media services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using different medium for communications (Tablet/PC/ Mobile)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pre-Flood Crisis Communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During Flood Crisis Communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Post Flood Crisis Communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feedbacks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5.2 Which of the following tools were effective for providing communication channels with respect for flood crisis *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Articles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Forms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social media services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Email Subscription for Alerts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Awareness

6.1 The system framework has raised my awareness Towards *

	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Flood Crisis Impact on the public BiH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood Crisis Governmental overall Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Importance of Governmental Collaboration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public Needs During Flood Crisis in BiH	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Essay Questions

The following page contains a few questions to allow expressing your overall opinion of the system framework and its potential as a communication and awareness system.

7.1. What are the 3 best aspects of the system? *

7.2. What are the 3 worst aspects of the system design? *

7.3. What do you think the system was trying to be? (Please tick) *

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Floods Communication Framework System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood Awareness and preparedness System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7.4. Did you find any design feature of the System Framework irritating? *

7.5. Did you make any re-occurring errors; could you name them? *

7.6. What changes would you make to the system to make it better for governmental use? *

7.7. What changes would you make to the system to make it better for public use? *

7.8. Is there anything about the system you would like to add? *

7.9. Did you enjoy using the System? *

- Yes
- No

7.10. Would you use such system framework again? *

- Yes
- No

7.11. Would you recommend the system framework for other users? *

- Yes
- No