Journal of Theoretical and Applied Information Technology
15th February 2017. Vol.95. No.3

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

A UNIFIED SOCIAL MEDIA FRAMEWORK DESIGN AGINST FLOODS THREATS - THE CASE OF BOSNIA AND HERZEGOVINA

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ABSTRACT

The use of social media services are providing solutions and new opportunities for innovative use during flood crisis events. The different tools provided by social media have proved providing many benefits in relation to protection and rescue services for governmental and civil protection. Social media services provide broader prospects for all affected by the flood threats to engage in warning and informing in reaction to flood crisis events. The use of social media in different crisis events proved to be faster medium for spreading information and alerts among public in compare to traditional use of media. This paper presents the design of a unified social media framework that has been used for research purposes by governmental officials and the public in Bosnia and Herzegovina against flood threats that affected the country in recent years. The system design is unique as it was built with consideration for diversity and non-centralized governmental structure in Bosnia and Herzegovina.

Keywords: *Bosnia and Herzegovina, Crisis, Floods, Framework, Social Media*

1. INTRODUCTION

In cases of emergencies, threats and disasters, governmental authorities' engage their communication system to manage and collaborate their activities to face and minimize the impact of any crisis or threat. In most cases, the use of communication system is utilized by the government without much engagement with the public. Such practices have proved to leverage the threats especially that the public need to be early informed of the threats in order to have urgent response to such events, which will minimize the effect and provide better response , preparation and collaboration with the governmental agencies [1]. The current provided social media networks and services have proved to be effective in many crisis events, as they provide real-time communication channel for sharing information among users [2]. The sharing process of information and collaborating efforts have helped in minimizing the impact and challenges during crisis events. Flood disasters and threats are becoming a recurring phenomenon in Bosnia and Herzegovina, due to the nature of Bosnia and Herzegovina, as it has mountainous topography with rich sources in water, rivers and lakes [3]. In May 2014 shattering floods swamped large areas of Bosnia and Herzegovina, the event showed inefficiency in the governmental and public communications and coordination exertions towards helping and rescuing efforts [4]. The result of such inefficiency, targeted the public to group and organize their efforts using social media platforms, to post and share information in order to alleviate and guard themselves from the disaster [5]. Citizens of Bosnia and Herzegovina recognized the benefit and potential use of social media platforms during crisis events, and such actions were the driving force for government to put an effort in enabling better communication with the public [4]. As a part of a research study, the BiH governments' readiness for using Social media as a tool for sharing information in case of disaster was investigated [5] [6]. The results showed that the used governmental procedures and settings are not appropriate or capable of addressing flood crisis for ensuring the safety of the public. The current operating governmental structure is creating many challenges towards adopting a strategy for collaboration and using social media services in appropriate manner [6]. Replicating crisis events and solutions from different cases will not provide desired solution for the Bosnian experience with the crisis, as different settings and complexities are

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found in the Bosnian governmental structure [7]. Thus, the direct use of social media without having a strategy or unifying and organizing the processes will benefit a small sector of the public only. The need for solutions is becoming a public demand for sustaining safety during such events [5][6]. The next sections will introduce the literature related to governmental challenges that resulted in magnifying the challenge for the governmental sector and the public. Moreover it will justify the need for a unified solution with respect to the complex governmental structure in Bosnia and Herzegovina.

2. BOSNIA AND HERCEGOVINA GOVERNMENTAL STRUCTURE

The government of Bosnia and Herzegovina has decentralized governmental structure that is distributed between state level, several entities and cantons [7]. The structure has two variations that are (Strategic and operational) levels. The strategic level is responsible for setting and reviewing strategic decisions related to the state level of Bosnia and Herzegovina and it consists of the president, members of ministers, ministry of security and protection and rescue sectors. On the other hand, the operational structure consist of three different governments that are (Government of Federation Bosnia and Herzegovina, Government of Republic of Srpska, Government of Brcko) [8]. Each of those governmental sectors have their own ministries and parliaments members. Moreover, each sector is also divided into different cantons and regions that each canton has their own ministries and mayors. For example, the federation of Bosnia and Herzegovina has a board of ministries and parliament members, it is divided into 10 different cantons, and each canton has its own board of ministries and parliaments too. Moreover, the government of Republika Srpska has its own board of ministries and parliament members and divided into 5 regions, where each region has its own mayor. The Brcko district has its own ministries, parliament and it is a one district. Thus for a total of 3.8M population there are more than 180 ministers, and a large number of 760 parliament members that work for cantons, district and regions [9]. This current governmental structure is forcing many challenges on the current operational and cooperation levels during crisis events[10]. The following figure shows the current two structures found in Bosnia and Herzegovina.

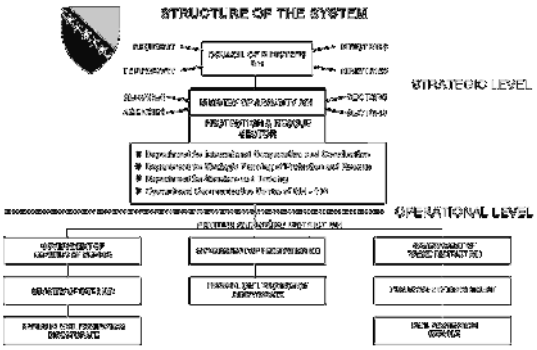

Figure 1: Bosnian Governmental Structure [10]

3. SOCIAL MEDIA AND FLOODS IN BOSNIA & HERZEGOVINA

The use of social media services in Bosnia and Herzegovina is largely increasing due to the increasing use of internet through PC and mobile devices. Based on the report published by Bosnia and Herzegovina Communication Regulatory Agency in 2015, they announced that with the population of 3.842.000, a number of 2.227.970 are having internet services. This rate makes a percent of 58% of operation of the internet and 3.491.188 of mobile phone Subscribers [11] Therefore, using social media in Bosnian context is looked at as a key instrument for sharing information of different nature. In terms of floods, flood occurrences' is occasional phenomenon in Bosnia and Herzegovina, as different cities are located near riverbanks. According to the International Bank for Reconstruction and Development, they published a report in mid April 2003, stating that Bosnia and Herzegovina is under perpetual risk that is intimidating 4% of its total area and 60% of its lowland area [12]. In the spring of May 13th, 2014, Bosnia and Herzegovina had a major flood incident that triggered exceptional floods along River Sava and its tributaries. Other rivers were affected too, and it was estimated that one third of the country was flooded with water levels that was unprecedented in a record of 120 years [13] The researcher in this project was directly involved in Bosnian flood crisis as he is governmental official at the Ministry of Communications and Transport of Bosnia and Herzegovina. He was officially engaged for the period of 19 days in the crisis Operation and Communication Center 112 (OCC112) of Bosnia and Herzegovina. For the duration of flood crisis many problems were identified that were not planned for and they

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resulted in inefficient timely response. The following problems are considered the main problems identified from the crisis [6]:

a) Diverse authorities, regulations and measures between governmental levels that are not coordinated with the state level structure law on protection and rescue. For example, the emergency state on floods for the federation of Bosnia and Herzegovina was declared on 15th of May, while for the government of Republika Srpska was declared on 17th of May. This differentiation and lack of coordination have imposed many challenges in providing services for protection and rescue of public during flood event [14

b) Nonexistence of a system that provides timely warning capable of informing the media and the public of possible crisis in the region. Thus for the flood events of May 13th 2014, OCC112 center have sent alert and notifications for the civil authorities in the Federation level and Republika Srpska, but such information was not furthered to operational levels of civil authorities or the media. Such action exposed the public for different vulnerabilities to direct impact of flood crisis [15].

c) Government headquarters that are responsible for managing crisis events were not able of interacting with large capacities of information displayed on social media related to flood crisis and the effected regions. Such incapability resulted in exposing the public to rumors and false information.

d) Lack of coordination between governmental sectors involved in crisis events. Moreover, lack of cooperation and coordination with national and international organizations that are providing humanitarian services. This inefficient in cooperation and coordination resulted in creating different problems with humanitarian aids and process. [15] [16]

According to Bosnian and Herzegovina authorities, they conducted evaluation for post disaster recovery needs assessment for the floods of May 2014. The results were shocking as the crisis had caused a destruction that is estimated to 15% of Bosnia and Herzegovina GDP that is nearly 3.98 Billion BAM. The major exposed sectors based on RNA report are [13]:

- Transport and Communications, estimated losses (680 Million BAM).
- Housing, estimated losses (886.4 Million BAM).
- Employments, estimated losses (1.55 Billion BAM).

The first days of the flood crisis, it was found that few and limited information were revealed for the public. This was the driving force for the public to search for alternative way of communication to be able to communicate with their families and friends, and to group their efforts for rescue operations[6][15].

4. SOCIAL MEDIA AS AN ALTERNATIVE

It was found by different studies that in event of natural disaster the main mass-communication medium for the public is using social media services [17]. Many governmental agencies in the world utilized those services through verified accounts in order to provide a medium for effective communication with the public. In Bosnia and Herzegovina, no consideration for the use of social media was formed or practiced in relation to flood crisis event. This lack of interest in social media services was formed as no foreseen benefits by Bosnian governmental officials in using social media services towards mass-communication in cases of crisis events. The researchers investigated the literature for governmental use of social media during flood crisis events, and the results showed no official use of social media services [6][15] [16]. However, it is important to mention that on the state and federal level, the operation and communication center-112, and Federal Authority of Civil Protection (FUCZ), had Facebook accounts that is not verified and used for posting information on some minor activities and past events. Republika Srpska and Brcko as governmental entity didn't show any usage of social media services [6]. The past actions show that there are no interest among Bosnian government representatives in using social media services for mass-communication with the public. On the contrary, the Bosnian public initiated many activities using social media to enable effective communication channels with their families and

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

friends, and to mitigate the threats of flood crisis through grouping their efforts into rescue activities and operations [16]. The following table, shows a number of social media profiles that have been utilized during the flood crisis of May 2014.

Table 1. Social Media for Flood Crisis in Bosnia and Herzegovina [6]

Facebook	Twitter hashtags
https://www.facebook.com/poplaveba	#poplave
https://www.facebook.com/poplavedoboj	#poplave2014
https://www.facebook.com/floodinbosnia	#Bosniafloods
https://www.facebook.com/Poplavebih	#helpbosnia
https://www.facebook.com/BosniaFloods	#Bosnia

As flood crisis events are becoming more common in Bosnia and Herzegovina, it is anticipated that more private social media profiles will be utilized in the future. The practices of having different unverified social media profiles can be distracting and threatening for sharing rumors and misleading information [18]. Therefore a serious consideration for governmental involvement should be planned in any future solution for utilizing social media services. From this point, this research aim was to develop a framework that can use different social media services with a focus on not disrupting the governmental user privileges with respect to the governmental structure presented earlier in this research. The frameworks will be used as authentic supporting system for improving the communications among different governmental sectors and entities. Such system can have great value for the flood crisis event, especially that social media services are widely used and reachable by all. The next section will focus on the methodological approach for designing the social media users' framework that will be used for providing effective communication channel among governmental entities and the public.

5. THE NEED FOR UNIFIED FRAMEWORK

Having complex governmental structure as presented previously in this research study, requires presenting a solution that will enable effective sharing of information among governmental agencies to enhance the cooperational level. Moreover, it should not disrupt the current governmental organization and be able of sharing services and information with the public. This research study focused on presenting a unified framework that can be used by governmental sectors to unify the policies and processes, without interfering with governmental structure, and ensure utilizing different social media services. The use of unified frameworks have been applied in different research studies, and in different disciplines. The idea of providing a unified framework came from educational solutions that presented a unified e-learning network for connecting different universities. As each university has its own structure and authority, the used unified framework was able of providing different services without disrupting the participating universities structure or authority, and it provided quality services for a wider scope of students. More on the presented unified e-learning structures and educational repositories can be found in [19][20][21]. The following figure 2 , shows a unified e-learning structure that connects different universities to share resources.

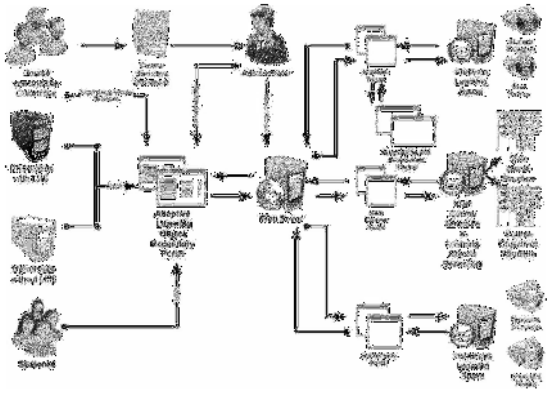

Figure 2: Unified e-learning structure [19]

From the previous unified e-learning structure, it shows that students, instructors, universities and learning objects are all treated as separate units that interact with each other in one system. The system provides the course structure that can be built as shared effort by the participating universities with respect for each course and discipline. Adding learning objects for each course is a shared effort by all universities and instructors, which can benefit all

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instructors and students using the system. The following figure shows the course structure used in unified e-learning system [19].

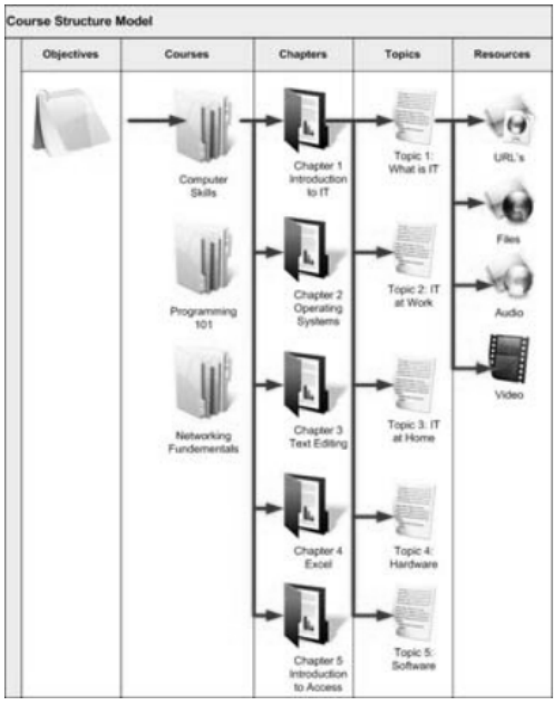

Figure 3: Course Structure in Unified E-learning Structure [19]

Using the unified e-learning system, each university can adopt the needed course and select the appropriate courses and learning objects to form a substructure that can be used in the course curricula. The use of the structure was tested with different universities and it provided a positive feedback and impact on sharing information and presenting quality learning objects for students [19]. The idea was adopted as it provided flexibility and ability to share information among the participating entities. Moreover, the previous structure didn't disrupt the participating universities structure or force a change in the policies and practices. This research study made a dedicated study on the previous structure and it came with a unified design to provide services and collaboration for the governments and the public in Bosnia and Herzegovina during flood crisis events. The following section will present the methodological approach that was used for designing the unified system framework for flood crisis.

6. METHODOLOGICAL APPROACH FOR DESIGNING THE UNIFIED SYSTEMS FRAMEWORK

The methodological approaches for the system development during the system design phase were based on the Waterfall System Development Life Cycle (WSDLC) model [23]. 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. In terms of requirement related to the system design, the focus was on using unified framework structure and defining user roles and functionalities as provided with unified e-learning structure, but with respect for flood events nature. Moreover, the requirements were outlined from previous two research studies and the literature, which focused on investigating the status and requirement of using and utilizing social media services for Bosnian governmental representative and the public [5][22]. They system framework for this research study focused on defining the user roles and presenting the associated functionalities. In terms of technical environment, the system framework used (JOOMLA) content management system as environment for providing the needed services. The selection of (JOOMLA) as environment was based on different factors that are [24][25]:

- It is (Open Source) content management system, that is freely available and does not need financial consideration
- It provides wide range of plug-ins that enables merging and connecting with different 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
- It provides the ability of defining wide range of user privileges that can be used in the system framework

The next sections will provide information on the requirements that were formulated as criterions

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outlined by previous research studies for governmental and public needs. Those criterions are the key factors that have guided the design of unified social media structure.

7. DEFINING TECHNICAL REQUIREMENTS AND CRITERIA

The outcomes from previous research studies found by the researcher have been used as a technical requirements guidelines for developing the framework [5],[6],[19]. The information related with requirements have been divided into 4 different categories that are:

- General System Framework Technical Requirements
- Administrative State Level Technical Requirements
- Cantons and Regions Technical Requirements
- Public Technical Requirements Category

A. General System Framework Technical Requirements Category

This category presents the criteria related to general system framework design that have been defined by the previous research studies and formulated as criteria:

- Criterion 1: The system framework should be accessible anytime anywhere using the internet [26].
- Criterion 2: The system framework should provide the ability for mobile phone to access and use the system [27].
- Criterion 3: The system framework should focus on providing the services for flood crisis [26].
- Criterion 4: The system should be able of providing content management [28]
- Criterion 5: The system framework should promote the use of different social media systems [5],[6],[28].
- Criterion 6: The system framework should provide different access levels and privileges for its users [6],[28].
- Criterion 7: The system framework should promote sharing information needed between governmental entities and the public [6],[26].
- Criterion 8: The System framework should consider evaluating resources added by the public [29].
- Criterion 9: The System framework should provide customizability for its users
- Criterion 10: The system framework should promote for different authorities to participate in the unified system [28].
- Criterion 11: The System framework should consider the Emergency Management Cycle [26]
- Criterion 12: The system framework should provide training for its staff on the uses of the system
- Criterion 13: The systems framework should provide policy of use for its users [28].
- Criterion 14: The system framework should measure the effectiveness of it functionalities in formal way [28],[29].

B. Administrative State Level Technical Requirements Category

This category presents the criterions for the Administrate state level functionalities and services.

- Criterion 1: The system framework should provide state level users with higher privileges [5],[6].
- 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 [5],[6],[28].

C. Cantons and Regions Technical Requirements Category

This category presents the criterions and justifications for the entity and cantonal functionalities and services.

- Criterion 1: The system framework should provide Entity and Canton users with higher privileges to add specific users [5],[6],[28].

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- Criterion 2: The system framework should provide content management functionalities for entity and canton users [5],[6].
- Criterion 3: The system framework should provide entities and cantons with capabilities to inform the public [5],[6]
- Criterion 4: The system framework should provide cantons and entities with capabilities to share contents and contact other entities [5], [6],[28].

D. Public Technical Requirements Category

This category presents the criterions for the public need and services.

- Criterion 1: The system framework should provide the public with information related to Crisis events.[6],[30]
- Criterion 2: The system framework should provide the public with the ability to register to the system for crisis event [6],[30].
- Criterion 3: The system framework should provide the public with the ability to connect to dedicated social media groups for crisis event [26],[30].
- Criterion 4: The system framework should provide the public with the ability to define their status during the event [31].
- Criterion 4: The system framework should provide the public with the ability to evaluate the services [32].

8. SYSTEM DESIGN

In an attempt to address the inadequacy of the current practices towards flood crisis in Bosnia and Herzegovina, 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 design focused on providing a solution for the current situation by providing a framework to connect the governmental entities virtually without requiring change in their practices or violating authority. The design of the system used two different approaches for presenting the system design; the system was designed taking into consideration the user roles that each has to perform within the system. The system has defined nine types of users as in order to provide more control and specification for the services with respect to the governmental structure diversity.

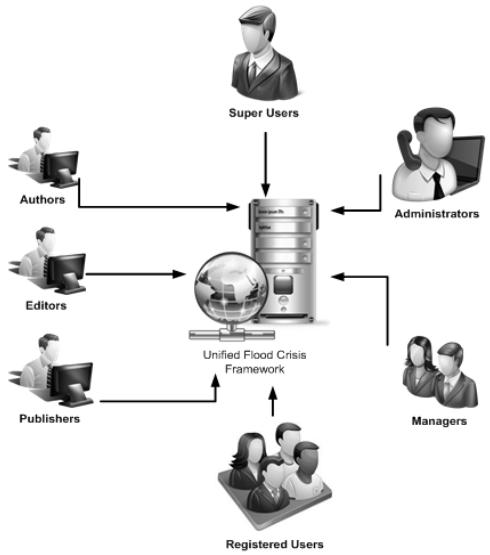

Figure 4: User roles in the system

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 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.

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- ***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 behavior 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

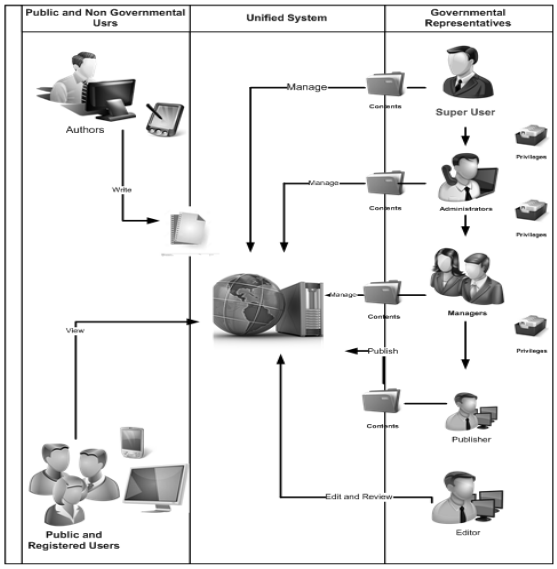

Figure 6: Connectivity and structural behaviour of the system

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

9. 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.

A. Super Administrators

They are responsible for tracking the system's functionality, granting privilege for state and cantonal 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 functionalities are associated with super administrators.

1. *Manage Components:* This functionality will enable Super Administrators to add different Joomla CMS extensions that are needed to extend the functionality of the system.
2. *Manage Templates:* This functionality will enable super administrators to define and use different templates that are available for the system
3. *Manage Users:* This functionality will enable super administrators to manage users and groups in the system.
4. *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).
5. *Manage Site Structure*: This feature will enable super administrators to change and configure Categories, Layouts and Menus.
6. *Manage Social Media:* This feature will enable super administrators to define the related social media services that will be selected and used.
7. *Manage Contents:* This feature enables Super Administrators to add content to the site.

B. Administrators

Administrators are responsible for tracking the system's functionality based on entity, canton and state 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 functionalities are associated with administrators

1. *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.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

2. *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.
3. *Manage Site Structure:* This feature will enable administrators to change and configure Categories, Layouts and Menus, the same privileges that are practiced by super administrators.
4. *Manage Social Media*: The privileges that are associated with managers are the same as super administrator
5. *Manage Content:* The privileges associated with administrators for managing contents are the same as super administrator

- ***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.

1. *Manage Extensions:* This feature will enable managers to manage some of the basic functionalities that are associated with components.
2. *Manage Site Structure*: Managers do not have many privileges associated with changing site structure.
3. *Manage Contents:* Managers have all the privileges to work with contents by either managing articles or media added to site such as super administrator

- ***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.

1. *Manage Content:* This feature will enable publishers to manage articles that are published using the frontend access to the system

- ***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.

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

- ***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.

10. USER ROLES AND GOVERNMENTAL REPRESENTATION

To sum up with the previously discussed roles of each user in the system, Figure 7 shows the framework design of the proposed structure with respect to the governmental roles in Bosnia and Herzegovina structure.

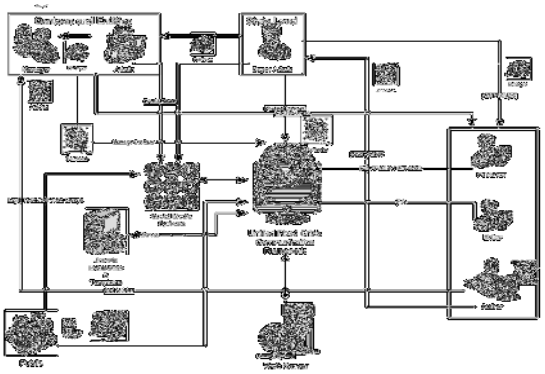

Figure 7 Unified Social Media Structure

Based on the previous figure the system's functionality is initiated by super administrators creating the main systems structure that is based on

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

state level for Bosnia and Herzegovina. The site structure included state level categories, menus, layouts, templates and site's main files and tutorials. Super Administrators are responsible for creating social media accounts that are related to flood crisis event. They will also be responsible for choosing and installing extensions that are used on state level for managing communication and information during flood crisis events. Moreover, 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.

11. SYSTEM FRAMEWORK IMPLEMENTATION AND USE

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:

- Constructing Systems Main Structure
- 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, federal representation for Bosnia and Herzegovina, Republic of Srpska, Canton Sarajevo, Canton Hercegovacko-neretvanski, Canton Unsko-Sanski, Canton Tuzla and Region of Banja Luka. The systems framework managed to provide different web sites within one unified system structure as shown in the following figure

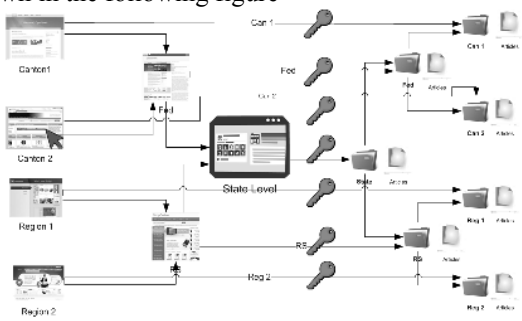

Figure 8: Different web sites within the unified system structure

From Figure 8, 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 illustrates the distribution of

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services and functionalities within the system framework.

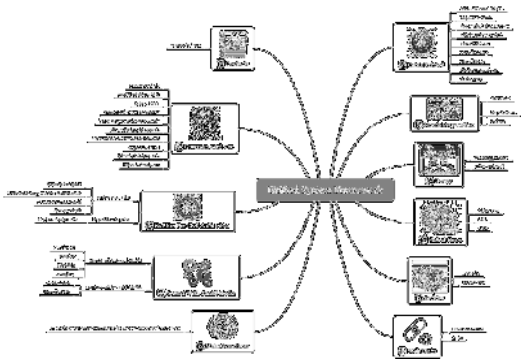

Figure 9: Distribution Of Services Within The Framework

Figure 9, shows 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 didn't use all the features, as some of them were included based on the needs. (Figure 10) shows the main systems web page that can be visited through the following link.
http://www.bihfloods.com

Figure 10: Main Web Page Of The Proposed System – Www.Bihfloods.Com

From this page (Figure 10), 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 11.

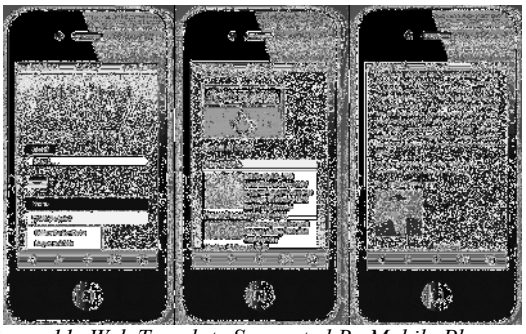

Figure 11: Web Template Supported By Mobile Phones

12. RESEARCH LIMITATIONS AND FUTURE WORK

The system was used as a prototype framework in December 2015 to simulate the flood events in May 2015. The system was used by more than 33 governmental representatives, and more than 170 public representatives. The system framework was not used officially as it does not represent the state level or governmental entity. The system connected different number of social media services such as (Facebook, Twitter, YouTube, Pin it, Google + and Google Maps). A future research will focus on including more social media services and engaging a larger number of governmental representatives and public to test the systems framework with different social media services. Moreover, future research study will focus on presenting the evaluation results of users' engagements with the system framework and will outline the positivity, negativities and focus on possible enhancements on the design and their effect on systems functionalities.

13. CONCLUSION

There are different successful uses for social media services during crisis events. Most of those uses are focusing on using specific social media services and with one governmental sector that is associated with crisis event. This research study worked on creating a framework for enabling complex governmental structure with different governmental representatives and sectors to use, interact and collaborate using social media in a formal way. The problem in Bosnia and Herzegovina was related to segregated entities and governances that are not communicating and cooperating among each other. This problem reflected on the services provided for the citizens during flood events. The research method for providing a solution was based on creating a

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

unified framework for using different social media services and enabling each governmental sector and entity to have and control its services. The system framework focus was on providing flexibility and sharing for information with other entities and federations. The idea of having unified structure was adopted from the educational settings as different solutions presented the use of unified e-learning structure with different universities using the system and having their own services and operational level. The proposed unified system framework adopted the same idea of unified e-learning framework and managed to provide different levels of usage and deliver flexibility through the defined structure and user privileges. The system was built using Joomla as content management system, and different modules, plug-ins and components were used to connect users with different social media services with respect to each user's role and privileges defined by the system framework. The system was put online and it was used as a prototype solution by different governmental sectors and the public in Bosnia and Herzegovina. The system managed to provide unified social media services with respect to the governmental structure. The next phase of this research will focus on investigating the usage of the system framework and outline the advantages and negativities. The negativities will be used to address the enhancement of the unified system framework design.

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