Workshop summary: Workshop on Semantics and Analytics for Emergency Response (SAFE2015)

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ABSTRACT

The Emergency Response domain is a highly challenging domain, requiring the active collaboration of several experts and authorities on the one hand and large-scale data analysis on the other. This poses significant challenges in sharing and analysing highly dynamic data describing highly evolving situations. This paper provides a brief summary for the first workshop in the SAFE workshop series. The workshop is aimed at bringing together analysts, practitioners, researchers and enthusiasts and provides a discussion ground for practical problems, solutions and projects that exploit Semantic Web, Linked Data analytics for Emergency Response. Following a round of thorough reviews, four papers are accepted and a keynote will complement the paper presentations along with a few discussion sessions.

INTRODUCTION

This workshop targets the intersection between Semantic Web and Linked Data, and the field of information systems for Emergency Response. The focus is on the use of semantic technologies to gather, share and integrate knowledge, as well as for supporting novel methods for analyzing such information, in order to provide better situation awareness, decision support, and potential for after-action reviews. Semantic technologies are particularly suited for preparing information for unexpected uses and new applications, which fits well with the main theme of ISCRAM 2015. This full-day workshop will be highly interactive, including presentations, discussions, group work sessions, and road-mapping activities.

WORKSHOP THEME AND GOALS

Emergencies require massive coordinated efforts from various departments, government organizations and public bodies to help and assist affected

communities. Responders must rapidly gather information, determine where to deploy resources and make prioritization decisions regarding how best to deal with an evolving situation. Sharing accurate, real time and contextual information between different agencies, organizations and individuals is therefore crucial to developing good situation awareness for emergency responders [1,2]. However, with the involvement of multiple organisations and agencies, each with their own response protocols, knowledge practices and knowledge representations, sharing critical information is considerably more difficult. Applying semantic technologies to represent information can provide excellent means for effectively sharing and using data within different organisations. Using highly structured, self-descriptive pieces of information, interlinked with multiple data resources can help develop a unified and accurate understanding of an evolving scenario. This provides an excellent framework for developing applications and technologies that are highly generic, reproducible and extendible to different regions, conditions, and scenarios. In addition, the semantic descriptions of data can enable new forms of analyses on this data, such as checking for inconsistencies, verifying developments according to planned scenarios, or trying to discover interesting semantically meaningful patterns in data. Such analytics can be performed either in real-time as the scenario unfolds, e.g., through semantic stream processing and event detection techniques, or as an after-action analysis to learn from past events.

The workshop is expecting a minimum of 20 participants and provides and exciting presentation program consisting of innovative approaches for the exploitation of semantic technologies, such as Semantic Web and Linked Data, for data gathering, integration, exploitations and analysis in Emergency Response scenarios and applications. The workshop provides a setting for participants to showcase their technologies, share experiences and ideas, and contribute toward building a collaborative community around the research topics. The workshop brings together expertise from three research areas: Semantic Web and Linked Data; Social Sciences and e-governance; and Emergency Response. The workshop is supported by, and complementary to, the W3C Emergency Information community group[1], where several of the workshop chairs are also

chairs of the W3C group.

Workshop topics included in the call for papers and participation were:

- Semantic Annotation and Mining, for understanding the content and context of both static sources and streaming data, such as social media streams.

- Integration of unstructured or semi-structured data with Linked Data.

- Interactive Interfaces and visual analytics methodologies for managing multiple large-scale, dynamic, evolving datasets, while exploiting their underlying semantics.

- Vocabularies, ontologies and ontology design patterns for modelling, managing, sharing and analysing information in the Security and Emergency Response domains.

- Stream reasoning and event detection over RDF streams.

- Collaborative tools and services for citizens, organisations, communities, which exploit semantic technologies, and/or produce semantically well-specified information, such as Linked Data.

- Privacy, ethics, trustworthiness and legal issues in the social Semantic Web and the use of semantic technologies, such as Linked Data.

- Use case analysis, with specific interest for use cases that involve the application of semantic technologies and Linked Data methodologies in real-life scenarios.

The main goals of the workshop are to allow researchers and practitioners to showcase and discuss their approaches, technologies, systems, and solutions using semantic technologies for solving real-world problems in the area of Emergency Response, to share experiences and ideas, and continue to build a community around the workshop topics (complementing the related W3C group). An

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[1] http://www.w3.org/community/emergency/

additional goal is to create a forum for discussions and research ideas that cross discipline boundaries, e.g., between research areas such as Semantic Web, Social Sciences, and Emergency Management etc.

RELEVANCE TO THE FIELD

Improved information management and information sharing is crucial for developing better decision support in Emergency Management. The use of semantic technologies is a step in the right direction, however; so far semantic technologies have only been used for decision support to some extent [3], and even less for specific approaches in Emergency Response. The W3C community group concerned with Emergency Information is one step towards remedying this situation, however, there is also a need for events that reach out to several different communities, and allow for highly interactive and engaged face-to-face discussions, such as this workshop.

The theme of the workshop is highly suited to the conference theme this year, 'Getting ready for the unexpected'. One of the main benefits of semantic technologies, such as the W3C standard RDF and the principles of Linked Data, is that data is prepared for uses that are not foreseen at data creation time. Hence, by using such technologies and formats, data is prepared for unexpected uses, which increases resilience in general and allows us to build highly customizable solutions, and approaches that can cater for unexpected types of event, or unexpected developments during unfolding emergencies. The workshop is also related to several of the conference tracks, however, it is set apart by focusing specifically on semantic technologies as a means for sharing and integrating knowledge and performing analytics. Related themes in the main conference include:

Track 2: Analytical Modeling and Simulation, topic: Data mining and information analysis. However, this workshop particularly focuses on semantic technologies, which enables novel methods for information analysis.

Track 8: Social Media Studies, topic: Issues and techniques for mining and analyzing Social Media data. However, although the sources of data for analysis could be social media systems, this workshop focuses particularly on semantic

technologies for structuring and analysing such data.

Track 10: Decision Support Systems, topics: Robust decision support, flexible and agile solutions, and Information fusion and knowledge integration. However, flexible decision support systems is only one potential application using semantic technologies, which will be discussed in the workshop, and knowledge integration is certainly at the core of the workshop, while focusing particularly on using semantic technologies for the task.

WORKSHOP OUTLINE, CONTENT AND OUTCOMES

The workshop is aimed at involving a large number of participants (minimum 20 expected) from a wide range of backgrounds, expertise and skillsets. In particular, participants working on semantic technologies, data analytics and knowledge representation in the Emergency Response domain would be an ideal audience. Adopters of solutions employing semantic technologies within the domain would also be highly interesting to the workshop.

The workshop received 5 paper submissions (4 full papers and one position paper). After a thorough review process, 4 of these papers (3 full papers and one position paper) were accepted for presentation at the workshop. Two of the papers present different approaches for Social Media monitoring for Emergency Response and Management, one from the visual analytics viewpoint and one from the RDF stream-processing viewpoint. The third paper proposes the use of semantic technologies for facilitating information sharing in a post-nuclear accident scenario. This is a position paper, mainly outlining a potential architecture and discussing benefits and limitations of the technologies. Finally, the fourth paper is a survey of Ontology Design Patterns that could contribute to developing better ontologies within this domain.

The workshop schedule will consist of three parts: (1) A short opening session introducing the organisers, followed by an invited keynote, (2) paper presentations by the authors of the accepted papers mentioned above, (3) an interactive

collaborative session on the theme "Semantics and Analytics for preparedness". The keynote talk will be presented by Bart van Leewen and will encapsulate how Semantic Web technologies can help firefighters prepare for the unexpected. Bart's 16 years firefighting experience and 19 years ownership of netage.nl highlights a new perspective on operational information delivery. His keynote would provide a unique opportunity for the participants to gather a practical insight from an expert in both fields.

The collaborative session will initially group the participants into small groups (mixing practitioners, researchers and individuals with different expertise) and will start off with a breakout session, where a research question and scenario will be posed to the groups, which the groups proceed to work on. The groups will then be invited to present their solutions and answers to all the participants. A joint discussion and road-mapping summary will conclude the workshop. Results of the summary will also be published as part of the workshop online post-proceedings.

The outcome of the workshop will be three-fold: (1) papers accepted at the workshop will be published in the online post-proceedings, including the results of the discussion and road-mapping session at the end of the workshop; (2) participants will also be invited to co-author an additional vision/white paper on their experience in exploitation of Semantic Technologies in Emergency Response; (3) the highly interactive nature of the workshop, e.g. group discussions, as well as the solutions developed in the interactive sessions will provide participants with opportunities to engage with other participants with different expertise and background, supporting the creation of novel and innovative ideas, project opportunities, and solution proposals.

ACKNOWLEDGMENTS

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