Methodologies for using Social Media Collaborative Work Systems

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***Abstract*—This paper proposes a new categorization of Social Media Collaborative Work (SMCW) systems and discusses methodologies for the use of SMCW systems. Popular Social Media systems such as Facebook, Wikipedia, Skype and Twitter can be seen as an evolution of systems for Computer Supported Cooperative Work. We are witnessing a renaissance in collaborative work that may overcome the many limitations of Computer Supported Cooperative Work. Furthermore large scale Social Media interactions provide an example of human self-motivation to accomplish collaborative work. System users are keen to adopt such technology, but we currently lack methodologies for using Social Media for Collaborative Work. We are conducting empirical studies to identify, determine, evaluate and develop such methodologies. In this paper we propose a categorization of Social Media for Collaborative Work and discuss requirements for Collaborative Work systems.**

Keywords, Collaborative Work, Computer Supported Cooperative Work, Methodologies, Social Media, Social Media for Collaborative Work Systems, Taxonomies

I. INTRODUCTION

Social Media systems like Twitter, Wikipedia and Facebook have millions (if not billions) of users. A self-motivation to interact, work together and create vast quantities of online content results in content sharing, timely communication, constant feedback, and endless followers seamlessly all working together with emergent outcomes that are of interest to researchers, businesses, members of the public, etc. These collaborations operate beyond the structured, fixed rules of engagement of cooperative work: the power of *collaboration* (by which we mean unstructured cooperation) is used to improve the lives of individuals and businesses in original and unexpected ways. Purposes for these collaborative interactions range across social needs for power, money, etc. The interactions go beyond the interactions of Human Computer Interaction as they ultimately change the states of the many participants and their relationships. Thus in Social Media Collaborative Work we find numerous people and groups using Social Media and working together to develop laws, business systems and political systems in the wider world. The ongoing development of these social collaborations, socio-technical systems and social relationships between the participating actors involved has undoubtedly changed the way we work throughout the world [1].

Social Media Collaborative Work systems are an evolution of Computer Supported Cooperative Work (CSCW) systems. CSCW systems include some early social media systems for general purposes but our concept of Social Media for Collaborative Work systems includes the full power of massive collaborations which can lead to new ways of doing collaborative work. For example, email systems can be integrated with wikis and social networking, and be used by product development teams working with engineers to build silent wind-turbine technology for houses around the world and so solve some of the world's renewable energy needs. Collaborative work is different from the cooperative work of CSCW or Groupware [2] because the latter usually involve a predetermined, relatively small group of employees working under the direction of a manager to complete a well-defined project within a limited timescale. Collaborative work (which may or may not be large-scale) does not suffer from these constraints and encourages a multitude of algorithmic, creative, evolving or emergent work solutions.

Collaborative work is applicable to the solution of a wide range of different types of problems, from those which demand high degrees of innovation to those that are amenable to the application of known prescriptive solutions. Furthermore these types of collaborative problems benefit from crowd sourcing and self-motivated contributions of individuals. Understanding human motivation to collaborate and adapt to evolving technology is central to collaborative work [3]. Collaborative problem solving can apply to large-scale and complex problems such as international climate change modeling as well as to small-scale problems such as solving a configuration problem on a home network. Requirements engineering within the context of SMCW systems is a considerable challenge in view of the evolution of the relationships between the participating actors and

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stakeholders. Rigour and formality would help us to analyse the requirements and understand them better.

In this paper we build on the well-established field of CSCW but also incorporate relevant systems thinking, social and business theory to develop Social Media for Collaborative Work as a field of research in its own right. Our aim is to develop methodologies for Social Media for Collaborative Work systems.

II. HYPOTHESES AND RESEARCH QUESTIONS

In this section we discuss our hypotheses and research questions.

There are a multitude of different SMCW systems, which can be used in many ways for many different types of collaborative work. For example, consider the recent *Time Critical Social Mobilisation Experiment* [4]. The challenge involved finding 3 real and 2 virtual knights which had been hidden in parks around the UK. The solution involved building a large team as quickly as possible, in order to capitalize on social connections and social motivations between users. This collaboration could best be achieved using social media.

To better understand the requirements for such systems and the mapping between the systems and different types of collaborative work, we have arrived at four hypotheses:

1. There are specific types of SMCW systems which are better than others for collaborative work.
2. There are specific types of SMCW functions which are best suited to particular types of collaborative work.
3. There are specific types of SMCW searches which are more effective than others for collaborative work.
4. There are specific types of SMCW interactions which are better than others for collaborative work.

In order to test these hypotheses we are exploring three related research questions:

1) Can we develop a taxonomy for SMCW systems?
2) Can we develop taxonomies for SMCW functions, searches and interactions?
3) Can we develop a family of methodologies for building, using, and analysing SMCW systems using other methodologies such as Soft Systems Methodology, empirical analyses, etc?

These questions and hypotheses will help to focus our future research efforts.

III. A NEW CATEGORISATION OF SOCIAL MEDIA COLLABORATIVE WORK SYSTEMS

The next part of this paper deals with a proposed categorisation which places Social Media for Collaborative Work in context. We propose a categorization of collaborative problem solving as shown in figure 1, which suggests that all socio-technical systems are collaborative. We see the individual as being at the centre of social and technological evolution, providing the stimulus to create and transform information for the purpose of collaborative work. Examples of complex Technology-Mediated Social Participation Systems include Twitter, Wikipedia and Facebook. These systems have many (possibly millions) of collaborating users. Socio-technical systems encompass Technology-Mediated Social Participation Systems [5] and involve interdependent actors and stakeholders. The large-scale collective action of interdependent actors and stakeholders together with applications and services constitute Social Computing [6]. CSCW is seen here as a subset of collaborative work.

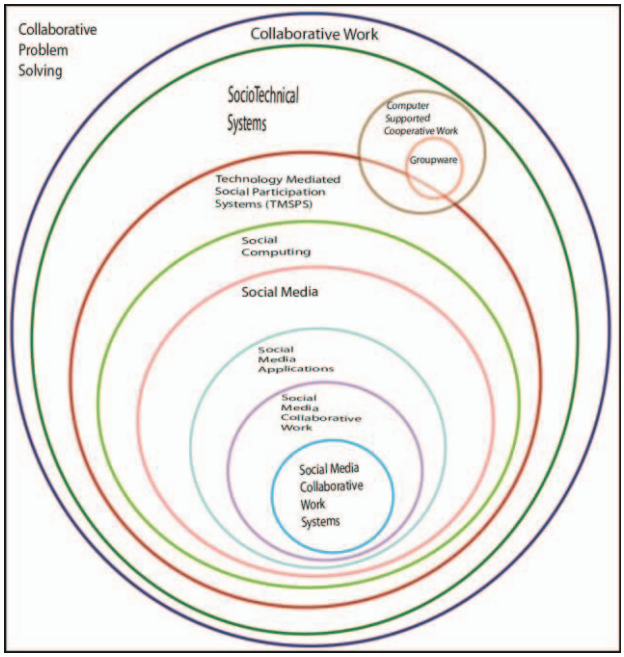

Figure 1. Categorising Social Media and Collaborative Work.

IV. TYPES AND REQUIREMENTS FOR SOCIAL MEDIA COLLABORATIVE WORK

This section discusses typical types of SMCW, together with examples, and proposes some of the requirements that need consideration.

A. Types of Social Media and Collaborative Work

Typical types of Social Media Collaborative Work include:

- Managing Resources e.g. Civil engineers coordinating the transport of building materials for building a skyscraper in London e.g. with Twitter Mobile application and Wikispaces.
- Managing projects e.g. Technologists allocating tasks to expert world-wide team members for the development of energy efficient cars [7] e.g. with Facebook or Google Plus.
- Building Systems e.g. Systems developers collaborating around the globe to make open source systems free, e.g. a system where users can scan their grocery purchases on a device in their kitchens and printout a purchase list at the end of the month so in effect a better grocery budget system [8] e.g. with Email, Skype and a wiki.
- Collaborating for Scientific experiments e.g. Scientist can develop, save and share their experiment work flows with other science researchers [9,10] e.g. with wikis.

B. Collaborative Work and SMCW Requirements

The complexity of effectively matching collaborative work to SMCW systems could benefit from using a multi-dimensional analysis similar to that provided by Zachman's Enterprise Framework [11]. These are some of the requirements we need to consider:

- Actors and Stakeholder needs
- Social relationships between Actors and Stakeholders
- Business and communication requirements
- Cultural, ethical and linguistic expectations
- Ease of system use, evolution and user motivation
- Functions and types of applications
- Hardware and Software requirements
- Legal requirements and Organisational standards

V. METHODOLOGIES FOR THE USE OF SMCWS

The positioning of the human being at the centre of technology systems is crucial A quantitative study of the twittersphere and its retweet mechanism has been carried out [12]. The information gained gave an insight into the behavior of the tweeters. This behavior could prove useful in developing methodologies for the use of SMCW systems. Furthermore for the validation of our method, data will be collected from developed SMCW systems via user interactions e.g. from user interactions with other users, interactions to Webpages, interactions to wiki categories or from the range of search terms used [13]. We also wish to pursue SMCW systems data analysis and validation within the context of well-established qualitative methodologies from the business and social sciences so that holistic socio-technical approaches underpin our SMCW methodologies [14,15,16].

VI. RESEARCH METHOD

Surveys will be used in order to establish and validate the methodologies that we propose. We will collect data from SMCW system users for analysis and to provide a basis for the validation. Previous SM surveys have shown SMCW systems such as Twitter, Instant messaging, Internet Relay Chat and Blogs being used more than Email [17,18,19]. So the development of Email with social networking, wikis etc. is a possibility but only a part of overall SMCW system development. Surveys will be used to determine and analyse SM types and functions that are being used for SMCWS. This could lead to the understanding needed for the full development of SMCW.

VII. CONCLUSION

We have discussed Social Media Collaborative Work together with examples of collaborative work requirements to illustrate how social media has redefined the use of technology and social platforms for work purposes. CSCW has been shown to provide the foundation for the deeper understanding of Social Media Collaborative Work, and. Social Media Collaborative Work has been put into context, highlighting Social Media's capability for unstructured collaborative work versus the highly structured cooperative work of CSCW.

This research is very relevant for the development of Social Media Collaborative Work, its systems, taxonomies, analysis and methodologies because it offers a way to delve deeper into the fabric of Social Media and provide pertinent applications for our working lives. The issues raised here now need to be refined further so that progress can be made.

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