Computational discovery of practical wisdom: narrative, community and meaning

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ABSTRACT

Today's diverse, fast-paced and innovative collaborative environments require knowledge workers that can quickly locate resources, communicate effectively and purposefully reflect on their activities and contributions. The collective articulation, interpretation and understanding of successful workplace processes is therefore vital for fostering creativity and driving innovation. We propose the use of community-centric computational narratives for capturing, analyzing and sharing the everyday experiential 'know-how' and insights accumulated by researchers and workers within the knowledge economy. We will present some preliminary prototypes of dynamic renderings of a diverse workplace community that combines resource selection, message semantics and design aesthetics.

1. INTRODUCTION

Competitive global companies cultivate fast-paced, innovative work environments where diverse teams use a wide variety of tactics and strategies to respond to emerging trends and opportunities [1]. The increasing complexity of problems tackled in the workplace have introduced a need for participants from all disciplines to operate and make contributions within multiple areas of inquiry [4].

Let us imagine a typical modern research enterprise where workers collaborate in diverse groups to produce new knowledge or artifacts. 'John' has been a senior engineer at this enterprise company for 6 years, but has decided to leave to pursue a graduate education. With his departure, the company loses the practical everyday wisdom or know-how acquired by John that enabled him to effectively complete his workday tasks. Gone is the strategic knowledge he developed for dealing sensitively with colleagues from different cultural or education backgrounds. Also lost is his mindful approach for participating in discourse-based decision-making sessions and his flexible methodology for reorganizing his work schedule to accommodate new time-critical research directions. Above all, there is no archived evidence of John's hard-won practical knowledge in a form that could be accessed, interpreted and re-evaluated by his current contemporaries or used as a learning or training resource for new company members.

Within this scenario, we make three observations regarding (a) knowledge transfer, (b) effective communication, and, (c) reflective practice. Knowledge transfer is a key challenge in modern workplaces where the personnel composition of groups can change over time, including loss of personnel and integration of new members. When an individual leaves a group, they take with them the practical, everyday knowledge that enables them to effectively work collaboratively. Effective communication is central in building and sustaining trust, as well as enabling discourse-based decision-making, particularly in entrepreneurial environments. Effective communication can be made difficult not only by standard demographic differences (age, gender, race), but also when the working group is culturally diverse and multi-lingual. Reflective engagement by the individual on the group processes is important to enable them to connect their everyday experience to the high-level group vision. Reflective engagement is also necessary to enable people to negotiate with different work practices.

2. RESEARCH CHALLENGES

These observations lead us to identify several key research challenges. Firstly, everyday workplace 'know-how' exists outside of conventional reports or presentations and is difficult to capture, archive, access or reconstruct. Practical understanding of this knowledge also necessitates that it be regularly recontextualized to account for changes both within (including the decision-making process) and outside the workplace. A second key research challenge that causes ineffective communication is the absence of an annotation or representation mechanism common to the workplace facilitating consistent interpretation. And finally, there is no comprehensive mechanism for workers to explore archived knowledge of prior-processes, including workplace successes and failures. This also means that workers are unable to inject their own reflections and interpretations into the knowledge archive.

3. RESEARCH APPROACH

We propose adopting a multidisciplinary integrative, or mixed initiative approach between data-driven analysis of work processes and narrative construction. This approach includes three main tasks of activity capture and archive, activity analysis and a narrative-authoring framework. Data is captured from two primary sources. The first is an event-based media repository, which allows a transdisciplinary research community to capture events and share artifacts (papers, demos, software) describing their workday processes [5]. Here, events are real-world occurrences that take place over time and space. Events are described according to the dimensions of who, what, when and where. The second data source is shared calendar streams from community members detailing moments and events of collaborative engagement.

We propose analyzing user activities in the online environment as well as activities in the physical world, through the calendar data. User activity analysis could include details of creation (creation of events or stories), interaction (event or story browsing) and communication (commenting). This analysis will help us to

determine emergent groupings amongst users by detecting similar online exploration patterns or commonalities in narrative style. Features are proposed to be extracted at multiple time-scales and can be divided into two categories – (a) properties relating to frequency of use/access (e.g. number of times a specific media object is viewed, commented upon, forwarded or re-used in a new narrative), (b) correlation based properties (e.g. correlation of media composition materials across narrative, similarity between individuals based on their physical world activity patterns).

We are currently developing a narrative-authoring framework that allows users to share reflective interpretations of their everyday work experiences through a common story representation framework. This storytelling framework builds upon prior work, including our own, in multimedia authoring and publishing and spatial storytelling [2][3]. Narratives help us to understand our experiences and translate them into more generalized forms of represented knowledge. We can understand a narrative as a type of pattern within which events or sequences of events can be arranged, interpreted and communicated. The authored narratives in our framework incorporate as raw material elements from the event-based media repository, thereby enriching our computational understanding of the data. Through the creation of informal story artifacts, users are able to share their everyday experiences with others while also providing some memorable evidence to return to again and again for reexamination under different contexts.
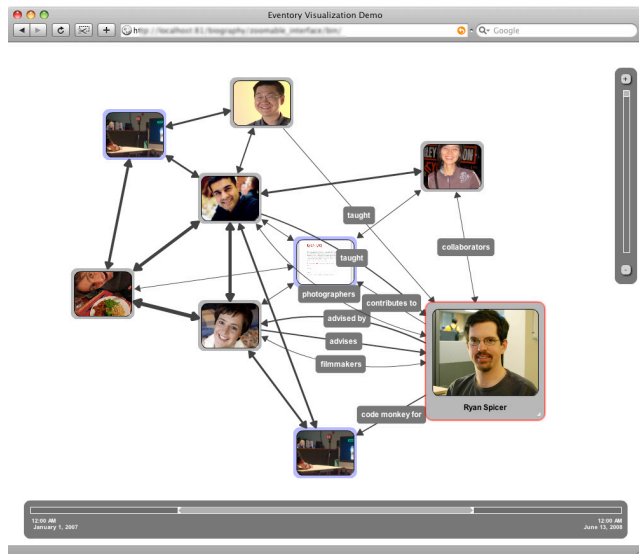

Figure 1. Prototype Story-Authoring Interface

Figure 1 depicts a snapshot of the story-authoring framework prototype interface which provides users with a spatial, 'zoomable' multimedia composition environment where informed use of compositional strategies, layout techniques and thoughtful media selection will produce a broad range of narrative awareness. The system could recommend to the user (as she is in the process of authoring) related media elements, relationships, as well as narratives created by other users who belong to the same emergent group as the author.

The story-publishing framework will provide users with multiple features for providing feedback to story authors such as the ability to leave comments, favorite stories, create themed story collections and create user-defined relationships between stories (is similar to, inspired by, led me to etc.) These stories will also be readily accessible in a context aware manner (e.g. examining a media object, will prompt the system to reveal all the stories in which the media appears), when the user is navigating the media repository. Additionally, viewing, navigating and reusing media or narrative structures will serve to change the results of the data analysis.

4. ACKNOWLEDGMENTS

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