Proceedings of the first Workshop on the Development of Activity Theory in Information Studies

Pre-iConference Workshop

Philadelphia, USA

March 20, 2016

Workshop organising committee:

Professor David Allen, University of Leeds, UK

Dr Emma Forsgren, University of Boras, Sweden

Dr Stan Karanasios, RMIT University, Australia

Dr Jyoti Mishra, University of Bradford, UK

Dr Alistair Norman, University of Leeds, UK

Dr Boyka Simeonova, University of Loughborough, UK

Professor Tom Wilson, University of Boras, Sweden

Short papers:

1. *Activity Theory as a Framework to Explore the Use of Social Media in a Policing Context*
   Emma Gritt
2. *Using Activity Theory to Understand Complex Relationships in Extended Network Organisations*
   Paul Bata
3. *Knowledge Workers on the Move: Hindrances to Knowledge Creation and Knowledge Sharing*
   Rosemary Francisco and Amarolinda Klein
4. *Application of Activity Theory to Study Complex Decision Making in Engineering Products and Services Development*
   Aleksandra Irnazarow
5. *Aging Informatics and Activity Theory*
   Stan Karanasios and Natalie Pang

Activity Theory as a Framework to Explore the Use of Social Media in a Policing Context

Emma Gritt
Leeds University Business School
University of Leeds
E.L.J.Dunkerley@leeds.ac.uk

Introduction

Policing is undergoing significant changes in the way it manages and shares information both within police organisations and with the public (Lowe & Innes, 2012). In 2008 police organisations in the United Kingdom started using social media. While there has been growing academic research on social media in emergency and disaster response over the last few years (Bird, Ling and Haynes, 2012; Kavanaugh *et al*, 2012), there is little research exploring the influence of social media on everyday policing activities. As the use of information from social media, particularly within a public safety environment, is still new and emerging, there is a distinct lack of theory to explain the transformation in work practices taking place. This research aims to utilise activity theory as a methodological and analytic framework to explore how police use social media for information sharing and decision making.

Karanasios and Allen (2014) suggest activity systems can be used for "analysing interaction between actors and collective structures and the use of tools, providing an analytical framework for studying the specific activity and practices" (p.531). Although activity theory originated in Psychology and has since been widely applied in Education research, there is now a growing interest in its use as a methodological and conceptual framework amongst Information Systems scholars (Allen, Karanasios and Norman, 2014; Barki, Titah & Boffo, 2007; Kuutti, 1996). For example, Crawford and Hasan (2006) argue that "Activity theory is relevant not only where situations have a significant historical and cultural context but also in dynamic situations where people, their purposes (objects) and their tools are in a process of rapid and constant change. Such is the case of the current environment of IS in research and practice" (p.66).

Methodological framework

In this research Engeström's (1987) third generation of activity theory (Figure 2; p.10) is utilised. It takes a qualitative, multi-method approach to explore the use of social media within a policing

context and how this influences and changes policing activities. Three UK policing organisations are the focus of this study. In this research semi-structured interviews provide understanding of the context around how tools have been developed within the organisation. Interviews also explore individuals' interpretations of the tools, the rules and norms, how information is shared and the community involved. Observations of police officers in operational tasks explore information practices, including the community and division of labour. Using these methods together allowed further explorations of tensions and contradictions. Data was coded and analysed using activity theory as a framework to provide activity systems of information practices within each organisation.

Findings

The study found three contexts of social media use in policing. The first context was found to be characterised by a high degree of ambiguity. In this context tensions and contradictions emerged in relation to the interpretation of the rules and norms when using the tool. The second context was more stable in relation to rules and norms, but contradictions emerged between the subject and tool in trying to interpret information in social media and also manage information overload. In the third context a new model of policing emerged where the tool enabled collaborative information sharing between the subjects and community and transformed police work practices. In conclusion activity theory provided a useful framework to explore social media use in a policing context.

References

Allen, D. K., Karanasios, S., and Norman, A. (2014). Information sharing and interoperability: the case of major incident management. *European Journal of Information Systems*, Vol. 23 (4), 418-432.

Barki, H., Titah, R., and Boffo, C. (2007). Information systems use-related activity: An expanded behavioural conceptualization of individual-level information system use. *Information Systems Research*, Vol. 18 (2), pp.173-192.

Bird, D., Ling, M., & Haynes, K. (2012). Flooding Facebook – the use of social media during the Queensland and Victoria floods. *The Australian Journal of Emergency Management*, Vol. 27 (1), 27-33.

Crawford, K., and Hasan, H. (2006). Demonstrations of the activity theory framework for research in information systems. *Australasian Journal of Information Systems*, Vol. 13 (2), pp. 49-68.

Engeström, Y. (1987). *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsulit.

Lowe, T., and Innes, M. (2012). Can we speak in confidence: Community intelligence and neighbourhood policing v2.0. *Policing and Society: An International Journal of Research and Policing*, Vol. 22 (3), pp. 295-316.

Karanasios, S., and Allen, D. (2014). Mobile technology in mobile work: Contradictions and congruencies in activity systems. *European Journal of Information Systems*, Vol. 23 (5), 529-542.

Kavanaugh, A. L., Fox, E. A., Sheetz, S. D., Yang, S., Li, L. T., Shoemaker, D. J., Natsev, A., and Xie, L. (2012). Social media use by government: From the routine to the critical. *Government Information Quarterly*, Vol. 29, pp. 480-491.

Kuuti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. A. Nardi (Ed.), *Context and Consciousness: Activity Theory and Human-Computer Interaction* (pp. 17-44). Cambridge, MA: MIT Press.

Using Activity Theory to Understand Complex Relationships in Extended Network Organisations

Paul Bata
Leeds University Business School
University of Leeds
bnppb@leeds.ac.uk

This paper presents description of information failures, particularly which is increasingly common in our contemporary world and in complex and extended organisations with the potential to do even greater damage as a result of that complexity and extension. Therefore, it would be useful to understand what it is that is in complex and extended organisations that particularly gives problems for information sharing. Consequently, we would be looking at some of these issues and activity theory will help us in this study because it allows the understanding of activities, actions and operations within organisations.

Activity theory also help us in explaining where and how the contradictions and tensions led to the failure of information sharing; collapse of information sharing processes and the perceived needed improvement in the system as discussed in literatures. Activity theory (AT) is also used as a meta-theoretical lens in a case study setting on four different activity systems with a common shared object to identify the problem as a whole; these are conceptualised within AT and accommodated as phenomena which AT can help us explain.

The case is taken from the educational sector and within an Examination board call National Business and Technical Examinations Board (NABTEB) which has various stakeholders and is designed to examine candidates within the expected examination period and award certificates which must be credible and acceptable by the stakeholders. More so, in pursuits of their organisational mandate (objectives), the stakeholders relate with each another through information sharing, creating relationships based on either of contractual or social agreement with different levels of control and the need for specialised group formation and expertise to solve both anticipated and unanticipated problems indifference of location and boundaries.

The elements of complexity in relationships in complex and extended organisations are not new but becoming increasingly evident as business environment is characterised by complexity, dynamism, scientific knowledge, inter-firm competitiveness and increase need for effective

information sharing (Huber, 2003). There is, therefore, the need to understand organisational structures and the types of relationships that exist between firms, their stakeholders and their communities. In trying to understand the concepts of such complex and varied relationships better, we conceptualised this paper by asking the questions

How do people share information in a complex extended network organisations?

We argue that the reason for complexity is due to a highly formal organisational structure which is legally driven and a combination of a highly informal developed relationships existing in the system (complex and extended system) which is an incompatible combination. Consequently, this system becomes complex due to the incompatibility of the relationship and as a result becomes harder to share information within the system.

However, the used of division of labour and either temporary or permanent teams/Knots to solve problems in this type of complex setting is a best choice to share information.

Knowledge Workers on the Move: Hindrances to Knowledge Creation and Knowledge Sharing

Rosemary Francisco and Amarolinda Klein
University of Vale dos Sinos (UNISINOS), São Leopoldo, RS, Brazil

Introduction

Mobile knowledge workers usually are involved with multiple clients and business processes problems and challenges. They regularly interact with different types of people both inside and outside the formal organisational boundaries – staff, clients, managers, and their own business network. Since the knowledge of mobile workers is distributed and technologies that support their work are in constant change, mobile knowledge workers have been faced with a paradox between individual autonomy and the need for social interaction. Reviewing the literature, it was observed that this link between mobile workers and knowledge creation and knowledge sharing has not been sufficiently addressed by previous studies. This paper presents a research that used the theoretical perspective of Activity Theory to analyse the individual and social context of mobile knowledge workers in order to identify how knowledge creation and sharing occur among them.

Method

This research is based on a literature review and on 15 qualitative interviews with mobile knowledge workers. The interviewees were consultants and relationship managers in charge of IT projects in Brazil. Although these workers are involved in many processes, consultants' primary activity is diagnosing the client's problems, while relationship managers need to improve the commercial relationship with their customers. These activities intensify the need of working on the move. Skype, Whatsapp, Google Hangouts and Appear.in were used to conduct the 30-40 minutes interviews. The workers chose these tools because they already use them in their working environments.

Analysis

The data were analysed qualitatively, using NVivo, considering the conceptual framework of

Activity Theory. The use of Activity Theory to examine the data provided highly accurate accounts of how the mobile workers perform their activities and also which factors affect knowledge creation and knowledge sharing in their context, especially for problem solving.

Findings

Due to the characteristics of mobile knowledge work, study these worker's daily routines and reaching them in their working environment becomes a challenge. Because they have unique needs, formal training is not enough to support knowledge creation. They are usually concerned with their knowledge improvement, which is often done by individual search. In the case of knowledge sharing, the main hindrances are identified among the instruments that mediate the information flows in their primary activity, and also in the workload towards their involvement in other activities – including client's activities. The urgency to solve problems, to achieve their activity's goals, anytime and anywhere, made them adopt new virtual communities, like Whatsapp and Facebook groups, as an attempt to strengthen the work relations, create and share knowledge.

Conclusions

Through the analytical lens of Activity Theory, the results of this study help to understand the intricate needs of mobile knowledge workers, mainly related to knowledge creation and knowledge sharing to solve problems. These findings can also highlight some opportunities that can be addressed for future research and development on this subject, in literature and practice.

Application of Activity Theory to Study Complex Decision Making in Engineering Products and Services Development

Aleksandra Irnazarow
Leeds University Business School
University of Leeds
aleksandra.irnazarow@gmail.com

This research seeks to understand the best way to undertake major design projects, such as complex engineering systems design so that productivity and quality can be improved. The study will enhance understanding of collaborative and decision making processes to guide development of supportive work practices and technologies.

Design of complex engineering systems requires intricate balancing among many considerations. Social and technological complexity of engineering projects has increased with globalization, digitalisation and advances in communication technology. Designers often work in interdependent but distributed, decentralized and multidisciplinary teams (Gopsill et al., 2013; Gericke et al., 2013), share information through technology and use sophisticated design tools such as Computer Aided Design (CAD) (Fixson and Marion, 2014; McKay et al., 2015).

To deal with the challenge of arriving at optimal design decisions companies use formal approaches such as the linear stage-gate product development process (Eppinger and Ulrich, 1995). Despite established processes biases and sub-optimal results of decisions making are well documented in product development due to factors such as project constraints, ill-defined problems (Simon, 1973), collaboration, communication and cohesion problems in teams (McGowan et al., 2013; Zsambok and Klein, 2014; Senescu et al., 2013; Mark, 2002; Yang and Jin, 2008), satisficing, confirmation bias, design fixation, the 'sunk cost' fallacy and others (De Weck and Jones, 2006; Hallihan et al., 2012; Viswanathan and Linsey, 2011; Ullman et al., 1987).

Research approaches to study design either focus on mathematically modelling formal design processes or take qualitative approach to investigating behaviour of design teams (Austin-Breneman et al., 2016). The proposed research seeks to use Cultural Historical Activity Theory, known as CHAT (Engeström, 2001), as a heuristic framework to narrow the gap between the two approaches. CHAT sees human behaviour as a goal directed activity system (Luria and Vygotsky, 1992; Vygotsky, 1980; Nardi, 1996) and modern organizations are seen as interrelated and overlapping systems of long-term, collective activities, short term actions, and automatic or semi-automatic operations. Applying CHAT analysis to work practices performed during design of complex engineering systems will uncover interactions between complex, changing objects of collective activities and fixed division of labour between professionals, processes and technology with its affordances and constraints (Neff et al., 2013). CHAT takes collective design activity as a unit of analysis thus allowing for a formalised but non-reductionist investigation of design decision making and providing a socio-technical and holistic perspective (Allen et al., 2011).

The following research activities are proposed to study complex decision making in engineering products and services development:

- Apply CHAT to exemplar decision making practices to improve understanding of current practices, capture real-world activity of decision-makers and analyse the role of technological tools mediating these practices.

- Identify interrelating activity systems and explain tensions and contradictions in activity systems underpinning complex decision making.

- Develop and test an intervention to be applied to exemplar decision-making practices with a view to bring about change and improvement to these practices.

References:

Allen, D., Karanasios, S. and Slavova, M. 2011. Working With Activity Theory: Context, Technology, and Information Behavior. *Journal of the American Society for Information Science and Technology.* **62**(4), pp.776-788.

Austin-Breneman, J., Yu, B.Y. and Yang, M.C. 2016. Biased information passing between subsystems over time in complex system design. *Journal of Mechanical Design.* **138**(1), p011101.

De Weck, O.L. and Jones, M.B. 2006. Isoperformance: Analysis and design of complex systems with desired outcomes. *Systems engineering.* **9**(1), pp.45-61.

Engeström, Y. 2001. Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of education and work.* **14**(1), pp.133-156.

Eppinger, S.D. and Ulrich, K.T. 1995. Product design and development. *1995.*

Fixson, S.K. and Marion, T.J. 2014. The Segmentation of Innovation: How Digital Design, Rapid Prototyping, and a Sharing Culture are changing the NPD Landscape.

Gericke, K., Qureshi, A.J. and Blessing, L. 2013. Analyzing Transdisciplinary Design Processes in Industry: An Overview. In: *ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*: American Society of Mechanical Engineers, pp.V005T006A031-V005T006A031.

Gopsill, J.A., McAlpine, H.C. and Hicks, B.J. 2013. A social media framework to support engineering design communication. *Advanced Engineering Informatics.* **27**(4), pp.580-597.

Hallihan, G.M., Cheong, H. and Shu, L. 2012. Confirmation and cognitive bias in design cognition. In: *ASME 2012 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*: American Society of Mechanical Engineers, pp.913-924.

Luria, A.R. and Vygotsky, L.S. 1992. *Ape, Primitive Man, and Child Essays in the History of Behavior.* CRC Press.

Mark, G. 2002. Extreme collaboration. *Communications of the ACM.* **45**(6), pp.89-93.

McGowan, A.-M.R., Daly, S., Baker, W., Papalambros, P. and Seifert, C. 2013. A Socio-Technical Perspective on Interdisciplinary Interactions During the Development of Complex Engineered Systems. *Procedia Computer Science.* **16**, pp.1142-1151.

McKay, A., Stiny, G.N. and de Pennington, A. 2015. Principles for the definition of design structures. *International Journal of Computer Integrated Manufacturing.* (ahead-of-print), pp.1-14.

Nardi, B.A. 1996. Studying context: A comparison of activity theory, situated action models, and distributed cognition. *Context and consciousness: Activity theory and human-computer interaction.* pp.69-102.

Neff, G., Fiore-Silfvast, B. and Dossick, C.S. 2013. Materiality: Challenges and opportunities for communication theory. In: ICA.

Senescu, R.R., Haymaker, J.R., Meža, S. and Fischer, M.A. 2013. Design process communication methodology: Improving the effectiveness and efficiency of collaboration, sharing, and understanding. *Journal of Architectural Engineering.* **20**(1), p05013001.

Simon, H.A. 1973. The structure of ill structured problems. *Artificial intelligence.* **4**(3-4), pp.181-201.

Ullman, D.G., Stauffer, L.A. and Dietterich, T.G. 1987. Preliminary results of an experimental study of the mechanical design process. In: *Proceedings from the NSF Workshop on the Design Process*: Ohio State University, Oakland, CA, pp.145-188.

Viswanathan, V. and Linsey, J. 2011. Design fixation in physical modeling: an investigation on the role of sunk cost. In: *ASME 2011 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*: American Society of Mechanical Engineers, pp.119-130.

Vygotsky, L.S. 1980. *Mind in society: The development of higher psychological processes.* Harvard university press.

Yang, M.C. and Jin, Y. 2008. An examination of team effectiveness in distributed and co-located engineering teams. *International Journal of Engineering Education.* **24**(2), p400.

Zsambok, C.E. and Klein, G. 2014. *Naturalistic decision making.* Psychology Press.

Aging Informatics and Activity Theory

Dr Stan Karanasios
Business Information Technology & Logistics
RMIT University
stan.karanasios@rmit.edu.au

Dr Natalie Pang
Wee Kim Wee School of Communication and Information
Nanyang Technological University
nlspang@ntu.edu.sg

The emerging area of aging informatics (Obi et al., 2013) is concerned with how aging populations use information communication technologies (ICT) and their information practices and the intersection of these aspects with quality of life. Researchers in aging informatics face a challenge of adopting suitable theoretical lenses to frame studies and generate insights on the use of ICT in the context of aging populations. Rather, the field of aging informatics has been largely concerned with issues of access and diffusion, training and capabilities, and barriers to use of ICT. Part of the challenge involves adopting, or developing, contemporary social theoretical lenses which are able to account for the social context (the activity that the aged person is undertaking), whilst considering the mediating role of ICT. Activity theory is presented as a relevant practice theory to frame studies in the area of aging informatics. However, whilst activity theory has a tradition of use in the fields of information systems, information management and Human Computer Interaction (HCI), which are all concerned with behaviour and design of ICT, its application in the area of aging informatics is surprisingly underdeveloped.

In this presentation the appeal and relevance of activity theory in this context is discussed. Activity theory brings into focus important issues for aging informatics concerning normative behaviour, problematising ICTs and interventions, and understanding opportunities for change (Allen et al., 2013). Activity theory also allows researchers to consider the analysis of ICT mediated activity in context, and by doing so does not privilege the technical over the social, rather it marries the social context and technology use – a critical challenge for human behaviour/practice and ICT studies (Allen et al., 2013).

Five primary contributions are identified for understanding aging informatics, which are borrowed from the use of activity theory in other areas of ICT mediated activity amongst challenging social contexts (Karanasios, 2014; Karanasios and Allen 2013) (i) framing ICT mediated activities; (ii) deconstructing ICT mediated activities; (iii) locating contradictions within activities as opportunities for change; (iv) framing networks of activities; and, (v) emancipation through ICT. Further opportunities for expansion of activity theory in the field of aging informatics are discussed, likewise the field of aging informatics is identified as an area which can lead to more comprehensive use of activity theory.

References

Allen, D., Brown, A., Karanasios, S & Norman, A (2013) How should technology-mediated organizational change be explained? A comparison of the contributions of critical realism and activity theory. MIS Quarterly 37(3), 835-854

Allen, D., Karanasios, S & Slavova, M (2011) Working with activity theory: Context, technology, and information behaviour. Journal of the American Society for Information Science and Technology. 62(4), 776-788.

Karanasios, S. (2014). Framing ICT4D research using activity theory: A match between the ICT4D field and theory? Information Technologies & International Development, 10(2), 1–17.

Karanasios, S & Allen, D (2013) ICT for development in the context of the closure of Chernobyl nuclear power plant: an activity theory perspective. Information Systems Journal 23(4), 287-306.

Obi, T., Auffret, J.P., Iwasaki, N. (2013) Aging Society and ICT. IOS Press