Actor-Network Theory in the study of research and technology development in Technology Enhanced Learning

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Introduction

This poster describes how a sociomaterial approach, Actor-Network Theory (ANT), was used in an ethnographic case-study to investigate ongoing research and technology development practices at an interdisciplinary project between education and computer sciences. The study asked how a shared research question was being answered in practice when divergent research approaches were brought to bear upon it, and how an innovative piece of educational technology might emerge through the interdisciplinary R&D practices.

The Case: "The Ensemble: Semantic Technologies for the Enhancement of Case Based Learning" –project (2008-11)

- Part of the Technology Enhanced Learning research programme.
- Large, distributed and multidisciplinary (16 members across six UK institutions).
- The Ensemble-project sought to 'realise the semantic web in Educational settings' and to 'enhancing case based learning' [1]

For more info see: www.ensemble.ac.uk

Data

An ANT study entails **ethnographic research methods**. The data for the study was generated and accumulated over 28 months using multiple ethnographic research methods, including interviews, diaries, email correspondence, diagrams and sketches, prototypes, photos, observations etc.

ANT is not a unified way of thinking

Originating from 1970-80s Science and Technology Studies, ANT has evolved over time. It is better characterised as **a unique collection of sociomaterial understandings** concerned with associations between human and nonhuman actors in day-to-day practices [2, 3].
The early ANT studies (*the Classic-ANT, cf.[4]*) focussed on the issues of relationality and materiality, and aimed to disperse essentialist and dualist categories and understandings (like 'the social' and 'the natural') of reality.

Both human and nonhuman actors contribute to the realities we study

Classic-ANT drew "ruthlessly" on semiotics asserting that similarly to words, "entities take their form and acquire their attributes as a result of their relations with other entities" [4]. This means that **humans and nonhumans exist as *effects* of these relations**, rather than as self-evident categories somewhere out there [4].

Also the non-humans can 'act'

The Principle of Generalised Symmetry is a central tenet of ANT [5]. This means that also objects and other **nonhumans have the capacity to 'act' *by influencing states of affairs*** through being entangled in networks with other actors. (Imagine how a missing house key would propel you to a completely different course of action to what you had originally intended.)

Actor-Networks are dynamic and evolving

Post-ANT, the second turn of ANT, aligns with the performative turn in social theory [6].Relationality is no-longer enough but **entities** are also seen as **"performed in, by and through those relations"** [4].In this way, actor-networks are often not stable but dynamic, constantly forming, staying together, or breaking apart. ANT is interested in tracing the sociomaterial practices happening within the churn of these networks and the multiple effects emerging as these shifting assemblages are enacted [7, 8].

ANT permeates all levels of thinking in research

Working with ANT affects the types of questions asked, the understanding and conceptualisation of 'reality', how data is generated and analysed, and how the study is written up. ANT offers a flexible way of engaging with data: when everything conceptualised in terms of network-like relations, there are no micro or macro levels. This allows the researcher to focus in on a detail as well as zoom out to take a look at the bigger picture. [7, 8]

Focussing on the *research question* shifted the focus from *doers* to the *process of doing.*

The main advice for ANT researcher is to 'follow the actors!'[2]. The focal actor, or 'token' [10, 11], whose path was being followed in this study, was the 1st Research question of the Ensemble-team. Doing this opened also a way into the ever-expanding data set. The analysis commenced by studying how the 1st Research Question was picked up by researchers with diverse research backgrounds, and how they started the process of translating that into practices of research and technology development. The token became translated into data, conflicting interim findings, to tension and compromises and to further research. The token's path shows also the gradual entanglement of the technology development with the research process, and how a *concept* for a piece of software as well as its prototype finally emerged from the process [9]. As the research and development processes progressed, **the token not only translated and transformed, but also multiplied and unified through negotiations and decisions taken within the unfolding and evolving project assemblage**. This way of analysis offered a means for following a moving, changing target through, and as part of, the practices without fixing it in place in advance.

[1] The Ensemble team, 2008. *The Original bid. Semantic Technologies for the Enhancement of Case Based Learning*: Case for Support.
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[5] Callon, M., 1986b. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In: J. Law, ed., *Power, action and belief: a new sociology of knowledge?* London: Routledge and Kegan Paul, pp. 196-223;
[6] Barad, K., 2003. Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter. *Signs: Journal of Women in Culture and Society*, 28(3), pp.801-831.
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[8] Rimpilainen, S. 2012. Gathering, Translating, Enacting. A study of Interdisciplinary research and development practices in Technology Enhanced Learning. A doctoral thesis. University of Stirling.
[9] Latour, B., 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.
[10] Gaskell, J., and Hepburn, G., 1998. The course as a token: A Construction of/by Networks. *Research in Science Education*, 28(1), pp.65-76.