

A Proposed Interpretivist Framework to Research the Adoption of Learning Management Systems in Universities

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Abstract

This paper proposes a practical research framework based on activity theory as a lens to research the adoption of learning management systems in tertiary education institutions. Following the identification of the interpretivist paradigm as an appropriate research approach, approaches such structuration theory, actor network theory, or activity theory are briefly considered. The paper then argues that activity theory is a natural fit and it was used but re-conceptualized for the context of an academic learning environment to propose an analytical research framework for LMS. In particular, e-Learning can be analysed as a teaching-learning work activity with an objective, mediators, actors, actions, mediator tensions, work activity as a transformation, and the activity outcomes. The paper posits teaching and learning through an LMS as an activity object; sees rules, pedagogy, nature of tasks and social contexts as mediators for the e-learning activity; institution, educators & learners as actor; work activity as transformation and quality learning as activity outcomes.

Keywords: Activity Theory, Interpretivism, Technology Adoption, Learning Managements Systems, Tertiary Educational Institutions.

Introduction

The "development and diffusion of IT throughout organisations and society" is accompanied by a challenge "to examine the relationship between IS, organisations, and society within which they are embedded" (Howcroft & Trauth, 2005). This requires a scientifically sound research approach - which is a "philosophical and theoretical framework that guides research" (Kekwaletswe, 2007: 95).

In the past, much of information systems research has tended towards positivist research approaches (Mingers, 2003; Kekwaletswe, 2007). Positivism is "premised on the existence of a priori fixed

relationships within phenomena..." (Orlikowski & Baroudi, 1991: 5) Largely aligned with the natural science tradition of conducting research, it encompasses the rules of formal logic, experimental and quasi-experimental design, as well as the rules of "hypothesis and deductive logic" (Howcroft & Trauth, 2005). An implicit assumption is that natural science phenomena (matter and machines) and social science phenomena (humans) phenomena and related investigations are sufficiently similar. On the basis of the two assumptions, positivists conclude that natural science research methods can be

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applied to all research (Babbie & Mouton, 2004).

However, a positivist assumption that “the best or only way of measuring the properties of a phenomenon is through quantitative methods” (Babbie & Mouton, 2004: 49), tends to privilege an enquiry only from one perspective. Understanding the theoretical and practical dynamics of learning management technologies and educational practices of educators requires more than just the deductive methods of theory testing as advocated by the positivist tradition. It also requires the understanding of qualitative phenomena of the application of ICT into social-educational settings. Whilst the positivist approach may be useful in the outline of first order (factual) problems about artefacts including the analysis of quantifiable data such as the number of computers and the frequency of use by students and staff, it is not geared for interpretations and understanding of context specific and unpredictable social factors such as feelings, beliefs and motivations. It cannot be used to explain the trends and relations between technology and the social phenomena outside a preconceived theoretical framework. Certainly the conceptual framing of ICT issues is an interpretive process that cannot be effectively carried out using non-interpretive positivist paradigms such as the predictive hypothesis testing and quantitative measures of variables (Klein & Meyers, 1999). Positivism is therefore not necessarily the most appropriate research approach for this investigation.

Interpretive research focuses on the complexity of human sense making as the situation emerges with the focus on understanding phenomena through the interpretations of how people see them (Boland 1985, 1991; Deetz 1996; Orlowski and Baroudi 1991). IS research according to Kaplan and Maxwell (1994) is interpretive if it is based on the assumption that “*our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artefacts*”. The

thinking behind this study is also informed by the argument that technology is a social construct, and an “*embedded system*” (Orlikowski & Iacono, 2001: 126) that represents both its technical form and the process to which it is applied. This process based view of technology requires an analytical method of understanding a socio-technical system such as a LMS that sees technology within the context of its use in social settings. Interpretive methods of research are “*aimed at producing an understanding of the context of the information system, and the context whereby the information system influences and is influenced by the context*” (Walsham, 1993: 4-5, in Klein & Meyers, 1999).

This paper seeks to propose an interpretive framework for researching LMS adoption at Higher Education Institutions based on Activity Theory. First, activity theory will be explained. Next, two alternative interpretivist theories are briefly discussed. Finally, the concepts of activity theory will be applied to the domain of LMS in a HEI context in the form of a conceptual interpretation framework.

What is Activity Theory?

As one of the most frequently cited theories in IS research, the activity theory (AT) can best be explained in terms of its key terms: internalization, mediation, subject, object, tool, transformation (process), rules, community, division of labour, and outcomes. The theory originates from Vygotsky’s (1979, in Miettinenn, 1999) concepts of mediated action, where human action is seen as more than a function of internal biological processes, but mediated by culture and artefacts (including signs and tools). Human activity is also socially mediated (Leont’ev, 1978).

Both the activity and context feature strongly in the vocabulary of the activity theory. An activity is seen as a factor that ties individual actions to the context, hence a basic unit of analysis in Activity Theory. It further emphasised however, that since our actions derive their meaning from the context, and that “*actions without context*

are meaningless" (Mursu *et al.*, 2008: 6) that actions are to be viewed within a context.

The AT theoretical approach or perspective (Sandars, 2005) has been used, interpreted and further developed by a number of theorists and researchers – to analyse the actual material conditions of human activity from a means-ends, user-needs, activity system perspective (Miettinen, 1999; 2002; Rajkumar, 2005). The AT has also been applied as a basis for understanding context-based investigations of individual and social transformations in information systems research by Kuutti (1991) and Korperla, et al (2002). It was also used by Kuutti and Molin-Juustilla (1998) as a research approach to investigating co-ordinations in networked organisations. The AT has also been successfully applied by Kekwaletswe (2007) in his doctoral study to investigate the dynamics of mobile technology in learning environments. Kekwaletswe found the theory to be an effective analytical tool to interpreting the phenomenon of "mobile learning", the technologies, influencing factors and context in which mobile learning it takes place.

Though this paper investigates a different technology application, namely the use or adoption of learning management systems

in higher education learning environments, the context of enquiry is similar to Kekwaletswe's investigation, hence the AT theory can be considered to be equally appropriate and useful. As such, it is suggested as a possible foundational framework for LMS in HEIs.

From the activity theory perspective, human computer interaction within IS research is seen as an activity system. A system consists of various parts joined together by interactive activity/ies of actors, using (and channelled by) mediators, with the aims of achieving a specific and common objective (motive and goal). The idea of a networked computer environment in a learning context within the framework therefore, suggests that learning becomes the main unit of analysis (and goal) around which mediators, procedures, and rules are drawn. Drawing on Mursu *et al* (2007), the key aspects of the work activity system in the Activity Analysis and Development (ActAD) Framework can be modelled as shown in Figure 1. The right-hand side shows different levels of analysis whereas the left-hand side illustrates the different elements of a given work activity when viewed from a systemic viewpoint.

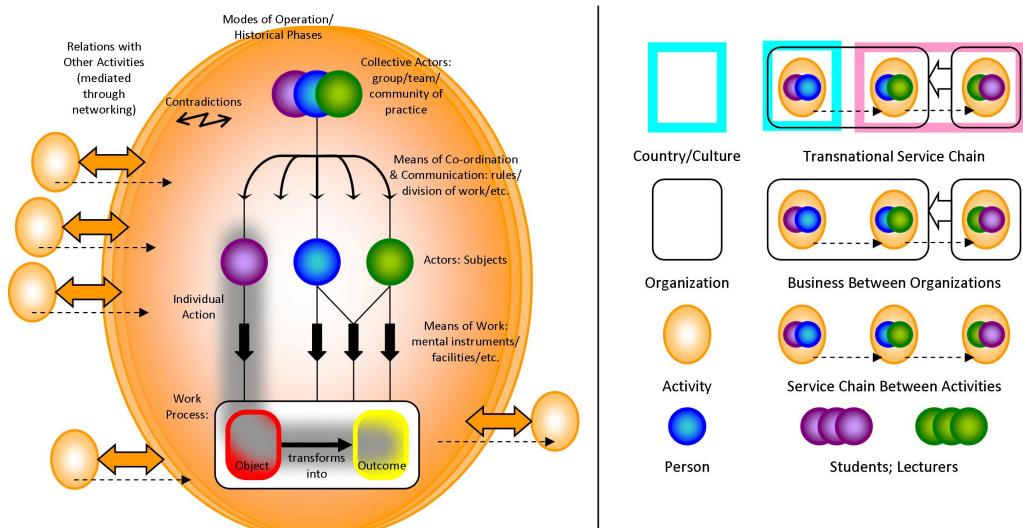


Fig 1: The ActAD Framework - Structure and Relations of a Work Activity as a Systemic Entity

This framework was built on Leont'ev's (1978) elaboration of Vygotsky's perspective of human activity as a process that is mediated by tools, artefacts, and rules.

Some Alternative Interpretative Theories

The next section will built on the Activity Theory-based ActAD Framework to formulate an analytical research framework in the context of LMS at HEIs. However, it is important to take note of alternative theories that could, arguably, be used instead. The following briefly discusses two major contending interpretivist theories which have been used in similar research contexts.

Structuration Theory

As a somewhat integrated discipline, information systems continues to draw its research theories from the older and much established disciplines such as Anthropology, Computer Science, Psychology and Sociology, among others (Johnstone, 2001). One of the most popular and frequently cited theory by IS researchers in sociology is the Structuration theory of Tony Giddens (Jones & Karstens, 2008).

Structuration theory is a general theory of social organization, and an ontology of what exists rather than what happens in society, for example, to understand "what sort of things are out there in the world, not what is happening to or between them" (Craib, 1992: 108). The structuration theory rejects the thesis that sees social phenomena as informed by (or products of) social structure or agency separately but assumes instead, that 'we create society at the same time as we are created by it' (Giddens, 1984 pp 14). The focus of structuration theory is on social practices that jointly constitute both individuals and society activities, hence structure is said to be activity-dependent. In what Giddens calls the "double hermeneutic" principle or the joint involvement of society and individuals, further informs the production and reproduction of practices across time

and space. The principle of structure and agency - where social structures and autonomous social agents are mutually constitutive (Giddens, 1990; 1991), assumes that the structure consists of norms (rules) and powers of signification, domination, and legitimization where social agents make sense of the rules (norms) through interaction. Compliance with expected behavior is not voluntary, it is legitimized, motivated or unacceptable behaviour sanctioned.

However, when applied to the study of user perceptions, actions and in-action in an e-Learning context, this line of thinking seems problematic in its attempt to rule out individual voluntary activity. In trying to make sense of the principle of legitimization, motivation, and sanction, this model of explanation falls short in making sense of limited usage of an LMS by educators – even in cases where they are motivated by their institutions, and pressurised by students to do so. In explaining this limitation, Jones & Karsten (2008) argue that the theory offers an insightful approach to analyzing social phenomenal only at a high-level of abstraction and not for direct application at specific contexts (Jones & Karsten, 2008) as required in this study.

Actor Network Theory (ANT)

Another leading analytical theoretical frameworks within the interpretivist research paradigm is the Actor Network Theory (ANT). The ANT offers a critical perspective to understanding the technical and the social aspects of techno-social interactions. It places a semiotic emphasis on the human and the technical agents (Latour 1987; 1992) whereby a technology account cannot be made outside that of the social aspect. It enables specificity about the technology (Hanseth & Monteiro, 1998) but opposes any position that seeks to view an actor within a network independently of every other actor in the network. The ANT suggests the elimination of all a priori distinctions between the technical and the social (Callon, 1986) actants in what Law (1987) refers to as a heterogeneous network.

Unlike the implications of activity theory where the activity system represents human actions that are mediated by neutral artefacts, the ANT presents a network as a sum of interrelated and causal connectedness of all factors on any socio-technical account. The significance of a network is in its 'continually negotiated processes' where both human and non-human (artifact) actors have a mutual and causal influence in network processes (Tuomi, 2001). There is no network without actors, and actors cannot act outside of a network. Each actor can only be viewed in relation to, and not separate from, other actors or parts of the network (*ibid.*). While a social network is merely a set of people, organizations, and perhaps their structures that are connected by a set of social relationships, a socio-technical network includes technologies that people construct and use in collaboration (Lamb & Davidson, 2002) where each act matters in the outputs of network interactions.

The ANT is built on the arguments that knowledge is embedded in social processes, conceptual systems, and material artefacts that are used in social practices (Latour, 1992). Looking at e-Learning from the ANT perspective therefore requires recognition of a negotiating interplay between the human and machines in the e-Learning environment. Through the ANT lenses then, one may not view technology as just a neutral passive thing, but an actor in the same analytical level with humans. A questionable assumption in this case is a supposed claim of symmetrical power that the technical and human actants have to exert a similar level of influence on each other. Do the technical and social actors not need to have similar "cognitive capabilities" to occupy symmetrical roles of influence in a socio-technical network? Cognitive psychologists such as Vygotsky (1978) clearly indicate a lack of this capacity on things (including technology) and on animals.

Our view sees an LMS as a socio-technical network that incorporates a computer, network, applications, learning material, learners, educators and/or mediators. Just

as human and non-human actors assume identities according to prevailing strategies of interaction in the ANT (Hanseth, and Monteiro, 1998), the parties within the e-Learning network should be mutually engaging, but also supportive. This view however, tends to streamline the arguments in favour of the constructivist rather than instructivist pedagogical stream. As opposed to the 'instructional' view for example, constructivists describe learning as the innovative and participative process that can be enhanced through e-Learning platforms. The question though, is of the extent to which ICT systems actually assume such a role in technology assisted education practices, and whether it is engaged as the active actor in the e-Learning network. Some level (but not a symmetrical level) of influence between all the technical and social actors is accepted here, though tools are seen as incapable of engaging in cognitive decision processes, and are understood to have a significant but lesser level of influence in the socio-technical network. For example, humans may choose to ignore technical artefacts if they have negative perceptions of its usefulness, or find it complex or user-unfriendly.

Although LMS adoption in HEIs can arguably be viewed successfully as the mutual shaping of actors in a network, reservations can be raised about the symmetrical notion of humans and non-human actors. As much as the mutual shaping argument is accepted, it is not widely accepted that it follows a linier and equal negotiation pattern.

However, ANT has been used very successfully to investigate, contextualise and analyse socio-technical applications of ICT – even by one of the authors, see (Trusler & Van Belle, 2005) – so its potential should not be discounted. Future researchers would be well-advised to carefully assess whether ANT may be a more appropriate theoretical "lens" for their purposes than Activity Theory.

Application of Activity Theory to LMS: A Proposed Analytical Research Framework

This section applies the activity theory into an analytical framework which can be used to investigate the adoption of LMS within a HEI context. For this purpose, the appropriate level of analysis (right-hand side of figure 1) uses the individual person (the lecturers and students) – as the units under discussion.

The work activity framework in figure 1 presents an activity as a collective phenomenon with a shared (1) *Object* in the form of *motives* and *goals*. The motives and goals as well as activities towards their realisation are mediated by tools, signs, artefacts, context and conditions – collectively referred to as the (2) *mediators* (Mursu, et al., 2008). The collective activity consists of (3) *actions* that are carried out by (4) the *actors*. Actors, also referred to as activity *subjects* are individuals or groups acting individually or collectively as guided by (5) *rules* and established *norms* – to achieve a common object (motive or goal). Not only the motives and goals, but also the relationship between subjects and objects, as well as the subjects themselves are also mediated by culture, tools, rules and contexts (Rajkumar, 2005; Miettinen, 1999).

Subjects create artefacts on a continuous basis in the activity system, to better enable the realisation of the object (motive & goal) which is the required outcome/s.

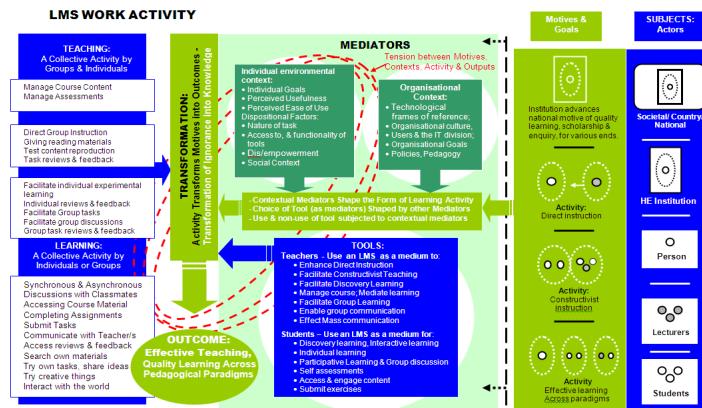


Fig 2: An Activity Theory-based Framework for Analyzing LMS at HEIs.

Though the object may often be similar to the (6) *outcome*, the two are not one and the same terms. They are separate activity phenomena in that the object exists before and along the activity. It has a finite time-frame that ends with the transformation of the object into an outcome an alteration, renewal, or abortion of the object following failure to achieve a desired outcome – large due to contextual or mediator tensions. The outcome therefore, only arises out of a successful interplay between the object (motives, goals) from the mediation process and actions, where the object undergoes a successful (7) *transformation* into an outcome (Miettinen, 1999).

The activity therefore is never an end in itself but a goal oriented process to ensure the realisation of the outcome, hence a careful decision on the choice of the enabling tools becomes important. In the case of a learning management system in the e-learning context, perceptions on the usefulness (PU) and the perceived ease of use (PEU) inform the initial decision to adopt and use, or to ignore a technology tool. Depending on the synergies and (8) *tensions* among the activity mediating factors, the object may be fully or partially realised, or may not be realised at all.

The activity system comprises of a number of phenomena, and the eight most prevalent to the context of our framework are applied in formulating the activity framework as an analytical approach. Figure 2 below summarizes the framework.

From an activity system based approach, e-Learning can be analysed as a teaching-learning work activity with an objective, mediators, actors, actions, mediator tensions, work activity as a transformation, and the activity outcomes. These are discussed in detail, individually, in the following passages.

Teaching & Learning through an LMS as an Activity Object

The activity theory puts forward the activity as the main unit of analysis in the activity system. Interaction between teachers (teaching), learners, tools, mediators, and the actual learning process is the main activity in the context of this paper. The object is seen as the overall institutional objective in the form of a mission, and is therefore not as specific as a goal. A goal is an elaborate and practical means (usually at individual lecturer level) to carry out the institutional objective. So, on the basis of the principle of collective activity, individual lecturer's goal in the teaching and learning process - should be in line with the main institutional objective and mission, hence the question of pedagogy, guidelines (rather than prescriptions), rules, and procedures. Teaching and learning are the activities in the e-Learning context and therefore the main units of analysis in this study. Starting with teaching as an activity object in the activity system, an LMS is useful across the four learning paradigms. In terms of the PU and PEU (Davies, 1989), a teacher needs to believe on the usefulness of the tool as an enhancer of the work activity towards the object, and find the tool conveniently usable.

Since teaching is the object (motive and goal) to advance effective learning (the main object), the teacher has options to choose the most useful and convenient of the available tools. Learners also need to have unlimited access to tool. The tool needs to be intuitive, interactive, and be flexibly applied to different learning uses. Studies by Mlitwa (2005), America (2006), Czerniewicz et al (2007), and Ncubukezi (2009) suggests that even positive perceptions about the usefulness of a

system may not be enough to encourage usage of e-Learning tools. The nature of the task relative to the uses of the tool, the rules of its usage, as well as the social context further determine usage or non-usage of the system.

Rules, Pedagogy, Nature of Tasks and Social Contexts as Mediators for the e-Learning Activity

Institutional policies on the usage of IT facilities for teaching and learning, learning policies, educational paradigms and pedagogies further inform usage or non-usage patterns of e-learning tools in a department, faculty or the whole academic Institution.

With respect to the nature of the task, courses such as information systems (IS) can be taught entirely through a computer system whilst fine arts or even music and ballet dancing may require more physical practice activity, in which case, it would not always be relevant to do most learning over an LMS medium. The social context plays a role in informing technology usage in that - where colleagues within the department resist the usage of e-Learning, individual lecturers may be negatively affected and tend not to favour the use of the tool. From the activity system perspective, the social context, the rules, the tools, matters of empowerment or disempowerment, as well as technical capabilities serve as mediators of the activity - which is teaching and learning through an LMS in this case. It follows from this argument that even where educators believe in the usefulness of an LMS, it may still be impossible to use it when the institutional support system and the IT network infrastructure are inadequate. The enabling IT network should be efficient navigation, and should carry maximum capacity to handle different versions of data and information exchanges, around the clock. With this understanding it can be asked whether enabling policies and guidelines as well as a supporting social environment exists to encourage effective usage of e-Learning in an institution.

Institution, Educators & Learners as Actors

The main issue in applying the activity system approach to analysing socio-technical activities "*is whether the work involves a collective group and an information system, or an individual and an information tool*" (Mursu, et al, 2008: 6). A collective actor would be a team with a goal carried out by groups or individuals. In an e-Learning environment, a collective of students may interact over a discussion forum or even over the same content repository facility in LMS platform as they work towards achieving a common learning goal. The institution in this case, views e-Learning as a system of interrelated and linked activities towards one common objective. At the same time, individual lecturers see a LMS as a tool to advance their individual goals. As an actor in the system, the educator offers one or more of the courses with other educators offering their respective bits, towards a student's qualification. This makes teaching a collective process carried out by individual teachers using preferred tools. Other teachers, the learning environment, the learners as well as the tools influence the teaching and ultimately, the learning process. All these factors are jointly called the activity system (Rajkumar, 2005; Miettinen, 1999).

By implication, the collective activity phenomenon suggests some level of cooperation among the actors in the activity system. As teaching is a collective activity carried out by individual teachers, some level of cooperation towards a common purpose is a logical expectation. In terms of the rules and pedagogy, an element of predictability of procedures, intuitive interface layout and ultimately, consistency in terms of tool availability, task response times and functionalities would simplify usability for the learner. In addition to understanding usage factors for educators and learners, the role of an institution and departments also becomes important. It is therefore asked under this point (in research questions), whether the institution provides an enabling environment in terms of the necessary infrastructure, user-motivation, technical

and literacy support to enable e-Learning activities.

Teaching & Learning over an LMS as Actions of the Activity System

The bottom line is whether teachers see a LMS as a useful tool to advance their teaching goals. Whether it is seen as a useful tool is largely motivated by their pedagogical paradigm and relevance of the system functionalities to the nature of the task. Even in this case, the system as a tool should be perceived as easy to use. That is the technical environment in terms of the capacity and speed of the network, issues of user skill and an encouraging social environment, should not be disempowering to the teacher, and ultimately to the learner.

Conflicts, Disempowerments, Technical Limitations, Mediator Tensions

Matters of resistance to change by individual lecturers, top down (and therefore alienating) approaches to introducing e-Learning systems by management, lack of training support, incompetent and uncooperative network divisions, as well as lack of cooperation between the IT network, academic planning, faculties and departments, individual lecturers and learners may inhibit adoption and usage of e-Learning systems in an institution. The presence of all these factors on the other, would positively mediate effective usage of LMSs in teaching and learning processes.

On this basis, questions of power relations within and between departments, empowering and disempowering factors such as training and technical support, as well as issues of infrastructure, software and program availability for teachers and learners are raised in this paper.

Work Activity as Transformation

The impetus for this paper was the observation of limited usage patterns of LMSs by educators in a number of South African universities. The question of perceived usefulness of an LMS relates to the extent to which an LMS enable a

transformation of an institutional objective (often reflected in a mission statement) through the work-activity process (which is teaching through an LMS) into effective learning as measured through learner experiences and performances.

Quality Learning as Activity Outcomes

Quality learning is the main goal, but also an intended outcome of teaching. This question pertains to the level of usefulness in which the LMS tool in the e-Learning environment improves learner experiences in terms of flexibility, convenience, extended access, and ultimately the ease in which the tool can enhance the transformation of the learning process – into knowledge.

Conclusion

This paper set to outline a research framework based on activity theory as a lens to research the adoption of LMS within an HEI context. As a background, two prevailing information systems research approaches were highlighted, namely the positivist and interpretivist approaches. Following the identification of the interpretivist paradigm as an appropriate research approach, theories such structuration theory, actor network theory, or activity theory could be applied in interpretivist frameworks. The activity theory views a research context as a collective work activity with a common objective between individual and group actors. In other words, teaching and learning is not an individual isolated exercise but collective activity that is carried out either by individuals or groups. The activity system phenomenon further acknowledges the context and environment as mediators of the activity. In a work activity, an object is transformed from a vague idea into an outcome, depending on the mediation process.

The activity system framework was therefore adopted and applied (or re-conceptualized) into a research approach framework as shown in figure 2 above. Ongoing research by the authors is concerned with the empirical validation of

the framework by analysing the adoption (or not) of LMS in four HEIs in the Western Cape of South Africa.

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