

Trust, collaboration, e-learning and organisational transformation

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While theoretically distinct, learning and knowing are meshed in practice. This paper builds on this observation and argues that organisational transformation and the development of best practices in e-learning share some similar context. This is particularly evident when knowledge management perspectives are considered. Specifically, trust and collaboration are shown to be common enablers of both activities. A range of interrelated models is introduced with trust identified as prominent within a complex mix of processes and outputs that can be described in terms of interoperability. Collaboration and interoperability are identified as key organising principles in information-based and knowledge-based economies. Through collaboration common goals and mutual benefit are discerned and pursued; duplication of effort is minimised; innovation is stimulated. Achieving technical interoperability demands use of networks in ways that harness the aggregate capacity of disparate systems, applications and services. The resulting infrastructure matches requirements of both e-learning and organisational transformation.

Introduction

Achieving organisational transformation that is consistent with best practice approaches to e-learning is not a trivial exercise. Such a challenge, while associated with the young but maturing domain of e-learning, calls for an examination of practices and methods that may already be well established. While 'promising practices'

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are worthy of consideration, the concept of something *promising* is semantically loaded toward emergent, future or unproven methodologies. This paper discusses tried and validated practices that can be applied to both challenges: that is, of achieving organisational transformation and developing effective e-learning environments. In this regard, *trust* is identified as a primary enabler of a complex mix of processes and outputs that appear at this nexus. Processes involving consensus building, consultation, collaboration, and knowledge sharing all depend on trust for effectiveness. For various technical and standardisation forums around the world, the desired output of these processes is a robust and viable e-learning marketplace. But for e-learning to mature and be supported by such a viable marketplace where there is easy access to quality content, applications and tools, technologies that work are a critical requirement. Moreover, these technologies that work must be trusted technologies – technologies that are validated, properly supported and that conform to established technical standards. Online banking can be seen as a useful example in this regard: mainstream adoption simply did not take place until the systems in the marketplace could be trusted.

With trust identified as a common enabler in both processes and outputs of communities of practice, a number of supporting models are introduced. An interoperability schema shows the interdependencies between the politics of consensus building through to the achievement of technical implementations that deliver interoperable technical systems. Key layers in this schema are political, semantic, syntactic and technical. Political interoperability involves declarations of intent, the pursuit of a common goal, and the agreement of the ground rules of collaboration. Semantic interoperability involves processes that establish shared meaning; and outputs that enable such things as the deployment of classification systems, taxonomies, shared vocabularies and metadata schema. Syntactic interoperability involves protocols for the development and implementation of structured data and information – and structured content can be seen as the foundation of modular, component-based e-learning architectures. Finally, technical interoperability is an expression of all preceding layers together with technical developments that leverage such things as a range of best practice software tools.

Organisationally, effective collaboration depends on trust. A model that depicts the interrelationships involving collaboration – networking, coordination and cooperation – is discussed. Collaboration and interoperability are identified as key organising principles in the various expressions of information-based and knowledge-based economies and both can be described as value-streams in a networked society. Through collaboration common goals and mutual benefit are discerned and pursued; duplication of effort is minimised; innovation is stimulated. Achieving technical interoperability demands use of networks in ways that harness the aggregate capacity of disparate systems, applications and services. Such a goal matches requirements for both e-learning and organisational transformation.

However, infrastructure alone is insufficient as a basis for collaboration. Collaboration needs to be situated within a framework that attends to organisational knowledge management. A model of the key facets of knowing is presented as a means for understanding the diversity of processes involved in the production, flow, transfer and management of knowledge in this context. This model is then used to discuss developments in e-learning, and the technologies, standards and infrastructures that are being developed to support it.

In combining these models the paper also draws on the literature concerning the significance of communities of practice. It is argued that within such socio-organisational forms – if appropriately supported – key success factors for organisational transformation and best practice in e-learning can be identified.

Reviewing the literature

There is substantial literature on organisational learning, renewal, reorganisation, revitalisation and the development of associated capabilities. In this paper we use the term

'organisational transformation' to refer to all of this. The literature tells us that transformation is much sought, but rarely fully achieved. It contains many accounts of failed attempts to effect transformations, whether the goals are seemingly modest (involving targets that are apparently within reach, and apparently undemanding, incremental, involving gradualistic change) or ambitious (involving more rapid or more radical change). Much attention has been given, in that literature and by consultancies involved in change management, to identifying critical success factors, such as ensuring that all involved in an organisational transformation initiative are fully supportive of the initiative and appreciate the consequences of failure, both for their organisation and for themselves and their colleagues. Yet despite all this activity and analysis, it remains hard to bring about the requisite degree of organisational transformation. Mainstream approaches are clearly not up to the task.

We contend that the literature on organisational transformation is deficient on two counts. First, insufficient attention has been given to interactions on scales far below the level of the entire organisation (i.e., between individuals, rather than at the level of departments or work-groups). One consequence is that emergent behaviour comes as a surprise, both within organisations and in their environment. Second, insufficient consideration has been given to the link between individual and group learning, on the one hand, and individual and group trust and collaboration, on the other.

In making these assertions, we acknowledge that there is a growing recognition of the important role of trust and collaboration at managerial level, particularly to aid with sense-making and managing complexity. But we feel that progress will continue to be slow unless use is made of multidisciplinary approaches (e.g., modelling of mechanisms for generating and maintaining trust and collaboration within e-learning and organisational transformation). In particular, attention needs to be given to linking insights from different literatures about context: for example, how learning and trust-building in informal settings (outside work) relate to what happens within organisations, whether face-to-face or mediated by technology as in e-learning and computer conferencing.

Our contentions stem from frequent, but anecdotal, observations about the inability of large organisations to make sense of and respond to the emergence of new technologies (e.g., the Internet, at a gross level, or Web Services or e-learning, at a finer level of detail). Given that such technologies are potential components of approaches that could yield organisational transformation, it is disquieting if the decision-makers in an organisation act, Canute-like, to restrict their use. This may indicate a lack of understanding of how to use those technologies and/or a lack of interest in the role of individuals in their diffusion and effective use. Alternative views are easy to find:

The story of the creation and development of the Internet is one of an extraordinary human adventure. It highlights people's capacity to transcend institutional goals, overcome bureaucratic barriers, and subvert established values in the process of ushering in a new world. It also lends support to the view that cooperation and freedom of information may be more conducive to innovation than competition and proprietary rights. (Castells, 2001: 9)

The 'rise of the network society' and globalisation in all its forms demonstrates *networking* to be a powerful configuration principle operating across multiple domains, most notably the social and technological (Castells, 1996). But while social networks are largely self-organising (an important principle throughout the whole of nature), technological networks (such as those that support the Internet) are primarily designed. In the many settings where e-learning now proceeds there is a confluence of these domains, triggering drivers of transformation in both individual and organisational practice. Further informing these perspectives is the literature on 'communities of practice' primarily articulated by Etienne Wenger (Wenger, 1998; Wenger *et al.*, 2002).

Norris, Mason, and Lefrere have recently highlighted the potentialities for sharing 'e-knowledge' enabled by advances in knowledge management, e-learning and pervasive computing (Norris *et al.*, 2003). However, while such potentialities exist,

harnessing them for transformative outcomes is another matter. In meeting this challenge Norris *et al.* introduce a number of models that are developed further in this paper.

With this context in mind we now turn to the primary topics of collaboration and trust.

Collaboration

The practice of collaboration has historically been associated with both virtue and vice. Accordingly, modern day terrorist 'cells' are labelled as evil while governments collaborating to counter their impact (with open, democratic dissent) are portrayed as righteous.

While closely related to networking, collaboration can be understood as a process that exploits a networked environment. In the words of Arthur Himmelman:

Networking is exchanging information for mutual benefit.

Coordination is exchanging information *and altering activities* for mutual benefit *and to achieve a common purpose*.

Cooperation is exchanging information, altering activities, *and sharing resources*, for mutual benefit, and to achieve a common purpose.

Collaboration is exchanging information, altering activities, sharing resources, *and enhancing the capacity of another* [individual or] *organisation*, for mutual benefit, and to achieve a common purpose. (Himmelman, 1993: 1)

While there are many variations on this (see, for example Allwood *et al.*, 2000) Himmelman's concise schema has been adopted here in order to both link and distinguish the semantics of networking and collaboration. In further situating this semantic framework within the context of contemporary e-learning and knowledge management a close relationship to *learning and organisational development* can be discerned. That is, while organisational development can be strongly shaped by these four categories, learning in a highly networked environment can be facilitated by collaboration.

In both e-learning and knowledge management contexts collaboration is enabled by the technological infrastructure. So much so that international standardisation groups are focused on work to develop common approaches to facilitating collaborative learning (SC36). Such approaches, while not yet mature, appraise collaboration more in terms of its usefulness and utility and as utilising *communication* as well as information technology. Whether through simple implementations via email reflectors and web-based forums or via peer-to-peer networked applications or sophisticated architectures – such as the Open Knowledge Initiative or the Internet2 Commons – collaboration is identified as a key activity to enable and support. However, operationalising such frameworks can prove to be an ongoing challenge to e-learning and organisational development.

As both a dynamic process and a description of an event, collaboration can sometimes be highly complex. It is not necessarily a straightforward matter of agreeing to do something together, to work toward a common goal for reasons of efficiency or expertise aggregation, to develop economies of scale, to leverage complementary competencies, to enhance a learning experience, or to position oneself or one's organisation better for technology transfer or access to markets – even if that's where it begins! If it involves many stakeholders and the 'network density' is high (Nooteboom, 2002) it is better described as a 'complex adaptive system', just like many biological systems such as ecologies. And if learning is a desired output then complexity will likely shape the process (Inkpen, 2001: 21).

For learning theorist, Etienne Wenger, learning is defined as 'the engine of practice, and practice is the history of that learning' (Wenger, 1998: 96). Such a recursive description has important implications when identifying the intersections and synergies between e-learning and knowledge management. The recursive description is also

important in Wenger's work where his attention is very much on process issues. And given his primary analysis is focused on the dynamics of informal learning within 'communities of practice' he makes use of the concept of 'duality' to describe the interplay of explicit and implicit knowledge (1998: 68–9). Such notions are also used in foresight construction where the identification of real-world tension axes can be seen as a useful tool in developing plausible (*'know-if'*) scenarios to assist in organisational planning. At a macro level a natural tension has historically been present between 'society' and 'technology'.

Communities of practice are increasingly being seen as playing a leading role in the management of knowledge, streamlining workflow and sustaining organisational intellectual capital, both within and across organisational boundaries. They represent an organisational form that provides a balancing influence to the traditional hierarchical forms of organisational structure and are the 'heart and soul of knowledge sharing' (Denning *et al.*, 2002). And without knowledge sharing there is not much of a knowledge economy!

An important characteristic of communities of practice and the pool of competencies they draw from is they are largely self-organising. They, or their knowledge, cannot be conscripted in the same way that workgroups or organisational teams might be assigned tasks (Snowden, 2002). The defining feature of communities of practice is the sharing of tacit knowledge through informal interactions among members. Wenger further elaborates:

The development of practice takes time, but what defines a community of practice in its temporal dimension is not just a matter of a specific amount of time. Rather, it is a matter of sustaining enough mutual engagement in pursuing an enterprise together to share some significant learning. From this perspective, communities of practice can be thought of as shared histories of learning. (Wenger, 1998: 86)

Recognition of the roles played by communities of practice has important implications not only for organisational development and transformation but also for learning. Within this current discourse, *learning* can be understood as a cognitive process that *transforms* existing (individual or organisational) knowledge. Thus, no matter how well designed a Managed Learning Environment, Learning Management System, or Enterprise Workflow System might be, the practice of a stakeholder's engagement with it will always carry with it a tacit potentiality. In well-designed systems there may even be mechanisms for capturing some of this tacit information in order to inform future designs. Systems may be designed to facilitate a diversity of learning experiences and opportunities for knowledge sharing but ultimately the scope of any learning experience is unpredictable and likely to have qualities or dimensions to it that are un-encodable.

Figure 1 represents a model that attempts to describe the complex nature of the recursive value-chain of data-information-knowledge when processes of learning, communicating, and knowing are accommodated. In this model the fundamental knowledge development process of sense-making can apply equally to individuals, communities of practice or organisations. In the digital domain one person's knowledge will always be another's data or information dependent on context and application. And an organisation or individual always needs to make sense of (ascribe meaning to) data, information, or explicit knowledge in order to learn.

The pivotal importance of communities of practice in learning and knowledge also finds strong resonance in the writing of John Seely Brown: 'what do we know that we didn't know ten years ago? That learning and knowledge are the result of multiple, intertwining forces: content, context, and community' (Ruggles and Holtshouse, 1999: ix).

More recently, Wenger *et al.* have extended this argument:

Firms that understand how to translate the power of communities into successful knowledge organizations will be the architects of tomorrow – not only because they will be more successful in the marketplace, but also because they will serve as a learning laboratory for exploring how to design the world as a learning system. (Wenger *et al.*, 2002: 232)

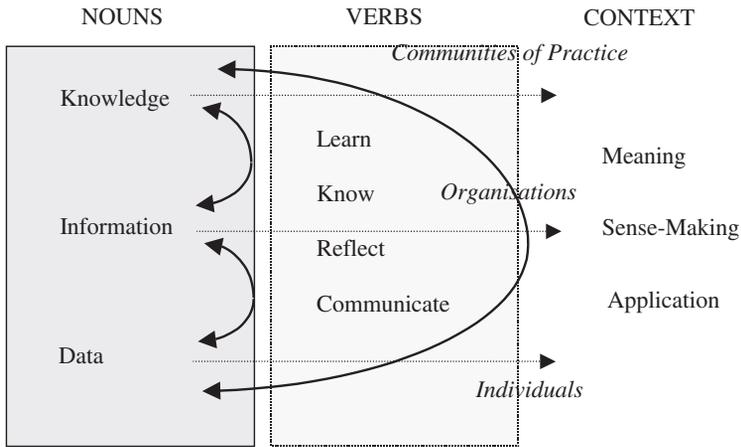


Figure 1

Such 'know-how' is also of strategic importance in the pursuit of systems interoperability where effective communities of practice are essential to the development and deployment of technical standards (Table 1). Without these foundations it would be difficult to imagine how the various infrastructures that support the Internet could be sustained. And economically, globalisation depends on the outputs of such community-based activity.

But what are the dynamics that make a community of practice effective and productive? While collaboration is implicated as strategically important in both e-learning and organisational development, it is also key to achieving consensus within the various standardisation forums (see Figure 2). This is not to say collaboration alone yields results. The argument here is that it is when it is operationalised within a context of trust that it can be seen to be most effective. Taking the argument further, Nooteboom suggests: 'if trust is not in place prior to collaboration, it has to be built up in the relation' (Nooteboom, 2002: 12).

Trust

[T]rust is a property of both organizational members and abstract structures or systems of organizations. (Nandhakumar and Baskerville, 2001: 192)

Why build trust? Onora O'Neill has recently remarked that a 'loss of trust' has become 'a cliché of our times'. She also paraphrases Confucius as saying that 'three things are needed for government: weapons, food and trust. If a ruler can't hold on to all three, he should give up the weapons first and the food next. Trust should be guarded to the end.' And more poignantly for our current circumstance, she adds, 'terror is indeed the ultimate denial and destroyer of trust' (O'Neill, 2002).

O'Neill's BBC Reith lectures on trust might draw on Confucius but they are keenly pointed with regard to issues of contemporary accountability to the public by the media, office holders and professionals of all kinds. In a word, she argues, without trust there is a culture of suspicion.

From an organisational perspective probably the most compelling argument regarding the importance of trust has to do with the high 'transactional costs' and 'relational risks' of achieving managerial targets within low-trust workplaces (Fukuyama, 1995; Lewicki *et al.*, 1998). Nooteboom echoes this argument while also reminding us of the transactional costs inherent in learning and innovation. Moreover, he argues, transactional costs must be balanced against the 'relational risk' (costs of relations in relationship development) whether this is within an enterprise or

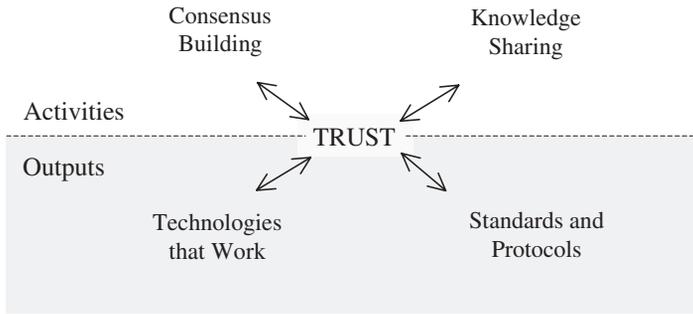


Figure 2

operationalised through mergers, acquisitions or strategic alliances. This argument is based on a definition of trust that embraces principles of reciprocity and obligation (Nooteboom, 2002: 2–3).

O'Neill argues that the overhead within low-trust organisational settings is further exacerbated by what she calls the 'new culture of accountability'. Accountability theoretically makes managerial targets transparent to public interest but in practice serves as a means of delivering *measurable performance indicators* for central regulators, funders, department bureaucrats and legal standards. The end result is a kind of deception and further erosion of public trust. 'Transparency certainly destroys secrecy: but it may not limit the deception and deliberate misinformation that undermine relations of trust' (O'Neill, 2002).

Looking at this issue from a value-creation perspective, Adler argues, 'as knowledge becomes increasingly important in our economy, one should expect high-trust institutional forms to proliferate' (Adler, 2002). Thus, as lifelong learning is enabled through e-learning within the workplace and organisation we *should* expect that 'promising practices' will be associated with high-trust. Such a view also finds resonance for Hacker *et al.*, where trust is described as an imperative for performance improvement and is not an optional choice. It is present in a wide variety of relationships, is critical for organisational health and is key driver of organisational transformation (Hacker *et al.*, 2001).

So *what* is it about trust – apart from its status as a moral and social virtue – that is so important to the flow of knowledge, whether in an organisational or e-learning context? This question has many answers but *consistency* can be seen as a key word. How can either a person or a technology be credible if their associated behaviour is inconsistent, and therefore unpredictable? How can an organisational procedure be implemented if it is not open or applied consistently? While the answers to these questions may seem intuitively obvious the challenge of establishing high-trust environments is not so straightforward.

So how do you build trust in both cultures and systems? Nooteboom's novel proposition is that 'trust and control are both complements and substitutes' (Nooteboom, 2002: 16). Organisationally, then, trust is just as important hierarchically as it is informally. Hierarchical organisation is consistent and predictable. Personal ('know-who') relationships and informal interactions that form such a strong foundation within communities of practice are key to effective knowledge exchange and the viability of networks. Most importantly of all, trust cannot be decreed, or designed, only *designed for*. Culturally, it depends on social capital. Technically, privacy and security must be achieved in processes that demand authorisation and authentication.

At a technical systems level, trust is encoded into subsystems supporting privacy and security – as it is with Shibboleth, an emerging open source standard being developed by the Internet 2/MACE (Middleware Architecture Committee for Education) initiative. Shibboleth provides a means for multiple institutions to share web resources that are subject to access restrictions (requiring user identification and authentication).

This technology is intended to solve the so-called 'single sign-on' problem where a user may need to interact with a range of different systems in order to accomplish a set of tasks – such as course management systems and library databases in distributed networks. Instead of the user having to use multiple logins Shibboleth uses 'clubs' to specify agreed policies among multiple parties.

Client relationship systems are also an expression of the strategic value of nurturing relationship and *loyalty* in the development of organisational capital.

When can trust be seen to be operationalised? A good example from e-business and e-commerce is the mainstream uptake of online banking – something that only took place once both privacy and security of transactions could be guaranteed. Loyalty programmes, such as frequent flyer awards, are clearly a response to the recognition of the high value that loyalty creates in developing or consolidating market share. Loyalty is not trust but it is commonly associated with it, as are recognition and reward. Trust certainly breeds loyalty; and in a reciprocal way, recognition and reward are tangible expressions of trust as value.

Value

Another way of describing social and organisation capital is in terms of *value*. In knowledge-based economies value chains arise from a context of abundance in contrast to industrial economies where value is typically derived from scarcity of resources. In the transition toward knowledge-based economies there manifests a shift from *value extraction* to *value creation*. Thus, a strong relationship between knowledge application and the creation of value also means there is a strong relationship between learning and value. The recursive value chains being enabled in the digital domain are fuelled by the production of knowledge not only from data and information resources but also from other knowledge.

Of course, value has many facets both tangible and intangible. It is a common driver of markets, networks, social attitudes, knowledge acquisition and technological development. Within knowledge-based economies knowledge becomes the primary source of value creation and innovation. What distinguishes value within the network society is that networks themselves are sustained not by conventional market forces (of barter and trade, demand and supply) but by *freely volunteered information* and introductions. This has important ramifications for the design of software systems that are intended to support e-learning and knowledge management. Moreover, 'in a knowledge-driven economy, technology is the most tangible manifestation of knowledge' (Sheehy *et al.*, 1996: 197).

Interoperability

Following Miller (2000), Table 1 identifies key facets and forms of interoperability. In representing interoperability as comprised of these dimensions, or layers, the intention is also to imply a strong interrelationship between them. It is further argued here that establishing political interoperability explicitly is a key foundation to establishing any subsequent layers. Trust is also dependent on it. In the various technical standardisation forums it is no coincidence that the first standards developed to support e-learning have been focused on metadata where both syntactic and semantic dimensions come together. The politics in the process of standardising the IEEE Learning Object Metadata took five years to settle! And while many of the technical specifications produced within the IMS Global Learning Consortium proclaim a 'neutral position with regard to pedagogy', outputs without discourse contributed by pedagogy specialists has been of dubious value.

A useful example of the interrelationship of cultural and technical interoperability is the specification for *Digital Repositories Interoperability* released early in 2003 by the IMS Global Learning Consortium. The consensus achieved in developing this specification spans requirements from two very different communities of practice: those concerned with the development of digital libraries and those more concerned with the

Table 1: Facets and forms of interoperability

Political	Agreeing to common goals and ground rules for achieving mutual benefit
Jurisdictional	Mapping legal, regional interests
Semantic	Achieving common understanding, common meanings
Cultural	Communities of practice, organisational units sharing knowledge and workflow
Syntactic	Sharing grammars, templates, style sheets
Technical	Systems exchanging data and services

development of infrastructure to support e-learning. Achieving this result was more than a technical solution – but it is a technical specification grounded in consensus established between diverse stakeholders to a common problem. Commonly agreed terminology (semantics) was key, as was the mutual recognition that neither group operated as an island. Ultimately, the prime driver was a *service need* articulated at the institutional level for an integrated approach to information discovery and learning management. Moreover, this service need requires organisational transformation in order to be realised.

Ways of knowing – a simple model

In developing a framework in which the above discussion can be understood in a knowledge management context the following model of the key facets of knowing is presented as a tool that may bring further coherence to the foregoing (Norris *et al.*, 2003).

Figure 3 represents a simple model that can be used to classify different kinds of knowledge. ‘*Know-who*’, for example, has a very different quality to ‘*know-what*’ or ‘*know-how*’. Unless one ‘*knows-why*’ to act, the effectiveness of accomplishing that act is likely to be questionable. Likewise, without a sense of ‘*know-where*’ (from and to) or ‘*know-when*’ there is not much strategy in any planning. And the practice of developing contingency plans through foresight planning rests largely on a capacity to ‘*know-if*’. Further explanation is presented in Table 2.

Individuals and groups

At the start of this paper, we contended that it was essential to consider individuals in any discussion of trust and organisational transformation. Some promising insights

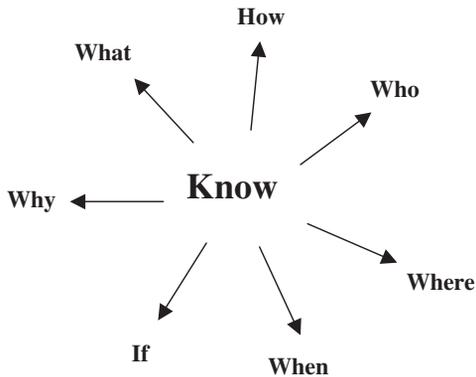


Figure 3

Table 2

Knowledge channels	Description
<i>Know What</i>	The object of knowledge – e.g., knowledge management, the Internet, information systems, marine science, economics, etc.
<i>Know Who</i>	Keywords = networks, connections, authorities, institutions, individuals, collaboration, associations, clubs, etc.
<i>Know How</i>	Keywords = networking, consulting, collaborating, sharing, researching, reflecting, developing, testing, maintaining, doing, innovating, managing, etc.
<i>Know Why</i>	Keywords = context, business planning, strategy, reasons, explanations.
<i>Know Where</i>	Keywords = where-to, where-from, strategic positioning, planning, reflecting, navigating.
<i>Know When</i>	Keywords = just-in-time, timing, pacing, planning, scheduling, context, the past, the future.
<i>Know If</i>	Keywords = just-in-case, scenarios, scenario development, foresight, futures, contingency.

could come from an analysis of the literature on e-learning, specifically in relation to notions that can be traced back to Vygotsky such as apprenticeship learning, scaffolding, and the zone of proximal development (ZPD). He describes the ZPD as 'the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration of more capable peers' (Vygotsky, 1978: 86).

Consider the case of apprenticeship learning. Here, as envisaged by Vygotsky, the learner has an expert mentor who is available to assist on a task that is realistic in terms of complexity and context. Initially the learner may simply observe the expert perform the task. Later, the learner may take on increasingly difficult components of the task (individually or with the mentor) until the entire task can be done without assistance. The assistance is called 'scaffolding'.

The Zone of Proximal Development (ZPD) requires collaboration or assistance for a learner or group of learners from other more able partners. This need for collaborative assistance arises from the belief that the activities which form a part of the child's effective education must be just beyond the range of her independent ability. The more able partners, whether peers, teachers, or computers must provide appropriately challenging activities and the right quantity and quality of assistance. . . . The key factor at the heart of successful scaffolding is not only the ability of the more able learner/teacher to offer appropriate help, but also their ability to withdraw or fade the support they offer when the learner is ready. The implication of this for those playing the role of the more able partner is that they need to have a good model of how well the learner is doing in order to both provide and withdraw assistance appropriately. This is true both for human and software learning partners. (Luckin and Hammerton, 2002: 759–760)

Although trust is not mentioned explicitly in such work, in our view it is implicit, for the learner is being asked to believe that those offering to provide assistance are in fact able to deliver on their promise, and is additionally being invited to entrust their learning to the 'more able partner'. This approach is usually considered only in the context of relatively formal learner-mentor relationships, in which the status of each is clear. Arguably it is also relevant to other contexts in which learning occurs, particularly those in which advice is being sought (e.g., in online peer-to-peer discussion groups). One notable feature of online groups, who may never have met face-to-face, is the emergence of mechanisms for ascertaining the trustworthiness of

participants, analogous to those in eBay. As an example, this means being able to find out the status of each participant – is someone really the expert or well-intentioned peer that they claim to be? The proof of the effectiveness of such mechanisms is the rapid diffusion, in the open source community, of *Know-Who* and *Know-How* knowledge. It may be that the practices that emerge in peer-to-peer communities will provide a viable alternative to what is on offer within organisations, both in terms of learning opportunities and in terms of visions of where a given organisation is going and how it can get there.

Conclusion

In this paper we have discussed organisational transformation and e-learning within shared contexts, such as the 'rise of the network society'. A range of models and schemas has been presented. Trust is identified as a primary enabler of a complex mix of processes and outputs, organisationally and technically. Processes involving consensus building, consultation, collaboration, organisational transformation, learning and knowledge sharing all depend on trust for effectiveness. Technical systems, such as Internet-based applications depend on interoperable sub-systems in order for data interchange to proceed efficiently. Moreover, collaboration and interoperability are identified as key organising principles in information-based and knowledge-based economies.

In a complementary way the recursive value chains emerging from complex interplays of data, information and knowledge in knowledge-based economies must be a primary concern in the ongoing development of infrastructures designed to sustain e-learning and knowledge management. Systems interoperability must figure prominently in these infrastructures – however, interoperability is most effectively achieved when its political and semantic requirements are given due attention.

In identifying the pivotal roles of trust and collaboration we have drawn on a range of current literature, leaving the precise work of terminology development to others.

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