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Trust among **SMEs** in Digital Business Ecosystems: Theoretical and Methodological **Foundations** for Establishing **Trust** through a Knowledge Base of **Regulatory Issues**

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Abstract

The aim of this chapter is to summarise research on the factors contributing to the establishment of trust amongst small- and medium-sized enterprises (SMEs) in Digital Business Ecosystems. This chapter describes the development of a Knowledge Base of Regulatory Issues that are important in the context of the development of Free Software/Open Source (FS/OS) for commercial use within the European Union countries. The Knowledge Base of Regulatory Issues arising from SMEs' participation in Digital Business Ecosystems is discussed in the wider context of the Digital Business Ecosystems initiative to indicate the results of initial research, to highlight aspects of the change of paradigm associated with ecosystems which involve trust, and to emphasise the need to confront conceptual research on technological change with empirical examination of the real-life contexts in which these ecosystems are developing.

In order to achieve this aim, in part 1 the core theoretical issues are identified and examined in terms of the engagement and participation of SMEs in Business to Business (B2B) collaborations within ecosystems. Issues of trust were identified in the early phase of the research as having the potential to constrain SME participation in e-business initiatives. Part 1 presents a conceptual analysis of the layers of trust required for increasing SME participation. Part 2 presents an illustration of the rationale leading to the methodology used to establish a taxonomy framework for addressing the regulatory issues. In part 3 a three-dimensional taxonomy framework is presented, together with a discussion of the Knowledge Base of Regulatory Issues that emerged as being of critical importance for developing trust among SMEs involved in ecosystems, that is, privacy, e-signatures and security, jurisdiction and consumer protection.

The conceptual framework was examined empirically by interviewing SMEs with respect to their views and concerns about the Digital Business Ecosystem vision and their experiences during the DBE project. The results of the interviews were used as a means of testing the validity of the taxonomy framework and the Knowledge Base that was developed. The validity of the Knowledge Base was verified and new insights into the importance of the Knowledge Base for SME engagement with Digital Business Ecosystems in the European Union were obtained. Part 4 summarizes the main empirical findings and overall conclusions are presented in part 5.

Trust: Why Does It Matter in Digital Business Ecosystems?

The adoption of new forms of e-commerce and e-business in the European small and medium enterprise (SME) sector has been identified by policy makers as a key priority for fostering innovation and competitiveness of the European SMEs in global markets (European Commission, 2005). The aim of Digital Business Ecosystems is to overcome existing barriers and to promote innovative forms of software creation, knowledge sharing and community building, thereby enabling long-term growth and competitiveness of the European SME sector. As envisaged by Nachira (2002), the Digital Business Ecosystem is intended to foster new and flexible modes of co-operation and networking through the dynamic aggregation and self-organising evolution of organisations by means of an open-source infrastructure. The control of the infrastructure and the dialectic between Open Source infrastructure and the regulatory issues arising in the ecosystem in the light of SMEs' perceptions, attitudes and understandings and as a result of their experience of specific services offered in the ecosystem are key issues to be addressed.

The Digital Business Ecosystem vision contrasts radically with business ecosystem concepts based on proprietary software, where control over infrastructure can be tightly managed. For example, the Digital Business Ecosystem vision does not include software development hierarchical frameworks as in the case of those developed by firms such as SAP, Novell or Microsoft, in which a main controller or owner of the software code rights is clearly responsible for development. Within a proprietary model, these elements are produced, transferred, and implemented in a managed process, usually with important checks and balances in place to ensure quality of service and compliance with policy and regulatory environments within which the systems will operate.

The Digital Business Ecosystem vision does, nevertheless, present some unique challenges that are difficult to manage, insofar as the vision embraces an open source model. An open source model suggests a decentralized undertaking, open to a diverse range of participants across many locations, making quality control more difficult to achieve. Issues such as favouritism, risk of exclusion or flaming, peer review mechanisms, problems in measuring team performance, effective correction of software errors and management of human resources have all been highlighted in the literature as potentially creating difficulties in open source environments (Raymond 1999; Bezroukov 1999). The aim of achieving self-organization in Digital Business Ecosystems suggests the need for a higher order capability to reproduce components with minimum intervention of human agents, thereby creating additional challenges for quality control.

The aim of the research reported in this chapter was to take an initial step toward the understanding of the regulatory requirements of Digital Business Ecosystems through the creation of a knowledge base of relevant generic regulatory issues. In attempting to identify and assess the key regulatory domains that have implications for the Digital Business Ecosystem vision, the thematic notion of trust was chosen as the point of departure. Trust relationships are central to e-business activities because any kind of economic transaction requires a level of confidence between the parties involved in a given transaction.

The regulatory domain is central to building trust relationships. This is evident in the characterization of 'trust' as an indicator of the confidence required by two or more parties if they are to enter into economic exchange. A trust relationship may be described in the following manner:

The willingness of a party to be vulnerable to the actions of another party based on the expectations that the other party will perform a particular action important to the trustee, irrespective of the ability to monitor or control that other party (Mayer, Davis and Schoorman 1995).

Trust is understood to enable action by establishing confidence among those parties with an interest in the expected outcomes of current or future transactions (Clarke 2002; Dutton and Sheppard 2004). One important prerequisite of confidence is a degree of 'certainty' which is a core issue for SMEs operating in a complex regulatory environment. In the e-business context envisaged by the Digital Business Ecosystem, a degree of confidence or 'certainty' is relevant to trust in each of the three facets that Nachira (2002: 14) identifies as necessary attributes of a digital ecosystem:

- ▶ Trust in services and technological solutions
- ▶ Trust in business activities
- ▶ Trust in knowledge

First, trust in services and in technological solutions may be regarded as a measure of confidence expressed in terms of security and reliability. This facet of trust comes close to the notion of ‘technological trust’ (Rosenbaum 2003) or the ‘belief that technologies will perform reliably and will not be used for untoward purposes’. For trust relationships to develop within the Digital Business Ecosystem, developers and users need to have confidence that both the basic layer of the system and supported applications provide the necessary degree of security and that risks to the reliability of services provided using the DBE platform are minimised.

Second, trust in business activities may be regarded as a measure of confidence expressed as the mutual recognition of accepted practices and procedures for specific sectors and local contexts. This aspect of trust is related to the notion of ‘institutional trust’ or to a collective expectation that the procedures needed for carrying out transactions successfully will be facilitated and followed (Pavlou 2002). For companies to successfully adopt and continue using DBE services there trust relationships need to be established in relation to the expected patterns of behaviour and organisational practices adhered to within the Digital Business Ecosystem. Without a shared understanding and the existence of supporting structures to facilitate the creation of trust relationships, cultural and organisational differences are likely to inhibit the formation of business relationships within the ecosystem environment.

Third, trust in knowledge may be conceived as a measure of confidence expressed in terms of symmetric access to information. Because knowledge is a critical asset in e-business activities (Fahey et al, 2001), differences in access to knowledge and information of relevance to e-business activities can lead to unequal advantage for parties operating within the business ecosystem environment. Hence, facilitation of symmetric knowledge-sharing and equal access to information are important for establishing trust relationships between companies participating in the ecosystem.

The next part (2) presents a review of the methodology applied in developing a Knowledge Base of Regulatory Issues. This is followed by a discussion of the taxonomy framework for the Knowledge Base which was created to link the concept of trust to specific regulatory issues as viewed from different operational perspectives (s.3). Finally, part 4 presents an overview of the empirical findings on the extent to which SME interviews confirm the conceptual aspects of the research.

Methodology for Understanding Trust in Digital Business Ecosystems: A Knowledge Base of Regulatory Issues

The Rationale

The rationale adopted in building a Knowledge Base of Regulatory Issues in Digital Business Ecosystems aimed to draw on key regulatory issues linked to engagement and participation of SMEs in B2B collaboration within this ecosystem. The issues identified as being important are the domains of the regulatory environment that should be given priority when developing e-business initiatives. They are referred to as “building blocks of the regulatory framework” and are as follows:

PRIVACY AND CONSUMER PROTECTION

The regulatory building block of privacy and consumer protection refers to regulatory issues with respect to the processing, control and distribution of personal and consumer data using electronic formats, taking into account the individual rights and freedoms of the e-business users.

E-SIGNATURES AND SECURITY

This regulatory building block refers to the issues associated with the sharing of information using digital media. The concern is to ensure autonomy and cross-border interoperability through mechanisms for authentication, non-repudiation, and ensuring the integrity of data.

JURISDICTION AND CONSUMER PROTECTION

This regulatory building block refers to the issues resulting from the cross-border nature of many e-business services and the associated challenges associated with contractual relationships between goods or service providers and customers, such as jurisdictional issues and the means for resolving cross-border disputes.

Specific Issues Arising from a Trust Perspective

The foregoing regulatory domains were considered to be important for establishing trust relationships in e-business (Berkey, 2002) and were examined in the light of their implications specifically for Digital Business Ecosystems. These specific considerations are explored in greater detail below.

PRIVACY AND CONSUMER PROTECTION AS TRUST DETERMINANT

Privacy issues are closely linked to consumer rights and existing legislation comprehensively covers business to consumer (B2C) transactions, whereas in the case of B2B contracts, the existing legislation is less stringent. In the context of Digital Business Ecosystems, issues concerning the management of databases shared between members of the ecosystem are important, as these databases are likely to contain information to which privacy measures are applicable as well as information that may facilitate the process of developing inferences about commercial activity derived from commercially sensitive data patterns. Other concerns include the relevance of information and access rights to the database, accuracy in the use of data, measures to enable evaluation of data sensitivity, and, finally, the need for a policy with respect to the rights of companies to prevent or allow the transfer of sensitive data.

The data privacy and consumer protection issues raise questions about the degree of trust established among businesses. The framework of the Digital Business Ecosystem plays the role of mediator and gate-keeper between interested parties.

E-SIGNATURES AND AUTHENTICATION AS A TRUST DETERMINANT

The regulatory domain of e-signatures and authentication is closely related to security issues in the e-business context. Regulatory considerations are especially important in the areas of authentication, digital signatures, electronic invoicing and payments. Authentication mechanisms support access rights to different information resources; they provide a means for identifying malpractice; and they provide an audit trail of transactions that is necessary for resolving disputes.

In the Digital Business Ecosystem vision, relationships between participants lead to payments and various types of transactions and issues related to e-signatures and authentication are important for establishing and sustaining trust between partners. In addition, considerations with respect to the interoperability of electronic invoicing systems and the traceability of processes within these systems are important factors in ensuring successful collaboration between partners.

JURISDICTION AND CONSUMER PROTECTION AS TRUST DETERMINANT

The regulatory issues in this area arise because of the cross-border nature of many e-business transactions. In the case of the Digital Business Ecosystem the main issues in this area are concerned with cross-border online contracting. Jurisdictional issues create severe limits for digital platforms that aim to bridge geographical distance and industry sectors and to facilitate e-business at the international level.

A Regulatory Taxonomy Framework

The review of the literature concerned with regulatory issues relevant to Digital Business Ecosystems provided the basis for the development of a taxonomy framework and for an examination of the most important regulatory issues from the perspectives of the SME users of the ecosystem environment. Taxonomy provided a framework for capturing the key elements of the overall regulatory environment that is likely to be applicable to the generic layer of a Digital Business Ecosystem.

Taxonomy Framework for the Knowledge Base of Regulatory Issues in Digital Business Ecosystems

Taxonomy framework: a description

The taxonomy framework developed for identifying and classifying regulatory issues relevant to the Digital Business Ecosystem vision draws its working definition from an approach adopted by the ALIVE project on legal issues for virtual organisations (IST 2000-25459):

[A] taxonomy should be regarded as a quest, setting out the boundaries of the main research subject and providing a preliminary framework of guidelines for an in-depth analysis of the [regulatory] issues related to the [project]. The taxonomy... initiates

further research by... pointing out the most problematic legal questions, clarifying and illustrating the significance of certain [regulatory] issues. The taxonomy does not present [regulatory or legal] solutions to these issues (Schoubroeck et al 2001a).

The taxonomy framework served as a tool for directing research on e-business ecosystem regulations. The result is baseline knowledge and a common point of reference for future research on important regulatory issues. The taxonomy framework contributes by guiding 'further discussions and the distillation of findings and existing knowledge' (Schoubroeck et al 2001b). The three-dimensional taxonomy framework is graphically depicted in Figure 1.

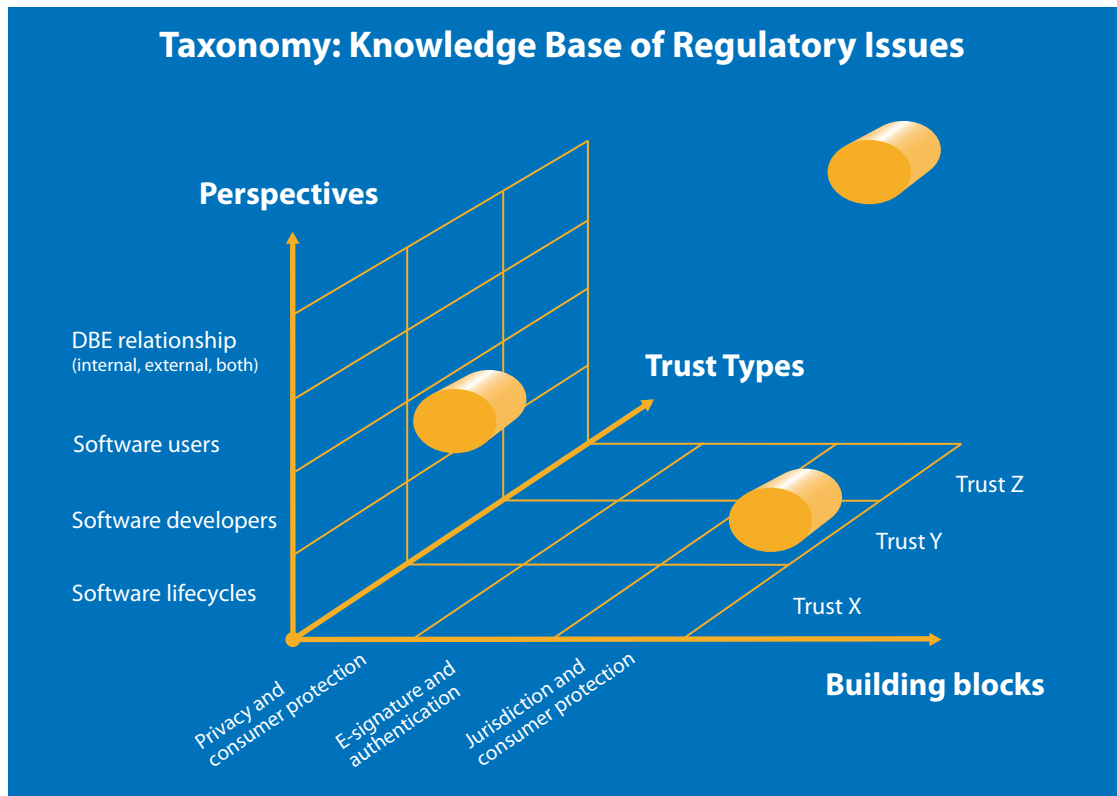


Fig. 1

A three-dimensional representation of the taxonomy

Taxonomy Framework: trust at the core

As Figure 1 shows, three types of trust were identified as initial starting points for the classification of regulatory issues, drawing on the model of trust suggested by Meents, Tan and Verhagen (2003):

TRUST TYPE X

This type of trust refers to trust with respect to the companies joining the Digital Business Ecosystem. From a regulatory perspective, the expectation is that the technical architecture and the basic services will incorporate existing e-business regulations and provide the facilities for carrying out transactions in a way that will ensure compliance with existing laws and norms.

TRUST TYPE Y

This type of trust refers to the expectations on the part of the DBE participants who are the developers of the ecosystem with respect to the companies joining the ecosystem. In order to establish trusting relationships, companies are expected to comply with existing laws and norms and to avoid creating unnecessary risks for the DBE participants.

TRUST TYPE Z

Trust type Z refers to the trust relationships between DBE participants themselves. This type of trust is indicated by confidence in the ability of existing norms and laws to govern the interactions resulting from the self-organisation and evolution of the DBE environment.

Building Blocks of Regulatory Issues and Operational Perspectives

The building blocks of regulatory trust summarised in part 2, representing the domains of the regulatory environment that are of priority concern when developing e-business initiatives are discussed in the light of the taxonomy framework together with issues that arise from an operational perspective.

BUILDING BLOCKS OF REGULATORY ISSUES

The generic building blocks of privacy and consumer protection, e-signatures and security, as well as jurisdiction and consumer protection, do not yield a complete understanding of the complexity of the regulatory environment associated with the Digital Business Ecosystem vision. The specific regulatory issues identified in each of the building blocks need to be examined and refined in the light of particular sector-specific and local settings and with respect to the aim of facilitating e-business among SMEs across Europe and in an ecosystem context.

OPERATIONAL PERSPECTIVES

The taxonomy framework outlined above can be further developed in the light of the operational perspectives of three sets of relationships or actors as indicated in Figure 1 – y axis.

DBE relationships

Regulatory issues can be classified on the basis of the degree of their relevance in the ecosystem environment. Two main types of relationships can be identified in this context:

Regulatory issues classified as internal refer to issues that either

- ▶ arise in the ecosystem environment and are specific to the ecosystem setting, or
- ▶ are directly linked to ecosystem participants and their activities in the ecosystem environment.

External issues are those that are not within the remit of the ecosystem members or governors to change – i.e. the external regulations applicable to e-business activities such as tax rules, consumer and data protection regulations, contract and competition law provisions, and so on.

In some cases, regulatory issues may be classified as both external and internal. For instance, based on an example from the ALIVE project (Schoubroeck et al 2001a), the use of digital signatures by the ecosystem members will be affected by certification mechanisms established within the project and by external certification requirements.

DBE actors

The classification of regulatory issues based on the actors helps to identify issues relevant to particular ecosystem parties and to analyse these issues from the perspectives of different actors. These are as follows¹:

- ▶ SME Service Providers: provide digital (software component) services that use the Digital Business Ecosystem as an infrastructure platform.
- ▶ SME Users: use services provided by the Digital Business Ecosystem for their own business needs in the form of “self-consumption” or in order to undertake transactions with other users of the same or compatible services.
- ▶ Business Analysts: help users to connect and establish their BML (Business Markup Language) profiles, while helping service providers to integrate into service chains and make services compatible.

Software Lifecycles

A software lifecycle perspective highlights regulatory concerns associated with software development, deployment, upgrading, expansion and discontinuation. Although software lifecycles are not specific to Digital Business Ecosystems, their importance for business collaboration is acknowledged in the literature and their role needs to be considered in the context of B2B collaborations within ecosystems as well.

Empirical Verification

The taxonomy framework reviewed in part 3 was developed further by populating it with real life data. Empirical research was conducted with SMEs linked to the DBE project in the EU (Finland, the UK and Spain). SMEs were invited to reflect on the taxonomy framework during interviews. Interviews were conducted with seven SMEs

1) An alternative classification can be based on a technical perspective (see Ferronato 2004) which distinguishes between SME SW Developer, SME Run-time User (Service Provider or Service Consumer) and Business Analyst.

operating in important areas and that had been provided access to the Digital Business Ecosystem platform. These areas included commerce, content management and accountancy.

The results of these interviews confirmed that trust is a crucial issue. In particular interviewees confirmed that trust in the systems architecture and the business solutions that provide DBE services, trust in the institutional arrangements supporting knowledge accumulation, and trust in the context of conducting business between companies, are the most important issues. From the perspective of the SME drivers of the DBE, in any given business sector their participation is influenced by their specific concerns about issues concerning identification, security, privacy and consumer protection, as well as by contractual issues specific to a given business domain.

SMEs can contribute significantly to the identification of issues of critical importance for the establishment of trust in the Digital Business Ecosystem and their views are also helpful in identifying measures that are likely to augment the future business prospects and commercial viability of the DBE framework.

The interviews with SMEs in Finland, the UK and Spain suggested additional critical issues that are likely to affect the Digital Business Ecosystem's future development. An important unresolved issue that emerged is whether the DBE will be legally constituted under European, national or local law. An associated issue is the extent to which the members of a business domain will have a role in the adoption of the DBE legal form in the context of their everyday B2B practices. The interviewees suggested that without a clear definition of the legal aspects, the engagement of SMEs with digital business ecosystems may be affected.

A possible solution to these issues was proposed by the interviewees. It was suggested that an authority could be created that would resolve some of the regulatory issues confronting SMEs. The SME representatives who were interviewed suggested that an authoritative body might reflect on appropriate regulatory principles, drawing on the expertise of an executive committee bringing together representatives from a wide spectrum of DBE partners. The interviewees appeared to favour a means through which the advice of legal experts could be sought officially so that the business interests of the SMEs and the technical potential of the DBE platform could be respected, thereby making the goal of DBE sustainability and trust more feasible to achieve in the future. This may appear to contradict the DBE vision of self-organisation, but it also suggests the need to ensure that the concerns of SME users of the DBE with respect to regulatory issues are addressed.

Table 1 presents a list of key regulatory issues that arise in the context of an examination of trust relationships for SME users of digital business ecosystems.

Table 1

Taxonomy Description: The SME View		
Perspective	Attribute	Method (example)
DBE Relationship	Internal	Concerns about DBE legal entity Integration of E-signatures Governance issues
	External	
DBE Actors	SME Service Provider	Identification
	SME Users	Security
	Business Analysts	Contractual issues Commercial incentives
Software Lifecycles	Proprietary Model	IP rights
	Open Source Model	Middleware ownership

This framework could be extended to consider regulatory issues from other vantage points in future research.

Conclusions

Further research is needed to extend the taxonomy framework presented here to other business domains and sectors. The Regulatory Issues Knowledge Base tool was developed through a multidisciplinary collaboration between social and computing scientists and it needs to be extended and validated in a working digital business ecosystems environment. The initial research reported here suggests that it will be very important to investigate the crucial regulatory issues in the context of the further development of governance mechanisms for Digital Business Ecosystems that will need to be developed to ensure their sustainability. The accumulation of a Regulatory Issues Knowledge Base that can be adapted to the specific needs of SME users of the ecosystems will need to be incorporated within future research in this area.

It is likely that issues of integration and compatibility between local, regional and national domains in which Digital Business Ecosystems become operational will need to be addressed in addition to those of trust. These issues will provide a basis for further elaboration of the Regulatory Issues Knowledge Base as a basis for developing and defining SME sector policies.

References

- Berkey, J. (2002) 'Outline of International e-commerce regulatory issues'. Intel/Unitar Campus of New Information and Communication Technologies and Diplomacy, New York.
- Bezroukov (1999) 'Open Source Software Development as a Special Type of Academic Research (Critique of Vulgar Raymondism)'. *First Monday* 4(10). Available at http://firstmonday.org/issues/issue4_10/bezroukov/ (last accessed 05.01.07).
- Clarke, R. (2002a) 'Trust in the context of e-Business'. *Internet Law Bulletin* 4(5): 56-59.
- Dutton, W. H. and Shepherd, A. (2005) 'Confidence and Risk on the Internet, in R. Mansell and B. S. Collins (eds) *Trust and Crime in Information Societies*, Cheltenham: Edward Elgar, pp. 207-244.
- European Commission (2005) 'The activities of the European Union for small and medium-sized enterprises (SMEs)–SME Envoy Report'. Brussels. Available at http://europa.eu.int/comm/enterprise/entrepreneurship/sme_envoy/index.htm (last accessed 05.01.07).
- Fahey, L., Srivastava, R., Sharon, J. S. and Smith, D. E. (2001) 'Linking e-business and operating processes: The role of knowledge management'. *IBM Systems Journal*. 40(4): 889-907.
- Mayer, R.C., Davis, J.H., Schoorman, F.D. (1995). 'An integrative model of organizational trust'. *Academy of Management Review*, 20: 709-734.
- Meents, S., Tan, Y-H and Verhagen, T. (2003) 'Distinguishing different types of trust online B2B marketplaces'. *Proceedings of the Tenth Research Symposium on Emerging Electronic Markets*, pp. 53 – 65.
- Nachira, F. (2002) 'Towards a Network of Digital Business Ecosystems Fostering the Local Development'. Discussion Paper. Available at <http://www.digital-ecosystems.org/> (last accessed 05.01.07).
- Pavlou, P. A. (2002) 'Institution-Based Trust in Interorganizational Exchange Relationships: The Role of Online B2B Marketplaces on Trust Formation'. *Journal of Strategic Information Systems* 11(3-4): 215-243.
- Raymond, E. S. (2001) *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*. Revised Edition. Sebastopol, CA: O'Reilly and Associates, Inc.
- Rosenbaum, H. and Davenport, E. and Swan, M. (2003) 'Situational Trust in Digital Markets: a socio-technical exploration'. *Ninth Americas Conference on Information Systems–Proceedings*. Available at http://www.maggieswan.com/papers/situational_trust.pdf (last accessed 05.01.07).
- Schoubroeck Van, C., Cousy, H., Droshout, D. and Windey, B. (2001a) 'Virtual Enterprise Legal Issue Taxonomy'. Leuven, K.U Leuven University—ALIVE Project. Available at http://www.vive-ig.net/projects/alive/Documents/Virtual_Enterprise_Legal_Issue_Taxonomy.zip (last accessed 05.01.07).
- Schoubroeck Van, C., Cousy, H., Windey, B. and Droshout, D. (2001b) 'A Legal Taxonomy of Virtual Enterprises'. Leuven, K.U. Leuven University—ALIVE Project. Available at <http://www.vive-ig.net/projects/alive/proc/Leuven-paperICE01.zip> (last accessed 05.01.07).