

E-business Outsourcing: a New Approach combining Information Rights Technologies and Agent-Based Theory on Norms

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1. Introduction

Along with improvements in communication technology and globalization of information software, the outsourcing of e-business initiatives has had a growing trend in financial services as well as in consumer and industrial markets.

Recently, many organisations are varying their model of outsourcing, bringing back in-house certain IT functions, in consideration of some threats regarding exposure to information privacy issues and possible reduction in business agility. Because of loss of IT control on confidential data, organisations aim at restoring their internal IT infrastructures, with autonomous planning and project management.

This suggests that firms recognise that only selective IT function outsourcing is useful, but the selection criteria they adopt to outsource are focused mainly on the human dimensions of cultural fit and quality of the outsourcers, underestimating the role of technologies.

The control of information is essentially based on the following instruments: contract, technology and copyright law. The digital revolution has reshaped the hierarchy by putting aside the law and promoting contract and technology. Copyright and Privacy law have just become an instrument to strengthen the control based on contract and technology.

However, e-business activities have revealed shortcomings in addressing risks in contractual frameworks. Server Level Agreements (SLA) are usually only adequate for contracts between the buyer and one service provider, but service providers normally engage subcontractors, potentially rendering the original contract controls inadequate. In order to address this situation, organisations can consider implementing Operating Level Agreements (OLAs) between the various subcontractors and their service provider. However, these add complexity and require careful consideration to help ensure a suitable outcome as in the case when a subcontractor provides services to other competitors.

The current state of e-business software and platforms cannot support the enforcement of the contractual framework since the policy issues of such technologies are devoted to reinforce periodic operational reviews and procedures for verification of compliance with the agreement and expected performance or for the audit process management.

The key-issues about control on confidential data are partially neglected by technological implementation. The alternative scenario is between (1) in-house IT architecture with proprietary software to run outsourced business process modules and (2) slight IT distributed infrastructures with technologies based on Business Right Management software and generally Risk Management systems. These systems refer to the joint technology-business processes by which intellectual property rights are communicated and upon which actions can be taken in order to prevent and compensate the unauthorized loss of protected information. In our contribution we discuss how a different approach, merging technologies from e-commerce activities and multiagent systems studies, could reverse these negative expectations on IT outsourcing growth. We propose a combined approach taking in consideration IT technology architecture on both the side of protection from loss of data control and of potential attitude in distributed computing for e-business

outsourcing. The decision to outsource must be strategic indeed. Outsourcing is a significant investment of cost and time for an organisation that implies not only risks, but also numerous opportunities in terms of minimising the management of supply chain software, eliminating faults in the IT infrastructure, cutting costs. Thanks to the development of effective technologies, the prospective impact of e-business outsourcing could import a real networked business framework which facilitate inter-firm collaboration, generate higher benefits in terms of value enhancement than IT applications focused on internal use.

We re-consider then the role of DRM technologies despite the criticism in the current debate on consumer law because of the limitation of usability and the concern over DRM systems, in terms of lack of interoperability and trade secrets, arisen in countries that with the major number of outsourcing countries.

2. Digital Rights Management and Information Rights Management

As known, Digital Rights Management (DRM) comprises various technical protection measures that may be used by authors and publishers in order to regulate and limit usage of digital resources, such as creative media, digital works or software, and for establish a secure channel for their distribution. Those technologies have been developed mainly since the last decade, together with the diffusion of digital media. A DRM system should provide the technological framework for the distribution of copyright protected contents, limiting their usage and diffusion according to some kind of contract, usually expressed in some standard Rights Expression Language (REL). The aim of DRM is to guard the principle of Intellectual Property (IP), which defines an ownership relation between the author of some kind of creation and the creation itself (Intellectual Property Object).

Apart the technological issues, debate about DRM is controversial; by one side, DRM promises to offer a needful secure framework for distributing digital content, enabling the implementation of new business models for media selling, and ensuring that content providers receive adequate remuneration for the creation of the distributed content. By another side, opponents upholds that DRM privatizes and replaces copyright law, undermines copyright limitations, threatens the interests of users and the public at large, inhibits creativity and innovation by unjustly extending intellectual property protection.

On despite of the controversy arisen around its mere existence, Digital Right Management systems have preserved the concept of Intellectual Property of digital creations. Nevertheless, DRM systems haven't had an adequate spread; causes of this are partly the general lack of trust on electronic transactions, partly the lack of interoperability among the systems, partly the insufficient scope of currently used Rights Expression Languages. Anyway the main problem, especially regarding multimedia contents, remains the fact that consumers have been reluctant to accept the restrictions imposed by DRM systems.

But Intellectual Property Objects are object of trade not only for the final consumer. From the very original idea in an author's mind until the final product, there have been some other intermediate IP objects along this process (that we call "value chain"), and they are subject of a possible trade too. For instance, rights on compositions, concerts, editions, arrangements can be related to the production of some kind of multimedia content. This kind of regulations and agreements have remained largely up to date in the analogue world. Another example is constituted by cumulative creativity and innovation, that is the process by which an Intellectual Property Object can change and evolve by means of another author's work; a DRM system should be dynamic, meaning that it should provide tools to deal with the relationships among numerous rights holders of various generations.

Even if they have not been a big social hit, at least DRM has proved to be a technological success.

Technology had failed to prevent illegal copies, but at least has succeeded at providing channels for a fair trade under the form of DRM systems.

DRM systems technologies are distributed on different levels; such technologies include encryption, copy control, digital watermarking, fingerprinting, traitor tracing, authentication, integrity checking, access control, tamper-resistant hardware and software, key management and revocation as well as risk management architectures. All these technologies are used to enforce certain policies. The specific technologies used vary from DRM system to DRM system. Depending on the particular combination of these technologies, the policy implications of various DRM systems vary greatly as well. In addition, most DRM systems also include certain technologies that enable the machine-readable expression of such policies, in particular RELs and metadata, which enable the content provider to express in a machine-readable form a rich set of usage rules. Those technologies constitute the basis for the electronic contract, a contract whose representation can be understood by computers, allowing DRM systems to control it and execute it automatically; an electronic contract is active, as it plays an important role in the execution of the contract itself.

The earliest electronic contract representations were born together with the electronic commerce and the first Electronic Data Interchange (EDI) standards. Their functionality depends largely on the kind of contract representation format they use: from the earlier architectures based on UML or XML (COSMOS, DocLog), to the more recent semantic representation, by use of ontologies developed in languages such as KIF or OWL; one of the most well-known XML-based RELs is the “eXtensible rights Markup Language” (XrML). A good Right Expression Language should be able to specify how to manage permissions such as copy, delete, modify, embed, execute, export, extract, annotate, aggregate, install, backup, loan, sell, give, lease, play, print, display, read, restore, transfer, uninstall, verify, save, obtain, issue, possess, and revoke content; furthermore, access to and use of digital content may be restricted to certain time periods, locations, devices, users, number of times; finally, it can be specified content’s quality, format and for what purpose the content may be accessed.

While DRM focus on preserving Intellectual Property, such kind of technologies can be addressed to another crucial task, consisting of the protection of sensitive and confidential information. Content security is one of the most critical issues organizations deal with; Information Right Management (IRM) is the set of technologies, evolved from DRM, employed in allowing users to maintain and track control of information once it has been shared. While DRM is typically employed in consumer-oriented applications, and focuses on pieces of content that has some commercial value, IRM addresses issues which are related to the confidential nature of the content itself. IRM technologies spreading promises to impact some important business realities, such as outsourcing or off-shoring; thanks to them, information could easily be forwarded worldwide to individuals that would not normally be authorized to access it.

3. Agent-Based Theory on Norms

Many theories and applications of multiagent systems such as electronic commerce, virtual communities, theories of fraud and deception, of trust dynamics and reputation, secure knowledge management, *et cetera*, have fruitfully employed the notion of a normative system regulating an agent society. Each of these applications comes with its own characteristic properties. For example, the role of norms and contracts in the interaction of agents is a major aspect of e-commerce and e-trading systems. Agents must reason about the fulfillment of norms, execution of rights, the possible violations of rights and what to do to repair such violations. However, classical game and decision theory presume a fixed set of interaction possibilities. Since contracts can be used to change the interaction possibilities, norms and contracts pose an important challenge to the game theoretic analysis of agent interactions. Normative multiagent systems make current approaches more flexible using the multiagent structure of normative systems: agents that can modify the behavior of normative systems via contracts, and can negotiate automatically new service level agreements. Legal effects of actions of the members of a legal system are complex and contracts do not concern only the regulative aspects of a legislation, i.e., the rules of behavior specified by obligations, or the constitutive part of it, i.e., the rules introducing institutional facts such as bidding in an auction, but contracts are systems of regulative and constitutive rules that provide frameworks for social action *within larger rule-governed settings*. Therefore contracts as legal institutions bring with them constitutive norms creating not only institutional facts, but creating also new regulative and constitutive norms. In this way, it is possible to specify in a contract new procedures for the interaction among agents. A normative system behaves like an agent monitoring and sanctioning violations, forming the basis of an ontology of social reality, including not only normative systems but also groups and organizations. This ontology is based on the idea that social entities can be modelled as agents which are attributed mental attitudes.

In our approach, normative multiagent system formally describe the interaction among the stakeholders in business outsourcing, ranging from privacy and legal aspects to business concerns, enabling a basis for formal analysis as well as a conceptual model for agent based technology.