Interoperability and Business Models for e-commerce

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Abstract. Technical interoperability is often considered as a pre-requisite for a global and open e-commerce marketplace. The proliferation of e-commerce architectures encourages market fragmentation. The commodity view of technologies seriously undermines the viability of individual e-commerce businesses. The disconnect between technologies and business practices creates short termism in business model creation and funding of the e-commerce industries. A seamless value chain that underpins an economic structure is ultimately dependent upon a shared approach to and a shared view of business processes and business semantics. Fragmentation at the basic level of architectures is not only commercially detrimental to individual businesses, it also decreases the long-term benefits of e-commerce to the market as whole.

1. Introduction

Interoperability is widely regarded as one of the most critical and urgent issues for the future development and growth of e-commerce. While the concept of interoperability is not new, how it needs to be applied, interpreted and implemented at a practical level is however subject to continuous discussions and occasional controversies. This paper discusses the different approaches to interoperability from the technical as well as business perspectives. In particular, it seeks to highlight how and why considerations of interoperability are deeply related to the activities of the various groups of stakeholders in e-commerce. It raises the question of whether a uniform approach to interoperability is possible and feasible.

Secondly, this paper reviews how interoperability relates to development of business models in the e-commerce space. Drawing on practical experiences of creating and then implementing business models for e-commerce, it illustrates the business problems surrounding and arising from the various interpretations of interoperability, and the considerable gap between interoperability as a technical concept and interoperability as a building block for an e-commerce commercial venture.

2. Technical Approaches to Interoperability in e-commerce

Technical interoperability is often considered as a pre-requisite for a global and open e-commerce marketplace. It has been variously interpreted, such as:

- Using standards or "standards-based" protocols
- Adopting a common technical framework at a basic level
- Providing a "core set" of services or service feature sets

- Implementing "complementary products" or a basic suite of software tools
- Defining a stable system architecture that has the support of the largest possible number of entities.

Technical interoperability therefore is closely linked to standardization. Indeed, many have argued that without standardization, technical interoperability is not achievable. However, those who advocate this view do not often agree on what needs to be standardized and secondly, how it is to be – or should be - achieved.

In recent years, a large number e-commerce frameworks, architectures and models (these three terminology is often used interchangeably and the distinction between them is a continuous source of debate in technical environments) have been developed within the standardization community and elsewhere, in an attempt to advance interoperability. The CEN Workshop Agreement (CWA) on this subject, for example, provides an analysis of over twenty of such efforts [1]. As the CWA acknowledges, its coverage is by no means exhaustive. The sponsors of the individual efforts include standardization committees, industry consortia, vendor communities, individual vendors, as well as user communities.

Table 1 e-commerce Frameworks, Architectures and Models and Their Sponsors

SPONSORS	FRAMEWORKS, ARCHITECUTRES AND MODELS
General Frameworks	
Microsoft	BizTalk
CEN/ISSS Electronic Commerce Workshop	Building Blocks
UN/CEFACT and OASIS	ebXML Technical Architecture
CommerceNet	eCo Framework
Esprit IMPRIMATUR Project	IMPRIMATUR Business Model
ISO TC184 and related groups	Industrial Data Framework (STEP)
Sun Microsystems	Java Electronic Commerce Framework
OMG Electronic Commerce Domain Task Force	OMG Electronic Commerce Domain Specifications
ISO/IEC JTC1/SC32	Open-edi Reference Model
Trading Models	
Various	Ad Hoc Functional and Process Models
IETF TRADE Working Group	IOTP – Internet Open Trading Protocol
Open Applications Group	Open Applications Group XML Framework
CommerceNet	OBI – Open Buying on the Internet
RosettaNet	RosettaNet
ACTS SEMPER Project	SEMPER – Secure Electronic Market Place for Europe
Payment Models	
Various	Electronic Payment Technologies
VISA and MasterCard	SET – Secure Electronic Transaction
CEN/ISSS TC 224 and ISO/TC68/SC6	Trading and Payment Model in joint report on card-related secure commercial and financial transactions
Security Models	
IETF PKIX Working Group	PKIX
CEN/ISSS TC 224 and ISO/TC68/SC6	Security Model in joint report on card-related secure commercial and financial transactions
Mobile Commerce Models	
Ericsson, Motorola, Nokia, Panasonic, Siemens and Sony	MeT – Mobile electronic Transactions

As the categorisation in the table shows, these frameworks/architectures/models have different focuses. Moreover, within an individual category, they often centre on particular themes or approaches. For example, BizTalk positions interoperability primarily in terms of data representation and formatting, Building Blocks in terms of business processes/sub-processes, ebXML in terms of messaging, semantics, processes and increasingly modelling, eCo in terms of systems, Java EC Framework in terms of software components, and so on. Some of them also have a notably sector flavour, such as IMPRIMATUR (content industries) STEP (manufacturing), RosettaNet (semiconductor), MeT (telecoms and IT). On the other hand, while some of these architectures overlap in certain areas, the bounds of their specifications rarely coincide. In other words, it is exceedingly difficult, if not impossible, to make a meaningful comparison between these available architectures. Moreover, the possibility of interoperability between two systems that have implemented different architectures is close to nil, at least without extensive and expensive interfacing exercises which are specific (i.e. proprietary) to the two systems concerned. The CEN/ISSS Electronic Commerce Workshop, therefore, has established a project to develop a meta-framework that provides a modelling language, methodology and open source tools for facilitating de facto interoperation, or mapping, between two incompatible systems [2].

The proliferation of architectures is often accompanied by exhortations to converge efforts on a single architecture, or to pool resources to develop a common "baseline" or "reference". However, in so far as the vast majority of these architectures do not share the same foundations, especially at the level of business process and semantic definitions, it is difficult to see how convergence can be realised, even on technical grounds alone.

3. The Context for Interoperability in e-commerce

The problems of interoperability have not generally enhanced the reputation of standardization. Formal standardization is perceived to be slow, unresponsive to market needs, unrepresentative of the various interests involved etc. – these arguments are well known and well rehearsed. At the same time, the past decade has witnessed a mushrooming of industry consortium activities, in e-commerce architectural development and other areas. This trend shows no sign of abating.

To put it simply, interoperability is about the use of a common set of technical specifications. These specifications need to be implemented into products (by vendors). The products need to be implemented (by users) for delivering particular services. Often, products are bundled together and made available as specific applications (by vendors or users). In this value chain of transforming basic IT products into e-commerce services, many parties or intermediaries could be involved, including service providers, integrators/aggregators, consultants etc. While e-commerce has "dis-intermediated" many parties in the more traditional value chain, it has equally spawned a new generation of intermediaries along the (re-structured) value chain spanning producers of the raw material both tangible and intangible to the end consumer. Many predict the increasingly prevalence of the dynamic value chain, which is constituted and de-constituted on the fly, elastic to market demand in almost real time.

The proliferation of e-commerce services is in principle not dependent on interoperability as defined above. Arguably, the reverse may be true. However, the proliferation of e-commerce services that also enables easy access to the market by those who wish to offer services and by those who wish to purchase services is dependent upon an open marketplace. Openness in this context can be defined in terms of entry barrier in respect of cost of entry, and for the provider,

also time to market, the degree of market fragmentation, and the availability of innovation opportunities. Interoperability is a necessary, though not sufficient, condition for market openness. Conversely, lock-in regarding a particular technical architecture that is implemented into specific product(s) potentially jeopardises market openness. As software becomes increasingly sophisticated and an e-commerce service, let alone services, needs to rely on multiple IT products in its delivery, the architectural basis has simultaneously become the more complex, and the technical openness of the architecture the more difficult to achieve.

Technical openness is, like interoperability, a concept that often confuses rather than elucidates. A technical specification that is open is generally defined as one that is publicly available in terms of accessibility. However, accessibility is not the same as implementation or use. An open architecture may comprise a myriad of technical specifications, all of which are publicly accessible, but with different licensing agreements attached. Second, an open architecture does not guarantee uniform implementation. Lack of interoperability between different implementations of the same specification is fairly common in the industry. There are also cases of lack of interoperability between different versions of the same product that implements the same specification. Third, the individual specifications that comprise an architecture do evolve over time and maybe at different points in time. Versioning of an architecture therefore may not be a straightforward matter which has ramifications for implementation compliance. Fourth, compliance itself is a malleable term, depending upon the compliance criteria, which may not ensure objectivity, neutrality or completeness.

E-commerce interoperability presents an enormous challenge because of the range of technical requirements in supporting a typical e-commerce business, which as experience shows, rarely succeeds without careful consideration of the business processes which span the value chain. Outsourcing may be a practical solution for some businesses, but it is not a substitute for value chain management. The execution of business processes requires not only technologies and specifications in the more "visible" areas such as architectures, semantics, electronic data interchange, information security and payment mechanisms. Depending upon the particular services offered, it typically also requires technologies and specifications in support of information management, data representation, communications, and specific sectorial needs. The Diffuse Standards and Specifications List, part of the IST Diffuse Project's online services, for example, provides a classification scheme of some thirty individual areas that may apply to offering e-commerce services [3]. The hype surrounding a particular technology, therefore, does not remove the fundamental need for meeting a wider range of technical requirements. As a general observation, given the large variety of technologies involved in delivering particular services, it is difficult to see how an individual technology – no matter how topical - can solve all the problems, or can guarantee interoperability, or openness. Indeed, it is unclear what these terms really mean in the context of such a claim.

4. Interoperability from a Business Perspective

Interoperability is unlikely to be a familiar term in the language of an e-commerce entrepreneur, who is typically more concerned with the business model, the bottom line, resourcing, staffing etc. Even in the "new economy" companies who deliver "pure" e-commerce services, technologies are often dealt with separately from "the business", though there are notable exceptions. While technologies lie at the heart of an e-commerce business, the

gulf between the "tech" and "non-tech" parts of the business is often immense, in the corporate culture, organisation, and strategy setting.

There is a pervasive view among senior business managers in e-commerce service companies that technologies are a commodity and a company's technology capability is a matter of financial resourcing – a view that is not discouraged by the IT providers to these companies. IT projects are not always aligned with business targets and objectives. The expectations from IT are not always realistic, leading to disappointment and even failed businesses.

The widespread availability of commercial off-the-shelf IT products and their generally falling prices is also partly responsible for the view of IT as a commodity. Modularisation of IT components encourages the perception that applications can be easily added or adapted to meet new business needs. The assumption is that the underlying architecture is scalable, robust and "open". Companies often find out belatedly, and to their cost, the complexity of integrating apparently trivial changes to "the system". Industry statistics indicate that a staggering 90% of IT projects do not deliver on time or are abandoned.

The disconnect between technologies and business models has a profound impact on the development of e-commerce. A common way of segmenting the e-commerce market is in accordance with the nature of the entities involved and how transactions are organised between the entities. The following is an example.
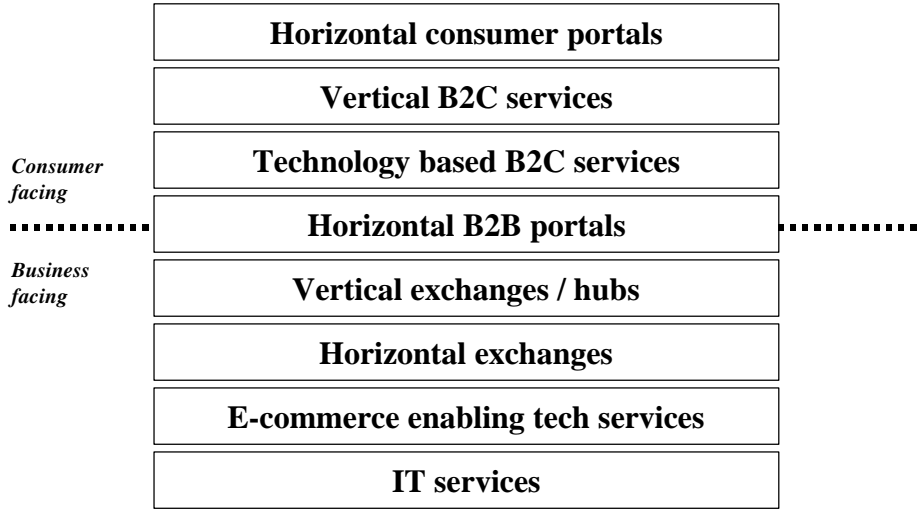
| Horizontal consumer portals |
| Vertical B2C services |
| Technology based B2C services |
| Horizontal B2B portals |
| Vertical exchanges / hubs |
| Horizontal exchanges |
| E-commerce enabling tech services |
| IT services |

Consumer facing ·
Business facing

Figure 1 e-commerce Market Segmentation

The compartmentalisation of technology has not only impacted on the organisation of e-commerce businesses, but also on the funding structure and evaluation models in venture capital and institutional financing. As market fashion has shifted from B2C to B2B and more recently to C2C or P2P etc, the continuous quest and re-invention of business models that meet market approval has detracted focus from the fundamental business processes and the technology infrastructure for supporting these processes. It also encourages a short termism in

creating business models that are contingent upon the emergence of the "killer app" or the "killer adoption". More fundamentally, it encourages the view that there are separate universes of business operations, distinct technology paradigms, and islands of value chains. It glosses over the fact that an individual who purchases books online is the same person who orders goods via a B2B hub and who is the "customer" of e-government services. From a technology perspective, a seamless value chain that underpins an economic structure is ultimately dependent upon a shared approach to and a shared view of business processes and business semantics. Fragmentation at the basic level of architectures is not only commercially detrimental to individual businesses, it also decreases the long-term benefits of e-commerce to the market as whole. Commercial differentiation needs not be equated with market fragmentation. A diverse and a dynamic e-commerce marketplace is dependent upon a commonly shared framework in different contexts.

5. Conclusions

This paper advocates the need to re-examine the concept of interoperability as it is applied in the technical and business contexts. It argues for a better understanding of the complex issues surrounding interoperability and how some of them impinge directly on the e-commerce marketplace in practice. Ultimately, how these issues are to be approached and tackled will determine the degree of openness of the e-commerce market in future, and the extent to which the benefits of e-commerce will be realised by the different sections of the community.

References

[1] CEN/ISSS Electronic Commerce Workshop, CEN Workshop Agreement – Summaries of some Frameworks, Architectures and Models for Electronic Commerce, CWA 14228, published in June 2001 (available from CEN Member National Standards Bodies)

[2] CEN/ISSS Electronic Commerce Workshop Project Group on E-Commerce Integration Meta-Framework (ECIMF), 2001-2002, http://www.cenorm.be/isss/workshop/ec

[3] IST Diffuse Project, http://www.diffuse.org