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Joseph Feller

University College Cork, jfeller@afis.ucc.ie

Pat Finnegan

University College Cork, p.finnegan@ucc.ie

Jeremy Hayes

University College Cork, j.hayes@ucc.ie

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OPEN SOURCE NETWORKS: AN EXPLORATION OF BUSINESS MODEL AND AGILITY ISSUES

Feller, Joseph, University College Cork, Western Road, Cork, Ireland. JFeller@afis.ucc.ie

Finnegan, Patrick, University College Cork, Western Road, Cork, Ireland. P.Finnegan@ucc.ie

Hayes, Jeremy, University College Cork, University College Cork, Western Road, Cork, Ireland. J.Hayes@ucc.ie

Abstract

The growing interest of commercial organisations in developing and exploiting open source software (OSS) has led to increased focus on business model aspects of the OSS phenomenon. However, much of the work on OSS business models describes the revenue stream but neglects other aspects of the business model. In addition, many OSS companies participate in business networks in order to offer the complete product / service offering (whole product) demanded by customers. Such collaboration is seen as vital in competing with large firms in delivering the 'whole product'. However, there are uncertainties about how such collaboration affects (1) the business models of participants and (2) the agility of the network. This paper examines Zope Europe Association (ZEA), a network of small open source companies co-operating to deliver the 'whole product'. It investigates how participation in the network augments the business models of each participant company, and identifies the business agility challenges faced by the network. The paper concludes identifying the need to address adaptability and alignment issues in addition to business network agility.

Keywords: Open Source Software, Business Models, Business Networks, Agility

1 INTRODUCTION

Developments in the production and use of Open Source Software (OSS) have come to closely resemble other complex product/service offerings of the twenty-first century as predicted by Davidow and Malone (1992). They emphasised the need for organisations to quickly and globally deliver a high variety of customised products. Huang (2001) additionally argues that the problems involved in the product development process are frequently of such magnitude that individual organisations do not have sufficient competencies to deal with all parts of the product design. In particular, market forces require organisations to deliver products and services to market so rapidly that organisations with similar goals must align themselves in IT-mediated partner networks in order to meet customer requirements (Stafford 2002). Moore (1999) popularised the concept of the “whole product” as the cornerstone of market-driven, rather than product-driven, businesses. The concept resonates with the dynamics of the open source software phenomenon, which, due to the peculiar licensing structure¹, shifts the focus from the *production* value to the *use* value of the software artefact, and emphasises services and meta-services surrounding the artefact. By definition, the whole product concept is wider than any specific software artefact, or single service description. Thus, networks of co-operating small open source software organizations may represent what Clemons and Row (1992) term a “move-to-the middle” where networks of organisations interact in order to deliver value (in the form of the whole product) to the end consumer.

¹ Open source software licenses allow users to use, modify and redistribute the product as they see fit, and provide access to the software's source code (see www.opensource.org).

This paper examines Zope Europe Association, a network of small open source companies co-operating to deliver the ‘whole product’. It investigates how participation in the network augments the business models of each participant company, and identifies the business agility challenges faced by the network. The paper begins by discussing the theoretical foundation for the study. Next, the research objective and research methods are discussed. The case environment is then outlined, and the findings presented. The paper concludes that participation in the network allows small firms to share business model components with a centrally managed network, and to engage in agile competitive practices by making network-level changes in response to changes in the external environment. However, the need to address adaptability and alignment issues in addition to business agility is highlighted.

2 THEORETICAL FOUNDATION

Researchers such as Krishnamurthy (2005), Weber (2004), Spiller and Wichmann (2002), Raymond (2001) and Hecker (2000) have documented a series of OSS business models. However, much of this work concentrates on the source of the revenue stream and neglects other aspects of the business models. This is not surprising, as the terms ‘business model’ and ‘revenue model’ are frequently, and incorrectly, used interchangeably. Indeed, Osterwalder et al. (2002) argue that consultants, executives, researchers and journalists have all “abusively” used the phrase “business model” but have “rarely given a precise definition of what they exactly meant by using it”. Mahadevan (2000) defines a business model as a blend of three streams: value, revenue, and logistics. The value stream is concerned with the value proposition for buyers, sellers and market makers. The revenue stream identifies how the organisations will earn revenue, and the logistics stream involves detailing how supply chain issues will affect the organisations involved. Osterwalder and Pigneur (2002) take a more meticulous approach, and propose an ontology that focuses on four aspects of the organisation: product innovation, infrastructure management, customer relationship and financials (see Table 1).

Product Innovation	<input type="checkbox"/> Target Customer Segment <input type="checkbox"/> Value Proposition <input type="checkbox"/> Capabilities
Customer Relationship	<input type="checkbox"/> Information Strategy <input type="checkbox"/> Feel & Serve <input type="checkbox"/> Trust & Loyalty
Infrastructure Management	<input type="checkbox"/> Resources <input type="checkbox"/> Activity Configuration <input type="checkbox"/> Partner Network
Financials	<input type="checkbox"/> Revenue Model <input type="checkbox"/> Cost Structure <input type="checkbox"/> Profit/Loss

Table 1: Business Model Ontology (Osterwalder and Pigneur, 2002).

Timmers (1999) argued that architectures for business models can be identified through the deconstruction and reconstruction of the value chain. Value chain elements are identified, as are the possible ways that information can be integrated both within the value chain and between the respective value chains of interacting parties. Furthermore, Evans and Wurster (2000) argue that as more advanced information standards are introduced, levels of collaboration between organizations can be achieved that were previously only possible within a vertically integrated hierarchical intra-organisational structure. Many economic entities have recognised the importance of the composition of the supply chain (or business network) that they operate in to the overall performance of the firm (Christiaanse 2005). Ticoll et al. (1998) argue that in situations of intense competition it is impossible

to accomplish innovation within the boundaries of the integrated industrial enterprise. Indeed, it is predicted that there will be a rise in the use of agile practices and dynamic supply chains in order to deal with turbulent business conditions and demand for highly customised products and services. The ability to quickly assess new business opportunities, to identify suitable trading partners, and to effectively coordinate delivery of products and services across the business network will be important characteristics for the virtual enterprise (Sadeh et al. 2003).

Following this logic, agility is seen as an important characteristic of business networks. The term agility has created significant interest in the business world (Lo 1998) and is recognised as a prerequisite for success in dynamic or turbulent environments (Camarinha-Matos et al. 2003). “Agility is a business-wide capability that embraces organisational structures, information systems, logistics processes, and in particular, mindsets” (Christopher 2000). Agility is necessary in unpredictable environments where demand is volatile, as an agile supply chain is seen to be more market responsive than traditional, forecast-driven, organisations and supply chains (Christopher 2000). Fingar (2000) believes that “the ability to change is now more important than the ability to create... Change becomes a first class design goal and requires business and technology architecture whose components can be added, modified, replaced and configured.”

In a virtual enterprise, agility is highly dependent not only on the skills of the individual firms that comprise the virtual enterprise, but also on the flexibility of the supporting infrastructure (Camarinha-Matos et al. 2003). Flexibility has been identified as an important characteristic of the agile organisation (Christopher 2000). Thomke and Reinertsen (1998) argue that the development flexibility of modifying a product is proportional to the economic cost of doing so and is dependent on both internal and external factors. External factors include changes in the needs of the end customer, while internal factors include changes in the development process. The economic cost of modifying a product is influenced by factors such as the unit cost of the product, its development schedule, its performance and its development expense (Thomke and Reinertsen 1998). They further argue that design flexibility can be brought about by (1) following a development strategy that can endure a higher probability of design changes, (2) having the ability to produce late changes to the product design in order to better integrate it with the technology and the needs of the customer, and (3) preventing late changes to the product design by making design commitments at a very late stage in the development process (Thomke and Reinertsen 1998).

As OSS firms engage in meeting different aspects of customer needs within a whole product context, it is reasonable to consider the agility of the network from the perspective of both internal attributes/characteristics and external competitive practices. Sharifi and Zhang (1999) argue that the concept of agility has two main attributes: responding to change promptly and appropriately, and capitalising on the opportunities that are created by change. Building on the work of Sharifi and Zhang (1999), it is reasonable to conclude that an OSS organisation (and, indeed, an OSS business network) must strive to acquire certain internal characteristics/attributes if they are to engage in agile competitive practices. However, such concepts have been neglected to date in the OSS literature.

3 RESEARCH OBJECTIVE AND METHOD

The objective of this study is to explore the business model and agility aspects of OSS business networks. Two research questions were formulated to support this objective:

RQ1: How does an OSS network affect the Business Models of participant organisations?

RQ2: What business agility challenges are faced by OSS networks?

Corbitt (2000) advocates the need for interpretative methods in studying IS issues. Interpretative studies focus on developing a greater understanding of social and organisational aspects of the research environment (Walsham, 1993), and are thus considered useful in the context of this study. Case studies are regarded as the most commonly used qualitative research method in IS, and are

especially useful for studying organisational aspects of IS (Benbasat et al, 1987). Cases are most appropriate when the objective involves studying contemporary events, without the need to control variables or subject behaviour (Yin, 1994). The single case study method is considered to be a potentially rich and valuable source of data, while suited to exploring relationships between variables in their given context (Yin, 1994; Benbasat et al., 1987) and is appropriate where it represents a critical case (Yin, 1994).

Given the exploratory nature of this research and the need to obtain rich data in complex environment, a case study approach is adopted. ‘A case study examines a phenomenon in its natural setting, employing multiple data collection methods to gather information from a few entities. The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used’ (Benbasat et al., 1987). The subject of the case study was chosen as it represented a critical case in the area of Open Source business practice. The researchers first conducted a thorough archival search to determine the existence of public domain material on the network and participant companies. As a result of this preliminary analysis, the researchers prepared a case study protocol as defined by Yin (1994). Based on this protocol, interviews were arranged with key personnel in during 2005. The interviews were transcribed and the accuracy of the data verified with the interviewees. The content analysis was conducted using Osterwalder and Pigneur’s (2002) business model framework as well as Aitken et al.’s (2002) and Lee’s (2004) agility frameworks.

4 CASE ENVIRONMENT

Zope Europe Association (ZEA) is an international network of businesses (see Figure 1) that build software and businesses around the application server technology called Zope, widely used for developing content management systems, intranets, portals, and related applications . ZEA provides a critical case of a network of Open Source companies co-operating to deliver a whole product. Indeed, ZEA’s explicit objective is delivering the ‘whole product for content management deployments’. ZEA partner companies are typically small (10 people or less). These companies have recognized that their size limits the contract (deal) sizes for which they could effectively compete, as well as their geographic range. One of the benefits of the network is, thus, that a number of companies can pool their resources to compete for larger contracts on a global scale. More importantly, in the context of competing on the basis of a whole product, the network allows partners to offer a full range of value chain activities, rather than concentrating exclusively on their own specialities (e.g. development, consultancy, training, etc.). The network is currently working on developing a single logo and related materials so that all partners can conduct marketing under the one brand.

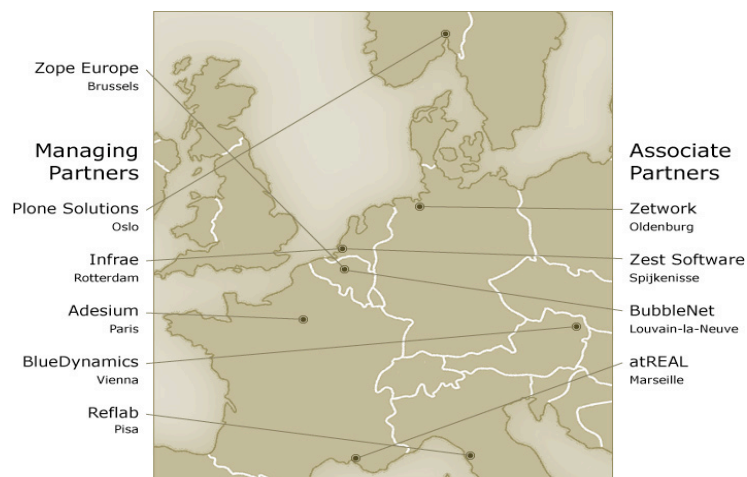


Figure 1: ZEA Network of Partners (Source: www.zope-europe.org).

According to the network's founder, the ZEA goal is "to say that we have the *whole product*". We are going to group together all the people who need a whole product made but can't invest the resources to do it, and then take that whole product and make it offerable by anyone in the network. It has so many benefits on profitability it's just amazing. It's really the only way to impact profitability."

In considering this approach from the perspective of the value proposition offered by the network, he acknowledges that, through partnering, the network can compete for larger deal sizes without competing directly with the large international consulting companies. In comparing the ZEA network with such consulting companies, he notes the increased flexibility offered to customers. In particular, he argues that: "instead of having a cathedral² model of Accenture, or something like that, we want to have multiple players in multiple countries. We can move things around as new trends emerge, new specialities emerge, stuff like that." He also highlights the importance of the fact "that the people in the network are the people that created Silva, the creators of Plone, the creators of Workflow, the creators of Multilingual, the creators of each one of these things. And we want to explain to customers that it's in their interests to have a relationship that rewards these people. It's in their interests, first, because the guy who wrote it can get the job done at a pretty effective rate."

However, due to the early stage of development at which the network finds itself, co-ordination amongst partners is still on a person-to-person basis. The founder acknowledges that there is a need to evolve the organisation of the network towards that of "regular business partnerships – quotas, geographical regions, etc." To date, co-ordination has meant observing trademark and domain rules, as well as some network terms and conditions to ensure that products/services delivered by partners meet the expectations of the customer. Finally, he acknowledges that it is critical to build trust amongst partners so that invoices are paid on time and other responsibilities are met.

5 FINDINGS

In order to answer the first research question (RQ1: How does an OSS network affect the Business Models of participant organisations?), the Osterwalder and Pigneur business models ontology was used as a lens to investigate how the presence of the ZEA network affects the business models of the member organisations. The results are summarised in Table 2, classified as per the pillars of the Osterwalder and Pigneur (2002) framework, and are discussed below.

ZEA enhances the value that member firms can offer to a specific target customer segment (Value Proposition) by allowing smaller organisations to group together to deliver the whole product as part of a consortium. The fact that the network spans many geographic territories with multiple languages and specialised local knowledge means that a consortium made up of small organisations can compete with the larger consultancy firms. This co-operation increases the range of projects in which members can become involved. The founder of ZEA remarked that "*we currently cover 12 different countries and I don't know how many languages and if we were a classic commercial company, they would have to be pretty big to have that same geographic coverage*". In terms of targeting customers, the ZEA brand is purposefully designed to be a mark that distinguishes participants in the network as being leaders in the market. Thus, organisations must already have a good reputation before they can join the network. The ZEA network also enhances the business model of participants by adding to the range of capabilities that underpin their value propositions. Many of the ZEA members are small start-ups that consist of two to four people with mostly specialised technical expertise. A major benefit of ZEA membership has thus been the ability to access ZEA expertise in areas such as project management, customer relationship management, requirements management, tendering and sales to complement technical expertise.

² Raymond (2001) first articulated the much cited contrast between the hierarchical cathedral model characterising proprietary software and the distributed model of the open source bazaar.

Business Model Pillar		Effect of ZEA on member's business models
Product Innovation	Target Customer Segment	Enhances reputation and branding of participants by providing a single 'market leader' brand.
	Value Proposition	Extends geographic coverage, supports the ability to offer specialised expertise, products and services in many languages and leveraging local knowledge.
	Capabilities	Enhances existing capabilities by providing a broader range of business capabilities, especially project management and customer Relationship Management.
Customer Relationship	Information Strategy	ZEA aims to provide lead referrals and to contribute to the sharing of experiences and knowledge.
	Feel & Serve	Facilitates profile building through common branding.
	Trust & Loyalty	Leverages access to expertise of software originators to build customer trust.
Infrastructure Management	Resources	Lowers friction when building teams, through information sharing, common methodology, tracking results, reporting bugs, etc.
	Activity Configuration	Enables members to act as a "value shop" configuration. Network reduces the information asymmetry between client and consultant resulting in customers 'joining' the community.
	Partner Network	ZEA network means that members do not have to outsource to partners outside the network.
Financials	Revenue Model	Increases deal size for members by creating "whole product" consortia.
	Cost Structure	Enables cost-sharing amongst members.
	Profit/Loss	Increases revenue and lowers expenses through sharing among members, leading to bigger profits.

Table 2: Effects of ZEA network on participants' business models

With regard to information strategy, ZEA aims to *"learn together, share experiences and refer leads to each other"*. However, as yet, resource problems have limited ZEA's ability to meet their ideal in terms of information strategy. Nevertheless, ZEA is proving very successful in enhancing the manner in which a participant firm reaches its customers (Feel and Serve). The market for Zope and Plone is characterised by customers approaching firms with whom they want to do business. A key value added by ZEA is that the profile-building activities of the network results in 'leads' for member firms. In some countries where the demand for Plone services exceeds supply, ZEA can partner with member firms in that country by co-signing the deal but leaving the local participant with ownership of the customer. Furthermore, a key aspect of customer relationships amongst open source firms is that trust and loyalty can be enhanced by providing access to the originator of the software. ZEA aims to assemble project teams that contain relevant software originators from participant firms. Thus members can build loyalty and trust with customers by providing them with access to relevant software originators.

The OSS network model necessitates the inter-organisational management of business infrastructure. A key challenge has been integrating different participants in a seamless manner to deliver the 'whole product' to customers. ZEA aims to lower friction in inter-organisational teams by establishing a common approach through the use of standing contracts, having customer references on file, having a common methodology; a common way of thinking about a problem, assigning work, tracking results

and reporting bugs. This is summed up by the ZEA founder as being the “*big difference between a rabble and an army. You can take a thousand people that speak different languages, that never worked together and they can get defeated by 50 people that are well trained*”. This approach is also evident in the ZEA approach to the configuration of activities and processes at the level of individual firms and at network level. The ZEA network allows members to act as a value shop or service provider and carry out the phases of this configuration (problem-finding and acquisition, problem-solving, choice, execution, control and evaluation) as if they were one integrated organisation. One of the areas where ZEA differs from the “value shop” definition (as per Stabell and Fjeldstad, 1998) is that in the traditional “value shop” model the information asymmetry between the client and the service provider (in this case a consultancy firm) is one of the main value drivers and results in high prices. This is not seen as desirable by ZEA. Instead the network endeavours to reduce this asymmetry so that the customer, instead of being a recipient of content management, becomes a participant in the OSS community. Finally, in relation to infrastructure management, the partner network aspect of the business model is a service that ZEA completely operates on behalf of its members. Thus they do not need to outsource activities to non-member organisations.

Enhancing the financial aspects of the business models of participants is a key objective of the ZEA network. ZEA aims to increase the ‘deal size’ that members can tender for leading to increased profit margin. A key aspect of the ZEA approach is thus the sharing of resources and common expenses. Thus participants can focus on key value adding activities of their business models, while sharing the resources, costs and risks of secondary value activities. An interesting revenue model arising in relation to OSS companies providing consulting services is an effort to move away from a ‘bill-by-the-hour’ model to fixed price. This move is occurring as the constant innovation with OSS results in the need for much less customisation, and thus, shorter development times. However, fixed price billing creates challenges for network-based project management as time overruns cut into the profit margins of the participant providing the service. The discussion of Table 2 above refers to the effects of the ZEA network on the business models of the network participants, and not the business model(s) of the ZEA itself. However, the various effects, taken as whole, result in the ZEA network operating as an entity in its own right, and engaging in agile competitive practices. Aitken *et al.*, (2002) present a framework for understanding agility in the context of internal activities such as marketing, production, design, organisation, management and people. This framework is utilised in the present study as a tool for describing the agile characteristics of the ZEA, as summarised in Table 3 and discussed below.

Activity Area	Key Characteristics
Marketing	Network provides and maintains unified Zope and ZEA brand.
Production	Network provides harmonised and integrated collection of diverse production processes and capabilities to deliver the whole product.
Design	Network provides harmonised and integrated collection of diverse design processes and capabilities to deliver the whole product.
Organisation	Network serves as competency rallying mechanism to deliver multi-lingual, whole product services across a wide geographic area.
Management	Network distributes responsibility and revenue through simple, decentralised and transparent network governance structures.
People	Network provides customers with access to original software authors and/or experts with unique competencies.

Table 3: Agile Characteristics of the ZEA

While the members of the ZEA are already independently able to utilise recognition of the Plone brand as a marketing tool, but this is only relevant to client firms already aware of Plone. The unified brand image of the ZEA promotes agile marketing in several ways, such as simplifying brand management (one brand versus many) and allowing the network to devote resources to unified brand building, reducing the burden on individual members (e.g., in order to increase brand awareness of the ZEA and its member organisations, the founder is active in giving interviews, attending conferences etc.). The long-term goal of the ZEA is to build up sufficient resources so that the network can project a professional image on behalf of the member organisations that simply would not possess the resources to do this individually.

The most important characteristic of the ZEA vis-à-vis production is its ability to leverage a large amount of diverse skills possessed by the member organisations. Thus, the network allows delivery of the “whole product” which would not be possible for the smaller members to do as a stand-alone provider. Likewise, many design issues associated with delivering the whole product are addressed through leveraging what the ZEA founder describes as “*a set of tools, and a way of working together, a common culture and ways of communication*” that serve to harmonise and integrate the practices of individual firms.

In terms of organisational activity, while the network facilitates matching member competency with customer need, the ZEA does not currently use explicit coordination processes to schedule work. Previous attempts to do so have had negative results – for example, an incident in which a member firm was advised not to accept new work for a certain time period based on a client’s intention, only to find that the client organisation was unable to sign the contracts in the agreed time frame, thus trapping the member firm into a period of non-productivity. However, by not having explicit scheduling mechanisms in place, the ZEA believes that it is more agile than traditional consulting firms as the network is able to allocate resources more dynamically and effectively and thus to smooth out the peaks and valleys that are a characteristic of technology consulting and development work.

From a management perspective, the goal of the ZEA is to ensure that network management and governance does not impede realising the potential benefits associated with the fact that open source software is by nature highly decentralised; the founder of the ZEA believes that this fact results in “*a higher velocity of innovation,*” and that firms in the open source space are thus better equipped to adapt to the very specific needs of clients. For example, while a larger proprietary software development firm may decide not to support a particular language because the market is not big enough to sustain it, open source firms can leverage the work of individual developers and smaller groups who do wish to support that language. Having a decentralised governance / management structure, and a decentralised approach to consulting, means that if a need is encountered for an unanticipated skill set, it is less of a problem to meet the need than it would be in the traditional consulting model.

Finally, in relation to people, the ZEA leverages the availability of access to the original author(s) and/or core maintainer(s) of the software products to respond to customer demand in an agile fashion. Similarly, the fact that ZEA is made up of a number of autonomous organisations, each having different philosophies, operating in different countries and meeting the needs of a diverse group of clients, means that the ZEA can draw from a wider variety of experiences. It is evident that membership within the ZEA not only affects the business models of individual firms, but also results in the existence of a network-based virtual organisation engaged in agile competitive practices. Therefore, the business agility challenges are faced by the networks were analysed using the work of Lee (2004). He expands on the concept of internal agility by also considering the adaptability of a supply chain as well as the alignment of players within that supply chain. Lee’s work is used to frame the content analysis of agility-related challenges facing the ZEA, and is summarised in Table 4. The categorisation of challenges according to this classification reveals that the challenges extend beyond agility to matters of adaptability and alignment. Consequently, while ZEA has been able to engage in agile competitive practices, the challenges that management have articulated indicate the need to move

beyond short-term agile practices to consider structural and technological changes in OSS markets, and creating performance incentives.

AGILITY	
<p>Objectives:</p> <p>To respond to short-term changes in demand or supply quickly and to handle external disruptions smoothly.</p>	<p>Key Challenges:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Co-ordinate information flow amongst network participants to ‘smooth out peaks and valleys’ associated with traditional work. <input type="checkbox"/> Foster collaborative relationships with partners based on the need for particular competencies. <input type="checkbox"/> Develop network level competencies (e.g. project management) to complement the core activities of participants.
ADAPTABILITY	
<p>Objectives:</p> <p>To adjust the network’s design to meet structural shifts in markets; to modify supply network to strategies, products, and technologies.</p>	<p>Key Challenges:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Leverage partner expertise in different geographical regions to understand market for the total product. <input type="checkbox"/> Plan for the introduction of new members into the network to meet requirements for particular competencies. Also, ensure an adequate evaluation of potential members. <input type="checkbox"/> Create an understanding of the needs of different types of customers (typically niche markets that traditional competitors don’t serve). <input type="checkbox"/> To effectively manage the expertise of network partners to ensure that the competencies of the network evolve in response to changes in the product technologies that originate outside the network.
ALIGNMENT	
<p>Objectives:</p> <p>To create incentives for better performance.</p>	<p>Key Challenges:</p> <ul style="list-style-type: none"> <input type="checkbox"/> To exchange information and knowledge freely amongst network partners. <input type="checkbox"/> Manage partner responsibilities in delivering the whole product in a manner that allows partners to focus on their core competencies. <input type="checkbox"/> Effectively provide non-core competencies in a manner that participants can confidently delegate important business model components to the network. <input type="checkbox"/> Equitably share risks, costs, and gains of initiatives. <input type="checkbox"/> Enable customers to understand the business value of engaging with and contributing to the OSS community.

Table 4: Key Challenges for ZEA as an Agile Network (based on Lee 2004).

6 CONCLUSIONS

This paper has explored the business model and agility aspects of participation by open source companies in a business network designed to deliver the ‘whole product’. This participation is seen as a business imperative in order for small OSS firms to compete for large ‘deal sizes’ with traditional integrated companies. The study demonstrates that participation in the network allows small firms to, in effect, outsource some elements of their business model to the network. This is particularly evident in the division of responsibility for customer-facing activities between participants and the central network. It is this division of responsibility that results in the network being able to engage in agile competitive practices as network-level changes can be made rapidly in response to changes in the external environment. Thus, the challenges that the network faces in ensuring that the multitude of reciprocal interdependencies necessary for the delivery of a whole product do not adversely affect the agility of the network. Nevertheless, it is clear that agile practices are only the first step for the network in competing in the software and consulting sector. Further work is necessary to address adaptability and alignment issues.

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References

- Benbasat, I., Goldstein, D.K. and Mead, M. (1987) “The Case Research Strategy in Studies of Information Systems”. *MIS Quarterly*. 11(3) 369-386.
- Camarinha-Matos, L.M., Afsarmanesh, H. and Rabelo, R.J. (2003) “Infrastructure developments for agile virtual enterprises”, *Int. J. Computer Integrated Manufacturing* 16(4-5), 235–254.
- Christiaanse, E. (2005) “Performance benefits through integration hubs”, *Communications of the ACM*, 48(4).
- Christopher, M. (2000) “The Agile Supply Chain – Competing in Volatile Markets”, *Industrial Marketing Management* (29), 37-44
- Clemons, E. K., and Row, M. C. (1992) “Information technology and industrial cooperation: The role of changing transaction costs”, *Journal of Management Information Systems*, 9(2), 9-28.
- Corbitt, B. J. (2000) “Developing intraorganizational electronic commerce strategy: An ethnographic study”. *Journal of Information Technology*. 15(2) 119-130.
- Davidow, W. and Malone, M. (1992) *The Virtual Corporation*. New York: Harper Collins,
- Evans, P. and Wurster, T S. (2000) *Blown to Bits: how the new economics of information transforms strategy*, Boston, MA: Harvard Business School Press.
- Fingar, P. (2000) “Component Based Frameworks for E-Commerce”, *Communications of the ACM*, 43 (10), 61-66.
- Hecker, F. (2000) “Setting Up Shop: The Business of Open-Source Software”, Working Paper, <http://www.hecker.org/writings/setting-up-shop>.
- Huang, C-C (2001) “Using Intelligent Agents to Manage Fuzzy Business Processes”, *IEEE transactions on systems, man, and cybernetics—part a: systems and humans*, 31(6).
- Krishnamurthy, S. (2005) “An Analysis of Open Source Business Models”, in Feller, J., Fitzgerald, B. Hissam, S. and Lakhani, K. (eds.) *Perspectives on Free and Open Source Software* Cambridge, MA: The MIT Press.
- Lee, H. (2004) “The Triple-A Supply Chain”, *Harvard Business Review*, October, 102-112.
- Lo, W.K. (1998) “Agility, Job Satisfaction and Organizational Excellence -- Their Factors and Relationships.”, *ISO 9000 and Total Quality Management - Third Proceedings*, 330-336.

- Mahadevan, B. (2000) "Business Models for Internet Based E-Commerce: An anatomy". *California Management Review*, 42(4), 55 - 69.
- Moore, G. (1999) *Crossing the Chasm* (Revised Edition). New York, NY: Harper-Perennial.
- Osterwalder, A and Pigneur, Y., (2002) "An e-Business Model Ontology for Modelling e-Business", 15th Bled eCommerce Conference, Bled, Slovenia, June 17-19, 2003.
- Osterwalder, A., Ben Lagha, S. and Pigneur, Y. (2002) "An Ontology for Developing e-Business Models", Proceedings of IFIP DSI Age'2002, Cork, Ireland July 3-7, 2002.
- Raymond, E.S. (2001) *The Cathedral and the Bazaar* (2nd Ed.), Sebastopol, CA: O'Reilly.
- Sadeh, N.M., Hildum D.W., and Kjenstad, D. (2003) "Agent-based e-Supply Chain Decision Support", *Journal of Organizational Computing and Electronic Commerce*, 13(3).
- Sharifi, H. and Zhang, Z. (1999) "A methodology for achieving agility in manufacturing organisations: An introduction", *International Journal of Production Economics*, 62, 7-22.
- Spiller, D. and Wichmann, T. (2002) "Basics of Open Source Software Markets and Business Models." FLOSS Final Report - Part 3.
- Stabell, C.B. and Fjeldstad, O.D. (1998). "Configuring value for competitive advantage: on chains, shops, and networks", *Strategic Management Journal*, 19: pp. 413-437.
- Stafford, T (2002) "Trust, transactions, and relational exchange: Virtual integration and agile supply chain management", Proceedings of the 8th Americas Conference on Information Systems (AMCIS 02), Association for Information Systems, 2002.
- Thomke, E. and Reinertsen, D.G. (1998) "Agile Product Development: Managing Development Flexibility in Uncertain Environments", *California Management Review*, Fall, 8-30.
- Ticoll, D., Lowy, A., Kalakota, R. (1998) In: Tapscott, D. (Ed.) *Blueprint to the Digital Economy: Creating Wealth in the Era of e-Business*, New York, NY: McGraw-Hill.
- Timmers, P. (1999) *Electronic Commerce: Strategies and Models for Business-to-Business Trading*, Wiley.
- Walsham, G. (1993) *Interpreting Information Systems in Organisations*. Wiley, Chichester.
- Weber, S. (2004) *The Success of Open Source*, Cambridge, MA: Harvard University Press.
- Yin, R.K. (1994) *Case Study Research, Design and Methods*, Sage Publications, Newbury Park.