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THE INTER-ORGANIZATIONAL SYSTEM (IOS) ARTIFACT:

AN INTERPRETATIVE DISCOURSE

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ABSTRACT

A need for theory-based research covering IOS artifact has been cited by IS academics and researchers, wherein the subject of the research is the IOS itself, as opposed to the contexts within which the IOS gets acceptance. This paper attempts to define a simple proposition pertinent to the IOS artifact and in doing so identifies areas of research interest, which if pursued could potentially lead to theories for IOS that are explanatory, instructive and stand the test of IOS evolution.

Keywords

Inter-Organizational Systems (IOS), IS Artifact, Design Theory

INTRODUCTION

A compilation of past research on Inter-Organizational Systems (IOS) (Robey et. al 2008) suggests that the primary areas of research interests, thus far, have been pertinent to the state-of-art IOS as a phenomena, with emphasis on three main aspects of IOS; these are – (1) the factors that result in the adoption of the IOS, (2) transaction governance implications and (3) the impact of IOS adoption on an organization. The findings published (Robey et. al 2008), indicates that the main dimension of interest for IOS research has so far been organizational science - attempting to define and describe the value proposition of IOS in an organizational context, the organizational impact and the implications for governance. IOS has thus largely been studied as an organizational phenomenon. For example, (Messerschmidt 2009) discusses an adoption model that takes into account both intra-organizational and inter-organizational factors critical to successful adoption of grid computing. Chang et.al 2008 and McCabe et.al 2008 further evidence the study of the IOS as a phenomenon. Nevo at al 2009 further reiterate that the dominant theme of IOS research for papers published between the years 1977 and 2006 has been IS success. This has created a conspicuous need for theorizing the IOS artifact itself in order to create a distinct identity for it.

In addition to the above, in the month of Dec 2009, a search was performed on the AIS elibrary, using keyword "IOS". The search uncovered 38 research papers that were published in the year 2009 all of which contained the keyword "IOS". These papers were subject to further search, using the keyword "IOS", which further narrowed the papers, that cover or reference the IOS artifact to 15. The other 23 papers, although contained the word "IOS", did not reference the IOS artifact, but referenced other entities such as "scena**rios**" or "**CIOs**". A cursory glance at the abstracts of these 15 papers revealed that 4 of these papers, presented findings relevant to the IOS artifacts, when considered as a sub-category of IS artifacts under analysis (Jeyaraj 2009, Karhade et al 2009, Nevo et al 2009) and thereby the IOS artifact itself was not the subject of the paper, instead the subject of the paper was trend analysis and findings pertinent to sub-categories of IS artifacts. 4 papers (King 2009, Messerschmidt 2009, Roberts et. al 2009, Williams et.al 2009) covered case studies that instantiated IOS artifacts. 1 paper (Hovav et. al) referenced the implications of the subject of the research, identity management, for the IOS artifact. 3 papers (Liu et. al 2009, Naik et. al 2009, Wunnava et. al 2009) covered the organizational impact of IOS focusing on the implications for achieving quality of service and competitive advantage if organizations were to adopt the IOS and use them in conjunction with their internal infrastructure capabilities. Finally, there were 3 papers (Corbiere et. al 2009, Frick et.al 2009, Madlberger et.al 2009) that treated the IOS artifact as the subject of the research and highlighted the features pertinent to the generalized IOS artifact. The limitations of the findings just discussed, lies in the fact that the search was restricted to papers published in the AIS eLibrary only.

This paper initially postulates a simple, definitional proposition, pertinent to the IOS artifact. Further dissection of the proposition reveals areas of research interests, pursuing which can potentially create theoretical foundations of IOS that can add to the body of research for IOS.

A SIMPLE PROPOSITION PERTAINING TO THE IOS

Proposition: An Inter-organizational system (IOS) is an IS artifact, that forges an alliance between two or more organizations, each of which choose to have a stake in the IOS entity.

Let us examine this statement more closely "An inter-organizational system is an IS artifact…." What is the implication of the IOS being a IS artifact? For the purposes of this paper, the definition proposed by Gregor and Jones in their work on "The Anatomy of a Design Theory" (Gregor , et. al, 2007), will be adhered to – which is to perceive IS artifacts as material instantiations of hardware and software. If IOS is a type of IS artifact, the diagram in Fig 1 further illustrates the relationship between IOS artifact and IS artifact and results in the identification of a well-known but thus far an implicit categorization of IS artifact which is the intra-organizational IS artifact. Let us choose the word intra-mural systems (IMS) to refer to systems that are created for the benefit of a single organization only.

As seen in Fig 1, the IOS and the IMS are types of IS artifacts and the main differentiating factor between the two types of IS, is in terms of ownership and support provided to business processes offered by the IS artifact which in the case of the IMS is a single organization and in that of IOS refers to the involvement of multiple organizations by definition. The IMS has existed since the inception of the IS artifact, both in theory and as material realizations, but with the emergence of the IOS, it has now become imperative to classify it as a separate class of IS artifacts, as opposed to using it interchangeably with the term "IS" – this would aid in a better understanding of the differences and similarities that exist between the IOS and the IMS as well as facilitate the creation of a distinct identity for IOS artifacts.
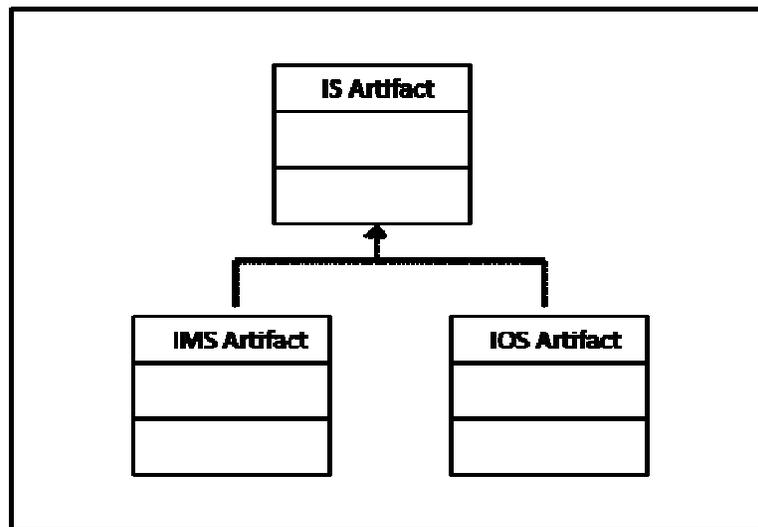

Figure 1. Generalization relationship between the IS artifact and the IOS

A useful area of research interest would be to study the aspects of IS artifacts in general, which by the property of inheritance makes these aspects significant and applicable for both the IOS and the IMS. To look at the key differences between the two artifacts would create separate and distinguishing identities for the IOS and the IMS. This study, of the points of similarities and differences, for the IOS and the IMS, can further explain factors that have an influence in artifact creation, such as the implications for the design patterns used for implementing the artifact, nature of technology used for implementing the IS artifact, degree of formality observed in engaging stakeholders, information security concerns, what is state-of-art for IOS and IMS implementations, human resource engagement and subsequent challenges and so on and so forth. For example, when observing and enforcing modular thinking in IS artifact design, in order to realize the benefits of using modularity, modularity used as a design precept is applicable for both the IMS and the IOS.

For the purposes of this paper, let us look at an IOS artifact instantiation and initiate a starter comparison between an IMS and an IOS. Let us take the scenario, wherein a customer wants to purchase a book from an online book store and is given the option to make a payment directly using a debit card or credit card or make a payment using her Paypal account. As can be seen in Fig 2, an IOS is at work here for facilitating the online purchase of a book. The IOS artifact, because it spans multiple organizations, is essentially a set of intra-mural systems each of which belong to distinct organizations and each of which partake in the collaborative endeavor that facilitates online purchase of the book.

The customer accesses the online bookstore which is essentially owned by the bookstore owner and makes decisions on which books to purchase from the web-site. In order to purchase the book, the customer is given the option to make the payment using either VISA or MC or her Paypal account. When the customer opts to make the payment online, essentially the customer invokes the IMSs owned by VISA, MasterCard or Paypal in order to complete the purchase transaction. The limitation of this case is that the IOS artifact under analysis is actually an extension of the IMS under evaluation and is not being compared to an independent intra-mural system such as a centralized database in another organization that has nothing to do with the infrastructure facilitating the online payment transaction.
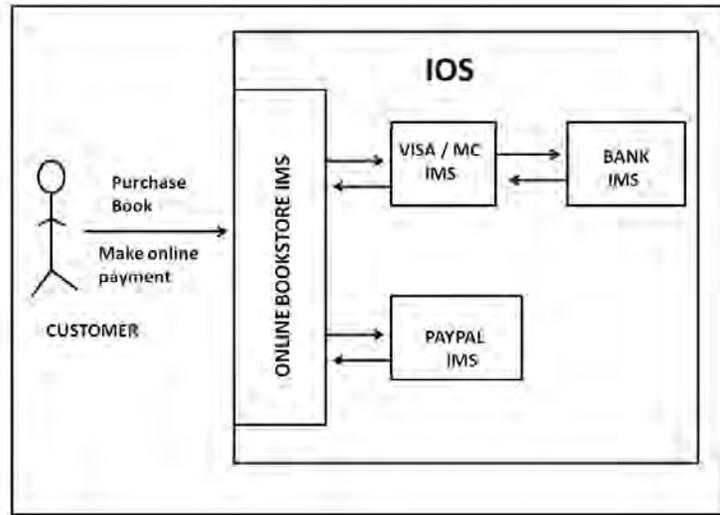

Figure 2. Customer making a payment at an online bookstore

The table below lists the attributes of interest for comparison purposes and their values for the entire IOS and the online bookstore's IMS. As we can see from the table below, the IOS artifact and the IS artifact have differing stakeholder expectations with respect to the quality attribute. Further attributes of interest when identified and defined can be instructive of the distinct identity that the IMS and the IOS exhibits both actually and ideally.

Attributes	Online Bookstore's IMS	IOS
No of organizational stakeholders	1	At least 4
Technology used	State-of-art	Standard
Availability window	20/7	20/7: Online Bookstore 24/7 : Payment
Troubleshooting SLA s	6 hrs	6 hr: Online Bookstore 1 hr: Payment
. . .		

Table 1. Attributes of interest in comparing the IMS and IOS

Now let us look at the second part of the proposition – "An Inter-organizational system (IOS) is an IS artifact, *that forges an alliance between two or more organizations,* each of which choose to have a stake in the IOS entity." The second part of the proposition –"forges an alliance between two or more organizations" emphasizes the IOS artifact as an agent for building relationships between two or more organizations. The alliances can be between competitor organizations or between

organizations that are part of a supply-chain or between organizations that belong to different industries (Nooteboom, 1999, Applegate et. al 1999). Useful areas of research interests would be examining the individual benefits that organizations reap by virtue of the alliances and the costs involved. As an example, the relationships that IOS forge between organizations creates the opportunity of generating "social capital" for each of the participant organizations who signed up to be a member of the IOS network, which each of the organizations can leverage to further strengthen their individual positions in the marketplace.

As an example, OMGEO, a subsidiary of Thomson Financial, markets a product called OASYS Global, essentially an IOS, that can be used by multiple trading companies, each of which sign up to use OMGEO, to effect broker transactions between subscriber organizations. Thomson Financial here, acts as a third party vendor of the OMGEO platform to facilitate transactions that occur between different brokerage firms. Not only do participants in OMGEO's global platform get to book and receive trade affirmations electronically (thereby transferring operational and regulatory risks to OMGEO), but also get to build trust based relationships, under reduced conflict conditions, with other brokerage firms at an organizational level as opposed to the individual trader level. As a result, organizations that sign – up for OMGEO's global trading system, not only significantly reduce operational and compliance risks but also have the opportunity to forge new trust-based relationships with other participant organizations, which in the absence of the IOS, were previously inaccessible, because of the size and position of the organizations in the marketplace. Studying the different types of B2B collaboration architectures and implications for each of the individual organizations can draw attention to the pros and cons of each type of collaboration architecture, which organizations can consider before making the commitment to sign-up for the IOS.

The third part of the proposition - *each of which choose to have a stake in the IOS entity* - focuses on the factors that motivate organizations to build a participatory stake in the IOS entity by virtue of organizations making a conscientious choice in engaging with the IOS artifact – which as mentioned in the Introduction, has been one of the primary and current areas of research interest for IOS. Due to the competitive environment within which organizations operate, this is an important area of research interest especially for competitor organizations (Cavaye et. al 1995), because it focuses on the identification of collaborative solutions that are synergistic and worth pursuing despite the competition. Although status quo studies on IOS, primarily place emphasis on factors that influence IOS adoption and diffusion, such as the creation of a Standards Development Organization (SDO) that is industry specific and can be of benefit to organizations that belong to a specific industry (Nelson et.al 2006), it is critical that these factors continue to be evaluated in terms of how exemplary they are in influencing future IOS adoption. The important aspect of this motivation is the ability of the IOS artifact to address an organization's need to have flexibility in maintaining the engagement with the IOS and minimizing the risk of dependence on the partnerships that an organization forges with other participants who have a stake in the IOS entity. Thus, while studying the descriptive features of state-of-art IOS, understanding organizational motivation and how to incorporate it in IOS design can further strengthen the business case for the IOS.

CONCLUSION

The paper highlights the fact that the IOS is a classification of IS and this property can be used in identifying the general characteristics of the IS artifact that the IOS artifact inherits as well as those that are unique to it. The second and the third part of the proposition, stated in the paper, while continue to focus on the organizational dimension of IOS they also allude to areas of research interest within the organizational domain that can influence the design of the IOS artifact. While the three areas of contemporary research interests mentioned in the Introduction are narrow in scope (Robey et al 2008) , these research areas are critical in forging trust-based collaborative relationships, which can also prove to be symbiotic.

ACKNOWLEDGMENTS

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