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A Resurgence Of Interest In Information Architecture

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Abstract

The topic of IT Architecture has emerged as a popular term in recent years, in particular by the term Service Oriented Architecture. In many ways there is nothing new about IT Architecture; what is new is that both public and private sector organisations are freshly receptive to talking about the strategic shaping of Information Technology using the language of Architecture. Information Architecture is a part of IT Architecture, and has also generated interest through e-business initiatives. Managing Information Architecture is a desirable IT responsibility, and is as much organisational as technical, drawing on the breadth of the IS field as we see it today. The contribution of the paper is an exposure of Information Architecture issues and an argument that its current topicality offers IS practitioners a renewed opportunity to pursue an Information Architecture strategy, and academics a new incentive to research this area.

Keywords: Information Architecture, Practice, Research, Local Government

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Abstract

The topic of IT Architecture has emerged as a popular term in recent years, in particular by the term Service Oriented Architecture. In many ways there is nothing new about IT Architecture; what is new is that both public and private sector organisations are freshly receptive to talking about the strategic shaping of Information Technology using the language of Architecture. Information Architecture is a part of IT Architecture, and has also generated interest through e-business initiatives. Managing Information Architecture is a desirable IT responsibility, and is as much organisational as technical, drawing on the breadth of the IS field as we see it today. The contribution of the paper is an exposure of Information Architecture issues and an argument that its current topicality offers IS practitioners a renewed opportunity to pursue an Information Architecture strategy, and academics a new incentive to research this area.

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1.0 Introduction

With Michael Earl being a keynote speaker for this conference, it is more than appropriate to highlight the far-sighted framework for the strategic management of Information Technology that he articulated as long as 20 years ago (Earl, 1989). Apart from making the case for the strategic management of IT, Earl segmented the field into three primary areas: Information Technology, Information Management and Information Systems. He articulated a number of frameworks for the strategic management of each area. He used the term 'Architecture' to represent the Information Technology framework (*op cit* p.95), comprising of four domains: Computing, Communications, Data and Applications. He noted at the time that there was not much academic literature based on this topic, although there was experience and awareness amongst practitioners. Since then a significant but not overwhelming literature has grown, although it arguably still has a lower profile than it deserves. Kettinger et al (1996) noted a resurgence of interest in Architecture along with the BPR movement in the 1990s.

IT Architecture is a maturing topic that addresses the strategic shaping of today's IT systems that have grown to be increasingly heterogeneous, isolated and distributed, serving a requirement for greater integration, coordination, across multiple channels and business processes. It operates at two main levels. At the project or solution

level, architects shape the integrity of individual systems for interoperability, performance and reliability; at the enterprise level, the organisation's IT resources as a whole equally need to be shaped in order to deliver benefits of integration, flexibility and reuse.

It is noteworthy that current expressions of the domains of IT Architecture are still quite close to Earl's four domains. Typically they are shown as Infrastructure (combining Earl's Computing and Communications), and Information / Data and Applications (corresponding directly to Earl). The Open Group (2008) uses domains of Business, Data, Applications and Technology, adding the 'Business' domain. Similarly CapGemini (2009) uses Business, Information, Information Systems and Technology Infrastructure. IBM's Service Oriented Architecture (SOA) reference architecture (IBM SOA, 2009) has less emphasis on infrastructure, a large emphasis on service layers but retains an IA domain.

The architectural movement and SOA in particular has caught the attention of business management in such a way that the enterprise architecture approach can be seen as 'a window of opportunity in terms of educating senior managers on the value of information management practices' (North et al, 2004).

There is relatively little current 'organisational' IS literature that studies Information Architecture (IA). This is surprising, since as well as focusing on the fundamental topic of Information, IA calls on a wide spectrum of IS perspectives and skills, from technical awareness and conceptual design to organisational awareness and management. This paper therefore seeks to expose some of the issues associated with IA and to encourage a resurgence of attention to the field. First it explains the central ideas of architecture, then looks at the history and scope of the IA concept. Next it spells out the particular aspects of IA, hopefully finally motivating the IS academic to research and teach more in this area.

1.1 Architecture Domains; technical and viewpoint independence

The logic for identifying separate architectural domains or layers, including the Information or Data domain, is twofold. First, there is a degree of natural independence between the domains that is offered by their associated technologies. Whether the independence is by design or evolution is debatable, as is the purity of their independence. However one powerful way to think about architecture is that it should shape and separate system design into these domains to produce separate independent components. Current technologies and standards (such as databases, portable operating systems and standard communication protocols) enable this separation, and new technologies are developing that enable yet finer granularity of domains, still separately manageable. Working with independent domains is beneficial for systems development and maintenance beyond simply partitioning development work that can be independently managed. It also encourages the re-use of components, that, by performing just one separable aspect of a design, are more likely to be generically usable. It also allows the possibility of modifying components in one domain (e.g. the hardware, the database management system) without affecting components in other domains; this has long been good practice in systems development. Finally it supports flexibility, again because changes may be isolated or at least partitioned into different independent components. The emphasis of development has changed from monolithic design, to managing components and interfaces.

The second way of thinking of architecture domains is more general, and relates to the representation of the many 'viewpoints' of a system. Viewpoints include not only the technical aspects mentioned already, but multiple broader domains or dimensions of architecture including geography, organisational structure, and even the different business strategies supported by the architecture. Each of these viewpoints can be thought of not just as semi-independent domains from a development viewpoint, but as a way of communicating an aspect of the architecture for a particular purpose, whether to business sponsor, individual user, technical development staff or service provider. Each stakeholder has their own viewpoint and interest, that needs to be understood as a basis for communication about the system. Each of these viewpoints

also has a dimension of granularity, and architectural thinking requires the ability to swiftly drill down or up through the detail of a viewpoint (Lankhorst, 2005).

SOA offers two additional domains. First, the Process domain represents business processes that the business should readily recognise. Second the Services domain breaks down processes into more elementary (and often common) service elements. Whilst being only one analytical step from the process domain, replication and redundancy of services become readily apparent; at the same time the services can be easily recognised by IT developers. Thus the power of SOA lies in demonstrating architectural thinking but using a (services) language that both business and IT can recognise. 'The information architecture is a critical step in synthesizing an understanding of the organizational strategies and mapping this to the technical environment' (Perks & Beveridge, 2003).

1.2 Practice of Architecture: pure vs possible

To the mind of a trained logician, mathematician or computer scientist, the vision of independent or semi-independent layers is highly attractive, suggesting the possibility of designing a minimal unified set of components to support the organisation's collective Information System requirements. In practice however, architects rarely have a realistic opportunity to design a pure system (Lankhorst, 2005; Hopkins & Jenkins, 2008). Even in the longer term, although architects may espouse the aim of developing an integrated coherent enterprise architecture, the existing 'landscape' and naturally dis-integrated development initiatives that arise means that it is a never-ending battle merely to maintain order, not to mention achieving rationalisation. The existing landscape is also often so big that it is simply infeasible to consider redeveloping the assets as a coordinated whole, not only due to the high cost and low short term ROI, but also due to the high risk of failure associated with large IT projects.

In practice then, although there is certainly a role for the enterprise architect and for a vision of a unified architecture, the enterprise architect is normally bound to 'eat the IT elephant' 'one bite at a time' (Hopkins & Jenkins, 2008). Architects are normally constrained to work towards current business objectives and deliverables, and rarely

have the time or resources to develop the architecture either for its own sake or for the sake of future economies, although there are exceptions (Reynolds, 2007). They have to work with funding that is directed towards particular developments, and whilst there is a role (as there has always been in IS) for creative resourcing, there is a very limited amount of architecture development that can be done at once. One of the key skills of the successful enterprise IT architect then, is to manage different initiatives whilst retaining a vision for the coherent development of the architecture.

1.3 Information Architecture

Kettinger et al (1996) suggest that data, or information architecture, has been a central element of strategic IT architecture since before Earl's book and even before the database was invented (that itself was a key enabler of information management). Kettinger et al define IA as 'a high-level model of a set of data classes configured to support the organization's value-adding business processes. The model may be portrayed in graphical form and is independent of technology and organizational structure'. By the same argument as above, although the naïve architect could see IA as the pursuit of a unified all-encompassing database, such an approach is not feasible, again partly because it would be unlikely to be funded, and partly because even with the latest database systems and other infrastructure developments it would be unlikely to work with adequate functionality, performance, reliability, security etc. So the first point about IA is that, as with architecture in general, it has to engage with business driven initiatives, and so becomes an enterprise and organisational issue at least as much as a technical one.

Hearing the experiences of IT Architects, I suggest that IA has been somewhat neglected amongst the Architecture domains, in practice as well as in the literature. In practice the emphasis has been to gain fast working strategic e-commerce systems, Internet presence or other business-critical systems, and the time to create a coherent managed information base is rarely found, although it does depend significantly on the culture and degree of unification or distribution of IS and their control in the organisation (Ross *et al*, 2006). A further impetus for the development of IA was the Internet boom, where the desire to produce Internet or Intranet pages naturally focused attention on their key content, i.e. information. It forced attention to issues

such as source including ownership, quality including accuracy, timeliness … as discussed below. Although all these topics are addressed in the typical 'Information Systems 101' teaching module, there seems to be an opportunity for further development in this area.

2.0 Information Architecture: incremental development

It is established above that IA is in theory a core element of IT Architecture and Strategy; yet is found to be not easily tractable. A clear example may be found in a major UK-based global pharmaceutical company. Despite the size of the company, in 2008 there was a sole Information Architect at the enterprise level. This architect openly recognised that progress is so difficult that it has not even been possible to introduce or enforce a common 'country code' standard across the company's operations. This is an excellent illustration because on the one hand it seems ludicrous that such a basic standardisation cannot be achieved, yet, once the history, complexity and culture of the organisation is appreciated, it is rather more readily accepted that such a change will not happen in the absence of a significant business-critical need as driver and funder. Further, the complexities and scale mean that even such an apparently trivial development could involve hundreds of applications devolved over 90 countries, 3 business units, etc, even if the changes were isolated to the Information domain. In particular unless individual business units see a gain from the standardisation, funding stalls. The Information Architect recognises that their approach must be incremental, proving benefits and building on small successes, persuading the business to invest in information architecture.

More positively, experience at a UK local government recently showed that in this sector there are business drivers of some force that are encouraging developments in Information Architecture. In particular there have recently been initiatives for 'Transformational local government' and directives to provide 'joined up' services, accessible via e-government portals with an associated focus on information (Beynon-Davies and Williams 2003; Weerakkody et al, 2007). Progress has been made towards standards and interoperability for the Property Index, the Citizens' Index and for geospatial data and towards the LLPG project – the UK-wide council initiative to consolidate property information and the Citizens' Index. The Local Government

Standards Architecture Reference Model (LGSARM, 2009) provides significant guidance towards architecture standards; its own model includes Information, Process, Transaction, Service, Discovery, Interoperability and Access (Channel) domains. There are increasing expectations for integration of services for such scenarios as if there is a fire in a local property, not only can the fire service know where is the best base for operations, but they need to be aware of a person who may not be able to exit normally, or of nearby residents who may be dependent on the care of a person affected by the fire. There is still little enforcement of common practice and standards between local councils, but there are working interest groups and plenty development work to be done. Weerakkody et al (2007) assert that 'Little is known about how EA frameworks can best be implemented and used in government Agencies'.

In both public and private sector cases above, IA can be seen to fall within the family of architecture in general, and is about 'the art of the possible'. IA is perceived as important only inasmuch as it is responds to a business-driven need. Although IS understands the need to be business-aligned and business-driven (Henderson and Venkatraman, 1993; Luftman, 2003), it perhaps has been slower to realise that it must manage business alignment alongside its own development, and that architecture notions can help. Thus pragmatic architecture, whether information, infrastructure or applications, has matured to the extent that it does not expect to achieve a short or even medium term unified architecture except perhaps in 'unified' companies (Ross et al, 2006). Instead it relies on raising awareness, knowledge and understanding of where are the discontinuities and imperfections, creating mappings between versions of components within and across domains, and dependencies between components as well as dependencies of systems on individual components. It may not have a single point for maintenance of any element, but hopes to know at least the multiple points required. This makes for a more feasible and sustainable approach in partnership with the business, but also makes for a frustrating role.

We now take a brief look at Earl's introduction to IA, followed by a brief review of other authors, and then go on to identify the elements of IA more systematically from the literature in general.

2.1 IA literature: Earl

Earl (1989) acknowledged data architecture as 'intellectually challenging, administratively painful, and practically frustrating', often receiving a low priority (*op cit* pp.99-100), an experience that is still common as illustrated above. Earl includes within the remit of information (data) architecture: determination of data storage locations, use and access, design and administration of databases, the definition and coding of data and communication protocols for interchange between organisations, as well as security and privacy. Such concerns are clearly still highly relevant, and at the technical level the Internet, XML and the Semantic Web are making a large contribution. Next, using a slightly abstract framework of 'parameters, schemas, policies and plans', Earl introduces examples of IA issues such as devolution of control, design of entity-relationship models, data definitions and structures, and security standards respectively, which are also still actively relevant issues for organisations today. Earl states (*op cit* p.102): 'experience shows that, as for architecture as a whole, data modelling is easier and more successful if it is done around particular functions, activities, or application areas than for the enterprise as a whole – despite the fact that data flows rarely obey such boundaries'. Here he recognises the overriding need for a pragmatic approach and strong focus, driven by business drivers and political empires.

Earl also suggests a methodology for architecture development (*op cit* pp.105 ff), a four-stage process of 'mapping, steering, updating and shaping' that identifies a direction from 'as-is' to 'to-be' in the light of technology capabilities, developing principles plans and actions to develop the architecture. He notes (*op cit* p.113) the lessons from practice, that scale, scope, necessity, speed, principles, increments, updates, fit, timing, resources, skills, consensus and support are all critical ingredients for successful practice. The process, organisational and change management aspects of the IS field today are very relevant.

Finally, Earl (*op cit* p.115) notes that to be effective, architecture must be seen as a framework (rather than a specific prescription), that concerns technology but should support and be linked to the IS strategy; it should be represented by a clear and integrated model that actively informs technology decisions and resolves conflicts. He

notes that architecture is as much influenced by organisational mandates and business imperatives as technological desirables.

Thus Earl set out a firm foundation for what were to remain issues in IA right up to the present time.

2.2 IA literature: other researchers

Brancheau et al (1989) present a strong architectural view of information, making a strong comparison with construction architecture. They stress the need for a target architecture that is based on business functions and structure and existing applications. They use a function vs data matrix to help to do the mapping step, to identify gaps or opportunities, and to raise issue of owners and rules for managing information. They recognise that the data model is always incomplete and support Earl's argument to focus on a manageable subset that is of current relevant and interest. They note the need for timing of initiatives and perennial need for commitment from senior management.

Kettinger et al (1996) offer a useful history of IA. They relate IA to Business Process Reengineering as synergistic approaches. They also refer to the process/data class 'CRUD' matrix that forms a key focus for mapping of information.

Evernden and Evernden (2003) see the need for architecture 'whenever we want to define a high-level overview of interrelated components and when the relationships among them are complex and difficult to understand', and include IA as an example. They note the multi-dimensional aspects that make models more complex and difficult to work with than just two- or three- dimensional models, and stress the need for business drivers.

Gilchrist and Mahon (2004) make a useful applied contribution to the field in an edited collection of chapters which are referred to more fully below. They also take the pragmatic architecture perspective, to tackle the relatively easy wins but have a wider plan, within the wider context of an enterprise IT architecture. They define IA as 'a coherent set of strategies and plans for information access and delivery inside

organisations'; a purely internal perspective in the definition seems restrictive, however.

Other writers such as Nordheim and Päivärinta (2006) suggest that related areas or terms are Enterprise Content Management, Information Resource Management Electronic Document Management and Knowledge Management.

Finally but certainly not least, Rosenfeld & Morville (2002) is a useful source of information about a range of issues associated with Information Architecture, with a focus on Web Sites, including enterprise level as well as solution level perspectives, process as well as content, stressing 'findability' and recognising the need to sell the idea to the business. They talk about the 'elephant' of IA in terms of its multifaceted nature, in contrast to Hopkins and Jenkins (2008) who were referring to the sheer size of IT systems.

3.0 Aspects of Information Architecture

This section seeks to bring together, summarise and draw attention to a number of the key IA issues that are likely to be of interest for IS researchers. It refers back to some of the works from the previous section but includes others and is now organised by theme rather than author or chronology.

3.1 Information Quality

The heart of information architecture must be information itself. Galliers (1987) defines information as 'a collection of data which, when presented in a particular manner and at an appropriate time, improves the knowledge of the person receiving it in such a way that they are better able to undertake a particular activity or to make a particular decision.' The old maxim of 'Garbage in, Garbage out' is perhaps the easiest way to be reminded of the age-old requirement to ensure the quality of the resource. Bocij et al (2006) summarise the key qualities under headings of accuracy, relevance, completeness, conciseness, scope, to which might be added timeliness, accessibility, security amongst others; some of these are addressed here.

3.1.1 Searchability, Findability, Accessibility

For information to be fit for purpose, it is fundamental that it is able to be found and presented to the person who needs it, when they need it, as well as in the appropriate form. This is not trivial where there are different versions of information across disparate sources, even considering the relatively structured database-driven transaction systems. For unstructured documents the problem is so much greater, Rowlatt (2004) claims that 'the fundamental IA software tool is search software'. Rosenfeld & Morville (2002, p 219) believe that, with regard to web sites at least, 'findability precedes usability' and discuss search methods and algorithms in this context.

3.1.2 Security

Writers in Gilchrist A and Mahon B (2004) mention security but only briefly, but surely it is an increasingly important topic that must be treated side by side with accessibility. Even Earl (1989) was conscious of the issue, as mentioned above, and although it is not dealt with in any depth here, it is recognised as a serious issue.

3.2 Metadata model

In order to find data in unstructured documents, a search engine can either search the whole document (if it is computer-readable) or it can search an index of key words. Key words are an example of metadata, data about documents: its location as well as content. Metadata is needed at the local document level, and also at the enterprise level to serve as a map of the sources of data about a topic. Metadata is difficult and resource-intensive to create and maintain, and an almost infeasible task for existing non-indexed documents. Although there are some technologies that can support the creation and maintenance of metadata, good quality metadata relies on intelligent and disciplined (therefore expensive) human input. Metadata typically includes reference, author, title, date, subject, revision history, authentication (Leloup, 2004). The 'Dublin Core' Metadata Element Set (2009) is an example of a standard for what might be maintained, although writers in Gilchrist and Mahon (2004) are generally pessimstic about the chances of maintaining more than the basic attributes of date, title, creator and subject. Even if key words are used, there is a difficulty of different people using different words for the same concept, so there are also significant efforts

to create agreed taxonomies or controlled vocabularies of terms that are relevant to a particular human activity system (Rosenfeld & Morville, 2002; Gilchrist, 2004; Maclachlan, 2004; McLaughlin & Greenwood, 2004; Warner, 2004). In particular, central and local government have been active in developing category lists (Maclachlan, 2004).

3.3 Information and Process

Although the information domain can be separated from the process domain, it is clear that they interact significantly (Kettinger et al, 1996), so that there is potential synergy between IA and Business Process Reengineering initiatives. Both share the need to cross organisational boundaries and therefore both require an integrated enterprise approach. Identifying information by tracking its flow across processes is a natural way of doing an information mapping exercise or audit (Buchanan & Gibb, 1998). We referred above to the use of information / process matrices (Brancheau et al, 1989; Kettinger et al, 1996) that embody the connection, and Fisher (2004) makes the important differentiation between the static view and the dynamic 'life-cycle' view of information. Thus it is important to recognise the dynamic, process view of information when developing the IA.

3.4 IA Methodology

Fisher (2004) suggests the usual project life-cycle approach of Discovery; Analysis; Design; Plan; Develop and Implement. He complements Earl's (1989) more strategic approach of 'mapping, steering, updating and shaping' that was identified above. Both include top-down shaping and steering but also bottom-up mapping and updating aspects, and as suggested above, IA mapping or discovery will include an element of process modelling (Kettinger et al, 1996). The Information Architecture Institute (2009) has resources that suggest a similar approach, also mentioning the iterative nature of IA methodology, and along with Rosenfeld & Morville, (2002) suggest various techniques apart from the information – process matrix mentioned earlier. Other sources e.g. van den Berg & van Steenbergen (2006) and The Open Group (2008) discuss methodological frameworks for architecture in general.

3.5 Organisational issues

It has been mentioned already that the issues and difficulties of information architecture are social as much as technical. They include the following:

- *Ownership.* It is important to establish responsibility and accountability for the qualities of information, yet this is not always clear in organisations. Sometimes parties my want to retain ownership for political reasons. At other times parties may wish they did not have responsibility, for instance the initial source of information is a natural place to ensure accuracy but often this role does not benefit from the accuracy or otherwise.
- *Governance.* Appropriate decision making processes and representation are required to ensure that information architecture policy is enforced. The Information Architect and other appropriate representatives need to be involved in hardware and software selection (Rowlatt, 2004) and systems development reviews, for instance.
- *Maturity.* Each organisation is likely to be at a different stage of maturity with respect to architecture in general and IA in particular. The general message about maturity is that it can only be built up gradually (Ross et al, 2006; Weerakkody et al, 2007). Organisations need to walk before they run, and not take too many steps at once.
- *Organisational Structure.* Adequate governance ultimately requires political authority, which in turn requires a suitable organisational structure with representation at sufficiently senior levels to be able to credibly challenge short term or siloed objectives in the interests of longer term architectural considerations.
- *Culture*. Different organisations have historically developed different attitudes towards information; at the early stages of IA, a cultural change may be required.

3.6 Challenges and successful IA practice

The primary challenges in IA appear to be:

- the organisation and indexing of unstructured documents, especially the legacy base of existing information
- negotiating and aligning architecture development with business projects
- establishing policy and governance mechanisms

These difficulties are common to IT architecture in general, and are likely both to suffer the intractability of enterprise architecture problems and to benefit from the methods used to address them. Although success factor lists and models are sometimes criticised, several IA writers have suggested factors, and it seems reasonable to recognise the value of experience. Suggested factors are listed next, unprioritised, including some issues already mentioned above:

- Shared vision (Earl, 1989; Fraser and Sobalvarro, 2004; Weerakkody et al, 2007)
- Alignment and timing with the business (Earl, 1989; Evernden and Evernden, (2003)
- Strong and decisive leadership and governance with reasonable but firm deadlines (Fraser and Sobalvarro, 2004)
- Incremental bite-sized focused initiatives, building on early success (Brancheau et al, 1989; Earl, 1989; Rowlatt, 2004; Fraser and Sobalvarro (2004).
- Senior management support (Brancheau et al, 1989; Fraser and Sobalvarro, 2004)

- Good technology choices e.g. database (Rowlatt, 2004)
- Ability to make compromise but maintain coherence (Gilchrist and Mahon, 2004)
- Communication among stakeholders (Weerakkody et al, 2007)
- Evaluation of the impact (Weerakkody et al, 2007)
- Staff architectural skills (Earl, 1989)
- The organisational culture and maturity with respect to information architecture (Ross et al, 2006)

4.0 Discussion and example

An example of initiatives in the area of IA that bring some of these notions together is a London Borough (Dmitriev, 2008). It has done some Discovery and Analysis work and classifies its key information classes as People, Partnerships (with service providers), Property and Transactions. It is looking into environments that integrate information, process, storage, search and retrieval. Its motivation is joined-up services and information storage management, building on an investment in electronic document management through funds made available from central government. The primary original objective was to manage filing space, but inevitably issues of keywords, search, ownership, format, source, business processes etc. arose, raising the level of debate 'bottom up'.

A system based on Microsoft Sharepoint has been considered, whereby documents may be shared, indexed, retrieved and attached to workflow patterns. It is suggested that this would be a more efficient process than the existing shared folders and email communications, for example project or other interest groups can be explicitly formed and instantly made aware of relevant documents or changes in documents. Such systems border on knowledge management and can replace informal 'hot-lists' of key contacts, that can soon become out of date. Ratepayers who initiate enquiries can be associated with a semi-automatic workflow that helps to coordinates relevant parties, with a particular advantage where those parties are in different directorates. For example a request to remove an animal can have one or more different processes associated with it, depending not least on the type of animal involved. There are still a number of issues including metadata maintenance, choosing the most appropriate technology, ownership of data, localised directorate perspectives and lack of perceived value, architectural vision and governance.

The argument of this paper is to suggest that there is both a current need and an opportunity for renewed attention to the area of IA within the IS field. Despite awareness that we live today in an information society, in many organisations information is still not managed well, to the organisation's cost in terms of errors and inefficiencies, and to its clients in terms of quality of service. The reasons why IA is not well managed are understood, are multiple, and are social as much as technical, yet as such are well within the remit of IS researchers. There has been significant technical development in both enabling hardware and software, and critically, enabling standards such as XML and search engines but there is less awareness of what makes for effective IA either at the individual architect or at the organisation level.

Specific research questions include:

- What makes for an effective Information Architect?
- What makes for an effective organisation in terms of managing IA, either in the public or private sectors?
- How can document indexing, organisation and retrieval be made less of a burden on resources?

Such research has its own challenges, including choice of method, defining and measuring success, and appreciating the contextual nature of the IA task.

5.0 Conclusions

The paper has shown that although IT Architecture in general and IA in particular are long established, they are enjoying an increased level of attention of practitioners in recent years. It has identified and highlighted six domains of interest in information architecture that can help to shape researcher or practitioner initiatives in the area of IA. It does not claim to be an exhaustive literature review at this point, but does refer to a number of key works. Given the current receptivity of organisations to architectural thinking, it is argued that, using a broad socio-technical outlook, IS academics should give the topic further study to complement the practical interest and progress. If we believe that 'Information is probably too serious a thing to be left in the hands of IT people' (Leloup, 2004), then let IS people give Information Architecture the attention that its fundamental nature merits. IA thinking has developed from Earl's firm foundation, but there is plenty work still to be done both

by practitioners and academics, and it is a good time to join that effort. The general advice of Hopkins and Jenkins (2008) would be to make clear and agreed plans to devour this 'elephant', albeit one step at a time. The only question is whether the IS development community has the appetite, and the IS academic community the interest.

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