The I in information architecture: the challenge of content management

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Abstract

Purpose – The purpose of this paper is to provide a review of content management in the context of information architecture.

Design/methodology/approach – The method adopted is a review of definitions of information architecture and an analysis of the importance of content and its management within information architecture.

Findings – Concludes that reality will not necessarily match the vision of organisations investing in information architecture.

Originality/value – The paper considers practical issues around content and records management.

Keywords Information management, Content management, Records management

Paper type Conceptual paper

Introduction

A lot of literature is being generated around information architecture (IA) at present. As is the case in many emerging disciplines, examination of the theory and practice of IA is found in the literature within diverse fields of study. In particular, IA is examined within the context of web usability and information management. Web usability literature on IA tends to focus on interface design, while information management literature tends to focus on taxonomy creation. This paper places concepts of IA within a broader framework, by acknowledging the importance of design and organisation, but focusing on managing content.

Information architecture: definitions and scope

A fundamental problem for anyone wishing to engage with concepts of IA is the lack of a clear definition of its scope. The Information Architecture Institute (2006) defines information architecture as:

- the structural design of shared information environments;
- the art and science of organizing and labeling websites, intranets, online communities, and software to support usability and findability; and
- an emerging community of practice focused on bringing principles of design and architecture to the digital landscape.

This largely mirrors Rosenfeld and Morville (2002, p. 4):

- the combination of organization, labelling and navigation schemes within an information system;

- the architectural design of an information space to facilitate task completion and intuitive access to content;
- the art and science of structuring and classifying websites and intranets to help people find and manage information; and
- an emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape.

The problem, or perhaps benefit, for anyone involved in the field is that there is no single, straightforward definition of information architecture. Part of the reason for this certainly lies in the fact that the discipline is, as pointed out in the above definitions, still emerging. Looking closely at the definitions offered, it is clear that there are common elements, particularly the concepts of organisation and design. Some authors would even argue that IA is synonymous with taxonomy (see, for example, Wikipedia's, 2006 IAI, entry); this does not seem helpful as the taxonomy is only one part of the information environment. Taking inspiration from the built environment, it has been pointed out by Worple (2000, p. 32) that:

> Architecture is concerned with more than just the frame, skin and external detailing of a building.

Content was mentioned only in passing in the definitions of IA cited above, but it is not just the structure and the external appearance that is important in IA, the information itself is of central concern.

No matter how well designed and aesthetically pleasing the IA, it is only going to be of benefit if it includes all the documentation and information its users need, and if that information and documentation can be easily retrieved. Architecture is not only about creating robust structures, it is also about functionality.

Much of the literature on information architecture examines content but restricts its coverage to high level content, dealing primarily with the information audit and with the organisation and design of systems, back to IA being synonymous with taxonomy. This is a top-down approach to system content – representing an ideal. This paper considers what actually exists in the system and the type of documentation that is likely to be created by discussing how to review and manage the individual information items present in the organisation. The reality will not necessarily match the vision.

Records management
The field of records management is of central concern here, and a good place to begin is to define the term "record". The Association of Records Managers and Administrators (ARMA, 1989, p. 16) define a record as:

> Recorded information, regardless of medium or characteristics, made or retrieved by an organisation that is useful in the operation of the organisation.

This is obviously a very broad definition, but the implication that the form or medium of the record is secondary to the information it carries is important.

This is emphasised on the ARMA (2006) website:

> It's estimated that more than 90% of the records being created today are electronic. Coupled with the overwhelming growth of electronic messages – most notably e-mail and instant

messaging – the management of electronic records has become a critical business issue. How that information is managed has significant business, legal, and technology ramifications. Ultimately, it doesn't matter what medium is used to create, deliver, or store information when determining if content is a record and should be managed accordingly.

The clear implication here is that records management is selective. A lot of documentation, a lot of content, will be produced and acquired by an organisation, but not everything will merit the status of a record. It is only the records that need to be stored and made accessible to system users.

Schwartz and Hernon (1993) emphasise the same point but take it a stage further when they say that records can be characterised by form, status and function. They point out that form is an important consideration in storage and retrieval, but that it is the record's status and function that determine its value. Status refers to the activity and permanency of the record, function refers to the role it plays within the organisation. In terms of status some records will be of transient interest, while others will need to be accessible for longer periods. In terms of function some records will be of general interest and importance and will need to be widely available, while others may be of interest only to limited numbers of specialist users within the organisation.

Content analysis and mapping

What strategies can be employed to determine what is a record (documentation that needs to be made accessible on an information system), and how can the status and function of those records be determined? This introduces the practice of content analysis. It was stated earlier that much of the IA literature looks at high level content, a top-down approach, in focusing on taxonomies and information audit. Rosenfeld and Morville (2002, p. 221) say that:

> Content analysis is a defining component of the bottom-up approach to architecture, involving careful review of the documents and objects that actually exist. What's in the site may not match the visions articulated by the strategy team and the opinion leaders. You'll need to identify and address these gaps between top-down vision and bottom-up reality.

A lot of the documentation that exists in any system might not possess the status and function that will define it as a record. Part of developing the information architecture will involve examining the documentation, deciding what should and should not be present in the system, and drawing up guidelines for authoring and content management. There has to be a clear strategy to formalise content gathering, analysis and mapping.

There is no quick and easy way to analyse content. No existing formula or software package is going to take into account the needs of a particular organisation. If the content analysis does not address specific organisational and user needs, then its value is questionable.

A sensible first step is to attempt to identify a representative sample of documents that will need to be present in the system. Rosenfeld and Morville (2002) suggest a "Noah's Ark" approach – begin the process by attempting to capture a couple of each type of animal. They divide species of document according to:

(1) *Format*. Paper and electronic text, audio-visual materials, software applications.

(2) *Document type*. News articles, technical reports, presentations, brochures, etc.

(3) *Source*. Documents from the various departments within the organisation: customer support, marketing, research and development, human resources, and so on.

(4) *Subject*. An existing taxonomy, thesaurus or classification scheme can be used to determine the subject range.

(5) *Existing architecture*. Assuming some kind of information system is already in place, a sample of the documentation that already exists within the system can be taken.

When the representative documentation has been gathered, the analysis of content can begin. When individual documents are being analysed there are four questions that should be kept in mind:

(1) What is this?

(2) How can I describe this?

(3) What distinguishes this from other documents?

(4) How can I make this document retrievable?

The "what is this?" question is the most general. The format is not significant if applications are provided to access the content. The creator of the document and the type of document (annual report, technical report, etc.) are also of limited importance. It is the information content of the document that determines its status and function as a record, so it can be prioritised in the analysis. The information content is addressed in the final three questions: "how can I describe this?", "what distinguishes this from other documents" and "how can I make this document retrievable?" Content mapping partly addresses these three questions and will help in determining status and function.

Content mapping involves identifying what Rosenfeld and Morville (2002, p. 289) term "information chunks" within documents. They define an information chunk as: "The most finely grained portion of content that merits or requires individual treatment." Content mapping involves asking additional questions:

(1) Can this document be segmented into multiple chunks that users might want to access separately?

(2) What is the smallest section of document content that needs to be individually indexed?

(3) Will the content of this document need to be repurposed across multiple documents or as part of multiple processes?

Finding answers to these questions involves identifying information chunks. First of all, can chunks be identified? Second, how small are the chunks? Third, will individual chunks be re-used across different documents or for different purposes – this last question obviously addresses the function or role of the content. An information chunk is essentially a record. Each chunk will have a status and a function (and a form) that will merit its definition as a discrete record. Clearly then, it is not the document itself that merits the status of a record, rather it is the chunks of information content each document contains that are the records that need to be managed.

All information systems contain a lot of records or chunks that are re-used in different documents for different purposes. Identifying and mapping the individual records or chunks is time-consuming initially, but will avoid duplication, storing the same information several times, and will make updating information on the system much quicker and more efficient. To make all this economy possible, the information architecture has to identify and map the relationships between records. Rosenfeld and Morville (2002) identify four different types of relationship that can exist between chunks:

(1) *Sequencing*. Chunks can be placed together in a sequence. It is often possible to identify a sequential relationship, particularly when dealing with processes. In an academic environment, for example, there are a series of steps involved in developing and delivering modules and short courses. It is useful, in that case, to present information about the process sequentially.

(2) *Co-location*. Chunks can be placed in the same document. Again using the university context as an example, module aims and learning outcomes will be reflected in the syllabus, so even though module aims, learning outcomes and syllabus may merit the status of information chunks in their own right, it is sensible to present all of those chunks on the same web-page.

(3) *Linking*. Chunks can link to other chunks. Hypertext links can be inserted to link to other chunks or records within other documents. In a module specification, there can be a link from the name of the module convenor to individual staff web-pages. The content of a reading list can link to the library website for information about whether there are loan copies of books available.

(4) *Shared meaning*. Even if chunks are not explicitly linked, they can share semantic characteristics that ensure they are co-located in an ad hoc manner. If metadata is created for a module specification and includes, for example, subject tags, or if the text of the module specification is automatically indexed, then anyone searching under the metadata tag or typing in a subject name or phrase in a search engine, will retrieve the module specification, plus all the other records that include the same metadata or the same text.

Metadata

So far the focus has been upon looking at documentation in a broad sense. Having introduced the term in the previous paragraph, it is useful at this point to consider content at the individual document level by looking at metadata.

Metadata essentially helps to describe and manage documents, regardless of format, although it is usually associated with electronic resources and it is usually associated with resource discovery or information retrieval. A very simple, widely used, definition of metadata is that it means data about data. A rather more detailed definition is provided by Vellucci (1998):Data that describe attributes of a resource, characterise its relationships, support its discovery and effective use, and exist in an electronic environment.Haynes (2004) says that metadata has five purposes:

(1) resource description;

(2) information retrieval;

(3) management of information;

(4) rights management, ownership and authenticity; and

(5) interoperability and e-commerce.

Resource description underpins the other four functions of metadata. At this level the focus is essentially upon cataloguing. Adequate description of resources means that the associated metadata can be used for retrieval, records management, and so on. Every resource has identifiable elements that can be used to describe it and differentiate it from other resources. These would include its title, the date it was produced, its creator, and its format, for example. Consistent and detailed resource description hugely increases the efficiency of information systems for retrieval and management of information.

It is clear that detailed resource description, using metadata, increases the efficiency of retrieval. Users can search for particular attributes like a particular author, date, format, and subject – assuming subject descriptors have been assigned to a resource. Essentially, metadata can increase the precision of searching by allowing for sophisticated field searching and subject searching. Subject metadata can also be used to assign resources to a category in taxonomy – increasing consistency of categorisation and so assisting browsing.

In terms of managing information, some metadata elements are specifically designed for records management. The e-Government metadata standard has an element called "preservation". This identifies resources that need to be archived and stored in the long term. In the traditional library environment, all information professionals are familiar with the life-cycle of materials – from acquisition, through circulation, to disposal. Metadata created at the ordering stage is used to manage and track all the other processes.

Rights management, ownership and authenticity are extremely important. Information is a commodity with a real economic value in most organisations. Haynes (2004) points out that one of the drivers for the development of metadata standards in the publishing industry has been the need to manage intellectual property rights. Metadata can include information about ownership of intellectual property, and information about provenance that can determine the authenticity of a resource and increase its value. This is particularly important in the digital environment, where information can be easily accessed and re-used.

Finally, interoperability and e-commerce is concerned with the exchange of information, sharing of resources and their commercial exploitation. It is useful to provide a formal definition of interoperability (Shirky, 2001):

> Two systems are interoperable if a user of one system can access even some resources or functions of other systems.

This is essentially what the UK e-Government initiative is devised to achieve. Information can flow seamlessly across government departments and can be accessed by the public. Use of the Dublin Core Metadata Element Set ensures that government websites share a common framework. MARC21 is another example – it generates metadata that allows for record sharing between libraries on a global scale. E-commerce depends on the ability to exchange data from one system to another and process it. Again, this is facilitated by a shared framework for managing e-resources.

Content management
Content analysis and content mapping are part of the information architecture development process. They will influence basic functionality, i.e. software applications, and taxonomy creation. Continuing usability of the system presupposes strategies for managing the content. As stated previously, no matter how well designed the system, no matter how elegant and robust the architecture is, the system is only going to be of benefit if it includes all the documentation and information its users need. That presupposes that the information and documentation is effectively managed. Content management systems are often treated as being synonymous to information architecture in the literature. An information system stores, organises and provides access to content. The information system has an architecture. These concepts are, therefore, inter-related, and an analysis of content management can be usefully developed within the context of general aspects of information systems and information architecture.

Boiko (2001, p.8) defines content management as:

> The process behind matching what "you" have with what "they" want. "You" are an organisation with information and functionality of value. "They" are a set of definable audiences who want that value. Content management is an overall process for collecting, managing and publishing content to any outlet.

The purpose of content management is to control the information lifecycle: through creation, approval, updating and weeding. This includes managing documents and managing records – those chunks of information that may be re-used or re-purposed across the system. There are commercial content management systems (CMS) that can be utilised, but decisions have to be made about which CMS will best suit an organisation's needs, and the CMS has to be managed. Here the focus is upon strategy and process, rather than individual applications.

McKeever (2003) outlines a four-layer hierarchy to provide a context for content management. This neatly demonstrates that content management underpins the whole system architecture. At the top of McKeever's hierarchy is the audience layer: the users of the system, who may be staff, and/or customers of the organisation, for example. One level below that is the outlet layer: the interface to the system. Below that is the activity layer: where contents are created and deployed, deployment being controlled by content analysis and metadata tagging. At the lowest level is the content itself: the records and documentation that are created, analysed, and deployed.

Here is the entire range of information architecture. Information audit and needs analysis examines the audience layer: identifying different types of user and their associated needs. Principles of user-centred design are addressed at the outlet layer, which will support a range of tasks and individual resources. At the activity layer, documents and records are created, categorised, and tagged so that they can be represented at the outlet layer and retrieved by the audience. At the content layer is the information itself. Content management incorporates everything from information through use and so does not restrict its sphere of interest to one level. Studying content management requires an examination of the whole system architecture.

Before going on to consider content management strategy, it is useful to look at the process in more detail. Here the focus is on the activity level of McKeever's model and the information lifecycle. Several writers including Boiko (2001) and Tredinnick (2005) map out the information lifecycle. Sequential models of the information lifecycle are

common, but the reality is rather more complex: phases and activities within the information lifecycle are iterative. Information is continually created, deployed, communicated and used.

The first phase is information creation and collection. A lot of people within the organisation may be concerned with this. Staff throughout the organisation may be authors of documents or creators of content. Some people may also have responsibility for collecting and making available external documentation or sources of information.

The second phase, which some organisations may ignore – depending on how closely content is managed, is approval. Some organisations will take a laissez-faire approach and allow content creators to decide what should and what should not be accessible. Other organisations will impose some form of centralised control to manage content. Approval may be the responsibility of departmental managers, or it may be the responsibility of an information manager or information management team. Certainly once a document has been created, it has to be approved quickly, so that it can move on to the next phase.

The third phase is deployment or publishing of content. This involves making the content accessible: creating web pages, assigning documentation to a category in a taxonomy, providing metadata to assist retrieval and re-use of information across multiple web pages, and so on. Creators of documents may have responsibility for publishing their own content, or the process may be overseen by specialist staff: information managers, for example.

The fourth phase is review of content. Once information is published, it is certainly not the end of the lifecycle. Content has to be continually reviewed to assess its status: currency, authority, value, and so on. The metadata assigned to a document can include information about review: when a document should be updated, when the information it contains will be out-of-date, when it should have been superseded by a new document. Including review information in the metadata should at least ensure that individual documents are checked for currency and accuracy every month, every three months, or whatever period seems to be appropriate. No organisation wants documentation present in their information systems after it has lost its value or relevancy.

The fifth phase is archiving and deletion of content. The review phase will identify documentation that is no longer needed. Some of the information contained in the documents will have been of transient value and the document should therefore be deleted. Other information, while no longer needed, may still have some value to the organisation and should be archived. When organisations relied on paper documentation, archiving was a given. Documents were filed away in the records management department, in the library, in people's filing cabinets. It is easy to delete digital information, and there has to be a policy and strategy whereby important documentation is archived for future reference.

A content management strategy should address a number of issues that are central to designing, maintaining and managing the information architecture. The strategy should establish roles and responsibilities, improve communication and ensure co-ordination of all information-related activities. Essentially the strategy should set out a series of objectives for managing content across the organisation, the overall aim being to improve information and resource sharing. It is important that the strategy include all stakeholders: managers, specialists and users. One of the barriers to

effective information sharing in organisations is the organisational culture. People will only participate if they see personal benefits in doing so. It can be very difficult to balance the needs of users and authors with the goals of the organisation, but an inclusive content management strategy can help.

Brys's (2004) paper provides a useful, practical outline of how to implement a content management (CM) strategy, and has been used in the following overview of the various issues:

- Emphasise the importance of information and its communication. This can be helped by drawing up clear policies and guidelines.
- Set out clear responsibilities. This should cover all levels: organisational, departmental and individual.
- Provide training. For managers, authors and users.
- Communicate clearly and inclusively. By making sure that effective communication channels about the information system are established – possibly through managers at departmental level.
- Emphasise the importance of the information architecture team in providing support and quality control.
- Set out workflow procedures for publication of content. To ensure smooth transition through authoring, approval and publication.
- Establish best practices. This might be done on a departmental level if general organisational guidelines do not address specific needs.

It is useful to divide implementation of the CM strategy into three stages: formulation of policy, planning and implementation. The CM policy would necessarily reflect the overall goals of the organisation. The CM strategy should set out a series of objectives; the policy should provide the means by which the achievement of these objectives can be measured. The UK's e-Government Policy Framework for Electronic Records Management (2001) stresses the setting of goals to help in determining the extent to which the overall strategy is followed and how far the policy guidelines are being met. CM policy would incorporate all aspects of the strategy outlined below, but central to the policy is an emphasis upon the importance of information and its communication within the organisation, and establishment of roles and responsibilities. The policy should clearly state how the content management strategy supports the work of the organisation. It should also set out guidelines about ownership of information and adherence to legal requirements generally. The policy can be quite specific, including things like using the Dublin Core Metadata Element Set to ensure consistency in describing documents. The policy should also specify individual and group responsibilities. For example, authors may be responsible for providing metadata; departmental information managers may be responsible for quality checks and approving publication of documentation.

The planning phase would emphasise Brys's next three points, which would also be carried through into the implementation phase: provision of training, clear and inclusive communication, the importance of the information architecture team in providing support and quality control. Training programmes must be designed prior to implementation. All the training resources must be in place: training staff, accommodation for training workshops and seminars, documentation, a help desk and

other online support. Everyone within the organisation should be informed about any changes. It is important in managing change that everyone who will be affected by the change feels that they are stakeholders and that proper consultation has taken place. The information audit should help people to feel that their needs are being taken into account. A commonly cited reason for IA development is to improve information flow that suggests that current channels of communication are not very effective. This can obviously create problems here. A mix of paper, electronic and face-to-face communication may need to be utilised and feedback encouraged. The final point in the planning stage pre-supposes that there is an information architecture team. If an organisation is willing to invest in improving access to information, then there should be a team of specialists, co-ordinating design, planning and implementing the new system. If the information architecture team has been involved in the information audit, they should already have quite a high profile within the organisation.

At the implementation stage, the architecture is in place, and the focus is upon its maintenance and effectiveness as an information resource. This involves issues previously outlined, training, for example, will be ongoing, but publication of content and quality issues merit discussion at this stage. Workflow procedures for publication of content should be established to ensure smooth transition through the information lifecycle: from creation and collection, through approval, publication, review and disposal. Everyone involved in the process should know exactly what their role is, and should perform that role efficiently. Ensuring that information is published quickly is vital, as is ensuring that only current information is on the system. To safeguard the quality of the resource and the information it contains Brys (2004) suggests that individual departments or services should establish best practices (and also guidelines where organisational guidelines don't seem to apply). The important point is to ensure that authors' needs are balanced with departmental or service needs and the needs of the organisation as a whole. Consistency is the key that predicates that certain important decisions should not be left up to individual authors. By delegating responsibility to departments or services, diversity can be accommodated while ensuring a degree of consistency.

Summary: implementation and maintenance issues
Finally, there are various questions that any organisation implementing information architecture and/or content management systems should have considered and found answers to:

- *Who should be responsible for strategy and policy formulation?* The final decisions will be made by senior management, but it is important to involve information and technical specialists, and, where possible, users. This relates to effective change management. It also relates to an issue raised earlier. It was stated that much of the IA literature examines high-level content: subjects that should be present within a taxonomy, and organisational needs as revealed in the information audit. That was a top down approach to system content – representing an ideal. Strategy and policy formation is also almost certainly going to represent an ideal – and in one sense that is perfectly acceptable. The strategy, in particular, will reflect the overall goals of the organisation. But by involving people at all levels of the organisation, it should be possible to learn about and incorporate (at least in the policy) what is realistically achievable.

- *Who should be responsible for design and implementation?* It is to be hoped that there will be an information architecture team. Designated, specialist staff should be recruited at the start of the process to provide input into the strategy and policy formation phase, which will feed into the design and, of course, the implementation. Members of the team should be involved in the information audit – apart from the need to feed the resulting data into the system design, it will also ensure that eventual users of the system get to know the team. Ultimately, potentially everyone within the organisation will be involved. Users will influence the design, and will be involved in testing prototype systems.

- *Who should be responsible for maintenance?* Ideally the information architecture team or an information manager should have overarching responsibility for managing the content of the system as a whole and, of course, the taxonomy. If everyone can add what they like where they like, then a nicely structured search and retrieval tool will quickly descend into chaos.

- *Who should be responsible for deciding what is included?* Again, ideally an information manager, or information management team, with an overview of the whole organisation and its needs and the needs of individual members of staff, should be responsible for deciding what resources are included, and how the resources are indexed – checking subject metadata and deciding which categories in a taxonomy resources should be allocated to. It seems sensible to leave the metadata creation and categorisation to the originators of documents, but authors cannot be expected to be consistent – although providing a list of descriptors in a glossary or thesaurus can help. It may be safer to leave the indexing to the information manager or the information team – but the volume of work involved may be prohibitive.

- *Should everything be included?* If the answer is yes, then that dispenses with the need for someone to make decisions about what is included. But, organisations generate enormous amounts of documentation, should everything be accessible to everyone? One of the key issues in records management is deciding what deserves the status of a record. Role and function require objective evaluation and authors might not be the best people to assess whether their documents have a function that merits their publication. Also, what is stored and capable of being retrieved within the information system will not necessarily be made available within the taxonomy. Taxonomies should be a means of improving resource sharing, if they grow too large or too complex or if they contain a lot of documentation that is of no possible interest to the majority of users, then they lose their efficiency as information retrieval tools. This leads to another question.

- *Who gets access – does everyone get access to everything?* Some information will almost certainly have to be password protected. This also impacts on the taxonomy. Should there be a single taxonomy for the whole organisation or is it more appropriate to have a shared taxonomy plus a series of specialist taxonomies? This seems to be contrary to the whole idea of a taxonomy as a tool to facilitate resource sharing, but are some parts of the organisation sufficiently specialised to merit their own smaller, highly specialised taxonomies to facilitate resource sharing among a few highly specialised individuals? Some resources might only be for the eyes of certain people within the organisation, so are parts

of the taxonomy closed to groups of users? The taxonomy will be mounted on an organisation's intranet, but is it appropriate to mount parts of it on the extranet? The answer is almost certainly yes. Remember that information chunks can be re-used and so will be included in documentation or web pages designed for external users. This introduces a set of new issues around public access and security.

- *Who should be responsible for deciding what should be removed?* Does an information manager decide, or should the creators of documents decide? If the information manager is responsible for deciding what goes in then it seems logical that they should be responsible for what comes out. Straightforward if, for example, an interim report is being superseded by a final report, but the information manager may lack sufficient specialist knowledge to decide when a document contains out-of-date and possibly misleading information. So should authors or other specialist staff be involved in the weeding process? Metatags can be used to determine the life of a document or to signal when content should be reviewed. But, is it safe to let authors decide what should be deleted and what should be archived?

All these questions impact on information architecture and content management strategy and all focus primarily on the content itself. Information architecture, in focusing upon structure and design, takes a top-down approach to system development: providing a framework and techniques that assist in the development of ideal information environments. In reality, the architecture is only as good as the information it houses. By focusing on content, this paper has outlined a series of management issues that should be addressed to ensure that the reality matches the vision.

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