

**Qualifying Examination
Part II
Questions from Dr. G. Harmon**

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Question 1

During the pre-Internet and Web eras, the information life cycle was typically portrayed as somewhat of a linear, sequential, and relatively slow and orderly process. For example, Harold Borko described the information life cycle as the functions associated with “the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information.” (Borko, H. (1968). *Information Science: What Is It? American Documentation*, 19, 3-5).

Response 1

The information life cycle is a model used to describe the various stages in the existence of information from creation to destruction. It is used to help us understand the processes involved in the management of information. Various authors have provided information life cycle models. The following are some examples.

O’Toole

James O’Toole claimed that the original information life cycle model was based on information embodied in records and was “first and most fully developed by record managers” (O’Toole, 1990, p. 51). The model consisted of four phases: creation, use, storage, and disposition.

Creation Phase

The first phase, creation, includes all the administrative elements needed to create a document. Such elements might include, creating the concept of the document, putting that concept in some physical form and transmitting that document to someone. (O’Toole, 1990, p. 51)

Use Phase

The second phase of the traditional model is use of the information. O'Toole reminded us that "records are necessarily created with a particular user in mind" (O'Toole, 1990, p. 51).

Unlike the creation phase which happens only once, this phase may occur or be repeated many times with many users. This is certainly true when a book, journal, or commercial video tape is produced with thousands of copies; but it is also true for reports, letters, photographs, and other documents. Within this phase are are considerations of access—who can use the material, security—protection of the material while in use, protection—keeping the material from being damaged or destroyed. Also the user must physically obtain the material in order to use it; that means the user must come to the place where the information is stored or the information must be transported to the person.

Storage Phase

Items need to be stored in some form to be available to the user. Storage might be for a short time or a long time. There are several issues included in this phase. The items need to be organized in some efficient way so the user can gain access to them; the items must be preserved so that they do not deteriorate (physically or electronically) while being stored.

Disposition Phase

Finally, when the items are no longer needed on a constant basis or not needed at all, they are moved to longer term archival storage or destroyed. The archives are considered part of this phase.

Ham

The model presented by F. Gerald Ham (Ham 1993, pp. 26-27) were similar to O'Toole's model with some minor details. Ham used the term stage rather than phase for each step of his cycle.

Creation Stage

Ham used the same name—creation—for the first stage as O'Toole. He also includes considerations of receipt from elsewhere and generation by a computer as part of this stage. He also stresses the importance of control of information and records from the beginning of the live cycle.

Active Administrative or Office Use Stage

Ham's second stage is similar to O'Toole's, but he highlighted "organizing, handling, and maintenance of information for immediate purposes." This detail was somewhat different from O'Toole's Use Phase in that immediate access or active storage is considered part of this stage rather than the Storage Phase of O'Toole's model.

Semi- or Inactive Storage Stage

In this stage, Ham addressed longer term storage requirements of the information. It is transferred to a storage place that is not so easily accessed but which provides protection at a lower cost than active storage.

Disposition Stage

Ham wrote that this stage has two outcomes: the records or information are either destroyed or prepared for "transfer to an archive for permanent preservation." So where O'Toole

considered archives a part of the Disposition Phase, Ham considered it separate and outside the life cycle.

T. R. Schellenberg

According to O'Toole, Theodore Roosevelt Schellenberg was "one of the leading American archival thinkers" (O'Toole, 1990, p. 22). His life cycle model consisted of three stages: Creation, Maintenance, and Disposition.¹

Creation Stage

Schellenberg's Creation (or birth) Stage was the same as O'Toole's Creation Phase and Ham's Creation Stage.

Maintenance Stage

His Maintenance (or life) Stage was a combination of the second and third states of O'Toole's and Ham's model. In it considerations are made for all activities needed for the user to access and use the information, including active, semi-active, and long term storage.

Disposition Stage

Schellenberg's Disposition Stage mirrored the last stages of O'Toole and Ham except that, like Ham, Schellenberg considered archives outside of the life cycle.

Penn, Pennix, and Coulson

Ira A. Penn, Gail B. Pennix, and Jim Coulson in their record management handbook (Penn, Pennix, & Coulson, 1994, pp. 12-17) created a life cycle model that included phases within phases. Its main phases consisted of Creation, Maintenance and Use, and Disposition

¹ Details of Schellenberg's life cycle model were obtained from my lecture notes from the UT Graduate School of Library and Information Science course LIS 389C.19, fall 200.

Stages. Within the Maintenance and Use Phase were the Active and Semi-active/Inactive Phases. The authors provide a more detailed description of the activities in each of the phases than did the previous scholars.

Creation Phase

The Creation Phase in the handbook covered the various ways that information or a document may be created including writing, and copying. The description is similar to that of O'Toole and Ham, but there is more detail. The authors pointed out that 70 percent of the cost of information is in the Creation Phase. The problems they discussed included the capture and control of needed documents. According to the authors, most information is created at the working level and some never leaves a worker's work station. The authors suggested that, "before a record is created, some thought should be given to the necessity for its existence. If it is unnecessary, it should not be created" (1994, p. 14). The authors stressed that as we move deeper into the information age it is more important than ever before that,

questions regarding the future of the information must be asked prior to the creation process. Although the maintenance and use activities can obviously not take place until the information has been created, the maintenance and use system must be developed at this early stage is that when the information does come into being it can be stored and retrieved in an orderly and efficient manner. (1994, p. 14)

Maintenance and Use Phase

This phase consisted of two subordinate phases: Active and Semi-active/Inactive. The description of this phase was similar to Ham although the subphases provided more detail about the activities involved. In their description, Penn, Pennix, and Coulson placed emphasis on the importance of good record management organization to provide easier user access to active information (1994, pp. 14-15)

Disposition Phase

Penn, Pennix, and Coulson have included the archives as part of the Disposition Phase. In this case the archive is equivalent to long term storage. In this way the model is closer to O'Toole's model than Ham's or Schellenberg's.

Interrelationships

Penn, Pennix, and Coulson were unique among the scholars discussing the life cycle models in that they provided a section in their description about the interrelationships between the life cycle phases. As part of their description, they added a second form of the life cycle model—the person/record relationship—as a series of concentric circles. The inner circle represented the information creation at the workstation and outer circle represented retention permanent record retention. Higher levels of managers become involved with the record management process as one moved through the circle. Ultimately senior management is required to make the decisions on which records will be retained permanently based the cost of maintenance versus the risk of not having a particular record when needed (1994, pp. 15-16)

Paul Wilson²

Paul Wilson's model identified two phases: Records management and archives. Within the Records management phase, there are six activities: creation, distribution, use, maintenance, storage, and disposal. Under the Archives phase there are also six activities: Appraisal or Selection; Transfer of Custody or Donation; Accessioning, Arrangement, and Description; Storage, and Preservation; and Access. Wilson's model, like O'Toole's included archives in the

² Dr. Paul Wilson was a visiting scholar to the School of Information at UT in 2001. His concepts of life cycle management are taken from the slides and notes I have from his class presentation on 30 Aug 2001.

model, but not just as an after thought. Wilson stresses the importance of the life cycle being a single integrated process from the birth of information with its creation to its potential final resting place in an archive. Anywhere along the process where storage costs may be realized, unneeded records may be weeded out and destroyed—only those records which have historic or long term business value should be preserved in the archive. This model was the most recent of the models presented and in my opinion, the one best able to accommodate Borko's functions, and the one most worthy of development in the digital age.

Comparison with Borko

Looking back on Borko's nine functions, we can now attempt to allocate them to the different life cycles.

Origination clearly falls into the creation phase or stage of each lifecycle.

Collection falls under the distribution and appraisal activities of Wilson's model. It is unclear where it falls in the other models.

Organization falls under maintenance and archival activities. However, in O'Toole's model it falls under storage..

Storage and retrieval fit together under the storage activities in all models although the retrieval activity from archives lies outside some of the models.

Interpretation is not addressed in any of the models although a case might be made that it is part of the use activity or phase. This case is supported by the user-driven model developed by Robert S. Taylor which includes a marriage of the user and technology in the information use environment (Taylor, 1986, pp. 23-47).

Transmission falls under distribution Wilson's model but it is unclear where it falls in the other models.

Transformation is not addressed in any of the models.

Utilization falls under use in all the models.

Question 2

Given current Internet and Web operations, as we might typically represent them today, how might the information life cycle be modeled, in terms of its fundamental nature, sequencing, spatial dimensions and dynamics? What are some of the implications of this “new” information life cycle for database designers, managers, and users? You need not spend time addressing the distinctions that can be made between data, information and knowledge. Report on critical sources as appropriate.

Response 2

The basic needs for control of information throughout the information life cycles previously discussed apply to the digital world. One still needs to control information even though it is digital. However, the concepts underlying these activities may not be applied as easily to the digital world. In the following sections of this paper, the twelve activities of the life cycle are discussed along with the impact of the Internet and World Wide Web on their usefulness in a future model. The description of a new live cycle model follows that discussion.

Information Life Cycle Phase Considerations

The phases of the life cycle as Wilson modeled provide us a good framework in which to address the impact the Internet, Web, and digital documents in general have had on the life cycle. They also provide us a framework in which we can gather candidate phases to be incorporated in a new model.

Information Creation

In the past information was generated and written down on paper. Manuscripts for books and journal articles were created and circulated to editors and reviewers. A final product was completed, proofed, and sent to a printer where a many copies were made. Copies were sent to book stores and libraries so that they may be read (or not read). In business, letters were written in longhand and typed by typing specialists who were adept at catching errors and making the finished product look “professional.”

The world has changed. Today a creator often types the information personally into a computer file. The computer makes or suggests appropriate spelling and sometimes grammatical corrections. The creator then sends the file for review and editing, and eventually the creation is printed or posted electronically on the Web. Business and personal letters, which used to be carefully crafted, are now dashed off and sent electronically, complete with any errors that may have been inadvertently left in, to readers who may spend as little time reading them as it took to write them. Then they are arbitrarily deleted or saved on some hard disk never to be looked at again. Even more ephemeral is instant messaging where the text disappears as soon as the next response is sent or when users logoff.³ But is the creation process different than it used to be?

However, some things are conceptually the same. Consider the sources of information in the past. It was created by individuals or groups of individuals and it emanated from organizational entities. Today it is still created by individuals or groups and it emanates from organizational entities. The tools are different and the medium is different, however; but the concept is still the same. The ability to quickly capture and preserve mistakes is now possible and economical. Information previously created may be easily recycled and used again with or

³ I recognize that any time that text is created, it is possible to save it. However, much of instant message content is not saved, intended to be saved, or even worth saving.

without modification. The care than one once took to put out information is now considerably reduced; but the first stage in the information life cycle is still the creation of information.

Most scholars writing about the life cycle in the past assumed that we create a document or record and then send it into the system as complete and packaged entity. Sometime later, the creator or someone else might want to revise update the document with a second edition; but the revision is also a complete packaged entity. In the past one might expect this revision to take a year or more to publish. Not so today. Now published information on the Web might be revised next month, or tomorrow, or after lunch or when we have a new idea. Information is not created in complete packages; it is now created in streams. New tools will have to be developed to capture the streams—and to cut the stream into pieces so it can be managed. New concepts will have to be developed to incorporate the streams of information into our information management process..

Information will have to be related to other information in some sort of organizational structure and that organization will have to be developed when the information is created. Our simple systems of managing ideas as complete and imbedded in the packages mentioned above will have to give way to systems that recognize that ideas and their packaging for consumptions are different and need to be managed as separate but related entities.

The International Federation Library Association has addressed the issue of just what entities are created during this initial phase. The report of the Study Group on Bibliographic Records suggests that there are four types of entities that are created whenever we create an record or document: *work*, *expression*, *manifestation*, and *item* (IFLA Study Group on the Functional Requirements for Bibliographic Records, 1998, p. 12).

The *work* is an abstract entity—“a distinct intellectual or artistic creation. . . . There is no single material object one can point to as the work” (1998, p. 16). The creation of the *work* must precede the creation of a physical entity, but it is not in a form that can be captured in physical form. It must first be captured in an expression.

An *expression* is also intangible but closer to the physical form the container of the information will take. It is,

the intellectual or artistic realization of a *work* in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms.

An *expression* is the specific intellectual or artistic form that a *work* takes each time it is "realized." *Expression* encompasses, for example, the specific words, sentences, paragraphs, etc. that result from the realization of a *work* in the form of a text, or the particular notes, phrasing, etc. resulting from the realization of a musical *work*. The boundaries of the entity *expression* are defined, however, so as to exclude aspects of physical form, such as typeface and page layout, that are not integral to the intellectual or artistic realization of the *work* as such. (1998, p. 18)

An *item* is the embodiment of an expression in a physical object or objects. It is the only entity defined in the report that one can touch and feel.

The entity defined as *item* is a concrete entity. It is in many instances a single physical object (e.g., a copy of a one-volume monograph, a single audio cassette, etc.). There are instances, however, where the entity defined as *item* comprises more than one physical object (e.g., a monograph issued as two separately bound volumes, a recording issued on three separate compact discs, etc.). (1998, p. 23)

The final type of entity is the *manifestation*. This entity is actually a group or class of items representing the items as they embody the expression. This is the entity most often considered to be represented in a library card catalog.

As an entity, *manifestation* represents all the physical objects that bear the same characteristics, in respect to both intellectual content and physical form. . . . All copies produced that form part of the same set are considered to be copies of the same *manifestation* (1998, p. 20).

This concept of a work is very important if we are to be able to structure information for use by others in our organization, in our society, and our descendents in the world community.

Penn, Pennix, and Coulson discussed the importance of interrelationships between the various stages in the information life cycle. Those interrelationships will become even more important in the world of free information on the Internet and Web. Christine Borgman emphasized this closeness in her analysis of creation, using and finding information noting that,

users can be sources of information, and thus providers [and] when considering an information life cycle, or creating, using, and seeking information, the line between using and providing information some times blurs. (Borgman, 2000, p. 57)

Information seeking is a continuous process, involving active and passive behaviors and formal and informal communications. The cycle of creation, using, and seeking information can be viewed as a series of stages, but these stages often are iterative. People move back and forth between stages, and they may be actively creating, using, and seeking information concurrently. People tend to manage multiple information-related tasks, each of which may be at a different stage in the cycle at any particular time. (2000, pp. 108-109)

There are special concerns for digital document creation in the digital world. The results of Gale Hodges' study of best practices for digital archiving suggest that:

The creator may be involved in assessing the long-term value of the information . In lieu of other assessment factors, the creator's estimate of the long-term value of the information may be a good indicator of the value that will be placed on it by people with in the same discipline or area of research in the future. (Hodge, 2000, para. 4.1).

The considerations might be different but Creation still appears to be a worthy activity for a new information model.

Information Distribution

Clearly the information distribution process has changed with the advent of the Internet. Information flow has increased tremendously in the past decade. Users with speeds of 19 and 56 Kbps are now communicating using broadband services of 1.5 Mbps and faster. Although there

were some constraints on the amount of information that could be passed, today we are deluged by information from all over the world. Where the danger before was that insufficient copies of a memo were made and that some person who might need the information would not get it, today the problem is reversed. People get so much information that they miss the important information buried in that which is unimportant.

Various techniques have been designed to help with this distribution; some are successful, some are not. Here are a few examples:

- Information pull versus push. With this approach, important information is made available to be accessed at users' convenience on an internal or external Website rather than pushing it to them. An example of this is the weekly activities of interest made available to iSchool Ph.D. students on the school Website rather than sending it to them in a message. This method has success if users are disciplined to ask for the information.
- Prioritized mail boxes. Users can direct that email be sent to a particular mail box according to content; or incoming messages could be posted in different boxes depending on the content. This method may work only if senders pay attention or agents are powerful enough to reliably determine message content.
- Personal assistant. Instead of a computer agent, senior managers often have assistants who read the email addressed to them and call their attention only to the most important. This was common for even middle managers in the past; but computers have replaced these assistants, even though they are not nearly as effective.

It appears that distribution is as important as it ever was and therefore a valuable candidate for inclusion in a new information lifecycle.

Information Use

Information is used for, decision-making, learning, entertainment, and many other activities. Ranganathan's first law of library science is that, "Books are for use" (Ranganathan, 1967, p. 7). When he admitted that documentation is a part of library service he wrote, "Documents are for use" (Ranganathan, 1963, p. 43). Today, he might write, "information is for use." Creating information is unnecessary unless it has utility and is of use. Penn, Pennix, and Colson, comment, that unnecessary documents should not be created, cited above, is even more important when considering the use of a document. Too many documents are not only wasteful, but may even have a negative impact on the usefulness of important ones.

As society becomes more global and information more freely available, information will have to be transformed and translated to the language of the user and interpreted in the context of the user. One might put these functions in the maintenance phase, but such conversion is required for information that is distributed but never enters the maintenance phase. And with some users, they will not have to be performed at all. Thus these functions of transformation and interpretation should be part of the use phase.

A Use phase is clearly needed in our new life cycle including Transformation and Interpretation.

Information Maintenance

An in the traditional life cycle, maintenance includes the provisions to keep the information together, insuring its validity, managing its provenance, and preserving it for use. It just seems so much harder when the information is electronic and stored in computers. Organization digital information will have to make great leaps. New concepts, such as topic maps (Rath, 2001) and information ontologies (Fensel, 2000), will have to be used to provide

better access to information. Tools such as Adobe PDF read only formats might be needed to save the data from corruption or unauthorized revision.

Here also it is clear that Maintenance will be needed in our new information life cycle.

Information Storage and Preservation

Storage and Preservation of information is considered in two activities of Wilson's model, one in the Records Management Phase and one in the Archives Phase. The separation of these two storage functions made sense in the era of paper. The institutions responsible for maintaining the documents were separate and the processes for short term and long term storage were different. Preservation techniques were considered most important for documents that required long term storage. There was little deterioration of documents maintained for only a few years so costs could be reduced by concentrating preservation expertise and tools in facilities specially designed for long-term storage.

With electronic information, the boundary is not as clear. Information stored electronically may deteriorate in seconds. Long term in Internet time is said to be weeks or days. System and application software is updated almost every year and users may find that they cannot read the formats of documents stored five years with today's software. Hodge discusses the problem of perseveration and the alternatives of PDF and SGML derivatives for storing for preservation of the "look and feel" of electronic documents (2000, para. 4.5.2).

The volume of documents to be stored continually increases. Lewis estimates there will be storage requirements of the future will be in multi-petabytes. He pointed out that "A typical large company today has hundreds of applications, terabytes of online information, and close to a petabyte of data on tape" (2003, November 4, para. 1). Companies with that much data will have an ever increasingly difficult job of keeping track of the value of the information that is stored,

determining which items of information are important for the company to preserve, and deciding which information may be destroyed. Lewis noted that organizations have, “almost no ability to match the value of specific information at any given point in time to the type of storage resources managing it” (Para. 1). Thus, maintaining the boundary between the Records Management and Archive Phases seems even more questionable.

The large volume of information to be stored and accessed will have an important impact on databases and database management systems. In the future virtually all information will be stored in databases. Even today we see a movement from static Webpages to dynamic pages, created upon request, from pieces stored in various databases. With this dynamic structure, a Webpage found at a particular URL today may be different tomorrow without any person having changed information in the database. Systems are becoming so complex that Information Architects may be as surprised as the user is with the information products they receive. The dynamic nature of the information forces us to ask the question, what is to be preserved? Do we take a snapshot of the database with all the associated application software that gives us a particular dynamic Webpage or do we simply save the data that has changed since the last time it was saved? How often do we save data? How long do we keep it? What do we do about data that is in formats no longer readable by the applications software?

Another impact on databases will be the impact of the type of information stored. Database management systems of the past were designed mostly for the storage of textual material. However, new management systems will be required to deal with images, hyperlinks, virtual information, audio and video information streams, and various forms of dynamic information. Today’s systems are not designed to manage these various forms of information and

the systems to organize and access such data will need extensive redesign in order to adequately accommodate them.

Hodge pointed out another problem—that of preserving links in hypertext documents (Hodge, 2000, para. 4.2.1.3). Should we save the document as well as the information in documents linked to it? How about the information linked to the later documents? Where do we draw the line? How do we decide? These questions are largely unanswered. However, it is clear that these considerations will have to be addressed in the life cycle.

As may be seen, a Storage Phase and a Preservation Phase need to be a part of our new information life cycle.

Information Disposal

The Disposal activity in Wilson's model is at the end of the Records Management Phase—it is where the decision between saving and destroying records is made.

As the boundary between Records Management and Archives disappears (see below), the need for records transfer disappears.

However, in the digital world the decision to destroy a record is not made at one specific point. Records are destroyed (or deleted) continually throughout the life cycle as they no longer serve a useful purpose. The important thing is that a clear policy be developed for destruction and deletion and the retention decision be incorporated in each information object. This must be done from the time of information creation. However, regardless of the place in the life cycle the destruction decision is made, the life of the information ends when it is destroyed.

Therefore, it is appropriate that this phase be retained but should be renamed Destruction.

Information Appraisal or Selection

With the tremendous growth of information stored in electronic data systems the problem of what to save becomes critically important. Considerations involve not only internal company uses but external demands, placed upon companies for certain information, often dictate what data should and should not be preserved. Lewis reported that “industry research has uncovered that in the U.S. alone, there are close to 10,000 state and federal regulation . . . governing the storage, availability, and disposal of information (Lewis, 2003, November 4, para.3). Hodge pointed out that we cannot wait until the end of the life cycle to decide how long to keep items of information, “even in rigorously controlled situations, the digital information may be lost without the initial awareness on the part of the originator on the importance of archiving. Practices used when a digital object is created ultimately impact the ease with which the object can be digitally archived and preserved” (Hodge, 2000, para 4.1). At this point in time specific information cannot be appraised because it has not been created. However, retention policy should be established at the beginning and information selected for retention at the beginning of the life cycle.

With these considerations, it is clear that phases for Setting Retention Policy and Selection should be incorporated at the beginning of our new life cycle model.

Information Transfer of Custody or Donation

In the world of paper documents and archives separate from normal records management when there was a clear boundary between records and archives, it was important to have a formal transfer of custody between the short-time storage and archival storage. As we have seen, that boundary has all but disappeared and the requirement for formal transfer has significantly changed. Now, more than not, information is stored in databases in multiple locations. Software

agents dynamically pull information from the inventory databases in several cities to display on a Webpage.

But, with the current emphasis on the validity of corporate finance and other data, the principles of provenance—the management of the chain of ownership—still apply. Data integrity, however, will have to be preserved from its creation rather than the time when archivists show an interest in it. This will require that information be tagged with indicators to specify its importance, that version control be strictly implemented, and that locking systems be kept in place to ensure the chain of ownership or modification is clearly identified.

Thus, our life cycle model should probably not include separate phases for transfer of custody and accessioning but should include one for Provenance.

Accessioning

The archive accomplishes several functions under accessioning. The most important is collecting documents together for description identification and storage. This is also necessary for digital documents but it is necessary before any storage.

Thus we should have a Collection phase.

Information Arrangement and Description

Traditionally the systems for the organization of information in the Records Management and Archives Phases follow different principles. Records management principles establish systems to allow easy access to the data. Records managers build files and indexes to allow easy access to the data. Archivists, on the other hand, preserve the original order of the documents.

In the digital world, neither concept is applicable. Information is stored in databases using entity-relationship structures and documents presented to users are organized more by the

hyperlinks connecting them than by any file structures. However, organizational considerations do not go away. Rather, the tools they use change.

Hodge pointed out that metadata will become a key element of the data identifying, description, and cataloging process (2000, para. 4.3.1). I expect that current trends of standardization will continue and that tools such as SGML and its derivatives, HTML, XML, EAD, HyTime (see DeRose & Durand, 1994) , Topic Maps (see Park & Hunting, 2003), etc. will become key to the description and organization process.

Proper design of data structures in databases will become critical for user access to data. This organization will come not only through traditional entity-relationship data design but also through new concepts of organization of digital data such as the topic map concepts mentioned above.

For each item of information generated in an organization, it is impractical for a new organizational structure to be built. Rather, the individual item would be described and put into the existing organizational structure according to its description. Building the organizational structure is called classification. Identifying the individual information entities to be placed into the structure is called identification. .

Thus, two more phases of our life cycle structure becomes evident: Description and Identification.

Information Access

Finally we come to the last activity of Wilson's model—how we manage who has access to what information and how do they get to it.

The question is similar to the same questions asked in the User Phase. But more likely the potential users will increase over time. Rights management becomes important as users outside

the immediate department of the creator gain potential access to the information created. Hodge poses several questions: “What rights does the archive have? What rights has the owner retained? How will the access mechanism interact with the archive’s metadata to ensure that these rights are managed properly? (2000, para. 4.6).

In addition, security must play a large role in the access to user information. This security data should be attached to managed information beginning at its creation.

So in our life cycle model there should be phases for Access and Security.

New Life Cycle Model

This leaves us with a new set of phases for the life cycle model: Creation, Distribution, Use, Maintenance, Storage, Destruction, Set Retention Policy, Selection, Provenance, Collection, Description, Identification, Preservation, Access, and Security. We need to order them to mirror the order that information would take through the new cycle.

First retention policy needs to be set. In addition, policy for provenance, access, and security also needs to be set so a single Set Policies phase might be clearer. The order then is Creation, Selection, Description, Distribution, Use, Transformation, Interpretation, Maintenance, and Destruction. Transformation and Interpretation are part of the Use Phase. The phases Collection, Identification, Storage, Preservation, Provenance, Access, and Security are integral parts of the Maintenance Phase. And Retention is implemented in the destruction phase. Here is our new model:

- Set Policies – in this phase (prior to information creation) policies for retention, provenance, access, and security are set.
- Creation – in this phase, the information is created.

- Description – in this phase (prior to selection) the information is described sufficiently well that retention, provenance, access, and security may be set and so that the information may be later identified in the information organizational structure.
- Selection – in this phase (prior to distribution) retention, provenance, access, and security are set.
- Distribution – in this phase initial distribution is made. (This distribution must be made via push technology; pull technology requires storage of the information.) This phase also includes information entering the organization from the outside. If the information is not destroyed after use, it must enter the description and selection phase before it enters the maintenance phase.
- Use – in this phase the distributed information is used. This phase includes Transformation and Interpretation,
- Maintenance – in this phase, the document to be stored are collected, identified in the information organizational structure, stored, and preserved for use under the provenance, access, and security policies previously set.
- Destruction – in this phase the information is deleted and forever lost to future generations under the retention policy already set. This may happen at any point in the information cycle. It is assumed that most information would be destroyed before it ever enters the maintenance phase.

We can see Borko's functions, origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization are all included in the new model

Is it important to have a defined life cycle? Lewis thinks it is. In November he provided this insight on Information Life Cycle Management (ILM),

ILM will change the way information is managed. It will become simplified and automated. Instead of today's plethora of information management tools, the IT manager will have a single and consistent view into the entire information infrastructure. And rather than applying new information requirements manually, application-by-application, the IPT manager will set enterprise wide policies that will automatically move information to the most optimal storage system at any given time.

With ILM, companies can keep their information productive through its life and respond to sudden changes in business management. (Lewis, 2003, November 4, paras. 9-10)

I agree with Lewis and believe that the new life cycle structure will provide a basis for instituting life cycle management.

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