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A Generic Preservation Model Based Cop Elements of Primary Research Data and Records

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Abstract
The aim of this paper is to propose a construction of the preservation framework for the preservation of social science research data and records in digital formats for the Malaysian case in order to fulfil the third objective of the study. It starts with the synthesis of mapping up the data from survey questionnaires and qualitative data gathered from face-to-face interviews against the elements of the generic preservation framework for the preservation of primary research data and records in digital format. This paper ends with the verification of the preservation framework elements by the interviewees in a focus group discussion from the three agencies involved in this study.
Keywords: Cop, Generic Model, Preservation Model, Research Data

1. Introduction

Primary research data and records are the products of a research process and they form an increasingly large part of our cultural and intellectual heritage and offers significant benefits to users. They can be organized into four categories namely records documenting the management of the research process; records documenting research outcomes or products; records documenting the management of the research process/projects; and research data in both 'raw' and 'analysed' form (McLeod & Child, 2003; Guercio, 2009; Wang, 2009; Gustavsen, 2009). The creation and maintenance of these records is integral to the research process. Complete, authentic and reliable records are required to demonstrate good research practice and to strengthen the reliability of research evidence; safeguard researchers and institutions from allegations of research misconduct; demonstrate effective stewardship of resources to auditors and research sponsors; protect individual and intellectual property rights; and demonstrate compliance with legislation, regulations and other requirements (Sam, 2009; Duranti, 2013). Whatever the context, preservation is a response to the threat of destruction and loss. The primary research data and records need to be managed and preserved to prevent destruction and loss to benefit further research, innovations and inventions. Increasingly, these records and the systems that generate, manipulate, manage and preserve them, are electronic in nature. One of the most significant problems facing research institutions and related organizations that create and manage their records is that electronic systems they used are seldom designed to keep records (McLeod, Hare & Rusnah, 2004). Thus the main problem is that of system obsolescence. Systems change rapidly and there is no guarantee that today's

software will be readable by tomorrow's hardware. In this case the preservation of primary research data and records in digital formats as part of our intellectual and cultural heritage is critical as there is already evidence that these data and records created or acquired with public money is being lost through neglect or through a lack of awareness of the need to take active steps to ensure its preservation (McDonald, 2003; Aliza & Zuraidah, 2010; Irwan Kamaruddin, 2014).

There has been concern about preservation of primary research data and records in digital formats in the library community internationally as early as in the 1990s. In 1996 the Commission of Preservation and Access (CPA) and the Research Libraries Group (RLG) in the USA published a joint report on *Preserving digital information* which identified problems, made recommendations and suggested areas for further research (Garrett et.al, 1996). In the UK, in November 1995, the Joint Information System Committee (JISC) of the Higher Education Funding Councils and the British Library addressed the question of the preservation of digital media by holding a national conference in Warwick, where a number of action points were identified (Fresco, 1996).

2. Literature Review

2.1 Digital Preservation Models On Primary Research Data and Records In Practice

The literature is supported by a number of case studies on the preservation on primary data and records in the social science research which provide a synthesis of existing best practice modelsand pragmatic examples, policies and implementation strategies in the developed countries. They introduced a range of stakeholders and organizational roles in the creation, management and preservation of digital resources including that of primary data and records for research. These are data banks, 'digitisers', funding and other agencies, institutional archives, academic data archives and legal deposit libraries.

2.1.1 Data Banks

These are made up of university computing services, perform large-scale data storage functions for a broad constituent community (Snell, 2014). According to Stafford and Flatley (2014) they are contract data services whose core function is to act as 'safety deposit box' in which data creators deposit their data for safe keeping under some form of agreement, and from which depositors again may recall their data at some point in the future. Utulu and Akadri (2014) argue that the data bank ensures that deposited data are available on contemporary storage media and leaves depositors to worry about whether they can be represented on and meaningfully accessed with contemporary hardware and software. Lauridsen (2014) opined that in some cases, the data bank may also contract with a depositor to take on certain functions which are more closely associated with an institutional or academic data archive, though these may be said to be additions to their core services. McLeod and Child (2003) illustrate few examples of data banks which include the Oxford University Computing Services

(OUCS), which provides an archive for the electronic assets of the University of Oxford, and the University of London Computing Centre (ULCC), which acts as a data bank for a variety of depositors and offers a data bank facility for the Computer Readable Data Archive of the UK National Archives.

2.1.2 'Digitisers'

'Digitisers' create data resources, or build collections of resources which are either created or acquired from third parties, for a variety of different but always very specific purposes. According to Stieglitz (2014), space missions which install satellites for the purposes of transmitting digital images of space, archaeologists who build a simulated town plan of Pompeii, art curators who hang a virtual exhibition, librarians and archivists who digitise images of printed books and manuscripts or documents are all 'digitisers'. They exercise a substantial degree of control over the data creation process and their use of the framework is influenced by their focus on the particular purposes to which their data collections are to be placed. Alemneh and Hartsock (2014) grouped the digitisers into three broad categories which reflect their roles and their intentions in the data creation process namely:Research-oriented agencies and individuals create or acquire data resources in the course of (or as an output from) specific investigations.

2.1.3 Funding and Other Agencies

Cissne (2014), Catani (2014) and Snell (2014) described these agencies as those invest in the creation of digital information resources and sometimes exercise some strategic influence over the financial, business, and legal environments within which such resources are created. Positioned to determine how and why data resources are created, these agencies may have a determining role in whether, how, and what cost data resources will be managed over the long-term, and made accessible for re-use. Their use of the framework may help to extend their influence over data resources throughout each stage of their life-cycle. Examples include the Natural Environment Research Council (NERC) and the Scottish Cultural Resources Access Network (SCRAN) (Krueger, 2014).

2.1.4 Institutional Archives

These are government or business archives, selectively build and manage unique electronic records which are generated by an organization and retained by that organization to document its activities. They will also make deposited records available as required by the record-generating organization. Institutional archives' use of the preservation model is governed by their involvement with unique records, their interest in those records' long-term retention, their influence, through the record-generating organization, over the behaviour of data creators, and their reliance upon mandated deposit by those creators as a source of collection development. Shu-Fen and Hsueh-Hua (2014) illustrate two examples of institutional

archives which are the National Archives of UK and the Centre for Electronic Records (CER) of the National Archives and Records Administration of the United States (NARA).

2.1.5 Academic Data Archives

These are selectively developed, maintain, and encourage re-use of unique data resources which are of interest to particular end-using communities. The resources themselves are drawn from a wide variety of depositors, though once deposited, they typically become the curatorial responsibility of the academic data archives (McLeod & Child, 2003; Utulu & Akadri, 2014; Chen-Gaffey, 2014). The archives' use of the preservation model is influence by their focus on secondary analysis, by their service to a specialist user community, by that user community's information requirements, and their reliance upon voluntary or non-exclusive deposit as a means of collection development. McLeod and Child (2003) illustrate two examples which include Data Archives at the University of Essex, and the Arts and Humanities Data Services (AHDS).

2.1.6 Legal Deposit Libraries

McPeck (2014) described legal deposit libraries as institutions with obligations to maintain and provide access to non-unique information objects whose deposit is legally prescribed and enforced upon producers of certain classes of those objects. Legal deposit libraries according to McPeck may supplement these core holdings through voluntary deposit and, funding permitted, through acquisition of objects either through subscription or purchase. Their use of the preservation model is governed by their reliance upon mandated deposit, their lack of influence over depositor's behaviour; and their orientation toward long-term preservation and secondary use. Examples include most national libraries.

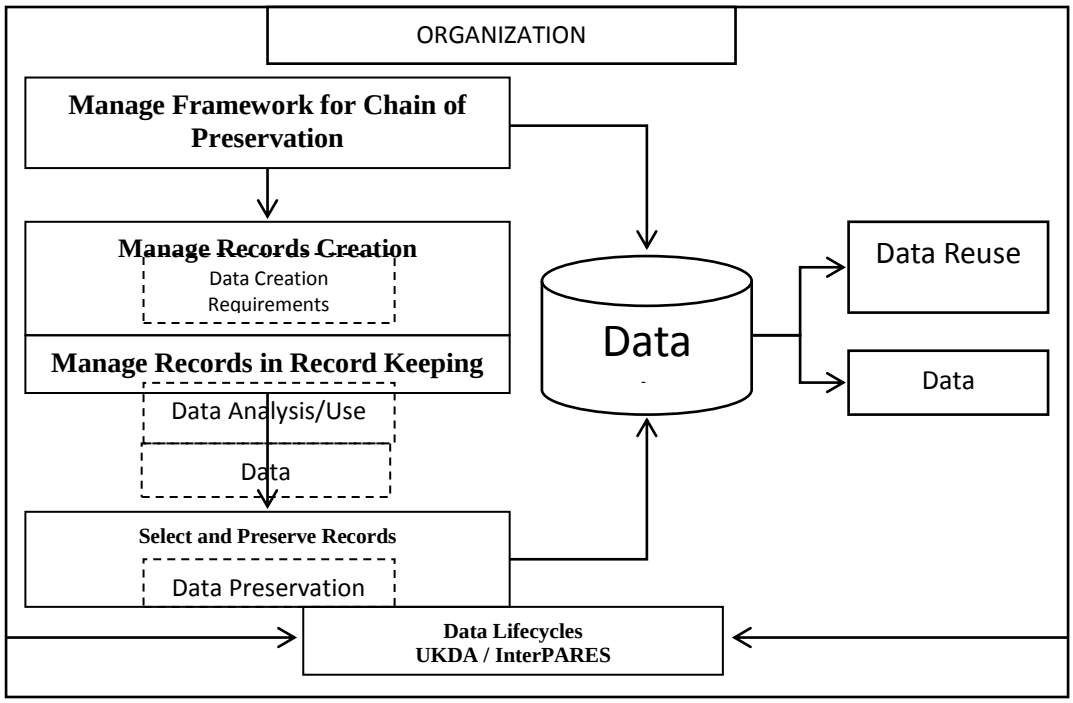

Figure 1. Generic Model for the Preservation of Primary Research Data and Records in Social Science Research

3. Methodology

The right methodological approach to research ensures and determines validity and reliability of this research. According to Babbie (2008) and Saunders, Lewis & Thornhill (2012), there are two major research philosophies have been used in the field of social sciences research namely positivist and interpretivist. The literature suggests that positivist associates with quantitative research whereby quantitative data are gathered by means of survey questionnaire. On the other hand, interpretivist is associated with qualitative research whereby qualitative data are gathered by means of face-to-face interviews and focus group (FG) discussions (Salkind, 2000; Powell & Renner, 2003; Gorman et. al, 2005; Pickard, 2007; Patton, 2008; Flick, 2009). Layder (1993) and Merriam (1998, 2009) agree that the methodology employed within a research project emerges from the nature of research questions. The research questions however, general and conceptual term also includes the question of research method to be applied which also refers to actual and specific process of data collection.

In this research, we implemented quantitative approach which is questionnaire to collect data from the respondent.The process of constructing the framework for the preservation of the primary research data and records for the Malaysian case takes in the form of mapping up the data collected from the survey questionnaires and the interviews from the Researchers, Research Administrators, IT Officers and Records Managers from three agencies A, B and C. This is based on the comparison of the elements of the generic model with the

qualitative data from face-to-face interviews and enhanced by the quantitative data from questionnaire survey.

4. Findings

4.1 Comparison Of Interview Data With Elements of CoP

Table 1 above represents the elements of generic preservation model 'Manage Framework for CoP' consisting of a continuing activities within a framework for the preservation of born digital data and records. 'Manage Framework for CoP' consisting of several activities to be implemented by the creating agency. These are 'Develop Management Framework' (Framework policies; Information about creator's existing records; Information about creator; Information about preserver); 'Design Framework' (Design requirements; Record-making system design; Recordkeeping system design; Permanent preservation system design); Implement Framework (Record-making system; Recordkeeping System; Permanent Preservation System; Information about Implementation Problems);'Maintain Framework' (Record-making System Performance Information; Recordkeeping System Performance Information; Preservation System Performance Information; Recommended Framework Revisions; Requests for Updated Information About Creator).

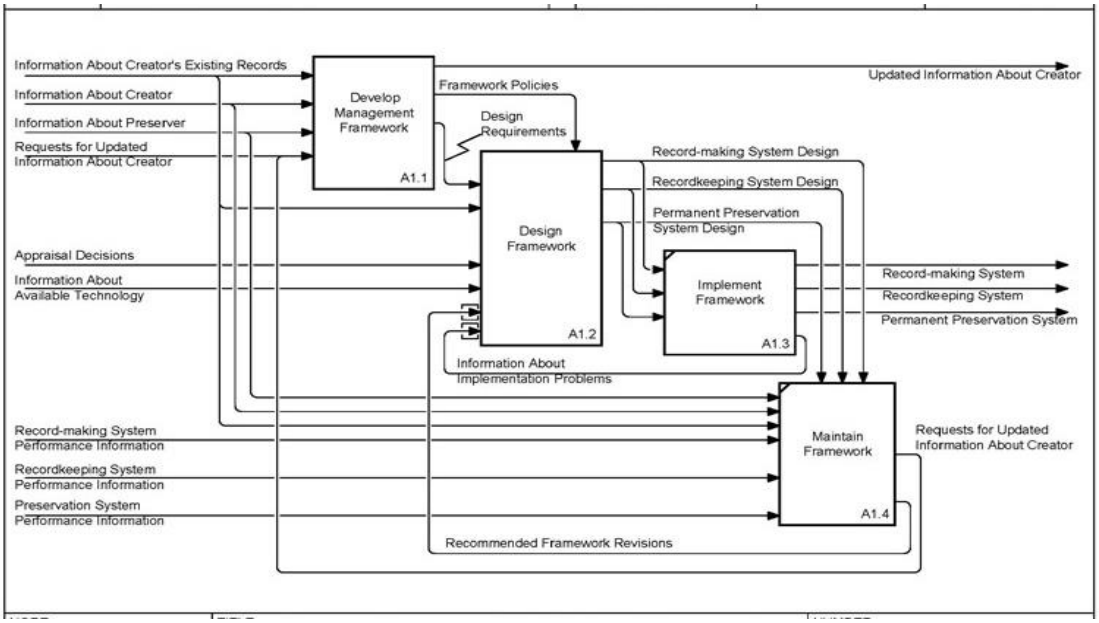

Figure 2: Model Elements of 'Manage the Framework for CoP'

Table 1. Elements of CoP Model 'Manage Framework for CoP' and Data from Face-to-Face Interviews

Elements of Generic preservation framework	The Malaysian Cases		
	Agency A	Agency B	Agency C
Manage Framework for Chain of Preservation			
Develop Management Framework			
Framework policies	×	×	×
Information about creator's existing records	✓	✓	✓
Information about creator	✓	✓	✓
Information about preserver	×	×	×
Design Framework	×	×	×
Design requirements	×	×	×
Record-making system design	×	×	×
Recordkeeping system design	×	×	×
Permanent preservation system design	×	×	×
Implement Framework	×	×	×
Record-making system	×	×	×
Recordkeeping System	×	×	×
Permanent Preservation System	×	×	×
Information about Implementation Problems	×	×	×
Maintain Framework	×	×	×
Record-making System Performance Information	×	×	×
Recordkeeping System Performance Information	×	×	×
Preservation System Performance Information	×	×	×
Recommended Framework Revisions	×	×	×
Requests for Updated Information About Creator	×	×	×

All the elements in 'Manage Framework for CoP' are necessary in developing a standard framework with the objective of embedding the continuum concept model's ideal integrationas a best practice framework for managing primary data and records for research in social science as it makes possible for the key players in research activities such as the researchers, research project managers, IT officers and records managers are brought together under an integrated recordkeeping framework working towards the same goal: to guarantee the reliability, authenticity and completeness of research data and records during the creation stage through the preservation stage.

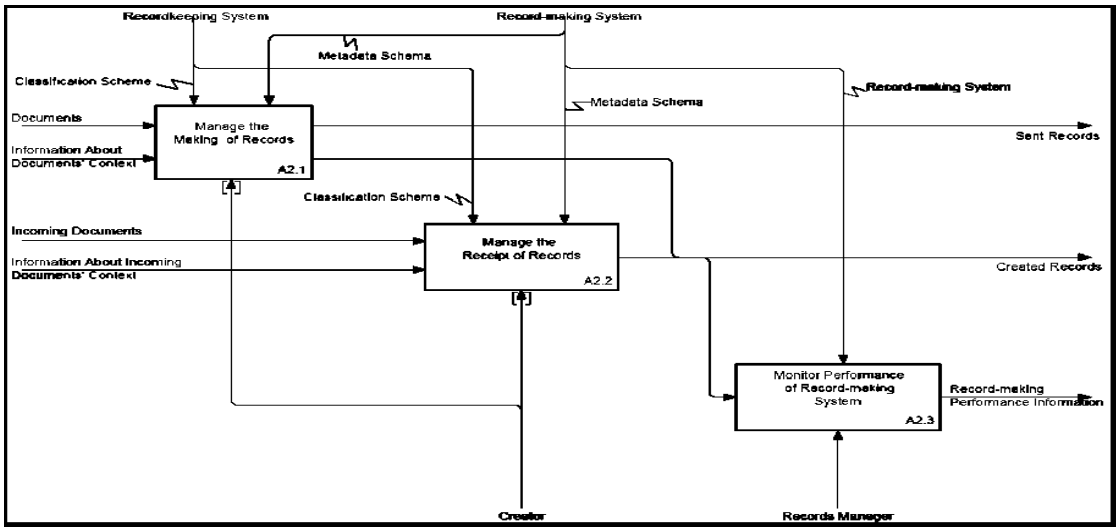

Figure 3. Model elements of CoP 'Managing the Creation of Records'

The data gathered from the survey questionnaires and interviews with the Researchers, Research Administrators, IT Officers and Records Managers from the three agencies, shows that there was an absent of establishment of such framework of CoP. Even though the synthesis indicates that there are 'Information about creator's existing records' and 'Information about creator' as suggested by data from the survey questionnaires and the interviewees at the Agency A, B and C, these information reside in the researchers' personal computers where the records were created. Even though some published data and information of research projects were kept at the agency's library and some were also kept at the ICT Department of the Agency, the 'Information about creator's existing records' and 'Information about creator' existed in isolation from the records management activities undertaken by the Records Managers at the registry. This information was not created within a standard framework for CoP. Thus this reflects that the key players in research activities such as the researchers, research project managers, IT officers and records managers were not brought together under an integrated recordkeeping framework. They work in isolation and therefore the implication was that there was no guarantee that the reliability, authenticity and completeness of research data and records during the creation stage through the preservation stage can be established.

Table 2. Elements of CoP Model 'Managing the Creation of Records' and Data from Face-to-Face Interviews

Elements of Generic preservation framework	**The Malaysian Cases**		
	Agency A	**Agency B**	**Agency C**
Managing the Creation of Records			
Manage the Making of Records	Manage the making of records in wide variety of systems which is not ERMS.	Manage the making of records in wide variety of systems which is	Manage the making of records in wide variety of systems which is

		not ERMS.	not ERMS.
Recordkeeping System	Wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.	Wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.	Wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.
Classification Scheme	The classification schemes were not created by a specific recordkeeping system but were created by wide range of data processing applications. Even though it allows search and retrieval of both records and metadata but it lack retention and disposition rules.	The classification schemes were not created by a specific recordkeeping system but were created by wide range of data processing applications. Even though it allows search and retrieval of both records and metadata but it lack retention and disposition rules.	The classification schemes were not created by a specific recordkeeping system but were created by wide range of data processing applications. Even though it allows search and retrieval of both records and metadata but it lack retention and disposition rules.
Metadata Scheme	Metadata created by wide range of wide range of data processing applications.	Metadata created by wide range of data processing applications.	Metadata created by wide range of data processing applications.

Documents	✓	✓	✓
Information about Document Content	✓	✓	✓
Manage the Receipt of Records	Through personal email; adopting a 'print-to-paper' sent to registry for filing.	Through personal email; adopting a 'print-to-paper' sent to registry for filing.	Through personal email; adopting a 'print-to-paper' sent to registry for filing.
Record-making System	Wide range of data processing applications such as MS-Words, Lotus Notes, Office Suites of different versions.	Wide range of data processing applications such as MS-Words, Lotus Notes, Office Suites of different versions.	Wide range of data processing applications such as MS-Words, Lotus Notes, Office Suites of different versions.
Metadata Scheme	Metadata scheme generated by wide range of data processing applications.	Metadata scheme generated by wide range of data processing applications.	Metadata scheme generated by wide range of data processing applications.
Classification Scheme	Classification scheme within proprietary programs such as MS-Words, Lotus Notes, Office Suites of different versions.	Classification scheme within proprietary programs such as MS-Words, Lotus Notes, Office Suites of different versions.	Classification scheme within proprietary programs such as MS-Words, Lotus Notes, Office Suites of different versions.
Incoming Documents	Through personal email; adopting a 'print-to-paper'.	Through personal email; adopting a 'print-to-paper'.	Through personal email; adopting a 'print-to-paper'.
Creator	✓	✓	✓
Created Records	✓	✓	✓
Monitor Performance of Record-making System			
Record-making System	Wide range of data processing applications	Wide range of data processing	Wide range of data processing

	such as MS-Words, Lotus Notes, Office Suites of different versions.	applications such as MS-Words, Lotus Notes, Office Suites of different versions.	applications such as MS-Words, Lotus Notes, Office Suites of different versions.
Manage the Making of Records	×	×	×
Record-making System Performance Information	×	×	×
Records Manager .	Not assigned the responsibility to manage electronic records. Responsible for paper records in the registry. Work in isolation on paper records in the registry.	Not assigned the responsibility to manage electronic records. Responsible for paper records in the registry. Work in isolation on paper records in the registry.	Not assigned the responsibility to manage electronic records. Responsible for paper records in the registry. Work in isolation on paper records in the registry.

The record creation or the making of born digital records must be managed in a specific recordkeeping system. Just like paper records, born digital records need to be managed consistently. As suggested in the generic preservation framework elements of CoP 'Manage Records Creation' effective management of these records includes the tasks of setting up classification structures (to aid in filing records).As defined by the CoP generic preservation framework elements, a classification scheme is a hierarchical tool that can 'facilitate the capture, titling, retrieval, maintenance and disposal of records'. According to Simonini (2014), Hendrickson & Young (2014) and Catani (2014) the classification scheme is one of the important foundations for any electronic or paper records management program: it is the central tool used to describe, categorise and control records. The function of the classification scheme is to process series or groups of records efficiently and effectively so that retention and disposition rules can be applied consistently; when used in an electronic environment, a further goal is to allow for comprehensive computerised search and retrieval of both the records and the metadata.The availability of the metadata scheme in the Malaysia case refer to the use of wide range of word processing software packages such as Microsoft Word which can capture metadata and apply file names and titles consistently. Hendrickson and Young (2014) argued that the reality is that the computerised features in such software are usually neither useful enough nor flexible enough to suit the specific needs of a particular organisation. Even though the software will capture metadata such as author, title, keyword 'tags' and date as claimed by the researchers and research administrators from Agency A, B and C, Snell (2014) claimed that

in word processing applications such as MS-Word, requiring staff to fill in Document Properties metadata leads to more work before records can be closed and filed. On the other hand Simonini (2014) argued that the metadata in this case can be misleading, especially if document production is shared: for example, the Author filed may take the last named editor even though several people have worked on the document. He further argues that in practice, no one may bother to use or maintain the metadata gathered using Document Properties of such word processing application (MS-Word). This situation may have happened in Agency A, B and C as the quantitative data presented in Chapter Five shows that majority of the researchers and research administrators used Microsoft Word and other common proprietary software to create their data and records.

In the Malaysian cases, there was general agreement from the Researchers, Research Administrators and IT Officers in particular that the classification schemes were not created by a specific recordkeeping system but were created by wide range of data processing applications. In such a practice as in the Malaysian case, the classification in different wide range of data processing applications hinders the creation of a structured file plan and therefore everyone in the organization could not easily identify one logical and unique physical or intellectual 'place' in which to file records. Instead in the Malaysian cases, the logical and unique physical or intellectual 'place' take place in the personal computers of the researchers or the creators of data and records.

In the generic preservation framework elements of the CoP, classification is intended to organise records into mutually exclusive categories so that there can be no doubt about the appropriate place for an individual item. If records and data are filed logically, information can be retrieved by anyone at any time according to a consistent set of rules and guidelines as in the CoP elements. Snell (2014) argued that there is no classification scheme is perfect, and any scheme will inevitably group together some items which relate to more than one subject area. On the other hand Clark (2014) opined that the great advantage of managing electronic records is that a strong classification scheme can be supported by computerised indexing tools, allowing users to retrieve records not only based on their functional purpose but also by names, dates, keywords or types of document.It was evident in the Malaysian cases, the researchers and other creators of electronic records become so use to creating, managing, and filing their electronic data and documents themselves in isolation. Even though well-structured file plans may exist for the organisation's paper records, office staffs rarely adopt that plan for the management of their electronic files. Consequently as evident in Agency A, B and C, electronic data and documents were often created according to individual preferences in a wide variety of word-processing and other types of system applications, making it harder to find, use, manage and preserve them.

There were matching elements practiced by Agency A, B and C with the generic preservation framework elements of the CoP shown in Table 2. The matching elements are *Managing the Creation of Records; Manage the Making of Records; Classification Scheme; Metadata Scheme; Documents; Information about Document Content; Manage the Receipt of Records;Record-making System; Classification Scheme; Incoming Documents; Creator; Created Records; and Record-making System.* However, even though the 13 practices in the Malaysian

cases matched the generic model elements, the practices were not exactly as suggested by the CoP model elements in which the first mandatory requirements that data and records should be created in a specific recordkeeping systems. In the Malaysian case there was an absent of recordkeeping system as metadata and records were created by wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; and compression systems among others. None of these application form part of a common or centralised specific recordkeeping system (ERMS).

One significant finding in the Malaysian cases which does not match the generic preservation framework elements was that the Records Managers were not involved in the management of electronic records created by the researchers. Even though the data suggested that digitized paper images and word processing correspondence hard copies were sent to the registry for filing, the records managers in the three agencies did not take the role in development of the institution's electronic records management requirements and procedures. They were working in isolation from the activities pertaining to the creation, maintenance and preservation of electronic research data and records. In the current practices, it is evident that the records manager's roles and responsibility on electronic records were taken over by the researchers and IT Officers. This responsibility should be shared by the records managers with the record creators and IT Officers in partnership collaboration.

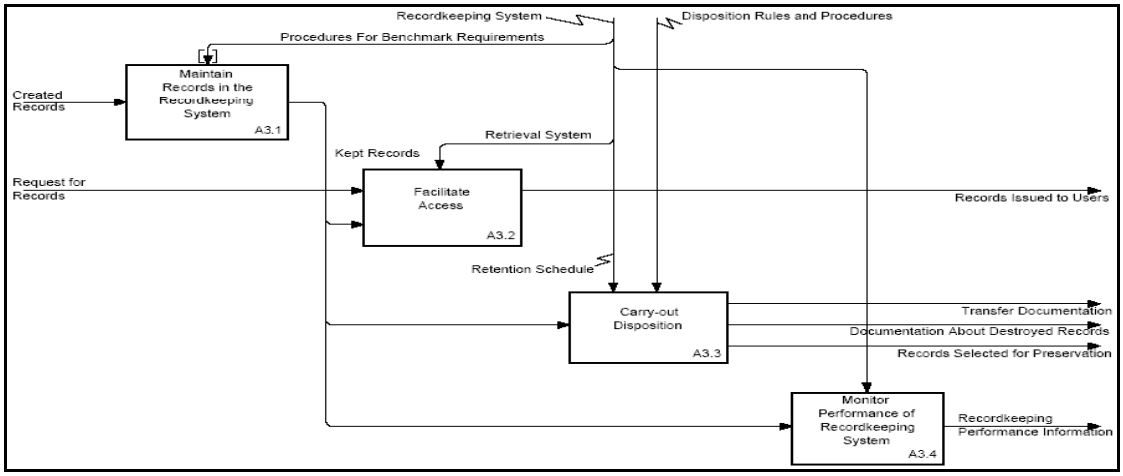

Figure 4. Elements of CoP model 'Manage Records in a Recordkeeping System'

Table 3. Elements of CoP Model 'Manage Records in a Recordkeeping System' and Data from Face-to-Face Interviews

Elements of Generic preservation framework	The Malaysian Cases		
	Agency A	Agency B	Agency C
Manage Records in a Recordkeeping System			
Maintain Records in Recordkeeping System	Maintain records in wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.	Maintain records in wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.	Maintain records in wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video interleaved; compression systems.
Procedures for Benchmark Requirements	✓	✓	✓
Created Records	✓	✓	✓
Kept Records	✓	✓	✓
Facilitate Access	Documents or records were saved by adopting migration strategy:	Documents or records were saved by adopting	Documents or records were saved by adopting migration strategy: change

	change media; compatibility, interoperability and convert to standard formats.	migration strategy: change media; compatibility, interoperability and convert to standard formats.	media; compatibility, interoperability and convert to standard formats.
Recordkeeping System	×	×	×
Retrieval System	✓ Migration strategy;In the library cataloguing system and personal to researchers.	✓ Migration strategy; In the library cataloguing system and personal to researchers.	✓ Migration strategy; In the library cataloguing system and personal to researchers.
Request for Records	Divergent practices and applications.Request from internal users; external users subjected to approval only for published reports and information.	Divergent practices and applications.Only from internal users; external users subjected to approval only for published reports and information.	Divergent practices and applications.Only from internal users; external users subjected to approval only for published reports and information.
Records issued to Users	✓ Research published reports; abstracts of research; journal articles; other published materials only.	✓ Research published reports; abstracts of research; journal articles; other published materials only.	✓ Research published reports; abstracts of research; journal articles; other published materials only.
Carry-out Disposition	×	×	×
Disposition Rules and	National Archives	National	National Archives Act

Procedures	Act for all types of records but implementation only for paper records	Archives Act for all types of records but implementation only for paper records	for all types of records but implementation only for paper records
Retention Schedules	Only for paper records	Only for paper records	Only for paper records
Transfer Documents	Not transferred to organisation's repository or national archival institution.Published reports; abstracts; journal articles; other related secondary information on research projects transferred to agency's library.	Not transferred to organisation's repository or national archival institution. Published reports; abstracts; journal articles; other related secondary information on research projects transferred to agency's library.	Not transferred to organisation's repository or national archival institution. Published reports; abstracts; journal articles; other related secondary information on research projects transferred to agency's library.
	Digitized paper images; Word processing correspondence and email attachments to the agency's registry.	Digitized paper images; Word processing correspondence and email attachments to the agency's registry.	Digitized paper images; Word processing correspondence and email attachments to the agency's registry.
Documentation about Destroyed Records	×	×	×
Records Selected for Preservation	All data and records of research activities are kept permanently in the personal computers. Published report and data were kept in the library server.	All data and records of research activities are kept permanently in personal computers.	All data and records of research activities are kept permanently in personal computers. Published report and data were kept in the library server.

		Published report and data were kept in the library server.	
Monitor Performance of Recordkeeping System			
Procedures for Benchmark Requirements	Fulfilling the requirements of Federal government legislation and funding agencies regulations.	Fulfilling the requirements of Federal government legislation and funding agencies regulations.	Fulfilling the requirements of Federal government legislation and funding agencies regulations.

Synthesis of the interview data in Table 3 shows that out of 16generic preservation framework elements of the CoP, six practices of the Malaysian case did not match the generic preservation framework elements. These are *Manage Records in a Recordkeeping System; Recordkeeping system; Carry-out Disposition; Documentation about Destroyed Records; Monitor Performance of Recordkeeping System; and Recordkeeping Performance Information.*

Even though data in Table 3 shows that records are maintained in recordkeeping systems but this takes in the form of wide range of data processing applications; networked; hierarchical; relational and object oriented databases; presentation graphics packages; modelling software; report writers packages; spreadsheets; image capture software; audio and video. While retrieval system is available only in the agency's library and personal to the researchers and creators of records. Although access to data and records were allowed but it was strictly for internal users only.On the other hand, disposition rules and procedures and retention schedules were available for paper records which were based on National Archives standard procedures. Published reports; abstracts; journal articles; other related secondary information on research projects were transferred to agency's library. All data and records of research activities were kept permanently in personal computers of researchers and some published data and information were kept in the agency's server at the IT Departments and in the agency's library. No data and records for research were subjected to appraisal or destruction based on the internal standard procedures and in accordance to the policy of funding agencies. The Official Secrecy Act 1972 (Amended 1986) was used by the Records Managers interviewed as the reasons for the researchers keeping all the records and data permanently in their personal computers.

Even though 10 practices of the Malaysian case matched the model elements of the CoP, these matching elements were not completely and exactly based on the CoP model elements due to the absent of a specific recordkeeping system used to create the primary data and records. In the CoP model, when a significant number of documents are stored on a shared network drive, a basic general filing structure should be established. If a division or branch (or a specific project such as research and consultancy project) has developed its own filing

structures, these structures should aim to conform to the principles of a general filing structure in order to prevent divergent practices and application. It is evident from the data gathered from Agency A, B and C that there were divergent practices and application in the creation of data and records for research.

The CoP model suggests the use of recordkeeping systems, end users should also be encouraged to use consistent filing structures in their own group and personal work spaces, not just when filing into shared drives. This consistency will help the organisation coordinate the creation, use and retention of working papers and final documents and will ease retrieval and access of information throughout the institution. With the use of recordkeeping systems a culture of sharing documents as organisational resources are encouraged, rather than retaining them as individually owned items as what was being practiced in Agency A, B and C where data and records become too personalised to the creators. This may lead to the important issue of the ownership of the data and records.

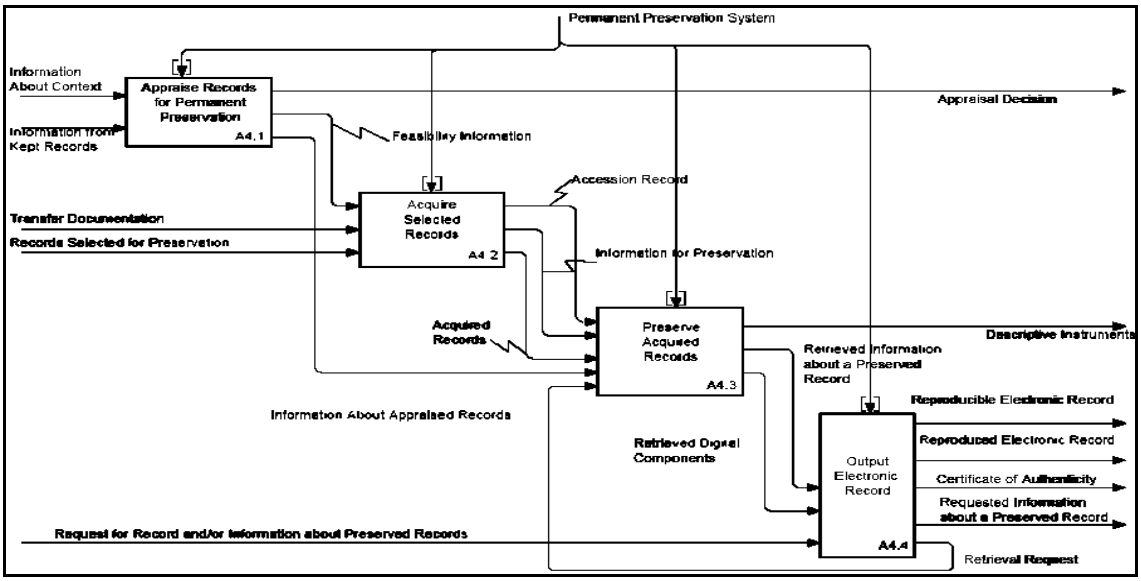

Figure 5. Elements of CoP model 'Permanent Preservation System'

Table 4. Elements of CoP Model 'Permanent Preservation System' and Data from Face-to-Face Interviews Elements of generic preservation frameworkCoP 'Permanent Preservation System' and data from face-to-face inter

Elements of CoP Model	The Malaysian Cases		
	Agency A	Agency B	Agency C
Permanent Preservation System			
Appraised Records For Permanent Preservation .	×	×	×

Permanent Preservation System	Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing system.	Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing system.	Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing system.
Information about Content	×	×	×
Information of Kept Records	Personal to researchers.	Personal to researchers.	Personal to researchers.
Feasibility Information	×	×	×
Appraisal Decision	Keep all by researchers.	Keep all by researchers.	Keep all by researchers.
Acquire Selected Records	Secondary information in agency's server and in the library cataloguing system.	Secondary information in agency's server and in the library cataloguing system.	Secondary information in agency's server and in the library cataloguing system.
Permanent Preservation System	Absent of permanent preservation system.Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing	Absent of permanent preservation system. Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing	Absent of permanent preservation system. Raw data and records in researchers' personal computers; secondary information in agency's server and in the library cataloguing

	system	system	system
Transfer Documentation	Secondary information in agency's server and in the library cataloguing system	Secondary information in agency's server and in the library cataloguing system	Secondary information in agency's server and in the library cataloguing system
Records Selected for Preservation	×	×	×
Preserved Acquired Records	×	×	×
Permanent Preservation System	×	×	×
Accession Records	Published research reports, abstract, lists of completed research, journal articles by the agency's library	Published research reports, abstract, lists of completed research, journal articles by the agency's library	Published research reports, abstract, lists of completed research, journal articles by the agency's library
Information for Preservation	×	×	×
Acquired Records	Published research reports, abstract, lists of completed research, journal articles by the agency's library	Published research reports, abstract, lists of completed research, journal articles by the agency's library	Published research reports, abstract, lists of completed research, journal articles by the agency's library
Descriptive Instruction	×	×	×
Output Electronic Records			
Reproducible electronic	Published	Published	Published

records	research reports, abstract, lists of completed research, journal articles by the agency's library in accordance to organizational internal regulation and Malaysian Official Secrecy Act. 1972 (1986)	research reports, abstract, lists of completed research, journal articles by the agency's library in accordance to organizational internal regulation and Malaysian Official Secrecy Act. 1972 (1986)	research reports, abstract, lists of completed research, journal articles by the agency's library in accordance to organizational internal regulation and Malaysian Official Secrecy Act. 1972 (1986)
Certificate of authenticity	✓	✓	✓
Request for records under information about preserved records	Strictly for internal users based on internal procedures	Strictly for internal users based on internal procedures	Strictly for internal users based on internal on internal procedures.

Out of 19 elements of the CoP model as shown in Table 4, only two practices of the Malaysian case matched the model elements namely *Output Electronic Records and Certificate of Authentication.*Preserving valuable records and destroying obsolete ones ensures that only necessary records are retained and saves the organisation time and money. The appraisal and disposal of electronic records is essential part of the preservation strategic plan. The establishment of permanent preservation system is mandatory as the greatest risk electronic records face is the risk of being altered, manipulated, overwritten or destroyed, resulting in an inauthentic and unreliable record or, worse, no record at all. Snell (2014) argued that this risk is compounded by the prohibitive cost of maintaining all the technology and expertise needed to retain electronic records in their original form. The changes in computers and information systems happen far too quickly to allow organisations the luxury of keeping 'old' computers just so they can access electronic records in their original configuration, especially when a large percentage of those records are not worth preserving for the long-term. In electronic record keeping systems (ERMS), retention and disposal metadata can be applied to a whole series of records by linking retention information to the classification scheme. This functionality is one reason archivists and other records professionals need to be involved in early development of electronic recordkeeping systems, so that they can support the development of classification

schemes and retention and disposal metadata before records are created within the system, saving time and effort and improving the management of and access to records.

For computer systems that do not have records retention and disposal functions as in the Malaysian cases, the records manager will need to create procedures for the scheduled disposition of records. These standard procedures were not practiced at Agency A, B and C as the records managers was not involved in the management of electronic records created by the researchers. A permanent preservation system described in the generic preservation framework elements of the CoP did not exist in the three agencies as primary research data and records were preserved by the individual researches who admitted that they keep all data and records they have created permanently based on the Official Secrecy Act 1979 (Amended 1986) and internal organisational procedures.

5. Discussion

In the process of validating the conclusive framework for the preservation of primary data and records for research only three categories of elements were considered to be the elements for the framework for the Malaysian case. These are: (a) generic model elements of the CoP; (b) those common elements of the Malaysian case that match the generic preservation model elements of CoP and (c) common elements of the Malaysian case that did not match the generic preservation framework elements but perceived by the focus group discussion as essential elements in the Malaysian public environments if the preservation framework is to be successfully adopted and implemented.

5.1 CoP Elements

5.1.1 Manage Framework for CoP

On this element of the CoP, the participants of the focus group centred their discussion on the framework policy which was very much lacking in their agencies. The records managers argued that although there is the National Archives Act and the Official Secrecy Act pertaining to the records and archives management in Malaysia, but they argued that the National Archives Act was not properly understood by the Head of the respective agencies. In addition the internal directives and procedures were insufficient for the enforcement of records and archives rules and regulation. As a result there was a lack of assigned responsibility and expertise for electronic records management as the records managers admitted that they lack knowledge and skills to deal with these records. Likewise, the IT officers on the other hand lamented that they themselves lack knowledge and skills on records management.

The problems of competencies led the participants to the discussion on issues of advocacy on records management which were raised by the researchers. The researchers believed that effective advocacy will help improve individual compliance with an organization's records management legislations, rules and policies and promotes records management as an important and required organisational function. The records managers argued that without proper competencies on the preservation of born digital records, the elements of 'Manage Framework for CoP' could not be implemented and practiced. The participants agreed that records management advocacy should be planned and implemented for activities, training

opportunities, establishment of tools, implementing of standards and communications that encourage best practices in records management. They came to a consensus that the need to advocate excellent in electronic records management was more important than ever considering the number of people (not only researchers) within every organization who create and manage born digital records.

5.1.2 Managing the Creation of Records

On the elements of 'Managing the Creation of Records', the researchers and research administrators informed the focus group participants of the various software systems which they used to create their data and records. Consequently all the participants agreed that the making of records in wide variety of systems operated independently of any recordkeeping system. There were no procedures in place for filing born digital records, retrieving or disposing of some types of electronic records, in a way increasing the risk of loss, duplication and confusion. At this point the IT officers raised the issue of assigned responsibility for electronic records and discussed it within the contacts of the National Archives Act, rules and procedures. The researchers suggested that the records manager should be officially assigned the responsibility. However, the records managers argued that preservation process involves complex technological support, which is why the records professional must work with a team of experts, including information technology specialists. Thus in the Malaysian context working together based on building partnership among the key players of shared responsibility on electronic records especially between the records managers and IT officers becomes and an important issue.

5.1.3 Manage Records in a Recordkeeping System

The researchers believed that over 55 percent of data and records they have created were stored electronically on single user storage media, such as a personal desktop computer, and not as part of a formal recordkeeping system. There were similarities on the participants' accounts on this issue as they believed that as more and more people within every organization are using computers, each employee will create and store electronic records in their own individual way, making it difficult to retrieve or to protect electronic records. To convince the researchers, research administrators and the IT officers, one of the records managers explained of the training he obtained from the National Archives of Malaysia on electronic records management which relates to the importance of an ERMS in managing data and records of research activities. The records manager made use of the opportunity in this focus group discussion to inform his counterparts that a good ERMS will have a file classification scheme and records retention schedules which will be agreed between the National Archives and government agency involved. He further suggested that only with ERMS that attributes of authenticity and reliability of research data and records can be preserved. To support the records managers' suggestion the IT officers cited several proprietary systems of ERMS software packages as potential recordkeeping system that also includes the management of email. The participants collectively agreed that primary research data and records should be created in an ERMS in the near future and the records managers and IT officers should prepare

the strategic plan for the implementation of ERMS. This should be supported by guidelines and manuals.

6. Conclusion

From the analysis of the various best practice models, the CoP Life Cycle model and processes developed by the Canadian InterPARES projects was chosen due to their distinct advantages as fundamental theories and processes for the creation of born digital records while ensuring the preservation of records attributes of authenticity, reliability, integrity and usability so that the records remain as valid evidence. By comparison to other policies, guidelines and models, the CoP model contains the most complete functional requirements for the continuum preservation of born digital records based on the records life cycle concept from creation, use, maintenance, disposal/appraisal and preservation. The CoP concepts and processes are intended for the management and long-term preservation of born digital records. It indicates the relationship among the core activities of records creators and records preservers. The detail functions of the CoP processes consisted of 'Manage the Framework for the CoP'; 'Managing the Creation of Records'; 'Manage Records in a Recordkeeping System'; and 'Select and Preserve Records' (refer to Chapter Four).

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