Community Informatics and the Information processing continuum

''The challenges of pluralising archival research and education
are complex and potentially far-reaching'

Upward, Frank

Stillman, Larry

Monash University

fupward@dodo.com.au

larrys@fastmail.fm

Abstract

Community information research projects should draw together a range of information based communities of memory and practice each with their different and individualized 'habitus-practice' relationships (core concepts in Pierre Bourdieu's genetic structuralist theories). Within each field there will, for example, be different views about how to maximize the effectiveness of the 'time-space distanciation' of community information (part of the kernel of Anthony Giddens's structuration theories). This paper will put forward different views of a continuum of information processes (processes of creation, capture, organisation and pluralisation). The views presented will relate to the formation of culture and to four cognate areas of activity for recording information in ways that support or explain cultural formation - information management, recordkeeping, publishing, and information systems views., These perspectives will attract information practitioners in different ways but all will be relevant to community informatics projects. The continuum approach outlined in this paper will then be discussed in terms of its nature as a form of generative structuralism, the continuum as machine, before a theory of continuum mechanics for information processing is outlined as a way of giving practical tractability to the

complexities of today's networked age. Finally a few more continuum models will be included to indicate that continuum theory is itself subject to the continuum.

1. Introduction

Community informatics (also known as community networking or community technology) is an emerging field of community development that sees new technologies as key tools for community change and empowerment. New systems of information storage, creation, and transfer are powerful resources and tools for community life that intersect with visions of community development in new and unexpected ways. Community Informatics (CI) is a term used by those coming from information systems or management systems approaches, and is current in academic discussions. Gurstein defined the field in the following way:

> Community Informatics pays attention to physical communities and the design and implementation of technologies and applications, which enhance and promote their objectives. CI begins with ICT, as providing resources and tools that communities and their members can use for local economic, cultural and civic development, and community health and environmental initiatives among others (Gurstein, 2000, p. 2)

Until now, Community Informatics has not been matched with key concepts of what has come to be known as the Monash Information Continuum. At Monash we have been discussing and exploring the information continuum since 1997 when Don Schauder, Barbara Reed and Frank Upward first provided a model for it (see figure three, below). Community informatics research projects provide ideal frameworks for testing out the ideas and analytical tools of those involved in the larger project of 'pluralising' archival research and education. In particular, the potential for sharing ideas about new ways of understanding the life and passage of information objects in civil society organisations and initiatives such as those found in community informatics projects, may lead to a fruitful dialogue and engagement between more institutionalised archival activity and more open and emergent democratic

community processes and technologies.

This pluralising project is part of the drive for what some archivists call the 'postcustodial archives' – in which archives formation is driven by the logic of archiving processes rather than the physicality of the archival institution as we have known it. The concept of postcustodial archives extends into all spaces in to which recorded information is consigned for remembrance purposes. Its logic takes archivists over many disciplinary boundaries (that in a postcustodial world will no longer be boundaries) and cuts across cognate areas of information activity in a trans-disciplinary pattern that closely parallels the emerging pattern for activities in community informatics.

The task confronting the 'postcustodial' archivists of the future (and the community informatician) is a complex one. This paper will put forward analytical tools, an over-arching theoretical construct (generative structuralism) and a practical view of applications as possible ways of managing this complexity, drawing cognate information communities together within applied, educational, or research centred 'communal memory space' projects. [For an explanation of 'communal memory spaces see our colleague Livia Iacovino's paper at this conference.]

 The continuum-based way of addressing connections across cognate disciplines outlined in this paper has to this date had its most rigorous use within a document-centric approach to information systems design and development using web browser technologies and internet technologies. This use has occurred within subjects taught to students aspiring to join or already belonging to a range of information based and other communities. The continuum approach applied to group projects within these subjects has helped establish a base for anchoring student experience in their own specializations while ordering that experience across the knowledge and skills base of different communities in a shared fashion using the rhythm of the information processing continuum (the creation, capture, organisation and pluralization of

- 3 -

information). Examples can be given – and one is given in this paper – but the method is of relevance to **all** informatics projects including community informatics ones and will only have any meaningful sense to a reader if they try to apply it.

2. The mechanical tools – The information processing continuum and a set of topological tables for analysing the building of community memory spaces

In trying to indicate that what is presented in this paper will be valid in community informatics research projects we have at times loosely connected the ideas that will be presented to ideas from the French sociologist Pierre Bourdieu. For ten years the confluence of web-browser and internet technologies have been dramatically changing the horizons of our thinking about electronic communication processes and most of us can imagine breath-taking applications of research in areas such as community informatics. It can be argued, however, that a problem Bourdieu focuses upon, our inability to cut across 'habitus' and span different communities that can contribute to such research, is hindering us in making practical adjustments to the changes that are occurring.

Pierre Bourdieu defined *habitus* as "the generative principle of responses more or less well adapted to the demands of a certain field, [which] is the product of individual history, but also, through the formative experiences of earliest infancy, of the whole collective history of family and class…." Our responses in other words are conditioned by the communities to which we relate. There is, however, more to habitus than mechanical responses. We have some understanding of the social rules and conditioning properties of these communities, but we remain social agents separate from and different to those communities which simultaneously dispose us to act in particular ways. The complexity of our responses is compounded by the fact that we can belong to a number of communities (Bourdieu 1990: 91 and passim).

Bourdieu's characteristic consideration of the interaction between an individual and the structures they operate in is labelled by Anthony Giddens and others as structuration theory. Giddens own structuration explorations make much of the processes of the storage of recorded information and the role this plays in the operation of communities over space-time. Giddens theory of time-space distanciation has been translated into a 'rhythm' for information processing derived from the processes of creating information, capturing it as recorded information, organising it and bringing it together within the plural domains of competition (see figure one). Each item of information once created, may or may not be recorded, stored and managed in ways that can benefit individuals, groups, communities, and can push that information out into the plural domains of the further reaches of space-time. (Upward 2005: 198-201).

Figure 1: The basic information processes continuum model [explained in (Upward 2005)]
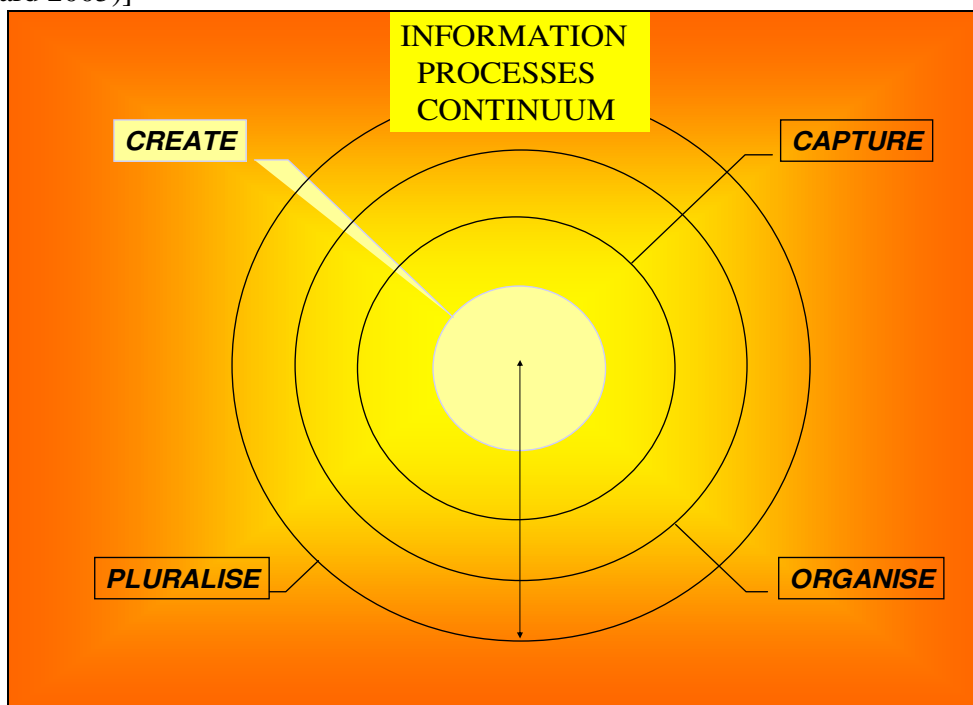
The space-time distancing basis of the information processing continuum sounds (and is) heavily theoretical, but it is easily understood by students in their aforementioned

projects. For example, a group working on a student banking system quickly works out the importance of working outwards from their own needs and the documents and information they create into the need to capture this for individual or group purposes and on to the need for organising this material for access and use over space-time. They can also see that they need to understand and draw upon the plurality of banking systems with which they may need to connect. They can readily see how the past history of banking processes as represented in current ones influences their actions and that future trends will affect any systems they design and the records and information they need to manage.

Using the information processing continuum as a logical template one can then map other continua. In what follows, five variations of the template will be presented, one for cultural formation, and four that address information activities: information management, recordkeeping, publishing and data management. They will be presented in this template form, but for those who want a more checklist based format they will also be presented in tabular form.

The tables and templates, to be useful, need to be read topologically (the logic of place). They deal with the logic of place, of disposition in Bourdieu's theorising, rather than with how that logic can be written about in a particular place or era. The most widely known advocate of topological thinking in academic circles is probably Jacques Lacan whose donut and needle example of it refers to the way our initial disposition is female but in males the shape is stretched and altered from there without ever disappearing and this meaning is present in the templates, but disappears in the tabular form. Setting out the logic in stretching fashion, however—in both the work of Lacan or Bourdieu—only indicates the way responses can be conditioned, not that the conditioning has taken place in the work of any individual agent

The first illustration and table to be presented (*figure two and table one*) deals with the way cultural heritage is constructed and is designed to assist this process by

linking it to some possible components of community informatics practice using space-time stretching processes related to the role of recorded information in embedding narratives into our existence. Underpinning each table, indirectly, is the topological explanation of Anthony Giddens. In each table this information processing continuum runs across the top. The left-hand column sets out individual elements that can be stretched continuum fashion into the shapes given to them by creation, capture, organization and pluralization processes:

Table One - The Cultural Heritage Continuum

Continuum	**Create**	**Capture**	**Organize**	**Pluralize**
Time-Space Distanciation	Interaction	routinisation	space-time distancing	societal totalities
Story-telling	Tale	Signification	Legitimation	Domination
Narrative Scale	Small story	group acceptance	organisational and community warrant	Meta-narrative
Cultural heritage containers	Exhibit item	exhibition	museum [in the sense of location of a muse]	museums

Cultural heritage as a term refers to the conditioning factors that social agents might or might not respond. It involves the attempt of different communities to build up, in Bourdieu's terms, their 'cultural capital'.

Figure two: the template version

The Cultural Heritage Continuum
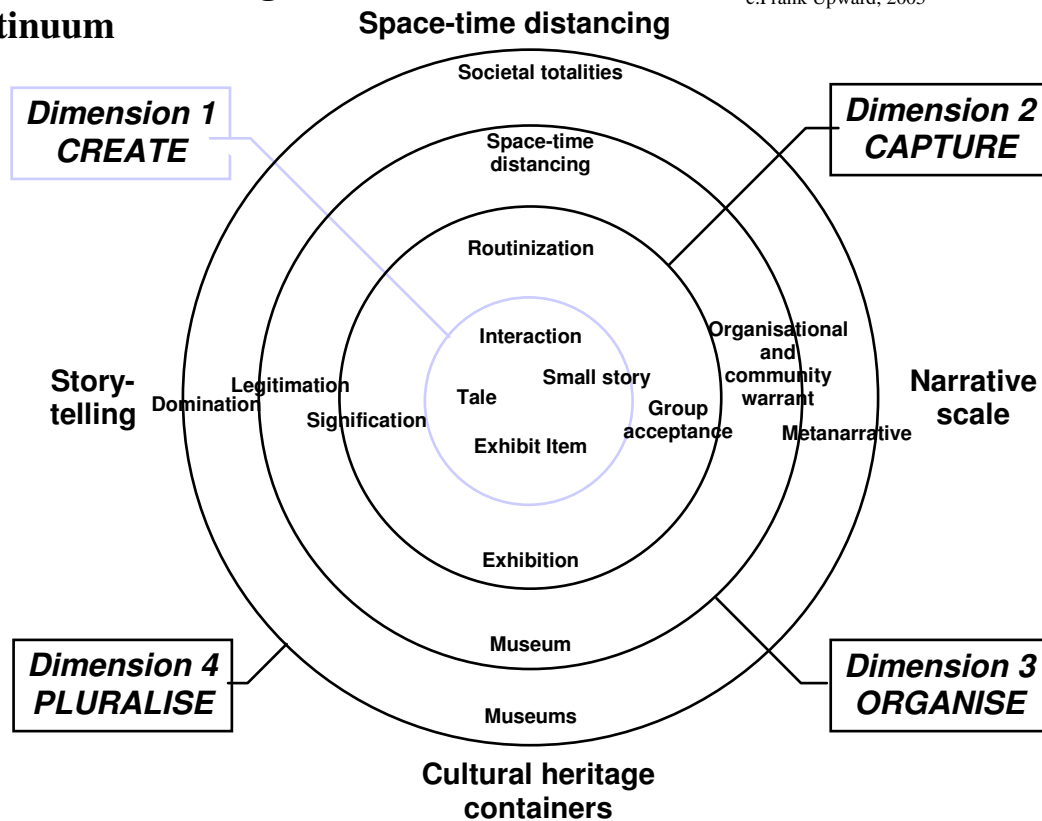
Topologically, the most challenging word in the above table and template is the word museum and its associated 'exhibit' terms. Topographically (how we write about places) many of us would describe a museum in more specific terms, moving some distance from the logic of disposition, the notion of enshrinement of the arts, sciences and the diversity of knowledge represented by different muses in ancient Western story-telling.

Other continua are more straight-forward. Giddens time-space distanciation continuum is represented in the model in the same order in which the points were presented in his work – interaction, routinisation, space-time distancing and societal totalities (note the plural use of societal totality). The story-telling continuum reaches back to Giddens as well, pointing to the theories of signification, legitimation and domination contained in his structuration theorizing (Giddens 1984). The continuum

of narrative scale moves from the individual story through to meta-narrative.

Collectively these continua are meant to focus attention on story-telling over space-time and the scale and acceptance of those stories. In relation to a student banking system project, for example, discussions are opened up about many of the stories we tell ourselves about banks and electronic banking and students also consider how they and other students would accept the system they are working on.

In relation to a community history project (as an example of community informatics) which could be undertaken, discussions are opened about the many forms of stories that are shared by families and communities in space-time, and the different forms they take, and the different ways they are illustrated (paper, photos, scrap albums, momentoes such as trophies and medals, music, performance, song, spoken work, formalized text, family trees, art work audio and video recordings of different types etc.), and how they are located (or transferred) in families and communities. How are judgements made about what remains private, what goes public, and what is legitimate? What is the 'shape' of such information going virtual, and where does the locus of control lie in the present and future?

Earlier it was mentioned that the first use of the information continuum emerged at Monash in 1997. The following template (figure three) was the starting point.

Figure three:
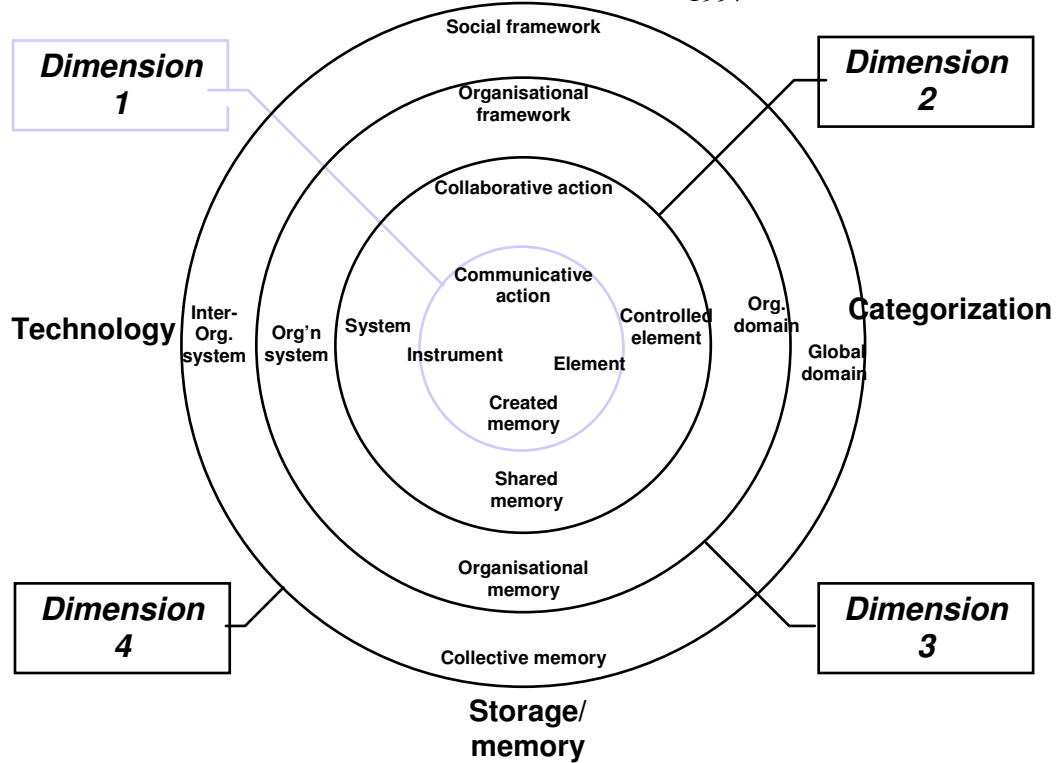
The Information Continuum

Action / structure

c. Reed Schauder and Upward, 1997

Dimension 1

Dimension 2

Technology

Categorization

Dimension 4

Dimension 3

Storage/ memory

Social framework

Organisational framework

Collaborative action

Communicative action

System

Instrument

Controlled element

Element

Org. domain

Global domain

Inter- Org. system

Org'n system

Created memory

Shared memory

Organisational memory

Collective memory

Table Two - The Information Continuum

Continuum	**Create**	**Capture**	**Organize**	**Pluralize**
Action and structure	Communic-able action	collaborative Action	organization framework	social framework
Categorization	Element	controlled element	organizational domain	global domain
Technology	Instrument	system	organisational system	Inter Organ-isational system
Storage and memory	Created memory	shared memory	organizational memory	collective memory

Some of the continua stretched out in the above table are now (to us) quite obvious,

although one of those, the storage-memory continuum contains a tricky component

that we still debate. Is community memory really a form of organized memory or is it collective memory? Is collective memory a plurality consisting of the aggregation of individuals or is it a reaching out towards a very full plurality, the societal totality as an aggregation of aggregations, an area where communities compete? It is beginning to be argued in the archival profession that only in this latter view of totality as an area of competition that one moves into a full sense of the word plurality, and that view is already strongly present in community informatics. The community in this view is more comparable to an organisation than some theorists might care to argue. This issue of scalability (of layers of plurality) is recursive in all the templates and tables being presented, but at least in this instance the other continua are relatively straightforward. The action/structure framework is self defining. The technology continuum, crucial to all forms of information management, is also self-defining, while the categorization continuum points to different levels of action related to our attempts to manage information by attending to its subjects, its functions, and other facets that can help give it handles for recall and dissemination.

The continua in the Information continuum are collectively meant to focus analytical attention on the nature of recorded information as an allocative resource, something to be shared and to be used within our activities. In student projects such as the student banking one the information continuum helps draw specific attention to technologies and categorization processes in a layered fashion focusing attention on some interesting problems involving the integration of different places and times that the best groups enjoy trying to solve.

The explorations of the elements in *figure four and table three*, The Records Continuum, has been going on even longer at Monash than the information continuum. The model is widely known about and discussed in the archival profession, unlike the information continuum discussion of which is only just beginning to be opened up. [The records continuum's paradigmatic nature has been explored generally in McKemmish, Piggott, Reed and Upward (2005)].

Table Three - The Records Continuum

Continuum	**Create**	**Capture**	**Organize**	**Pluralize**
Evidential qualities	Trace	evidence	corporate/individual memory	collective memory
Transactional qualities	Transaction	activity	function	purpose
Identity	Actor	work unit	organization	institution
Recordkeep'g Containers	[Archival] document	record(s)	archive	archives

The table presents the 'who did what' of human action (the identity and transactionality continua) along with the storage and recall of recorded information about those actions (the recordkeeping container and evidentiality continua).

The template version is particularly apposite for the records continuum because of the way documents are figuratively and literally stretched topologically into records, into an archive (crudely corporate, community or whole of individual memory) and the way the plurality of the archives needs special management.

The continua in the records continuum collectively are meant to focus analytical attention on the nature of recorded information as an authoritative resource, something to be relied upon not because of its content but because of the way it has been created and maintained with some continuing contact to the original specificities of its occurrence. It also in student projects raises basic issues about the metadata needed to manage documents, whether there is a need to keep 'fixed documents' and if so can be maintained in native format or need to be transferred into so called archival formats, and so on.

Similarly, in the community history community informatics project, the continuum would be of interest to those designing community informatics

Figure four:

The Records Continuum
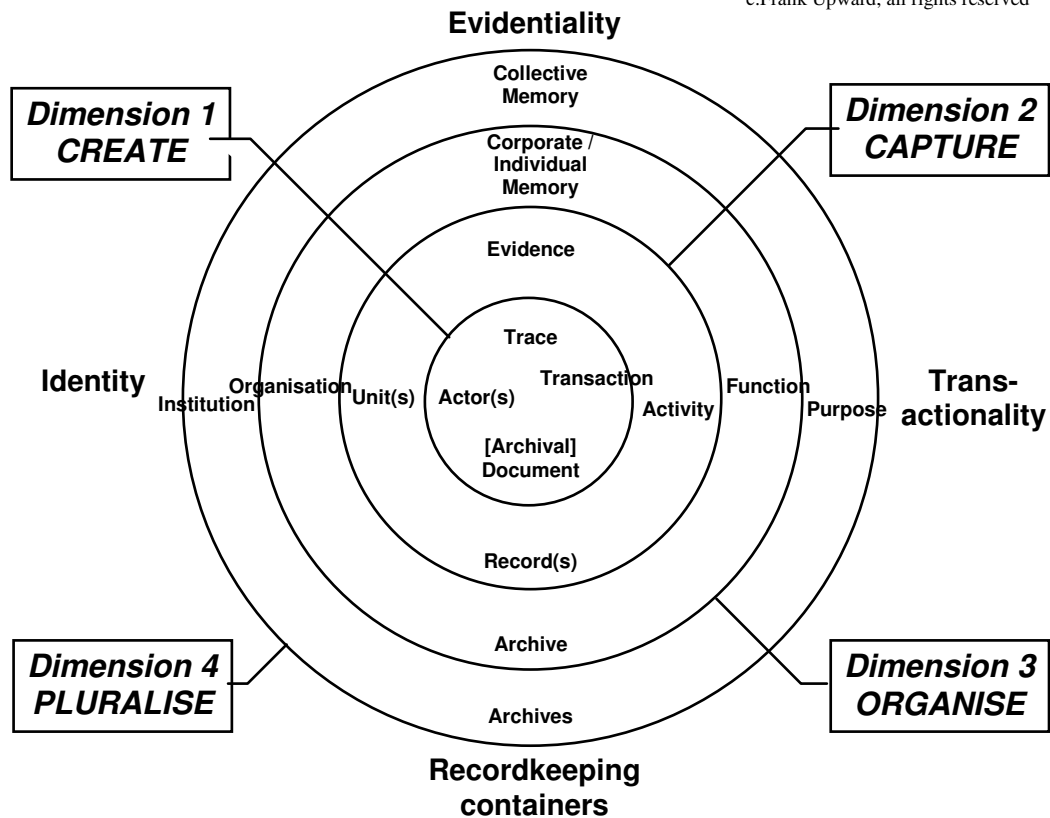
The next set of continua touches on a major new frontier in internet-web browser environments, electronic publishing. In *Table Four* (and *Template Five*) the emphasis within this broad field is upon the vital issue of access.

Table Four - The Publication (access) Continuum

Continuum	Create	Capture	Organize	Pluralize
Learned knowledge	Experience	collaborative learning	organizational learning	social learning

- 13 -

Reach	Authorial intent	group circulation	organizational or community totality	societal totalities
Issuance	Author(s)	publisher(s)	organisational or community authority	societal authority
Publication Containers	[public] item	published item	library	libraries

The logic of the word publishing is connected with the process of making something public, a process which can be deliberate or accidental.

Figure Five:

The publication [access] continuum

Copyright Frank Upward, 2000
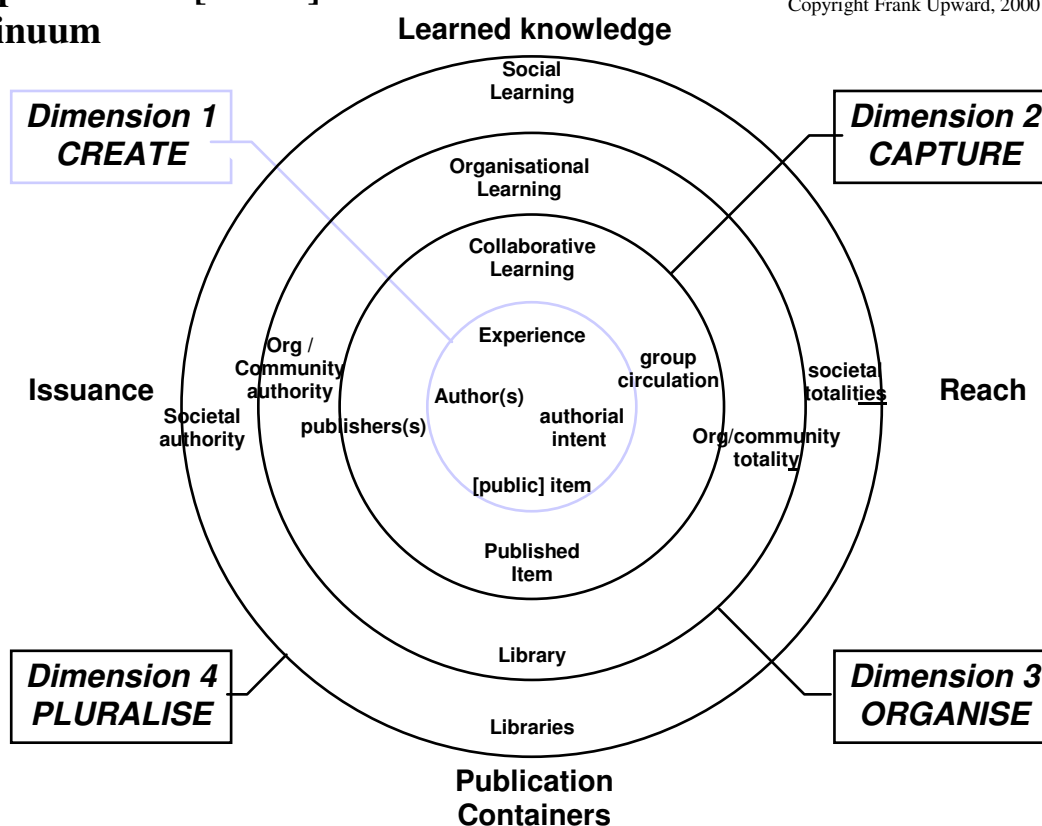
The continua selected for representation within this logic are the object itself access to the experience of others contained in the object ('learned knowledge'), the authority of its issuance, and the reach it has. The 'library' refers, of course, to the dispositive meanings of the word in which there is an association with text and its liberating powers, not its more recent topographies. Learned knowledge relates to a type of

knowledge of particular relevance to community informatics (the latter continua was contributed tentatively by Don Schauder).

> The continua in the publishing continuum are collectively meant to focus analytical attention on an 'invariant' logic for analysing the placement of information objects into public domains and involve a recognition that while the notion of a 'public' audience can be given a very plural meaning, the moment one communicates beyond the boundaries of ones own system public availability becomes a possibility. It raises issues of openness/restriction that in relation to a student project like the banking one are vital.

Last in this plethora of templates and tables, but not least, is a continuum based representation of information systems (table five and figure six).

Table Five - The Information systems [data] Continuum

Continuum	Create	Capture	Organize	Pluralize
Power modalities	Enunciation	Facilitation	Interpretation	Normalis-ation
Data plumbing	Source	Linkages	Organisational connectivity	Inter organis-ational connectivity
Data modelling	Data representation	Group requirements	Organisational requirements	Inter organis-ational requirements
Data Storage	medium	Data structures	Data warehouse	Data warehouses

This table refers to the systematic control of data, but if one thinks about this only in relation to modern systems literature one is unlikely to produce an 'any place any era' topology given how heavily topographies of data in the information domain have been skewed towards explanations that depend upon data base computing paradigms. To understand data topologically one needs to be able to get one's mind around the pre data-base notion of words as linguistic data and of pictures as ideographic data, both of which open up the subject of document computing (Hartland, McKemmish and Upward, 2005). This enables data management to be viewed across eras and in

- 15 -

different places and helps give a much greater fullness to the systematic structuring of information objects whether we are talking about a cave painting, a title to property, a data base, or a data warehouse.

The continua in the information systems (data) system collectively are meant to focus analytical attention on both the power of information systems and the need to bring that power to as many users as possible. It ties in with the technology component of information management of course, and within a project such as a student community banking system focuses group member attention on all of these issues and many more.

Figure six

The Information Systems [Data] Continuum

Power Modalities

Copyright Frank Upward, 2000

Dimension 1

Dimension 2

Dimension 4

Dimension 3

Normalisation

Interpretation

Facilitation

Enunciation

Inter-Org. requirements

Group requirements

Org'n requirements

Data representation

Source

Linkages

Inter-org Cnnectivity

Org. Connectivity

Medium

Dara structures

Data warehouse

Data warehouses

data modelling

Data Plumbing
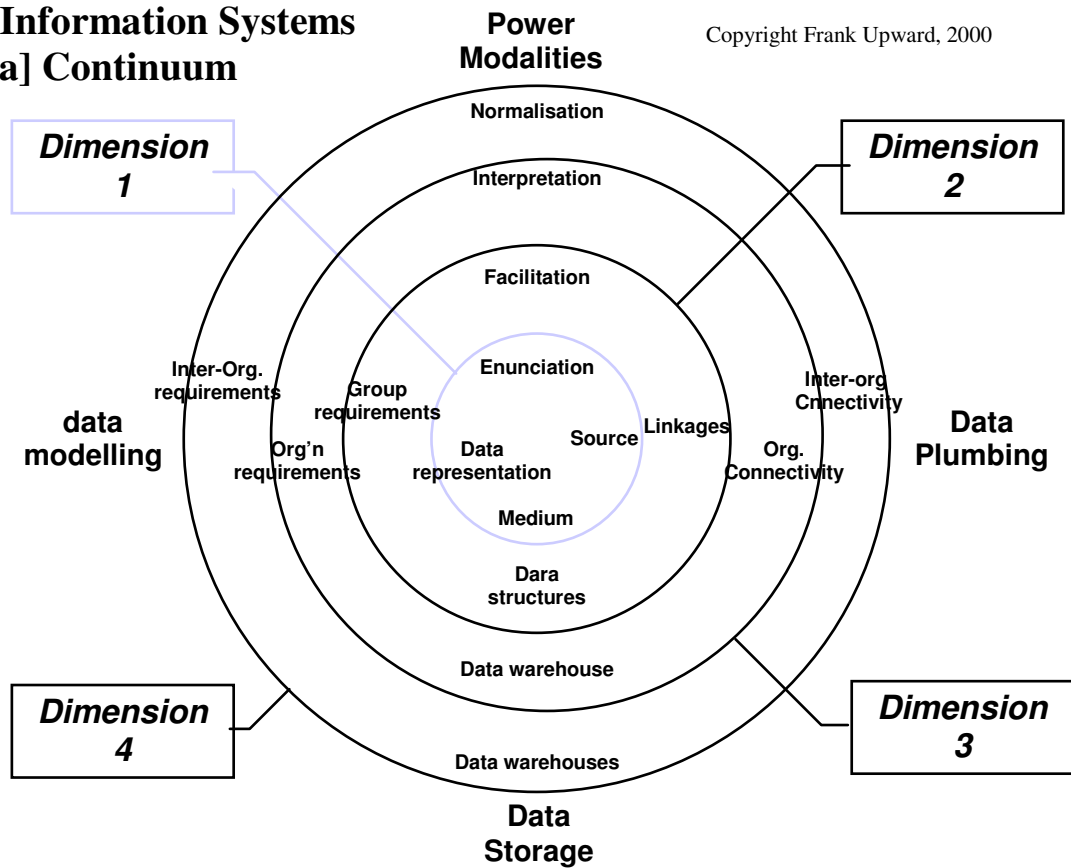
Data Storage

Information systems are instruments of our modalities of power which can be stretched out continuum fashion. The flow of data (or more specifically its connected flow, or plumbing), the way we model data, and the storage of data can also be discussed within the rhythm of the information processing continuum.

We can belong to a number of communities and their influence on us can vary, but each of the above models can and does have its own use and might find its communities of adherents who might still be fighting power battles. For an information manager (or librarian, as a discipline which spawned a major variety of information management) the 'ICM' might be seen as a 'superior' model to the records continuum whereas some archivists might see the records continuum model as the most significant of the five. For an information professional working with community

informatics projects, it is a way into mapping the multitude of information creation, transmission and storage processes with which a community is involved, including particular ideological or ethical issues that enable or inhibit such processes[1]. There should be no hierarchical arrangements of these tables. They provide a suite that can achieve collective power transcending the need to push forward one's own views at the expense of others and creating a shared rhythm for the mechanics of experiences that can be had within projects directed at community memory spaces.

But before further discussing the mechanics of habitus, its 'practice' component, it is useful to pause briefly on the nature of the continuum as a machine so that the problem being addressed within the practice component of this paper is clarified.

3 Generative Structuralism: The space-time continuum and machinic becoming.

The above tables are reductionist if they are read topographically or typographically. They take complex areas of activity and simplify them down beyond all but logical forms of recognition. Read topologically as part of the dispositive elements of an information processing continuum, however, they are expansionary. They represent many inter-acting and inter-relating points and present a complex array of what in postmodern phrasing is often referred to as the spaces in between, the areas of interaction between points.

The logical interaction between points and the operation of the 'spaces in between' has been explored within French literary philosophy and French sociology over the last fifty or so years in ways that are still affecting English language theorising. Various writers (including Bourdieu) have explored from many different angles a

---

[1] See (Draft) Code of Ethics for Community Informatics Researchers, http://vancouvercommunity.net/lists/arc/ciresearchers/2006-07/msg00024.html, 27 July 2006.

complex array of spaces between the perceptions of an individual, the texts they draw upon, the tasks they are undertaking, the groups and communities they see themselves as belonging to and the codes that govern what can be said and not said by individuals and communities. The previous tables represent a 'continuum' based way of entering these spaces.

Once one reads the tables in this way they present problems connected with the massive complexity, the continuum of content, they raise. This complexity perhaps can be mitigated by an understanding of the space-time continuum. A single philosophical basis for continuum theory was first set out in the work of Samuel Alexander in 1920. He provided a monistic approach to diversity, a philosophical explanation that within one idea explains growing complexity. Everything that exists is made up of 'Space-Time'. Even logic is a complex of it and the complexity is increasing. As the Australian philosopher Quentin Gibson paraphrased Alexander's monism:

> As things have gone on, bits of space-time have become more and more complex in their structure, and with each level of complexity they have been found to take on a new and distinctive quality (Gibson: 36)

The space-time continuum generates everything and the generation of the new will increase exponentially (short of cataclysmic or reductionist interventions). This argument can still be made today without fear of easy philosophical refutation. It also has a solid intuitive component to it whether one looks at bio-diversity, recent cosmological theories, the generation of ideas during the twentieth century or the impact new technologies are having on us through the mushrooming expansion of the 'networked age'. Complexity is increasing exponentially, or at least that is an argument which an historical overview and the experiences of many of us more long-lived occupants of this planet can support.

In the abstract prepared for this paper the growth in complexity was described as 'generative structuralism'. That term was used (rather than the space-time continuum)

because it provides a more generic form of branding. Generative structuralism encompasses continuum theory, but it can also be used to cover any 'interaction of bits' theorising. Such 'post-structural' theorising looks at how things have been generated in the past and present and speculates on how things can be generated in the future. Such forms of theory as mentioned above are strongly present in twentieth century French literary philosophy and sociology, but they are also present in Australian thinking - perhaps because of the 'ghost' (machinic presence) of Henri Bergson in both.[2] In Bergsonian time there are moments and movements out from moments which interactively control the present. All is archiving (see the appendix to this paper, Figure 7).

Bergson's concept of time is a recipe for galloping complexity. One reader of his work, Gilles Deleuze, used his theorising machinically for the development of the concept of machinic becoming in which one idea connects with another idea in order to transform and maximize itself (Colebrook 2002: 57)[3]. This is remarkably similar to the core of Alexander's theorising, except Alexander is more explicit about the way newness does not by itself supersede oldness, generating greater complexity. The space-time continuum, however, is in Deleuzian terminology, an engine of machinic becoming. This notion, that all is a construct of the process of archiving, was represented by Deleuze in a book on Bergson in the form of a platonic cone (see figure seven where the platonic cone is presented using information process theory.)

In Bergsonian time there are moments and movements out from moments which interactively control the present. In sociology an alternative term for this time based

---

[2] In French literary philosophy the distorted presence of Bergson is easily observed. In Australia it occurred because of the work of the significant Melbournian philosophers, the Gibson family (father William and sons Boyce and Quentin) who disseminated the ideas of Bergson and Samuel Alexander in their lectures and writing taking a similar experience based approach to knowledge formation.

[3]Pierre Bourdieu was chosen for occasional referencing in this paper because he is one of the most heavily represented writers of our times on the World Wide Web, the greatest tool for machinic connectivity that has ever existed. Using connections with those who have connected to Bourdieu it becomes possible, for example, to begin to maximise ideas about what it means in the information professions to be a 'continuum mechanic' although the next section does not even begin to fully optimise this.

machinic connectivity is structuration theory. This French term was willingly applied to his own theorising by Anthony Giddens in his landmark work, *The Constitution of Society*. The term is also often applied to the work of Bourdieu, although he preferred the more clearly time-connected term 'generic structuralism' (Bourdieu 1990: 14). All terms, it can be argued, are indicative of attempts to transform and maximise Bergson's notions of time. Within sociological variants of the time theme understandings are developed out of examinations of the way individuals interact with, shape, and are shaped by the structures in which they operate. (Is it that the theories of time and space-time have split and diversified without completely wiping out their predecessors is some sort of proving of Alexander's core theory about the generative nature of the space-time continuum?)

Figure 7: All is Archiving (After Bergson, after Deleuze)

Region of Competing
Archives

Pluralise

Organise

Capture

Time/Space

Create
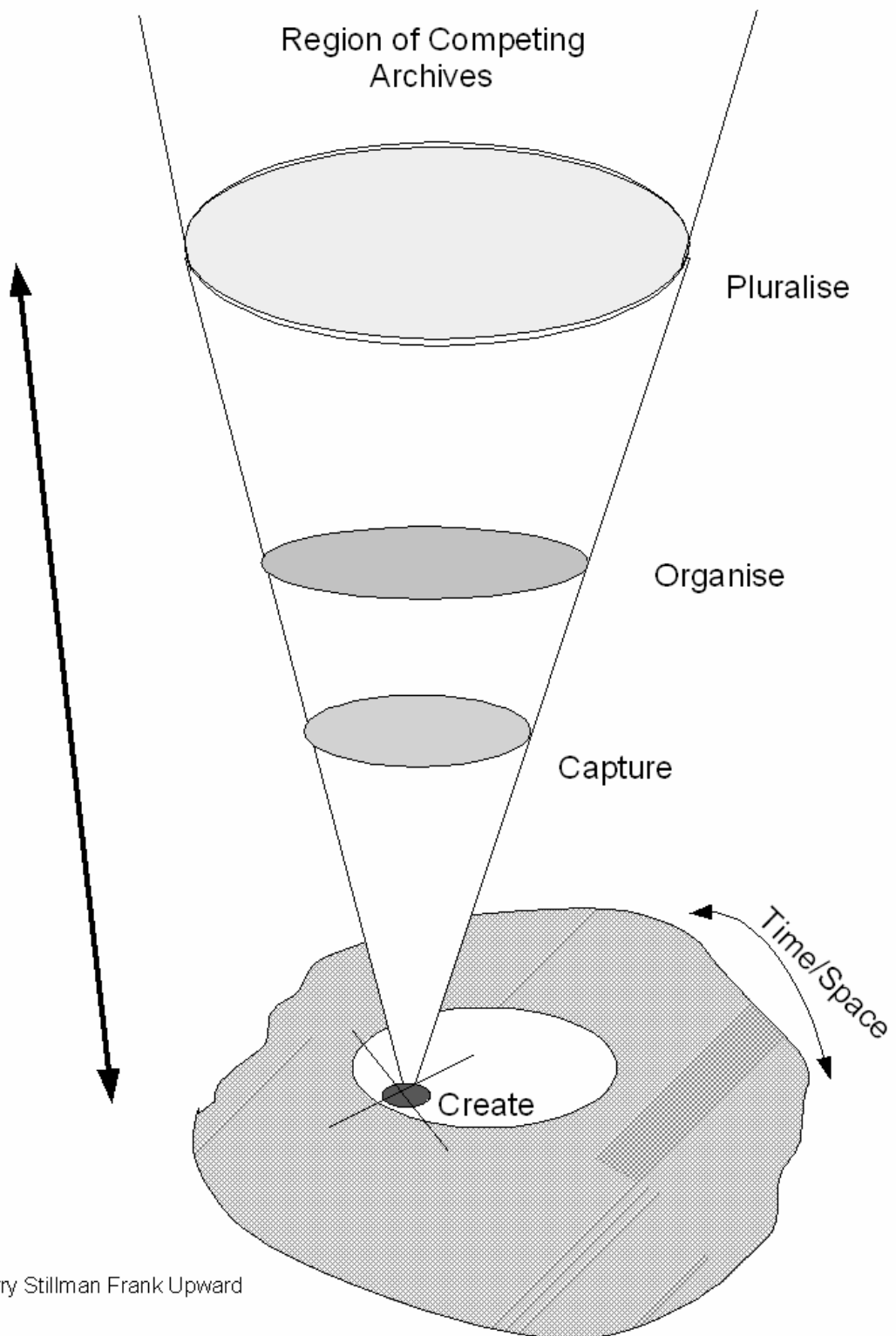
© Larry Stillman Frank Upward
2006

From the sorts of understandings developed in this paper so far sociologists would presumably be likely to move on to the description [topography] of particular groups and individuals within those groups. One could for example open up discussions of Bourdieu's concept of cultural capital by looking at whether the different continua outlined above ever have represented attempts by particular groups or individuals to enhance their prestige, status and power and whether different elements of the continua presented have interacted to maximize their efforts. Such uses can be proposed for the tables, but this paper will now move to the concept of practice more directly. It will do so under the label continuum mechanics, a way of thinking about how to make the complexity of today's networked age more tractable.

4 Continuum mechanics – making the machine more tractable

Within projects the topological explorations of continua arranged in accordance with the information processing continuum have a heuristic use. The records continuum model, for example, is used for teaching purposes on all continents by a number of educators. It has been used profitably (according to research reports) in projects where there was a need to communicate recordkeeping concerns to others, particularly information systems analysts or where there was a need for a conceptual framework looking at recordkeeping processes through time. At least one software company has found it useful in communicating recordkeeping ideas to audiences, as have some archival authorities and organizational units. The other models have similar explanatory uses at Monash, but knowledge about their existence is only just beginning to be disseminated. Thus, there appears to be a potential for offering the templates as problematicising, decision-making, or diagnostic tools in considering the flow of information in community informatics projects.

It might seem fanciful to think that this teaching experience based set of tools can be transferred into application and research projects where different information communities in the past have often competed and the notion that there is a common

rhythm for their endeavours is largely unknown. Perhaps, however, community informatics can take us into a new era where common experiences within project teams will change the structures in which we operate and make such tools more understandable and usable. Projects, as a form of practice, can extend our habitus shaping broader ways of being, acting, and thinking than we have followed in the past. They can link in to social practices, shared experiences, experimentation and the comprehension of our relationships and differences at both conscious and unconscious levels (Bentley 1987). In short they can offer generative structures.

Such projects (as not just Bourdieu but any Marxist) can still tell us, will often degenerate into experiences controlled by power relationships – and certainly not just at student level - but if the above tables are used non-hierarchically perhaps this degeneration will not occur as often. Even if competition still exists within a project group at least that competition might begin from a more equitable starting point whether we are talking about student, application, or research projects.[4]

There is also a strong paradigmatic quality to the information processing continuum which so far has shown through most strongly only in relation to the records continuum.

An example of the paradigmatic use of the templates is given in figure eight, which presents our colleague Livia Iacovino's analysis of legal issues in recordkeeping using the records continuum template.

The records continuum model provides a way of analysing recordkeeping and

---

[4] Projects that begin with a document that is going to be part of electronic commerce or business applications are endless and despite all the design effort that has gone into these areas for the most part the Marxist theory that power relations will always win out seems to have been proven correct. Very few systems analysts and technologists understand documents and it shows. Very few applications take full advantage of the wide sets of knowledge and skills that could be brought to bear. As a result it is still a fun area to teach and there is still much that students can do which both entertains and instructs them about the habitus-practice relationships of different communities of information professionals.

archiving processes in any era or place and the same should be true of all the other templates if they are truly topological. The records continuum paradigm provides practical questions at very basic and often ignored levels. It makes it easier, for example, to understand and explain why appraisal programs, policies and practices should address issues related to what documents to create, what records to capture, and what needs to be organized in an archive for retrieval and dissemination. It also can be used to draw attention to the need to expand appraisal processes to take account of genuinely plural perspectives about archives those that look at the totality of archives not only their provenancial beginnings. It can be used in all these ways in

Figure 8 The records continuum model as template for juridical issues (Livia Iacovino)

THE JURIDICAL DIMENSIONS OF UPWARD'S RECORDS CONTINUUM MODEL   Figure 1

Evidential Axis

Individual agency
▪ moral, legal and professional responsibilities

Ownership (moral or economic)

Legal and moral competencies

Legal personality
▪ entity-specific legislation

Legal and moral mandates/ powers
▪ enabling legislation

Authentic evidence over time
▪ collective 'will'
▪ universal well-being

Legal accountability to the organisation

Rights-obligations; consequences of actions

Judicial evidence
▪ circumstantial
▪ motives
▪ intention

Transactionality Axis

Legal and moral mandates
▪ societal ends
▪ utility-happiness
▪ needs/benefits

Purposes

Functions

Activities

Acts

▪ substantive laws - universal
▪ industry-specific laws
▪ codes/practices

Procedure required by or implied by law; legal and moral consequences; sanctions/penalties:

Collective Memory

Corporate/ Individual memory

Evidence

Trace

[Archival] Document

Records

Archive

Archives

4D   3D   2D   1D

Actor(s)

Unit(s)

Organisation

Institution

Identity Axis

Evidence laws and compliance

Reporting responsibilities

Responsible 3rd Party
▪ archival legislation
▪ FOI
▪ privacy
▪ access/disclosure laws

Recordkeeping Axis

© 1998-2002
Frank Upward
and Livia Iacovino

- 26 -

similar fashion within projects centred on description where it draws attention to the various layering of metadata from creation to the need for archivists to develop multi-provenance concepts. All of the other templates raise equally fundamental questions, and in tabular form act as an check-list of fundamentals for any information project, giving a form of tractability involving an analysis of what matters in this set of circumstances.

The method outlined above is an information based form of continuum mechanics in which the paradigm cannot be fully found in any one model. Its greater use is in the way the information process continuum and the many models exploring it draw metaphorical and actual attention to the need to spread the stress of complex information systems design and operation across the skills and knowledge sets of a number of information communities, and to do so with shared attention to the creation, capture, organization and pluralization processes.

This raises some obvious research questions for informatics which can be transferred readily into lessons for understanding community informatics. Of the myriad of complex information systems that have failed to meet expectations or have even collapsed in the last thirty years, how many of these have drawn on a narrow range of knowledge-skill sets? How many of them have bungled aspects of one of the four regions of the information process continuum or the space-time distancing processes more generally?[5] More generative research questions (ones which are less rhetorical) can be connected to the development of a use case approach to complex information systems involving organisational, community, emergent and pluralized memory spaces (i.e. those outside of simpler data base paradigms where use case approaches already abound). Within such use case approaches where will the various 'habitus-

---

[5] Every single instance of failure will have causes connectable to the information processing continuum. The space-time continuum is after all a monistic explanatory tool and if creation, capture, organisation and pluralization processes are addressed there is no reason to expect that the systems will be anything other than adequate for their time and place.

practice' relationships pointed to in this paper fit? Can they be brought to bear in less competitive fashion than the past? What will be the key technical components of an *open ended* use case method? How seriously will we take Bourdieu's injunction that we should apply our tools to new objects and in new contexts in ways that help us develop the tools as we go along – i.e. take an approach that uses rather than fears the unknown results of generative structuralism (Parker 2000: 43)?

In relation to some of the key components for a use case method, Australian recordkeeping archivists would be likely to put forward two suggestions drawing on their own habitus-practice background. One component is registration. Recordkeeping practices were dominated by registration processes for many centuries but began to lose favour in twentieth century paper environments because they were too labour intensive. In electronic environments their importance in generating things from granular beginnings is conclusively demonstrated by internet protocol registration processes and web page control. You cannot have structurally generative information systems (i.e. intelligent action systems) without it.

The other component, metadata, is inseparable from registration. The way we approach registration in particular cases will help us choose strategies from amongst the plethora of metadata schemes our information communities are producing. The registration – metadata nexus can open up issues of habitus-practice because it forces us to discuss a major question: what experiences register with us?[6] Why cannot our different information communities agree on what matters? Why do some of us sense the need for some things and others have different feelings? Why is it that some people find more meaning in open and unauthorised metadata systems such as *flickr* as a means of capturing the meaning of information objects than more traditional, controlled, and hierarchical metadata? There are many ways of asking the same question but as discussed above, a shared understanding of the information processing

---

[6] The tower of Babel we are capable of building out of different professional approaches to metadata illustrates the sort of problems which Bourdieu would describe as the problems of habitus and practice

continuum opens up some hope that the differences will be resolved Bourdieu fashion by reason rather than power or habit.

The increased recognition of the needs for integrated and partnering approaches to research, and for collaborative, inter-professional, and inter-disciplinary approaches to both research and applications can still hide power plays. The ideas in this paper are directed at furthering the dissipation of our boundaries in non power-play fashion. We need to get on top of the mechanics of the continuum. It is presently viewable as a runaway machine and we cannot afford to lose any forms of traction for harnessing it. Our past knowledge and skill sets need to move forward generatively into the new era, not die in an old one. We need to use projects of all kinds, educational, application and research directed, to update our 'habitus-practice' relations getting ourselves enmeshed in the ideas and practices of others while bringing to bear our own particular knowledge sets and skills within the shared framework of the information processing continuum. Easy words to write, but to do something with them we need tool.[7]

5 More continuum models and templates

Since the first continuum model was developed in 1996 (the records continuum model) models have themselves begun to expand exponentially. Here another to consider.

---

[7] We also need to find simple non-reductionist ways of harnessing the information processing continuum. Justice and openness were suggested thirty-five years ago by Jean-François Lyotard at the end of *The Postmodern Condition* (1984) should be essential goals in information systems development. Justice is complex, openness is not, but that is the beginning of another paper…

Figure 9 is the application of the continuum to the production of academic information derived from interviews with research subjects. Information artifacts, as records and outcomes of action, become disembedded and reused in other contexts, for example, a research interview is 'unitised' and its parts are reconstituted via different technologies or processes as evidence for particular research and theoretical constructions in academic production. The interview, or any data, is therefore moved space-time, and is reconstituted, reused, re-embedded according to particular human or machine agency (human speech is transformed by agency of speech recognition software into text), or human agency makes particular interpretive decisions about how ambiguous sounds should be transcribed in transcription. The interview data (or its constituent parts) become 'pluralised' with the production of different knowledge artifacts: theory, the application of theory and the development of scholarly and practical publications. Its pluralisation can also lead to it being used in other forms of action, such as social action, lobbying, or policy-making.

The incorporation of the time-space dimension is also important for several reasons. First, it recognises that information objects have a changing historical life, and in addition, the reconstruction of time and space through modernity, and particularly through the agency of ICTs, gives information objects new potentiality (for example, data units can be immediately 'served up' on a website or in an electronic journal, whereas previously, months or years would pass by before a ship arrived with a copy of an overseas journal for use in an Australian library).

A similar modification of the cone could, for example, be used to represent the different purposes and processes in which aspects of a community informatics community history are processed.
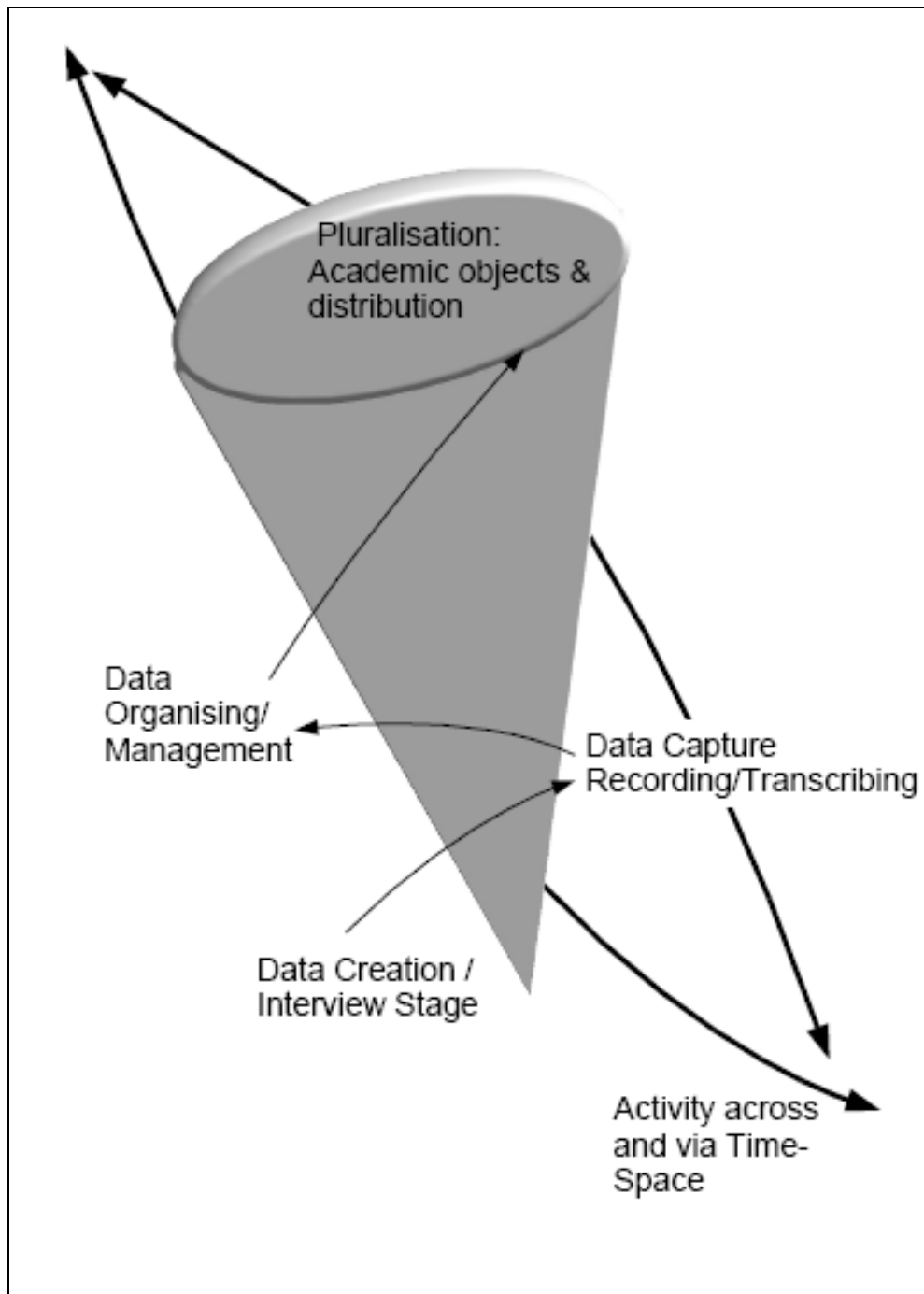
Figure nine: An example of the Information Processing Continuum, Academic Publishing Process © Larry Stillman 2006).

Figure 10 text labels:

Time-Space

Agents
Human Action | Stored Memory
Metadata | Technologies

Individual
Collaborative
Corporate
Societal

Purposes

•Enjoyment
•To enhance living
•Awareness
•To maximize opportunity
•Accountability
•To minimize risk

Modalities
structuring scope of action
Interpretive
•Via signs and meaning
•Facilitative
•Via resources and power allocation
•Normative
• via norms & sanctions

Creation | Capture
Organisation | Pluralisation
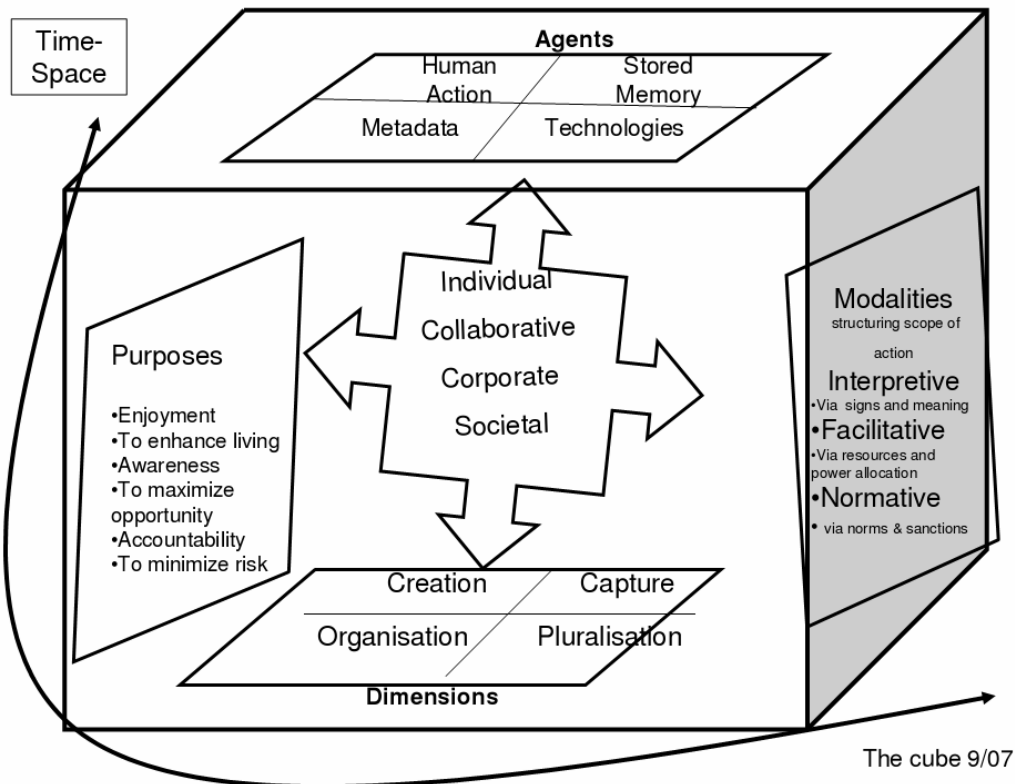**Dimensions**

The cube 9/07

Figure 10: The Information Continuum in space-time

Figure 10 is another variety of a generic model of the Information Continuum (see Figure 1, above), but it also attempts to provide true dimensionality, through a the cube shape, placed in space and time, as a way of demonstrating that agency works across different dimensions and through different media. Thus, if we focus on human action (on the top 'level'), agency works in any number of individual through to societal ways at different levels of depth (going backward and forward in the cube), and in similarly different degrees with the different modalities. Thus, for example, in a community-based, agency setting (of relevant to community informatics), a strongly normative dimension around the importance of collaboration and care, influences attitudes to, and use of facilities (such as ICTs). It may well be that the structural principles which develop in an agency do not support information (stored memory) pluralization via ICTs for reasons of privacy, confidentiality or fear of exploitation of

indigenous knowledge, but on the other hand, there is no objection to using ICTs for infotainment based upon the capture and pluralization of non-sensitive information.

Of course, as with any model representation, the figures should not be considered as firm pictures of reality, but broad-brush strokes of key theoretical points to be used as a starting point in analysis or teaching of empirical or hypothetical situations.

References

Bentley, G. C. (1987). "Ethnicity and Practice." Comparative Studies in Society and History 29(1): 24-55.

Bourdieu, P. (1990). In other words : essays towards a reflexive sociology. Cambridge, Polity Press in association with Basil Blackwell.

Colebrook, C. (2002). Gilles Deleuze. London ; New York, Routledge.

Deleuze, G. (1988). Bergsonism, trans by Boundas, C., New York, Zone.

Gibson, Q. B. (1961) Facing Philosophical Problems. Melbourne, F.W.Chesire.

Giddens, A. (1984). The constitution of society : outline of the theory of structuration. Berkeley, University of California Press.

Lyotard, J.-F. (1984). The postmodern condition: a report on knowledge. Minneapolis, University of Minnesota Press.

McKemmish, S., M. Piggott, et al., Eds. (2005). Archives: recordkeeping in society Topics in Australasian library and information studies. Wagga Wagga, NSW, Centre for Information Studies, Charles Sturt University.

Parker, J. (2000). Structuration. Buckingham, Open University Press.

Upward, F. (2005). The records continuum. Archives: recordkeeping in society S. McKemmish, M. Piggott, B. Reed and F. Upward. Wagga Wagga, NSW, Centre for Information Studies, Charles Sturt University. 24: 197-222.