The deconstructed journal – a new model for academic publishing

John W T Smith,
The Templeman Library,
University of Kent at Canterbury.

ABSTRACT: *The limitations of existing proposed and operational publishing models intended to replace the academic journal are briefly reviewed. Three 'insights' are described, the first is into the 'means/end' confusion of much current net-based publishing activity, the second is that it is the purpose, not the form, that is the important aspect of the traditional academic journal model, and the third is that satisfactory net-based publishing models need not contain a central publisher. From this new viewpoint is developed the Deconstructed Journal (DJ) model which it is suggested is a better model for network based academic publishing. It also solves some of the problems of the current model. Although the main focus of the DJ model is the replacement of the STM journal it has implications for all areas of academic journal publishing.*

Introduction

The proposed publishing model described in the latter half of this article has been developing in my mind for over five years. The beginnings of this model can be traced back to an idea for network-based scholarly publishing which I described at a meeting held at the Royal Society in 1993[1]. I also described variations of this early model to other meetings in the UK[2] and India[3].This article itself is an extended and updated version of a short paper given at the ICCC/IFIP Conference on Electronic Publishing in 1997, Smith (1997).

Initially I did not feel it was worth writing about that early model as I felt it was so obviously a candidate to replace the traditional paper-based model that others must already be describing it in the literature of library and information science. However, this has not been the case. Although other models have been proposed, and tried, there has not to my knowledge been any model described quite like the one I currently call the 'Deconstructed Journal' (DJ) model. The nearest I have seen is in a paper by Ginsparg (1996) where he writes:

"Any type of information could be overlayed on this raw archive and maintained by third parties." ... "the average reader could benefit from an interface that recommended a set of 'essential reads'..."

However he is concerned with the problem of accessing a single large archive source and does not extend the idea he is describing to distributed sources. Neither does he point out that it has a close resemblance to the 'recommending' or 'filter' role of the traditional academic journal. Although the ideas expressed
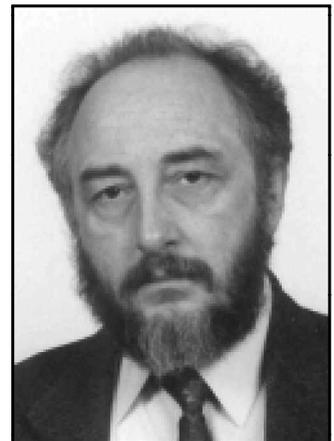

John W. T. Smith

1 'E-Journals –
Exchange of
Experience
Meeting', 26
February 1993, The
Royal Society,
London (organised
by the British
Library Research
and Development
Department).

2 Invited talk to
the staff of
CAB International
(CAB-I) on 5
November 1993

3 Workshop at the
National Centre for
Software Technol-
ogy in Bombay,
India, on 6
December 1994.

4 Scientific, Technical
and Medical.

5 For further details
see: http://
www.njp.org/
faq.html

6 As at January 1999.
See http://
xxx.lanl.gov/cgi-bin/
show_recent_weekdays
_graph for latest
figures.

here could apply, to a greater or lesser extent, to most areas of academic journal publishing I have chosen to make the STM[4] journal the main focus of this article. The STM journal has a more clearly defined role for its authors and readers which makes it easier for me to compare the old and new models discussed. So from this point on I will use the phrase 'STM journal' rather than the more general 'academic journal'.

Another very recent development that has echoes of the DJ model is the *New Journal of Physics*, IWR (1998), launched by the Institute of Physics (UK) and the Deutsche Physikalische Gesellschaft (Germany) in the autumn of 1998[5]. The relationship to the DJ model in this case is the proposal that the author pays for 'publication' and the end product is free to the reader.

Brief history of the development of e-publishing models

Two paths There have been two distinct approaches to moving scholarly publishing to the net.

1. *From the users:* To use the available tools to provide generalised communication systems of use to the academic community. From this initially came moderated mailing lists and USENET Newsgroups. Later this led to innovative and important systems like the Physics E-print Archive, Ginsparg (1994).

2. *From the existing commercial publishers:* To mimic existing STM journals, in most cases right down to the page layout.

The first approach leads to models that take advantage of the capabilities of the net but usually do not have the formal structure required for the solid, trustworthy transfer of organised knowledge. Sometimes they have been adapted to support such features as peer review or other forms of content evaluation but this has often been 'bolted on' afterwards rather than being intrinsic to the design.

The second approach limits the capabilities of the net as a knowledge transfer medium by forcing on it concepts that make no sense in the network world. For example we still have the continuing existence of the 'page' and the 'issue' in e-versions of STM journals. At a deeper level the second approach also transfers to the net many of the bad points of the paper based model. These include: cost of subscriptions, loss of IPR by the author, restricted access to publication due to lack of space, etc. Finally the centrist approach of the current model does not fit the basically distributed model of the net.

Existing/proposed e-publishing models

For examples of the variety of models proposed for academic e-publishing see Bailey (1994), Ginsparg (1996), Harnad (1990, 1996), McKnight (1993), Odlyzko (1995), Piternick (1991), Rowland (1994), Savenije, B (1997) and Swinnerton-Dyer (1992).

Swinnerton-Dyer (1992) proposed a publishing model heavily influenced by the paper model in operation and based around a centralised server. Bailey (1994) briefly reviews selected proposed large-scale models and then lists a set of basic requirements he feels any e-publishing model must fulfil. Odlyzko (1995) includes an outline model based on the interactive and less formal possibilities of net-based publishing. Harnad (1990) is concerned mainly with the pre-formal communication stage between researchers, but Harnad (1996) elaborates the earlier model to include a mechanism for peer-review. Ginsparg (1996) describes the operation of a real working e-publishing model. In this case the question is not whether it works (use of the Physics E-prints Archive is currently running at around 70,000 connections per day[6]) but whether the implicit model it embodies is applicable to other areas of research. Savenije (1997) argues an opening case similar in some ways to mine but his analysis of the publisher and/or journal roles is too simplified and his suggested model is focused mainly on possible roles for the library.

Although the ACM Electronic Publishing Plan, ACM (1995), is a list of assumptions, goals and proposed actions

needed to move towards e-publishing, rather than an explicit description of an e-publishing model, it does contain an implicit model. In this implicit model the concept of the journal is weakened, the issue disappears, and the idea of access to a 'database of documents' (similar to that described by Ginsparg (1996)) becomes the 'core of the membership package'.

For other surveys of attempts to replace the STM journal see Bailey (1994), Lines (1992) and Piternick (1989).

Need for another new model

Given this plethora of competing (and in some cases operational) e-publishing models why is there a need for yet another model?

The first insight – the 'means-end' confusion

The problem with most of the current network-based attempts to replace the paper STM journal (and many of the proposals for future models) is that they have set out to mimic or replicate the existing mechanisms without asking the fundamental question *'Why are they the way they are?'*. In essence they have confused the current 'means', the STM journal, with the real 'end', scholarly intercommunication and recognition.

The second insight – a lesson from the past

However, before dismissing the paper-based journal and the model it embodies there is something it can teach us. The current model of the STM journal is the result of many years of evolution. The fact that it has retained its present general structure for nearly two centuries implies it must be doing something right, i.e., it must be playing a real role. Any replacement must therefore *play the same roles* or, to rephrase it more strongly, it must *satisfy the same needs*.

To apply this insight the first move therefore is to decide just what roles the STM journal plays.

The main roles These are the roles most users (and librarians,[7] etc.) would say are played by the STM journal.

- *Editorial* – The most obvious role of the journal is the selection of material. This is mainly subject based, i.e. 'Does this item fall within the remit of the journal and/or would it be of interest to our readers?', although there may also be some quality control element as well.
- *Quality control (Content)* – This is the part played by the referees. A major part of the effort that sets the reputation of a journal is carried out by the referees.
- *Quality control (Form)* – The copy editing and general page design that make a journal look professional is carried out by copy editors and other non-academic professionals.
- *Conferring recognition of work done* – In terms of importance this ranks first from the point of view of many authors (for some the actual dissemination of the information may rank higher).
- *Marketing (or making aware)* – marketing of the journal to possible readers and other customers, e.g. libraries.
- *Delivering/disseminating* – the delivery of the information (in the form of the physical item) to the purchaser or reader.

The first two items on this list can also be considered as a form of filter which allows through only information that is relevant and of sufficient quality. This idea will be considered more fully below in the context of the proposed model.

The 'hidden' roles In addition to the obvious roles played by the journal it also has hidden or non-obvious roles which are nevertheless important to the academic research community.

- *Subject defining* – A journal (the editorial board) helps to define the areas it serves. It does this in two ways:
- *Directly* – through invited review papers and/or editorials.

7　An analysis by Maurice Line (Line, 1992) although carried out for a different purpose agrees with mine in many areas.

- *Indirectly* – through the editorial decisions made, i.e. the papers chosen for inclusion.
- *Community defining* – Again, depending on the subject area, a journal may help define a research community through its readership. This is more likely to be true of emerging research areas.
- *Archiving* (*maintaining a record for posterity*) – Strictly speaking it is not the role of the journal to archive the results of work done, but the physical objects that are the traditional journal are themselves archived, usually by the customers, mainly academic libraries (at no direct cost to the journal publishers, the authors, or the other researchers in that field).

We will return to this analysis of main and hidden roles when we consider the proposed new model.

The third insight – no necessary need for a central publisher

Reviewing the above 'analysis' of the roles of the STM journal without any commitment to the current model (in fact with a positive desire to escape the limitations of the current model) the one thing that is obvious is that most of the activities involved are independent (e.g. quality control activities are not concerned with distribution) and therefore there is no obvious need for these roles to be carried out, or co-ordinated, by a central organisation (i.e. the publisher). Like the 'page' and the 'issue' the need for a publisher (or central co-ordinator) is a result of the requirements of the paper-based model. As long as there was a physical item to be produced and distributed it made sense to do this as collections of papers (issues) rather than single papers. Someone (or some organisation) was needed to collect these together, arrange selection, printing, binding, and distribution. It also made sense for this person/organisation to organise the quality control (editorial board, referees, etc.) as well. Once it is realised there is no necessary requirement

for a central publisher one can consider new structures (or organising models) that play the roles listed above, i.e., satisfy the needs currently satisfied by the present publishing model.

This is the essence of the third insight – the realisation that it is possible to have a model for STM publishing that can satisfy the needs of the STM community without a central publisher/co-ordinator. This can be achieved by involving a *collection of co-operating actors or agencies*.

Further, this distributed model far better utilises, or matches, the capabilities of the net than does any centralised model.

This basic idea of a decentralised academic publishing model designed to play all the roles of the current model based on co-operating actors or agencies can give rise to a collection of operational models which fit within its fundamental premise. What is described below, the Deconstructed Journal (DJ), is one such operational model.

An aside – A new Paradigm? I find I have needed to describe my proposed new model (the DJ) from many angles. This is because I am using words (e.g. journal, publishing, article, etc.) which may have one meaning in the old model and another in the new. This problem of words/concepts changing their meaning leads me to suspect that my new DJ model is a true 'paradigm shift' as described by Thomas Kuhn in *The Structure of Scientific Revolutions*, Kuhn (1970). Many authors writing in the area of new publishing models have described their work as incorporating a 'paradigm shift' but in many cases their new models are not new paradigms – they are simple (or complex) extrapolations or re-workings of the current model. This changing in the meaning of words/concepts during a paradigm shift is not complete proof of such an event – but it is highly indicative. To be precise it is the underlying set of assumptions derived from the three insights (most importantly the proposal that a distributed model without a central publisher could satisfactorily replace the current model) that are the new paradigm.

The Deconstructed Journal – One possible operational model

What follows is one way of reassembling the elements 'pulled apart' in the previous section, or viewed another way it is a way of fulfilling the roles of the STM journal using a new assemblage of actors and activities.

The Subject Focal Point

As one might expect, at the core of this new operational model is a Web[8] service similar in structure to a current subject gateway[9]. This service contains links to relevant items of interest to its readers (who may also be subscribers). This is the Subject Focal Point (SFP) and it is the visible replacement for a specific STM journal in the current model. Some of the important differences between the SFP and current paper-based and e-journals are:

- It is a gateway-like service which points, links or refers (the exact term is a merging of these three concepts) users to items of interest.
- The operators of the SFP do not own, or have any exclusive rights in, the items pointed to.
- The major role of the SFP is to act as a 'filter' between the contents of the net and the user or subscriber – not to be a repository of the said material.
- The operators of the SFP do not (in most cases), arrange the quality control (content) stage (i.e. refereeing) of the publishing process.

How a new SFP would be started

A basic version of the SFP would be created (or come into existence) in the following way:

- A group (who will probably form the editorial board of the SFP) would decide a new SFP was needed.
- They would search the net for relevant items, maybe also announcing on various e-mail lists and USENET Newsgroups, etc, their intention to set up this new SFP and invite suggestions for inclusion in the first 'issue'[10].

- Using similar tools (e-mail lists, USENET Newsgroups, Web pages combined with search engine posting services and search engines), plus other information dissemination tools (including hardcopy advertisements if relevant) they would announce the availability of the new SFP.
- The service might be made available 'free' supported by a learned society, academic institution, or some other form of public funding, or it might be subscription based with users, or their institutions, paying for access.

The SFP and the DJ – a clarification

It is possible to confuse the Subject Focal Point (which replaces, at a surface level, the journal in the current model) and the Deconstructed Journal which is the overall model within which the SFP works. This confusion can arise because in the current model most of the needs described in the analysis above are satisfied during the production of the traditional journal. In the DJ model the SFP only satisfies some of these needs and activities carried out by other organisations satisfy the rest. Therefore we cannot compare the SFP directly with the traditional publishing model we must consider all the activities described within the DJ publishing model. The following section may help explain this.

An operational view of the DJ model and the 'actors/activities' that form it

To see in detail how this model would work we need to list the various roles that need to be played by this replacement for the current STM journal model (as defined by the analysis of the roles of the traditional journal above) and indicate how, and/or by whom, the role is to be carried out within the proposed new model.

The main roles

- *Editorial* – This is performed by the SFP editorial board (or equivalent). The editorial board would select items for inclusion, manage the

8 I use 'Web' here as it is the currently available technology – there is nothing implicit in the DJ model that links it to the Web model – any net-based service with a similar functionality could play the role.

9 There is, as yet, no consistent terminology in this area – I am using subject gateway to mean a site dedicated to listing links relevant to a particular subject area (e.g. SOSIG for Social Sciences). A gateway may also contain primary information.

10 Of course, 'issue' is an anachronism here – first appearance or manifestation my be a better word – but this is a new complex entity and we do not yet have the correct words for its parts, or even have a completely clear description of its parts.

11   I use the phrase 'author/producer' to indicate the items on the net are not, and will not, necessarily be in the currently accepted form of the article or book or similar written entity. However, the phase is awkward so for the rest of this article I will use 'author' even though it is understood the more general phrase is intended.

12   Selective Dissemination of Information

operation of the server, and possibly arrange for summary or survey articles to be written.

● *Quality control (Content)* – This is an area of radical departure from the current model. In the DJ model the refereeing role organised by the publisher in the current model would be played by independent organisations who would evaluate or give their 'stamp of approval' to items (articles, sites, services, etc). These could be submitted by the author/producer[11], the editorial board of an SFP, or an independent agent (literary agent, university, company, etc). These 'evaluator organisations' could use paid or unpaid referees (as with the current model), or some other mechanism, for deciding whether to give their stamp of approval. The evaluator organisations would be paid for all or part of their effort by the author, the employer of the author, or others. Harnad & Hemus (1997) argue strongly for a model where the author or institution pay for publication and their arguments are relevant here but they do not clearly separate evaluation from 'making available'. There are existing organisations that could play this role, for example the learned societies or universities (in the same way that they currently cross-check the quality of each others courses). Other independent bodies might be set up to do this. It might be argued that there could be possibilities for corruption or other forms of favouritism if payment is involved for evaluation but any such (corrupt) organisations would soon disappear as evaluators would have nothing to sell but their reputation. There also room for greater flexibility in this new approach – for example evaluators could rank an item rather than just give it a pass or fail. Because the SFP only includes a link, and not the article, it is not forced into the 'include/not-include' situation of the paper-based model.

● *Quality control (Form)* – This could be carried out by the author, possibly with the aid of intelligent software (for example programs like the Wizards in Microsoft products which aid in the layout or production of a document or presentation, etc.). Other options are local experts (within the institution), external commercial organisations (as one might use a graphic designer for a book), etc. Many universities already have a resident HTML expert who advises on Web page design – this could be the same person or part of the same team, or they could go out to external designers, consultants, etc.

● *Marketing (or making aware)* – The SFP makes its subscribers aware of the new items of interest. It will probably do this passively, simply by being there when they look, but it could be proactive by e-mailing subscribers to alert them to the availability of new material. It could do this in rich and complex ways. Some subscribers would have a regular update which would mimic an 'issue', others might only ask to be informed actively of items above some pre-set level of relevance, etc. Although this could be quite flexible it would need to avoid becoming an SDI[12] service for the reasons outlined in 'Community defining' below. The SFP might also arrange for its own pages to be indexed by the major search engines even though it may not allow open access to non-subscribers. In this way those not aware of the SFP could find references to it using a search service. It would probably at least make its top level page available for open access and ensure it was listed in the general network indexing services.

● *Delivering/disseminating (enabling access to the items pointed to)* – This is carried out by the network as part of its normal operation. It is not the problem of the SFP to ensure access to the items pointed to, though it may have automatic regular checks to ensure they are available. This latter activity would be a service to its subscribers so they do not waste their time trying to access unavailable items. It might also inform authors that their items are not currently available. An SFP built today

would contain URLs pointing to specific network locations but in the future it will probably contain URIs which identify the item but leave it to other services to supply the nearest location.

● *Conferring recognition of work done* – This is a function of the SFP and the evaluator organisations. It is worth emphasising that there is nothing in the DJ model to prevent an author having his or her work evaluated by more than one evaluator and the model positively encourages multiple SFPs to point to the same item since there is no concept of SFP/item ownership.

The 'hidden' roles
● *Subject defining* – As with the current form of journal the SFP has two ways to help define the subject it covers:

> *Directly* – The SFP can have invited review papers and/or editorials. These would form part of the value-added service paid for by the subscribers to the SFP and would be the only items owned by the SFP (if the operators of the SFP so wished). However, it might be in their interest to enter into agreements with related SFPs to share these items.
>
> *Indirectly* – The selection of links listed by the SFP would automatically be 'subject defining' as it is with the equivalent activity in the current model.

● *Community defining* – An SFP would help define a community because its subscribers would share the same links to related information. It is because this role is required that the SFP's active marketing should not be too tailorable, i.e. it must not move to being an SDI service. The danger of SDI taken to its logical limits is that each researcher is provided with a unique view of the information available and there is no shared commonality of knowledge. Without this commonality of knowledge we couldn't have the community activity that is STM research.

Archiving – This is a thorny area for all forms of network publishing. With the paper version the customers provide the archive, and the publishers the items to be archived. Although this approach is possible for electronic documents it is not recommended as we would have the wasteful[13] situation of multiple stored copies of each item (plus any Copyright problems). However there are better solutions, for example:

● The authors' employers provide it, e.g. the universities, or other research organisations. They get the kudos (it is part of their research image) therefore they want 'their' papers to be visible and available into the future.

● New 'not for profit' organisations provide it. The JSTOR service is an excellent example of such an organisation, Garlock (1997), JSTOR (1998).

● Governmental, or inter-Governmental organisations provide it (e.g. some branch of the United Nations, or for the members of the EU, a Europe wide body).

● There might be a commercial opening. For example one could imagine a company, a little like a pensions company, which guarantees availability in the future by using the current fees to pay for the provision of new and existing items on its machines[14]. It may be thought that there would be a problem as the amount of stored information grows but the flow of funds remained constant – however it is more than likely that storage technology will increase in capacity and fall in cost at a sufficiently rate to counter this problem. In addition, with sophisticated staging techniques it will be possible to have old and very rarely used items on very cheap off-line storage which is only accessed on demand. This technique is standard practice today with very large collections of data. Such a service could operate without even real-time interaction with its clients. The request for an old document could be collected by a local program which e-mailed the request to the archive server. Like the DJ model the archive could be spread across

13 Wasteful because there is no need for each user or institution to keep a copy when one can be downloaded on demand. However a few distributed copies for security purposes would be a sensible precaution.

14 This model is where part of any income pays for current operation and part is invested for the future.

many co-operating organisations with a central service routing the request to the appropriate one without the customer knowing, or caring, where the document was coming from.

The SFP as a filter

This analogy was mentioned briefly above. The realisation of the filter role of the traditional STM journal was one of the early steps that led me to formulate the DJ model. This role is the major role of the SFP where it is explicit rather than implicit as it is in the traditional journal model.

The filter role could easily be extended so that, in addition to providing links to items submitted, the SFP could have a team (like an extension to the editorial board) that actively scans the network for interesting and relevant items. This 'one-stop-shop' pointer service for all information on the net of value in a specific subject might be the major selling point for the SFP and the primary reason why a subscription is taken out. An extension of this idea might be that instead of an author submitting an item to an SFP he or she might post a reference to it in some common area concerned with the appropriate subject or subjects, knowing that 'talent spotters' from the SFPs look there for new material.

An author view of the DJ model

Another way of illustrating the DJ model is to consider how it might operate from the point of view of an author/researcher.

The researcher:

1. Prepares an article
2. Places it on a visible server
3. Notifies one or more evaluator organisations
4. Revises it in the light of comments until evaluators give it their seal of approval
5. Notifies the relevant SFPs who place it on their recommended list if it is relevant.

There are many possible variations. For example the article may be on a university server during the evaluation phase but be moved to a commercial or not-for-profit independent server before being 'offered' to an SFP or SFPs.

A reader/user view of the DJ model

A possible reader use scenario may be:

1. User runs a local client program (today it would be a Web client) and links to the SFP server.
2. On initial connection the user is asked for identification (this may be automatic).
3. Using this information the server returns a 'front page' that depends in part on when the user last connected, and possibly also on a stored profile.
4. The user views local (to the SFP) information and/or follows links/pointers from there.

Assuming a functionality at least equivalent to the current Web client/server environment the user will then be able to view items on screen and/or request copies. It is worth stressing that access to the primary material will be free in almost all cases. An example of where access might not be free is where an SFP recommends (i.e., points to) a commercial service if the editors considered it to be of value to their readers.

Some selected advantages, possibilities and problems of the DJ model

As one would expect there are many implications and possibilities that follow from this new model. A selection of the most important ones are considered here.

Problems with the current model 'solved' by the DJ model[15]

Escape from the 'scatter problem' The scatter problem is when information pertinent to a specific area of research is spread across a number of journals. This is particularly common with emerging

15   One of the main reasons for 'paradigm shifts' according to Kuhn is that the old paradigm (or model) has insoluble problems (anomalies) which often disappear if the new paradigm is adopted.

research areas as there may not be a specific journal or journals dedicated to the subject. It can also occur with work that straddles current research area boundaries. The DJ model completely eliminates the scatter problem. To be exact the scatter problem need not exist in the model as no published item is owned by any particular SFP – so any SFP can point to any item that the editorial board feels would be of interest to the subscribers.

Easier publication of new authors/ideas A well known problem of refereeing in the current model is that authors with new ideas (especially those involving new theories or paradigms) find it difficult to get published, Schauder (1994). The DJ model, because it allows for many independent evaluators, and the possibility of grading rather than the simple pass/fail (publish/don't publish) approach of the current model, could allow unknown authors with a radical new idea to get published (more correctly 'acknowledged' or 'made visible') more easily.

Delay caused by the referring process Because there may be a range of evaluator organisations within a topic area it is possible the speed of throughput might increase.

Good articles not published for space reasons Good articles sometimes miss being published because of limited space in paper-based journals. This obviously cannot happen with the SFP as it only points to items elsewhere. Obviously this is true of many other forms of e-publishing once one has escaped the physically imposed limits of the paper-based model.

Other problems of the current model highlighted by the Royal Society STM publishing report (1993) A detailed study of the STM information system in the UK was carried out for the Royal Society, British Library and ALPSP in 1993, Royal Society (1993). Although this is a little dated now many of the conclusions and recommendations in the report are still relevant. The way in which the DJ model would address some of these is considered below. The numbers and heading titles referred to are taken from the Royal Society report.

- Conclusion C8 – *Demand for current awareness services* – As indicated above the SFP combines both secondary and primary publishing in one service.
- Conclusion C12 – *Need for subject access to, and quality control of, networked information* – This is the primary role of the SFP and the DJ model.
- Conclusion C16 – *Need for the continuance of the peer-review system* – The DJ model fully supports quality control mechanisms using peer-review (and other quality control mechanisms).
- Conclusion C17 – *Problem of 'salami slicing' publishing* – The DJ model solves this partly because it allows one item to be 'published' in more than one SFP and/or be evaluated by more than one evaluator organisation. Where an article deserves recognition across current subject boundaries the model allows this. It also solves this problem in the same way that it solves the 'scatter problem' described above.
- Conclusion C19 – *Role for smaller learned societies* – Provision of an SFP might be a money earning option for smaller learned societies as the strength of an SFP lies in the expertise of the editorial board rather than the size of the learned society. Also capital costs for setting up an SFP are low.
- Recommendation R6 – *Benefits of focused current awareness services* – The SFP provides a model for such services that extends beyond any of the current services and enables the involvement of academic, not-for-profit and commercial organisations.

Some new possibilities

Full grown birth Any new SFP that comes into existence can start by pointing to existing items that are relevant to the subject area in question. This again follows from the fact that no item is owned by any specific SFP.

Fading of the primary/secondary publication division Under the definitions of the current paper-based model the SFP is more like a 'secondary' publication than a 'primary' publication, since it points

to, but does not contain, the actual information item. However it is the first point of contact, and link, between the subscriber and the information sought. In this it resembles both the primary journal and a secondary bibliographic service.

Problems

There are three main problems areas preventing easy adoption of this model. These are: community acceptance, funding, and technical. Of these the first two are by far the most important.

Acceptance The major obstacle to the adoption of the proposed new model is acceptance by the user community – as an earlier writer on this topic pointed out

> 'the introduction of a single innovation in technology cannot be successful until it is accompanied by an appropriate set of social, behavioural, organisational, and institutional innovations.' Goldhar *et al* (1977).

Twenty-one years later a strong proponent of e-publishing is still lamenting

> 'But the biggest brake on progress is still surely the reluctance of authors to entrust their work to a new, unproven, medium in place of the one that has served them faithfully for years.' Harnad (1998)

Such acceptance will only come about when the professional and funding bodies accept publishing in this model as equal to paper-based or network based publishing using the traditional model. Research funding bodies in the UK are recognising network published items as long as they have passed the usual quality control tests (i.e. selection and refereeing), so one assumes they would accept the DJ model as long as the quality control was as good.

On the positive side some research areas have already diverged markedly from the traditional path without completely abandoning it. A prime example is physics and related sciences (mathematics, astronomy, etc) where the researchers are already placing their papers in the e-print archives for their colleague to access long before they are available in the traditional journals. For these groups the DJ model will not look so alien and its attributes may be more easily recognised. Indeed the *New Journal of Physics* (mentioned in my introduction) includes some of the basic ideas of the DJ model. Although it is not clear from the available information whether authors will need to pass Copyright to the NJP as part of the publishing process there seems to be no reason why others could not point directly to any article within it as it is available free to any reader. To this extent it appears as a simple server/archive within the specification of the DJ model.

Funding (and efficiency) The second most important obstacle is finding an operational economic model that would fund activities within the new model. Although a detailed consideration is not possible here the basic funding model assumes the following:

● The SFP itself is most likely to be either funded by an external organisation, e.g., a learned society, university, etc, or paid for by institutional or individual subscribers. Where the SFP is a subscription based service (like a current STM journal) the model does not define who will pay. There will be some SFPs that will appeal to the individual subscriber but the majority will probably be accessed by members of institutions under an institution wide arrangement. The users' institution will arrange access and pay the subscription fee in the same way that it would currently subscribe to a journal for the library, or subscribe to any other networked service. An SFP could possibly be paid for (or supplemented by) relevant advertisements (as most current network search services currently are) but it is felt most academics would prefer a publicly funded or subscription service free of such distractions. Yet other funding models are possible, e.g., commercial sponsorship with discreet mention of the sponsor.

- The refereeing/evaluating activity is paid for by authors or, more probably, by their employing institutions. This approach is similar to the page charge already required by some existing journals. It is also the model adopted by the *New Journal of Physics* (although in this case the fee also pays for mounting the paper on their server and archiving).
- The archiving activity is paid for by either the authors or their employers, possibly using an insurance, co-operative, or pension model[16]. Alternatively the archiving service could be provided at no direct cost by central/ international governmental agencies.

Related to the idea of cost is 'efficiency'. By this is meant the overall cost of the system to the end-user community including the researchers and their employer organisations. At first sight the DJ model with its added actors and activities would appear much less efficient than the current model. However this is not necessarily the case. Many of the actors are in fact the same people, for example the referees are likely to be the same, so to are the academic members of the SFP editorial boards. In addition some current activities are not required, e.g., storage of the paper journals by libraries. When we add in the general efficiencies of e-publishing compared to paper publishing the differences between the two models shrinks again, e.g., the DJ has no printing or distribution costs. There are writers in the area of new models for STM publishing, for example Walker (1998), who argue that if we take into account the whole cost of the STM publishing enterprise from author to reader including the profits made by publishers and the cost of libraries (to store and make available the paper journal), the cost of e-publishing will be significantly less overall. The experience reported by Walker on the move of the *Florida Entomologist (An International Journal for the Americas)* to electronic form confirms this. Odlyzko (1998) also argues, with examples, that considerable savings can be made in the move from paper to

e-publishing. These arguments, of course, are relevant to e-publishing in general not just the DJ model.

Technical problems There are various technical problems. The following are just two of the more important ones.

- *Identification* – The SFP will (in most cases) only store the pointer and what is at the other end is beyond its control. To ensure the item pointed to is the one the SFP intends to recommend to its subscribers some form of verification process will be needed. This will probably involve storing the item in a non-editable form and including some form of digital signature.
- *Verification/authentication* – In the same way the seal of approval of an evaluator organisation would need to be attached to the final item otherwise false claims about its quality could be made, or inadvertently other documents might gain approval by accident. Again, some form of digital signature technique might be appropriate.

Despite these problems, and others that might be encountered in the implementation of a publishing system based on the DJ model, it is felt there is no serious technical problem that cannot be overcome by the application of existing techniques.

Conclusions

It is proposed that the DJ model could replace the current paper influenced electronic publishing model. There are six main reasons why I feel this model is superior to most existing operational and proposed models.

Fit for it's purpose

Because it is based on an analysis of the roles of the time-proven traditional model the DJ model is known to be fit for it's purpose.

Better fit

The DJ model far better fits the flexibility of the network as a publishing and

16 The insurance model involves each institution paying a small sum each year, the co-operative model is the formation of a large consortium, e.g., all universities in a country, to provide the service for a membership fee, the pension model is described in the sub-section *The hidden roles* within the main section *The Deconstructed Journal – One possible operational model* above.

information dissemination medium. It is a de-centralised model able to change and adapt with changes and developments in the network and it's facilities.

Solves current problems

The DJ model solves many of the problems manifested by the current paper-related model.

New openings for entrepreneurs

The open distributed structure of the DJ model means there are openings for many new actors to play small, medium and large roles within the new model.

Greater academic freedom

Because the central element of the DJ model, the SFP, does not own the Copyright of the items it points to, control of further distribution or use is left with the authors and/or their employers. This allows greater freedom for the individuals and institutions concerned to use and re-use their intellectual property. There has been an increase in resentment over they way traditional journals insist on being given Copyright as part of the publishing deal, Bachrach *et al* (1998), and Sutherland (1999).

Shift of power and control to the users and producers

The proposed DJ model has fundamental roles for such entities as the learned societies and the universities. Adoption of the DJ model or any other model conforming to the underlying assumptions on which it is based will give them more control over the STM publishing industry. This would return control to those who both produce and use the fruits of this industry.

Epilogue – getting there from here

The DJ model cannot simply evolve from the current model as there are internal conflicts, e.g., the concept of journal/article ownership in the current model versus the requirement for SFP/article non-ownership in the DJ model. Never-

theless I feel there could be a transition period during which some subject areas would set up SFPs, evaluator organisations, archives, etc, while others continued with the traditional model. The key move is the provision of trusted evaluator organisations. They are needed to provide the quality control lacking in most network-based publishing. Further, they can perform this role even before the emergence of any SFPs.

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