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6. ELECTRONIC THESES AND DISSERTATIONS

Promoting 'Hidden' Research

INTRODUCTION

Over the past ten years an increasing number of Higher Education Institutions (HEIs) and research-related organisations have been encouraging the submission of theses and dissertations in electronic format (Suleman et al., 2004). The creation of digital versions of such material began even earlier, as postgraduate students were quick to realise the advantages offered by word-processing packages and associated software. A survey of over 2000 PhD students, 1740 supervisors and 125 librarians undertaken in Great Britain by the 'UK Theses Online Group' (UTOG) in 1996 revealed that, even at this time, the majority of theses were produced using standard word-processing packages (Roberts, 1997). Responses to this questionnaire based survey indicated that most British students were positive about the idea of their thesis being made available on the Web although a significant proportion of supervisors expressed concerns. The results also indicated that most researchers found it useful to consult theses, yet librarians reported that many titles were seldom or never used. Within the United Kingdom, this report proved to be the basis of a turning point: it provided evidence that suggested that it would be worthwhile developing a service that enabled researchers to access electronic theses and dissertations (ETDs) quickly and easily on the Web (Copeland et al., 2005).

Where access to ETDs was already available in the late 1990s, via the Internet, and where usage figures were recorded (for example on the Virginia Tech Web site http://scholar.lib.vt.edu/theses/data/somefacts.html), it is evident that they were a much consulted resource. Given the context within which the early ETD discussions and developments were taking place, it is, at first sight, surprising that more universities did not encourage and adopt electronic submission procedures as soon as the technology made this feasible. At this time HEIs were purchasing an increasing number of journals in electronic format. Similarly, electronic abstracts and indexing publications were replacing printed versions and electronic books were making an appearance. The slow transition from print theses and dissertations to ETDs was due partly to a lack of investment in relevant research and development. Many individuals and institutions were working in isolation or in an unfunded capacity and facing technical, legal, administrative and political challenges which required a considerable amount of staff time to resolve.

CONCERNS AND DIFFICULTIES

A key concern voiced by some faculty members and supervisors centred on the potential extra work that would be required of students. As a minimum, electronic

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submission would necessitate the conversion of a 'Word' document into PDF (the 'portable document format' created by Adobe Systems). In many cases, however, the theses would include images, diagrams or photographs that would have to be scanned. There could even be multimedia items (such as video clips) that would most appropriately be integrated into the body of the work rather than just attached as an appendix (Kirschenbaum, 2004). As advocates of ETDs enthusiastically encouraged the adoption of embellishments that would enhance access to specific information within theses, such as links from contents pages and tables of illustrations to the main text, and links from reference numbers in the text to the relevant entry in the bibliography, concern began to grow about the additional skills needed to achieve these features. Some supervisors who were already worried about completion rates questioned whether the opportunities offered by the production of electronic theses outweighed the potential problems associated with placing extra demands on the students.

Some supervisors also expressed concern about how electronic theses would be examined. Where a print copy could be supplied for use during the viva, this was seen as acceptable. However, where the format would not allow for a hard copy equivalent to be produced it could cause difficulties: examiners could find it awkward to read a whole thesis online, they may lack the skills to access all the parts of the work, or they may omit sections in an ETD that was not produced in a traditional linear style. Even if readers at the time could access the full content easily, inadequate means of preservation or migration might lead to a situation where the material could not be read in future (Gladney, 2004).

The concerns of some of the supervisors matched those expressed by some librarians, I.T. staff and university administrators. If electronic submission becomes a requirement, universities have to ensure that adequate training is provided for students and their supervisors and that sufficient equipment, such as scanners, is made available. Policies and procedures need to be amended and approved by the appropriate committees if theses and dissertations are to be submitted (and made available on the Web) in electronic format on either a voluntary or a mandatory basis. Decisions have to be made regarding whether e-submission is to be compulsory or not and whether it will be introduced for everyone on a set date or whether its introduction will be staged so that only those enrolling from the date that the regulations are changed will be compelled to supply their thesis in electronic format. Decisions have to be made about which departments will undertake particular elements of the work, and overall workflows have to be changed to accommodate the new arrangements (White, 2007). Much time can be saved when members of library staff do not have to obtain hard copy theses from distant store rooms, or acquire and provide theses on inter-library loan. However, new, time-consuming, tasks (such as uploading theses and assigning metadata etc.) arise when an electronic submission and storage system is adopted. New routines might require the introduction of a programme of staff training and they might lead to changes to the distribution of the workload.

Over time, many of these initial concerns have subsided to some extent. The expansion of the 'open access' movement, the growth of institutional repositories in

HEIs, and the increasing number of prestigious organisations now accepting electronic theses is encouraging more institutions to consider replacing paper theses with ETDs. As more universities begin to make their theses available on the Web, however, one key topic remains an area of concern: copyright. Most students are happy to allow their thesis to be uploaded onto their university's Website, particularly since institutions generally employ a 'non-exclusive' deposit licence (which allows students to publish their work elsewhere) and most allow for an embargo period where there is a valid reason for delaying public access to it (e.g. where a patent is pending or where the student is intending to publish some of the material in a book or journal). The main area of concern relating to copyright is not the completed thesis; it is the inclusion of third party material. Where students have already sought permission to reproduce work by other authors or illustrators in their thesis, permission may have been granted on the assumption that the end product would be a traditional paper thesis which would only be viewed by a limited number of readers. Where the electronic thesis is to be made available on the Web, permission to reproduce the work of others should be obtained on this basis. Universities or national libraries which choose to digitise theses retrospectively and make them available on the Web need to take into account that there is a risk factor if the appropriate permissions have not been obtained.

All of these concerns and potential difficulties have contributed to the delay in the growth of a body of ETDs. However, in recent years an increasing number of institutions have realised that the benefits associated with making their PhD students' research output easily accessible on the Web outweigh the problems that need to be overcome.

ADVANTAGES AND BENEFITS

The key benefit of making PhD theses available on the Web is that more of them are read and some of them are read by many more people than was the case when they were held in paper format by university or national libraries. Given that each thesis represents years of research, that not all authors currently publish even the key findings of their endeavours in journals or monographs, and that some of the research is funded from sources of public finance, it seems obvious that action that publicises the results more effectively should be encouraged. For students embarking upon an academic career, in particular, it is advantageous to enable researchers to have easy access to their work: their names and their research will then quickly become known to a wide international readership. Institutions also benefit from the increased publicity associated with greater visibility of the work that is being undertaken by their students.

A growth in the body of theses available on open access on the Web is resulting in improved services to researchers. Where faculty members can obtain access to the full text of theses quickly and easily, they are more likely to make regular use of this type of resource. Making theses available in electronic format within institutional or national repositories allows researchers immediate access from any location, 24 hours a day, regardless of the number of other users. This contrasts

significantly with the alternative: requiring readers to visit the library of the institution where the thesis was created, obtaining the work in hard copy on inter-library loan (for use in the requesting library only), or obtaining a microform version for use in a cumbersome reader-printer machine.

Students benefit from the opportunity to create their theses in electronic format when they have research results which can be expressed better through multi-media than in text. Digital format allows for a degree of flexibility and creativity which was not possible when print versions of the work were required. In subject areas such as music, design, art and the performing arts, students can address topics which would have been difficult to deal with previously. In subjects such as maths and engineering students can include elements, such as interactive formulae and graphs, which allow examiners and other researchers to test and appreciate their research findings more easily.

The inclusion of multimedia requires students to acquire an understanding of how to create such material and how to incorporate it into the body of the thesis. This not only improves the quality of the end product, it also enhances the students' skills base and should prove helpful in their future work. Many of those involved in graduate education endorse this viewpoint and use the same argument in response to concerns about the potential additional workload for students who have to learn more about I.T. and copyright when producing electronic theses for publication on the Web. It is a strong argument. At the lowest level, the I.T. skills involved in producing an ETD are only those which most employers would expect from recent graduates nowadays. Similarly, with an increasing emphasis on 'research methods' most universities would consider that they have equipped their graduates well for future academic and research careers if they have provided them with a basic understanding of copyright, intellectual property rights and publishing requirements.

Another reason to favour ETDs, and one which requires no justification, is the cost benefit associated with them. In places, such as some of the former Eastern European countries, which required students to submit a large number of copies of their bound paper theses, significant savings can be made when electronic versions are accepted as an alternative. Moreover, researchers, university departments and libraries can save money when theses do not have to be obtained on inter-library loan. There are also savings to be made on some of the 'hidden' costs associated with hard copy theses, notably with regard to storage space and staff time retrieving and re-shelving items.

SOURCES OF ADVICE

For individuals and institutions considering allowing, or mandating, the submission of theses in electronic format, an increasing amount of information and advice is being made available through Web pages, journal articles, and conference papers. Those involved in advocacy work and in producing training packages, dealing with queries, recording usage statistics, and establishing institutional and national repositories, etc., are encouraged to share their expertise and to make their material freely available on the Web.

At international level, the Networked Digital Library of Theses and Dissertations (NDLTD) is influential in encouraging the acceptance of ETDs and in offering advice and guidance on related matters. Its Web site (http://www.ndltd.org) provides a wealth of useful information on matters ranging from how to set up ETD programmes and how to create and locate ETDs to details of relevant current research, conferences and award-winning theses. Its membership list includes many of the institutions which have been involved in the creation of ETDs for a number of years and many of which have Web sites which are well worth viewing. Its 'Board of Directors' lists individuals who are committed to promoting the concept of electronic theses and dissertations and who can provide advice to those engaged in advocacy campaigns within their own institutions.

The NDLTD has its origins in the USA (Fox et al., 1996). It was established in 1996 as a result of a project led by Virginia Tech, and many of the current institutional members are based in North America. However, there is an increasing amount of involvement from institutions across the world. This international emphasis is perhaps demonstrated best by the success and development of the programme of annual ETD symposia promoted by the NDLTD. The first of these events was held in Memphis in 1998; this was followed by events at Virginia Tech in 1999 and the University of South Florida in 2000. In 2003 the symposium was held in Europe for the first time (at Humboldt University in Berlin) and the success of this conference led to an appreciation of the benefits of varying the location to attract new delegates (while also encouraging the growth of a strong network of experts with long term involvement in this subject area). After a return to the USA in 2004 (http://www.uky.edu/ETD/ETD2004/), the conference was held in Sydney in 2005 (http://adt.caul.edu.au/etd2005/etd2005.html), then in Canada, in Quebec, in 2006 (http://www6.bibl.ulaval.ca:8080/etd2006/pages/index.jsf), in Uppsala in Sweden in 2007 (http://epc.ub.uu.se/ETD2007/) and in Aberdeen in Scotland in 2008 (http://www.rgu.ac.uk/etd/home/). The venue for the 2009 symposium was once again in the USA, (http://www.library.pitt.edu/etd2009/), at the University of Pittsburgh.

The annual international conferences provide a good opportunity for delegates to network and to keep abreast of the latest developments relating to ETDs. Where possible, PowerPoint presentations and conference papers are made available on the Web to ensure as many people as possible can access the information. Nevertheless, there has been growing recognition of the advantages to be gained by forming regional groups and holding regional conferences for those who are unable to attend the international symposia. ETD focused conferences and seminars have been held at national level in countries across the world in recent years and the first NDLTD 'US regional conference' took place in St. Louis in October 2006 (www.wvu.edu/~thesis/News/ETD_2006_US_Regional_Conference_Web.pdf).

Within Europe, there have been efforts recently to share good practice and to identify gaps and areas of overlap. In January 2006 representatives from eleven European countries were represented at an invitational workshop on e-theses which was held in Amsterdam and organised by the Dutch SURFfoundation and the UK Joint Information Systems Committee (JISC). The group investigated interoperability and accessibility issues as well as business models, legal constraints, preservation

concerns, and the ways in which participants might work together in future (Jacobs, 2006). The meeting revealed the variations between the countries (for example, with regard to the percentage of ETDs available relative to the total number of theses produced), areas of mutual concern (for example, legal issues), areas of overlap (for example, the existence of UK, French and German metadata sets), and areas where future co-operation would be of significant benefit (for example, multimedia developments and preservation requirements). A number of topics were identified as likely to benefit from future European-wide attention and, following further discussions, an advocacy and support group, 'GUIDE' (Guiding Universities In Doctoral E-theses), was formed. GUIDE later merged with the expanding 'DART-Europe' group: a partnership of research libraries and library consortia which are working together to improve global access to European research theses (http://www.dart-europe.eu/About/).

DART-Europe is endorsed by the Association of European Research Libraries (Ligue des Bibliothèques Européennes de Recherche), LIBER (http://www.libereurope.eu/), and works closely with the NDLTD. The DART-Europe partners have developed a single European Portal (http://www.dart-europe.eu/basic-search.php) to enable researchers to access European ETDs more easily. They participate in advocacy work to influence future European e-theses developments and the organisation provides partners with a useful networking forum on ETD issues.

'Digitala Vetenskapliga Arkivet' (DiVA), the 'Academic Archive Online' developed at Uppsala University in Sweden (http://www.diva-portal.org/), NARCIS, the gateway to scholarly information in the Netherlands, (http://www.narcis.info/) and the Australasian Digital Theses (ADT) Program (http://adt.caul. edu.au/) all provide good examples of what can be achieved at national level to make ETDs more easily accessible. In addition, many individual institutions have produced Web pages containing useful advice about ETD policies, procedures and programmes. Amongst the good examples from the USA are those at Virginia Tech (http://scholar.lib.vt.edu/theses/), West Virginia University (http://www.libraries.wvu.edu/theses/) and Brigham Young University (http://etd.byu.edu/start.html).

The NDLTD annual awards highlight how theses and dissertations can be enhanced through the inclusion of multimedia and presentation in electronic format. The NDLTD Web site contains links to recent award winning ETDs on subjects ranging from architecture to the performing arts. Awards in previous years have been given to the authors of theses dealing with topics as diverse as medicine and piano playing. (http://www.ndltd.org/events_and_awards).

OBTAINING SUPPORT FOR THE ESTABLISHMENT OF AN ETD COLLECTION

As the above summary of 'advantages' reveals, the creation and provision of theses and dissertations in electronic format benefits separate stakeholder groups to differing degrees. When establishing an ETD collection it is essential to obtain support from each of these groups. Senior managers may have to be approached to secure resources

and to endorse changes to university policies. Senior administrators may have to approve changes to procedures and workflows and, if an institutional repository is to be created, IT managers may need to ensure that this development is incorporated satisfactorily within the university's IT infrastructure. Library staff will need to decide whether to buy-in to a commercial service, participate in a national scheme or establish their own ETD collection. Depending upon which route they choose to follow, they will have to decide which company to approach to maintain their theses holdings or which software to use as the basis of an in-house e-theses repository. They will also have to decide on the metadata set to be used. It is likely that a project team or working group will have to be established to ensure that there is adequate communication between the staff from many different sectors.

The support of academic staff and supervisors is essential if a cultural change is to be achieved. Students may need their support and encouragement to experiment with the use of multimedia and the presentation of their research results in electronic forms. They may need advice about copyright restrictions and intellectual property rights. At the very least, students wishing to produce their thesis in electronic media should not be dissuaded from doing so by faculty members who are resistant to change.

The students themselves are key to the success of attempts to move from print theses and dissertations to ETDs. In some HEIs it has proved necessary to introduce a voluntary system of e-theses deposit initially, with a view to mandatory e-submission later. This is likely to be the case where the university authorities feel it would be unfair to change the requirements placed upon students who are part-way through their studies and who enrolled in accordance with a set of regulations which made no mention of producing a thesis in electronic format. Where the submission of e-theses is on a voluntary basis, there has to be an emphasis upon advocacy work, the provision of training and a system in place to respond to enquiries etc. Decisions have to be made about how much support and guidance is offered and the way in which it is provided.

TRAINING

Training has to be provided for research students, to assist them to create their theses or dissertations in electronic format. The training requirements of library, administrative and IT staff also need to be taken into account, and academic staff need to be briefed about how ETD developments will affect their role as supervisors. The training may take a number of different forms.

Senior staff may wish to receive occasional updates on significant developments, achievements and problems. This could take the form of presentations, or the submission of briefing papers, to relevant committees. Where individuals need to be persuaded about the benefits of ETDs, or encouraged to become involved in work that requires new skills etc., it may prove worthwhile investing time in one-to-one meetings. The needs of the majority of the students may be catered for by the provision of periodic workshops. These may be relatively informal sessions, either bookable in advance or available on a drop-in basis. To ensure a high level of attendance at training sessions, and to ensure that students attend such events at an

early stage in their studies, it may be preferable to organise formal timetabled training sessions. Such events may lack the flexibility of informal sessions, and may not include enough time to follow up on individual enquiries in depth, but they do allow for systematic coverage of the key issues.

Amongst these key issues, a number of themes can be identified. There is a need for the students to comply with institutional policies and procedures and to comply with legal requirements. There is also a desire for students to create ETDs that are easy to read and easy to navigate. Technical skills are needed to produce documents for use in an online environment and students need to be aware of aspects such as file size and structure. Students should be made aware of the benefits of making their work available on the Web but they should also be advised about the type of situation that would merit an application for an embargo period.

Much information, such as details relating to the rules and regulations for the presentation of ETDs, is best made available through Web pages. Where there is little to debate and no benefit to attending a practical workshop, Web pages may be the preferred option: they are accessible to distance learners and available to be consulted at any time. A good example of guidelines for the preparation of electronic theses and dissertations may be seen on the Web pages of the University of Pittsburgh http://www.pitt.edu/~graduate/etd/formatguidelineshtml.html#x1-3000

CONTENT

The University of Pittsburgh ETD guidelines make a distinction between the requirements for a Master's thesis and a doctoral dissertation. In keeping with this approach, most universities view the research output of masters' level students as being of a significantly different standard to that of doctoral students. The question of whether to include masters' theses and dissertations in an ETD collection on open access on the Web is a decision that has to be taken by individual institutions. Some organisations wish to make as many of their students' ETDs as possible available to a wide readership, others wish only to publicise the higher level of research that is represented in PhD theses. Between these extremes, there are many variations: some universities include MPhil, MLitt, or MBA ETDs but not MA theses and some select the best of the masters' ETDs for inclusion. The decision about which material to include depends upon the policy of the institution and the purpose of the collection: whether it is to encourage all postgraduate students to publish their work on the Web and to demonstrate the full breadth of the postgraduate work being undertaken, or whether it is to showcase high level student research (usually alongside the research output of faculty members).

Some HEIs may wish to digitise theses and dissertations retrospectively to improve ease of access to this valuable resource. If the number of paper theses is high, or the budget to undertake the work is limited, it will be necessary to agree a policy which takes into account the factors which influence the selection of titles. If a large collection is to be converted systematically into digital format, it may be most appropriate to select material by date: starting with those produced most recently and working backwards in case the resources to complete the project prove

inadequate. If the available budget is known to be limited, it may be most beneficial to select those titles which are known to be used. The latter selection criteria maximises the likelihood of helping a significant number of researchers in their efforts to access the works they need quickly and easily, it ensures that as much staff time is saved as possible by eliminating the need to retrieve and re-shelve the most heavily used material, and it enhances the likelihood of generating statistics of use that demonstrate that the digitisation project was cost-effective and is worthy of additional support.

The choice of which theses and dissertations to digitise retrospectively may be made on a subject basis. If a university aims to promote the research it undertakes in particular subjects it may be worth selecting material in these areas to ensure that the ETD collection reflects the priorities of the institution. If there is significant variation between schools and departments in terms of their support for ETDs, it may be useful to focus on those which view the development positively. Prioritising the work of particular departments may provoke a reaction from staff in other areas; but any approach that raises the profile of the ETD collection at an early stage should prove beneficial in the long run.

POLICIES AND PROCEDURES

Once support has been gained for the establishment of an ETD collection, and decisions made about the material to be included, it is necessary to ensure that university regulations are amended appropriately to reflect the new policies and procedures. Where committees have to consider the proposals, it will be essential to allow adequate time for the process of approval to be completed.

Amongst the changes to be made will be the wording of regulations relating to the presentation of theses and dissertations and those relating to the submission procedure. Students will need to be made aware, at an early stage, of regulations on matters such as the inclusion of multimedia and the conditions associated with providing a copy of their work which will be made available on the Web. In order to avoid the need for university committees to have to periodically revise the regulations about multimedia, it may be best to concentrate on the mechanism for seeking approval rather than creating a list of acceptable software; for example, the regulations could state that students should restrict themselves to using mainstream software where possible and that approval for the formats used should be obtained from their supervisors and those maintaining the ETD collection.

University committees will have to decide whether the submission of theses and dissertations in electronic format is to be optional or mandatory. There are advantages and disadvantages to each approach and, therefore, the decision will have to be based on local circumstances. Requiring electronic submission results in a high volume of content, which may be made available for inclusion in an institutional repository, but it may be difficult to persuade a committee to approve such a proposal. It may also be difficult to enforce this regulation if a paper version of a thesis put forward for use at a viva has led to a decision to award the degree but the ETD is not subsequently provided. Optional submission of electronic copies may be an

approach that is more acceptable to committee members, but this may lead to the need to devote more staff time to advocacy work to persuade faculty members and students to take advantage of this opportunity. A strategy which may be acceptable to both faculty and those trying to promote ETDs is to introduce mandatory e-submission in a staged way: making the compulsory aspect effective only for those students who enrol after the regulations have been changed but encouraging existing students to provide electronic versions on a voluntary basis.

In addition to obtaining committee approval, it may be necessary for those seeking to establish an institutional ETD repository to hold discussions with individuals in administrative and legal departments. The paperwork and the workflow will change as a result of a change in the submission system and the records that are kept may need to be changed. Advice may need to be sought from university lawyers regarding the wording of 'disclaimers' e.g. statements that the repository and the institution are not responsible for any mistakes, omissions or infringements in the deposited work. Legal advice may also be sought regarding the wording of both the 'deposit licence' (signed by the authors of the ETDs) and the end-user licence (to which those who access the ETDs are subject). In order to be able to respond quickly to legitimate complaints, it is also worth determining protocols for the removal of material from repositories (i.e. a 'take-down' policy).

ESTABLISHING AN ETD COLLECTION

Since a significant number of institutions internationally are now making their research students' theses and dissertations available in electronic format, much information exists about different ways of achieving this. In terms of which of the various options to follow, a key consideration is whether to encourage students to provide copies of their ETDs to a commercial organisation such as 'ProQuest' (for the 'ProQuest Dissertations and Theses Database') or whether to establish a repository. If the latter route is chosen, it is necessary to decide whether to 'buy-in' to services that manage digital assets, (such as 'Digital Commons', 'DigiTool', 'Open Repository' or 'EPrints Services' amongst others) or whether to create an in-house repository using internal resources and open-source software. The *Open*DOAR Web site (http://www.opendoar.org/index.html) reveals the range of academic open access repositories now in existence and the variety of ways in which these have been created. The range of repository software that has been used by HEIs for the ETD repositories reveals that different organisations have selected different approaches to meet different criteria. The choice for an in-house institutional repository may depend upon the level of technical expertise available. Popular choices include 'DSpace', 'EPrints', and 'Fedora' software. (Information about these products as well as much other useful detail associated with the establishment of institutional repositories is provided in a publication by Jones et al., 2006).

The choice of metadata used may be influenced by a number of factors, for example the need to comply with the requirements of national arrangements for ETD collections or the amount of staff time available to add detail beyond a basic level. The Electronic Theses Online Service (EThOS) that is being developed in the UK

has agreed a metadata set (UKETD_DC), based on the widely used 'Dublin Core' metadata standard (http://dublincore.org/), that is generic enough to be applied to doctoral theses produced in a wide variety of UK institutions but specific enough to enable the central service to harvest all relevant material (http://ethostoolkit.cranfield.ac.uk/tiki-index.php?page_ref_id=25). Both the NDLTD and DART-Europe are currently engaged in discussions about metadata and the ways in which improvements could be made at international level to standardise some aspects in order to enhance access to ETDs.

Differences in terminology, procedures and requirements associated with how theses and dissertations are presented in different countries make it difficult to reach agreement in some areas. However, as liaison improves and those involved in development work gain a better understanding of why particular decisions have been taken in certain circumstances, it is becoming easier to work towards achieving enhancements to the current arrangements which will enable researchers to undertake federated searches to obtain relevant material from institutions across the globe. The NDLTD Web site offers researchers the opportunity to browse or search through ETD collections across multiple institutions at once (http://www.ndltd.org/find). It provides a link to the 'VTLS Visualizer' (ETD search and discovery system powered by VTLS) and the 'Scirus ETD Search' (an ETD search and discovery system powered by Scirus). The 'NDLTD Union Catalog' now contains over a million records of ETDs.

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