

Plagiarism Detection and Prevention

Final Report on the JISC Electronic
Plagiarism Detection Project



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0. Executive Summary

The JISC Electronic Plagiarism Detection project was established to review electronic solutions to the issue of plagiarism. However, it became clear that, as with most things in life, technology can only assist us, it will never replace the expertise of humans and that the answer to problems usually lies in process and procedures not technology alone. Electronic detection has its place in institutions but the real solutions lie in appropriate assessment mechanisms, supportive institutional culture, clear definitions of plagiarism and policies for dealing with it and adequate training for staff and students. If these areas are improved, the need, desire, and appeal of plagiarism can be taken away for most students.

The JISC project was split into four strands each examining a different aspect of plagiarism. The four strands included: a technical review of free-text and source code plagiarism detection software, a small pilot of free-text detection software and a good practice guide to plagiarism prevention. Each strand was carried out by institutions from the Higher and Further educational sectors under the central management of the JISC.

The project produced a 'Which' styles report on five products available for 'free-text' detection, a report on the current use of source code detection software and a review of two products available in this area. In addition to these technical reports, a report on good practice in the area of plagiarism prevention has been produced, which includes recommendations for both institutions and academics. Finally, a summary report on the pilot project has been produced, this includes details of the problems experienced, reaction from staff and students and recommendations on useful software facilities. All these reports are available for the community on the JISC web site at

<http://www.jisc.ac.uk/mle/plagiarism>

At the end of the project, a series of workshops were held around the country where delegates were given an opportunity to hear the results from all the strands, to comment on these and to provide suggestions to the JISC on what further work needed to be carried out.

This report provides a summary of the projects, the subsequent dissemination workshops and recommendations for future work. These recommendations include setting up a Plagiarism Advisory Service to act as a source of information for staff and institutions on issues such as writing an institutional policy, implementing procedures and how to set assignments that make plagiarism harder. This service may also provide services to students to assist in the development of their study skills and advise on how to avoid plagiarism. Further to this, it is recommended that the Advisory Service should run a national

electronic plagiarism detection service, if implemented. Before this can happen, the report recommends that a number of studies into organisational processes and technical requirements for suitable detection software are carried out to ensure that the services meets the needs of the community.

Other recommendations include the funding of a series of workshops to improve understanding about plagiarism in the community. A number of recommendations are made to other JISC committees to fund studies into student attitudes and into detection of plagiarism of graphical material.

JISC is also recommended to involve other organisations in setting up and running the service, in particular the Generic Centre of the LTSN.

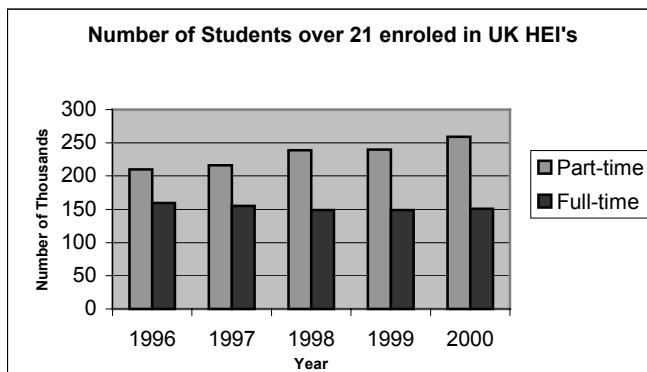
1. INTRODUCTION

1.1 Background

In the early part of 2000 the JISC Committee for Integrated Environments for Learners identified that although there was no statistical evidence that plagiarism was on the increase, anecdotal evidence suggested that this form of cheating, particularly from electronic sources, was increasing. Plagiarism has been around as long as formal education; however, there have been dramatic changes in society in the last five years that have affected the social environment in which students now learn. These changes have had positive and negative effects and include:

Widening participation and the move to mass continued education

- Students now have a wider variety of skills and social backgrounds
- Some students may be less committed to a full learning experience and instead concentrate on achieving the final certificate
- Their subject selection may be based on the job market rather than aptitude or skill
- Class sizes have increased
- Increase in the number of mature students studying part-time (see table below)



Figures Provided by the Department for Education and Skills (DfES)

Introduction of course fees and the elimination of grants

- Students may have to work part-time to support their studies thus having less time to study, attend lectures or be involved in extra curricular activities
- Students may select institutions closer to their family home and therefore only go to the campus on specific days to attend lectures

The growth of the Internet and the resources available

- The web continues to grow at an increasing rate; this provides staff and students with a vast array of material of varying quality
- The scale of the web has meant it is impossible for most staff to be familiar with all the relevant text in the way they may have been with paper based material
- Material can be accessed from outside the Institution's campus, thus allowing students to carry out research on the Internet regardless of location
- As the opportunity of commercial gain from the Internet is recognised, there is a growth in the number of 'Cheat sites' providing either pre-written or customised essays
- The web provides a quicker way of plagiarising other people's text by eliminating the need to retype text copied, text can simply be cut and pasted into a word processor document.

1.2 Aims and Objectives of the Project

In response to this, the project set out to provide information to staff and institutions in their endeavours to detect plagiarism electronically. This should include, but not be limited to, a technical review of plagiarism detection software an analysis of the organisational issues surrounding plagiarism and a piloting of a detection package in one or more institutions to see how this form of software might be embedded into a University or College's assessment processes.

1.3 Description of Projects

To achieve this aim, four projects were commissioned.

- A technical review of free-text plagiarism detection software
- A technical review of source code plagiarism detection software
- A pilot of free-text detection software
- A good practice guide to plagiarism prevention

In this instance, the term 'free-text' refers to work made up of sentences and paragraphs such as essays, final reports and dissertations. Source code refers to computer programming languages such as C++ and Java.

1.3.1 Technical review of free-text plagiarism detection software

In October 2000, an advertisement was placed in the press asking for institutions or individuals to tender to carry out a technical review of software available in the area of free-text (i.e. essays and dissertations) plagiarism detection. The

University of Luton submitted the successful bid and started work on a report in January 2001. Luton selected five products to review:

- **CopyCatch.com** - <http://www.copycatch.freemove.co.uk>
- **Eve** - <http://www.CaNexus.com>
- **findsame.com** - <http://www.findsame.com>
- **Turnitin** - <http://www.turnitin.com>
- **Wordcheck** - <http://www.wordchecksyste.ms.com>

Each product was reviewed under a number of criteria including reliability, technical requirements, ease of use, and costs for institutions. In addition to this, Luton produced an online questionnaire on the issues associated with plagiarism and asked academic staff from across the country to fill it in. Over 300 questionnaires were completed and details of the results can be found in the report from Luton.

This report will be of interest to technical and academic staff at FE or HE institutions that are considering using plagiarism detection software.

The full report by University of Luton can be found at the following URL:

<http://www.jisc.ac.uk/pub01/luton.pdf>

1.3.2 Technical review of source code plagiarism detection software

In October 2000, South Bank University was commissioned to carry out a technical review of source code plagiarism detection software. The issue of source code plagiarism and its subsequent detection has been around for several years. South Bank decided to build on the existing experience and contacted Computer Science Departments across the country, asking them to fill in a questionnaire concerning this form of plagiarism detection. In addition to this, they carried out a technical review of two publicly available products.

- **JPlag** - <http://www.JPlag.de>
- **Moss** - <http://www.cs.berkeley.edu/~aiken/moss.html>

This report will be of particular interest to staff working in Computer Science departments, but it will also be useful for any academic staff that teach programming as part of their course.

The full report by South Bank University can be found at the following URL:

<http://www.jisc.ac.uk/pub01/southbank.pdf>

1.3.3 Pilot of free-text detection software

The aim of the pilot was to identify the social and institutional issues associated with the use of plagiarism detection software. For the period of the pilot, a copy of the software designed by iParadigms (turnitin) was placed on the network, where staff from the participating institutions could access it via a web browser. IParadigms are one of the leading suppliers of detection software in the US and the only company to provide detection of web based material and student collusion.

In October 2000, an advertisement was placed in the press inviting institutions to tender to take part in a national pilot of electronic plagiarism detection software. Five sites were selected, each agreeing to pilot the software in five subjects.

- University of Aberdeen
- Dudley College
- Liverpool Hope
- University of Staffordshire
- University of Wales, College Newport

Further details of this system are available as an appendix to the main report.

This report will be of interest to technical and academic staff at FE or HE institutions that are considering using plagiarism detection software.

The full report summarising the pilot results can be found at the following URL:

<http://www.jisc.ac.uk/pub01/pilot.pdf>

1.3.4 Good practice guide to plagiarism

Oxford Brookes University was commissioned to write a guide to institutions on good practice in the area of plagiarism. They have endeavoured to provide recommendations for both staff and institutions on how to tackle the issue of plagiarism, focussing on prevention rather than detection.

This report will be of interest to all staff working in FE and HE institutions. However, it will be of particular interest to senior managers, academics and those working centrally to combat the issue of plagiarism.

The full report by Oxford Brookes University can be found at the following URL:

<http://www.jisc.ac.uk/pub01/brookes.pdf>

1.3.5 Dissemination of Project Results

The project results were disseminated at three workshops open to members of the FE and HE community. The workshops were held in the week beginning 16th July in London, Manchester and Stirling. The project teams provided presentations on the results of their project in the morning. In the afternoon delegates were given the opportunity to discuss in smaller groups the following issues

- Issues raised by the project and possible good practice already being carried out by delegates
- Existing use of electronic detection software
- The way forward for JISC in this area

The results from these discussions have been used to inform this report and the recommendations within it.

1.3.6 Project Management and Steering Group

The author of this report, Gill Chester, has carried out overall management of these projects, during a year's secondment from UKERNA to the JISC Secretariat. Gill has reported to a Steering Group made up of members of the FE and HE community. Professor Robert Cormack from the Director and Chief Executive of the University of the Highlands and Islands Millennium Institution, chaired this group

A full list of members and the groups Terms of Reference are available at the following URL

<http://www.jisc.ac.uk/mle/plagiarism/pdsq.html>

1.4 Main Deliverables from the Project

The project deliverables were agreed as follows

- i. A Technical Review of free-text plagiarism detection software
- ii. A Technical Review of source code plagiarism detection software
- iii. A good practice guide to plagiarism
- iv. A report on the issues associated with the use of electronic plagiarism detection software in institutions
- v. A formal report summarising the project findings as a whole and recommendations for future work
- vi. One or more workshops to disseminate the work of the project to the FE and HE community

All reports from the project will be made available to the FE and HE community.

1.5 Areas not covered by this Project

This project has concentrated on the detection of plagiarism from the Internet and student collusion. Although recommendations will be made in this report concerning other sources, it was not the aim of the project to investigate detection of more traditional forms of plagiarism, such as copying from books or journals.

Other areas not included in this report are

- Detection of text converted to a foreign language and then translated back to English
- Detection of essays translated from a foreign language
- Plagiarism of diagrams, pictures or graphs
- Cheating in exams using mobile phones, pagers, hidden crib sheets, calculators etc

1.6 Project Definition of Plagiarism

A definition of plagiarism has not been written for this project. JISC decided at the outset that the project should seek to provide generic advice on this issue and tools to identify text taken from other sources. If these tools are used and text is identified as being available at another source, it is up to institutions to decide whether the work has been plagiarised based on their definitions and policy.

1.7 Why do Students Plagiarise?

Students plagiarise for a variety of reasons and it is important to consider these before reviewing detection and prevention so they can be addressed. It is also worth remembering that a combination of reasons may affect a student's decision to plagiarise. In this instance, no distinction has been made between the plagiarism of external sources and plagiarism of their peers' work (often referred to as collusion). The following are ten examples of reasons why students might plagiarise.

1) Bad time management skills

Perhaps the most common reason people plagiarise is bad time management skills. Having left it to the last minute to complete an assignment they panic and try to find the quickest solution. External pressures affecting much more of the student population, such as the need to work or care for children, may make the situation worse.

2) Unable to cope with the work load

This is similar to bad time management, but this problem lies with the student's timetable and assignments from multiple modules clashing.

3) The tutor doesn't care, why should I?

If the student senses that the academic is not interested in the subject or the student's learning then the student is less inclined to care. This apathy by the lecturer can be shown in a multitude of ways such as showing no enthusiasm for the subject, providing handouts that have obviously been used for years or assignments that seem dated.

4) External pressure to succeed

In the US, statistics have shown that one of the main reasons people resort to plagiarism is the need to keep up a grade average. Although this does not appear to be an issue in the UK, there may be external pressures such as parental and cultural expectations that make students feel they have to plagiarise to achieve.

5) Lack of understanding

The most common cause of minor plagiarism is a lack of understanding of how to cite material from other sources.

6) I can't do this!

If a student is faced with an assignment they feel is completely beyond their ability they may feel they have no option but to copy the answers. However, this may have more to do with a lack of clarity in the assignment specifications than a student's ability. This problem is often linked to bad management skills: it is human nature to leave until last the things we either consider hard or unpleasant.

7) I want to see if I can get away with it

Students may be motivated to see if they can get away with plagiarism for several reasons. If they are trying to test the institution and/or academic, it is likely that, whatever prevention methods are put into place, this small proportion of students will always attempt to plagiarise. In fact there is an agreement that the more visible prevention methods are the more challenging for students.

However, particular problems arise if the institutional policy encourages students to plagiarise merely to see if they can get away with it. If a student has left an assignment until the last minute, knowing that the penalty for plagiarism will simply be to resubmit the work, they are in a win-win situation. Either they won't get caught or they will effectively be given an extension.

8) I don't need to learn this, I only need to pass it

If a student is not motivated to take part in the educational process or does not appreciate that they need to acquire the knowledge to continue their education, they may be inclined to take the quickest route to success.

9) But you said work together!

Most people in the project identified collusion as far bigger problem than plagiarism from printed material or the web. As noted in the introduction to this section, no distinction has been made between the plagiarism of external sources and plagiarism of peers' work. In this instance the term collusion has been used to describe a situation when students have been asked to work together on an assignment and have presented the same text. Obviously in some cases the assignment specification allowed for this; if not the work will be regarded as plagiarism. It is important that the specification makes clear what is expected so students are aware if individual or joint assignments are required

10) But that would insult the experts in the field

Finally, there is the issue of cultural differences in learning and presentation styles. In some countries it is customary to include material from experts in the field without citation. Although all students must work under their institution's regulations it is worth taking this into account when training students in study skills.

More details on students' attitudes to plagiarism and why students believe people cheat can be found in section 2.3.1.4. 'Originality and Cheating' in the 'Human and Organisational Issues Associated with Network Security' report. This report was produced for the JISC Committee for Awareness, Liaison and Training (JCALT) by South Bank University and the University of Glasgow. The report can be found at <http://litc.sbu.ac.uk/jcalt/>

2. SUMMARY OF RESULTS

2.1 *Issues Relating to Policy and Practice*

2.1.1 Results of the Project

The project has produced four reports covering the four project strands, these projects are described in section 1.3 of this report.. These reports will be useful to anyone considering the use of plagiarism detection tools. However, some key items from these reports and from the discussion at the workshops are worth highlighting .

- There is a place for Electronic detection in institutions but **only** as part of a wider approach to prevention¹
- The key to avoiding the possibility of plagiarism is the setting of the right assignments²
- The teaching of study skills is vital in combating plagiarism³
- There is a need for a national advisory service, providing advice and guidance in the area of plagiarism prevention and detection for both academics and students⁴
- There are legal issues surrounding the use of plagiarism detection software as well as wider issues regarding the electronic storage of students' work⁵

2.1.2 Electronic detection – Its place in institutions

2.1.2.1 The wider picture

The deployment of electronic detection cannot be done in isolation. During her presentation at the dissemination workshops, Jude Carroll of Oxford Brookes University noted that 'an institution must take an holistic approach to the issue of plagiarism.' Consideration should be given to

- The setting of assignments
- The training of students on the issues of plagiarism and essay writing skills
- A clear policy on plagiarism at an institution (and at department level, if necessary)

¹ Further details are provided in section 2 of this report and Carroll, J. and J Appleton, ., "Plagiarism – A good practice guide" (2001). Available at <http://www.jisc.ac.uk/pub01/brookes.pdf>.

² Carroll, J. and J Appleton, ., "Plagiarism – A good practice guide" (2001). Available at <http://www.jisc.ac.uk/pub01/brookes.pdf> Section 2

³ See section 2.1.3 below.

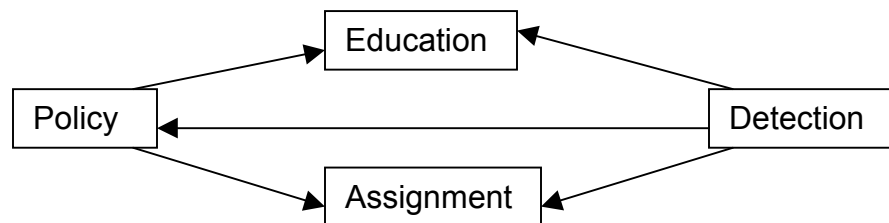
⁴ See section 4.1 below.

⁵ See section 2.1.2.2 below.

- The process involved when plagiarism is suspected
- A unified institutional approach to the issue of plagiarism that avoids confusion by staff and students

Only if all these issues are taken into consideration can the problem of plagiarism be tackled. There is no quick fix; deploying electronic detection software must only happen as part of a wider institutional approach. Full details can be found in the report by Oxford Brookes University on the JISC web site at the following URL: <http://www.jisc.ac.uk/pub01/brookes.pdf>

Electronic detection should therefore be just one part of a set of tools for dealing with this issue. Clear decisions should be made before setting assignments on how the results will be treated and what is expected from the students. The software can only highlight areas of text that have been found at another location, it does not identify plagiarism or a plagiarist. The results can be used to provide evidence of cheating but its main roles should be to inform the development of the students' education and assignment design process. The monitoring of detection results can provide useful feedback so these processes can be continually developed to meet the needs of the students and prevent plagiarism.



This is backed up by the recommendations in the 'Human and Organisational Issues Associated with Network Security' report produced for JCALT by South Bank University and the University of Glasgow (<http://iitc.sbu.ac.uk/jcalt/>). They noted that "rather than simply invest money in technical fixes to discovering plagiarism, more thought needs to go into the attitudes, practices and structures that underlie it, and how to best change them." Section 3.1.

As noted in section 1.7 above, there will probably always be a small proportion of students who intentionally plagiarise. However, the majority can be helped to avoid inadvertent plagiarism by training, guidelines and clear policies.

2.2 Issues Relating to Electronic Detection

2.2.1 Lessons Learnt

Full details of the lessons learnt during the pilot on using electronic detection software can be found in section 1.5 of the summary report of that strand on the JISC web site at <http://www.jisc.ac.uk/pub01/pilot.pdf>. This report also contains

the recommendations on the technical issues relating to the use of electronic detection, including

Ease of deployment:

This will depend on the IT skills of staff and students, especially in the process of setting up and registering students. Details of staff and students reaction to the project have also been included in the report.

Ease of Use

All sites reported that student submission of text is essential. However this will also be affected by the skills of staff and students, institutional processes and the availability of computers

Software Issues

It is clear that software deployed will require, local technical support and the supplier will have to have a reasonable turn-round time to deal with enquiries. In the trial, assignments took up to 24 hours to be processed, although this may not cause the major problem of markers a problem, it may not fit with the assignment process of all institutions.

Comprehensiveness

The software packages used in the pilot did not check for plagiarism of graphical material such as images, diagrams or graphs.

The software used in the pilot did not currently hold copies of electronic journals and textbooks. However the software used in the pilot, does store each assignment submitted into its database of reference material for future comparison. Therefore frequently referenced papers and books will be incorporated and checked.

3. FEEDBACK FROM WORKSHOPS

3.1 Overview of the Workshops

The project results were disseminated at three workshops open to members of the FE and HE community. The workshops, held the week beginning 16th July 2001, took place in London, Manchester and Stirling. During the morning sessions, the project groups presented their findings. These included two case studies from the pilot sites (the sites presenting varied at each venue).

In the afternoon, delegates were split into groups and asked to discuss four topics

- The issues raised by the project
- Possible good practice already being carried out by delegates
- Existing use of electronic detection software
- Discussion on the way forward for JISC in this area

Each group was given a set of issues to consider under each topic.

3.2 General Issues

Most people had a story to tell about plagiarism and problems they had experienced, although the number of students caught plagiarising varied dramatically across institutions. It was highlighted that the media had pushed the issue so far that sites must now be seen to be taking action and that there were external pressures from QAA and professional bodies such as the Bar.

3.2.1 Student Training

Delegates agreed that training students on the issues of plagiarism would help prevent the problem. There seemed to be no unified approach to student training; some institutions provided compulsory courses for all students, while in other institutions this training was left to the department; others still provided both institutional and department training. However, most people agreed that this provision could be, at best, patchy. One delegate was able to report positive results from their 'programme of improving study skills, teaching referencing and warning of the use of electronic detection methods'⁶.

Some institutions have a targeted approach when it comes to plagiarism education, particularly for first year students and overseas students. Delegates felt that students were encouraged to cut and paste information from the Internet

⁶ Large, S. Report on the JISC workshop on electronic detection plagiarism held on the 16th July 2001.

at school as part of their IT skills education. This led to confusion when they entered continuing education and were told this was wrong. It is also clear that if a student plagiarises at the start of their course, they will not only be inclined to continue, they will not have the foundation of knowledge required for future work.

In the case of overseas students, some students come from cultures where the use of other people's material is not only acceptable, it is expected. These students need special tuition on the expectations of a UK institution and assistance on how they should meet these requirements.

3.2.2 Policy

Most delegates said that their institution had a policy on plagiarism although several said this was unclear or some department policies contradicted it. It was clear that these policies differed, some sites required proof of intent, others relied on academic judgement.

Staff from FE colleges noted that all work carried out under their HE courses was subject to the regulations and policy of their affiliated body. This in itself could create contradictory policies.

Whatever the policy it is important that 'important to let learning drive the scheme and not let the plagiarism tail wag the learning dog'

3.2.3 Prevention

Most delegates agreed that prevention is more important than detection and all work should have that emphasis.

Some delegates noted that their institutions were cutting back on the amount of course work in a module and returning to exams. Others were using more multiple choice tests to assess learning. This concerned some delegates who felt that this change was not a good thing and meant students would only be proving memory retention not demonstrating their learning.

Some delegates informed the groups that they had introduced peer review as students actually wanted to 'catch out' people plagiarising. Delegates asked that the provision of this facility be reviewed in a national service.

3.2.4 Group Work

Delegates noted problems when setting group work. It was highlighted that these assignments needed to have clear guidelines on what was required so if collusion was detected, and not acceptable in that assignment, the normal disciplinary procedure could be followed.

3.2.5 Staff Training

Staff felt that the issue of plagiarism should be included in their staff development programme. There was a feeling that some staff might not have the IT skills to use electronic detection software and would shy away from using it. There was also a concern that staff might forget to check for plagiarism manually and that training on this should be included in staff training.

Some staff felt that their institutions did not always support them in their endeavours to detect and punish plagiarism. This ranged from employing lengthy procedures for progressing suspected plagiarism cases to unwillingness by senior management to punish students found plagiarising.

There was also a feeling that not all academics were aware of the extent of the problem of cut and paste plagiarism from the web or were aware of ways to search the Internet for similar material. To resolve this, institutions will need to provide training to provide the skills and perhaps more importantly the motivation to search the web as opposed to traditional methods of detection.

3.2.6 Use of electronic detection software

Although there was some use of source code detection tools, very few delegates said their institutions were using electronic detection (where software was used it seemed to be either Copycatch or Turnitin). The majority said detection was still carried out by eye, search engines such as 'Google' and basic academic 'gut feeling'. Other methods of prevention included students signing a declaration stating that the work submitted was their own, original work, and peer review.

However, it was agreed that all plagiarism detection, electronic or manual, should be taken forward in partnership with the teaching experts. It was also noted that a focused approach to plagiarism detection and prevention will provide validation to the strength of the institutions degree.

Some delegates highlighted the issue of authentication and problems with students submitting one essay to an electronic system and different paper version to be marked. Students would only do this if they were attempting to gain a higher mark for the paper essay. In this scenario a student would still need to write the electronic version and as most plagiarism is committed when the student has run out of time it would be rare. However, it is a genuine issue and institutions should consider random comparisons and make this practice clear to students.

3.2.7 The way forward for JISC

3.2.7.1 National Service

Virtually all the groups said they did think that JISC should consider a national service as long as its emphasis was on advice not electronic detection; this enforces the ideas laid out in section 3. However, many felt that a detection tool would not only provide a useful time saving method of detection and evidence collection, it would also help to focus the institution on the issues of plagiarism.

They noted that a central detection service would require significant commitment by the institution to amend their processes and provide training for staff and students. It would also impact on staff time so every effort should be made to ensure that any service assisted staff during the assessment period and did not create additional work. Several delegates noted that a national system would have to provide added value to local level detection and should provide the uploading of files. However, a majority of delegates felt that the most important element for any detection system would be ease of use. A possible by-product of a national system might be the collection and publication of national figures on the extent of plagiarism in institutions. This would inform institutions on the possible scale of the problem.

It was also noted that once students knew about the service and its capabilities, they might attempt to find ways around the systems such as using more paper based material or electronic journals only available via a dynamic search engine and therefore not accessed by the software.

All delegates agreed that any work taken forward by JISC should be done in partnership with other national organisations and groups.

3.2.7.2 Charging Model

Most delegates agreed that charging for use of a national detection service would inhibit use, although some felt that if their institutions were committed to the use of this form of software they would be willing to pay a charge. If charging was introduced the following models were suggested

- Flat fee for a year with unlimited use
- Fee based on institution's size

However, it would be useful if JISC could establish the service for a fixed term (possibly two years), so institutions could evaluate their use before cost implications were introduced.

3.2.7.3 Workshops

Delegates noted that they would value future workshops on the issue of plagiarism. These events could provide useful and, more detailed, guidance, give support to practitioners and stimulate discussion of the issues.

3.2.7.4 Network Bandwidth and Database Capacity

Several groups were concerned about the network bandwidth and database capacity, but experience suggests these are not serious issues.

4. OUTCOMES – ISSUES FOR INSTITUTIONS TO CONSIDER

It has become abundantly clear from the project and the subsequent workshops that the solution to the problem of plagiarism is prevention and that this solution can and should come from within an institution, not from a detection product. Institutions need to review their procedures, staff support and student training and not rely solely on purchasing software. Institutions should therefore take a holistic approach to plagiarism by ensuring they follow the guidelines given in the Good Practice Guide by Oxford Brookes University. This reports provides details on the following four areas

- Designing assignments
- Student training
- Climate that discourages plagiarism
- Electronic detection

The two areas noted as particularly important were training and institutional process.

4.1 Staff Training

As noted in section 3.1.1.5 delegates at the workshops highlighted a need for more support and training for staff. Institutions should consider staff training in this area. For example, guidance can be provided on setting assignments to avoid plagiarism, training given on how to deal with students who plagiarise in a fair but constructive way and advice offered on how to develop training on study skills at the department level.

Policy should be agreed at an institutional level and made clear to staff. Once this is in place, every effort should be made to ensure that staff are given the tools, support and time to implement the policy. To support staff, institutions should ensure their procedures assist staff in their endeavours to ensure academic rigour.

4.2 Student Training

As noted several times in the report on the pilot project, students have serious concerns over their essay writing skills and their ability to avoid plagiarism. Institutions should therefore consider whether their current procedures for teaching study skills and essay writing really meet the needs of the students. This provision may vary among departments and schools and it is important that all students are given consistent access to a high quality of training.

4.3 Institutional Procedures

As previously noted, policy and procedures should assist staff in their efforts to ensure academic integrity while ensuring students' rights are upheld. Jon Appleton and Jude Carroll recommend in their Good Practice guide⁷ that

- All identified offences of plagiarism should be disciplined, although a fast track approach to minor offences should be included
- The issue of plagiarism discipline should be kept separate from the assessment process
- Institutions should provide the mechanisms for student work to be submitted securely to ensure work cannot be copied or stolen; this will also show students that the institution values their work and its originality
- Institutions should create an effective record keeping system to enable a consistent approach discipline
- Institutions should ensure there is a clear mechanism for detection and discipline, and more importantly that all staff involved understand their roles
- Institutions should provide support and training for staff and students in the area of plagiarism

4.3.1 Steering Group

Institutions might like to consider establishing a steering group on the issue of plagiarism. This group should be made up of senior management, lecturers/tutors, administration and support staff. This group should seek to find a consensus across departments/schools on a definition of plagiarism, common policies and definitions of breaches of this policy. It will also facilitate discussion between this wide group of interested parties and gather together their views. This arena may also help to address any frustration staff are experiencing over this issue. As with any issue, involving enthusiasts in possible cultural change will help in its implementation.

4.3.2 Policy

Policies on plagiarism should be clear to both staff and students. Institutions should take care to ensure that department policies do not conflict with their overarching policy. Institutions should seek to promote a knowledge and understanding of their plagiarism policy to students. This policy should be designed and written by a cross section of staff members (see section 4.3.1).

⁷ Further details are provided in section 2.1.2 of this report and Carroll and Appleton, "Plagiarism – A good practice guide."

4.3.3 Plagiarism Definition

It was noted that, while, it might be useful to have a national definition of plagiarism, which people can use, it was clear that definitions of plagiarism vary dramatically across the country, and therefore unlikely that a consensus could be agreed.

4.3.4 Integration of Electronic Detection into the Assessment Process

If an institution is considering the use of plagiarism detection software, it is important they consider how this will fit into their current assessment processes. The detection mechanism should assist tutors in the marking process, but not provide additional work and complication. This may include: considering if the software can fit into the current submission timetable, whether it can be integrated with existing electronic submission software and if electronic submission is not currently in use how the institution can move towards using it.

4.3.5 Electronic Submission

It is predicted that, in the long-term students will all submit work via an electronic submission system. When institutions are considering this type of software they should consider linking it to other software providing additional functionality such as peer review, plagiarism detection and virus checking. However, it should be noted that the introduction of electronic submission is a vast undertaking and careful thought should be given to how it will assist staff in their duties, as well as the IT skills required for staff and students to use it.

4.3.6 Legal Requirements

All institutions should have a clear policy on ownership of student copyright. If this is not already in place, institutions should consider this issue as a matter of priority. If ownership is left with the students, consideration should be given to the legality of electronically storing students' work. To avoid these problems, institutions may wish to ensure that all students sign over their copyright to the institution when they sign up for a course. If ownership is assigned to the institution, they should consider their moral responsibility to negotiate the splitting of fees with students who produce work of financial benefit. The emphasis of institutional ownership of copyright should be compliance with the legal requirements of storage and not financial gain.

5. RECOMMENDATIONS FOR JISC COMMITTEES

The recommendations provided in this section are a response to the needs and issues detailed in sections 1 to 4.

5.1 Recommendations for JISC Committee for Integrated Environments for Learners

It is recommended that JCIEL establish a national plagiarism advisory and detection service. This service will provide two main services. Firstly it will offer advice and guidance to institutions on policy, definitions and good practice and, secondly, will run a national electronic plagiarism detection service.

Alternatively, JCIEL could set up a purely advisory service if it did not feel that a national detection service was necessary at this time.

It is not felt appropriate to set up a detection service on its own; it is more important to assist institutions with resources and advice that help them to prevent plagiarism. Any software solution should be integrated into a plagiarism prevention system rather than stand alone as the only response to the problem

This service should include the following elements.

5.1.1 Advisory Service

5.1.1.1 Advice and training for staff

This service will be offered at two levels, guidelines and recommendations for institutions as a whole and advice and training for individual academics. Material would be commissioned from the community either directly and available to the community via the service web site. There should be no copyright on this material, so institutions are free to use the material as required. Examples of useful material may be

Institution Level

- Guidelines for writing a plagiarism policy at institutional and departmental levels
- Guidelines on the relationship between institutional policy and department policy
- Recommendations and outlines for student training in study skills and essay writing
- Case studies from institutions with good practice to share

- Case studies from overseas institutions on how they are tackling the problem
- Guidelines for establishing disciplinary processes
- Guidelines for handling appeals
- Legal guidance on copyright and human rights in the area of plagiarism
- Disability issues regarding electronic submission and plagiarism detection
- Case studies on the introduction of electronic submission
- Discussion papers on the specific issues for FE; for example, at what level should the issue of plagiarism be introduced into the classroom?
- Guidelines on the handling of assignments

Academic Support

- Guidelines on setting assignments to avoid plagiarism while still meeting learning goals
- Hints and tips on searching for material on the web
- How to deal with students who plagiarise
- How to build on institutional training of students in study skills
- Tips on spotting plagiarism in documents

5.1.1.2 Advice and training for students

This area will be designed for students providing user-friendly guidance and advice on writing essays. Two educational tools will also be provided.

- A self-analysis package, where students could test their understanding of the issues and find out if they are a potential 'plagiarist'. This tool should be completely anonymous and available to students to fill in as many times as they like. The use of this tool can be integrated into an institution's student training procedures and staff could recommend its use. However, the service might also produce publicity material aimed at students that can be displayed around an institution. During Phase 3 of the TLTP initiative the project, ELEN (Extended Learning Environment Network), put together a paper-based tool similar to this, based on the research carried out by Jacqueline Davis from De Montfort University. Similar tools are under development at other institutions.
- A generic tool providing interactive training on referencing and study skills. This tool should be enjoyable and graphically pleasing, but more importantly it should provide clear instructions on how to plan, write and cite references in essays. If institutions had existing information about plagiarism on their intranet, they could link to this tool. Once this tool is produced consideration should be given to the value of subject specific guidance. This could be commissioned from the general community or via the LTSN subject centres.

It is clear that if students can see that there is a national advice service on this issue they may start to appreciate how seriously plagiarism is being taken at a national and institutional level.

5.1.1.3 Provision of material

For the service to succeed it must constantly communicate with the community concerning their requirements. This can be done informally through workshops or via a suggestion area on the web page. The service's annual work plan needs to be managed by a steering group and approved by the JCIEL. Major items of work will be commissioned from the community or in collaboration with other national organisations. In some cases it may be useful for individuals or institutions to be approached directly to provide specific information, e.g. case studies. The service should be allocated a modest budget to fund small studies or guides at short notice.

5.1.1.4 Portal to external information on plagiarism

As with most subjects there is a wealth of information on this subject on web sites and within the community. It would therefore be useful for the service to provide an area that brings all this information together in one place. This may include links to useful documentation, web sites, conferences and national press articles. This area will need to be constantly updated and a search facility made available. The Generic Centre is considering a similar venture and a meeting to discuss joining up these efforts has been arranged.

5.1.2 Detection Service

Although detection software should only be used alongside a wider approach to plagiarism prevention, the general feedback from the community has been in favour of JISC providing some form of central detection service. It is recommended that a trial service should be established for two years. This will allow JISC time to monitor its value to the community and give institutions enough time to implement the required processes, such as the student permission forms and test the use of the software. The impact of the two-year service on the network and the growth of the database should be monitored, so that growth rates can be calculated and provision for additional resources for a long-term service to be made, if necessary. Sites wishing to use this service will have to register and enter into an agreement with JISC on its use. An example of this agreement is available in Appendix D.

It is not clear at the present, which, if any, of the software products reviewed and tested will be most suitable as the basis for a detection service. In section 5.1.3 a recommendation suggests a technical review of the products to identify the most appropriate product. This section considers the general requirements of the

service. The software chosen should be capable of satisfying most of these requirements.

5.1.2.1 Service Requirements

The detection service should provide the following facilities. This list has been compiled from the pilot projects' recommendations and input from the community.

Detection of Material Plagiarised from Other Sources

The primary requirement of the service is to detect text that appears to have been copied from elsewhere. The software should compare submitted material against resources on the web, text submitted in earlier assignments, text in commonly used journals and textbooks and text submitted in assignments at other institutions. The software should only highlight similarities between the assignment and text found from external sources, academic judgement should be used to identify plagiarism.

Detection of Collusion

Another important service is detection of possible collusion or copying between students submitting assignments. Ideally, the service should create a growing database of assignment against which submitted text can be checked, incorporating any submitted material into the database. The need to compare material against such a wide range of sources provides a strong argument for a national, rather than an institution-based service.

5.1.2.2 Software Functionality

In addition, the service needs the following functionality:

Batch uploads

It would be useful if the system had the facility to allow batch uploads. This facility would allow institutions to upload and process material at off-peak times. This will be especially helpful where their submission procedures will not easily allow for student upload of their own material, where their IT provision is inadequate or where there was concern over network bandwidth during busy submission periods.

File upload

As noted in section 1.5.1.2 of the pilot report, it is troublesome to cut the text of an essay and paste it into a text box. Some browsers also limit the number of words that can be managed in this way. It would therefore be useful if the

system could allow formatted files to be uploaded (for example Word documents).

Alignment with institutional processes

As noted in section 4.1.5.1 the software should be aligned to institutional assessment processes to avoid time delays and duplication of work.

Cost effectiveness

Like all JISC services, it should be cost effective to run and where possible cheaper than individual institutional subscription, although the added value of a central database of student work and central negotiation for online content such as course books may offset the need for cost savings.

Ease of use

As noted in the summary report of the pilot project, one of the main criteria for success given by pilot projects and delegates at the workshops was ease of use. The service must be accessible to people with a range of technical skills and should require very little training to use. The service should also be accessible to students and staff with disabilities.

To avoid constant colour printing, results should be clear and distinguishable if printed in a standard black and white format.

Availability

It is vital that the service is available when required and that any problems are fixed by the supplier in a timely manner. Failure to provide a continuous service at all times will cause problems for institutions, particularly during end of term assessment periods. This will require UK or European based technical support.

Integration with existing systems

It would also be useful if this system could integrate with software already being used by institutions for electronic submission and their MLE

5.1.2.3 Issues around a central detection service

Network Loading

There is some concern over the additional traffic loading that a central detection service may place on the JANET network. With the advent of SuperJANET 4 and the massive upgrade to the network's backbone, this seems unlikely to be an issue.

Database Capacity

Any system deployed should include plans for continued growth of the database as essays are uploaded and stored.

As noted in section 4.1.5 network loading and database capacity should be monitored throughout the service to identify additional requirements as early as possible.

Ownership of Database

It is clear that the ownership of the database and the material contained within it should be owned by JISC. This should be explicit in the contract between the software supplier and JISC to ensure the material is not used for any other purpose now or in the future.

Statistical Collection

Delegates at the workshop noted that an advantage of a national service was the ability to provide statistics on the number of cases of potential plagiarism that were detected by the software. However it is recommended that no statistical data is collected or published because the software only identifies text found at an external source and academic judgement is required to identify whether plagiarism has taken place. However institutions can collect local statistics for their own purposes.

5.1.2.4 Learning from experience

To enable sites to learn from the experiences of others, a variety of studies should be commissioned by the service after it has been running for some time. These will cover experiences of using the system and integrating it into existing software and procedures including:

- Integrating submission to the detection service into their assessment process
- Integrating existing electronic submission processes into the use of the detection service

This information will not only inform sites when they consider the use of the detection service, it will also inform JISC on needs for future developments of this service.

5.1.2.5 Inclusion of published material

As previously noted the inclusion of published material would enhance the service provision of a central detection service. Although this will occur over a period of time if all submitted material is included in the system's database, it is recommended that JISC seeks partnerships with publishers to include their material in the resource database at an early stage, and to keep the material up to date. There has been some interest from publishers in the project and their possible involvement in any future service. Initial discussions have taken place with various people in the publishing trade including, the Head of Online at Cavendish Publishing Limited, who feels that Cavendish is very interested in principle with becoming involved with the project.

It is vital that material commonly used by students in both FE and HE are included in the database. It will be important to survey both communities and related organisations such as the Library Association to establish the full scope of the requirement.

In addition to published material, institutions should have a facility to upload text from local discussion boards where they know permission has been cleared for all participants.

5.1.3 Additional Studies

It is recommended that a number of supporting studies are carried out before a national plagiarism detection service is launched.

It is clear that we should learn from the pilots and seek to provide a service that best meets the needs of the community. Therefore the following questions/issues need to be reviewed before the detection software is commissioned.

Study One - Institutional Process

Generic Process - To enable the electronic detection facility to fit into the community's existing assessment procedures, a study should be carried out to identify one or more processes for assessment. This will enable us to specify a system that will not create barriers for use and may provide additional functionality to academics.

Electronic Submission - Electronic detection is only possible through electronic submission; this fits into the wider issue of electronic submission and its place in institutions. Therefore this study should also review the current use of electronic detection software in UK HE and FE institutions, the issues relating to the introduction of these systems and the skills required by staff and students to use them.

Ideally, an institution, under contract to JISC, should carry out work on these issues. The selected institution should have experience with mapping institutional processes and the issue of electronic submission. The work should be carried out before the invitations to tender for the detection software are sent out, as the results of this study will need to inform the tender document.

Study Two – Software Requirements

In section 4.1.5.3 it is made clear that there are several key elements to the success of the detection software. These are based on comments from the community and feedback from the pilot studies. The technical review from the University of Luton has indicated that there is no one company providing a product that can meet all these needs. It is therefore recommended that a feasibility study be carried out to the technical requirements of the software on which a national service could be based.

Technical and Infrastructure Issues

- Interoperability with electronic submission software currently in use
- Interoperability with IMS standards (can detection software be linked into existing MLE packages to allow integrated record keeping etc)
- Feasibility of uploading formatted text such as Microsoft Word
- Feasibility of bulk uploading of assessments
- Technical issues associated with integrating the systems with publishers' databases so their online material can be included in the data checked
- Feasibility of data storage and sizing required
- Associated costs (i.e. software, technical infrastructure and housing)
- Appropriate management, maintenance and housing of hardware
- Review of how the detection service would map onto or integrate with current JISC services
- Disability issues associated with the use of electronic detection

As with study one, the results will inform the specifications laid out in the tender document.

Finally there needs to be a review of current institutional copyright procedures. This will recommend, in consultation with legal advisers, a model agreement for students to sign, giving permission for electronic storage of their course work. This agreement should be made available before the detection service is available for use.

5.1.4 Workshops

5.1.4.1 Workshops on plagiarism

It is recommended that JISC organise a series of workshops in the area of plagiarism, irrespective of whether a national advisory and/or detection service is commissioned.

If such a service is created then this work will form part of their duties. However it is important that academics are given an arena to discuss the issues and learn good practice.

These workshops might cover topics such as:

- Presentations and demonstrations from suppliers
- More in-depth presentations on
 - Assignment setting
 - Student training
 - Staff training
 - Dealing with students who plagiarise
 - Cases studies from institutions seeking to tack this problem
 - Case studies from institutions with a real problem
 - International perspective on the issue
 - The sharing of good practice

5.1.5 Implementation Plan

It is recommended that JCIEL advise on the best way to implement and run a national plagiarism advice and detection service.

A JISC plagiarism advisory service could be resourced in a number of ways, however two models have been reviewed and included in this report. Full details of the tasks that either solution should carry out is provided in Appendix B. In both models procurement for supply and management of the detection software will need to be carried out and managed. Overviews of the resource models are provided below.

Management Models

Model one – Co-ordinator

JISC recruits a two year FTE to be responsible for the day-to-day management, commissioning and development of the service under the guidance of a steering group.

The co-ordinator will need to be employed immediately to carry out the activities recommended for the Advisory Service and to commission the additional studies. Both activities should be carried out in parallel. The co-ordinator will then manage the tender for the provision of an electronic detection service.

Model two – Outsourced service

JISC could go out to tender for an institution, organisation or company to run the advisory service. This group would provide all the resources required to run the proposed service and would report directly to the steering group.

This model will require a co-ordinator to be employed (equivalent to 0.5 FTE) for a 12-month period to carry out the procurement of the Advisory Service and the feasibility studies. Once the Advisory service is commissioned, it is recommended the co-ordinator continue to manage the procurement and implementation of the detection software, while the Advisory service establishes itself and employs staff. The co-ordinator will also work with the advisory service to;

- Monitor their progress
- Provide advice where necessary
- Keep them informed on the progress of the detection software procurement and development
- Work with them to produce a training module on the detection software for institutions
- Report to the JCIEL Committee

The co-ordinator role would no longer be required once the plagiarism detection software is commissioned and operating. All activities would then be carried out by the Advisory and Detection Service.

A mapping of these processes is available in Appendix C.

5.1.6 Governance and management

As with any JISC service or project, the plagiarism advisory service will need to have a strong steering group, which will be responsible for

- Specification of resources to commission
- Evaluation of resources supplied
- Management of the service budget
- Management of sites/academics/organisations providing reports
- Future Planning

It will be vital for this group to be representative of the different roles involved in an institution on the issue of plagiarism; for example, registrars, lecturers and staff involved in the examination quality assurance practice.

5.1.7 Exit strategy

In consultation with the JISC, the service will be expected to draw up an exit strategy, which will need to consider the current charging mechanisms used by other JISC services.

5.2 Recommendations for JISC Committee for Awareness, Liaison and Training

This project has highlighted a number of issues relating to staff development and student support. **It is therefore recommended that JCALT be consulted throughout the commissioning process.** They should also be asked to nominate a member for the Plagiarism Advisory and Detection Service steering group who would be a link with JCALT or its successor committee.

JCALT are recommended to consider commissioning a study of students and their concerns in the area of plagiarism. This could be made accessible to the community via the advisory service web site to inform institutions when they student study skills training. This would build on the report they commissioned from South Bank University and University of Glasgow entitled 'Human and Organisational Issues Associated with Network Security'. This report can be found at <http://litc.sbu.ac.uk/jcalt/>

5.3 Recommendation for JISC Committee for Electronic Information

Although these projects only reviewed free-text and source code plagiarism, there is obviously a problem in the area of graphics and images. **It is therefore recommended that JCEI considers commissioning a study into whether current Content-Based Image Retrieval (CBIR) packages in development at institutions could be adapted into a plagiarism detection tool to search for similar material either in a database or from the web.** If this form of detection is possible a tool should be commissioned and added to the advisory web site for use by institutions.

6. LEGAL DISCLAIMER

The information contained herein is believed to be correct at the time of issue, but no liability can be accepted for any inaccuracies.

The reader is reminded that changes may have taken place since issue, particularly in rapidly changing areas such as Internet addressing and consequently URLs should be used with caution.

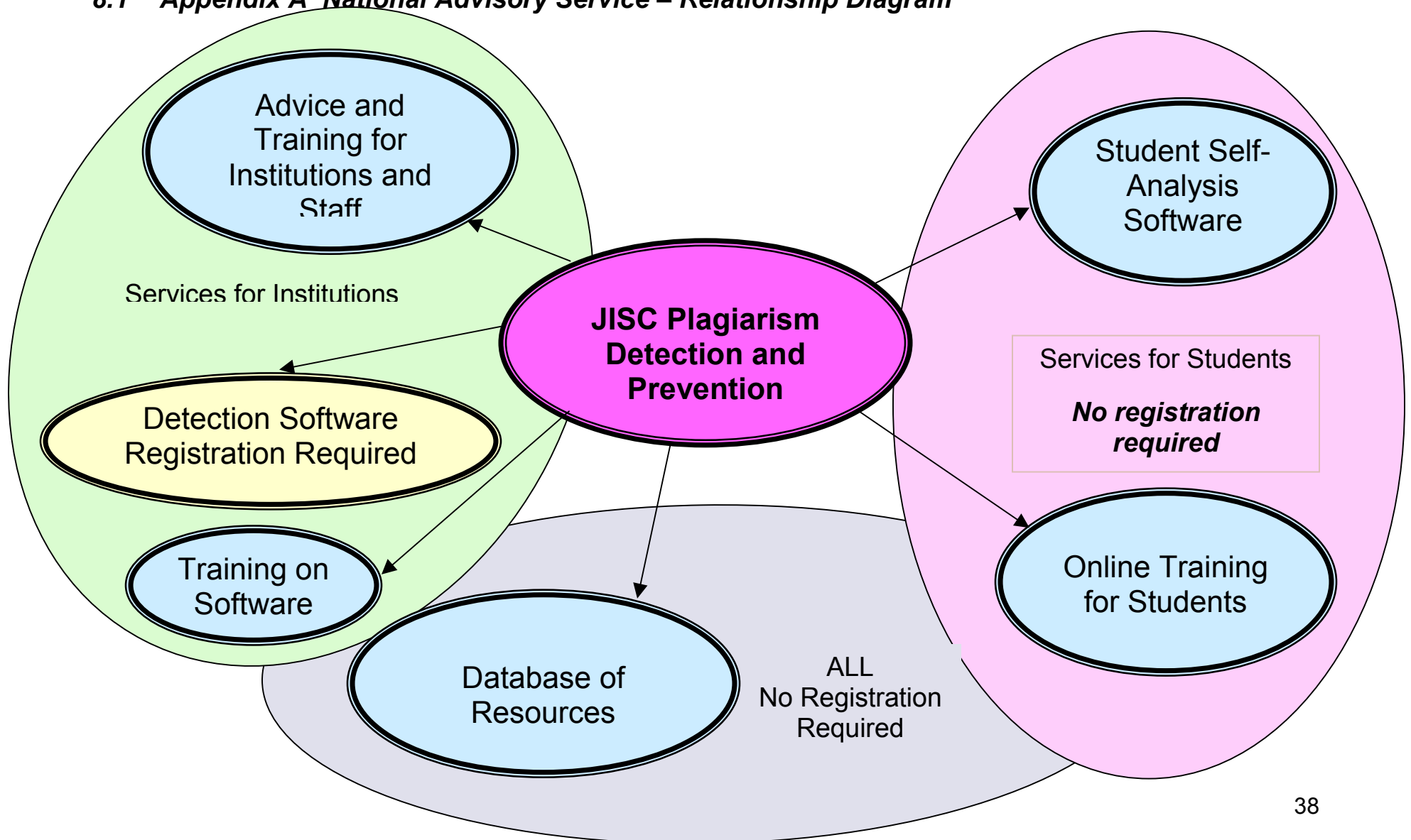
The JISC cannot accept any responsibility for any loss or damage resulting from the use of the material contained herein

7. ACKNOWLEDGEMENTS

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8. APPENDIX

8.1 Appendix A National Advisory Service – Relationship Diagram



8.2 Appendix B National Service – Service Tasks

The following tasks should be carried out by the person/service nominated to manage the advisory service.

8.2.1 General Service

Promotion of services to HE and FE institutions

The service will need to be promoted to both the HE and FE sector. Methods of doing so may include

- Speaking/attendance at regional and national conferences
- Liaison with JISC RSCs
- Visits to institutions
- Liaison with relevant national bodies such as FEDA, BECTa, NILTA, LTSN subject centres, CVCP, Skill, JISC Regional Support Centres
- Organisation of publicity material on the service

Organisation of community workshops in the area of plagiarism

In addition to the online advisory service, workshops covering different topics should be organised for the community in this area. See section 5.2.3 for more details.

Maintenance of service web site

The service should be provided via a service web site, the technical provision of which may be outsourced to a third party. However, the service should be responsible for updating the information, its accuracy and availability.

8.2.3 Advisory Service

Co-ordination of Resource Commissioning

As noted in section 5.1.1.1 all resources for the advisory service will be commissioned either directly from the community or via a national body working in a particular area. This should be carried out in a timely manner and to the specifications laid down by the steering group.

8.2.4 Detection Service

Training of Staff at institutions subscribing to the detection product

If an institution decides to register to use the detection software the following training may be needed.

- Technical advice on using the software
- Advice on embedding the software into institutional practice
- General good practice in the area

The advisory service should always encourage institutions to use electronic plagiarism detection software as part of a wider approach to the issue of plagiarism. The technical training could be provided either by the service, a contracted training organisation (for example Netskills) or via the RSCs. If a third party provides the training, the advisory service must work with them to ensure they provide the relevant details and are kept up to date on the service developments.

Co-ordination between JISC and the detection software supplier(s)

The service provided by the software company should be continually monitored to ensure it is in line with the agreed contract and where necessary steps should be taken to resolve problems. This may include face-to-face discussion (and therefore may involve overseas travel), videoconferences or telephone conferences. The service should be available continuously and procedures should put into place to guarantee this.

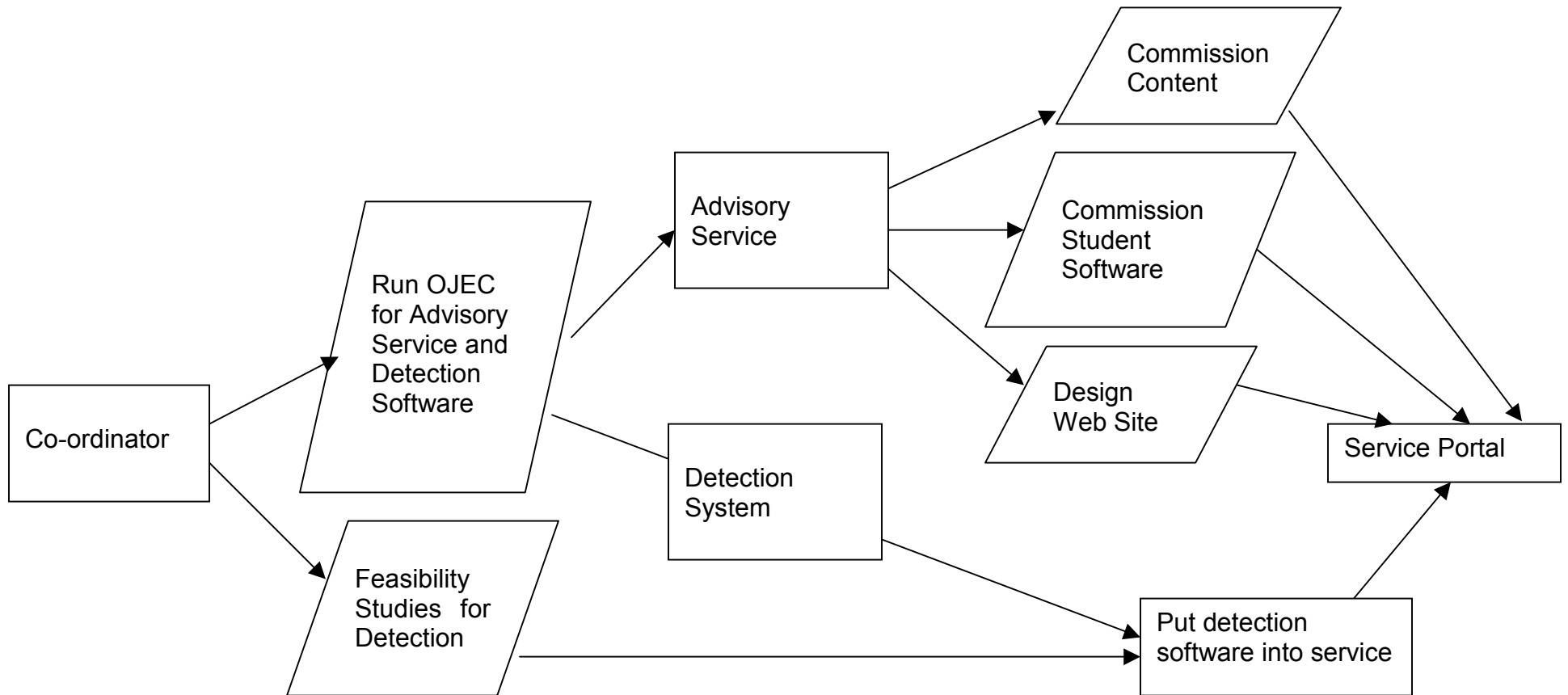
Promotion and development of the detection service to relevant organisations

To ensure the continued development of the detection service, links should be built with vendors who handle electronic text. Vendors may include publishers, agents and web sites. This may encompass site visits, co-ordination of publicity material aimed at this sector and attendance at International book fairs and conferences.

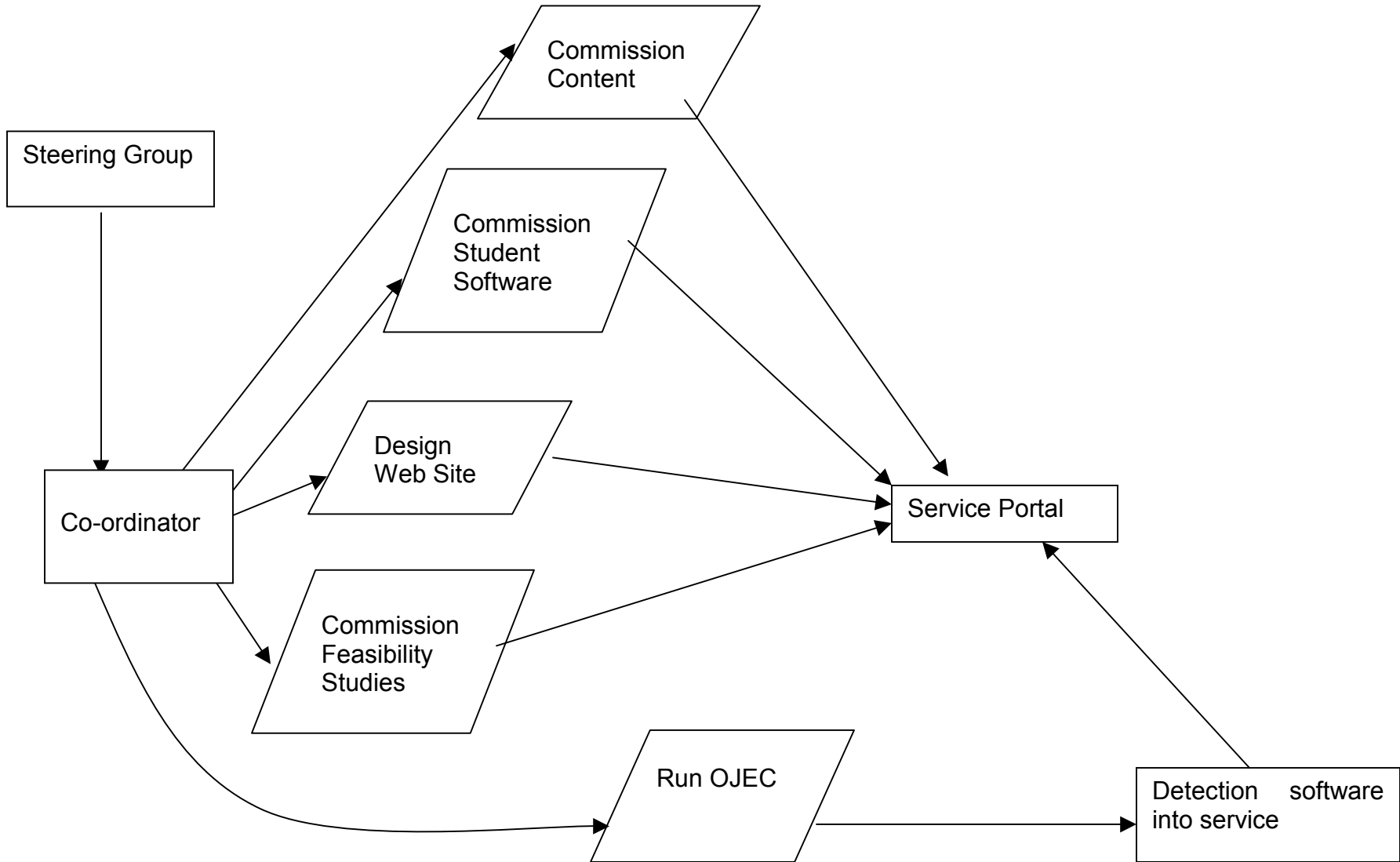
Awareness of developments in copyright law

The service will be need to be fully versed in the issues relating to European copyright law and ensure that it stays abreast of changes and developments in this area.

8.3 Appendix C – Mapping of Outsourced Service



8.3 Appendix D – Mapping of Co-ordinator Service



8.4 Appendix D – Sample Agreement between HEFCE and HEIs for use of students’ materials in plagiarism service

[Name/Position
Name/Address of HEI]

[Date]

Dear []

[Introduction/Description of the service

“the Service”.]

In return for our allowing you access to, and use of, the Service (subject to the conditions of registration [to which you have already agreed] [attached]) you permit us to make full and unlimited use (including incorporation into the Service) of all materials that you, your students, or anyone else at your request submit(s) to or enters in the Service. This permission extends forever and cannot later be withdrawn.

Our permitted use is not restricted to use in the Service as presently operated but will also cover anything replacing the Service, and any other use we may choose. Our permitted use includes (by way of example only) copying, adapting, modifying, distributing and exploiting any or all text and other content contained in those materials, for any purpose.

You confirm that you hold or have obtained all necessary and appropriate rights, and taken all other necessary and appropriate steps, to grant us the permission set out in this letter.

Please confirm your acceptance of the terms of this letter by signing where indicated below.

Yours faithfully

[]
for and on behalf of [JISC]

I confirm that we agree to the above terms:

.....
Signed for and on behalf of [HEI]

Name:

Position:

Date: