

It is possible to teach computer ethics via distance education!

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The Australian Computer Society (ACS) has mandated, through their core body of knowledge, that computer ethics and professional responsibility should be included in information technology study programmes. However, quite naturally, the ACS do not provide any direction as to how such content should be imparted to students. Many different models are used to good effect. In this paper I describe the framework in which computer ethics is taught in the Bachelor of Computing at Deakin University. This programme is offered in both on- and off-campus mode. I will discuss the innovations that have been incorporated to accommodate the special requirements of distance education students and demonstrate that it is possible to teach computer ethics without face-to-face contact with students.

1 Background

In 1996, Prof. Diane Martin of the George Washington University was a visiting professor at the School of Computing and Mathematics, Deakin University, Geelong. One of her major undertakings during her short tenure here was to implement a unit on computer ethics in the Bachelor of Computing (B. Comp.). The unit, SCC383 – Computers and Society and Professional Ethics, is a third year core unit in the B. Comp. programme, and is run in parallel with another core third year unit, the Computer Project.

Prof. Martin designed the unit as an on-campus unit. However, Deakin University is one of several Australian institutions offering their programmes via distance education. The B. Comp. is one such programme. On joining the School of Computing and Mathematics in early 1997, I was presented with the task of translating the on-campus version of SCC383 into an off-campus unit to be offered to distance education students in second semester of that year.

In this paper I describe how Deakin University supports distance education and how that support has changed as eLearning is being introduced. I describe the virtual classroom I have set up to support SCC383 and discuss the advantages and disadvantages of teaching and

learning computer ethics in such a virtual environment. I conclude with personal observations about the teaching process and some comments from students on the outcomes of the eLearning experience.

1.1 Supporting distance education students

Deakin University is committed to distance education, encouraging the "... effective use of information and communication technologies to sustain and enhance teaching and learning" (Deakin University, 2000). Deakin is also committed to creating a virtual campus through the use of "... flexible learning support services ... to transform teaching and learning in on-campus, distance and flexible learning [modes] and ... on-line course development and delivery" (*ibid.*).

Since the inception of SCC383, the emphasis on using on-line technologies to support teaching has changed quite substantially. In 1997 distance education students were usually provided with paper-based study guides and readers. They also had access to tutors via e-mail and phone. Many computing units had Web pages associated with them, where up-to-date information and announcements could be made for students to access. However, the communications were generally one-to-one or one-to-many from staff to students. More recently, off campus students are supported via web-based teaching technologies such as WebCT as well as the more traditional technologies. Further, the provision of study guides has moved away from paper-based to electronic media. Communications between students is encouraged, providing peer support not previously encountered by many off campus students.

The pedagogical philosophy underpinning SCC383 is that students learn by doing. For on-campus students, lectures highlight issues, encouraging students to think about them by observing and discussing specific situations and examples. Tutorials are opportunities for students to analyse, discuss and evaluate issues and potential problems, situations and solutions in small groups. But most off-campus students at Deakin never set foot on campus! The problem then was how to translate this very real-time learning experience into a virtual environment in such a way that off-campus students could achieve the same learning outcomes as on-campus students.

Various options suggested themselves. I could use bulletin boards, e-mail lists or on-line chat to model the real tutorials on-line. The problem here is that there were few (if any) facilities in any of these technological environments to mirror small tutorial group situations. Further, distance education students could be anywhere in

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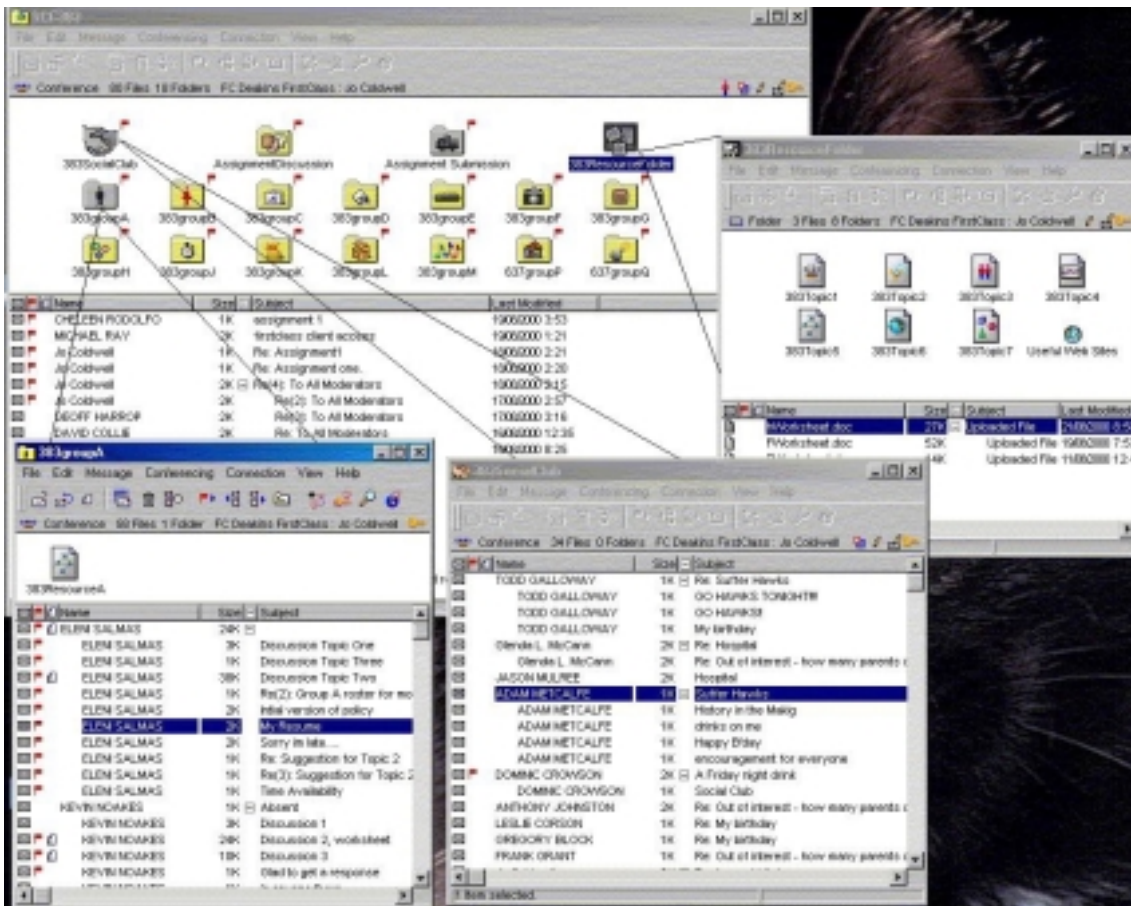


Figure 1: The FirstClass learning environment

the world, rendering synchronous communication modes infeasible. Even within Australia different time zones can cause problems. The situation is further aggravated by off campus students' very different study habits (they have a tendency to work at odd hours or in block mode at the weekends). What was required was a solution that allowed asynchronous communication, sub-groupings of students within the unit, and kept records of communication in order to assess student participation. Staff involved in the unit also needed the ability to moderate discussions and provide direction and feedback to participants.

1.2 Creating a virtual classroom

The solution presented itself in the form of the on-line conferencing package FirstClass¹ which is supported by Deakin University. It uses the client-server paradigm but also has a Web interface, although some of its functionality is lost when using Web browsers.

FirstClass supports online discussions in both synchronous and asynchronous modes within *conferences*. A conference is a discussion area, or forum, where users are given specific access rights, ranging from no access, through read only, to full read and write permissions. This allows conference administrators the

ability to generate sub-conferences that are public (everybody has access) or private (only specified users have access). This is the functionality that allows the creation of private tutorial areas within a class.

Figure 1 shows the virtual environment in which students complete their discussions. The window labelled "SCC383" is the main conference area for this unit. The top part of the window shows all the sub-conferences and other resources that students in SCC383 have access to. The lower part of the window shows the messages that have been posted to this conference. This part works much like a bulletin board. Messages can be sent, read and replied to. "Conversations" are threaded when the reply option is used.

Information relating to the regular discussion topics is provided via the conference resource folder (383ResourceFolder). Here all the materials needed to complete the exercises, such as scenarios, problems, discussion templates and so on, are stored in Acrobat Reader format and can be downloaded very easily. General resources are also provided, such as useful web sites and links to on-line readings.

Tutorial groups are created by using sub-conferences with limited accessibility. Approximately 10 students are allocated to each group (e.g. 383groupA in figure 1) and only these students (as well as staff) have access to this area. Here students have access to their own folder (383ResourceA) that they can use to share documents or

¹ FirstClass™ is a trade mark of SoftArc Corp.

other resources. Tutorial exercises are undertaken in these subgroups, emulating “real” tutorial group work.

Other forums are provided for non-tutorial oriented discussions. For example, the conference “AssignmentDiscussion” has been provided for the first time this year. Previously, students used the SCC383 main conference area for this, which made it rather cluttered. Also for the first time, I have set up a conference area specifically for submission of assignments electronically. Previously, paper-based assignments were submitted.

The conference “383SocialClub” is a popular forum, particularly amongst off campus students. The only rule governing activity in this forum is that any discussion relating to the unit is NOT allowed!

1.3 Learning in a virtual classroom

The SCC383 study guide (Coldwell, 2000) informs students that this unit is:

“designed to help students understand the principles and develop the skills to participate in the analysis of the social and ethical impact of the computer technologies they will be designing and developing in the future. In this [unit they] will be required to read, think, write and speak!”

Computing units generally require students to use problem solving skills in a technological environment, calling on mathematical and programming skills as well as the ability to memorise content. The emphasis of SCC383 is very different from most other units that students would have completed to this point in their studies. The technically-oriented students perceived SCC383 as a hurdle they had to clear in order to qualify for their degree (it is a core unit) rather than one where they had an opportunity to learn some new information technology related skill. However, using a technology-based learning environment seems to have overcome some students’ misgivings about “learning” non-technological based content.

Translating real-world exercises into the virtual world was relatively straightforward although one-semester’s experience of running SCC383 in off-campus mode required some additional administration, had unexpected time constraints and posed some interesting learning difficulties for students.

The main difficulties arose with the tutorial exercises. In the real world students completed an exercise/discussion per week during semester. This proved to be too much for off-campus students to handle successfully. In the first instantiation of SCC383 off-campus, the combination of conversing asynchronously and off-campus students’ study habits meant that they were unable to satisfactorily complete the exercises in the timeframe set. In fact, most discussions degenerated into a message bank of individual opinions. In other words, each student prepared a response to the discussion topic, posted it to their group’s conference area and that was the end of that!

There was little or no discussion taking place, certainly no critical thinking or evaluation of their responses.

The following year the number of discussion topics was halved to just seven, each lasting for two weeks. This partially solved the problem encountered in the previous year. Some students still had a tendency to post an opinion and no more. Others left their submission until the last moment - a common practice for most computing students! Obviously further modifications were needed to encourage more active discussion and timely submissions.

Lately, each of the seven discussion topics have been split into two parts, the first to be completed in the first week of the 2-week timeframe, the second in the second week. The first part of the exercise for example, may involve analysing a scenario, brainstorming an issue or evaluating a situation. The outcome is a collation of the groups input for this part of the exercise. In the second part, this outcome is critically analysed to develop some evaluation or perhaps to produce a policy document which had the potential to avoid the problem in the first place. See the appendix for examples of tutorial exercises and expected outcomes.

1.4 Teaching in a virtual classroom

In the first year that SCC383 was offered off-campus, staff and students alike were unfamiliar with the FirstClass environment. We discovered that problems with the technology were the greatest hindrance to successful teaching and learning outcomes. This is not uncommon when any new technology is introduced into an existing process. For the first month or so of the semester most communication between staff and students revolved around loading the correct FirstClass client, identifying correct network settings and generally gaining access to the facilities provided by FirstClass.

More recently the School of Computing and Mathematics has adopted WebCT as the main on-line teaching technology for all of its units. I took advantage of the students’ prior knowledge of this teaching platform by using it as the initial entry point into the electronic discussion part of the unit. The electronic study guide is made available here, as are assignment specifications and details relating to discussion topics and other tutorial work. Further, information about accessing and using FirstClass is provided in WebCT as well as a downloadable version of the FirstClass client. Figure 2 shows the teaching environment used for SCC383.

WebCT provides a bulletin board facility called “Class News”. During the first few weeks of semester this forum was used to overcome any technical problems that students encountered when trying to gain access to FirstClass. Using a familiar technology to facilitate access to an unfamiliar one proved to be rather more successful than methods previously adopted.

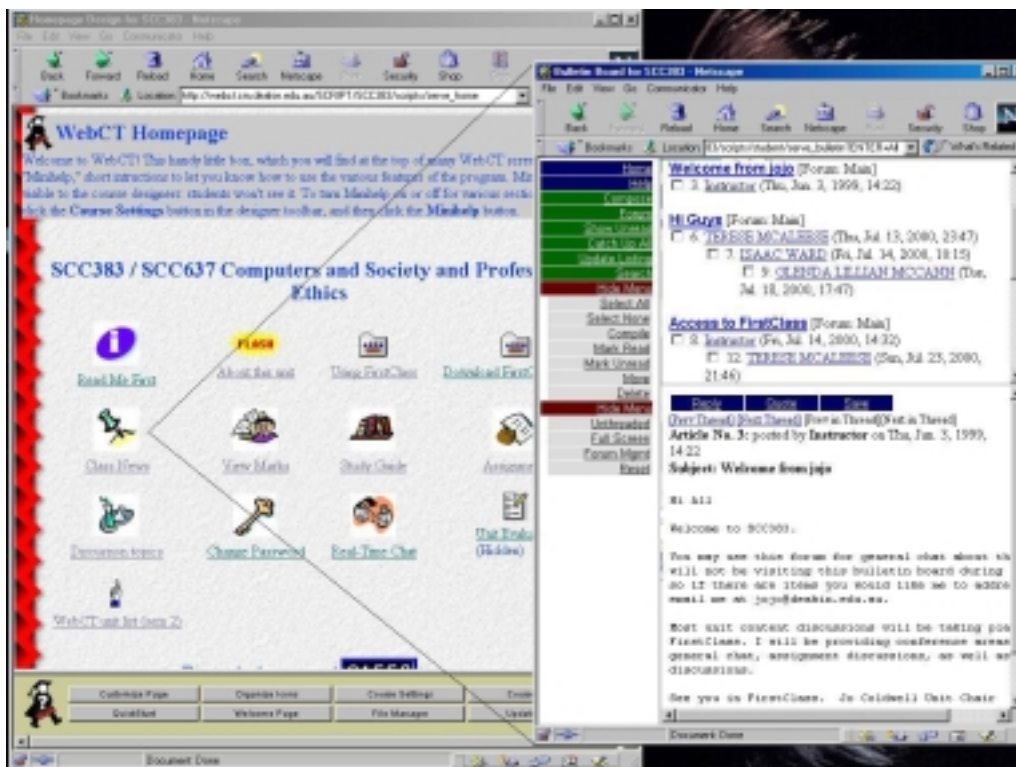


Figure 2: The WebCT teaching environment

2 Discussion

There has been much written on the efficacy of teaching computer ethics at the start of a course of study, as capstone units as is the case here, integrated in software engineering style units or simply spread throughout the curriculum. See Burmeister and Simpson 1999, Fielden 1999, Gotterbarn 1991 and Staehr 1999, for example. All have their merits and drawbacks. Gotterbarn (1991) summarises these well:

“There are three general strategies to introduce discussions of computer ethics into the curriculum. The first and most common method is to dedicate a section of an introductory survey course to the impacts of the use and abuse of computer technology. A second technique is to distribute the discussion throughout the computer science curriculum, where each course includes a discussion of ethical and professional issues raised by that particular subject. The third approach is an in depth course for computer science majors. Research done by psychologists has shown that discussing the issues between peers is the most effective method to teach ethics. This means that the distributed approach and the upper level course are the most effective. Research in ethics has also shown that the distributed method is better. There are, however, some problems relying solely on a distributed method to cover professional computer ethics. Not all faculty members are comfortable discussing ethics and ethical issues are often the first subjects dropped from a course when there is a time constraint. An upper level course, in addition to the distributed method, will avoid some of these difficulties and will provide greater depth of

discussion than can be provided using the distributed method alone.”

These models work very successfully - but in off campus mode there is no guarantee that students will "see" the issues as issues without positive direction. To ensure that ethical and professional issues are covered satisfactorily it is necessary to emphasise their existence. This is guaranteed within the context of a unit of study dedicated to the coverage of such issues. However, I am not suggesting that this allows academics to abdicate all responsibility for covering ethical and professional issues within the context of other units. Students need to be at least aware that such issues exist before they are in a position to study them in any depth.

During the last 3 years various modifications have been made to the form and content of the unit to ensure its relevancy to the rapidly changing IT environment and to maintain accessibility to all students. I have moved away from providing paper-based study materials as much as possible, although the reader is still produced in the traditional way. WebCT is used to provide electronic study materials rather than providing traditional paper-based study guides. Using this electronic medium as a teaching environment has enhanced my ability to maintain the resources and keep them up-to-date. Using paper-based materials requires up to 12 months lead in time to update the content, prepare camera ready copy, print and distribute to students. This has been reduced to a few months and new material can be added at any time throughout semester. There was some disquiet amongst local off campus students initially as they felt it was their “right” to receive paper-based study guides. However, as it has become more common for such materials to be provided electronically University wide, that resistance

has evaporated. Off campus students who were off shore however found the electronic media more convenient as they were not subjected to the vagaries of overseas snail mail!

As my experience with the software has increased I have started to experiment with different virtual situations, such as incorporating on-campus students into the virtual environment, creating multicultural groups and, most recently, asking students to undertake collaborative assignments in the virtual environment.

Initially the on-campus students were apprehensive about using FirstClass as they felt they would be treated as off-campus students. Having elected to study in on-campus mode they felt that using what at the time they considered to be off-campus tools would compromise their learning experience. This dilemma was overcome once students realised that they were in a position to acquire a new, and very marketable, skill – working in a computer supported collaborative work environment which is not uncommon in larger distributed organisations. On campus students still attend “real” lectures, only the tutorials are “virtual”.

I have already mentioned off-campus students' apparent inability to discuss topics initially. Although the timeframes set to complete the work aggravated the situation, it seemed that they had spent so much time working on their own during their studies they had forgotten how to hold a discussion in an academic environment. By incorporating on-campus students into the same forum it encouraged all students to participate in activities more fully. The changes I made to the tutorial exercises (see examples in the appendix) further encouraged active and meaningful discussions.

One of the positive aspects of using on-line media and technologies to support a learning environment is the immediacy of communications, even in asynchronous mode. Peer support within the environment lifted some of the burden usually placed on academics to respond to student queries thus allowing more time to be spent on moderation and academic feedback (rather than technical or administrative). However, this immediacy is also a drawback. Students expect to receive responses to their queries almost before the query is posed! A typical example occurs when students submit assignments electronically and expect their results almost by return. Unfortunately it does take real time to mark over one hundred 1000-word essays!

The 383Social Club has proved to be a popular discussion forum each year. Initially, the students did not use the forum until I realised that they did not know why they had access to it! They had been looking for some academic rationale for its presence. The trick here is to place a seeding message early on in semester that sets the tone of any future conversations. For example, the seed message this year was:

“Well, all good conferences have an excellent social programme. This one is no different. Welcome to the club. Drinks and nibbles are free. The only condition is that you are not allowed to talk about scc383 here!

Now's about a good time to sit back, enjoy some refreshments, relax and watch the sunset.

Mine's a G&T with a twist - a double I think.”

This was quickly followed by student input, including birthdays, footy results, TV soaps and most recently “... champagne on the house to celebrate the birth of ...”.

3 Conclusions

Is it possible to teach computer ethics virtually? Yes it is. But it must be undertaken in a systematic way. We must have good reasons to teach in a particular way. If we are to teach in a virtual environment we must have access to the supporting infrastructure. Further, the infrastructure must be easy to use otherwise the technology will detract from the content being presented.

In the case of Deakin University, it is essential that off campus students are able to aspire to the same learning outcomes as on campus students, but not necessarily to do so by using the same processes. In this case I have taken the unusual step of designing the unit for off campus presentation and translating it into on campus mode, despite it starting out life as an on campus unit. This has been a challenging task but worthwhile. The methodology I have adopted has provided both on and off campus students with very different learning experiences which they can take with them into the workplace. They have a better understanding of, and appreciation for, the impact that IT is having on society, the types of ethical issues that they may have to address during their working lives and their responsibilities as professional information technologists. Further they have learnt how to work collaboratively in virtual environments, as well as to nurture virtual communities and overcome some real ethical issues about using virtual environments while learning about them.

The feedback I have received from students has been mixed with some disliking the compulsory on-line participation, finding the workload heavy, or believing that “... they didn't really learn much.” However, this negativity is countered by some very positive feedback which makes my efforts, and that of the students, worthwhile. The following are comments from the 1999 student evaluation for scc383:

“I though the subject was going to be a bore, I was very wrong. Ethics has turned out to be the most interesting unit I have done this semester.”

“The subject ... has opened my eyes to what it is to be a professional.”

“Most other units I have completed have been computer programming and as such I was very wary about writing essays. This meant that assignments took me longer. I found the work and topics covered by this unit very interesting and as such didn't find it difficult. It is always easier to learn when you are enjoying what you are learning about!”

Thomas and Carswell (2000) have written on their experiences of using FirstClass at The Open University in the UK. They suggest that

“... electronic communication can be an effective tool for supporting collaborative learning that overcomes the difficulties associated with distance and time in a distance education environment.”

I have demonstrated here how electronic communication, used in conjunction with a series of appropriate teaching technologies, can enhance the learning outcomes for all students, not just distance education ones.

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Appendix

Discussion Topic 6 – Computer Crime

Complete the following tasks by **Sunday, 8th October**.

Hackers are discussed at length in Baase. Articles about them appear almost daily in the media. They have had books written about them, such as Steven Levy's book, *Hackers*. Levy outlines what he called the "hacker ethic", an approach to computers and information at odds, apparently, with much of our discussions on ethics.

"The Hacker Ethic. Access to computers – and anything which might teach you something about the way the world works – should be unlimited and total. Always yield to the Hands-On Imperative!"

To do:

Discuss the implications of the hacker ethic. Look at both positive and negative aspects. Do not limit yourself to what you consider to be currently legal or illegal. Look at the issues from a moral and ethical standpoint.

To add fuel to your discussions, consider the recent situation where a student "inadvertently" hacked into the GST web site. Over 17,000 businesses received warning e-mails from the hacker informing them of the lack of security and including confidential company details (such as bank account details) as proof of the hack. The hacker was hailed as "good" by some of the organisations that received the e-mail and yet was likely to be charged by the police for breaches of the Crimes Act. (This incident

was report on the 7.30 Report, ABC TV on Thursday June 29th.)

To do:

Moderator: compile a list of implications as a Word document and upload it to your resource folder. It is conceivable that members have suggested the same implication but as both negative and positive factors. Include both.

This part of discussion topic 6 should be completed by Sunday, 1st October.

To do:

Discuss any anomalies in your list. As a group, identify the most important implications (up to six positives and six negatives). Include justifications for inclusion in your list.

Moderator: when the group have completed their deliberations for this part, upload your document to the scc383 resource folder. The document should be called xHackers.doc, where x is your group letter. This task must be completed by 6th October.

During the 7th and 8th October, have a look at the lists posted by the other groups. Do they highlight similar implications as your group. What are the differences, if any? Do the justifications provided warrant the differences?

Discussion Topic 3 – Consumer Privacy Concerns

Complete the following tasks by **Sunday, 27th August**.

The following extract is taken from an article published in 1998. I will provide the full reference when you have completed this discussion.

"The Internet is quickly becoming the world's largest public electronic marketplace. It is estimated to reach 50 million people worldwide, with growth estimates averaging approximately 10% per month. Innovative business professionals have discovered that the Internet can be exploited to offer a number of services both for their customers and for their strategic partners. The Internet has also revolutionised retail and direct marketing. Consumers are able to shop from their homes for a wide variety of products from manufacturers and retailers all over the world. They are able to view these products on their computers or televisions, access information about the products, visualise the way the products may fit together, and then order and pay for their choices. The Internet has changed modern business and presented a new paradigm of business relationships and transactions.

Despite the much-heralded recent successes in utilising the Internet marketplace, one of the major

impediments against full-scale integration of [it] with modern business is the lack of confidence Internet consumers have in the newly developed marketing machinery ... The most crucial issue that Internet consumers have identified is fear and distrust regarding loss of personal privacy associated with the emerging electronic commerce marketplace. One recent survey ... determined that over two-thirds of Internet consumers considered the privacy concern to be very important."

To do:

Identify the privacy concerns that you, as IT professionals, and you as consumers, consider to be the major impediments mentioned in the extract. Prioritise them. Develop a simple policy that an Internet organisation could use as public relations material to inform their potential customers that they have adequate procedures in place to protect their customers privacy.

Note:

The group will have to work out an equitable scheme to allow all members of the group to

contribute to the policy. I suggest the moderator for this session collects your initial ideas on the policy and collates them into a single document which is saved in your resource folder in the group conference area. All members can access it and make suggestions as to how it should be modified.

It will take several iterations before you are all satisfied with the final document so you **MUST** contribute to the initial version before Friday 18th.

Moderator, please keep track of who made a contribution and when.

To do:

Moderator – when your group is satisfied with the policy, post it to the scc383 main conference RESOURCE folder. The document must be called “xPOLICY.doc” where x is your group letter. This task must be completed by Friday, 25th August.

During the 26th and 27th of August, have a look at the policies posted by the other groups. Do they make similar statements as your group’s policy? What are the differences, if any? What, in your opinion, caused the differences?