

# Ethical Concerns in Computer Science Projects

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## INTRODUCTION

Many more computer systems do not work in the way they are intended (Sommerville, 2004; Pressman, 2004). Computer systems are also increasingly vulnerable to misuse (Edgar, 1997; Rowe & Thompson, 1996) and crime (Barrett, 1997; NHTCU, 2003; Casey, 2004). The concerns ascribed to the development of computer systems can also be attributed to the development of computer artifacts in undergraduate and postgraduate projects; poor software practice can often be traced back to the education of the practitioner. The main issue addressed here is the steps academics, computing schools, and departments and universities should take in order to address the potential harm that could result from inappropriate projects, and the potential benefits of introducing an ethical approval phase.

It is incumbent on academics in their role as project supervisors to ensure that students do not undertake any projects that have the potential to cause harm; clearly the scope for a student to cause damage is limited, but is also non-zero. Such an approach to project conduct might be made conspicuous, thereby inculcating the student into sound and ethical work practice.

## BACKGROUND

Since the 1990s the subject of computer ethics has been formally embedded into computing curricula—both in the United States as part of the ACM Curriculum (ACM, 2001) and in the UK (QAA Computing Benchmark). The British Computer Society (BCS), the main accrediting UK body for computing programs, places great stock on legal, social, ethical, and professional issues being embedded into the curriculum; it is acknowledged that technical education and skills alone are insufficient for a professional life in computing.

There are many different definitions of “computer ethics” (Maner, 1980; Johnson, 2001; Moor, 1985; Gotterbarn, 1991), but all are concerned with the potential impact computers systems have on society. Applying the principles of computer ethics encourages practitioners to consider the effect their product or artifact could potentially have. It is suggested in this article that students and supervisors engaging in *computing projects* should consider the ethical implications of their work as an integral part of that project process.

In almost every computing program worldwide, the project is an integral part: few would dissent from this inclusion, as this is the best simulation universities can offer of software development “in the real” (Fincher, Petre, & Clark, 2001). The BCS examines projects, focusing on the theoretical and practical application of computing and software engineering principles. It is customary for computing undergraduates to have more than one project experience, and it will represent 25% or more of a senior academic year.

However, the BCS does not explicitly examine the ethical nature of projects or expect discussion of ethical issues in the project process or write up. While this does frequently occur, a formal connection between these two aspects is not sought. The whole issue of ethical scrutiny of computing projects is a “live” but underdeveloped issue.

The ethics agenda for research carried out in universities is developing and gaining momentum, although recent research undertaken by the Nuffield Foundation (2005) suggested that “Ethical scrutiny of university research is patchy despite the fact that more institutions than ever have committees to vet projects.” One of the criteria in the Nuffield Foundation research was whether ethical considerations of student research were scrutinized. A framework for ethical scrutiny is proposed which would address ethical issues in projects and as a result optimize the educational benefits for students, and also allow computing schools to protect themselves in the case of something going wrong.

Within the UK, preliminary work is underway in the development of an “ethical framework” for computing projects. This is being undertaken in conjunction with CPHC,<sup>1</sup> professional bodies (BCS, IEE, ACM), and the HEFCE-funded IDEAS Center of Excellence in Teaching and Learning (IDEAS, 2005). This framework (see below for detail) will provide guidelines on ethical;

- **Responsibilities:** Institutions, schools, staff, students
- **Scrutiny:** Filter, terms of reference review, ethics committee
- Inclusion in student project
- Assessment

Ethical issues have always been a mandatory element of many degrees—medicine is the obvious example. However, there has been a recent growth in the number of university and school committees considering ethical issues across many disciplines. The Royal Academy of Engineering (which includes computing in its remit) has recently established a working party on this issue (RAE, 2005). Simultaneously there is a growth in the breadth and choice of subjects and discipline areas which constitute computing projects: there is a “rush to interdisciplinarity” driven by the need for students to be able to apply technical skills.

As the range of potential projects increases, so does the potential for computing projects to cause harm either to subjects or through inappropriate development of a computing project product: this is an obvious risk in the area of, for example, health informatics; students regularly work alongside health professionals (well versed in ethical constraints) but rarely have any grounding in the ethical issues they are likely to encounter. It is common for student project work to be deployed, even if only prototype, and sensible precautionary mechanisms are sometimes absent. Projects regularly generate Web-based databases as part of their development, and authors neglecting issues such as confidentiality as a fundamental design issue would clearly be flawed.

Additionally, there are potential ethical issues associated with the gathering of primary data; for example, informed consent and anonymity. These become more relevant as applications that impact widely become more commonplace and attractive as project activity. Again, these issues are routine in many professions,

but have rarely been considered as a normal part of computing.

## ETHICAL ISSUES IN PROJECTS

There are many subject areas for potential concern, such as obtaining primary data from under-18s or vulnerable adults; the development of computing artifacts which raise ethical concerns, for example virus generators; and research in sensitive subjects such as health informatics, computer forensics, dataveillance, and so forth.

The standard pattern of projects is proposal, requirements analysis, implementation, testing, and documentation—this pattern is explicitly encouraged by the BCS. A number of computing schools have introduced aspects of ethical scrutiny at the proposal stage, although a few have embedded more detailed ethical scrutiny throughout project development and expect explicit consideration to be documented in the write up. This article seeks to promote a framework which can be adopted by computing schools to identify potential ethical problems early in the project.

Initial research<sup>2</sup> suggests that many institutions leave ethical considerations to the supervisor, without making use of formal structures, relying on their professionalism, and putting trust in students’ behavior. There is no suggestion that staff are remiss in this *responsibility*: the point we make is that the need for this filter is growing, and that little opportunity is currently taken to establish this phase as part of the student’s education.

Commonly given reasons for not formalizing an ethical consideration process are the pragmatic ones of time and volume. There needs to be a quick and workable “filter” to ensure ethical appropriateness balanced with the need to ensure all interests are protected. Historically, software *product* generation has been seen as the primary aim of projects, and academic hesitation in devoting time to tasks other than production might be seen as understandable. It might also illustrate a deeper issue in convincing the community of the benefit of devoting explicit resource to ethical considerations.

There are a number of stakeholders who have responsibility in ensuring that a project is ethically acceptable. Obvious ones who have responsibilities (depending on the nature of the project) include the:

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