CHAPTER 8

Final considerations

Aims
To discuss life after your project.

Learning objectives
When you have completed this chapter, you should be able to:

- understand ways in which you can develop your project further in the future;
- understand exemption and accreditation criteria for projects by the British Computer Society;
- recognise the skills you have acquired from doing your project and understand how you can apply these skills in the future.

8.1 Introduction

Now that your project is coming to an end there are a number of things you will wish to consider for the future. Just what does the future hold for you? Are you going to stay on in academia or move on to pastures new and go into industry? Do you wish to forget all about your project or take it further? Will the successful completion of your project lead to further qualifications and recognition such as British Computer Society membership? What have you learnt from doing your project and how will these skills be useful in the future?

8.2 Taking your project further

8.2.1 Introduction

When you complete your project, hand it in and crack open the champagne. You will probably have one of two feelings about it. You might be so fed up with the sight of it that you never want to see it again and you want to burn

all your books and notes. This, however, is not advisable as you may need to attend a viva or rework some of your project if things didn't go quite according to plan. Alternatively, you might be so enthusiastic about what you have achieved that you eagerly anticipate your 'A' grade and can't wait to get back to your work and develop your great ideas further.

Developing your project further can result in a number of things. You may wish to develop a commercial software package from a program that you wrote as part of your project. If you have completed an undergraduate project, you might want to develop your ideas further into an MPhil or PhD. You might want to write a paper on your work to share your ideas with the academic community. You might want to patent your work or you might want to seek some kind of funding so that you can develop your work further. Some of these issues are discussed in the following few sections.

8.2.2 *Seeking funding*

Trying to obtain funding for projects is not an easy task, even for experienced academics and managers. As a newly qualified graduate with little track record and probably few, if any, publications, you stand little chance of obtaining funding on your own. You also have the problem of not knowing who to turn to for funds and how to apply and complete any forms and paperwork that are required in an appropriate way. In short, you will probably not obtain funding on your own. One way around this is to try to forge links with research groups and industry. Your own department might have a research group with internationally recognised researchers who might be interested in your work and wish to involve you with theirs. Your supervisor may wish to keep you on as a research student or a research assistant. You may be lucky and have developed some software for a local company as part of your project so it might be worth liaising with them for further funds. Whatever the case, you will need to work with somebody else and learn from experience.

Applying for research funding and obtaining grants is not discussed widely and there are few texts devoted to this topic. However, two books that you may find useful to help you are Burcham and Rutherford (1987) and Ries and Leukefeld (1995), which provide a useful overview of this topic.

8.2.3 *Developing commercial software packages*

Because of the nature of your course it is likely that you might develop a piece of software as part of your project. You might feel that this software has some commercial value and you might wish to market it as such. This may require a lot more development work or it may simply mean packaging the software in an appropriate way for delivery. Once again, this kind of project advancement is not easy to do on your own.

You may have to establish some commercial links to market your product.

You might have to obtain some kind of funding or financial backing to get your ideas off the ground. You might also find there are difficulties with patents and intellectual property rights over work you have done for your project. These problems might be even more pronounced if your project involved working with an organisation or company and they wish to stake some claim over your work.

Whatever the case, perhaps the best place to start to resolve these issues is with your project supervisor. He or she should be able to help you or know who you should contact to address these issues. They might also be keen to be involved with any future developments that you make because they will already have been closely involved with your project to a large extent.

8.2.4 Copyright and patents

Who owns the rights to your project when you have finally submitted it for assessment is a 'grey area' within universities. Some institutions openly recognise your *intellectual property rights* (IPR). They recognise that you have intellectual property rights over any work that you produce as part of your course. The copyright for everything you produce thus belongs to you. This means that, while your institution would require copies of your work to retain for assessment purposes, you would be able to sell patent and copyrights for your work as you wished. You would also be entitled, for example, to develop and sell any software that you had produced as part of your course.

While this level of recognition of student ownership represents one extreme, other institutions will claim to own all rights to any work that is produced by students during, and as part of, an academic course. In certain instances, where collaborative projects have been undertaken with industry, you might find that the company involved with the project will wish to retain some ownership of anything that you produce as well.

In summary, if you feel that you wish to take your work further or develop something commercial from it, it is worth checking to see what rights you have over what you have produced. Check your own institution's guidelines and rules on matters of this nature and be prepared for vague answers! Patent and copyright laws are extremely complex and you may well find that you end up going round in circles and generating more questions than answers. For more information on IPR refer to Bainbridge (1995), which is an entire book devoted to the subject of intellectual property.

8.2.5 Publishing your work

You may feel that your project went so well that you wish to publish your work, either in a recognised journal or through a forthcoming conference. Your supervisor may well be closely involved with this idea and will certainly advise you. Writing for publication is not as simple as cutting and pasting a few

sections from your report. It must have some form of logical structure to it and it must show clear evidence of a contribution. The process of getting work published can also be rather long winded – for example, it is common for some articles to be published well over a year after they have been submitted.

There are books available that can advise you on writing for publication. Three such texts devoted to this topic are Lester (1993), Day (1996) and Jamieson (1996), which you should consider referring to if you are thinking of writing an academic article for the first time. Alternative routes into publication can be through submitting internal reports within your own department or by writing brief summary papers or articles in more popular journals and newspapers.

8.3 Additional topics

While this book has covered probably all the topics you will require to complete both undergraduate and postgraduate computing projects successfully, there are a number of topics that have only been mentioned in passing and may be relevant or needed by you. This section briefly summarises these topics and provides you with some pointers towards further reading that you may find useful.

- *Statistics*. Part of your project may well require some form of statistical analyses. For example, from running some software speed trials, is an algorithm you have developed *significantly* better than an existing algorithm? Are any of the responses from a survey you have used 'significant'?

  The number of statistical tests available is enormous and beyond the scope of this book to discuss. There are also many books available that cover statistics. Some that you may find useful are Kanji (1993), which summarises a number of statistical tests and defines their application, and Gibson (1994), which provides a reasonable introduction to elementary statistics.
- *Questionnaire design and analysis*. As part of your project you may need to design and put together a questionnaire, decide how to use it and who to send it to, and work out how to analyse the responses. Questionnaire design and application is not a straightforward issue. However, texts that might help you with these topics include Hague (1993) and Oppenheim (1992), which both provide good coverage of this subject.

  Questionnaires may form part of a wider survey that you wish to undertake. While you will often find some information on performing surveys within more general texts, two books devoted exclusively to this topic are Fowler (1995) and Czaja and Blair (1996).

- *Qualitative analysis*. Qualitative data are those data which you gather that are not expressed in absolute arithmetical terms. They represent opinions, observations and ideas, and are generally gathered from questionnaires, surveys and interviews. Reviewing, analysing, evaluating and summarising these data often occurs in sociological studies. This may, for example, form part of an information systems project that aims to obtain user feedback on human interface issues. Two texts that cover this subject in detail are Mason (1996) and Silverman (1997).

8.4 British Computer Society exemption and accreditation

8.4.1 *The British Computer Society*

The British Computer Society (BCS) is the professional representative body for computer scientists and information systems practitioners within the UK. As a graduate from a computer course of one kind or another you are encouraged to join the Society because it represents your interests at a professional level. Under its Royal Charter the BCS is required to 'establish and maintain standards of professional competence, conduct and ethical practice for Information Systems Practitioners' (BCS 1998: 4).

In order to become a member of this professional body, the Society initially established the BCS examination so that potential members could demonstrate their competencies within the field. However, because of the vast range of computer qualifications available at undergraduate and postgraduate level, the Society introduced 'a system of exemptions for appropriate courses ... to provide alternative routes to Membership'.

In 1990 the Society became a nominated body of the Engineering Council so the exemption system was extended to include 'accreditation at Chartered Engineer (CEng) or Incorporated Engineer (IEng) level'. The BCS thus visits academic institutions to assess which exemptions or accreditations should be awarded for computer science and information systems courses. You will need to check with your own institution to see what level (if any) of exemptions or accreditations apply to your own particular course. You may find, for example, that while one course within your department is fully exempt, another is not.

You can become a member of the BCS at one of a number of levels. For example, to become an Associate Member you would normally have to complete Part I of the BCS examination or its equivalent. You may be exempt from completing this part of the examination because you have successfully completed a recognised HND or Honours degree. To become a Corporate Member you would have to complete Part II of the BCS examination, or have completed a recognised Honours degree successfully.

Not only must you complete the relevant BCS examination (or show you

have achieved its equivalent) to become a professional member of the Society, but you must also complete a *Professional Project*. The Professional Project, like the BCS examination, must also be completed at one of two levels, depending on the type of membership to which you are applying. Thus, the Professional Project must be completed at either Level I or Level II.

Usually, as part of your course, you will be expected to complete a project of one kind or another. The Society recognises this point and exempts people who have completed an acceptable project as part of their university course from the Professional Project. Your institution might have blanket exemption by which all students who complete their course are exempt from the appropriate level of the Professional Project. Alternatively, your institution may have selective exemption in that only students who complete 'appropriate' projects will be exempt from the Professional Project. You will need to confirm the level of exemption your department holds.

Exemption and accreditation of courses depends upon a vast range of factors – their underlying theory, level of group work, project management, how they integrate theory and practice, how they work with other disciplines and so on. However, within the scope of this book computing projects are the primary concern and, as such, the Society's requirements for exemption from the Professional Project are presented.

8.4.2 Exemption from the Professional Project

The Society requires that in order for projects to meet the requirements for exemption they 'must be passed at the first attempt to gain the award, with no condonement and no referral'. The Society also identifies what your project's report should contain. The following list is taken directly from the BCS guidelines (1998: 10):

- 'elucidation of the problem and the objectives of the project';
- 'an in-depth investigation of the context/literature/other similar products';
- 'a clear description of the stages of the life cycle undertaken';
- 'a description of the use of appropriate tools to support the development process';
- 'a description of how verification and validation were applied at all stages';
- 'a critical appraisal of the project, indicating the rationale for design/implementation decisions, lessons learnt ... and evaluation (with hindsight) of the product and the process of its production';
- 'in the case of group projects, a clear indication of the part played by the author in achieving the goals of the project';
- references;
- 'appendices – technical documentation'.

The guidelines go on to list the criteria projects are required to meet to give exemption from Part I and Part II levels. At Part I the specific criteria include:

- 'the project should be of the order of 100 hours of work by each individual';
- 'the task should be to develop an IT solution to a practical problem';
- 'it should emphasise design and be documented by a technical report';
- 'the project work may be part of a group project, but the technical report and assessment must clearly identify each individual's personal contribution'.

At Part II the specific criteria include:

- 'it involves at least 150 hours of individual student effort';
- 'the task should be to develop an IT solution to a practical problem';
- 'it exhibits a structured approach to information systems practice';
- 'the product exhibits the attributes of quality, reliability, timeliness and maintainability';
- 'it must involve the production of a professional report';
- 'it must lead to a description of the process and of the product'.

The BCS documentation goes on to discuss, in more detail, requirements for projects to attain CEng and IEng accreditation. For these types of accreditation you must complete both an individual and a group project. While the criteria outlined above tend to emphasise the practical nature of projects, the individual project in this case can be either research or practically based. While the report for a practical-based project in this case should include the same components as for BCS exemption listed earlier, individual research project reports should contain in addition:

- 'a clear description of the research method used';
- 'a description of the outcome of the research'.

While the BCS maintains high standards and requirements for membership, there are many excellent projects undertaken within computer departments in universities that would not match the Society's criteria for exemption and/or accreditation. However, if you are intending to become a member of the BCS it is as well to check the level of exemption your institution holds and check that your project falls within the criteria presented here.

For more information about the BCS, and more detail on membership and exemption and accreditation, you can contact the Society directly at:

The British Computer Society
1 Sanford Street
Swindon
SN1 1HJ
UK

In addition, many academic computer departments contain a BCS 'representative' and many of your department's staff may well be members. You should ask your supervisor and other members of staff if you want to know more.

8.5 The future

8.5.1 *Your new skills*

This section discusses briefly how you will be able to apply the skills you have learnt from your project in the future. As an undergraduate you might find yourself moving on into industry or staying on within the academic community to pursue your studies further; for example, for an MPhil or PhD. As a postgraduate you may wish to remain in academia as a lecturer, a research assistant or fellow, or you too might decide to move into industry. The following points relate to a number of skills that you should have developed during the course of your project, whether at undergraduate or postgraduate level.

- *Independence*. One of the objectives of your project was to develop your skills as an independent worker. Quite often institutions refer to student projects as *Independent Studies*, which emphasises this point. Being able to work on your own without detailed supervision is certainly a skill worth cultivating and it should be one of the skills you developed during the course of your project.

  Industry expects independence from graduates, and postgraduate research degrees will require this skill as a matter of course. Be prepared to show initiative and independent thinking in your chosen career and be able to take charge of situations rather than having to be told what to do and be directed all the time.
- *Thinking*. Your project should also have taught you how to think about things more critically and in a deeper way. Independent thought and ideas represent a maturity of understanding that does not develop from merely attending lectures and tutorials. Your project should have furnished you with these kinds of skills. Once again, being able to look at things in new ways, showing deeper understanding and imagination, are skills that postgraduates are expected to have.
- *Learning*. Your project should also have taught you how to learn. As part of your project you should have had to learn new skills, new ways of looking at things and new ways of thinking. This 'learning' would not come from lectures and tutorials but from your own independent research and study. You have, therefore, understood and developed the skill of independent learning – a skill that will be useful both in industry and postgraduate work.

In addition, your project may also have provided you with an underpinning theoretical grounding in a number of areas rather than a specific technical skill. This is important as it means you can often develop and learn new skills more quickly from this firm base than you could otherwise have done by merely learning a particular tool, language or technique. For example, although you might not be able to program in a particular programming language, your underpinning theory of languages will mean that you can learn a new language very quickly. You are thus more flexible and adaptable to change than you would otherwise be with a purely technical background.

- *Technical skills*. You might also have picked up some technical skills during the course of your project. You may have learnt how to use a particular software package or apply particular analysis and design methods. While you may never use these particular technical skills again, they can provide you with a basis on which to learn similar techniques and tools in the future and they also help to bolster your CV!
- *Communication skills*. Both written and verbal communication skills are a vital part of any degree project. Improving your skills in these areas will certainly be useful, whether you go into industry or continue with postgraduate work. Verbal communication skills will be useful in industry as you will have to liaise with all kinds of people – managers, customers and clients, your own staff, consultants and so on. You might also be expected to give presentations and demonstrations and will certainly be expected to produce reports that must be clear and concise.

  At postgraduate level you will encounter many new people and situations that require both your written and verbal communication skills. You might have to attend conferences or give seminars. You may be required to do some teaching or support tutorials and laboratory sessions. You will certainly have to produce written reports, transfer documents, articles and, ultimately, a thesis.

8.5.2 **Your new job**

While the above issues represent developments to your own portfolio of skills, this section looks briefly at how things might be done differently in your new career.

- *Industry*. If you go to work in industry for the first time it can be quite a culture shock. Where, in the past, you might have looked at things from a purely academic viewpoint because they interested you, within industry your primary concern will be *cost*. Work you do and projects you undertake will only be performed if they are financially viable. The

software you produce must do what it is supposed to do and what was asked for – there will be little need to justify it or place it within a wider context. You will also feel more pressure to complete work on time. Where your project was your own responsibility and you were the only one who would suffer if it was handed in late, in industry many more people will be relying on you to get the job done.

- *Higher degrees.* If you are moving from an undergraduate qualification to a postgraduate course – an MSc, MPhil or PhD – you will have to adapt your way of thinking to some extent. All specialist MScs and conversion MScs will contain a project as a significant part of their assessment. MPhils, on the other hand, are represented entirely by a research project. In both of these cases your depth of understanding and critical evaluation will have to be far more mature than at undergraduate level.

  The nature of the PhD is also very much different to an undergraduate project. It will need absolute justification and contextualisation, and it will certainly have to make a contribution to knowledge. These days, timing is also more critical. Departments are penalised by funding councils if you take longer than you should to complete your PhD so pressure will be on you from other sources, not just yourself, to complete on time. You might also need to diversify your work into articles and papers for publication. As mentioned earlier, you might also have to do some teaching or help out with tutorials. An excellent book that can help you with the transition from a first degree to a PhD is Phillips and Pugh (1994), which provides some interesting information on doing a PhD.

8.6 Summary

- Although you have finished your project there are still ways in which you can continue your work further in the future: seeking funding for further research, developing commercial software from your project, seeking patents and copyright on the material you have produced, and publishing your work in academic journals.
- Your degree course and project may provide you with exemption and accreditation for membership of the British Computer Society and Engineering Council. Your own department will be able to advise you on this.
- You should have learnt a number of skills from your project that will come in useful in the future – either for a job in industry or further academic work: independence, the ability to 'think', learning skills, technical skills and communication skills.

8.7 Exercises

1. Think about how you could develop your project further in the future.
2. Find out if your course is exempt and accredited by the BCS and, if so, to what extent.
3. Write down what you have learnt by doing your project. How have you changed and developed as a result?

Bibliography

Allison, B., O'Sullivan, T., Owen, A., Rice, J., Rotherwell, A. and Saunders, C. (1996) *Research Skills for Students*, Kogan Page, London.

Bainbridge, D. (1995) *Intellectual Property*, 3rd Edition, Pitman, London.

Barnes, M. (1989) *Have Project, Will Manage*, BBC2.

Barrass, R. (1978) *Scientists Must Write: A Guide to Better Writing for Scientists, Engineers and Students*, Chapman & Hall, London.

BCS (1998) *Guidelines on Course Exemption & Accreditation*, British Computer Society, Swindon.

Belbin, M. (1993) *Team Roles at Work*, Butterworth-Heinemann, Oxford.

Bell, J. (1993) *Doing Your Research Project*, 2nd Edition, Open University Press, Buckingham.

Blaxter, L., Hughes, C. and Tight, M. (1996) *How to Research*, Open University Press, Buckingham.

Bliss, E.C. (1976) *Getting Things Done*, Futura, London.

Boehm, B.W. (1981) *Software Engineering Economics*, Prentice Hall, Englewood Cliffs, New Jersey.

Borg, W.R. and Gall, M.D. (1989) *Educational Research: An Introduction*, 5th Edition, Longman, New York.

Burcham, W.E. and Rutherford, R.J.D. (eds) (1987) *Writing Applications for Research Grants*, Educational Development Advisory Committee, Occasional Publication No. 3, University of Birmingham, UK.

Burton, C. and Michael, N. (1992) *A Practical Guide to Project Management*, Kogan Page, London.

Campbell, D. and Campbell, M. (1995) *The Student's Guide to Doing Research on the Internet*, Addison-Wesley, Wokingham.

Campbell, J.P. (1990) *Speak for Yourself: A Practical Guide to Giving Successful Presentations, Speeches and Talks*, BBC Books, London.

Collier, J.H. (ed.) (1997) *Scientific and Technical Communication*, Sage, London.

Cornford, T. and Smithson, S. (1996) *Project Research in Information Systems: A Student's Guide*, Macmillan, London.

Creme, P. and Lea, M.R. (1997) *Writing at University: A Guide for Students*, Open University Press, Buckingham.

Cryer, P. (1996) *The Research Student's Guide to Success*, Open University Press, Buckingham.

Czaja, R. and Blair, J. (1996) *Designing Surveys: A Guide to Decisions and Procedures*, Sage, London.