



Department of Computer and Information Sciences

PGT Dissertation Handbook

Academic Year 2019/2020

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1. Introduction

Students who progress to the MSc project are required to complete a dissertation of around 20,000 words (+/- 10%) on a topic of their own choice, which has been approved by their proposed supervisor.

Dissertations embody a period of individual research and, within the time-scale available, should contain an element of original work. Originality may be expressed in various ways: a small-scale field study, a survey, development of a computer-based system, or an original analysis/critique of the literature (see later section on dissertation types).

The following guidelines deal with the general requirements for such dissertations including the style and layout of dissertations, which have to conform to certain standards in order to be acceptable to the Department. The requirements for specific types of dissertation will have been reviewed in the Research Methods class.

2. Time Scale

Students will be advised following the May Board of Examiners (normally the first week of June) as to whether they can proceed to the MSc project and, if so, will then have their supervisor confirmed. The dissertation submission date will normally be set for mid-August (you will be advised of the specific date by the course directorate and/or your supervisor). If a student misses the August deadline the earliest point at which their dissertation will be considered will be the May Exam Board of the following year. Extension requests will be considered as for all other courses but extensions may result in the dissertation being considered for later exam boards.

3. Progress

University Regulations on postgraduate courses state that students are expected to be in attendance for the duration of this part of their course (refer to Section 8 of University procedures and guideline: postgraduate instructional programmes for information on the roles of the student and the supervisor).

You should maintain regular contact with your supervisor, and keep him or her informed of progress. This will usually be achieved by submitting completed chapters, summaries of work done, etc., and will also ensure that your research does not lose its focus; do not disappear for three months, and then return with 20,000 words, since it is unlikely that this would be an acceptable dissertation, nor could it be assessed in time for consideration by the Board of Examiners.

You may need to go away for visits, etc., in connection with your dissertation, but absence for any other reason (other than documented medical grounds or significant change in personal circumstances) cannot be used as the basis of a request for continuation of studies.

4. Ethics

The purpose of the Departmental and University Ethics Committees is to ensure that any investigations (regardless of subject domain) carried out by staff, or students that use human beings as participants are known to conform to the standards set by the professional bodies. These standards are aimed at ensuring that the rights, safety, and wellbeing of the participants is considered at all times.

4.1 Contact

The contact for any information related to ethical approval of studies is Dr Marc Roper for undergraduate, Dr Lisa McCann for research students, and Professor Ian Ruthven for postgraduate instructional students.

4.2 What you need to do

It is important to realise that any investigation that involves human beings as participants - even something as apparently harmless as a questionnaire or simple user study being undertaken as part of a project or your research - has to be granted ethical approval. To gain this approval you need to provide a protocol describing how you plan to conduct your study via the Departmental Ethics Approval system at:

<https://local.cis.strath.ac.uk/local/ethics/index.php>

The protocol will be expected to cover the following points:

- How participants will be recruited (i.e. how you will obtain volunteers).
- How participants' consent will be obtained and demonstrated (this needs to be auditable).
- What participants will be told about the conduct of the research (i.e. they need to be briefed to be able to make an informed decision about whether to participate).
- What participants will be expected to do (in broad terms - see the point about content below). Please note that any participant must be able to freely withdraw from the study at any point (if they begin to feel stressed for example) and must not feel under any pressure or obligation to complete the study, answer any particular question, or undertake any particular task.
- How data will be stored (i.e. how the security of analogue and digital data will be maintained).
- How data will be processed (e.g. analyzed, reported, visualized, integrated with other data, etc., all of which must adhere to the Data Protection Act and take participant confidentiality into consideration).
- How and when data will be disposed of (i.e. comprehensive and secure destruction).

These points cover most studies carried out within the department, but you should read the extract below from Appendix 2 of from the University's Code of Practice on Investigations on Human Beings to make sure that there are not any other issues you should be considering. Note that for more substantial or unusual projects additional information may be required and closer reading of the full Code of Practice (available from the University Ethics Committee page) and discussions with the relevant departmental contact.

The Ethics Committee does not comment on the appropriateness of methods only the ethical issues arising from the implementation of research methods. The appropriateness and correctness of your research methods is something that you need to discuss with your supervisor.

The protocol should be submitted to the relevant departmental contact well in advance of any planned study. Requests are normally processed within one working week, but may take longer than this for more complex studies.

You will be asked to declare whether ethics approval has been approved when you submit your dissertation, and any research which does not conform to Departmental and/or University requirements may be rejected by the Board of Examiners. Retrospective approval for ethics is not acceptable; you must obtain this in advance of carrying out any data collection etc., which involves humans.

5. Dissertation types

There are five types of dissertation, which students can undertake each of which utilizes a different weighting for the key criteria used to mark the dissertations.

Table 1. Dissertation Types

Dissertation type	1	2	3	4	5
Criterion	Weighting	Weighting	Weighting	Weighting	Weighting
Introduction and rationale	5%	5%	5%	5%	5%
Literature review	15%	15%	15%	15%	20%
Methodology	10%	25%	20%	30%	30%
Analysis	45%	30%	35% *	25%	20%
Conclusions and recommendations	15%	15%	15%	15%	15%
Structure, presentation and referencing	10%	10%	10%	10%	10%

* Including any systems documentation.

1. An extensive literature survey, i.e. desk based research exploring issues, analysing and comparing alternative approaches to addressing these issues, and forming recommendations and conclusions based on this analysis.
2. Case study based, i.e. identifying operational examples of how different approaches, solutions, methodologies, etc., have been applied, assessing the relative strengths and weaknesses of these approaches, and forming conclusions and recommendations based on this analysis.
3. Application based, i.e. analysing, specifying, building and evaluating a prototype application or demonstrator, and forming recommendations and conclusions on the relative merits of the technologies involved and the methodologies used.
4. Evidence- based, i.e. investigating opinion regarding a systems issue using a suitable data collection method, analysing the data collected, and forming recommendations and conclusions based on this analysis.
5. Experimental, i.e. designing an experiment and associated software to test the performance of a system or system component(s), analysing the data collected, and forming recommendations and conclusions based on this analysis.

Note that students taking the MSc Advanced Computer Science, MSc Advanced Computer Science with Big Data, MSc Advanced Software Engineering, must undertake a Type 3 (application) or Type 5 (experimental) dissertation. If undertaking a Type 5 dissertation then the dissertation should still contain software development. This is to comply with BCS accreditation. Students taking the MSc Information Management or MSc Digital Health Systems courses must choose from Type 2 (case

study), Type 3 (application) or Type 5 (experimental). If they choose Type 3 or Type then there must be some element of software development and if they choose Type 2 then there must be a focus on IT systems with a named institution. Please see Appendix 6 for further details on each project type.

6. Submission

The final bound copies of the dissertation should be submitted by the 17th August 2020, for consideration by the Board of Examiners. Two printed bound copies must be submitted by 20th August 2020. You do not need to submit your bound copies in person, they may be submitted on your behalf by a colleague or friend.

In addition, the dissertation should be submitted through MyPlace, the electronic version will be automatically submitted to TurnItIn.

The copies should be bound, preferably with metal spiral binding and plastic covers (“Wire- O binding” from the Print Unit), with the title, your name and year clearly stated on the front cover. The Print Unit is located in the Curran Building:

Print Services ([map](#))
Room 264
Curran Building
100 Cathedral Street
Glasgow G4 0NS
Opening Hours: Mon - Fri, 9.30am - 4.30pm
Tel: 0141 548 2829
Email: print.enquiries@strath.ac.uk
<http://www.strath.ac.uk/printservices/>

All dissertations will be read by a second member of staff and both your supervisor and this second reader will prepare a report and agree a mark for your dissertation for consideration by the Board of Examiners. In the event that a mark cannot be agreed the dissertation will be marked by a third member of staff and the Director of Postgraduate Instructional Courses will mediate to arrive at a final mark. Dissertations that are submitted after the deadline will normally be referred to the May, or later, Board of Examiners. If the Board of Examiners recommends the award of MSc, graduation will take place in November (you should register for graduation as soon as possible after knowing that you are eligible to progress to the MSc project, if you wish to avoid paying a late fee). Information on graduation, including enrolment forms and gown hire can be found at: <http://www.strath.ac.uk/graduation/>.

The Dissertation class follows University policy on extensions. Failure to submit by the August deadline will result in a failed attempt and you will be given a second attempt with a deadline in December.

If you fail to maintain regular contact with your supervisor, or fail to meet the deadlines set by the Department, the Board of Examiners can recommend to Senate via the Board of Study that you be withdrawn from the MSc programme and transferred to the Diploma course (in which event, the Diploma would be awarded immediately, since all requirements will have been met).

7. Plagiarism

The University regards academic dishonesty as a serious offence. Allegations of academic dishonesty will be fairly assessed and appropriate action will then be taken. An allegation that has

been dismissed as a disciplinary offence may still incur an academic penalty for poor scholarship. A record will be kept of any formal allegations and the outcome of their assessment. The University Calendar (Regulation 5.2: Offences Related to Academic Dishonesty) provides details of the procedures to be followed and penalties, which may arise in cases of academic dishonesty.

Copying material from other authors without acknowledging their work, and failing to clearly identify quotations and other material from original sources represents poor scholarship and is not consistent with the aim of demonstrating understanding. When you take material from a book, an article or web site, you should consider it, and fashion it, in order to support your argument or to highlight a key theme or approach. You may use quotations, facts, ideas, etc., but they must be related to your work and must be attributed. Copying material verbatim or copying significant portions of material with only minor alterations both count as plagiarism.

Where plagiarism occurs, a formal warning will be given and the Department, in assessing the merit of a dissertation, may decide that the extent of plagiarism is such that the dissertation contains nothing of the student's own effort and therefore attracts a mark of zero. The case may also be referred to the Senate Discipline Committee. In less extreme cases the plagiarized sections will be set aside and the dissertation marked only on those parts, which do follow normal conventions. When you submit the dissertation, you will be required to sign a declaration that it embodies your own work, that it has been composed by yourself, and that you have made due acknowledgement to the works of others.

8. Style and Layout

8.1 Font

Submissions should use an 11 or 12 point font, 1.5 line spacing and have either indented paragraphs, or paragraphs separated by a single line or equivalent spacing. Leave a good margin all round. Use a font that is clear and easy on the eye (e.g. sans-serif fonts such as Arial, Calibri and Verdana), and avoid exotic fonts such as those that represent handwriting.

8.2 Length of Dissertation

Dissertations should be approximately 20,000 words (+/- 10%) in length.

8.3 Structure

Dissertations should consist of the following parts, in the order given:

Title page	see example below
Declaration	signed and dated, see example below
Abstract	see advice below
Acknowledgements	see advice below
Table of contents	see example below
List of illustrations	see advice below
Dissertation proper	see Table 1 for marking criteria, and advice below
References	see advice below
Appendices	if appropriate

Exceptionally, for Type 3 (application) and possibly Type 5 projects (experimental), where there is also an application component to consider, a lower word count of no less than 15,000 words may be acceptable; however, this must be discussed and agreed with your supervisor prior to submission.

8.4 Abstract

The abstract is a short (up to one page) summary of the dissertation, its conclusions, findings, etc. It should not be a chapter by chapter description. An example of an abstract is attached.

8.5 Acknowledgements

It is appropriate to acknowledge any special assistance received in the course of preparing your dissertation, particularly if assistance came from outside organisations or individuals, but acknowledgements should be kept to the minimum necessary.

8.6 Dissertation proper

It is anticipated that most dissertations will contain the following chapters:

Introduction

Literature review

Research methods

Analysis

Recommendations and conclusions

Guidance on the content of these chapters will have been provided in the Research Methods class, and copies of slides will have been posted to MyPlace. Chapters may be subdivided into sections and sub-sections, but should not normally be subdivided any further (e.g. Chapter 2, Section 2.3, Sub-Section 2.3.3).

8.7 References

References should be made to any quotations given in the work, and to any concepts, ideas, facts, data, etc., which you derive from the work of others, whether in the form of quotation or not. References in the text should follow the guidelines in the student handbook (i.e. Harvard style). References which do not conform to an acceptable standard may need to be resubmitted with the necessary corrections and, as this could delay your graduation, you should get into the habit of citing in this way from the start. There are many online guides that you can consult if you need advice on referencing specific types of sources.

Provide details of the author(s), date, in brackets at the point of citation, with the page number if the reference is to a monograph, e.g.:

The call for a free flow of information between nations is laudable, but in reality the flow is often dictated or controlled by the most wealthy countries and commercial organisations (Usher, 2006, p.52)

or:

As Usher (2006, p.52) has pointed out, the call for a free flow of information between nations is laudable, but in reality the flow is often dictated or controlled by the most wealthy countries and commercial organisations.

Both citation styles are acceptable, but choose one and be consistent in its application. You should provide a single alphabetically ordered list of works consulted or cited, with inclusive page numbers for articles, etc.

8.8 Quotations

Short quotations (up to 2 lines) should be included in the text, in double quote marks. Longer

quotations should be placed as a separate paragraph, without quote marks, and indented, e.g.:

Short quotation

Drybrough (2002) suggests that "merely documenting procedures is insufficient; you must also have proof that you do what you say."

Long quotation

In discussing the relationship between society and information technologies, Hamelink has pointed out that:

The question arises whether the historical process in which informatisation evolves from mechanisation implies fundamental changes in the social structures in which it takes place. To answer this, it is helpful to go back to that earlier phase in history which is commonly referred to as the industrial revolution (Hamelink, 1999, p.172).

In the case of long quotations, the reference should always be placed in brackets at the end of the quotation.

8.9 Page Numbering

Preliminary pages should be numbered in Roman numerals. Arabic numbering should begin on the first page of the dissertation proper, i.e. the Introduction. Page numbers should be placed at the bottom centre of the page.

8.10 Figures, illustrations, etc.

Any illustrations, figures, charts or diagrams should be placed in the text as close as possible to the first point at which they are mentioned. They should be drawn clearly and each type of illustration should be numbered consecutively throughout the dissertation, e.g. Figure 1.1 - Figure 10.3, Table 1.1 - Table 6.4. Try to ensure, where possible, that illustrations and tables fit onto one page, and take care that they do not run over from the bottom of a page to the top of the next. The source of illustrations (if taken from other works) should be given under the illustration, in the same style as references. Exceptionally, a large number of illustrations, each of which occupies a page, can be gathered together into an appendix at the end of the dissertation. They should still be numbered consecutively, and the appendix should also be numbered.

Appendix 1 - Title Page

THE ORGANISATIONAL IMPACT OF INFORMATION TECHNOLOGY:
EFFECTS ON THE QUALITY OF WORKLIFE

HORACE BROON

This dissertation was submitted in part fulfilment of requirements for the degree of MSc
Information and Library Studies

DEPT. OF COMPUTER AND INFORMATION SCIENCES
UNIVERSITY OF STRATHCLYDE

SEPTEMBER 2012

Appendix 3 – Abstract

ABSTRACT

In acknowledgement of the fact that people often experience a change in work values where new technology is concerned, this research examines the effects that IT based systems have had upon users' feelings of job satisfaction. The organisation forming the context for the research is JLM whose Information Services Section at Harding, in Cumbria, has recently introduced two very different IT based systems.

The aim of the research is to make a study of work values at both an organisational and individual level, to assess what it is that people expect to gain from satisfying work and to consider how these values alter, if at all, with the introduction of new technology. The discussion examines the importance of integrating social organisational policies with technical policies in the management of future technology.

It was discovered that a significant number of employees did experience an increase in job satisfaction following the introduction of the systems concerned. In some cases this was directly related to use of the systems, in others to the resultant change in the nature of the work and its requirements of the individual. The increase in job satisfaction is attributed to the existence or fulfilment of certain work values and is found to occur most frequently where a certain number of employees' work values exist or are enhanced by the nature of the work. Thus technology, by bringing about change in the organisational social structure, is able to bring about change in the quality of worklife.

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Appendix 5 – Paragraph Layout

A5.1 Indented format

CHAPTER 1: EXPERT SYSTEMS: AN OVERVIEW

1.1 Introduction

The last few years have witnessed a dramatic growth of interest in the applications of expert systems (ES) across a wide spectrum of disciplines and professions...

Expert systems have risen to prominence as a result of four major inter-related factors...

1.1.1 ES application areas

Expert systems have been applied in a wide range of areas in many subjects and disciplines...

A5.2 Block format

CHAPTER 1: EXPERT SYSTEMS: AN OVERVIEW

1.1 Introduction

The last few years have witnessed a dramatic growth of interest in the applications of expert systems (ES) across a wide spectrum of disciplines and professions...

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Appendix 6 Types of Dissertation

This document provides a guide to the five dissertation types available for the MSc dissertation stage of your degree. The five dissertation types are (1) extended literature review; (2) case studies; (3) applications; (4) evidence-based and (5) experiment. Each dissertation type is expected to provide an introduction, literature review, methodology, findings and recommendations/conclusions sections and has its own marking scheme (see end of this document) which allocate different marks to these components.

Students on MSc Information and Library Studies may choose any project type, students on MSc Digital Health Systems and MSc Information Management can choose from Types 3 or 5 but their projects must contain some component of software development. Students on these courses may also do a Type 2 project but the project must have a focus on IT systems within a named organisation with which the student will work closely during the dissertation. Students on MSc Advanced Computer Science and MSc Advanced Software Engineering, must choose either from Types 3 or 5, and they contain an element of software construction. This restriction is to adhere to the British Computer Society accreditation requirements for your degree course.

Extended literature reviews

All dissertations require a literature review which provides evidence of independent reading. This informs you as a researcher and forms the theoretical basis for your work. It also guides the direction of your research and may provide secondary data, e.g. for discourse analyses. The extended literature review requires greater depth of material and greater consideration of the material. It is not simply a summary of available literature but should present a novel interpretation of the literature based on your insight and reading.

Key questions to ask in an extended literature review are:

- What is already known about this topic?
- What concepts and theories are important?
- What research methods and approaches have been adopted?
- Are there any significant controversies?
- Are there any inconsistencies in findings?
- Are there any unanswered research questions?

Acquiring the literature

Most searches are unsophisticated and tend to be recall oriented, trying to obtain all the literature rather than focusing on the most useful literature on a topic. A second weakness in extended literature reviews can be simply collecting literature and then trying to 'force' a narrative on the literature collected. Don't just rely on Google and other search engines. Do look at specialist tools such as Google Scholar and use [subject specific databases](http://www.strath.ac.uk/library/eresources/) (<http://www.strath.ac.uk/library/eresources/> and <http://guides.lib.strath.ac.uk/cis>).

Organising the literature

You need to develop a clear and compelling framework around which your analysis is structured. The simplest approach is to use key themes related to the research questions. A chronological approach may also be useful in some cases to show how an area has developed over time. Initial literature searches may focus on gathering review material and other documents that help orientate you in the topic before you start reading in detail.

Do keep notes on the material you read as extended literature reviews need to show the source material has been critiqued. Questions to ask are:

- What are the strengths and deficiencies of the material you are reading?
- Are there any errors or significant limitations?
- What are the relationships with other work?
- What are the levels of consensus and coherence within the papers you are reading – are the papers tackling similar, identical or completely different research questions?

Do also keep records on what sources you used and how you obtained these. This record is important in writing your methodology section.

- What sources did you use –databases, libraries, agencies, web-sites, informal sources, grey literature?
- Why did you use these sources?
- What search strategies did you use?
- What criteria did you apply for inclusion and exclusion of material?
- How useful, reliable, etc., were the sources?

Types of literature review

There are two major types of extended literature review: **narrative** and **systematic**.

Narrative literature reviews are interpretative and synthetic in that they describe a process of discovery to build a picture of an area of knowledge based on detailed reading and understanding of appropriate literature. They lead to better understanding of a field of study rather than necessarily providing clear answers to research questions. They can be seen as a form of meta-ethnography in that they describe how researchers have viewed, tackled and answered research questions as expressed through the research literature. Such reviews are common in social sciences and qualitative research.

A common critique aimed at such reviews is that they are opportunistic and selective, that is researchers pick and choose which literature fits their existing perceptions and therefore the reviews are open to bias on the part of the researcher. Any review must be objective and deal with the literature as it appears, noting contradictions in the literature and honestly reflecting the current state of knowledge rather than trying to force a personal opinion on the literature. However, personal interpretation, the form of new insights, is very valuable and characterizes a good literature review.

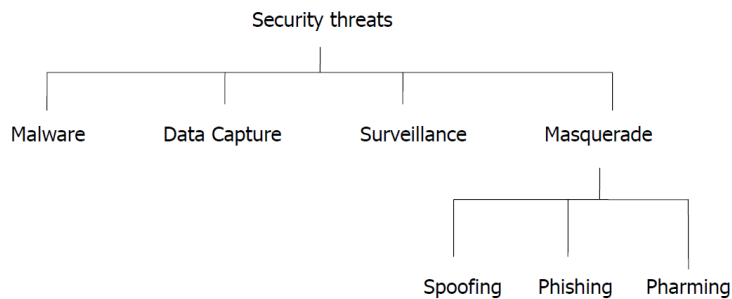
Critiquing literature is very important. Even though work is published in peer-reviewed form does not mean it is correct or valuable. However, we should be fair when critiquing others' research; knowledge is always in a state of flux and earlier researchers did not have the benefit of later researchers' insights and knowledge.

Systematic literature reviews are usually positivist in approach: trying to build patterns based on evidence and are, hence, meta-analytic. They are more common in natural sciences to provide a scientific and transparent process based on summarizing (usually large) numbers of studies on a common theme or research question. Typically, systematic literature reviews lead to a specific addition to knowledge in a field and are more suited to answering specific research questions rather than general ones, e.g. which approaches search system evaluation are best, do men and women use technology differently, what factors influence use of public libraries, and are useful for forming evidence-based conclusions to such questions.

A common critique of this type of review is that they often claim to be comprehensive but the parameters are chosen by the researcher, e.g. reviewing children's success in using search systems needs a definition of what constitutes being a child and what counts as a search system, both decisions are made by the reviewer and different choices may lead to different results.

Analysis

There are different ways to analyse the literature and present your findings to the reader. One approach is to provide a **taxonomic** description (as shown below) where high-level concepts, such as security threats, are broken down into sub-concepts, such as malware, which can be described in separate sections. Such an approach can be useful in leading the reader from general concepts through to more specific concepts or implementations.



A second approach is a **matrix** approach where concepts, such as freedom of information, data protection and intellectual property, are compared against major variables, such as implementation in different countries. This leads to a compare and contrast approach to the literature; highlighting major differences between the variables for each concept.

National Approaches to Information Legislation

	US	UK	China
Freedom of Information			
Data Protection			
Intellectual Property			

A second example is shown below where different media are compared against implementations of search systems to help retrieve these media.

Information Retrieval from Different Media Types

	Statistical	Probabilistic	Semantic
Text			
Images			
Sound			

A third approach, suitable in particular for comparing studies on a common theme, is the template approach. A **template** describes major variables, such as sample size, relevant to each study and each template provides data on a single study. This approach can also be useful for comparing between studies, identifying missing data in studies and comparing the values for each variable. The templates are a way of organising notes on the studies, the dissertation should still provide a textual analysis of the findings from the templates.

Analysis – Template Approach



Citation	
Sector	
Country	
Sample Size	
Instrument	
Response Rate	
Perceived Advantages	
Perceived Disadvantages	

Documents as evidence

In the literature review the focus is on what people have said about the topic but documents (text and non-text) may be the topic of study themselves. For example the review may be on certain types of documents such as legislation, official document, business documents, emails, blogs or tweets and may concentrate on physical characteristics (e.g. publishing and printing history), digital characteristics (e.g. properties), or content (e.g. how it is said, and what is said). Content itself may focus or consider aspects such as register (context and purpose), voice (passive/active, aggressive/defensive), interaction between document sources (conflict, consensus), rhetoric (metaphor, alliteration), vocabulary (orientation, evolution), consistency (intra- and inter- document), signatures (authorship, tag clouds) or semiotics (symbols, designs).

Summary

Extended literature reviews involve the interpretation of a larger body of literature. The outputs should not just be a summary of what others have said but should provide new insights and perspectives. This may involve content analysis, which can also be applied in surveys and case studies

Case studies

A case is an event or set of events which occur(s) within a specific context, for example:

- Case handling, to deal with claims in an insurance company
- Medical case management, to ensure that there is appropriate diagnosis, treatment and care
- A criminal court case, to bring an accused to, and through, trial

Case-studies are complex and intricate studies which are often location and/or organisation based. They are time-sensitive in that they investigate current, rather than historical, situations which involve a combination of people, processes and behaviours. They may involve quantitative data but typically involve a lot of qualitative data. Case studies are appropriate for in-depth, rich investigations of complex phenomena and this often means investigating fewer samples (cases). However, the small number of cases does not mean the case study is simpler or easier than other types of dissertation.

Here is an example of a **research context** for a case study dissertation

Many enterprises are considering hot-desking as a means of reducing the costs of office space which often lies unused. Technology is seen as key contributor in delivering more flexible working, including home-working and off-site working.

This leads into a **research problem**:

The introduction of hot-desking requires employees to alter working practices and introduces new issues ranging from information security, through staff appraisal, to capacity planning

And subsequent **research questions:**

- To what extent have expected business benefits (as specified in the business case) materialised, and why?
- How do employees view the shift to hot-desking?
- How might the transition to hot-desking be improved?

A literature review on this problem, as with other case studies, needs to consider different viewpoints, possibly including hot-desking literature, remote working literature, organisational change literature, and change management literature. It may also include literature from professional bodies such as the Chartered Institute of Personnel and Development and research institutes such as the Institute of Work Psychology (Sheffield) who as produce official reports on topics such this.

Ethnographic approaches

A common data gathering used in case studies is ethnography. Ethnographic approaches use observation and associated field notes, interviews and associated transcripts, internal documents (business cases, policy statements, employee satisfaction surveys, etc.). Time constraints may lead to more focused studies (micro-ethnography), e.g. how do staff in call centres deal with work problems in an environment of constant interruptions and monitoring?

Observations may be closed (where we are only interested in certain types of behaviour that we know are important) on open (where we observe all possible behaviour). Observations may also be structured we observe certain groups at pre-determined times or unstructured where we place no restrictions on the observations. Observers may be participants in the observation scenario, e.g. acting a librarian in a library observation, or non-participant where the role is purely observational. The observations may also be overt (where it is clear that observation is occurring) or covert (where the observation is hidden from those being observed). These choices must be carefully considered and justified both ethically and in terms of the research being conducted. Consider the four scenarios below:

	Open	Closed
Overt	Queuing Behaviour in a Station	Employee Attitudes to Hot-Desking
Covert	Reactions to Self Service in a Library	Racism amongst Delegates at a Political Conference

In the first situation there is no need to be covert in terms of observation as this will not change behaviour. In general, overt observation is more ethically preferable to covert observation so should be chosen unless there is a good reason to be covert. In this situation there might not be any clear idea of what behaviours may arise in such a situation so open observation is appropriate. In the fourth situation (politics) closed observation is appropriate but also covert observation as attitudes such as these may not be openly displayed in the presence of an outsider.

Situations that are appropriate for open coding are ones where there may be fewer pre-determined behaviours of interest whereas the ones appropriate for closed coding are those where the data of interest (such as attitudes) can be guessed in advanced.

In any ethnographic study we have to ask what types of observation are appropriate, what are practicable (in terms of time, researcher effort and data to be gathered), what is the influence of the participant on the situation (might your presence change the situation being observed and therefore misrepresent reality), and also the influence of the situation on you (some situations are potentially distressing and should be approached with care).

Interviews, surveys and other data gathering techniques may also be employed within case studies.

Data analysis

An in-depth description of a single case study using qualitative analysis may be used to test a well formulated theory, compare a situation over time, look at extremes, look at completely new conditions, compare against previous case studies or describe typical situations. Comparative analysis of two, or possibly three, case studies may also be undertaken in different sectors, cultures or jurisdictions. Analysis of more than three situations moves into the realm of surveys which will be considered later in this guide.

The qualitative techniques used in analysing documents are all applicable: template, matrix, taxonomic or content analysis, but other coding may also be required such as body language, facial expressions, event types, etc.

Case studies may also consider factors such as:

- Finances –identifiable savings; set-up costs; employee savings; insurance
- Technology –security; functionality; licensing; fixed versus moveable devices; telephones
- Information –storage; access; security; privacy
- Operations -capacity planning; bookings; environment; office furniture; hygiene; human factors; personal storage; replacements
- Human resources –supervision; appraisal; health and safety; education and induction; consultation; job descriptions; special needs
- Culture –team building; knowledge transfer; (im)permanence; values; pervasiveness; shared versus personal space

Recommendations

Recommendations can be of different types, e.g.

- Testing, e.g. the extent to which a business theory reflects reality
- Explanatory: an understanding of how consensus, conflict, co-operation, etc., operate in complex situations
- Learning: how to deal with similar situations in the future

Summary

Case studies are complex, detailed investigations which may require a number of methods to be employed. Much of what is analysed is documentary (transcripts, field notes, business documents) and may include observations. Case studies lead to insights and learning rather than general laws but are very valuable in creating understandings of social and business phenomena.

Applications

Applications are written applications, i.e. designed and coded by the researcher. They may make use of existing software components but should have some clear element of original software development. These may be desktop applications, mobile applications or web based applications.

All applications, like other dissertations, have a **research context**, for example

A pressing challenge for museums is how to present museum objects in an intriguing way to engage visitors. With added pressure to compete with the entertainment industry, museums are adapting to incorporate interactive technologies in the museum space. A particular challenge is developing smart museum objects: objects which have digital content embedded and can interact with visitors. These can enhance the visitor experience in numerous ways helping the visitor better understand the object.

which in turn leads to a **research problem**:

This project will develop smart objects for the museum sector. It will, through developing smart objects, investigate what styles of engagement are appropriate for the museum sector and how such objects should be evaluated.

and **research questions**:

- What styles of engagement are appropriate for museum smart objects?
- What technology is suitable is appropriate for such objects?
- How can we make such objects sufficiently robust for repeated use within a typical museum setting?
- How can smart objects best be evaluated?

Literature reviews for dissertation can be based on the peer-reviewed research literature but for very new problems there may be little to guide us. Alternatives are market analyses (what other applications are already available and what is the gap in the market), developer fora such as and product documentation.

An alternative may be also to conduct studies as to learn more about usage requirements such as usability studies or existing studies such as the iPhone-Nielsen Norman Group seminars.

Development models

Each application project needs some form of methodology to guide and document the process of developing a solution. Typical process models include the standard waterfall models, evolutionary prototyping, agile development, etc. The process model should be described and motivated.

Within any process model there are four basic stages: design, build, test, and deploy.

Design

The design phase of an application dissertation should provide a description of: the requirements specification and modelling based on the literature review, going from high-level conceptual design to lower level design diagrams, using a standard notation such as UML. Supporting material, such as class diagrams, can be relegated to Appendices.

The design material should also describe technical requirements, e.g. particular operating systems, necessary for the application.

Build

The build, or implementation, phase should provide descriptions of the development tools and languages used to implement the solution in a level of detail that allows the reader to reproduce the application. It is not necessary to describe each line of code but you should describe in the main body of the report any code that is particularly interesting or challenging to develop. All code should be submitted on a CD with your dissertation at submission time.

Test

The test component should describe unit and systems testing plans and results; user acceptance testing document and results and, where appropriate, performance testing results. Detailed test plans can be presented in appendices with summaries of the results presented in the main body of the report.

Deploy

The final stage in any application is deployment either through a formal route such as AppStore or to a user. This is not necessary for your dissertation but your dissertation should describe how a user can install and run your application, including a user guide in the Appendices.

Evaluation

The test component should describe the testing strategies you used to test the correctness of your system but it is essential to also conduct evaluations on the application to test other characteristics of your solution. There are a range of evaluation approaches including: usability studies and user opinion studies.

Usability studies are systematic observation under controlled conditions where we test how easy an application is to use and to identify common mistakes users may make when operating a system. It is important to remember that it is the systems being tested rather than the users. Good usability tests should involve a sample of the

intended user group but individuals should not be used in multiple tests to avoid learning effects.

Usability studies should provide some form of usage scenario to allow users to use the system in a natural way, e.g. use this mobile phone to phone your best friend. The purpose of the application *may* be provided to the user although do remember that many applications don't come with instructions and users often don't read help instructions.

Studies should have some metrics, e.g. time taken to complete tasks, accuracy, or number of mistakes, that will help decide whether the application is a success. We can gather data through a number of techniques such as log analysis, think-alouds, video, observations or interviews.

User opinion studies gather information on an application. They are similar to surveys in that they gather subjective data but here they gather data on an application that participants are asked to use. In opinion studies we may gather information on functionality, utility, design, aesthetics, emotional response, intended use, speed or how likely participants would be to use/buy the application.

Summary

State-of-the-art technologies may not yet be reflected in academic literature and this dissertation type involves the creation of a new application. In the dissertation it is important that you specify the methods you have used to develop the application, and why you think they are appropriate. Testing and evaluation are also methods and need to be described and justified. As with other dissertation types it is only the dissertation that is assessed so the text is very important in conveying your achievements.

Evidence-based projects

These projects collect and analyse data to answer their research questions. They may take the form of interviews, traditional questionnaire-based data gathering tools, focus groups or analysis of existing data-sets. They cross-sectional studies where researchers are interested in variation across multiple cases. Generally, these studies are based on data collected at a particular point in time for each case. Longitudinal studies are also possible, but rarer, and look at data collected for each case at intervals.

In surveys we are looking mostly at quantifiable data that is based on variables that are non-manipulable, that is variables as they occur naturally rather than manipulating them to see their

effect on other variables. The latter approach is the experiment type of dissertation. What all surveys try to achieve is to look for patterns of association in the data collected to draw conclusions about variables relate to each other.

Here is an example of a **research context** for a survey-based approach:

There are several hundred search engines which cater for generalist to specialist information needs. There are also several meta search engines which combine results obtained by different search engines. Despite the availability of choice most users utilise Google as it is often the default search engine on web pages and has global brand recognition.

Which leads to a **research problem**

It is clear that Google is a search engine of choice but it is less clear why users ignore other, potentially more effective, engines.

and associated **research questions**

- Which search engines do people use?
- What do they use the engines for?
- Why do they use the engines they do?
- What features do users expect a search engine to offer?

A literature review might consider benchmarking literature, search engine evaluation literature and search strategy literature

There are many tools that may be used in a survey to gather data such as questionnaires, structured observations, interviews, and content or statistical analyses.

Questionnaires and interviews

Questionnaires may utilised via the web using tools such as SurveyMonkey, email, telephone, post or face-face meetings. All questionnaires and interviews should be piloted to ensure questions are understandable and to test timings. They should ask essential questions; i.e. those which provide data you will use and should include clear instructions about how to respond and make it clear that a respondent is not required to answer any particular questions. The latter is essential for ethical clearance for any questionnaire.

Good practice includes:

- Developing consistency across questions; consistency creates habitability
- Concentrating primarily on closed questions which are easier to answer and are more likely to be answered
- Leaving room for people to write if using open questions
- Trying to have a logical flow of linked questions
- Aspiring to moral neutrality and balance as 'loaded' or judgemental questions can alienate respondents.
- Thinking carefully about questions which could be construed as overly intrusive
- Thinking carefully about questions for which more than one response is invited
- Thinking about the length of the questionnaire as respondents may get fatigued and stop answering
- Thinking about the ability of respondents to answer the question

- Thinking about leaving demographic information to the end
- Trying to start with less challenging questions to ease respondents into the questionnaire
- Close with a courteous thanks

Poor practice includes:

- Asking very general questions which are difficult and time-consuming to answer
- Asking long questions which are time-consuming to read
- Asking complex questions which are difficult to understand
- Asking double-barrelled or conjunctive questions which can be difficult to answer, e.g. did you find Google useful and efficient?
- Asking leading questions, e.g. do you find Google useful?
- Asking questions that include negatives as these can be more difficult to understand correctly
- Asking questions with ambiguous terms
- Using acronyms or specialist terms which might not be familiar to respondents
- Using imbalanced scales
- Using too many Y/N questions as this can lead to respondent fatigue
- Using overlapping categories

Sometimes ranking may be a better way of dealing with multiple response questions: so rather than asking 'Which of the following search engines do you use (tick all that apply)', ask 'Rank the following search engines in terms of frequency of use'. This gives you two pieces of information for one question, both of which can be coded.

Summary

Evidence-based approaches work with collected data from people, either in the form of answers to given questions or analysis of data created by people for other tasks, e.g. social media. Framing good questions is a fundamental component of all evidence-based techniques as is testing and re-testing the data collection. Questionnaires, which are often completed at a distance and not in the presence of the researcher, also require thoughtful layout and design. As surveys usually cannot be repeated they require very clear objectives translated into a clear data gathering tool where the analysis method is known in advance.

Experiments

Experiments involve variables which are manipulated under controlled settings to investigate how the change in one variable, e.g. different system, age group, tasks, affects other variables, e.g. search success, information literacy, user satisfaction. Experiments rely heavily on quantitative data gathering and analysis and preferably involve hypothesis testing.

Four Key Criteria in Quantitative Research Design

There are four main criteria to consider in the design of any experiment:

1. **Replicability**–can the method be repeated (i.e. is the method described comprehensively and unambiguously)? In general, we should be able to provide a detailed specification of our search strategy, our survey method, our testing methods, etc.
2. **Reliability** –are the results of the study repeatable (i.e. if you apply the method again in the same context will you get the same results)? Here the same results does not mean exactly the same numbers - we cannot use the same people as their belief and knowledge states will have altered – but we should expect the same general results. That is, if our first experiments shows that one system is better than another then repeating the study with another sample from our population should also show the same system is better. If not, then we might have problems with our experiment.
3. **Validity** –do the results produced by the method have integrity (i.e. are the research instruments well designed and appropriate)? In general yes: we should be able to produce robust and effective research methods which are open to scrutiny. However, good methods may be poorly applied so we may wish to convince our audience, or ourselves, that the findings are “credible”
4. **Generalisability**–do the results have external validity (i.e. can they be applied to contexts other than that in which they were obtained)? In many cases no: our samples are often non-probabilistic and therefore cannot be claimed to be representative. However we would hope that the results are “transferable”: they may demonstrate trends, patterns, etc., which can be confirmed in other contexts

Here is an example of a **research context** for an experiment:

Indexing the contents of a database improves retrieval speed as the entire table does not have to be scanned for matching data. However performance may be compromised as the indexes have to be recalculated every time a record is added or updated. In addition storage requirements grow as the indexes grow, along with associated backups. Text retrieval increases the problem as redundancy is an essential characteristic of language.

which leads to a **research problem**:

The increase in text-related applications on handheld devices (PDAs, e-book readers, etc.) raises issues about performance and optimisation of applications.

and research questions:

- Which of the following techniques produces the best performance: inverted file, content addressable file store, trigrams, byte substitution?
- How does file size affect performance?

Hypotheses:

- CAFS will be more efficient for databases up to 250MB (~1000 documents), byte substitution for up to 1GB (~4000 documents), while trigrams will be more efficient for larger databases.
- All methods will be more efficient than inverted file for each threshold

In order that there is a fair test and we can cleanly associate any performance differences to database design all tests will have: one device per algorithm, all operate on the same model configured with the same preferences, applications, etc. and we will use the same test collection (of sufficient size), only text will be used and this will be in same format. Further, we will use the same queries run in the same order.

This standard set-up allows a fair comparison between the techniques which can be used to test the two hypothesis.

Summary

Experiment-based dissertations are relatively few in number and are closest to empirical scientific research. However even though few in number they are very valuable in providing precise, statistically tested conclusions to research questions.

Dissertation Types

There are five types of dissertation, with some commonality in terms of methods between them. Your role is to choose the most appropriate methods for your chosen dissertation topic. As the marking scheme vary between dissertation types you will be asked to verify which schema you wish to use when you hand in the dissertation.