MANCHESTER METROPOLITAN
UNIVERSITY
SCHOOL OF COMPUTING, MATHEMATICS
AND DIGITAL TECHNOLOGY

COMPUTING AND DIGITAL TECHNOLOGY
DEGREE SCHEME

PROJECT HANDBOOK

Contents

The Project unit involves a single piece of work; you are required to undertake an substantial original piece of work, specified and executed in conjunction with your supervisor. Your supervisor will be assigned to you, subject to the constraints of work-load balancing, in accordance with your timely-expressed preferences, or, failing this, your degree title. This work will typically involve an element of research and/or software development, making a unique contribution to knowledge. The project is assessed through three separate Elements of Assessment (assignments), the Feasibility Study (5%), the Product (30%) and the Report (65%). Individual assignment briefs will be issued, but it is important to consider the task as a whole, as success in one part relies on success in another.

Project supervision

Undertaking a large project is a challenging and often daunting task which is why students are be assigned a project supervisor who will offer guidance, support and formative feedback during the course of the project. Students should contact their project supervisor no later than the first week in term 1 and arrange a mutually agreeable day and time in which to have weekly project meetings. These project meetings should be 30 minutes in duration and give an opportunity for the student and their supervisor to discuss the project on a one-to-one basis. It is expected that in the first instance, these meetings will be weekly, but as time passes, the student and supervisor may make a decision to meet on a less frequent basis. However, it is important that this is only done with the agreement of the supervisor, and the student and supervisor stay in close contact at all times.

It is vitally important that students make full use of these meetings and the support on offer, not only because it will help greatly in the successful completion of the project, but also because the student's attendance and performance during these meetings contribute towards the final project mark. The project unit is a self-study unit which means that it is the student, not the supervisor, who should be taking the lead on the project. It is appreciated that students may require more guidance at critical times, e.g., during the early stages of the project, which will be provided when necessary by the project supervisor.

In addition to supporting students with their project work, the supervisor has the role of personal tutor to their project students. Some of the time allocated for the project meetings will be spent on personal tutoring matters. It is recognized that on occasion, issues may develop that cannot be solved by the student and supervisor on their own. If this occurs, see the unit leader, Dr Nicholas Costen, without delay. His office is JDE1.49, where his office hours are displayed. If these are not possible, please make an appointment via `n.costen@mmu.ac.uk`.

Chapter 1

Project Elements and Schedule

1.1 Project Components

The work will be described and assessed by your completion of three components:

1. The writing of a Feasibility Study, explaining the project you intend to undertake, and addressing issues concerning scheduling, equipment and ethical and physical risks.

2. The development of the Product, typically a piece of software, a game or immersive environment, or perhaps a scientific investigation or video, worth 30% of the marks.

3. The writing of a Report describing the project and its outcomes, worth 65% of the marks. You will be asked to describe the project n person, via the Showcase event.

The following are short, indicative, descriptions of the characteristics of the components by which the Project is assessed. In each case, longer descriptions will be made available in due course.

- **The Feasibility Study** At the start of the project period, you will agree a project topic with your supervisor. In the majority of cases, this will have been selected from list of topics supplied by your supervisor, but in some cases you may have been allocated a supervisor with a topic being specified, or your interests may have altered since allocation occurred. In the light of advice from the supervisor, you will develop the project description, or verbally agreed idea, which in both cases tend to be generic and indicative in content, into a Feasibility Study. This will specify aims, objectives, methodology, and a

timetable for completion, among other parts. Your project topic is normally pathway-specific and, therefore, the aims and objectives agreed within the Feasibility Study should demonstrate alignment with the aims and learning outcomes that apply to the studied pathway. This will be expressed as one or two aims and objectives of your degree pathway, identified as appropriate to the topic and included in the Feasibility Study. In addition, the Feasibility Study will contain an appropriate and acceptable Research Ethics application for the project, including an appropriate Risk Assessment.

- **The Product** The nature of this will vary, given the topic of the project. In most cases, it will take of the form of a piece of software. This can, for example, be an independent executable, a web-site, database system, mobile "app" or plug-in. Alternatively, the Product can take the form of a scientific investigation of a topic, such as, for example, a User Experience assessment or the exploration of the use of particular machine-learning techniques for a particular problem (in both these cases, the investigation protocols and experimentation, assessment scripts and as far as possible raw data should be submitted). Further, it could be that the project topic involves the development and exploration of some media-production method or technique. In cases such as this, the Product would usually be a piece of audio-visual work demonstrating the particular features considered in the project. In whatever form, in all cases, the Project must include distinct Product, the design and development of which are the centre-piece of the whole Project.

- **The Report** This is a description of the project achievements containing, as a minimum requirement, a discussion of the problem being addressed, a critical review of relevant literature and related work, and a description and critical evaluation of the solution proposed. Normally, a project Report is expected to contain 8,000 to 14,000 words. The Report must have the project's Terms of Reference and signed Ethics Form included with it, as appendices. Failure to do so will be treated as evidence to subvert the University's Research Ethics and Governance regulations and will be treated appropriately. A fuller description of the Report is given later in this document.

  As part of the Report assessment, you will be asked to take part in the Showcase. This is your opportunity to explain your project and its outcomes to your examiners. Subject to normal exigencies, these will be your supervisor and one other academic, chosen to be knowledgeable in the field; note that visitors from outside the University will also be invited to attend the event. The Showcase will be held shortly before submission of the Report, and will involve each student

presenting some "explanatory materials" (this might take the form of an on-screen poster or a small number of slides), and being able to demonstrate the capabilities of the Product. The precise form of the latter will vary with the nature of the Product, but will ideally allow it to be operated. Students should also expect to discuss the project with the examiners.

1.2   Project Schedule and Interim Documents

In addition to the supervision meetings, a series of more general talks will be arranged for students; these will appear in your timetable. These will cover a range of topics including writing your Terms of Reference, constructing a Literature Survey, developing Software Evaluation techniques and more specific discussions of the characteristics of successful projects in different areas of computing. Attendance at these sessions is expected and will be monitored.

The talks will take place in C0.14 at 13:00 on Mondays. The schedule for the talks will be as follows. Note that the Week 0 talk will be on the afternoon of Wednesday 19/09/18:

Week	Starting	Topic	Lecturer
0	17/09/18	Overview of Projects	Nicholas Costen
1	24/09/18	Writing your FS	Nicholas Costen
2	01/10/18	Project Ethics	Nicholas Costen
5	22/10/18	Background Review	Nicholas Costen
6	29/10/18	InfoSkills	Elizabeth Peet
7	05/11/18	Tutor Week	
8	12/11/18	Software Security I	Majdi Owda
9	19/11/18	Software Security II	Mohammed Hammoudeh
		Christmas Vacation	
14	14/01/19	Marking Exercise	Nicholas Costen
15	21/01/19	Software Evaluation	Elaine Duffin
16	28/01/19	Usability Evaluation	Stuart Cunningham
17	04/01/19	Statistical Evaluation	Nicholas Costen
18	11/02/19	Tutor Week	
19	18/02/19	Report Instructions	Nicholas Costen

In order to assist your time-management and to ensure that all aspects of the Project are completed correctly and to the best of your ability, a number of interim documents will be required. Moodle and/or TurnitIn upload pages will be created for each component. Work uploaded there by the following dates will be formatively marked, and written feedback will be

given. The submissions can then be edited in the light of the feedback and, as appropriate, used to form parts of the Report.

The following table sets out the dates and requirements. Note that the deadline is the Friday of each week; the "Monday date" is to give the start of each week for use with work-planning. All assesed items (i.e. Feasiblity Study, Product and Report) must be submitted via Moodle by **23:55** on the dates given **in bold**. Work submitted afterwards will be considered **late**; the regulations currently state that such work has a mark of zero, unless Exceptional Factors or Personal Learning Plan issues apply.

Week	Starting	Requirement	Deadline	Weight
4	15/10/18	Feasibility Study submitted	**19/10/18**	5%
12	10/12/18	Prototype Report uploaded	14/12/18	
18	11/02/19	Product submitted	**22/02/19**	30%
20	25/02/19	Report Outline uploaded	01/03/19	
25	01/04/19	Showcase held	**Specified day**	
25	01/04/19	Report submitted	**05/04/19**	65%

The definitions of these interim documents are as follows (more detail will be given closer to the date):

- The Prototype Report should be approximately 3,000 words and cover the background research of your project. Such questions as the theoretical underpinning of the topic, other previously undertaken solutions to similar problems and techniques and software facilities used should be covered. In addition, it should describe the formal process by which the features, characteristics and software arrangements of your Product have been determined. Typically it will report such actions as a user requirements analysis, a UML and/or storyboard-based software and/or interface design or perhaps a mathematical–statistical algorithm construction procedure. Once completed and considered by your supervisor, it can be used as the basis of equivalent portions of your Report.

- The Report Outline is the hierarchical structure of chapters, sections and sub-sections which you will then proceed to fill in to write out your Report. The aim of the exercise is to allow you to discuss the way the Report will be organised and constructed with your supervisor; you will then, if necessary, be able to adjust the structure to better display the achievements of your project.

Chapter 2

Feasibility Report

2.1 Structure

You must agree with your supervisor, by the deadline set by the project co-ordinator, a Feasibility Study (FS). This is a short document that defines the aim and objectives of your project with a clearly established plan and timetable to achieve those. In addition, it should enclose a completed ethics form and risk assessment (signed by School Health and Safety representative). The text (in addition to the forms) should not exceed 2,000 words or 4 pages.

General guidance on writing project plans are available on Moodle, as well as via project lectures. The following are the recommended sections (and their contents) of your FS:

- Title;

- Course-Specific Learning Outcomes: these are a subset of the learning outcomes particular to your degree course which are addressed by your project (see the next section);

- Project Background: requires a description of the context and the relevance of the problem your project is tackling;

- Aim: should describe in general terms what the project is intended to achieve, what (non-trivial, relevant) problem it aims to solve. For example, a project aim could be to design and implement an algorithm to automate the generation of teaching timetables efficiently and effectively given a set of constraints `C` and an objective function `F`;

- Objectives: list what you intend to do in order to achieve the aim identified in the previous section. These are usually expressed as a break-down of the aim into more specific goals - e.g, survey existing

techniques to automated generation of student classes timetables; perform the analysis and the design of a new algorithm for automated timetabling;

- Problems: it is important that in designing your project, you are aware of any critical stages in the work, at which you may be halted. Clearly considering these will allow you and your supervisor to seek ways of mitigating them;

- Timetable and Deliverables: define what you intend to do and produce on a weekly basis. Naturally, this will include the progress and final reports;

- Required Resources: Note that our School does not guarantee to provide suitable hardware/software to support your project. It is up to you to choose appropriate tools and to ensure that you will have access to them for the duration of your project. Naturally, you are welcome to use any software that is installed on the machines in the laboratories.

  In some situations, it might be possible to order or install specialist hardware/software to support your project - please check it with your supervisor. A number of pieces of additional hardware are available for students to use on a booking system. A list of these items is available on Moodle.

  Alternatively, you may prefer to use your own equipment and software. If you choose the latter, you must ensure that you are able to arrange a demonstration of your product at the end of your project.

- Ethics Forms: An ethics application form is required to be completed to ensure that anyone involved in any kind of project work. This demonstrates that they are both aware of, and are taking appropriate steps to deal with, any ethical issues that the work may raise. The expectation is that, for most projects, there will be no such issues to declare. The type of situations which need to be declared include projects which involve handling confidential or sensitive data, handling personal data (as defined by current data protection legislation, note that this includes videos from which individuals can be identified), and contact with young or vulnerable people.

  You will have to make an application via the University ethics system, *EthOS*. Your supervisor will be prompted to sign your application, validating it. Once this has been done, save the application as a PDF (as the instructions say, do this via the `Print` option) and include it in your Feasibility Study.

  If the completion of the ethics application reveals that a full application is required, see Dr Nicholas Costen as a matter or urgency. A

completed Health and Safety Risk Assessment must be submitted with the application. A range of completed Risk Assessments are available on Moodle; please check with your supervisor that it is appropriate; if not again see Dr Costen.

2.2   Course Learning Outcomes

As part of your Feasibility Study, you must specify a number of course specific learning outcomes to which it relates. These are drawn from the specification of the various different degree pathways which you are all registered on. It is your task to identify which of the learning outcomes of your degree are relevant to the particular project topic you are tackling (these will not be the same for all students doing a particular degree), agree the selection with your supervisor, and include them in the FS that you submit.

BSc (Hons) Computing

Students successfully completing this award will:

- Apply theoretical knowledge and practical skills in the analysis, specification, design, construction and evaluation of information systems using a variety of methodologies.

- Demonstrate a range of programming skills and articulate those skills through the implementation of systems.

- Demonstrate an advanced understanding of database management systems, and to develop advanced skills in their exploitation.

- Demonstrate skills and attributes that will enhance employment opportunities in general computing and IT.

- Demonstrate a general awareness of information and database system standards, including their impact on the environment.

- Apply a variety of techniques for extracting knowledge from data, including data grouping, summarisation, preparation, exploration, visualisation and mining.

- Understand the business context in which computer systems operate in the on-line world.

- Demonstrate effective communication, decision making and creative problem solving skills, and identify appropriate practices within a professional, legal and ethical framework.

BSc (Hons) Software Engineering

Students successfully completing this award will:

- Demonstrate an understanding of the principles of object orientation in the context of analysis and design.

- Apply project management techniques in order to plan, monitor and control a project.

- Explain and utilise fundamental object orientation concepts such as classes, encapsulation, inheritance and polymorphism and relate them to their practical situations including library and graphical user interface (GUI) development.

- Utilise in-depth, practical experience of the types of software tools that can support an object-oriented software lifecycle and develop this through practical experience.

- Utilise and understand methods and appropriate software tools for software development, including Software Testing Tools, Version Control and Project Management.

- Demonstrate an understanding of the fundamental, basic issues of software testing.

- Evaluate and apply design patterns for the development of high-quality, object-oriented software systems.

- Build robust, secure distributed systems using techniques such as messaging, persistent storage, remote methods and components.

- Have a range of programming skills to apply in the software engineering environment.

- Demonstrate that they can participate in and complete a substantial project, involving research, planning, specifying, designing, building and testing software, integrating knowledge gained from the core units on the award.

BSc (Hons) Computer Science

Students successfully completing this award will:

- Use knowledge, abilities and skills for further study and for a range of employment in areas related to scientific and technical computing.

- Interpret legislation appropriate to computer professionals and also be aware of relevant ethical issues and the role of professional bodies.

- Analyse, design, and implement algorithms using a range of appropriate languages and/or methodologies.

- Design, implement and interrogate database systems.

- Apply the principles and operation of languages, compilers and interpreters.

- Demonstrate effective communication, decision making and creative problem solving skills, and identify appropriate practices within a professional, legal and ethical framework.

- Critically appraise and apply suitable artificial intelligence techniques for a variety of software systems.

MComp (Hons) Computer Science: Further Learning Outcomes

In addition to achieving the learning outcomes for BSc (Hons) Computer Science, students successfully completing this award will:

- Demonstrate an in-depth understanding of key principles that arise in the design, analysis, and implementation of advanced networks, operating systems and distributed systems.

- Analyse new technologies and synthesise approaches to the management of big data.

- Undertake research, synthesis and innovative development related to current advances in computer science; implement and critically evaluate such activity in a professional level project.

BSc (Hons) Computer Forensics and Security

Students successfully completing this award will:

- Demonstrate an understanding of the scope and theoretical underpinnings of computer forensics and security.

- Conduct forensic analysis of computer, network and other device data using a variety of techniques and platforms.

- Use a range of programming and database skills to assist in forensic and information security investigations.

- Demonstrate an understanding of the characteristics and operation of various networking technologies and operating systems.

- Conduct an investigation in response to an incident by making use computer, network, internet and mobile security and/or forensics in legally acceptable manner.

- Document a security incident and/or forensic investigation to a professional level.

- Critically appraise computer and network aspects of security.

- Interpret legislation appropriate to computer professionals and also be aware of relevant ethical issues and the role of professional bodies.

- Identify and make use of current scholarly research in the field.

BSc (Hons) Computer Animation and Visual Effects

Students successfully completing this award will:

- Identify and demonstrate a range of approaches and techniques for the design and creation of digital assets.

- Evaluate and integrate dynamic animation systems for use in composition with live action footage.

- Produce, design and analyse three-dimensional models for rendering and animation within an industry standard production workflow.

- Identify roles and associated skills within the animation and visual effects industry, and monitor emerging technological developments.

- Demonstrate effective communication, decision making and creative problem solving skills.

BSc (Hons) Games Design and Development

Students successfully completing this award will:

- Identify and use a range of approaches and techniques for the design and development of digital games.

- Recognise and critically assess the underlying principles guiding the design of relevant visual, audio, interactive, and narrative aesthetics for digital games.

- Develop skills in the use of game engine and middleware tools and use these to create interactive games and other entertainment software including the appropriate testing and evaluation of the software.

- Apply gamification as a creative practice within the field of game design.

- Identify roles and associated skills within the games industry and be able to work as a team member through the life-cycle management of a game's design and development.

- Identify the steps to develop and manage a successful professional workflow using appropriate tools and processes in order to produce documentation and other deliverables that meet project expectations to professional standards.

- Demonstrate effective communication, decision making and creative problem-solving skills, and identify appropriate practices within a professional, legal and ethical framework.

- Critically evaluate game products and the influence of emergent, hardware, communication and entertainment technologies on game design and the games industry.

BSc (Hons) Computer Games Technology

Students successfully completing this award will:

- Be skilled and fluent in the use of structured computer programming techniques and demonstrate these skills though implementation of programmes.

- Develop skills in the use of graphics application interfaces (APIs) such as OpenGL and middleware tools and be able to use these to program/develop real-time, interactive 3D graphics for environments games.

- Apply design principles, use design methodologies and produce documentation for game specifications using industry standard approaches.

- Acquire a knowledge and understanding of behavioural systems most commonly employed in games design and be able to apply these appropriately.

- Understand the key technical problems and issues in three dimensional modelling, rendering and animation and be able to monitor new developments in these areas.

- Implement systems and frameworks that demonstrate that they are a competent user of the mathematical tools and techniques used in three dimensional computer graphics and in game physics.

- Appreciate the characteristics and features of a variety of game genres and be able to relate games design to broader media, art and culture.

- Be able to work as a team member and to understand the life-cycle management of a game development.

- Demonstrate effective communication, decision making and creative problem solving skills, and identify appropriate practices within a professional, legal and ethical framework.

BSc (Hons) Web Technologies

Students successfully completing this award will:

- Apply essential web design and development concepts, principles and practice in producing responsive, interactive, robust and dynamic web sites for a range of business scenarios and problems, showing judgement in the selection and application of tools and techniques.

- Develop efficient, reliable and maintainable object-oriented code for cross-browser solutions using appropriate client and server-side web languages (e.g. Javascript, PHP, etc.), frameworks, web services, cloud computing, languages for the storage and exchange of data (e.g. XML, JSON).

- Manage the web design and development process from initial requirements to final delivery, applying appropriate project management techniques, usability methods, documentation, and source control systems (e.g. Git).

- Design and build quality websites using content management frameworks (e.g Joomla!) and learning management systems (e.g. Moodle).

- Demonstrate effective communication, decision making and creative problem-solving skills, and identify appropriate practices within a professional, legal and ethical framework.

- Develop an understanding of the business context in which computer systems operate in the on-line world.

2.3   The Role of Research Ethics

The place of research ethics within a university is best thought of in terms of the avoidance of reputational damage. There are broadly four types of danger:

- Danger of the University (this, of course, includes you as a student) being found to being undertaking research of a nature which might attract negative publicity (for example, we are obliged to maintain records of research involving genetically modified organisms or which is security sensitive, and this is managed through the ethics system),

- Danger of physical injury to experimenters or participants (like any other activity, this is a matter for the Health and Safety system; all applications must have a Risk Assessment attached to them);

- Danger of psychological injury or exploitation of participants (we have, for example a responsibility not to make use of inappropriate power relationships or unnecessary deception of participants),

- Danger of inappropriate use or release of data (we are bound by both the Data Protection and Human Tissue Acts and must ensure that our procedures follow best practice in these areas).

Following on from these concerns, we have a responsibility not to collect more data than is necessary. It is therefore appropriate both to undertake a review of the proposed protocol and to see accepted applications as licenses to collect a stated amount of data, not to carry out protocols.

2.3.1   Procedures Relating to Research Ethics

The following procedure should be carried out in consultation with your supervisor. It should be considered in parallel with drawing up your Feasibility Study, and submitted as part of it.

The necessary ethics forms can be found at the following URL:
`https://ethos-apply.mmu.ac.uk/`

1. After login (use your standard University details), click `Create Project`. Enter the project title as agreed with your supervisor, and, from the menu choose `Undergraduate and PGT Application`. press `Create`.

2. Click `Student Application Form` and confirm that you will abide by the University's Academic Ethical Framework in relation to this project.

3. Now answer the questions. Obviously, the precise answers will depend on what you are doing, but the following points will apply to everyone:

   - The application is **not** being submitted as a "learning experience";
   - The Faculty is **Science and Engineering**;
   - The "course title" is **6G6Z1101 Project**;

- The start date is the deadline for the FS submission - Friday 19/10/18.

- The end date is Friday 23/08/19 (this is the deadline for the second resubmission for 2018-19 and so the last possible day you might be working on the project);

- Discuss with your supervisor if there are Health and Safety issues, if there are, list them and include a Risk Assessment form, signed by me, Nicholas Costen;

- It is unlikely that the project is part of a larger study, but your supervisor will tell you.

4. Once you have completed the questions, **confirm** that you have answered the questions correctly, **request a signature** from your supervisor and **sign** the document (it won't let you finish signing until you have answered all the questions).

or

Contact me, Nicholas Costen, without delay about submitting a full Ethics Application. *Please note that under no circumstances will I allow applications involving the use of school children as participants to go forward.*

5. When you have received ethical approval from your supervisor, or me, create a PDF of the application (do this via the `Print` button) and include it as part of your Feasibility Study.

- *Do not collect or manipulate data for your project before you have obtained the signed document.* You may however undertake your literature survey and / or Product design.

6. When you write and submit your Report you **MUST** include the signed form as an appendix to your document, as part of you FA. Supervisors will be prompted to ask for evidence of a plan to do this when you submit the Report Outline. Examiners will be instructed to treat Reports which do not include a signed ethics form as non-compliant and as evidence that the University Research Ethics and Governance regulations have been subverted.

Chapter 3

Product

3.1 Introduction

This chapter is intended to help you to submit your Product successfully. It is shorter than the others, as it is know that variability in the nature of the Product is likely to be significantly greater than in the other components. This document is written on the assumption that your Product is a traditional executable file which can be run on a standard desk-top computer. We are aware that in many cases, this will not be true, because many will, for example, involve apps to run on mobile phones, or databases located on a server. The precise selection of items to submit should be made on the basis of discussion with your supervisor.

3.2 Submission requirements and procedure

The underlying aim of the Product submission is twofold:

1. To allow the examiner(s) to explore the functionality of your Product. To this end, you need to include the executable, and instructions on how to use it.

2. To allow the examiner(s) to assess the quality of the code and (perhaps) run the product on another computer or use it as the basis of some other project. To this end, you need to include the source code.

To support this, you should do the following: prepare a zip archive of your product for submission, which includes source, project files, assets, data, compiled executable, video/audio and any other files required to build, run, or view the product. Include a text file explaining the procedure required to run the executable, including specifying any any associated software (e.g. Java RTE, Python interpreter, Matlab etc.). You will need to share the file with your project supervisor and second reader via the `OneDrive`.

3.3   Using the OneDrive

1. **Accessing your OneDrive account.** You can access your `OneDrive` folder via `MyMMU`. Choose `Files` from the home page, then `OneDrive`. This will take you to your `Office365` homepage - from here select `OneDrive` again to navigate to your top level `OneDrive` folder.

2. **Uploading your zip archive.** You can either drag and drop files, or use the 'upload' menu - see Figure 5.1 below. Remember that if you are not on campus, your upload speed may be quite slow - domestic broadband is often highly asymmetric.
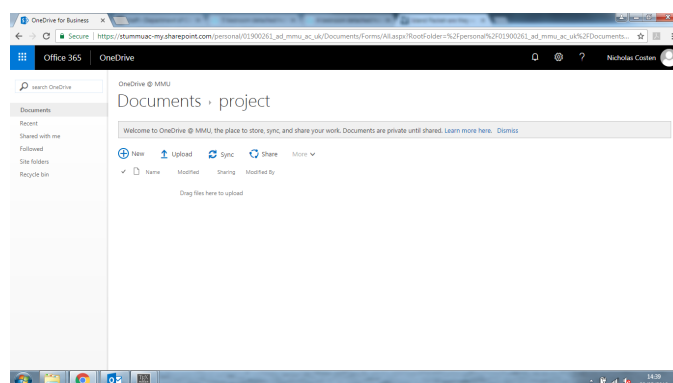

Figure 3.1: OneDrive file view.

3. **Sharing the archive and completing the submission.** Once the file is uploaded, you should share it with the members of the teaching team - do this by setting up a public link to the file. The procedure is:

   (a) Right-click the file in the browser and choose 'share' from the menu, as shown in Figure 3.2.

   (b) On the new box, select 'get a link'.

   (c) From the drop-down menu choose 'View link - no sign-in required' (see Figure 3.3).

   (d) Copy the link from the dialogue box and paste it into Product submission page on Moodle.

4. **After the submission.** Do not, under any circumstances, delete or otherwise amend the zip-file after the submission deadline has passed. To do so may give the impression that you have altered your Product (this would qualify as a late submission). Please note that this will extend of the end of the academic year, as the Products may be required by the courses' external examiners.
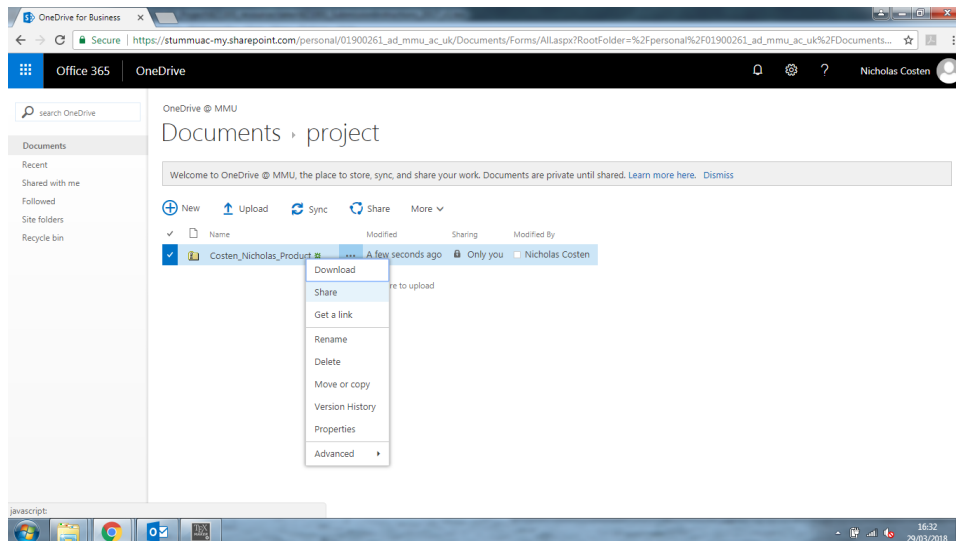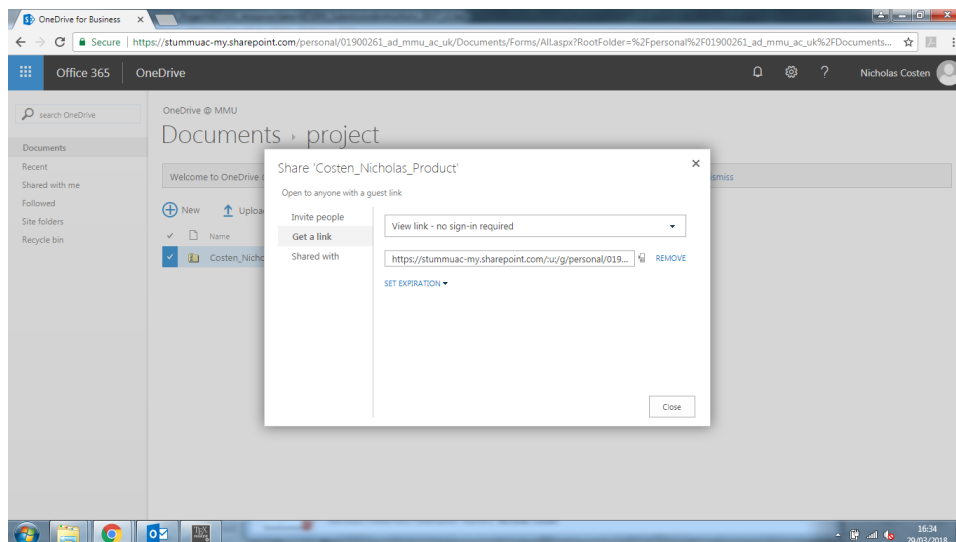
Figure 3.2: Sharing a file.

Figure 3.3: The link dialogue box.

Chapter 4

Showcase Guidelines

4.1 Introduction

This document is intended to help you to prepare for your Project Showcase; it is not a comprehensive briefing and is only a set of indications.

The full Showcase will last for about 3 hours (before or after lunch on one day of Week 25; several iterations will be held), during which time other students and internal and external visitors can see your work. The events will be held in the John Dalton Central Block Laboratories, and you will each be assigned a computer on which to demonstrate your work. During the couse of the event, you will be assessed by a pair of examiners (your supervisor and second reader). They will visit you at your computer, allowing you to explain your project and what you have acheived.

The following components can normally be expected of your interaction:

- Explanation of the project by the student, this normally takes the form of a short talk, typically illustrated by a few slides;

- Interrogation of the student by the examiners, a question-and-answer session designed to broaden their understanding of the project;

- Demonstration of the Product; this normally will take the form of the student operating the application, and offering the opportunity to use it to the examiners.

It is normal that the discussion of the project between the examiners and student will flow over and through the demonstration.

4.2 The slides and talk

This should be brief and to the point. The examiners will not welcome lengthy explanations (more than about 5 minutes uninterrupted speech and/or five slides). The intention is to give the student an opportunity

to answer the question "please explain what your project was about", setting the scene for the demonstration and discussion. It also allows you to cover issues of aims, background, design and testing which are not necesarily obvious when simply showing the Product. The slides and talk should be addressed to a knowledgeable audience, composed of experts in the general field of the project.

Essential points to consider and address are:

- What was the central problem or task of the project. This will be derived from the aims and objectives, but should be posed as the intellectual problem or challenge, rather than the set of exercises such as the report-writing which you had to undertake.

- Previous systems, algorithms and/or data which you had at your disposal to guide your research and development.

- Techniques used to solve the problems (this will vary between projects, but might centre on software design and development methodologies, perhaps showing a UML-style class hierarchy, some algorithmic pseudo-code or equations underlying your solution).

- An indication of how you can be confident that your solution works effectively (that is to say, some results from your evaluation stage).

- Some very brief conclusions and lessons or implications from the work.

4.3   The demonstration

Obviously, the nature of this stage will vary with the project you have undertaken. However, please note that it is your responsibility to ensure that, if appropriate, the Product will run in the laboratory at that time (it may be necessary for you to bring suitable hardware with you, matters of this sort should be discussed with your supervisor beforehand). If you have generated an executable, you may run it in your own file-space or on your own computer (there is no requirement to actually run a copy already uploaded onto the oneDrive, although changing the code after Product submission is not allowed). You can expect the examiners not be impressed if you have difficulty getting the code running, and, since this is a demonstration, there is no requirement that they operate the product themselves, although they may wish to do so.

4.4   The questions

These are relatively relaxed and informal. The examiners will be looking to see if you understand the project area and have undertaken the work yourself. You may be asked about the technical aspects of the Product, perhaps

with regard to the design process or algorithm logic. You are unlikely, however to be asked to explain individual sections of code. The examiners will seek to explore the functionality of your Product, and see if you appreciate its limitations. A few questions include:

- "what other features would you add to the system",

- "what has gone wrong with the system",

- "what are you most proud of",

- "what would you do differently if you did the project again", and

- "what have you learned from doing the project".

4.5 The end

Finally, the examiners will ask you if you have anything else you wish to tell them, or any questions for them. You will then be free to go. Final Project submission will be on the Friday evening; this must include the Report and the materials from your Showcase.

Chapter 5

Final Report

5.1 Introduction

This chapter is intended to help you to write your project report. The material presented here is not part of the Regulations of the Modular Degree. Any disputes or appeals arising from the consideration of your project will be judged solely in accordance with the Regulations as published in the Student Handbook.

This document aims for generality. There is a wide variety of projects in the school, so the particular form of your project report will be unique to your project. Therefore, this document concentrates on those aspects of a project report that are always required, e.g.: structure, presentation, etc. Discuss with your supervisor the form that your particular project report should take.

The final section of this document gives some of the characteristics of the ideal project. Once again, bear in mind that these give generally applicable advice. Therefore, nothing is said about documentation, but if you have designed a piece of software, it should really be documented appropriately. Equally, if you have conducted a survey, you should ensure that you have clearly explained what information it is supposed to elicit, how you selected the methods you used, how you chose your subjects, etc.

Remember to leave sufficient time for writing up your project. You should discuss with your supervisor whether you are ready to start writing your report. In order to get full credit for the work you have put in, you must write a good project report. This takes time, so do not leave it until the last minute.

5.1.1 Report Formatting

The project report is probably the largest and most comprehensive document that you will have produced to date in your programme of study. Its purpose is to communicate the work done throughout the course of the

project to a non-specialist (but one who has a good understanding of undergraduate level computing) so that the reader fully understands what is being presented. This carries the largest weighting of all of the project deliverables and is expected to take the majority of the time allocated for the project unit to produce.

The project documents should comply by the following university standards for academic project reports:

- The report must be a typeset PDF document.

- The report must have a title page that includes: the university logo; the name of the faculty; the name of the student; the degree title of the programme; the title of the project; the month and year that the project was completed; the name of the school to which the student belongs.

- The report must have a preamble consisting of (on separate pages): a full-page abstract; an acknowledgements page; a signed university plagiarism disclaimer; a table of contents; a list of figures.

- The report should use a 12pt Times New Roman (or the LaTeX equivalent) font with 1.5 times the standard spacing for the main text with suitable larger bold type fonts for the chapter, section and sub-section headings. Chapters, sections and sub-sections should be numbered appropriately. All chapters should start on a new page.

- All pages with the exception of the title page should be numbered at the bottom aligned to the centre of the page. Roman numerals should be used for pages in the preamble and Arabic numerals used for all other pages starting at 1 for the first page of the first chapter.

- All mathematical expressions should be typeset using an equation editor. All display equations should be centred on the page. Where a display equation is numbered, the number should be aligned to the right-hand margin alongside the equation and enclosed in parentheses.

- All figures and tables should be centred on the page and should not have elements placed alongside. Numbered figure captions should appear below figures and tables.

- All sources should be cited using the Harvard method with a list of references containing the citation information in alphabetical order by the first author's surname a placed after the conclusions chapter. See the University's referencing guide for more information using the link below.

    `http://libguides.mmu.ac.uk/refguide/mmuharvard`

The project supervisor will advise on the detailed aspects of the report and will provide formative feedback on the interim documents, which are expected to form draft sections of the report. Students should however note that project supervisors will not proof read the whole report prior to submission. Students are advised to use either LaTeX or Microsoft Word software available on the university machines on which to prepare their project report. Skeletal templates that give an indication of the basic formatting in both LaTeX and Microsoft Word formats are provided on the Moodle area for this unit.

5.2   Report style and presentation

The report should be as short as possible, consistent with a good description of the work carried out. For the vast majority of projects, the word count is to be somewhere between 8,000 and 14,000 words. This would generally result in a report with about 50 to 70 pages containing not only written text, but also figures and fragments of code, for example. While word or page counts are useful for measures of the workload involved, it far more important that your report forms a coherent description that is concise but, at the same, contains all the relevant sections given your project aim and objectives. Please seek advice from your supervisor on this - the last deliverable, which is the Report Structure, is particularly helpful for this purpose.

A high standard of organisation and presentation is required. The report must be written in competent English. Reports should be use a 12pt Times New Roman (or the LaTeX equivalent) font with 1.5 line spacing for the main text. Chapters, sections and sub-sections should be numbered appropriately. All chapters should start on a new page. Sections of computer code should be indented and presented in Courier font. Chapter and section headings may be in a slightly larger font, emboldened or both. Avoid overuse of different fonts and styles. All text should be justified on both the left and right margins.

The title page should not be numbered. All other material before Chapter 1 should be numbered using Roman numerals, starting with the digit i, and should be positioned on either the bottom centre or the bottom right hand side of the page. The first page of Chapter 1 should be numbered as page 1 (using decimal numbers) using the same page number positioning. All proceeding pages should be numbered using the same method, with the exception of divider pages, which should be unnumbered (e.g. a page that states the word Appendices should not contain a page number).

Your report must be written in a clear and unambiguous style. This means that your work will be grammatically correct and your use of English will strike an appropriate balance between formality and readability. You must check your work for spelling. Modern word-processors have spell-

checkers so there is no excuse for spelling mistakes. Obviously, a spell-checker cannot distinguish between "their", "they're" and "there", or other similar homonyms, so you must read your work carefully. As final year students you are expected to be able to write properly in English.

You must use punctuation properly. You should be particularly careful with commas and apostrophes. If you have a sentence with several commas in it, try reading it aloud. You will probably find that it is too long to make any real sense. Split such sentences up into more manageable units. Apostrophes are used only to indicate possession or elision. The use of brackets to indicate sub-clauses, comments or asides should also be avoided (although sometimes they can appropriate).

As a general piece of advice, ask another student to comment on a draft of your project report. Another person will often spot grammatical and typographical errors that you miss. Also, you will get some idea of how clearly you have expressed your ideas and how convincing are your arguments.

5.2.1 Figures and Tables

A figure caption should appear below each figure, and a table caption should appear below each table. Insert figures and tables after they are cited in the text; make sure that you cite them all. The figure or table, together with the caption (which should give the number of the figure or table), should be centred and referred to within the text as "Figure 5.1 shows..." or "...as shown in Table 5.1". There should be a blank line above and below each figure or table.
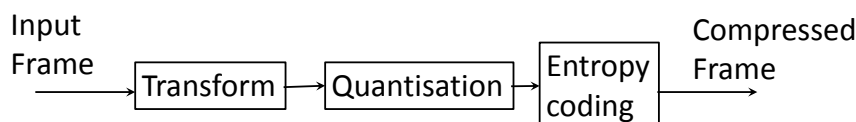
Figure 5.1: Transform coding.

Number	Measurement
M0	Difference in Y values
M1	Maximum of TI
M2	RMS of TI
M3	Range of TI values
M4	RMS of SI

Table 5.1: Quality measurements used by CQA

If preparing your report on Word, use its caption handling facility to enter figure and table headings. This will allow you to auto-number the

headings and also to generate a List of Figures and a List of Tables at the beginning of your report.

5.2.2 Equations

Number equations consecutively within each chapter (e.g. the first equation in Chapter 1 should be numbered (1.1), the first equation in Chapter 2 should be numbered (2.1) etc.). Equation numbers, within parentheses, should be positioned flush right as in (5.1). The equation should be centred and included in the sentence within your text which brackets it. There should be a blank line above and below each equation.

The following is an example of the correct use and formatting of an equation:

Using the root mean square error,

$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (x_i - m_i)^2}, \qquad (5.1)$$

as a measure of accuracy, where x_i and m_i are respectively the i-th elements of the observation and reference,....

Be sure that symbols in your equation have been defined before or immediately following the equation.

5.2.3 Bullet Points and Ordered Lists

Ordered (numbered) lists and bullet point lists should be indented on both the left and right margins (see Section 5.5.1 "Common mistakes").

5.2.4 Footnotes and Endnotes

Do not use footnotes[1] or endnotes.

5.2.5 Referencing

Whenever you refer to another's ideas or findings you should include a reference. This will allow the reader to locate and refer to the original source in the event of wishing to find out more information about a particular topic. Please note that references do not allow you to copy sections of work that are not your own.

---

[1]This is a footnote. Endnotes are similar but placed at the end of the document. They are annoying and deprecated in scientific writing. Other, non-scientific subjects, typically including humanities such as history or music have different standards and make use of them.

There are a number of conventions for citing references. You should follow the one referred to as "Harvard", described in great detail in the University's guide `http://libguides.mmu.ac.uk/refguide/mmuharvard`.

The citation should be given name and a year, as in the case this case: (Britch, 2003a). This name form is easier to work with than others and gives some visual clue to the reference. When naming authors, use their surname only; do not use their personal names, titles or initials unless it is necessary to distinguish two people with the same surname. If there are two authors of a paper, use both their surnames to identify it (Britch and Costen, 2005). For three or more, give the name of the first author and the words "et al" (Britch et al, 2007). It is not normal to state where the authors work; this is an attempt by journalists to give credibility their statements and is not appropriate in scientific writing where we are concentrating on the content of the work.

A citation is placed in the text and the corresponding work is included in the list of references. All citations in the text should be represented in the list of references and conversely, all works in the list of references must be cited in the text. Works that are not explicitly cited, for example material on computer languages, design methodologies etc., that have been used in the process of carrying out the project and so should be acknowledged, should be placed in a separate bibliography.

One of the useful features of the Harvard system is that the citation can take several forms, depending upon which part it plays in the sentence. The citation should be entered into the text wherever you wish to refer the reader to the original source e.g.:

> A detailed explanation of the stages of the waterfall model can be found in Sommerville (2004).
>
> Recommendation BT.500 (CCIR, 1982) defines experimental conditions such as the minimum number of participants, lighting conditions, timing etc.
>
> For example, it has been found experimentally that perceptually proper division of bits between luminance and chrominance in the compressed bit stream is obtained by application of the Euclidean distance in YUV space (Westerink et al., 1992).

At the end of the document you should include a list of references, ordered by name then year. Such a list is shown below, as an example. The title of the work should be italicised. Also note that when referencing a book, exact page numbers should be included.

> Britch, D., *Wavelet-based digital image watermarking for copyright protection*, 10th IEEE International Workshop on Systems, Signals and Image Processing, Prague, Czech Republic, 10–11 September 2003.

Britch, D. (D.Britch@mmu.ac.uk), *Project allocation*, Email to John Smith (J.Smith@mmu.ac.uk), 5th October 2003.

CCIR, *Recommendation 500-2, Method for the subjective assessment of the quality of television pictures*, Recommendations and reports of the CCIR, Geneva, 1982.

Shoemaker, C. *A survey of techniques for digital watermarking*, http://www.vu.union.edu/~shoemakc/watermarking/, 27th October 2002.

Sommerville, I., *Software Engineering*, 7th edition, Pearson Education, Harlow, UK, pp. 65 - 68, 2004.

Westerink, P. H., Biemond, J. and Boekee, D. E., *Scalar quantisation error analysis for image coding using QMFs*, IEEE Transactions on Signal Processing, 40**2**, pp. 421–428, 1992.

In the event of an author having published multiple documents in the same year you can append a letter to the end of the year, in order to uniquely identify the reference e.g. [Britch 2005b]. When referencing a web page, you should list it as "viewed on dd-mm-yyyy". This only applies to blogs and other self-published source of information. Journal articles and books or their sections are cited via the publisher's name and the issue etc, even if they are available via a website. The name of the journal, conference or book gives weight to the publication you are citing; it is important that you take the time to find the full citation of the papers you use. As mentioned in other documents, writing your report in LaTeX will allow you to solve all of these problems with ease.

5.2.6   Quotations

In general, quotations should be avoided. They are generally only appropriate when you want to introduce some text as data into the report to be considered and criticised; it is rare for this to be done in computing. However, if necessary, short quotations can be embedded into the text. They should be italicised and placed in quotation marks with a reference being given, as follows:

Unfortunately, watermarks are not always robust to standard image filtering techniques. *"While the watermarks are still visible after sharpening and blurring, too much information from the original image is also present and obscuring the watermark."* [Britch, 2003a]

Longer quotations should be in-set as follows:

> *"Furthermore, the watermarks are not very robust to the addition of random noise. Even at an addition of 10%, the noise overwhelms the watermark. However, the watermark is more robust to the addition of uniform noise."* [Britch, 2003a]

5.3   The Structure of your report

Before beginning the write-up you should agree the general structure and contents of your project report with your supervisor. However, the precise structure will depend on the nature of the subject matter and on how you approached your topic. Nevertheless, in any project report one would expect at least an introduction at the beginning and a conclusion at the end. The most important thing is that the report should be structured logically. You should try to establish a structure before you start writing. A suggested report structure is shown below.

Title Page	Give: project title, University logo, author, formal title of degree, supervisor.
Declaration	A signed plagiarism disclaimer, as follows:

> No part of this project has been submitted in support of an application for any other degree or qualification at this or any other institute of learning. Apart from those parts of the project containing citations to the work of others, this project is my own unaided work.
>
> Signed
>
> --------------------------------

Acknowledgements	Optional (acknowledge anyone who helped you with your project).
Abstract	A summary of the work undertaken, stating the problem, how the problem has been solved, and the result.
Contents	A list of chapter and section headings, with their respective page numbers.
List of Figures	A list of figure headings and page numbers.
List of Tables	A list of table headings and page numbers.

Abbreviations	A table showing each abbreviation used within the report, and its full meaning.
Chapter 1 Introduction	A statement of the aims of the work and a brief overview of the remainder of the report.
Chapter 2 Literature Review	Relate your work to previous work (literature). Give the context of the Analysis work and any technical details necessary for understanding the work.
	Establish motivation for the present work and relate it to the wider social, ethical, legal and professional context.
Chapter 3 Design	State the identified requirements and show design diagrams with full explanations for your product.
Chapter 4 Implementation	Describe the work undertaken and the results obtained. Small sections of code can be used to aid the understanding of a particular point. Discuss testing strategy and show testing details.
Chapter 5 Evaluation	Examine critically the completed work and the results achieved. Relative achievements (or lack of them) to the original objectives. Depending on the type of project, this may involve significant user-evaluation, statistical or application-completeness testing.
Chapter 6 Conclusion	Briefly restate the work undertaken, summarise any findings or recommendations, acknowledge limitations and make suggestions for further work.
References	Use a recognised referencing system and be consistent.
Bibliography	List any material consulted but not specifically referenced.
Glossary	Optional.
Appendices	
	Appendix A : Feasibility Study
	Appendix B : Materials used in Showcase
	Appendix C : Link to OneDrive directory containing Product

> Appendix D, E, etc : Other materials - User manual, test runs, questionnaires etc. You do not need to include your entire source code. Note that each appendix should be referred to within the report text.

Initially, try to put yourself in the position of someone who knows nothing about what you have been doing during your project. (NB the second reader will know something about the general area of your project but not about the detail of what you have been doing in that area). You have to convince this person of: (a) the justification for your project (i.e. that what you have done is worthwhile/sensible/useful etc); and (b) the quality of your work (i.e. that you have made a good job of whatever it is that you have done). It is guaranteed that if your report is not logically structured, you will fail to achieve either (a) or (b).

Obviously, your report should be organised into chapters and each chapter should be organized into sections. Each chapter between the Introduction and the Conclusions should deal with a substantive area of your work. Although chapters should normally be relatively independent of each other, there is nothing wrong with establishing a link with the next chapter at the end of the current one.

When writing the sections of a chapter, there are a number of points that you should bear in mind. First, make sure that section headings reflect the content of the sections. Second, if you are numbering sections 1.1, 1.2, 1.2.1, 1.2.2 etc (and there are very good reasons to do so), make sure that you do not go beyond three levels of subsection. Remember that you are trying to convince someone of something. You cannot expect the reader to remember where they are in a maze of sections and subsections, much less follow the arguments you are trying to put. If you find yourself writing section 6.4.1.3.1.1, ask yourself what you are trying to say and whether or not you might find a better way of saying it.

It is not acceptable to ask your Supervisor to read your project report through in full before he/she has to mark it, but it is entirely reasonable to ask them to comment on the structure you propose for your report. Start with a list of chapter titles and then refine this by adding the titles of the major sections within each chapter.

5.4   Chapters and sections in your report

This section describes some of the chapters and Sections your report should contain. This is not an exhaustive list.

5.4.1   The abstract

Your report should be prefaced by an abstract. This is a single-paragraph summary describing the problem you were trying to solve, how you solved the problem, and the result.

5.4.2   The introduction

Your report must have a coherent introduction. A useful basis for your introduction might be:

- Background to the project (i.e. an expanded version of the section in your terms of reference).

- Detailed assessment of the problem. Your account of the problem your project is addressing.

- Realistic aims and objectives for the project.

- Brief overview of the chapters in the report. You should aim in this section to give some sort of idea of how the report is structured.

5.4.3   The literature survey

All project reports are expected to include a literature survey, and this will normally be detailed enough to warrant a chapter of its own. You should present your literature survey in narrative form. It is not enough to produce a long list in the form of "Smith (1990) said this. Jones et al (1992) said that". You should aim to critically evaluate the work you have read and to show how your understanding of this work has contributed to your project.

5.4.4   What you have done

Somewhere in your report you will need to explain what you have done during the year. You may feel that this discussion is best distributed over several chapters. For example, you may want to describe the functionality of a system in one chapter and the user interface to the system in another. Wherever this discussion is situated, you must be careful to justify what you have done instead of merely describing it.

5.4.5   The body of your report

As has been said, it is not possible to state generally what should go in the body of your report; this depends entirely on the nature of your project. However, there are some remarks that are appropriate for all chapters.

First, you should introduce each chapter with its own mini-introduction. This should summarise how the chapter fits into the whole report. If appropriate, it should summarise what the previous chapter says and indicate how this chapter follows on.

At the end of each chapter, you should summarise the contents of the chapter and what you expect the user to have understood from it. Again, where appropriate, you should indicate how the next chapter follows on from the present one.

5.4.6 Evaluation

It is not enough in a project to do something and then report how you did it. In most cases you will be expected to evaluate what you have done against some criteria that you have designed. Depending on the nature of your project, this evaluation may warrant a chapter on its own.

You will be expected to have considered the evaluation criteria before embarking on any development work, and it may be that you have alluded to them in several chapters in your report. Nevertheless, it is worth restating and justifying all your evaluation criteria together in a separate section or chapter. Your evaluation should normally cover all aspects of your project. If there are some aspects of your project that you do not evaluate, you should explain this and explain why.

5.4.7 Conclusions

Your report must have a conclusions chapter. In the final chapter, you will attempt to draw together the themes and arguments presented in the body of your report. As with the other chapters, you should introduce the conclusions with a very general overview of what is to follow.

In your conclusions, you should attempt to reiterate what you have achieved during your project. You should emphasise the positive aspects of your work and show how you dealt with the problems that arose during the course of the year. Where problems have proved insurmountable, you should describe potential solutions to the problems and show how you worked around them. If you feel that more work could profitably be done in the area of your project, you should indicate this and describe the form this work might take.

Finally, you should attempt to comment on how you feel you tackled your project and how you might have approached it differently. In this section you might like to comment on how the other modules you have taken during your degree have contributed to your project and how you feel your project may help you in your future career.

5.4.8   References

Your project report must have a references section. This section lists all the material that you have referred to in your project report.

5.4.9   Bibliography

Your project report may contain a bibliography section. This section lists all the material that you have consulted while undertaking your project, but not referred to in your project report.

5.4.10   Feasibility Study

Include a copy of the Feasibility Study you submitted at the beginning of your project as an appendix to your report. This should include the Ethics Form, and is required to ensure that the examiners can see you have stuck to what you intended to do.

5.4.11   Showcase Materials and Product

Include a copy of the materials you used at the Showcase, and also a public link to a copy of your Product on the OneDrive.

5.5   Positives and negatives

This is a miscellaneous collection of pieces of advice on the Report.

5.5.1   Common errors to avoid

- It is generally not appropriate to use the first person ("I" or "we") to describe activities undertaken in the project. The readers know that the work (is meant) to be your work, so you don't need to say it. Using the first person plural ("we did (something)...") encourages the readers to ask if someone else undertook the research. Use the indefinite, passive form ("it can be seen", "it was undertaken") by preference. The `Word` grammar checker may object, but this is appropriate academic form.

- The word *data* is plural, not singular.

- Do not use the word *essentially* to mean approximately or effectively.

- Be aware of the different meanings of the homophones *affect* and *effect*, *complement* and *compliment*, *discreet* and *discrete*, *principal* and *principle*.

- Do not confuse *imply* and *infer*.

- The prefix *non* is not a word; it should be joined to the word it modifies, usually without a hyphen.

- There is no period after the *et* in the Latin abbreviation *et al.*.

- The abbreviation *i.e.* means "that is", and the abbreviation *e.g.* means "for example". Generally, they should be avoided, in any case.

- A graph within a graph is an *inset*, not an *insert*.

- The word *alternatively* is preferred to the word *alternately* (unless you really mean something that alternates).

- Commas, semi-colons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)

- British form is to use a decimal point between the integer and fractional components of a real number (as in 1.25), and commas between units of 1000 (as in 1,200,000.25). Some other languages reverse this arrangement. Use a zero before decimal points: 0.25, not .25.

5.5.2　The ideal project report will...

- Contain arguments that are expressed clearly and persuasively. Reasoned justifications to support these arguments will be presented. Appropriate reference to the literature will be made to support the arguments. Dissenting views from the literature will be discussed.

- Contain a detailed and critical assessment of previous work conducted in this area. The main contributors to the debate will be highlighted and their work will be discussed in more detail. The student will attempt to demonstrate where his or her work fits in with the literature presented.

- Identify the major problems addressed by the project. The report will set these problems in the context of the aims and objectives identified for the project. These problems will be explained in detail as a prelude to the student's account of how they were solved. The report will also indicate other possible solutions to these problems. Where particular problems have proved too difficult in the time available for the project, they should be discussed and the student should identify potential solutions.

- Include an element of self-critical reflection. The report should review openly whether certain decisions were justified and whether certain activities could have been done better. The report should demonstrate how the student has learned from any mistakes that have been made. The report should also show what the student has learned from the positive achievements of the project. The report should demonstrate the student's ability to discuss alternative approaches to the work undertaken in the project. The report should also reflect how the student's other courses (including the placement, if any) have contributed to the project.

- Contain a section that indicates what further work might be fruitful. This other work might be a continuation of the project or in a different but related area. In either case, the report will explain what the contribution the student thinks his/her work can make to this future work.

- Demonstrate that the student has managed his/her time appropriately in completing the project. Will clearly show where changes to the project plan have had to be made and will indicate how the student adapted his/her project to accommodate these changes.

- Only contain material that is relevant to the aims and objectives for the project, as expressed in the report.

- Be written in good English and the ideas will be expressed clearly, unambiguously and persuasively. The work will consist of coherent sentences that are punctuated correctly. There will be very few spelling mistakes.

5.6 Submission Arrangements

5.6.1 Final Submission

Final submission will occur on the evening Friday 05/04/19, at 23:55. At that point, you must upload onto Moodle your Report and Showcase materials. Work uploaded after this time will be treated in accordance with the University regulations (at the time of writing, these state that such work shall be marked as 0%, unless you have made an approved application for Exceptional Factors or have a negotiated Personal Learning Plan extension).

Some students may be given an additional period to complete their project, as a consequence of a Personal Learning Plan, or a delayed deadline, as a consequence of Exceptional Factors. In both bases, these will be considered to apply to the date of the Showcase, as well as the Report. As a consequence, the examiners reserve the right to consider that student with

an extension who fails to give a Showcase within their deadline has failed to attend and so will receive a mark of zero for that component. By default we will expect students to demonstrate their work at the scheduled Showcase, but if necessary a special session will be arranged for them.

5.6.2   File names

All of the documents you submit should be PDFs and follow a consistent naming convention. They should identified by your full name and the type of content they contain in form: `Lastname_Firstname_Document.pdf`. Thus for his Terms of Reference, Nicholas Costen would in upload a document named `Costen_Nicholas_FS.pdf`, while for his Report it would be `Costen_Nicholas_Report.pdf`. The one exception to this is the Product, which should be a `ZIP` archive, named as `Costen_Nicholas_Product.zip`. The code or similar files inside the archive can have any names that are appropriate.

5.6.3   Submission FAQs

This is a collection of queries and answers posed at the point of submission in previous years.

1. **General instructions on document preparation**

   In brief, there are three parts to the Report:

   - Report proper - the PDF text document.
   - Showcase - the materials (slides etc) from your talk, included in the PDF as an Appendix.
   - Product - the code (or whatever) you've written, saved on the oneDrive and with its URL included as a separate Appendix in the PDF.

   A couple of students asked have about combining the different bits. I think it's best to:

   (a) Make sure each of the documents is actually a PDF (if one is a set of images, each image can be separately converted to a PDF document, so it is essentially a single page).

   (b) Some of PDF documents may need "flattening" (conversion of the contents of textboxes and so on into normal text or images). This can be done by printing the document to another PDF file.

   (c) Create an appropriate number of additional files, each of which is a single page saying something like "Appendix A Feasibility Study".

(d) Concatenate them using Adobe Acrobat in the following order:
   i. The body of your Report
   ii. The extra sheet saying "Appendix A - Feasibility Study".
   iii. The actual FS
   iv. An extra sheet saying "Appendix B - ..."
   v. Etc. etc. ...

2. **Is it acceptable to use a figure from another research paper in my literature review? This is in addition to citing the paper.**

   Yes, it is acceptable, but you must make the origin of the diagram clear to the reader. You should include a comment on the lines of "Diagram re-used from [reference]" in the figure's caption. It is not enough to just have a passing reference to paper in the text of the report.

3. **I submitted my project yesterday to test for similarity; it came as 8 percent. However today I added my appendices to it and its now showing as 26 percent. It's highlighted all my references as similar along with my declaration which is showing as 17 percent! And all my ethics forms!**

   Don't worry, we know that that sort of "boilerplate" text raises similarity levels. Your supervisor will look at the overlap and see that it is caused by the inclusion of the forms and so on. The similarity checker actually allows individual source documents to be removed from the match, so that a score can be found ignoring this sort of overlap.

4. **I have deployed a running version of my project on Digital Ocean VM for demo purposes and as part of my project objectives. Do I need to provide a SSH access to the virtual host or simply give the domain name from which access the demo should be enough?**

   You should put a copy of the code on the oneDrive and also a file with the URL so it can be run. There may be a couple of reasons why you shouldn't give full details on operation - one is that it takes a great deal of your time, the other is that you end up having to leave account login details living around. You'll have to make a judgement.

   Inevitably there is a trade-off involved about access and operation - the examiners want evidence that you have generated a product, that is has well written code and that it runs. However, we appreciate that it may integrate with impractically large amounts of external materials or require specialized software to compile and operate.

   The underlying idea however is that we'd like to be able to get at your code, as it is today. We may need to look at it at some point well in

the future. We're aware that things change, and accounts may lapse. Hence the need to supply a copy of what you've written.

5. **The majority of my code and functionality is stored and ran from the online secured Amazon network. Should I just provide text-file versions of the code with a video example of it functioning as it is not possible to give the marker access to my skill development area.**

    The code alone will be fine in cases such as this. There is no requirement to generate videos of the product operating (presumably, this has been done in the Showcase anyway).

6. **Does the spacing between the text have to be 2.0?**

    It's a lot easier to read and make any notes on it necessary if the text is spread out a bit. On the other hand full double space is maybe a bit excessive - 1.5 is probably optimum.

7. **I have uploaded the wrong version of my report to the submission! Please tell me there is something I can do to fix this!**

    Don't worry, if you look at the upload page for your Report, you'll see the words "Submit Paper" and a little "up-cloud". Click on them and you can upload the new report.

8. **My product consists of a Java project and a large data set that has been collected. There are over 1 million rows within the data set. am I expected to upload this data set in some form of CSV file to the oneDrive account?**

    Ideally we want to be able to both see what you've done to create your Product, and also experience its effects. Thus you need the code and (if appropriate) the executable and any data it uses. We appreciate that in some cases, the data will be very large; in that case, the code alone is acceptable. In all cases, please remember to zip the files up so a single archive can be up- and down-loaded.

9. **I have received an extension on my report due to exceptional factors, shall I still submit the other parts of the project today or should I submit it all on my revised deadline?**

    We only have one submission date. Thus if you have an extension (EF or PLP) you should bind all the components together and submit them by your new deadline.

    If you have an extension and haven't done your Showcase presentation yet, please get in contact with your supervisor to arrange one. This

should be close to, but before, your revised deadline. I'll alert the supervisors to the revised deadlines.

Chapter 6

Formative Documents

These documents are not assessed; rather you generate them provide formalised progress statements, defining different aspects of your project. While they should not be copied wholesale into the final Report, they are intended to provide material which can be included. The documents should be uploaded onto Moodle; your supervisor will then provide feedback on what you have written.

6.1 Prototype Report

- Details are to be discussed with supervisors who, depending on the nature of the project, may recommend slight deviations from the general guidelines set out here.

- As the name suggests, it is a progress report and, as such, not expected to be a complete, comprehensive report that later becomes the literature review and design chapters of your final report (it is assumed, naturally, that it will inform the writing of the report). The main goal is that students use this progress report as practice of academic writing and an opportunity to receive early feedback from their supervisors.

- Word count should be within 2500–3500 words; for group projects, each member should produce an individual review concerning their part of the project.

- The report should describe (concisely) existing work with the aim of (1) contextualising the project, (2) point out useful techniques and algorithms that will be employed in the solution; also, (3) analyse critically and compare existing work (e.g., conference and journal articles, pieces of software) that address a (significantly) similar problem to the one addressed by one's project.

- It should also cover a wider consideration of one's responsibility for aspects of the project which affect the public well-being, Intellectual Property and related issues and the importance of trustworthy software. Furthermore it should consider the issues of risk and safety in computing and cyber-security, both in the context of the project's topic.

- The literature review process and writing is guided strictly by one's aim and objectives and, consequently, by the project's desiderata (the desired features of the solution).

- The design section of the report is a commentary on a process which makes use of one or more different techniques. The selection of these techniques should form a (short) component of the report, as their usefulness will vary according to the topic of the project.

- It is expected that a considerable amount of the report will consist of the results of using design methodologies such as stepwise refinement, pseudo-code, UML, database normalisation or storyboarding. In the nature of these techniques, the outcome will take the form of diagrams. Once sized such that the text within them is legible, they should be considered to be equal to an equivalent amount of double-space text. Given typical font size, a whole page of such type will consist of about 300–350 words. Thus even with diagrams, a report of approximately 9 pages will be considered normal.

- References in the body of the text and a bibliography should be included; Harvard referencing is recommended, but similar styles such as those produced by standard installations of LaTeX/BibTex are accepted.

- In parallel with the written element, it is expected that the student start developing substance (code or whatever other features are appropriate) of the Product, and formally share it wit the supervisor at this point.

6.2 Report Outline

This is a short description of the components required for your Report outline. The basic idea here is that you should supply a list of Chapter, and Section titles, setting out how your report will be arranged. You may, if you like supply sub-sections, but lower divisions are not encouraged. If the titles are obscure, a single sentence may be added to explain the content of that part. The purpose of this activity is to allow you to think about the nature and content of the report before you start writing it, giving you a

set of headings which you can then fill in. Obviously, you should discuss the content with your supervisors, but the following table supplies a possible structure.

Title Page		Give: project title, author, formal title of degree, supervisor.
Chapter 1	Introduction	A statement of the aims of the work and a brief overview of the remainder of the report.
Chapter 2	Literature Review	Relate your work to previous work (literature). Give the context of the Analysis work and any technical details necessary for understanding the work. Establish motivation for the present work.
Chapter 3	Design	State the identified requirements and show design diagrams with full explanations for your product.
Chapter 4	Implementation	Describe the work undertaken and the results obtained. Small sections of code can be used to aid the understanding of a particular point. Discuss testing strategy and show testing details.
Chapter 5	Evaluation	Examine critically the completed work and the results achieved. Relative achievements (or lack of them) to the original objectives. Depending on the type of project, this may involve significant user-evaluation, statistical or application-completeness testing.
Chapter 6	Conclusion	Briefly restate the work undertaken, summarise any findings or recommendations, acknowledge limitations and make suggestions for further work.
References		Use a recognised referencing system and be consistent.
Appendices		A : Feasibility Study Appendix B : Materials used in Showcase C: Link to OneDrive directory containing Product D: Anything else (perhaps raw data...)

Chapter 7

Submission and Assessment

7.1 Assessment Criteria

The criteria are designed to align with the University's graduate outcomes. These are:

1. Apply skills of critical analysis to real world situations within a defined range of contexts;

2. Demonstrate a high degree of professionalism, e.g. initiative, creativity, motivation, professional practice and self management;

3. Express ideas effectively and communicate information appropriately and accurately using a range of media including ICT;

4. Develop working relationships using teamwork and leadership skills, recognising and respecting different perspectives;

5. Manage their professional development reflecting on progress and taking appropriate action;

6. Find, evaluate, synthesise and use information from a variety of sources;

7. Articulate an awareness of the social and community contexts within their disciplinary field.

Your work will be marked by two members of academic staff; by default these will be your supervisor and one other academic, expert in the area of your work. The supervisor alone will mark the Feasibility Study and Product, the second marker will contribute to the Report assessment. They will assess your submission independently, before seeking to agree a mark. If they cannot agree a mark, your work will be given to a third academic to assess. The unit leader will then assign a mark, on the basis of the three assessment reports.

Student effort As a 30 credit unit, the Project requires that you undertake 300 hours of work. These are allocated as 25% (75 hours) summative assessment (direct production of materials yielding marks), 10% (30 hours) directed study (meetings with your supervisor, lectures, drop-in sessions) and 65% (195 hours) of student-centred work (independent research, design, development and testing). Given the number of weeks available, you should seek to consistently spend approximately 10 hours each week working on the Project. This includes time spent over the Christmas and Easter vacations.

Feedback Formative feedback will be given informally in the supervision sessions, and also formally on the assessed components. This will occur through Moodle and subject to the normal three-week feedback deadlines.

7.2 Re-assessment Arrangements

Should a student be determined by the examiners to have failed to meet the pass mark for the Project (this is 40% overall), they will, in completing the free-text assessment feedback, provide a list of aspects of the project which need to be amended to reach the 40% level. Should a student fail to submit their project, a mark of zero will be recorded and no feedback given. The feedback will include a recommendation on the nature of the re-assessment process.

In a change from previous yeas, there will be two phases of re-assessment. In the normal course of events students can expect to be informed of the re-assessment decision on 21/06/19, with a submission requirement by 13/07/19. Students likely to be re-assessed should, however, be aware of this some time earlier, on the basis of the assessment feedback. A second round of reassessment will then if necessary apply between 02/08/19 and 22/08/19. Support will be given by the student's supervisor and Program Support Tutors both face to face and electronically. If necessary, the Project unit leader will nominate a new supervisor for the re-assessment period.

If a student is required to repeat the Project overall, with or without attendance, this whole set of instructions will apply. By default the student will be required to undertake a new project, with a new supervisor.