

CSC4008 Digital Transformation: Software Design, Management & Practical Implementation

Student Handbook 2018-19

1. Module Co-ordinators

The module coordinators are

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2. About the Module

The rapidly changing technology landscape offers many opportunities with regards to developing software to help with management of the world around us. From analysing opportunity, identifying innovation through delivery of solutions, the modern software developer must be capable of working collectively within a professional and social setting connecting the workplace and the client. This group based module investigates how innovation can be embedded within the software design process in the delivery of a practical solution that addresses all potential user needs.

3. Pre-Requisites

This group-based module is only available to students enrolled on either the MEng in Computer Science, the MEng in Software Engineering or the MEng in Electronics and Software Engineering degree programmes.

4. Course Contents

Opportunity Analysis, Entrepreneurship and Innovation, Business Planning, Modelling and documenting software design; Software Design principles and patterns; Software Architecture; Modern approaches to software design; Legal Social and Ethical considerations, Software Project and Team Management.

5. Learning Outcomes

Students will

- i) Have a good knowledge of market evaluation, opportunity scoping, background research and software design related to a modern commercial setting.
- ii) Gain the ability to evaluate systems in terms of architecture, general quality attributes and possible trade-offs presented within the given problem.

- iii) Gain knowledge of the commercial and economic context of the development use and maintenance of computer-based systems.
- iv) Be able to frame the opportunity within an innovative business model outlining the overall requirements i.e. model and analyse the extent to which a computer-based system meets the criteria defined for its current need, use and future development.
- v) Recognise the legal, social, ethical and professional issues involved in the exploitation of 36 computer technology and be guided by the adoption of appropriate professional, ethical and legal practices
- vi) Be able to apply analytical skills within a team to a practical commercial opportunity.
- vii) Understand the realisation of software requirements as software designs.
- viii) Appreciate how to operate and contribute as part of a team, understanding the different ways of organising teams and the roles within a team in the development and delivery of an end-to-end software solution.
- ix) Appreciation of risk management within the development process from an end user, commercial, team and individual perspective.
- x) Deploy effectively suitable tools for the construction and documentation of computer applications and to use and apply information from technical literature

6. Skills

After completing this module students will have a knowledge of opportunity analyses, business modelling, and commercial delivery of software against a created set of requirements.

7. Project Details

Aims:

- Work collectively to develop an innovative industrially informed IT solution.
- Revolutionise estate management with products and services employing available data.

Digital transformation relates to the potential strategic transformation of business and organisational activities, processes, competencies and models to take advantage of changes and opportunities offered by a mix of accelerating digital technologies. In groups, students will identify the need for and develop a commercial grade system with potential for delivering transformation.

As an example, within the general area of Internet of Things (IOT) there is a growing need for initiatives around smarter buildings. Students could therefore work cooperatively in groups in the identification of drivers for intelligent buildings and the delivery of an innovative commercially driven software solution.

Once in groups students will be encouraged to investigate potential solutions to a range of presented areas within the area of transformation. Background research will be expected to be undertaken in the chosen

area bringing together information, existing practices and development risks, thus facilitating the generation of innovative ideas. Groups will subsequently develop a software product within a methodology and framework that encapsulates innovative and commercial standards while addressing the legal, social, ethical and professional issues involved.

Input will be provided by local companies in terms of understanding the commercial realities of developing and delivering innovation within the software design and delivery process. Teams will be encouraged to think creatively and embed innovation within all aspects of the solution development process. The resultant systems produced will represent a coming together of awareness of customer requirements, available data, creation of new data, current practices and innovation.

As part of the assessment students will be expected to assess their ability to work as part of a modern software development team within a commercial setting e.g. both critically analyse the software produced, each other's performance and their own contribution to the project. This will be achieved through a process on intra and inter assessment. Students will also be assessed in relation to their understanding of legal, social and ethical issues and how these relate to the software development process, including the commercial and economic context of software development, peer review and risk management.

Your objectives are

1. Work as part of a team
2. Plan, manage and execute a software engineering project
3. Understand Commercial and Industrial Setting
4. Identify potential opportunity and scope solution
5. Plan product development
6. Delivery of MVP and future plan
7. Appreciate, legal, social and ethical aspects

8. Lectures

Lectures will include a range of topics such as how to do background research, market evaluation, and opportunity scoping; how to deliver a software design within a modern industrial setting having developed and managed requirements; how to choose a software architecture and know the possible trade-offs presented within the given problem; knowledge of the commercial and economic context of the development use and maintenance of computer-based systems; how to frame opportunities within an innovative business model outlining the overall requirements; the legal, social, ethical and professional issues involved in the exploitation of computer technology. Be able to apply analytical skills within a team to a practical opportunity

Appreciation of risk management within the development process from an end user, commercial, team and individual perspective.

Deploy effectively suitable tools for the construction and documentation of computer applications and to use and apply information from technical literature.

9. Data Sources

We will provide links to some data sources, but you may find others and even invent some (within reason).

10. Visiting Lecturers

We will carefully selected interesting and informative guest lecturers from local companies and from investment agencies. These are not so easy to schedule so they will appear in different timetable slots. Some will talk about technology that you could use, others will talk about innovation and startups. We would like to see content from these used in your final process and product, if suitable.

11. Assessment

Background and Plan:	20%	Background Research and Innovation Plan to submit week 4 Introduction, Background Research, Opportunities, data sources, possible features, Benefits
Design:	20%	Software Process Choice, Software architecture and design to submit week 6 Create Design Document identifying individual contribution
Solution:	40%	Report outlining solution delivery, critical analysis of solution, team and individual performances. Lessons learned. Week 12
Pitch	20%	Presentation and Demo week 13

More details are given below.

- The Background and Plan are designed as individual pieces of work. You should come up with
 - Opportunities,
 - data sources,
 - sensors,
 - possible features,
 - use cases (6 pages)
- The Design Document is a group effort (15 pages) and should contain
 - User Stories
 - Software Process to be used and why
 - Toolset
 - Software Architecture Document
 - Appendix: Individual Contribution
- The Solution document is a group effort should contain
 - Background
 - Scoping and market evaluation

- Project planning
 - Software Realisation
 - Documentation
 - Product Roadmap
 - Legal, social and Ethical Implications
 - Critical Analysis and Lessons Learnt
 - Potential Business Context and Future Planning
 - Details of Individual Contribution
- The Pitch will be a demonstration and presentation of your business and technical solution.

12. Process Management

It is up to the team to manage their own process and product development. We mandate the use of GitLab – available under the EEECS self-service site and you must give Dr McCollum and Dr Greer access to the repository. We will use this to monitor progress and assess contributions later. Please keep a list of your commits and the commit ID in each case.

There are other recommended tools

- EasyBacklog – to manage requirements and delivery
- Trello – to visualise progress (or taiga.io)
- Slack – to communicate with team members (or Microsoft Team Management)
- Others as you see fit

13. Submission Format

All written submissions should be as PDF and should be submitted via Turnitin. A link will be sent to you closer to the hand-in date to facilitate this.

Documents must:

- be prepared using a word processor,
- Use Times New Roman 12pt font,
- Have a page number on each page,
- Have a Justified Layout with 2.5 cm (one inch) margin on all sides,
- Must have a line spacing of at least 1.15 lines,

A template for guidance will be provided.

Please read your submissions carefully and check document spelling using spell checking tools. The main text should not exceed that stated for the submission.

The Turnitin service facilitates electronic hand in and storage but also allows you to check for plagiarism. Be aware that this service detects and highlights any text that is similar to existing sources. You will have a chance to review and correct the document in TurnItIn before finally submitting.