Strategy and Design of ICT Services

Teaching guide
Activity Plan

Academic year:	2011/12
Term:	3
Project Name:	Strategy and Design of ICT Services
Subject code:	21751
Course:	Telecommunications Engineering (Telematics)
Number of credits:	4
Total number of hours:	36
Timeframe:	
Year:	Third
Type:	Optional
Period:	3rd Term
Professors:	Andrew Mackenzie

Subject description

- **Academic year:** 2011/12
- **Name of subject:** Strategy and Design of ICT Services
- **Code:** 21751
- **Type of subject:** Optional
- **Qualification / Course:** Telecommunications Engineering (Telematics)
- **Number of credits:** 4
- **Student hours:** *36*
- **Timeframe:**
  Year: Third Year
  Type: Term
  Period: Third term
- **Professors:** *Andrew Mackenzie*
- **Department:** *Information and Communications Technologies*
- **Group:** *Not applicable*
- **Teaching language:** *English*
- **Building where the subject is taught:** *Roc Boronat*
- **Timetable:** *Tuesday (8:30 to 13:30)*
  Wednesday (10.30 to 12:30)
  Friday (12:30 to 14:30)

Introduction to the subject

The objective of this course is for the students to acquire skills in analysing business and user needs, taking inter-related strategy and design decisions and defining the plans and processes required to build successful ICT (Information and Communications Technology) services that are the basis of businesses.

It will teach these aspects of determining strategy and decision making in the environment of developing an ICT Service, where the business is built on technology. These technology and development related decisions need to be taken based on target customer needs, business model, core competencies of the company, available skill-sets, funding available and the service development, operation and maintenance costs.

The Strategy and Design of ICT Services course will include theory, but will also illustrate it with specific case studies that will be discussed in class, with student participation a requirement.

It will use the principle of Project Based Learning (PBL), where students learn by doing. Students will work together in groups of 4-5 to define an ICT service that a business can be built on (i.e. it is the basis of the business, not an internal IT service), then continue to analyse aspects required to build and operate it, taking decisions about architecture, technologies employed, what to do in-house and what to outsource, and create a plan to build and operate it. They will exercise the subjects covered in class, working as a team to produce intermediate deliverables that are also presented in class and a final plan and presentation.

The subject studied has a strong practical emphasis that is directly applicable in professional life, as most ICT Service Projects will involve considering many or all of the aspects covered in this course. For this reason we recommend that students should approach the subject with particular interest, endeavouring to practice the concepts presented to the full in their project work. It is even advisable to study part of the subjects in greater depth than that required in order to pass the assessment, as this will lead to higher level professional qualifications in knowledge that is in great demand and highly valued in today's society.

Students are encouraged to approach the projects as if they were an entrepreneurial idea they are pursuing outside of the University and that they apply the topics covered in the course as if their future business idea depended on it. This approach will develop skills that will be useful to the student in their professional life, whether as an Entrepreneur or not.

It does not focus on software programming or detailed software design or specific software design methodologies. It does cover software development processes, especially those that relate to how the development project is “designed”, technology chosen, skills-sets to employ/out-source and process choices.

Prerequisites for the subject

There are no formal prerequisites in terms of the subjects that must have been passed during the students' education to take the subject, apart from those necessary to register for university.

The subject assumes a basic knowledge of software development and project management.

The student is expected to have a positive attitude towards teamwork and a willingness to actively participate in class discussions.

Given that the subject is given in English, and that participation in class discussion is encouraged, the student should have a reasonable level of comprehension of spoken and written English.

In many of the work activities it is the students themselves who have to define the specific tasks to be carried out, the specific problems to be solved and provide the references, procedures and methods for resolution – thus active participation and initiative is a requirement.

Skills to be obtained in the subject

General skills	Specific skills
Instrumental 1. Information gathering, analysis and extracting conclusions. 2. Goal Definition. 3. Decision making. 4. Oral and written communication, including presenting decisions and plans. **Interpersonal** 5. Collaboration and Teamwork 6. Compromise. Reconciling multiple opinions and ideas into one, team, project which all individuals support. 7. Critical reasoning. **Systemic** 8. The ability to apply theoretical knowledge to practice.	Characterizing potential users, gathering user input and needs and representing as 'personas' to design for. Business Model definition and communication (high-level) using Business Model Canvas. Technical decision making based on Users, Business and Technical criteria.

Assessment

Since this course is based on teamwork, under normal circumstances all members of a group will receive the same grade.

- The professor reserves the right to adjust grades of under-performing group members on an individual basis, due to lack of attendance to sessions, lack of participation in class or lack of contribution to the team work.

Teams will deliver and present intermediate deliverables plus a final deliverable and presentation. The final mark will be determined:

- 60% on the intermediate deliverables and their presentation
- 40% on the final deliverable and its presentation

The deliverable and presentation will be evaluated using the following criteria:

- On-time delivery of deliverables
- Communication and teamwork
- Application of theory, extensiveness of research and data gathering and analysis
- Structure and appearance of deliverables
- Well reasoned decisions, supported by data, analysis, conclusions and comparison to alternatives.
- Overall credibility and convincingness
- Appearance, structure, clarity and quality of presentations (visual and spoken), adherence to time limits.

Each team will be asked to nominate a team leader/spokesperson, who can bring to the attention of the professor cases of team members not contributing sufficiently. Obviously, it is preferable that such problems are resolved internally in the team and not brought to the professor to arbitrate. If such a case does occur, the team members will be asked to assess individually the contribution of all other team members. The results will be aggregated by the professor and marks adjusted accordingly and a warning given to the student(s) in question.

Each student must ***attend to a minimum of 80% of the sessions*** including theory, practices and tutoring sessions. A list will be available in each session in order to sign. When this condition is not met (attendance < 80%), the student will fail the subject.

Contents

Assignment

The assignment of this course is to conceive an ICT Service which will be offered to customers as the basis of a business. The service will consist of a web/internet component that is delivered to consumer or business users, coupled with a client application in some client device (Mobile phone, tablet, computer, console, TV, etc).

During the course, teams will identify and describe the target users, define a business model and build a strategy and plan to develop and operate the service exercising the theory given in class (see the Content Modules section below for details) to create intermediate deliverables during the course.

Finally, teams will combine all the aspects covered into one final presentation to be given in class.

Content Modules

User Centered Design

The objective of this module is give an introduction to the subject of User Centered Design and to make the projects user-centric from the start. It will produce a 'persona' (an archetypical user representing their target users) that can be used to keep the customer real and the customer needs alive in following stages where they might be forgotten otherwise.

- Theory
  - User Centered Design – a review of methods
  - Defining 'personas'
- Student work
  - Identification of users and their needs
  - Description of target users and a 'persona' to characterize them

Business Model Definition

The objective of this section is NOT to go into depth either in business models or the Business Model Canvas, but to have a common framework to capture aspects of the business model and force definition of a business model that will be used to drive decision making in later blocks.

- Theory
  - Introduction to Business Model Canvas
- Case Studies
  - Discuss examples in class
- Deliverables:
  - Generate business model for project and describe using Business Model Canvas
  - Describe offering, Target user segments

Skill-sets and Core Competencies

- Theory
  - Core Competencies
  - In-house, subcontracting, Outsourcing
- Deliverables
  - Defined set of core competencies desired for the company
  - Skill sets to have in-house
  - List of activities that will externalize and why
  - Cost structure by type of activity

Service Demand and Delivery

- Theory
  - delivery models
    - owned / leased hardware
    - on—site / hosted / cloud based servers
    - cost structure, people, skills-sets and staffing implications of each
  - Capacity planning
    - Demand curves and prediction
    - examples
    - problems of being under dimensioned
    - problems of being over dimensioned
  - Cloud computing
    - economic advantages of cloud, advantages and disadvantages
    - comparison of IaaS, PaaS, SaaS
    - comparison of AWS, GAE, Azure, etc
    - languages, tools, lock-in, alternatives...
- Project Deliverables
  - Create a demand graph
  - compare solutions for their project and choose one
  - implications on skills, hiring, plans, costs, toolsets and languages, lock-in risk
  - Service delivery plan for project
  - cost estimate for their service

Client Development

- Theory
  - Selecting target client platforms (mobile, which mobile, phone and/or tablet, game consoles, which?, PC which OS, TV...)
  - How to develop to cover multiple platforms.... multiple efforts, any shared code? Common skill sets, joint/separate teams, cross-platform development
  - Look at web app, HTML5 local app, native, cross platform development tools...
- Case study of client applications
- Deliverables
  - Definition of target client platforms and how they will develop for them, teams, tools, languages, etc

Development Planning

- Tutorials by group, reviewing their plans to date and helping them structure a development plan and make sure they have all the relevant content in it and are exercising the aspects covered in theory to date.

- Deliverable: Project plan with
  - Service description, main features
  - Architecture diagram and description of major components
  - Project Phases, Phase goals, Checkpoints
  - Activities by phase, Gantt schedule
  - Development teams and responsibilities
  - Total cost estimate for development activities
  - List of HW, SW, tools to buy and cost (for development)

Quality and management of risks

- Theory
  - Gated lifecycle with pass/fail criteria
  - Different ways to help improve quality, at different stages of the project lifecycle.
  - Testing: why test, different types of test by lifecycle and where/who does it.
  - Continuous integration and test, regression testing, etc... quality planning? Deciding what to test
- Project Exercise

Software Engineering Processes

- Theory
  - Software Configuration management/Version control
  - Defect tracking
  - Managing development in parallel with maintenance...
  - SW Maintenance and Evolutionary development
  - Quality processes: Continuous integration, Regression testing, release processes, production staging, etc
- Project Exercise

Intellectual Property

- Theory
  - Overview of main license types (Open Source and a closed source), characteristics of main open source licenses.
  - Using open source in your project, pitfalls, etc.
  - Why do companies open source software, fit with their business plan and strategy.
- Case Study
- Project Exercise

Planning for Maintenance and Updates

Having a product and service that can be monitored and updated after release needs to be designed into the product and the plan.

- Maintenance and release processes for a service - Case Study
- Project Exercise

- Theory: Analytics and Monitoring
- Case Study: Review of analytics tools for mobile clients
- Project Exercise

Methodology

The approach on which the subject is based is project-based learning, by which the student assimilates knowledge by means of its application to an assignment (see previous section) which structures the fundamental learning blocks of the subject.

The course consists of these main types of activities:

- **Theory**: Delivery in class of prepared material, aimed at knowledge transfer. Will consist of theory plus presentation of examples.
- **Case Study**: Professor will present a problem or example (usually based on a real life example) which the class will discuss, discussing aspects of it, considering alternatives and how it is relevent to their project. Student participation is a requirement.
- **Tutoring**: Unstructured time spent with project groups to help clarify doubts they have about theory, how to apply it to their project and aimed and consolidating theory and keeping projects on-track.
- **Work outside the classroom**: A number of hours are set assign for teams to work on their project outside the classroom, applying theory to their project and creating material for presentation in class.
- **Class Presentation**: Both individually (initially) and as a team, work created outside the classroom (both intermediate deliverables and final presentation) will be presented in class in presentation format. The intermediate deliverables form the basis for the project presentation, which after iteration based on later theory and deliverables (due to the interdependence of decisions) will be completed and presented in class.

Information Sources

8.2. Bibliography

"**The Concept of Core Competence**", by C.K. Prahalad and Gary Hamel, Harvard Business Review, May-June 1990,

Business Canvas is taken from the book "**Business Model Generation**", by Alexander Osterwalder and Yves Pigneur, Published by Wiley.

"**What is strategy?**" By Michael E. Porter, Harvard Business Review, November-December 1996, Product No. 96608
http://www.ipocongress.ru/download/guide/article/what_is_strategy.pdf

"Exclusive: a behind-the-scenes look at Facebook release engineering", online Article by Paul Ryan, ARS Technica.
http://arstechnica.com/business/news/2012/04/exclusive-a-behind-the-scenes-look-at-facebook- release-engineering.ars

8.4. Teaching resources

- Slides
- Articles and Case studies
- Models of documentation to be submitted

8.5. Tools.

The Moodle tool will be used for communication between students and teaching staff:

- The teaching material produced by the teaching staff and complementary bibliography articles will be available, as well as models of the documentation to be submitted by the students.
- Both the project and practical work done by the students will be submitted.
- The partial and final grades will be published.
- The relevant warnings for following the subject will be published also in Moodle.