

# Advanced Higher Computing Science



## Planning & Analysis: All Units

### Pupil Notes

Name: \_\_\_\_\_

# PLANNING & ANALYSIS

## FEASIBILITY STUDY

The basic purpose of a feasibility study is to work out if the proposed expenditure of time and money is likely to be worthwhile and whether the objectives of the project can be actually be achieved.

There are four main areas of feasibility:

- Technical
- Economic
- Legal
- Time

### Technical Feasibility

Is it technically possible to create a solution with the available technology?

Does the technology exist just now?

What resources are required or have to be acquired?

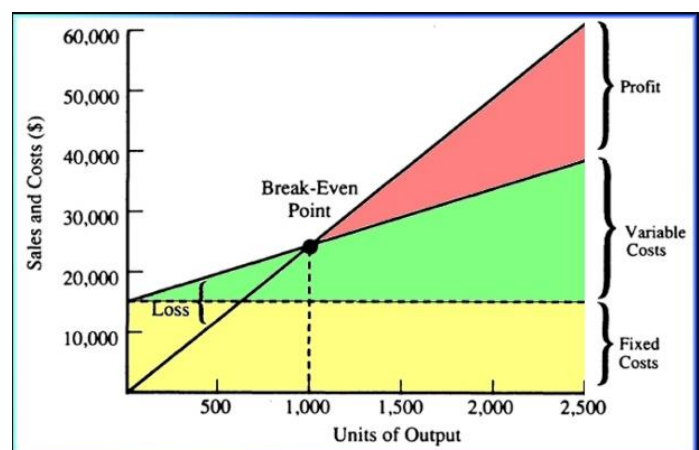
How much training will staff require to use the new system?

### Economic Feasibility

Is it possible to complete the project with the budget available?

Is the cost of creating the project justified by the financial reward of doing so (cost-benefit-analysis)?

When is the 'break-even point'? This is when the new system stops costing money and starts to make money.



Setting up a new computer system is an investment and involves capital outlay. The costs of a new system include:

- The costs of acquiring it in the first place
- The costs of installing it
- The costs of maintaining it which also includes training.

## **Legal Feasibility**

Can the solution be created and adhere to existing laws?

How would the new system affect contracts and liability?

Are health and safety issues in place?

Would the system be legal under such local laws as the UK?

Are there any Data Protection Act issues?

What are the software licensing implications for the new system?

## **Time Feasibility**

Is there enough time to complete the project?

Are the right people and resources available when required to deliver the project on time?

How long will the proposed system take to develop?

Will it be ready within the specified time-frame?

When is the best time to install?

## USER SURVERYS

User surveys gather information about:

- What features potential end-users of a product would like to see provided
- How they will use the product
- How they are likely to access the product
- What platforms they are likely to use.

Information from user surveys is analysed to identify:

- Requirements
- Scope
- Constraints

Results of the analysis are used to create the draft requirements specification. This is a document that you will be required to create for your project in Advanced Higher.

### EXAMPLE OF USER SURVEY SQA QUESTION

1. A software development company is developing a social media site called “MusicFans”. The development project is carried out over a number of weeks and part of the Gantt chart for the project is shown below.

Task	Week	1	2	3	4	5	6	7	8	9	10	11	12
<b>Research</b>													
Feasibility study													
User surveys													
<b>Analysis</b>													
Scope and constraints													
User requirements													
Business requirements													
Functional requirements													
Operational requirements													
Requirements specification													
Draft report													

- (a) User surveys for the “MusicFans” site are completed in weeks 3 and 4 of the project. Describe what information would be gathered and how it would be used in weeks 5 to 12 of the project.

2

### POSSIBLE ANSWERS

User surveys gather information about what features potential end-users of the ‘MusicFans’ site would like to see provided, how they will use the site, how they are likely to access the site and what platforms they are likely to use.

In weeks 5-10, information from user surveys is analysed to identify requirements, scope and constraints. In weeks 11–12, results of the analysis are used to create the draft requirements specification.

## SCHEDULING & RESOURCES

### Scheduling

The role of project manager, is to use their skills to turn the project requirements specification into a work breakdown structure (WBS).

These tasks are allocated as items of work to be completed by individuals or teams.

### Work Breakdown Structure

A work breakdown structure represents the hierarchy of tasks to be completed and the milestones within the project.

#### Milestone:

A specific point in the project timeline which has importance. Progress is evaluated and reported to the client. The client will receive some of the output from the project work (deliverable).

#### Sequence:

Often there is an interdependence between tasks in a WBS. This dictates the order in which the tasks can be completed.

For example: An upgraded school server could not be installed until the hardware has been purchased.

### Resources

Projects require resources in order to be completed.

Resources can be in many different forms from people to software/hardware/anything else required to complete the project.

Examples of resources would include:

- The Project Management Team
- Specialist Teams (consultants, lawyers, designers, etc.)
- Specialist Software

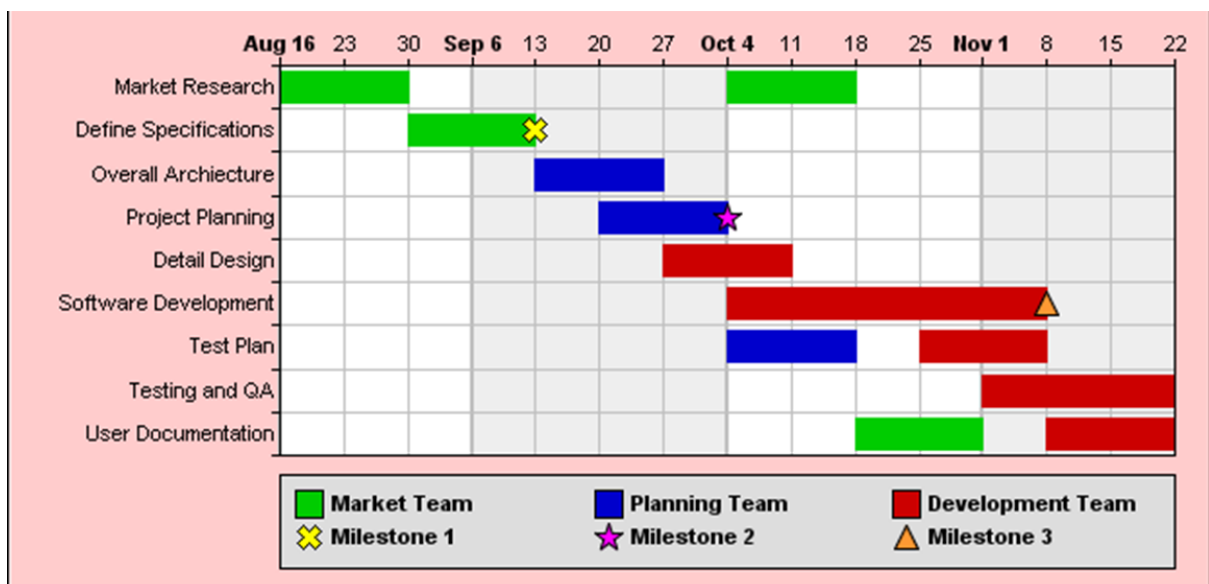
Allocating separate tasks to different teams and workers will allow the project to be completed quicker and reduces scheduling issues.

## GANTT CHARTS

A Gantt Chart is a way of showing the work breakdown schedule

The timeline is used to show:

1. When tasks begin and end
2. The length of each task or job
3. Any tasks that overlap
4. The start and end dates for the whole project



### Float:

Float is the amount of time that a task can be delayed past its earliest start or earliest finish without delaying the project.

If the earliest and latest end times are the same, the task is critical.

## END-USER REQUIREMENTS

In order for a product to be a success, you have to understand what the eventual users really need.

To get this right, the design team will:

- Interview Users
- Work with and create focus groups
- Use workshops while developing

In order to aid the design team the following documents are produced:

- Personas
- User stories
- User scenarios
- Use case

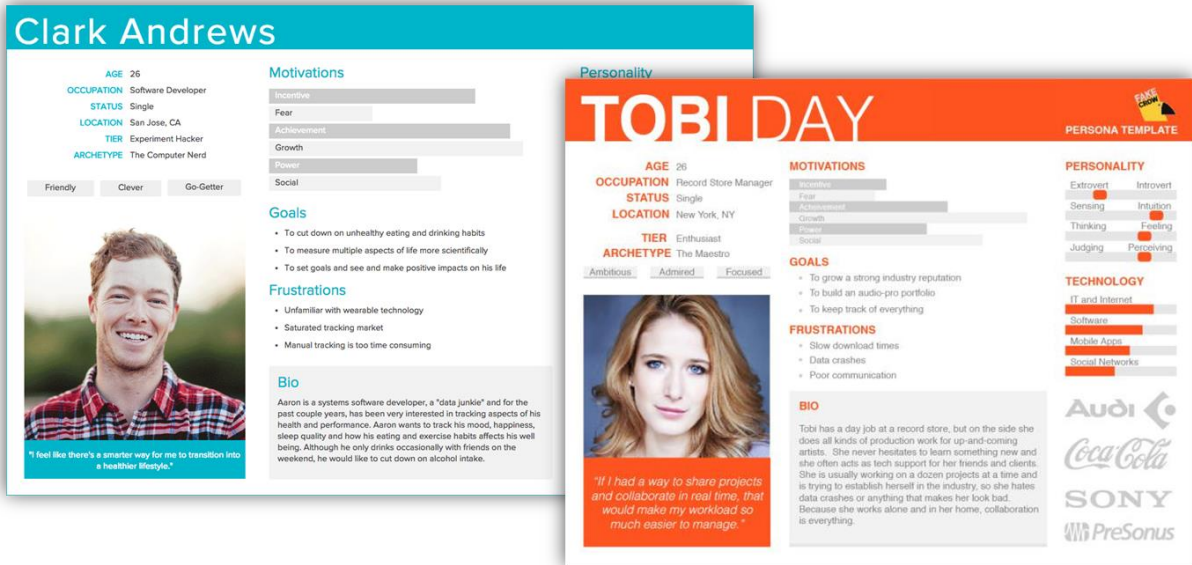
### Personas

Personas are fictional characters created to represent the different user types that the team feel are important to the project.

Personas might include the following key pieces of information:

- Persona Group (i.e. web manager)
- Fictional name
- Job titles and major responsibilities
- Demographics such as age, education, ethnicity, and family status
- The goals and tasks they are trying to complete using the software
- Their physical, social, and technological environment

A quote that sums up what matters most to the persona as it relates to your software.



## User Story

A user story is a brief statement that identifies the user and their needs.

The user story will provide clearly stated details about a job that the user will be doing.

One persona may have more than one user story developed around it.

## User Scenario

A user scenario expands upon your user stories by including details about how a system might be interpreted, experienced, and used.

Your scenarios should anticipate the user's goal, specify any assumed knowledge, and speculate on the details of the user's interaction experience.

## **USER SCENARIO & USER STORY EXAMPLES**

### **User Story 1**

As an HR manager, I want to browse my existing tests so I can recall what I have in place and figure out if I can just reuse or update an existing test for the position I need now.

### **User Story 2**

As an HR manager, I want to send a draft test to the functional manager so I make sure I've covered the right topics on the screening test.

### **User Scenario**

Max has been helping his father manage the 'Hughes Inc.' memorabilia shop in beautiful Coatbridge since he graduated from University a decade ago. In the last year, Max's father has retired, leaving Max in charge. Their only commercial aftershave bottler (to capture Mr Hughes essence), which Max's father purchased before Max began working with him, has broken down. He suspects that the hydraulic pump lever is broken. Max manages to locate the operator's manual for the bottler, and searches the web for the manufacturer's name and the model number. He finds several listings for his bottler online, and chooses the first one to view. On the bottler's listing page, he finds a link to a PDF of the owner's manual. He reads through it and finds a diagram showing the hydraulic pump and the part number for the lever. But there is nowhere on the page he is viewing that indicates he can order this part. He clicks a link to contact the manufacturer, who he hopes can point him in the right direction. One of Max's long-time clients is expecting to pick up an order of 4000 bottles of aftershave in two weeks.

## SCOPE, BOUNDARIES & CONSTRAINTS

### Scope

In simple terms scope is what is to be included in the project.

It involves determining and documenting a list of specific project goals, deliverables, tasks, costs and deadlines.

### Boundaries

The project boundaries should be the features that are related to the project, but they are not included in the scope. This avoids confusion and the thought that there is something missing in the project, and will also alleviate the fear of some missed requirements.

*Example 1:* Let's say that you are working on an Question and Answer website, typically every Q&A website have a ranking feature but the client does not want this feature, so you mention this in the project boundaries section in your scope.

*Example 2:* Let's assume that your project is to construct a 4 story building. For one reason or the other, the building will not include an elevator, so you mention this in your scope, since it is assumed that all buildings nowadays have at least one elevator.

### Constraints

Constraints are the limits imposed upon a project.

These constraints may influence how you manage your project and may even determine whether or not you decide to proceed with your project.

### EXAMPLE QUESTION

Radio Lowden plays songs from the years 1990 to 1999 inclusive. The songs played by the radio station must have featured in the official UK top 40 singles chart from these years.

(a) Using the above example, explain the terms scope and constraints.

2

### ANSWER

*Scope* – what is to be included, in this case, for example, songs from 1990 to 1999 inclusive

*Constraints* – the limits imposed, in this case, for example, only songs from top 40 singles chart.

## **FUNCTIONAL REQUIREMENTS**

Functional requirements deal with what the system should do or provide for users.

They include description of the required functions, outlines of associated reports or online queries, and details of data to be held in the system.

## UML CASE DIAGRAM

Unified Modelling Language (UML) provides a standard way to visualise, specify, construct, and document the analysis and design of a software system.

UML is a pictorial language used to make software blueprints that can be used to model software and non-software systems.

To model a system, it is important to capture the dynamic behaviour of the system. Dynamic behaviour is when the system is running or operating.

The purpose of a use case diagram is to capture the dynamic aspect of the system. Use case diagrams:

- are used to gather the requirements of the system
- are used to get an outside view of the system
- identify the internal and external factors that influence the system
- show the interaction among the requirements as 'actors'
- aid communication between the client and the developer

Use case diagrams consist of four components:

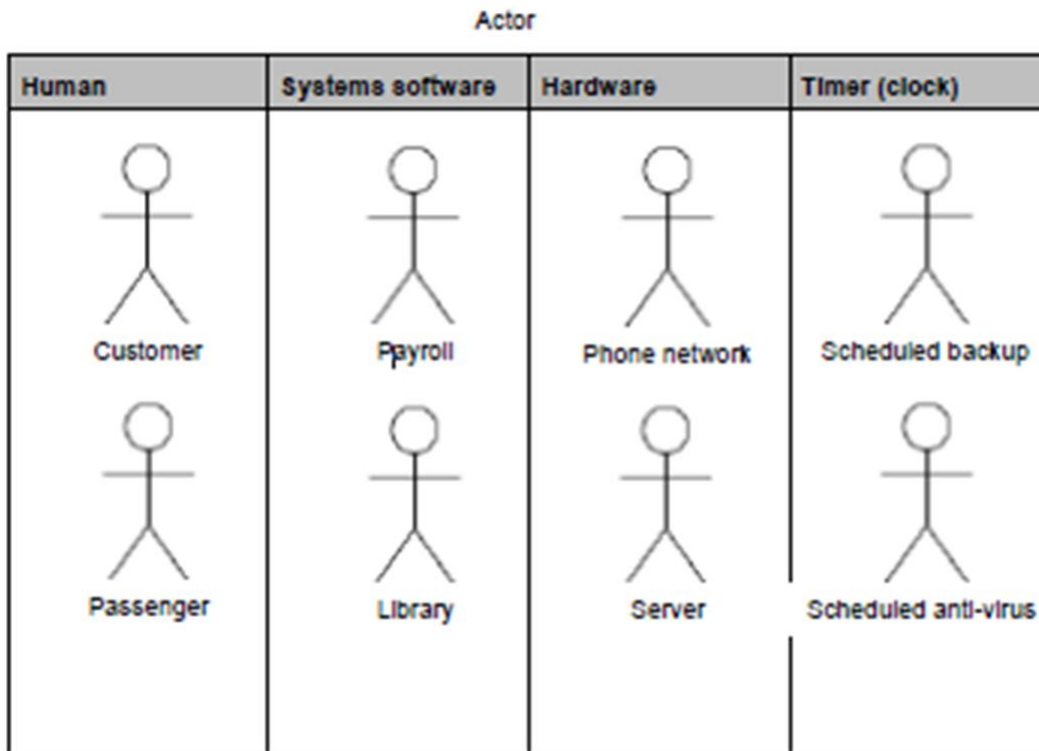
1. a system boundary
2. actors
3. use cases
4. relationships

### System Boundary

In a UML case diagram, a system boundary is shown as a rectangle. All components of the use case diagram are shown inside the system boundary.

The system boundary represents the limits of the system being developed: only those actors and processes to be considered are illustrated within the system boundary.

## Actors



## Use Case

A use case describes an action (process) or a sequence of actions (processes) that must be in the system being developed.

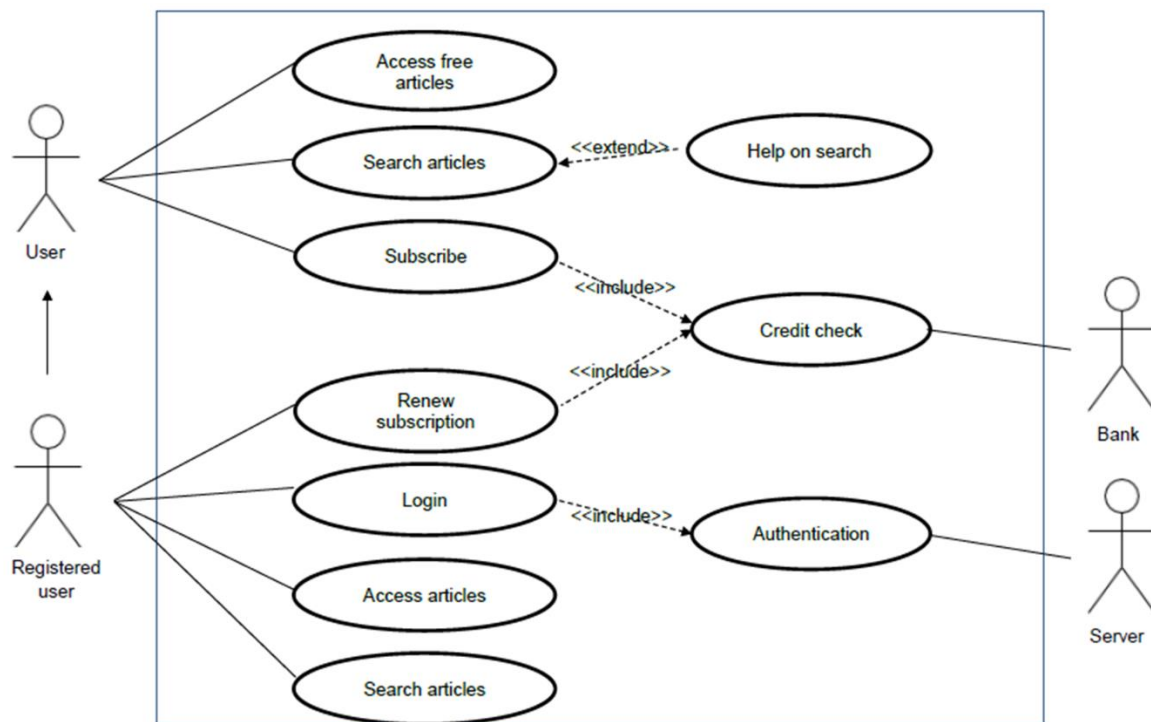


A UML case diagram shows a use case using an ellipse: - see right.

Use cases help to determine the requirements of the system under consideration, by describing the functionality that the system will provide.

Use case functionality (process) may be initiated by an actor or may be started by the system itself, providing a useful result to an actor.

## SQA EXAMPLE USE CASE DIAGRAM



### Relationships

A use case diagram can have five types of relationship:

1. Association between an actor and a use case  
Each actor must be associated with at least one use case, although it can be associated with many use cases.

A line with no arrowheads connects an actor to a use case.



2. Generalisation of an actor  
Generalisation of an actor means one actor can inherit the role of another actor. The descendant actor inherits all the use cases of the ancestor.

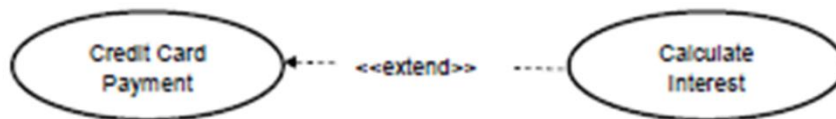


A line, with a single solid arrowhead pointing at the ancestor actor, connects a descendant actor to the ancestor actor.

### 3. Extend between two use cases

Extending a basic use case provides additional functionality to the system.

An extended use case is connected to a basic use case using a dashed line, with a single solid arrowhead pointing at the basic use case. The label <<extend>> is placed on the line.



### 4. Include between two use cases

An included use case is part of the basic use case. It is a mandatory process, as the basic use case is incomplete without it.

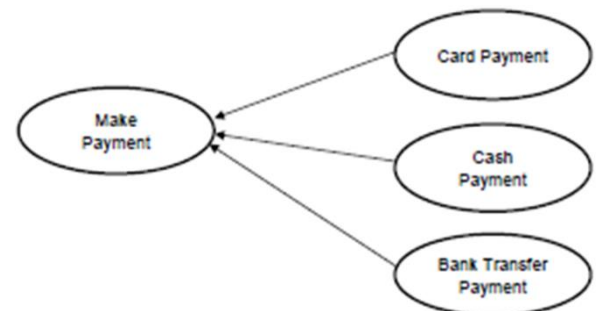


An included use case is connected to the basic use case using a dashed line with a single solid arrowhead, pointing at the common basic use case. The label <<include>> is placed on the line.

### 5. Generalisation of a use case

This is similar to generalisation of an actor.

A line, with a single solid arrowhead pointing at the ancestor use case, connects a descendant use case to the ancestor use case.



## EXAMPLE EXAM USE CASE DIAGRAM QUESTION

A new website is being developed for owners of electric cars.

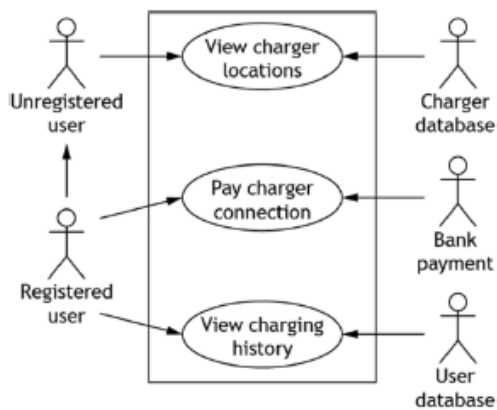
Unregistered users of the website will be able to see the location of public charging stations.

Registered users of the website will be able to connect to one of the chargers and pay for the use of the charger via the website. Once the charge has completed, registered users will be able to view their charging history with details of locations, prices and charge level after each charge.

Draw a use-case diagram for this website.

3

## EXAMPLE SOLUTION



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1 mark for 3 use cases.

1 mark for registered and unregistered actors interacting with correct use cases.

1 mark for any database actor (charger, bank or user) interacting with correct use cases.