# 3rd Year Project

The following has been produced to outline some things that I think it would be good for you to think about over the summer before you return in September. What is important is that you start to think about your project now.

If you have been allocated one of the projects that I have proposed, then it's important you take ownership of the project if it is to be a success. Whilst I have provided a general overview of the project and what I think it involves, I'm not the one doing the project, you are. As such, I very much encourage you to think about the project and what you'd like it to be and for you to define its direction. The project should remain in the same general area. However, I very much encourage you to modify it to suit what you would like to do and achieve. So, please have a think about this over the summer.

## Project aims and objectives

It is usual to express your aims and objectives for your project from the outset. They formulate what you want to achieve and how, as well as offering a means of monitoring progress and measuring success. However, there's often some confusion as to the difference between the two.

### Aims

The **aim** is what you hope to achieve, i.e. what your overall intention is. The aim gives an indication of what you aspire to deliver at the end of the project. It describes what you want to achieve and is a statement of your intentions in broad, high-level terms, emphasizing what is to be accomplished (but not how) at the end of the project.

You will usually only have one aim. You can have more, but typically no more than 2 or 3.

Think of the aim as being concerned with the purpose of your project. You may not necessarily be able to measure the success of the project from the aim(s), due to the aspirational nature of the way they are expressed, but they do provide a broad idea of what you'd like to achieve. Sometimes the aim can, in fact, be unachievable.

### Objectives

The **objectives** (you should have a number) are specific statements, or measurable outcomes or milestones that will help you achieve your aim(s).

- Objectives use specific statements that define measurable, specific outcomes, which are practical and achievable.
- Objectives often reflect project milestones, so it is often useful to describe them as things that can be completed.

- Aim to define around 5 to 6 objectives. You can have more, but don't have too many as you may find out that what you are expressing are more requirements rather than objectives.
- Objectives should be SMART, that is:
  - **S**pecific – it's important to be precise about what you are planning on doing, but make sure an objective is brief and to the point.
  - **M**easurable – It should be expressed in such a way that it will be clear when you have satisfied the objective.
  - **A**chievable – make sure it is achievable, don't attempt too much. It is better to have a less ambitious but achievable objective than an over-ambitious one that you cannot possibly meet.
  - **R**ealistic – Make sure you can achieve the objective with the resources/skills/time you have available.
  - **T**ime – be wary of how long it takes to complete an objective, take into account unexpected delays that may impact what you can achieve. Don't over-estimate the time you have available.

At the end of your project, you will need to assess whether or not you have met your objectives and if not, why not? They can be used to critically reflect on your performance, what was a success, what wasn't and why!

### Issues

There are often a number of issues when constructing aims and objectives:

- Having too many aims – usually one or two is enough. Personally, I believe one should be enough.
- Confusing objectives with goals - a goal is generally broader and longer term, much like an aim.
- Not being specific enough – don't waffle, be concise.
- Clearly differentiating the two – typically creating a list of "aims" that are in fact objectives.  They are different, but they can ultimately describe the same thing. There should be a connection.

It is vitally important that you carefully construct aims and objectives at the start of a project, as they form the foundation of the project, and its success (or failure) is measured against them. However, there may be a need to re-evaluate your objectives (maybe not the aim) as the project progresses if (for example) the project needs to change direction due to some unforeseen reason.

Here are a few (what I think) are good examples taken from past student project reports:

**Student 1**

The aim of this project is to investigate the relationship between COVID-19 and opioids by analysing Twitter data.

The objectives of this project are as follows:

- Collect a suitable and large data set of tweets that mention opioids and COVID-19.
- Implement and develop natural language processing (NLP) pipelines for performing:
  - sentiment analysis (SA) in order to capture the feelings and attitudes of Twitter users toward COVID-19 and opioid use.
  - named entity recognition (NER) in order to characterise Twitter data about COVID-19 and opioids and extract key information.
  - topic modelling in order to identify hidden themes in Twitter posts about COVID-19 and opioids.
- Analyse and interpret the results of SA, NER and topic modelling in order to determine whether they provide new insights into the relationship between COVID19 and opioid use or whether they support existing research into this topic.

**Student 3**

This project aims to examine and leverage recent developments in blockchain and smart contracts to address the problem of copyright infringement in the online content by excluding the need of a trusted third party represented by copyright and intellectual property agencies.

The following objectives have served as guidance for the development of the project:
- research current copyright and intellectual property legislation concerning digital artwork distribution
- gain a thorough understanding of the blockchain environment and its potential applications which involve the use of smart contracts to eliminate the engagement of a trusted third party
- familiarise with a blockchain development platform and the associated APIs in order to develop a blockchain based application
- find an efficient process or an algorithm that allows storage of digital artwork into the blockchain
- facilitate the acquisition of the artwork through a cryptocurrency exchange
- design an artistic and innovative user interface to envision the needs of an artist

## Requirements

It is often worth thinking about the requirements for your project, i.e. determine the user expectations for what is being developed and what features should it exhibit.

What are the functional and non-functional requirements? Remember, functional requirements basically something the thing you are developing must do, whereas non-functional requirements describe how the thing you are developing works - they reflect the performance and usability of the system being developed. The difference between these is that if you do not meet the functional

requirements, then the thing will generally not work or behave as expected. If you fail to meet the non-functional requirements, then the thing should still work, providing the functional requirements have been met, but how the thing performs will be impacted. See [1] for further information.

Like objectives, requirements give you something to measure project success against, particularly in your final report. However, importantly they provide clear statements on what you are developing will look like and how it will operate. You can think of the requirements as expanding on the objectives to give you specific measurable elements to your project in terms of functionality and usability. Think about aims, objectives and requirements as different levels of abstraction when describing the project. The aim is the most abstract statement, the requirements contain the most detail and are hence less abstract.

## Project Management

To succeed, you should plan and manage your project effectively throughout the year. The easiest way to achieve this is to produce a Gantt chart [2] where you illustrate the project schedule by charting project features/deliverables as a function of time. However, the plan will likely require continual refinement as you move through the project, particularly as you learn more about the project and what you are trying to achieve, or encounter issues that delays progress, or if you identify new areas of investigation. As a minimum, I expect you to produce an initial Gantt chart at the start of the semester and to continue using this (and adapting when necessary) throughout the project.

You should also considering adopting structured project management techniques (beyond the Gantt chart) to help you manage your time and ensure progress is made, on a weekly basis, during the project (from day 1 until you hand-in the final deliverables). Examples include the use of an Agile approach, where the project development is managed using sprints and scrums (what you will have seen in software engineering). Or you can use a Kanban board [3], where you break the project down into smaller tasks where you highlight what needs doing, what's current being done, what's been completed and issues that are halting progress. As you work through the tasks (or features) you move them between columns. There are other approaches to project management, some suitable, some maybe not so. Personally, I like the use of Kanban boards and have witnessed some strong project management skills from past students using this approach. However, in all these approaches you need to be able to clearly identify the tasks, which requires you to know your project well.

It is important to realise that, whilst the project takes place over the year, you don't have the luxury of a full year to work on your project; instead, you have roughly half that time. You start on your return in late September and usually submit the deliverables around April (Easter time, which varies between years),

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[1] https://enkonix.com/blog/functional-requirements-vs-non-functional/
[2] https://en.wikipedia.org/wiki/Gantt_chart (a one-off reference to a Wikipedia page!)
[3] https://en.wikipedia.org/wiki/Kanban_(development) (okay, another one, don't shout at me!)

so you will be working on your project from September to April. If you factor in the semester 1 exams in January then, in effect, you have roughly six months to work on your project, with most of this time (just less than two-thirds) taking place in semester 1. Hence, this is the reason why planning is so important. Whilst you are not expected to work on your project over the summer, it's essential you do some initial investigation and understand what your project is, and what it involves, before you return in September. That way, when you return you can start your project running because you fully understand your project and what needs to be done.

In the past, my recommendation is to plan your project such that you have something to deliver by the end of semester 1 – this doesn't have to be the final polished, working implementation.

## Backups

Finally, it's vitally important that you keep backups of your work. This could be using Gitlab for software version control, or simply backing up files to a remote server. DO NOT leave all your work in one place, such as your laptop or a USB memory stick. Laptops break and USB memory sticks can be unreliable. Every year we have students who lose work because they've failed to back it up. You cannot use the loss of work as grounds for mitigation. It's your responsibility to ensure you have backups. You have been warned!