HOW TO WRITE A CREST PROJECT REPORT

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1. Introduction

What do your readers need to find in a project report?

- You must define *Aims* and *Objectives* to show that you *understand* the nature of the problem being studied and what good solutions will look like.
- You describe a *systematic investigation* of the problem, and how you learned about alternative approaches to solutions. (Find out what others have done before you!)
- Describe how you *evaluated* the potential solutions against the problem description and how you decided which of the ideas was the best one to take forward for further development work.
- You should *develop* your best ideas, by adding detail and identifying possible difficulties, discussing how they might be overcome. You may report on experiments, or describe prototype hardware construction.
- *Reach a conclusion*. Explain whether you have met the original aims and objectives: if not explain why not; if you have, explain what you would do next.
- *Evaluate your learning, your successes and your failures.* So you can do better next time.

During this process you will have

- gathered information,
- identified and overcome problems,
- applied what you knew already (e.g. from course work),
- discovered new knowledge and resources while doing the project,
- reflected on what you have learned,
- communicated all this to your audience.

At the start of the Report you make a claim (that you *will* achieve something) and the rest of the report is a *structured* presentation of the evidence that you have indeed achieved it. You assemble the evidence in the *logical* sequence that make most sense and is easiest to understand.

The Report is therefore *not* a diary of the project, nor is it your lab. book, describing everything you did, whether it turned out to be a false trail or a good lead (though also keeping project diary and/or a lab. book is a “good practice”, and it will certainly help you to write your report – see Section 9.4).

More words are not better! You are not producing literature. Say what you need to say as simply and clearly as possible and say nothing more. When deciding what explanation to put in or leave out, imagine you are writing for fellow students (outside the project) rather than the CREST assessor. Think about what they know and do not know. Get friends and family to proof read your report. The best CREST report I ever saw was one of the shortest – but every word counted.

In addition to explaining the science and engineering behind your project you should also make it clear to the CREST assessor just where you have met the **CREST Assessment Criteria**. This will help you get the award, and you will not miss anything out that should have been there.

Report writing is an important skill that you will use for the rest of your professional life. Let us pick it apart.

2. The CREST Assessment Process

You must meet 11 of the 15 assessment criteria. See https://help.crestawards.org/portal/en/kb/articles/criteria-for-bronze-silver-and-gold-crest-awards (accessed Feb 2021) for the current criteria.

The same points apply to both Silver and Gold levels, though the conditions for satisfying the criteria are more rigorous at Gold level.

In addition to uploading your joint team report at the end of the project each individual on the team must also write an individual student profile explaining their particular role in the project and how they, as an individual have addressed the criteria.

3. General Points on Report Formatting

A professional report is not at all the same kind of thing as an essay. Its entire purposes to convey information as accurately and unambiguously as possible. There is generally **a claim** ("*I have solved this difficult problem.*") and an **argument** which supports the claim. ("*This is how I solved it.*")

It normally helps if you are **concise** (avoid unnecessary words) and you use the formatting of the text to help the reader see the logical relationship of different parts of your argument to each other.

- **Number the pages.** This helps when referring back to evidence from later in a report. Microsoft Word will automatically number pages if you ask it to.
- **Number the sections.** See above. Use MS Word "Styles" to do this. (This is sometimes not as easy as it should be, but is definitely worth learning.)
- **Give the sections informative titles**. It will help the assessor to see that you have addressed all the Assessment Criteria if your sections have titles (as far as possible) that relate directly to some of the criteria. (This is not possible with all of the individual criteria, some of which can only be assessed with a wholistic view of the entire report.)
- Include a **Table of Contents.** If you structure your report using MS Word "Styles" to make section headings, Word can automatically insert a table of contents for you.
- **Number all figures.** Every figure should have a number and a figure caption and should be explicitly referred to by that number from the text (explaining what relevance the figure has to the argument of the report.) If you use MS Words "Insert Figure" feature correctly, figures will automatically be numbered in sequence and you should be able to generate a list of figures (with references to the pages on which they occur) at the beginning of the document.
- **Do not waste time on fancy formatting.** The reader generally wants to get at the information in the report. He or she will not remember what fancy font you employed.
- **Use diagrams.** Number them. (MS Word will automatically number Figure boxes if you give them captions. Always give them captions!)
    - o But do not invest too much time early on polishing figures that you are then afraid to change. (If you draw them by hand, just scan or photograph to incorporate them in the electronic copy that can then be emailed to the assessor.)

All this formatting advice has very little to do with the appearance of the document and everything to do with helping the reader find his or her way around. This is the only part of word processing that it is <u>really</u> worth learning, and it is rather surprising how few professionals get round to it.

3. Report Structure

You do not have to use the Section titles that I suggest in the sub-sections below, and in fact most professional reports would probably use alternative titles, but if you use the ones suggested here it might help the CREST assessor see where you have addressed the Assessment Criteria.

3.1. Front Matter

This is the conventional name for stuff that typically appears at the start of professional report. The bulk of the report is then taken up by the **Body** and you might also have **Back-matter**, such a list of **References**, a **Bibliography**, and in long documents maybe an **Index**, and often **Appendices**.

3.1.1. Title Page

Remember to put the name of everyone on the team on the title page! The title page usually also includes (obviously) the report title, the date the report was completed, and the organisation to which the team belongs.

Good titles are important. In professional life, more reports and scientific papers are written in each field than anyone can possibly read in a lifetime. Most of us scan dozens of titles looking for something that might be relevant before finding one that rings a bell. As an author, you have that one second a reader spends scanning the title to convince your potential audience that your work might be worth a pause.

3.1.2. Abstract

This is usually the last job you do because you do not know what you have done till you have done it. Then you can think of a good report *title*, and draft a short *abstract*. It is normally a paragraph and probably just summarises what you aimed to do and to what degree it was successful.

If a good and relevant title attracts our readers attention, they may then read the abstract. Professionals may scan dozens of abstracts before finding one report that might be worth looking at in detail. If you cannot tell me in your title and one-paragraph abstract that I am likely to learn something interesting, I pass over, never to return, and your work is condemned to obscurity. You are fighting for attention.

3.1.3. Acknowledgements

Some project teams like to acknowledge the help they received from mentors, teachers and other contacts they made during the project. If you want to do this (and it is not necessary) do it here. Acknowledgements are really due if someone went significantly out of their way to help when they did not have to. They would normally be included if:

- An external organisation gives you financial support (e.g. buys or donates equipment);
- A professional or an organisation gives you access to raw data that they have collected for their own work.
- It is not necessary to acknowledge the use of data (e.g. images from the Sloan Digital Sky Survey) specifically collected with aim of later being placed in the public domain. (You would, however, note the source of data through a citation.)

3.1.4. Table of Contents

As explained above, you can make Word generate a Table automatically. (Ask your ICT teacher if you do not know how to do this.) It is useful in longer reports (say more than 20 pages) If you want to do this put it here.

If you have used a lot of figures, you can also include a list of figures here. This is not really necessary for short reports.

3.2. Main Body

We now move on to the main body of the report.

3.2.1. Aims and Objectives

This “Aims and Objectives” section (sometimes just called “Introduction”) is where you explain what you are trying to do - what you expect to achieve and so on. You need to define Aims and Objectives to meet the Assessment Criteria.

A lot of people are sometimes confused by the difference between Aims and Objectives so first we should clarify the definitions, as commonly used in both educational environment and project management.

Aims: general statements concerning overall goals, ends or intentions. Aims specify a direction of travel but do not necessarily say exactly where you will end up. So, you might say “*Our aim is to improve energy usage in the school.*”

Objectives; specific things that will be done by a particular time. Objectives are normally measurable steps on the way to achieving your overall aim. We might, for example put forward “*Objective 1: measure the total energy consumption of the school. Objective 2: measure what the energy is used for and where it is wasted.*”

Ideally, objectives should be S.M.A.R.T. (an acronym engraved on every project managers heart). That is they need to be:

Specific: it needs to be clear exactly what you expect to do - no ambiguities!
Measurable: we want to know how whether you have achieved it or not, using objective evidence that everyone would agree on.
Achievable: some things are possible and some things are not. E.g. reducing net energy consumption in the school to zero is probably not achievable.
Realistic: given the resources and time available to you, it is reasonable to expect that you will succeed with this objective.
Timely: things that arrive too late loose their value. As a minimum you will need to meet objectives before you finish your project. In practice you will probably need to do better than that. (E.g. finding out how much energy is used and where it goes is probably essential **before** working out a plan to reduce energy consumption.)

Before, however, you can state the Aims and Objectives you must spend a bit of time understanding the nature of the problem that you have been given.

If you are doing an engineering design project, your client (i.e. EdF Energy) gives you a written brief. (E.g. “*Design a method of extracting debris from a nuclear reactor.*”) Much of the information this document contains is relevant to the problem posed, such as sizes of access holes, but it probably does not make complete sense to you at this stage. This is typical of real life. You probably need to some some background research or **ask questions.**

- I would therefore expect that the next section of the Report would be a summary of what was told to you. (It would also be reasonable to include the written brief as an appendix to the Report.) What you need to highlight in this section are the details that seem to be particularly important to your line of investigation (when you are writing this, or at least during the final report revision, you already know where you have got to at the end of the project). You might well identify some gaps in knowledge at this stage: things you need to find out, either by asking the client or doing some research on the Internet.
  - *By doing this you are showing you understand the problem context (**AC2**).*
  - Your **Aim** might be stated as something like "*completing a design that has a good chance of extracting the debris quickly and at a reasonable cost.*" (**AC1**)

- You should at the end of this section be able to list the critical features that a solution needs to demonstrate to *be* a solution. At least some of your **Objectives** (**AC1**) will be a statement of the critical features that your design must have.
- When you evaluate possible solutions ("**Select Approach**" **AC3**), you will be able compare them to this list and ask how good they are against each point. These comprise the *solution evaluation criteria*, and it is usually a good idea to make them explicit (e.g. bullet points). It is useful to think about three different types of criteria:
  - Things that the solution *must* do (e.g. pick up an irregular shaped object not larger than 20cm in any dimension, and weighing less than 1kg).
  - Things that it should *not* do (e.g. "Do not introduce forbidden materials into the nuclear reactor.").
  - Quality criteria (e.g. Able to do the job in less than X hours. Costs less than £Y. Cause harm less than once in 10,000 years of operation.)
  - Most of the things you put here are really obvious, but it is surprising how often people go wrong by forgetting the obvious.

If you are doing a science project you might be given a general Aim (**AC1**) such as "*Try to understand why there are different types of galaxy by investigating how and where stars form."*
For science projects, the specific objectives (**AC1**) will always include the formulation of a scientific hypothesis that you will try to test using experimental data. They will probably include learning about specific techniques that are relevant to performing the experiments (e.g. "*Learn how to access data from the Sloan Digital Sky Survey and use it to measure colour differences across galaxies.*")

3.2.2. Project Context and Research

This naturally fits as a report section after the Aims and Objectives.

You will probably have to do a good deal of background research to understand the context. This usually includes:
- Relevant background technical information.
- Why is the problem is important? What will change if it is solved? Who will benefit? Can we define a money value?
- What have other people done before you in trying to address the same aims?

The best time to write this section of the report is *as early as possible*. If you cannot produce a concise clear statement of what you have been asked to do, you do not understand the issues, and you will probably start solving the wrong problem.

You can always **ask** for more information.My past experience with CREST projects is that **teams are too reluctant to ask supplementary questions**. (Your teacher can forward questions by email and field replies.)

In scientific and engineering reports this section may have several different names, such as “*Literature Survey”* or “*Previous Work*”. When producing a CREST report, however, I suggest you stick with “*Aims and Objectives*” to make the assessment easier.

3.2.3. Develop a Project Strategy, Plan and Organisation

These are activities that you start early in the project (e.g. while you are starting your background research) and they will continue while you do other things. (Planning goes on until the project is completed.)

The CREST Assessment Criteria say:

- (AC4) about Strategy: “*Students **communicate** a clear strategy for their project and include an outline of decisions made and their reasoning….*”
- (AC5), about organisation and planning: “*….**include a description** of how they did this…*”

So you have to talk about these things in the report. The problem is where do you put it, because at an early stage in the project you do not know all the answers. It is only possible to put in place a low-detail plan, saying perhaps that you expect to spend so much time on research, so much on implementing your project, and so much on writing up. You cannot add detail until you know exactly what you will need to do. Similarly, you can state a broad strategy, such as: “*Do some research to understand the problem. Come up with some alternative approaches. Evaluate these and select the most promising.”* However, until you select an approach for the rest of the project you cannot develop the detail of your strategy.

There are two approaches:
- Tell the story with the benefit of hindsight and out of time sequence. So, you might have a section which just describes your initial plan and strategy, and then you explain how it changed and developed through the project.
- At this point in the report you just describe your outline plan and strategy, and promise to return with more detail when you know more (e.g. after the “Section of Approach” is completed.

Both options works, and which appears most natural will probably depend on the details of the project.

You may also wish to address **Use of Material and Human Resources (AC6)** in the same way. Firstly, what you decide to do and how you decide to do it will depend on the people and equipment you have available. If you have a comic ray detector (there is one on the roof of Marling School) you can do a cosmic ray project. If you have people on your team who are good at computer programming you can think of doing projects that involve a handling a lot of data. I think that you will need to explain at an early point how such considerations affect your choice of approach (**AC3**) but you will also need to come back to the issue and explain how your expectations worked out. As above, it could be done in one place with the benefit of hindsight - or distributed in more chronological order.

3.2.4. Selection of Approach

This can be an explicit section or sub-section in your project report.

There are often a number of different ways you might consider using for addressing your problem. (If there is only one way forwards, you need to explain why there are no alternatives.) In order to show that you have satisfied **AC3** you need to explicitly consider the options, and list the pros and cons of each, finally coming up with a reason for selecting one of the approaches.

A typical way of going about this would be to draw up a table in which the different strategies were arranged in columns and the rows would be assessment criteria such as whether they meet the project objectives - as declared earlier. You may also need to consider more general criteria such "Cost", "Technical challenge", "Skills needed", "Time required", "Value".. and so on.

It is rarely the case that one option stands out from the others. One option might be technically the best solution - but too expensive. Another might have "low risk" (because, perhaps, you can buy off-the-shelf kit) but will not do the full job.

At this point, surprisingly often, someone will say "*Why don't we see if we can combine the best bits of option A and B?*" (You might, for example, use an "off-the-shelf" robot to enter a reactor, but modify it to do things it could not previously do.)

This selection process is not a guess, but neither is it a completely logical deduction, because we cannot foresee the future. There are things we just do not know yet that will turn out to be relevant. So we make *judgements.* You explain your decision as far as possible by making claims such as "*Based on my experience and my research, I choose A rather than B, because I judged B as more complicated and therefore likely to be more expensive to build."*

Good engineers choose designs that are easy and cheap to build, easy to use and work more often than they fail. Good scientists choose problems that look hard but turn out to be soluble, and where the solution is interesting because it lets science advance. (Solving the structure of DNA immediately made many other previously very difficult scientific questions in biology now look potentially soluble.)

3.3. Implement the Chosen Solution

This is probably the largest phase of the project, in terms of time used, and also the major part of your report, in pages written. In this guide, however, it will be given the least amount of space, because it all depends on which problem you have chosen to tackle, and whether it is primarily scientific or engineering. You might use section titles like "Equipment", "Method" etc for science report and maybe "Design", "Construction", "Testing" for engineering reports.

Here your work addresses a number of the assessment criteria and in order make it easy for the Assessor you can explicitly point out where you were faced with difficult problems and explain the decisions made to overcome them. Where your proposed solutions are not simply copies of ideas on the Internet or in books, but arrived at by hard thought and creativity, just say so! Professional scientific papers are always very careful to point out where something has never been done before, or where they have produced original insight and understanding.

<u>You do not have to invent completely new things to be creative</u>. Combining existing ideas in novel ways is well-recognised by patent authorities as original. (For example, combining a computer and a touch screen with a mobile phone produced the smart phone.)

For scientific reports, the primary consideration is that you should explain what you have done in a way that would allow other scientists to reproduce your experimental results. You have, in fact, already been taught how to do this in order to produce the “write-up” of your science practical classes.

The primary element of the description include:
- A description of any equipment used or constructed. (Standard types of equipment can just be referred to generally - for example “voltmeter”.)
- Steps taken to calibrate the equipment. In real science research we are often pushing the capabilities of our measuring equipment, and we need to know whether it is telling the truth or misleading us. Public domain datasets, such as Sloan Digital Sky Survey, are usually issued with calibration information.
- The method of data collection, in sufficient detail that the reader could in principle do the same thing.
- The results collected. If the volume of data is small you can include a table here. Larger volumes (e.g. hundreds of data point) could be presented as a graph with a table of raw data as an appendix. These days it is also possible to collect very, very large amounts of data (e.g. in the HiSPARC cosmic ray detector network) and that is often stored “on-line” with a description in scientific reports of how to recover the relevant information when required.
- You must explain what the data mean and how they should be interpreted. (In particular, you should be able to show that the information is relevant to your stated objectives.)

For engineering projects, you must explain your design in detail (use diagrams) and also explain exactly how it meets the needs that you identified for a solution in the early part of the report. There should be sufficient detail that the reader can see that your design could be built and if built, that it would work.

If you do build something, you can explain any difficulties in the construction and then describe how it was tested to see whether it worked as expected.

3.4. Reach a Conclusion

Now you need to summarise the argument. Up till now, you have collected lots of information, analysed it, eliminated some ideas and selected others. This is a “bottom-up” progression from Evidence→ Answer.

You could now just summarise this process, and this is the traditional scientific approach to publication, and you will see it in the vast majority of scientific papers in the professional literature. It is rather like a detective novel: you see the evidence coming in, you are shown what it means as it arrives and how it connects together, then the final solution is revealed as the inescapable deduction from the evidence.

However, because engineers often have to make judgements when conclusive evidence is lacking and they might choose to write their report in a different way, often with a “top-down” perspective.
- I would start by restating my proposed solution,
- *then* explain (briefly) why it ticks all the boxes of the evaluation criteria,
- *then* I explain (briefly) why it is better than some of the alternative approaches,
- *then* I produce the solid evidence that backs up my detailed claims (such as calculations or even experiments with prototypes, perhaps).

That is, we start by revealing the answer, and then show why the evidence demonstrates that it is the best answer.

Both ways of doing it are acceptable, and you can even use a combination. The choice is yours.

It is also normal in the Conclusions to explain the implications of the work (both direct and indirect are recommended in **AC8**). You might think about these points:
- What do we know that we did not before?
- What techniques have been mastered? How can they be more widely applied?
- What new questions have now been suggested?
- What further work should be undertaken.

3.5. Report "Back Matter"

This is stuff that traditionally appears after everything else in the report.

3.5.1. Bibliography

A bibliography is a list of material that you have found useful in your research and that the reader may also find useful if working in the same area.

You may have used it for gaining background knowledge of a context, but it is not possible to say that a particular claim in your report relies on one particular document noted here.

3.5.2. References

A professional report that relies on information not contained within the report itself uses *references* (often called *citations*, especially by Americans). These say where the reader can find and check the information you have used to support a claim you have made.

You use a reference were there is an explicit claim in the text that you would not expect the reader to accept without further evidence. For example "*There are black holes at the centre of most Galaxies (See A Fabian, Annual Reviews of Astronomy and Astrophysics, 2012)* " You do **not** need references when it is stuff that your assumed audience would be expected to know and accept, e.g. "*Newton's law of gravitation is* $F=GMm/r^2$*"* so you do not need: "*(Newton, Principia, 1668)"*

The most recent revisions of the CREST assessment criteria emphasise that, particularly at Gold Level, students should make an effort to use **primary sources**. A primary source is a document written by the people who carries out the original research, or perhaps by the engineers who evaluated a particular design. It is usually published in peer-reviewed journals, so has been checked for scientific accuracy. **Secondary sources** are evaluations or summaries of primary sources by other people. When I need to learn about a new scientific field my first step is normally to find a *Review Article*. Professional scientific reviews are normally authored by someone in the field who is well acquainted with the relevant literature, and who is regarded as having good scientific judgement. (Just being asked to write a review for a major journal is considered a significant mark of distinction - "*We trust your abilities, understanding and judgement*.") They give you the reviewers opinion on what is important and why - but it is filtered through one person's view of the world, and another reviewer might take a different approach. You may also use **tertiary sources**, which collect information from secondary sources. School textbooks are usually considered tertiary sources, though some university level books that have extensive citation of primary source are considered secondary. (It is a fuzzy boundary.) By the time science appears in school (and some university) textbooks it is normally “part of the furniture” - so widely accepted that there is no need to cite back to the original research.

Some of your information may be Web sites, and if you choose to refer to these the normal practice is to give the URL (the website address) e.g. as in the footnote example here associated with “*Octopus Integrating Project*”[1] . You should include the date on which you looked at the site, because websites often change significantly over time, unlike scientific journals which are fixed once published. (In this document I have referred to the CREST website a number of time. This *normally* changes each year, so it will probably look different now.)

Use can a footnote (see the bottom of this page for an example), or put them all at the end of the document in a numbered list and refer to the numbers used in the list in the text (e.g. something like “See Ref. 1”, or even just “[1]”). There are a couple of other common conventions as well (e.g. the “Harvard” system as in, for example “*It is known that ..(Smith and Jones, 1990)*” where the references are then collected at the end in alphabetical order. Many universities require their students to use this format for essays and dissertations - but different departments in the same university may insist on different formats. It depends on the historical conventions in that academic area.

Any method that is clear to the reader is OK in the CREST context, but in professional life you will have to conform to the particular convention used by a journal publisher, the organisation for which you work, or your university department.

If you want to see an example of how university students are expected to cite, have a look at https://www.open.ac.uk/library/help-and-support/quick-guide-to-harvard-referencing-cite-them-right.

When you get to university, you will be heavily penalised if you use other peoples’ work without a citation. It is called *plagiarism* and it is a sure-fire way to get kicked out if you become a repeat offender. (These days most university department require electronic submission of assignments so they can do that checking automatically. They check against material on the web and also compare all the assignment submission with each other.) I know from having attended many CREST assessments that the CREST assessors expect to see proper use of citations.

4. Appendices

The report structure described above outlined a linear development – a story – reflecting the way you went about the job.

However, professional reports often contain other material that supports the work, but does not neatly fit into a storyline. For a CREST project, I would recommend at least the following appendices.

4.1. The Project Plan

Feedback from previous CREST project participants almost universally laments their team’s failure to do enough up-front planning. This tends to reveal itself when the report submission deadline is rapidly approaching and you realise how much work

[1] http://www.octopusproject.eu/publication.html accessed 01/09/2013.

there is still to do! Planning is much easier than you might think, and a little planning gives a very big return in stress-reduction in the back end of the project.[2]

The Plan normally has three main elements:

1. A list of the jobs that need to be done.
2. Allocation of jobs to people in the team.
3. Estimates as to how long each job will take.

Job estimates are usually guess-work, and almost everyone underestimates the amount of time required for an unfamiliar task (even when you think you are allowing for underestimation). However, a poor guess is better than no guess at all, because you can refine it as you gain experience on the project.

The Plan is always about the future. If something takes longer than expected (and they often do) you have less time in the future to finish the project so you have to change the plan in order to bring it in on time. Planning is only useful if you do it all the time and all the time you are asking the question "*What do we need to do next to get to the end on time?*"

The Plan will therefore certainly change during the course of the project and you may well wish to include a copy of the plan as it was at several stages, for example:

- You brief outline plan at the start of the project.
- Your revised (more detailed) plan after you have completed your research.
- The plan after you have completed the bulk of the work and you now need it to help finalise the project.

We monitor our progress each week against our plan because this is how we know whether things are going too slowly and there is less time than we think available in the future. Although all planning is about the future, we can, nevertheless, learn from the past. If you consistently underestimate the amount of time jobs take, you have better start increasing your time estimates by an appropriate amount! Beware, however, the people who say "My task is 90% complete." Many people leave the really difficult part of the work till the end and in my experience anything up to half the time can be used for "the uncompleted 10%".

My advice is:

- Open an Excel spreadsheet (do it now!). Specialist planning software is available (some for free) but it will take too long to learn and you do not need its sledge-hammer to crack your nut.
- In column 1, list the main jobs to be done. Start with:
    - Planning and project organisation.
    - Understand problem.
    - Research previous work.
    - Decide way forwards.
    - Develop ideas.
    - Write report.

  You can subdivide each of these main heading into as much detail as you like. Good planners recommend breaking down work into chunks that you are pretty sure you can do in a few hours (or at most a day).
- Now work out how much time in total all the team can give to the project (say 2-3 hours per person per week). Divide it equally between the above headings, as a starting point, and write into the spreadsheet. You should also find out the final report submission date (which is probably not flexible!), so

[2] Let me confess now: optimistic and insufficient planning is a generic trait of most engineers at all stages of their careers. We all lament it and we all promise to do better next time, but next time we realised that we could have done *even* better. That is no excuse for you not to plan: "Do more planning" is still excellent advice.

you should now be able to write in approximate dates when you need to finish each major stage.

- Now decide within the team who does what. Write names into spreadsheet so there is no argument later.
- At this point most project teams realise that they have much less time than they think to complete each part of the project. You may have to go back to your plan and reduce your ambitions in order to fit everything in.
- Things can go on in parallel: you can, for example, start writing parts of the Report early – as soon as the relevant work is complete.
- All plans change. What is past is past. All you can change is the future, and you must keep adjusting the plan to get you to the Report Submission Deadline with a completed Report. That might mean doing one or all of:
    - Not doing something you thought you might do.
    - Spending more time on the project (and less watching TV).
    - Getting people who are well ahead with their jobs to help those who are behind.
- Update the spreadsheet with what actually happened! How long did it really take? This will be very useful for Appendices A2 and A3!

4.2. Team Roles

How did you divide up the work? This can include personal contributions from each team member explaining which tasks each of you undertook and why.

4.3. Reflections: What Went Well? What Went Badly?

We always used to finish our projects in EdF Energy with an honest assessment of what we did well (and should do again next time) what we did badly (and would not do again) and note anything else learned that might be useful in the future (even if it did not contribute directly to the outcome of this project). When we start new projects of a similar type we look back at our experience archive and try not to make the same mistakes twice.

Note that the CREST assessment requires that you reflect on the experiences in the project, so you must include a section dealing with this in the CREST project report (though it can be an appendix).

4.4. Project Log (Optional – but strongly advised)

I often keep a project log (equivalent to a laboratory notebook) describing everything that I did and what happened as a result. This is useful when you want to remember the good and the bad bits at the end of the project. This becomes a permanent record that supports future learning – for example, if we need to do a similar project in the future.

Any format is OK, but I would recommend a table, with headings such as:

Date	Action taken	Expected result (e.g. how long it will take).	Actual outcome (e.g. did it work and how long did it actually take).	Learning points (e.g. “Optimistic assumptions were made. Be more realistic!”)

I cannot begin to tell you how useful this habit will be to you in *any* area of endeavour where you wish to continuously improve your performance. It is the basis of all coaching: keep practicing the things that do work and stop doing the things that do not work.

5. Final Advice

CREST teams giving feedback in the Final Assessment not infrequently wish that they had read *this* document (and related documents) more carefully, and paid attention to its advice earlier in the project. Take Note! There is a lot of useful information here and you will not absorb it all at once.