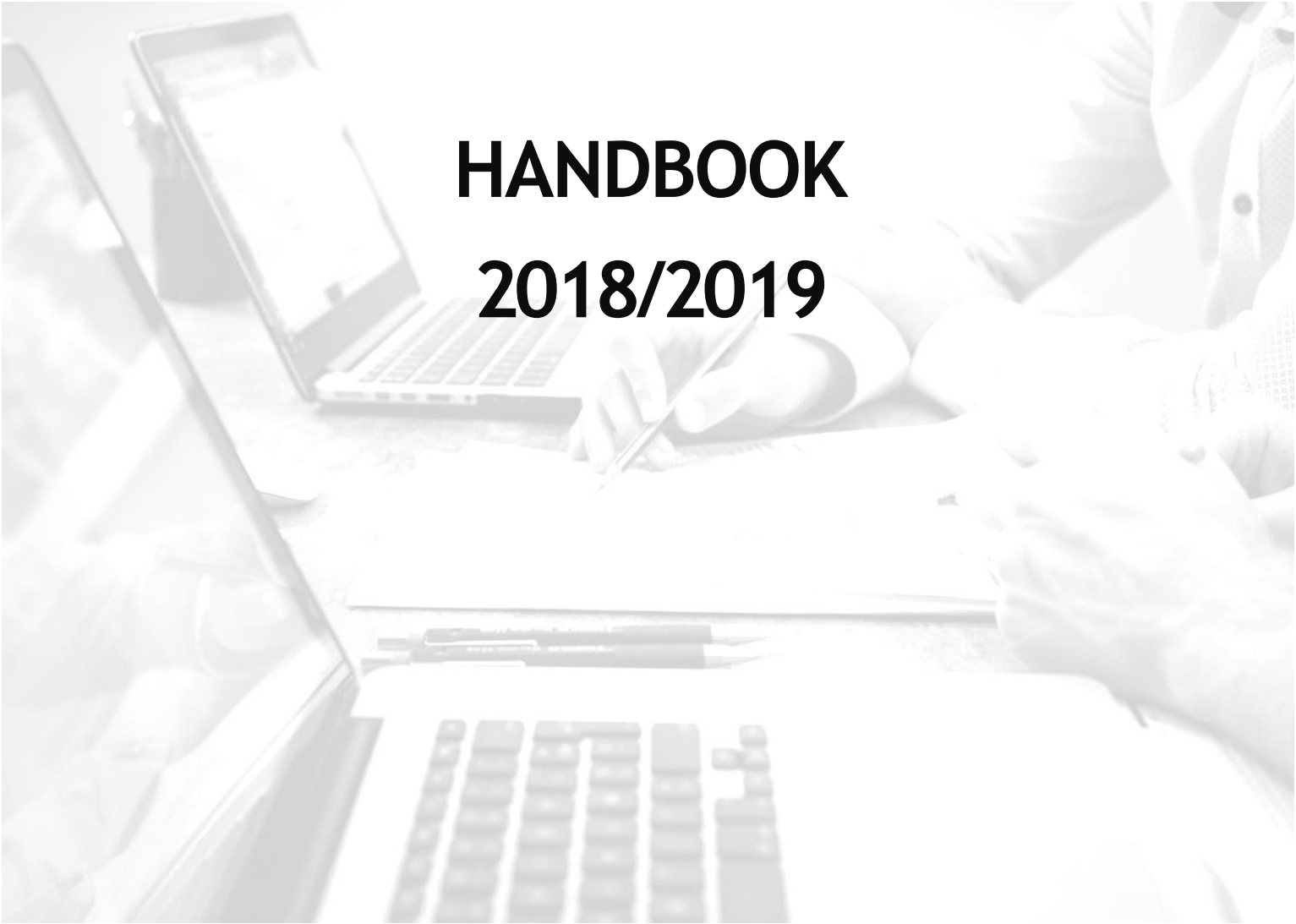# INTERNSHIP PROGRAMME

Master in Computer Science (MCS)

Master in Computer Engineering (MAI)

Master in Computer and Electronic Engineering (MAI)

HANDBOOK
2018/2019

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Computer Science and Statistics

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1 Introduction

Internship is an important part of your education as a computer professional and we want you to get the most out of it. The purpose of the internship is to further develop your understanding of how the design and theoretical aspects of computer science are applied to practical problems within a real world context. As an intern, you are participating in two different worlds, the world of work and the academic world—you have a foot in both camps, so to speak.

As part of the world of work, you will discover what it's like to work productively in the computer sector today, applying your knowledge of computer science to the challenges you meet in the workplace. Many of the subjects you've studied in college have a direct impact on what you are doing. Others go towards giving you a solid background in the general area of computing. You'll be extending and deepening your knowledge of computer science while you are working. You'll be learning what it's like to be part of a workforce: how to deal with your fellow workers, including your bosses; how to take suggestions, (including criticism); how to contribute to work teams, and so on. You're required to be a reliable and productive employee, and you're being paid.

Immersed in this absorbing and exciting world, it's easy to lose sight of the academic world, but remember that your internship is really part of your college education. We absolutely want you to the get the most from it, so we have developed a number of learning outcomes for it, and we have set you some tasks and goals that a person who was simply working in your environment would not have. In particular, we would like you to incorporate an element of individual scholarship in your technical report.

By comparison with someone working alongside you, you'll have to do more, since you're still part of the academic world. We will evaluate you on these tasks and goals to see how well you achieve the learning outcomes.

2 Practical Details

The internship period is the second semester of your senior sophister year—roughly the middle of January to the middle of August. You need to have an internship set up in industry or in a research lab. Please visit `http://www.scss.tcd.ie/internships` for information about internship opportunities. We will update it from time to time, so you should visit it periodically.

2.1   Contact Details

Internship Coordinator	internships@scss.tcd.ie	+353 1 8961782
Gerard Lacey	Programme Director	gerard.lacey@scss.tcd.ie +353 87 2396 567

The postal address of the school is: *School of Computer Science and Statistics, O'Reilly Institute, Trinity College, Dublin 2.*

2.2   Curriculum Vitae

Increase your chances of securing the internship you want by submitting a great CV. Get your CV reviewed at one of the weekly drop in CV clinics, or sign in to MyCareer to make an appointment with your Careers Consultant Marielle Kelly for advice on making your application stand out. Visit the Careers and Advisory Service for more information.

2.3   Application Process

The application process varies a bit from company to company, but the general pattern is the same: you apply for an internship as if you were applying for a job. You may have to send your applications directly to the host company, or you may have to send them to us. There may be a specific deadline, or there may be a rolling programme of application. In any case, pay close attention to the relevant requirements. Typically, promising candidates will be selected from the applications submitted, interviews or other similar events will be held and the successful candidates will be offered internships.

2.4   Dates and Deadlines

The official title of the course's you are on is *BA (Mod) in Computer Science / Master in Computer Science (MCS) and Bachelor in Computer Engineering (BAI) / Master in Computer Engineering (MAI).*

The exact dates for the placement window are:

From:	begining of January 2019
To:	end of July 2019

You can choose to continue working beyond July 31st. Note that deadlines for

submission of course work will not be moved to accommodate longer placements. Please take deadlines into account when planning your internship.

The following coursework should be handed in to Computer Science reception no later than 4pm on the dates specified below.

- Internship Goals document: Friday 1st February 2019.

- Technical Report and final version of the Reflective Diary: Friday 2nd August 2019. We will also need you to submit an electronic version of your Technical Report by the same date.

An electronic version of your reflective diary (covering the first period of your internship) should be submitted to your academic liaison by Friday 12th April 2019 (mid point assessment).

You will need to attend a Poster Presentation in April in the foyer of the O'Reilly Institute. The submission date for the poster will be a week in advance of the event. You must use the template downloadable from: `http://www.scss.tcd.ie/undergraduate/computer-science/ss/assets/PosterTemplate.pptx`, a PowerPoint document. You then send the electronic version of your poster to internships@scss.tcd.ie, and we have them printed. If you are unable to attend the poster presentation please inform the internship coordinator so that alternative arrangements can be made for the evaluation of your poster.

Between the 1st of June and the end of the Internship period you need to give an oral presentation to both your academic supervisor and your host supervisor. These are compulsory attendees, but other company representatives may also attend. It is strongly advised that you schedule this presentation early in your internship in order to accommodate holidays etc. that may be taken during the summer months.

The expected year of your graduation is 2020. All going well, you will be awarded the degrees: *BA (Moderatorship) in Computer Science* and *Master in Computer Science* or *Bachelor in Engineering* and *Master in Engineering*.

2.5   Supervision of your Internship

Your internship should be supervised by a host mentor *(typically your work place supervisor)* and we will appoint an Academic liaision in January of your internship year. On securing an appropriate internship you must return an internship agreement

form to the Internship Coordinator. On this form you must add the details of the individual who will be your host mentor or work place supervisor. You can ask the company you will be working for to provide you with these details. The company should also sign this agreement.

2.6   The Goals and Tasks of Internship

The principal aim of your internship is to achieve a set of learning outcomes. The tasks we set are to help you achieve these outcomes.

2.6.1   Learning Outcomes

On completion of your internship, you should be able to:

(a) contribute to the design and development of systems at the forefront of computer science research and critically evaluate their performance;

(b) apply theoretical knowledge in an industrial or research laboratory setting to solve real world problems;

(c) practice and further develop skills in communication, management and teamwork;

(d) practice and further develop skills in time management and reporting within an industrial or research laboratory setting;

(e) contribute to an ethical and professional work culture.

2.6.2   Tasks

The tasks to be completed are:

- Write an Internship Goals Document

- Keep a Reflective Diary

- Give a presentation to your supervisors (host mentor and academic supervisor)

- Write a Technical Report

- Present a poster on your internship

2.7 Going Abroad

You may wish to do your Internship overseas. This could be an especially valuable learning experience, however you must pay special attention to the below.

2.7.1 Finding a Host Oragnisation Abroad

The host should be a reputable organisation that holds relevant health, safety and welfare legislation. Interns should not take positions in locations prone to civil unrest or political instability. The position offered should meet the learning requirements of the Internship module which are listed above.

2.7.2 Other Things to Consider

Visas
Ensure that you have the appropriate visa for any country you will travel to and that it allows you to partake in an Internship while there. Visa applications can be lengthy so you need to start the process early. You are responsible for ensuring you have the appropriate visas in place when going abroad.

Vaccinations
Be sure to get any vaccines necessary for any countries you are travelling to. Talk to you GP for advice on vaccines and staying healthy abroad.

Accommodation
Check that any accommodation is safe. Do your research and avoid being scammed.

Insurance
Trinity College strongly recommends that all students obtain travel insurance and private medical insurance before you leave Ireland to go on your study or placement experience abroad.

Please see Chubb Travel Insurance for one such travel insurance offering identified by Trinity's Insurance brokers which all TCD students who are resident in Ireland (excluding Northern Ireland) may avail of when on a trip abroad devoted to academic study including Erasmus or Gap Placements or Work where the travel begins and ends in Ireland.

There are many other providers to choose from if you wish to check them out through the internet or through an insurance broker. The main areas to be aware of when comparing cover and the impact on the premium an insurer will charge are:

Policy Cover and Limits: these can vary significantly from one policy to another. Also, budget options can be provided online whereby cover is excluded for Personal Effects and Money.

Operative Time: the Chubb offering includes cover for work activities but some online travel providers will provide cover for holiday trips only. Maximum duration any one trip: This needs to be sufficient to cover the entire trip but some policies could restrict cover to a much shorter duration i.e. 4 to 30 days duration.

Repatriation: if a student has an accident and needs to be repatriated back to Ireland, the Chubb policy has unlimited Emergency Repatriation Expenses. Other alternative policies may have cover limits on the repatriation element. A summary of the Chubb cover can found at the link below.

Please ensure you read and fully understand the policy terms and conditions before purchasing any travel insurance cover. In addition to the above you should apply for the European Health Insurance Card.

Recommended Insurance: `www.chubbinsure.ie`

2.7.3 Before You Go

Make sure to investigate the health and safety, culture, customs and local laws of your destination.

For Internships abroad you must complete the a safety statement form which is downloadable from the Internships website and return it to the Internship Coordinator with your Internship Agreement. The Internship documentation should be submitted no later than Friday October 27th.

3 Guidelines for Writing Goals

Your internship provides you with an opportunity to put into practice the skills you have learned in college. In addition, you should have an opportunity to enhance those

skills, obtain the perspective of a work environment and benefit from a mentor or supervisor's experience and advice. The workplace creates learning possibilities, and what is most central to your individual learning is how you participate and interact with these possibilities. Therefore, in order to gain maximum benefit from your internship it is important to identify learning possibilities. A key way to so this is by writing internship goals.

3.1 Writing Goals

The goals you need to write must be specific to your internship. Identifying your goals will allow you to work out how you can benefit the most from the internship and give you specific targets to aim for. They should be agreed with both your academic- and host-company-supervisors.

Here are some suggestions for areas you should write about:

- The Technology

    - Specific tools or languages that you want to learn

- The Processes

    - The processes (i.e. documentation, validation etc.) that are used within the organisation

- The Practice

    - The craftsmanship of professional software development
    - The language of authentic practice
    - The working habits or professional software developers (e.g. communication, management, teamwork, time management, report writing, ethics)

Each goal must have a set of clear targets. These targets are the specific actions and accomplishments that must be completed in order for you to reach your goal. Targets should be 'S.M.A.R.T'.

- Specific

    - Your goals should be clear and focused. Avoid vague goals.

- Measurable

- Your goals should be measurable by you or others.
- Set measurable targets against each goal.

- <u>A</u>ttainable

  - Your goals should be achievable within the environment you will be working in, be realistic.

- <u>R</u>elevant

  - Remember that aim of the internship is to put into practice your computer science skills in an authentic environment. Write goals that are relevant to these aims.

- <u>T</u>ime Bound

  - Your goals (and the targets you will have to hit to reach them) should have a time associated with them.

3.1.1 Examples of Goals

Internship Goal One: Learn a new programming language
Targets:

1. My team use a programming language called *Jame* and my supervisor will provide materials and tutorials for me to learn it.

2. I will get a chance to try out the *Jame* environment when the team implements the program design.

Internship Goal Two: Enhance my program design skills
Targets:

1. I will work with a team in developing the input, processing and output specifications for an application to view real-time weather reports on Java-enabled cell phones.

2. I will develop pseudo-code for one of the program procedures.

3. I will participate in peer reviews and receive valuable feedback on my strengths and weaknesses.

3.2 What Next?

The goals must be reviewed by your academic supervisor and host mentor. They may suggest changes based on what is realistic and/or measurable.

3.3 Structure of the Goals Document

The goals document should be structured in the following manner:

1. It should contain an introduction to your internship

2. It must contain at least three clearly written goals

3. Each goal must have SMART targets associated with them

4. Goals should be prioritized from those which are important to those which are secondary.

4 Guidelines for Writing the Reflective Diary

4.1 Introduction

Reflection is a structured thought process that helps you learn from the experiences you are having on the Internship Programme. Unfortunately, we do not always learn from experience and reflection is the process that helps us to gain the maximum understanding from the situations and experiences we have.

As part of the assessment for the internship, you are required to complete a Reflective Diary. The aim of the diary is to help you bridge the gap between your Computer Science education and the authentic workplace practice you experience on the internship.

4.1.1 What do you reflect on?

Reflection is most effective when it is applied to areas of your experience that are memorable or significant in some way to you. For example, an incident, event or activity that:

- Went better than you expected

- Went worse than you expected

- Caused you to stop and think

- Was unexpected

- Challenged your assumptions about what you thought would occur

In short, the best reflections tend to be about those events or incidents that challenged what you thought before, presented a dilemma or left you with a sense of unease.

Within the context of the Internship you should focus your reflections on the key learning outcomes of the module:

- the design and development of systems at the forefront of computer science research, critically evaluating your own contribution

- how you applied your theoretical knowledge in an industrial or research laboratory setting to solve real world problems

- the development of your communication, management and teamwork skills

- the development of your time management and reporting skills within an industrial or research laboratory setting

- the development of your understanding of an ethical and professional work culture

4.1.2   How do you reflect?

Reflection is best thought of as a structured process, not just a description of what happened. A useful scaffold is presented below:

1. Descriptive Writing

   Write a paragraph or two that is a straightforward account of the incident, event or activity, including any context you deem relevant. This helps to take you back to the event and start the reflective process

2. The Reflection

   - During this stage of the entry you start reflecting on the event by questioning yourself; for example:

- Why did I decide to reflect on this event; what is it that makes this memorable or makes me uneasy?
- What has surprised me about this?
- What has challenged the way I think or the way I thought things would be?
- What were my assumptions about how things would be compared to how they actually are?
- What have I learnt about myself as a result of this event?
- What have I learnt about the practice of the environment I am in?

Through these questions and consciously thinking about the event, you will arrive at a set of explanations or new understandings about the incident. Think about these explanations and why you think the way you do about them

3. The Outcome

- All reflections must have an outcome and this needs to be clearly articulated and presented at the end of the reflection
- Outcomes could include:
  - a new understanding
  - a plan to research something
  - a commitment to yourself or others

Note: Events should be reflected upon in chronological order as is standard for a diary. You should write roughly a half page a day and no more than a page a day.

5 Poster Presentation

Designing a poster is a big challenge: it must be visually appealing, concise, informative and should pique the viewer's interest. It should contain an absolute minimum of text. There are lots of tutorials and suggestions online for designing really great posters, and we will offer a small prize for the very best poster this year. Here are some suggestions for topics you might cover (feel free to add or modify):

- What your host organisation does and what responsibilities and/or activities have been assigned to you by your host organisation.

- What are you doing and what have you learned in the internship. What kinds of opportunities (other than assigned duties) have you had to enhance your knowledge?

- Constructive ideas on how your internship experience might be improved. What additional classroom knowledge might have been useful before your internship experience?

Your poster will be A1 size in full colour. You must submit a PDF of your poster about a week before the poster session. Apart from its content, the poster should make it obvious who you are, who your host is and that it's a TCD SCSS poster—see `http://www.tcd.ie/local/identity/logo-downloads/` for TCD logos, etc.

6   Technical Report

Throughout your working life you will have to learn continuously from your work experience as well as from formal Continuing Professional Development (CPD) opportunities. One key skill in learning from work experience is to be able to 'step back' from the quotidian details of your work and take a more considered, more general, more high-level view of your technical work, just as you have to do to write the technical report. Seen in this light, writing the report is a step on the road to a professional level learning engagement with your work in the future. Writing like this is also a common requirement where you have a professional mentor other than your day-to-day boss. Typically, you will have to give a careful account of your work to your mentor to enable them to understand your work situation in general.

The technical report itself is a substantial document, about 60 pages, and it should cover the technical aspects of your work. Your workplace setting will determine the technical area you are involved in and your role in it.

In general, your task in writing the report is, considering the technical side of your work, to show that you have made progress in fulfilling the learning outcomes of the internship listed on page 8.

Bearing the academic aims of internship in mind, the technical report should demonstrate a level of individual scholarship beyond the level of simply fulfilling your role in the organisation. To take a simple example, if your role involves using a particular technology, you could investigate and describe—from an academic perspective—alternative technologies to those used.

Here also, as a very rough guide, is a list adapted from the British Computer Society accreditation guidelines [1]. It lists criteria and desired outcomes of a whole

programme, but it could also be used as a checklist for your technical report. Your report should show that, as a result of your internship, you demonstrate progress on a reasonable subset of the criteria listed. *It is unnecessary that your report should cover all criteria listed.* The list is intended only as a guide—it would be very unlikely that your technical report could cover all the criteria listed. Nevertheless, it would be worth checking that your report does indeed address some of them.

High level criteria

- An ability to apply the practical and analytical skills present in the programme

- Innovation and/or creativity

- A synthesis of information, ideas and practices to provide a quality solution together with an evaluation of that solution

- An awareness of wider customer contexts and the identification of problems that such contexts might deliver

- The ability to work co-operatively (for example, as a team) to deliver a significant piece of work

- A critical self evaluation of the process

Computing-related criteria

- Knowledge and understanding of essential facts, concepts, principles and theories relating to computing and computer applications as appropriate to the programme of study

- A knowledge of the mathematical and scientific principles underpinning relevant current technologies and their evolution

- Understanding of the principles of managing computing processes

- A knowledge of the commercial and economic context of the development, use and maintenance of computer-based systems

- A knowledge of the management techniques which may be used to achieve objectives within a computing context

Computing-related practical abilities

- The ability to deploy appropriate theory, practices and tools for the specification, design and implementation of computer-based systems according to customer and user needs and use innovation and creativity in a practical context

- The ability to evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem

- The ability to recognise and analyse criteria and specifications appropriate to specific problems, and plan strategies for their solution

- The ability to model and analyse the extent to which a computer-based system meets the criteria defined for its current use and future development

- The ability to recognise the legal, social, ethical and professional issues involved in the exploitation of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices

- The ability to recognise any risks or safety aspects that may be involved in the operation of computing equipment within a given context

- The ability to deploy effectively the tools used for the construction and documentation of computer applications and to use and apply information from technical literature

The report should provide a detailed description of the work you undertook during your internship, both in terms of any technical artefacts you produced, and the organisation in which you participated. With this in mind, your report should introduce technical concepts using background reference material—cite technical reports, papers, books or documents which might help illustrate or understand what specifically you were doing. You can consider your reader to be someone who is an expert in computer science, but who may not have specific familiarity with what the company you worked with does, or with the specific technologies you used to achieve your goals.

Let's take a few scenarios.

- Suppose you are part of a team developing an application for use in-house within your host company. In your technical report, you could give a background motivation for the application, the design of the application, implementation, testing, analysis, results, evaluation, etc. You could make an

academic study of alternative approaches to the approach taken. If the application is not finished, and hasn't reached the later phases of development, you could write about how it should progress; how it should, for example, be tested. You would also describe your involvement in the development—what part of the process, be it design, coding, testing, evaluation, etc.—whatever you contributed to. A similar situation would be if you were in a research group and your duties were to undertake a piece of research and do some design and implementation work based on it.

- A second scenario is where you are implementing or reimplementing parts of a legacy system. Your report could describe the existing system, taking in background theory, related work, system architecture and implementation. It could then go on to detail the approach being taken to the new work, including advantages and shortcomings of the methods used to work with legacy code. In other words, you should take a step back from the work you are actually doing and make a scholarly evaluation of the technical aspects of the the system as a whole. As in the other scenarios, you should also detail your specific role in the work.

- To take another scenario, suppose you are working in a consulting role, providing a technical service to clients, who might be in-house clients. Your job is to work with the clients in order to design a system which makes use of a technical service you provide, or to determine what you need to do to provide them with the technical service. Your technical report would comprise a description and a scholarly technical evaluation of the service, including related work, theory of operation, implementation and analysis. As in the previous scenario, the idea is to consider and evaluate, as a professional computer scientist, the technical aspects of your work.

- A final scenario to consider is where you are involved in a number of separate projects, spread out over the period of your internship. Here, your technical report would actually be a technical and academic review of each project, each of which would be necessarily shorter than a technical report devoted to just one project. You would also have the opportunity, towards the end of the report, to write about the commonalities and differences you found between the projects.

You can see a common basic structure: for each project, your report needs to have a brief motivation or overview section, a detailed technical background and/or related work section where you could display your individual scholarly investigation and analysis. Then there should sections dealing with the technical aspects of the system

you are involved with—dealing perhaps with design, implementation, operation, testing, evaluation and usage.

You should also write about your role in the work you describe.You should write specifically about what you did, what kind or arrangements were in place for working with colleagues, teamwork, development methods (if appropriate) and so on. You should write about how you achieved your own goals and targets, or how they changed over the course of the project or of the internship.

6.1   Level of Treatment

You have plenty of space in a 60-page document to go into considerable depth in your technical report. Bearing in mind the point made earlier—that you are part of the world or work and the academic world—you will have to work pretty hard to satisfy the requirements of both. Your report will certainly require you to do some external reading and research, beyond what would be needed for routine work in the area. This is to be expected—we want you to learn, and we want to see and evaluate the outcome of that learning.

You should keep in touch with your host to ensure that what you write does not breach rules of confidentiality. Company-specific techniques and practices can often be related to more generally known principles and practices, and hosts are generally quite flexible, but it's important to check with them.

7   Evaluation Scheme

- 5% Submission of Internship Goals Document

- 5% Mid-point assessment of Reflective Diary

- 15% Oral presentation to academic supervisor and host mentor

- 65% Technical Report covering the design and development work carried out by the student.

- 5% Assessment of the Reflective Diary

- 5% Poster presentation at Showcase Event

8 Acknowledgements

Thanks to Tim Savage for his many contributions to this document.

References

[1] British Computer Society. Guidelines on course accreditation.
`http://www.bcs.org/upload/pdf/hea-guidelinesfull-2010.pdf`,
September 2010. Accessed: April 26, 2012.