HERIOT WATT UNIVERSITY

Technical Writing

F21RP Dubai Week 2

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Recap (What you should know by now)

- How should my F21RP document look like (document structure)
- What is a literature review?
- How do I search for my literature(references)?
- Referencing and citation (How and when ?)
- What is plagiarism and how to avoid it?

Topic of this week (Technical Writing)

- ‘How’ to write (check slides and video of Dr Murdoch Gabbay)
  - Technical writing style should be: **clear – simple – stating facts**
  - What to avoid to win over your reader
  - Some nice examples

- So, what do we do today?

Topic of this week (Technical Writing)

- ‘How’ to write (check slides and video of Dr Murdoch Gabbay)
  - Technical writing style should be: **clear – simple – stating facts**
  - What to avoid to win over your reader
  - Some nice examples

- So, what do we do today?
  - Emphasize on important concepts related to literature review and technical writing
  - Take questions

Research Report Structure & Rubric

Indicative Marking Scheme: (Check Canvas)

Abstract, Aims, Objectives and Project description: Abstract succinctly describes project? *Introduction identifies the research gap and motivates properly the project? Does it give a very brief overview (potentially with an example) of what is going to be proposed?* Aims of the project are clear?		**10%**
Literature Review • Clarity/readability • Good and clear organisation • Appropriateness/thoroughness of references and citations • Evaluation methods and metrics discussed thorough • Critical analysis of issues *Background section that sets the foundations of what is going to be explored and/or a Related Work section describing similar efforts on the topic?*		**40%**

Indicative Marking Scheme: (Check Canvas)

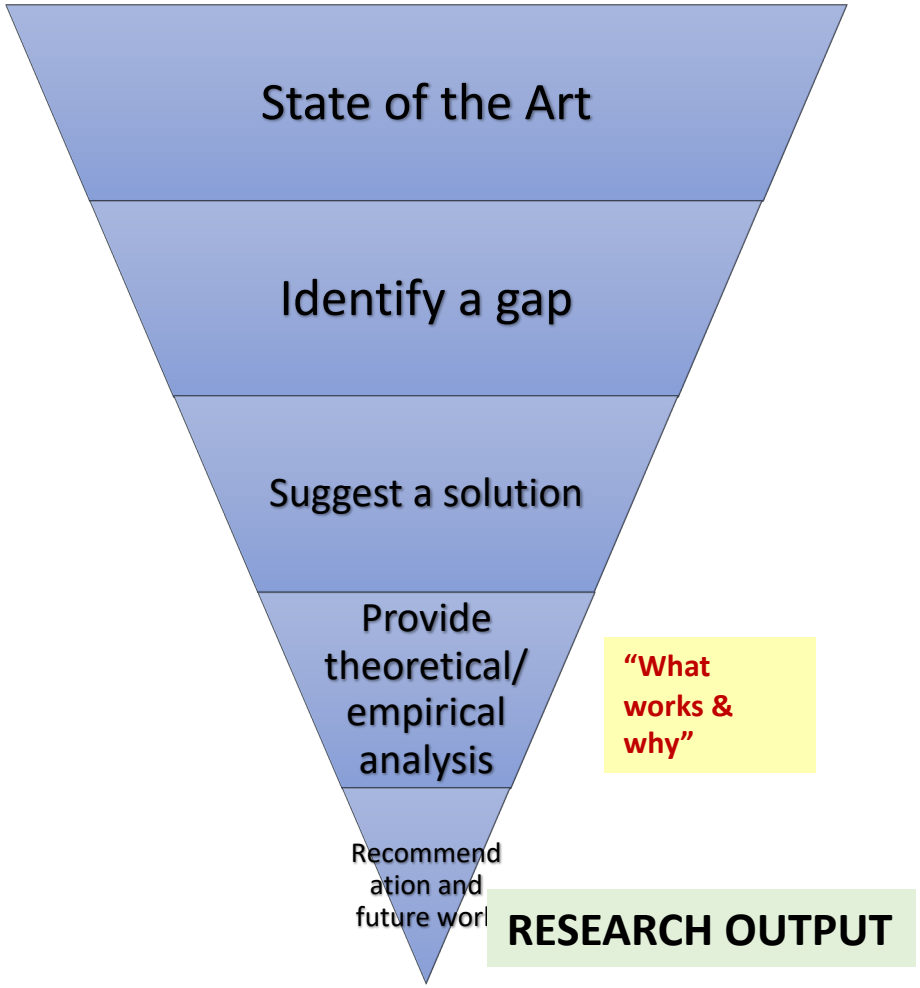
Requirements Analysis / Proposed Methodology (link to objectives) *Are project requirements clearly specified, prioritised and categorised?* Is there a section on the proposed methodology for the particular research? Are there any associated diagrams/figures? How is the proposed work going to be evaluated? Are there any metrics applicable? Is there going to be a human evaluation experiment? **[later ML based project methodology as an example]**		**30%**
Project Plan & Professional, Legal, Ethical, and Social Issues *Have the project requirements been broken down into realistic tasks on a timeline? (this should relate to your objectives and methodology)* Some sensible risk management in evidence? Are the main PLES issues of the project highlighted? Does the student show a good understanding of these issues? Has the project Ethics form been submitted? (if not, total mark = 0)		**20%**

Literature Review

…. First step you do to conduct research (after identifying your problem)

Your MSc is about conducting Research ….Research?!

- **What is it about:** **'new ideas'**
  - Advance the science
  - Create foundational knowledge
  - Highlight open questions
  - Pose new challenges
  - Bring theory & real world closer
- **How:**
  - Theoretical analysis, empirical studies, comparisons & validation of existing methods, (maybe) new models/case studies
- **Who:** Academia & tech firms
- <u>Not about developing software</u>



[Troubling Trends in Machine-Learning Scholarship, By Zachary C. Lipton, Jacob, Steinhardt, Communications of the ACM, June 2019, Vol. 62 No. 6, Pages 45-53]

Literature Review (40 marks) + Introduction (10 marks)

What is a good literature review?

- Well structured
- Written in clear and correct language (MAKE SURE TO AVOID PLAIGERISM)
- Based on a set of relevant and technically sound references

- **Content:**
  - Present a narrative of the current state of the knowledge related to your topic
  - Build on what has been done before
  - Don’t just report
  - Include critical evaluation and identify gaps
  - Put your work in the context

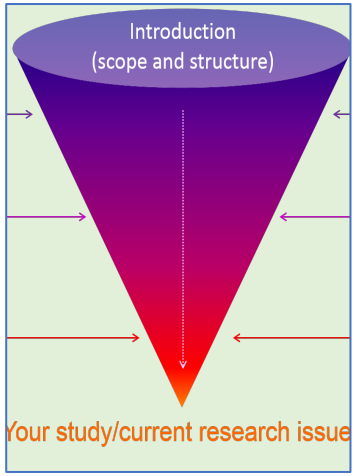
Steps to compile your literature review

1. Find your references (start by 5-10 scientific papers)

2. Read actively & take notes: **(Read for a reason)**

My tip: Identify key subjects of the area & document your readings

- Background : Importance of the topic, applications, challenges,….
- Models, techniques, approaches, ……
- Data Sets, experiments, evaluation criteria
- General results & findings
- Gaps and future work



Ask questions – Make comparison - draw links between different studies – think critically – try to identify gaps

(also you might find a thread to other important papers in the topic in reference list)

How to write your review

- Think about the structure according to the topics (consult with your supervisor)
- Make sure there is a logical flow between your sections.

- **Related work:** (report and compare between different papers)

  Create a narrative and not just a list of who did what?
  - Identify similarities (also, similarly, again, in addition,……)
  - Identify complements (moreover, furthermore, adding on, …)
  - Identify disagreement or contradictions (however, conversely, nonetheless, on the other hand,……..) – *[Writing an effective literature review, Allan Gaw, HW 2020]*

- **Critical Analysis:** Compare between methods in high-level, outline differences, give supporting evidence from literature, IDENTIFY GAPS and lay foundation for the rest of your work.

Example of creating a narrative & linking literature

- One of first researchers to investigate this problem is Chen . . .
- Smith & Jones on the other hand present …. . .
- Conversely, another study ….. .
- One researcher who agrees with Chen is . . .
- A different approach to this question looks at problems in...
- One of most relevant problems is addressed by Green . . .
- Similarly Bengio et al, have looked into the problem of ….
- A problem with this approach is . . .
- The main limitation of this approach is ……

[Writing an effective literature review, Allan Gaw, HW 2020]

Aims and Objectives

….. Write a draft & keep revising it. Finalize as you go ….

Chapter 1: Introduction

1. Background (Overview)
2. Motivations
3. Aims & Objectives
4. Outline of the Report

Aims

- **Aims** are statements of intent. They are usually written in broad terms. They set out what you hope to achieve at the end of the project.

Example:

The aim of this study is to exploit several supervised and unsupervised machine learning techniques to analyze sentiments in Emails obtained from a law firm to improve operational efficiency of the business.

The aim of this study is to exploit several supervised and unsupervised machine learning techniques to analyze sentiments using different feature extraction methods. The models are tested on two Email benchmark data sets.

Objectives

- **Research objectives** describe concisely what the research is trying to achieve. They preferably can include 3-5 bullet points to outline the accomplishments you wish to achieve through the project.

- Objectives, should be specific statements that define measurable outcomes.

- **Strong verbs -** *collect, construct, classify, develop*, devise, measure, produce, revise, select, synthesise, *compare, analyse, evaluate, investigate, explore,..*
- **Weak verbs** - appreciate, consider, enquire, learn, know, understand, be aware of, appreciate, listen, perceive

Research Objectives

- Objectives, should be specific statements that define measurable outcomes.
- **Strong verbs -** *collect, construct, classify, develop, select, compare, analyse, evaluate, investigate, explore,..*

Example1: (Sentiment Analysis)

1. Investigate several text preprocessing techniques.
2. Analyse different feature selection techniques comparing data driven and language-based features
3. Construct and evaluate classification model based on objectives 1&2
4. Compare the resulting approach to baseline model

Research Objectives

Example2: (Fraud detection)

1. Collect, analyse and prepare the data set
2. Explore and evaluate various machine learning suitable for fraud detection e.g., KNN, Random Forest, etc.
3. Explore and evaluate various deep neural networks/architectures for fraud detection e.g. RBM, autoencoders etc.
4. Compare ML and DL models and analyse the performance with respect to various evaluation metrics including training and prediction time.
5. Give recommendation and provide guidelines for best practices based on data set and learning model

Methodology (ML based projects example)

Technical description of how you will reach your objectives:

- Data collection and analysis
- Data preparation & preprocessing
- Feature extraction and evaluation
- Experimentation with model fitting and selection. Hyperparameter tuning.
- Result analysis
- Reporting and final findings
- Deployment (if applicable)

Your Supervisor

Working with your supervisor

- Every supervisor has his/her own working style
- In general your supervisor:
  - Will NOT do the research for you
  - Should NOT provide you with the references
  - Will NOT correct your language and spelling mistakes
  - Might NOT read all your document before submission

- It is good to consult/agree with your supervisor on:
  - Quality/number of your references
  - Structure of the report (Particularly structure of your Literature Review)
  - Aims, Objectives & Methodology
  - Provide him in advance with some samples of your writings.

Technical Writing

(some slides are from material Praxis course by Steve Gill)

Technical Writing style (standards)

What you write should be

- **clear**
- **concise**
- **as short as possible**
- **as simple as possible**

Every sentence you write should **make sense**.

Use short sentences. (When in doubt, use two short sentences instead of one long one.) Normal guidelines: 15-20 words.

Mistakes can annoy and distract a reader and lead him/her to undervalue the substance of what you have written.

Long Sentence….. NOOOOOO!

The supervising training organisation is obliged to work with the business or employer - and the apprentice - to design a training plan, including the training that needs to occur, how and when that training will take place, who will provide the training, and how that training will be assessed.

http://www.kerryr.net/webwriting/techniques_long-sentences.htm

Long Sentence …….YES!!

could be rewritten as

The supervising training organisation works with employers and apprentices to design a training plan. This training plan includes details of:

- training requirements,
- training delivery, and
- assessment.

Some very short sentences

Ever tried. Ever failed. No matter. Try again. Fail again. Fail better.

from *Worstward Ho!,* by Samuel Beckett

Meaning/ Content

- Report writing should be objective, or at least impersonal.
- Nowadays a shift towards the personal, with use of the first person.
- Referencing from reliable sources provides some semblance of objectivity.
- It is not enough to report facts and the opinions of other people. You must try to abstract and present **meaning**.

Standards of Technical Writing

Presentation:

- Does the report have a good professional style and quality?

Organization:

- Does the report lead you through the information in a coherent manner?

Content: Is the content good and appropriate?

Spelling & Grammar

References:

- Can you distinguish the author's words from those taken from other sources? Has an appropriate reference model been used?

Presentation

Style of a professional/technical report

- Use clear, concise and simple sentences
- Use formal language
- It should be well organized - well spaced
- Use professional looking fonts and useful figures (if needed)
- Avoid bad punctuation, spelling and grammar mistakes
- Avoid repetitions and unnecessary details
- Use proper referencing and citations
- **Include figures and reference them correctly**

Organization (ANYTHING YOU WRITE !!)

- Title, name, course, date
- Introduction
- Main body of report with multiple (headed) paragraphs
- Summary or conclusion
- A final section of references.

The organization should lead you through the information in a coherent manner

(Did you include your name, course, date in title page?)

For F21RP deliverable -consult your document layout

Content

- Tips to show some ‘depth’ in your report:
  - Include some history, comparisons, different opinions, pros & cons
  - Discuss rather than list facts (critical analysis)

- Avoid :
  - Too many quotes (Not enough of your own words)
  - Vague concepts
  - Missing explanations
  - Abbreviations and Jargons that cannot be understood by the public

Spelling and Grammar

Avoid:

Bad punctuation

Bad spelling

Grammar mistakes

Apostrophes

Long sentences

Bad structured/complicated sentences

Referencing

- Use Harvard referencing model and correct citation within text:
  - The Harvard system (author-date scheme)

(recommended ….!!)

- Choose your references from a trusted source

Around 10-20 academic references

Some Referencing Criteria

- Proper citation within text. No need for excessive or unnecessary use of quotes
- References are enough and font looks good
- Use of appropriate referencing model
- Details of references are included
- Your references are from a trustworthy source. At least 10 peer reviewed articles
- ***Figures are properly referenced***

Referencing & Citation

- Check Lecture material week 1 & University workshops. Preferred author-date system, example (HARVARD)
- Referencing and resources for report writing can be found in Library service also check Cite Them Right Online
- Look at examples for different references types (Books, Journals, Internet,……) at

macmillan citethemright

Plagiarism & Collusion

- Plagiarism and collusion (for individual work) will be severely penalised.

- Collusion: extensive collaboration leading to similar results.
- Plagiarism: unfair or inappropriate use of another's work.
- We have to report any suspected case to the dean.

- **Your reports must not consist of slabs of text pasted from web-sites.**

- *If you feel that a particular sentence sums up what you want to say, put the text in quotes and give it a reference.*
- All the same, a sequence of quotations is not a report. We want to see your own words. These are evidence that the ideas have passed through your mind.

Non-textural Content

- Technical reports often contain figures and tables.
- Give each a numbered caption. (fig1 or Table1)
- Pictures should say where they are sourced!
- Each figure/table should be referred to in the text.
- ‘One picture is worth ten thousand words’, attributed to Frederick Barnard; a North American adman.

Figures need to be referenced and explained in text.

Each figure should have a caption with figure number, title and citation to source.

In your text you would write:

Figure 1 depicts the development of microprocessors during the last 40 years. Gordon Moore, one of the founders of computer processor giant Intel®, postulated exponential growth (every 18 months the complexity of integrated circuits will be doubled) and his forecast has turned out to be pretty correct so far.

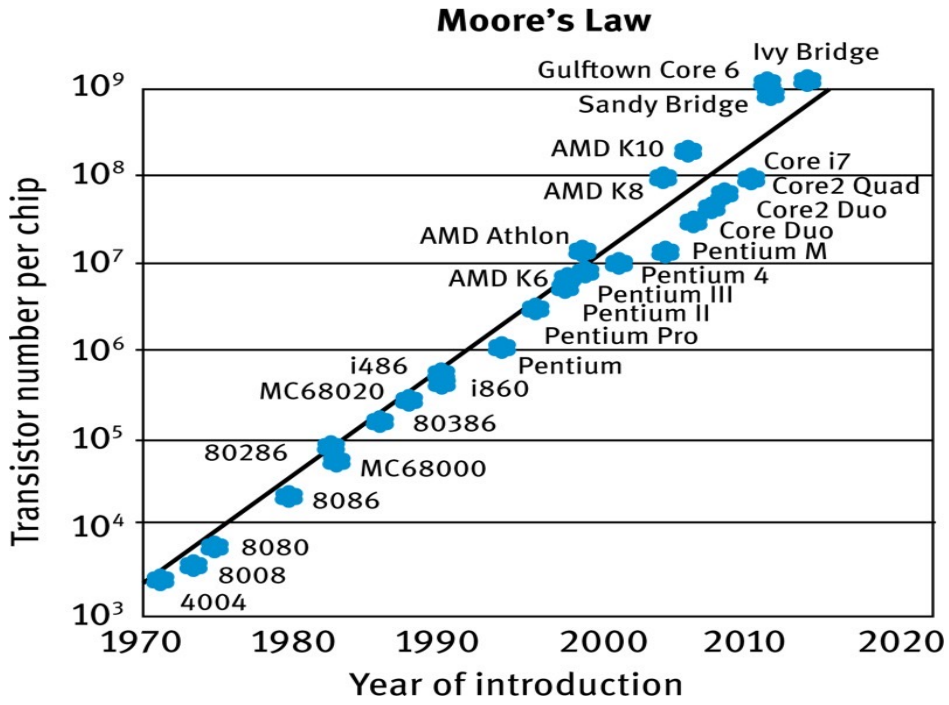


Figure 1: Explaining Moore'Law (Ostendorf and Köni, 2015)

What irritates readers

Bad punctuation

Bad spelling

Jargon

"Generally hard to understand"

Misuse of words

Unexplained acronyms

Unclear technical terms

(Guardian, July 26th 2004, report on the Plain English Campaign)

Person

The first person is ***I, me, my, we, our, etc***.

The second person is ***you***, ***your etc***.

The third person is ***he, she, they, their, his, hers, him, her, etc***.

Until recently, the first and second persons were seldom used in formal documents.

Nowadays, we are starting to be less formal.

I prefer the third person.

Using the Third Person

“The author found…” (avoiding the first person)

“Research has found …” (impersonal)

“It was found…” (passive voice)

Mostly used in scientific writing!!

The apostrophe

It's means ***it is***.

Her, ***his*** and ***its*** (possessive) have no apostrophe.

Singular possessive apostrophe, e.g. "Student's marks" means the "marks of the student".

Plural possessive apostrophe, e.g. "Students' marks" means the "marks of the students".

If you really can’t handle the apostrophe, leave it out altogether.

e.g. and i.e.

e.g. is short for exempli gratia and means "for example"

i.e. is short for id est and means "that is"

There is almost never any very good reason for using either

Other Tips

You should check your spelling. (A spelling-checker helps but is not enough by itself.)

Their (possessive pronoun)/**there** (adverb indicating place, pronoun etc.)/**they're** (they are)

From/**form** (one of many mistakes not picked up by spelling checkers)

Principal: usually a person, the head of something
Principle: a basic truth, law, idea or assumption (not a person)

To: preposition (to go) or adverb (to town)
Two: number
Too: adverb (too much, they went too)

Dependant (noun): a person who is kept or supported financially by another
Dependent (adjective) / independent

More tips

Define abbreviations once, at first occurrence (even when you think the meaning is obvious).

UK and American English are different.

- **Be consistent**

Here's a list of common mistakes:

http://www.careers.cam.ac.uk/students/work/spelling.asp

Here's another site:

http://dissc.tees.ac.uk/Mistakes/Spelling/Spell5.htm

Proof Reading

- Read your own work through slowly and thoroughly. (Reading aloud can help.)
- Get someone else to read your work.
- Does it really say what you think it says?
- Cut out words or phrases that don’t add to your argument.
- Repetition is easy to commit and easy to deal with.

The completed report

Your account should be:

- **complete**
- **well organized (chapters, sections, headings, sub-headings)**
- **clearly presented (well spaced, nice pictures)**
- **intelligibly written (meaningful sentences)**
- **without irrelevant detail**
- **without unnecessary repetition**
- **properly referenced**

Wrapping it all up

Where you should be now!

- You should have a topic and a supervisor
- You should have met or talked to your supervisor at least once
- You should have started to collect and read your references
- Your should be following on all what is happening on F21RP canvas course

- My Tips: (How to go forward) You will learn the most about F21RP write up by:

1- Carefully reading your literature*

2- Attending the F21RP lectures (1 lecture for each chapter)

3- Devoting enough hours/week to work on F21RP

4- Looking at past F21RP/F21MP reports/dissertaions

5- Check out Latex! Strongly recommended (latex template on Overleaf (Links to an external site.)),

* Refer to Andrew NG's advice to read scientific papers

Check out Additional University Support

Library Skill Hub sessions (Power Hours) covering variety of topics that are beneficial for F21RP:

- **Finding e-resources**-(e-books, journals, databases, conference reports, statistical data, etc.)
- **Literature Search –** Involves effective search related to your research topics and designs
- **Citation & References & avoiding any plagiarisms**
- **EndNote Online –** Building your academic resource library on your devices.(words)

Register for online sessions at Skills hub

- Check out F2F **HWUD Skills Hub Sessions by Dr. Ramakanta Semester 2**

Thank you!