CSCM10/CSCM10J Research Methodology

Research Report & Planning

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Scope

- Details of Initial Project Report
- Writing a Research Report
- Project Planning

Details of Initial Project Report

Initial Project Report

- Have a meeting with your project supervisor to
  - clarify the topic of your project
  - support you in your project
  - discuss and check your documents before submissions
  - discuss feedback from marking
  - supervisor is the main person to discuss the outcome

Initial Project Report

- This report contributes 15% of the mark for the module
- Approximately 2-3 pages including (about 5) references
- Submit an electronic copy as a pdf via Canvas.
- The file name should be <studentnumber>.pdf
  - Don’t worry if Canvas slightly modifies it (e.g., adds “-1” to the file name)
- You can send as a backup an email to

  cs-submissions@swansea.ac.uk
- See precise details in the Assignment Handout:

  2122_CSCM10 > Modules > Coursework and Assignments > Assignment_Handout_2022.pdf

Content of Initial Project Report

- Goal & Motivation of the Initial Project Document
  - To Familiar with proper academic writing.
  - To clarify the aims and objectives of the project.
  - To identify related work.
- The initial project report should consist of the following:
  - Clarify the nature of the project, its **aims** and/or **objectives**.
  - Result of a preliminary **literature search**, including a summary of the content of the most important articles for this project.
- Contain at least **5 references**.

Writing a Research Report

Main parts

- An academic report should have
  - A title page or a title
    - For initial project report, a title is sufficient
  - An abstract,
  - An introduction,
  - A body,
  - A conclusion
  - A bibliography or/and references.

Title Page or Title

- Should contain
  - the title of your document
  - coursework reference,
  - date of submission (for future referencing),
  - student number.
  - If you want you can provide your name
- In case of the Initial Project Report
  - The title is the **title of your project** as it currently stands,
  - Coursework Reference is **CSCM10 Initial Project Report** or **CSCM10J Initial Project Report**.

Abstract

- Can be on the title page, or put directly after the title,
- usually indented.
- Summarises in a few sentence what your document (project) is about.
- Useful for readers to decide whether or not to continue reading.

Introduction

- Introduces main concepts in the report
- Gives a motivation
- Use evidence, facts, references to support
- Briefly states what content of each major section of the body
- After reading this the reader should
  - be motivated to read the document,
  - have a good idea what the document is about, and what is to come.

Main Body

- The body is where you present the bulk of the material.
- Should be logically structured

For example:

I. *Methodology*
II. *Database(s)*
III. *Experimental Design*
IV. *Results & Discussion*

Conclusion

- The report should contain a Conclusion section in the end
  - Clearly states the conclusion(s) of the report
  - Summarises the document and reminds the reader what they have read
  - The conclusion should introduce no new topics.
  - A future work (optional)

Followed by a standardized reference/bibliography section

General Good Practises

- Report should be a **self-contained** document.
- As the reader reads it they should understand the content without needing a question, task or other description.
- Give facts, evidence, proofs, references, supporting information for your statements
- Be self-critical. It is positive to write about weaknesses of your approach.

Logical Structure

- Use sections, subsections (and subsubsections) to structure the report.
  - Example:

    1. Propositional Logic

    Propositional logic uses atomic propositions . . . . Atomic propositions can be 'glued' together using the logical connectives: and, or, implies, and equivalence.

        1.1 Disjunction

        . . .

        2.2 Negation

        . . .

    2. Type Theory.

Figures and Footnotes

- Figures should have a caption, and should be referred to in the text.
  - Usually they have numbers (for easier referencing).
  - If a figure comes from some other source, you need to state clearly the source (“Source: [3]”).
- The purpose of footnotes (in Computer Science) is
  - to provide a place for additional information
  - that is not part of the main story
  - The interested reader can choose to read it

Before Submission

- Make sure all text is justified
- Text has been spell-checked and grammar checked.
- Text is uniformly formatted (same font for text of the same category).
- References, cross references, page numbers are correct.
- Student number, assignment name, and module code should be on the title page, and is repeated on every page.
- You may or may not provide your name.

Project Planning

Before we continue…

Dr Sean Walton's talk uploaded in this week's lecture section should be considered essential viewing as an addition to this

Learning Goals

- Why do we need to do project planning?
- Understanding Software Development Life Cycles and choosing the right one for your project
- Planning your time using Gantt charts and understanding what makes a good Gantt Chart
- Using Risk Assessments to sensibly guide your planning

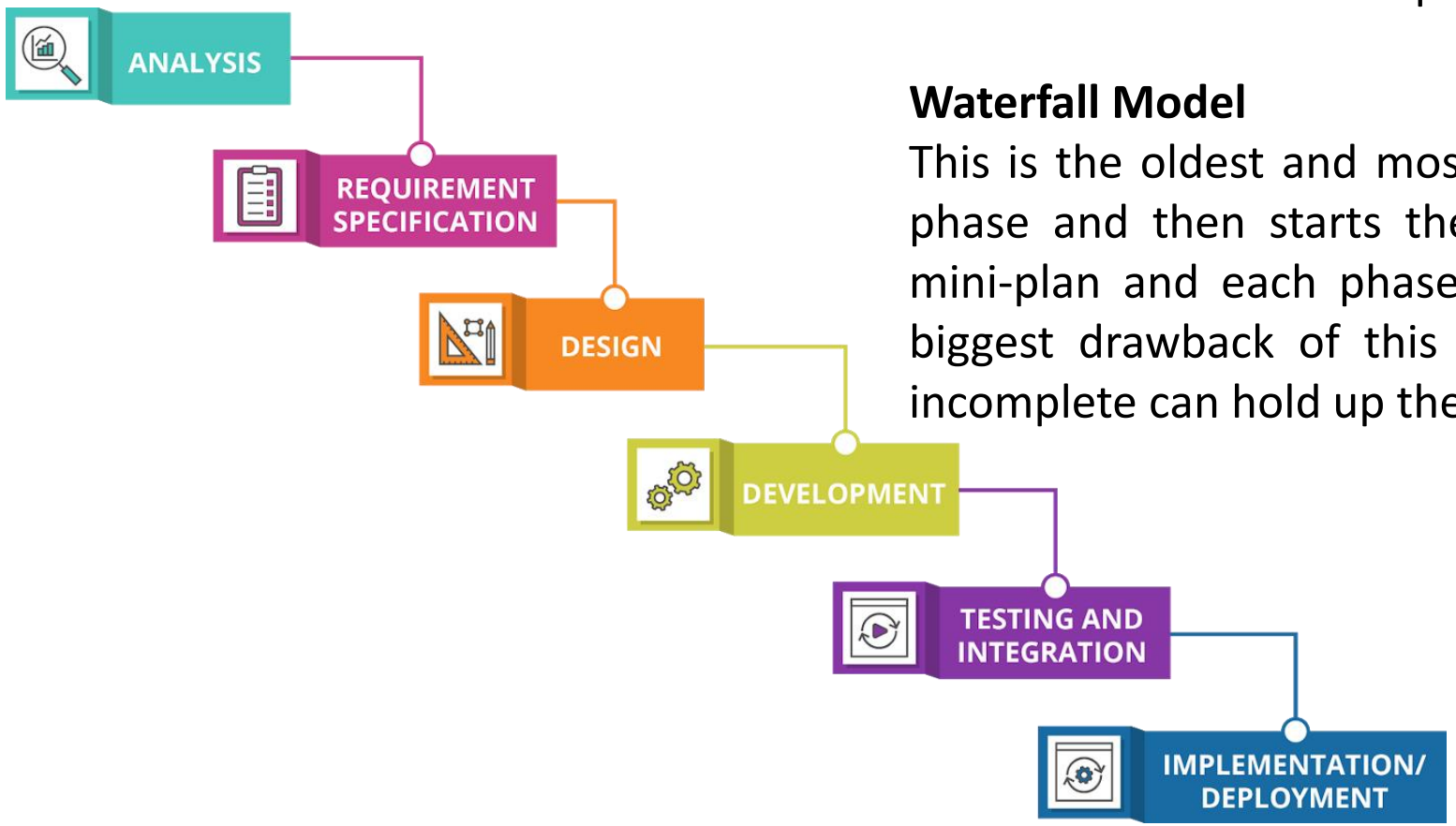
The necessity of planning

- Failing to plan is the same as planning to fail
- To avoid reinventing the wheel
- Keep the project development under control
- Easy for adjustment
- Vision of the goals
- Avoid to go astray

Software Development Lifecycles (SDLC)

- Starting with what you know
- An SDLC is a principle rather than a plan – it's an idea to help you guide how you plan out your approach to development
- An SDLC is not a substitute for thinking about software development
- If something doesn't seem to flow properly, don't blindly stick to a single SDLC
- Choosing between tools is the useful skillset

Waterfall Model



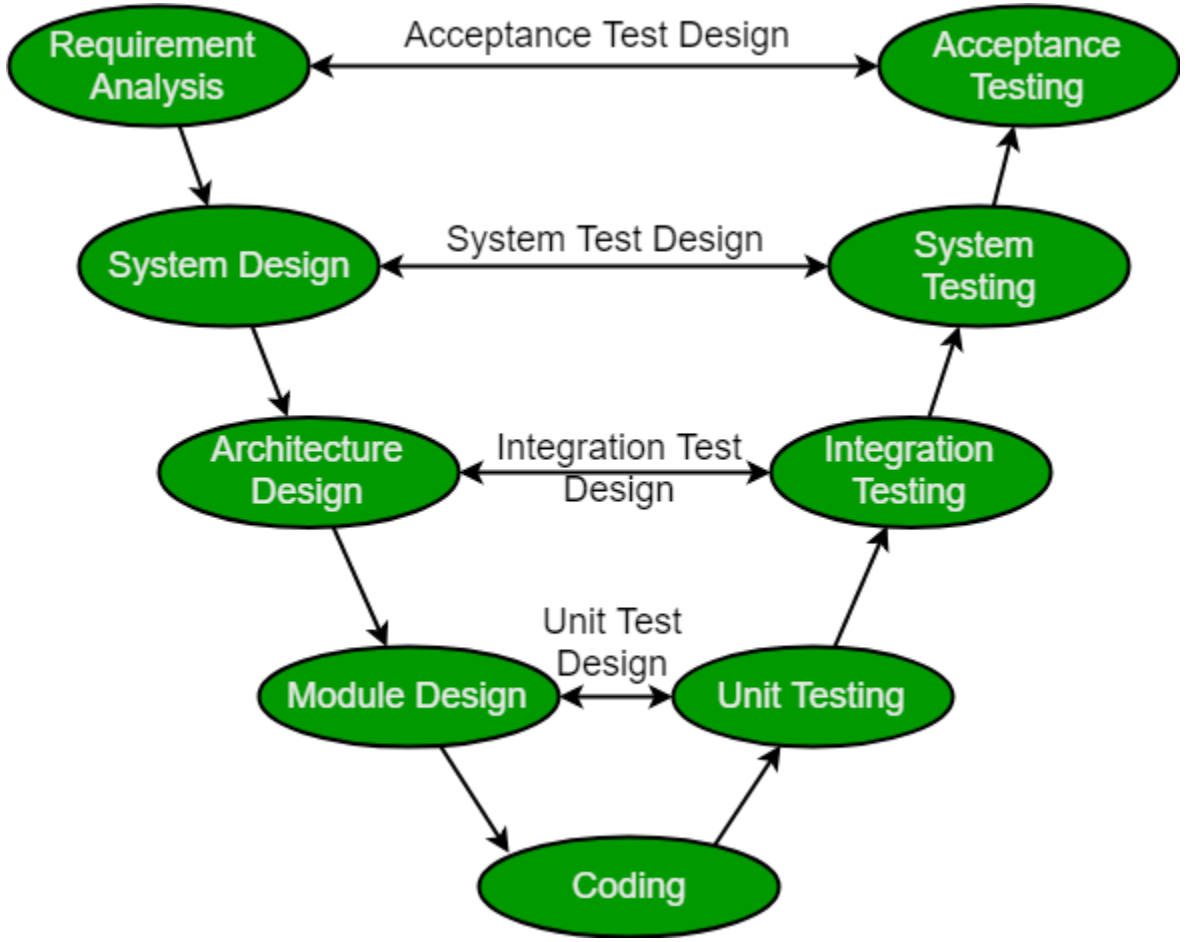
SDLC or the Software Development Life Cycle is a process that produces software with the highest quality and lowest cost in the shortest time possible.

Waterfall Model

This is the oldest and most straightforward. It finishes one phase and then starts the next. Each phase has its own mini-plan and each phase "waterfalls" into the next. The biggest drawback of this model is that small details left incomplete can hold up the entire process.

V-Shaped Model

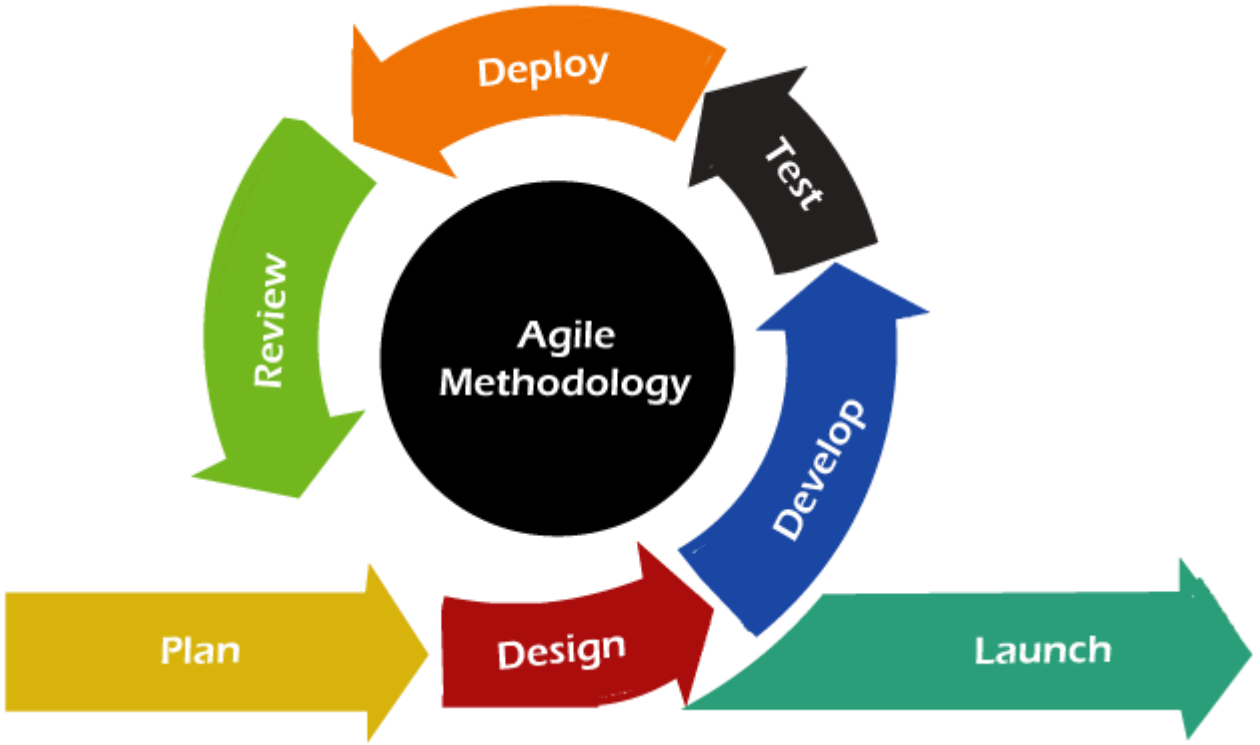
V-Shaped Model
An extension of the waterfall model, this SDLC methodology tests at each stage of development. As with waterfall, this process can run into roadblocks.



Agile Model

Agile Model

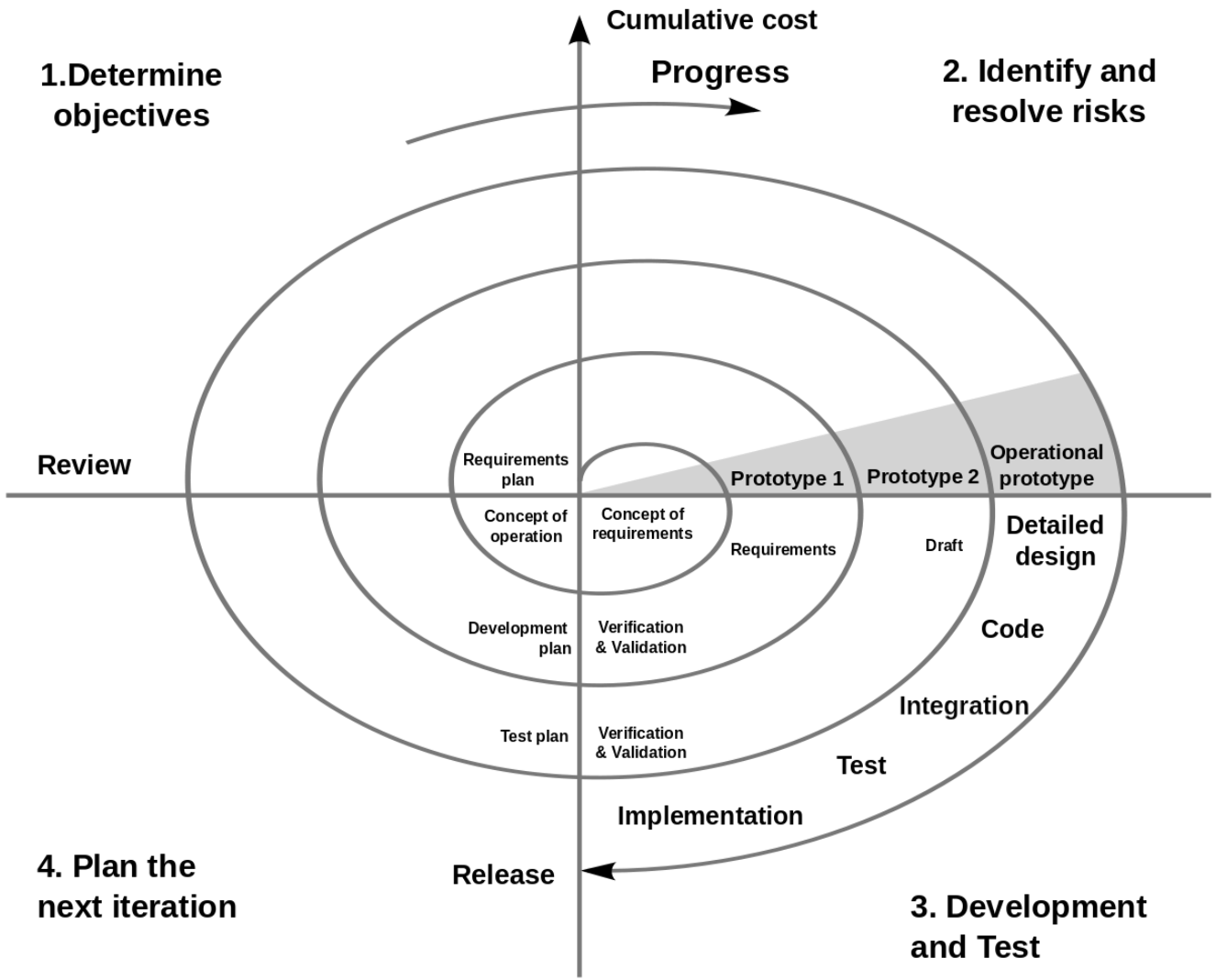
The Agile SDLC model separates the product into cycles and delivers a working product very quickly. This methodology produces a succession of releases. Testing of each release feeds back info that's incorporated into the next version. The drawback of this model is that the heavy emphasis on **customer interaction** can lead the project in the wrong direction in some cases.



Spiral Model

Spiral Model

The most flexible of the SDLC models, the spiral model is similar to the iterative model in its emphasis on repetition. The spiral model goes through the planning, design, build and test phases over and over, with gradual improvements at each pass.



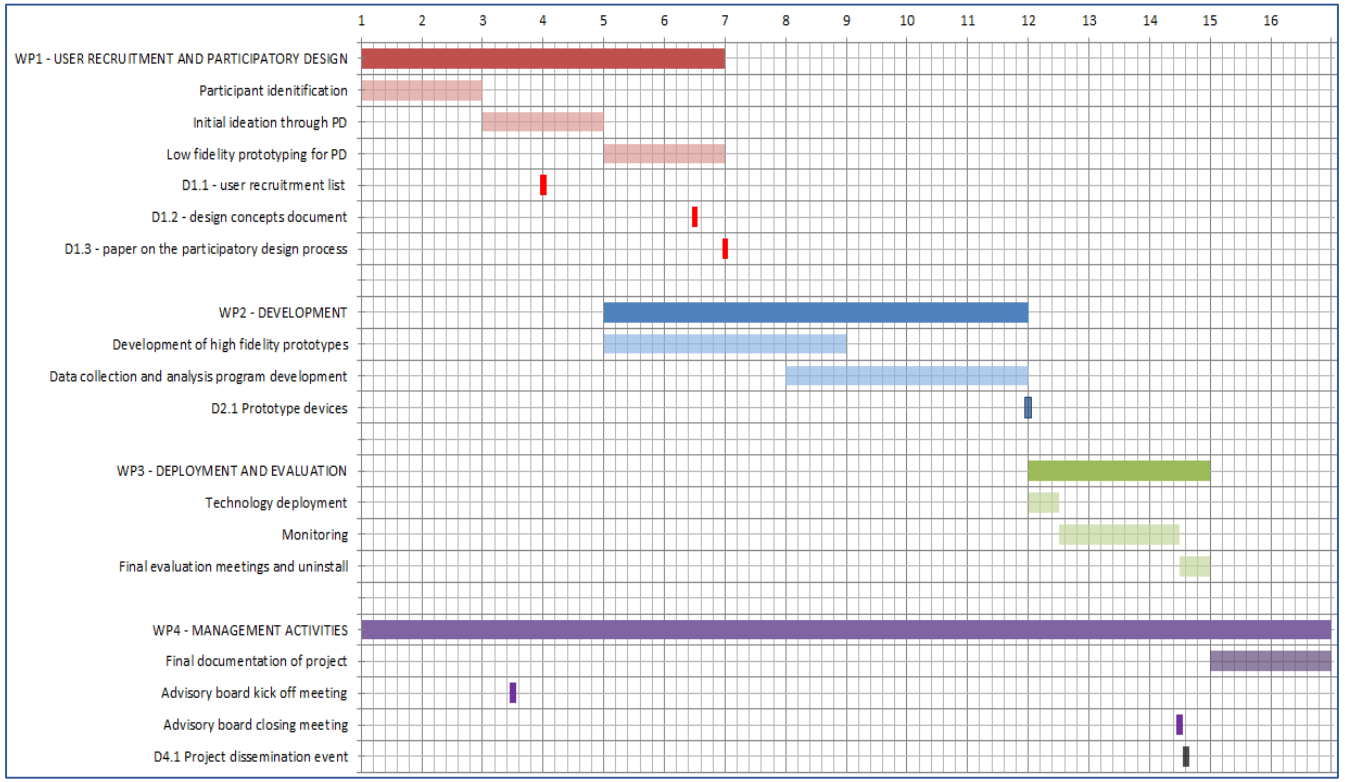
A few other models

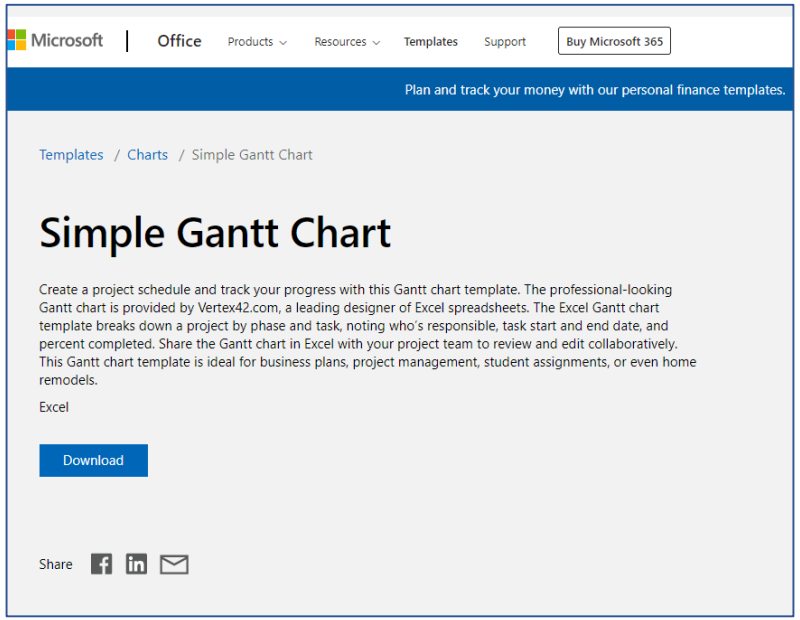
Iterative Model
This SDLC model emphasizes repetition. Developers create a version very quickly and for relatively little cost, then test and improve it through rapid and successive versions. One big disadvantage here is that it can eat up resources fast if left unchecked.

Big Bang Model
This high-risk SDLC model throws most of its resources at development and works best for small projects. It lacks the thorough requirements definition stage of the other methods.

Failure to take into account the needs of users and stakeholders can result in a poor understanding of the system requirements at the outset.
The benefits of SDLC only exist if the plan is followed faithfully.

Gantt Charts





Gantt Charts – make them useful

- A Gantt chart is something you should be able to take into meetings with your supervisor and refer to every 1-2 weeks
- That should give a clear hint about how much detail you need to work into them
- Be realistic when making them!
- If you are doing the spiral approach with prototypes, show your prototypes
- If you are working on an Agile model, show the sprints you will employ

Risk Assessment Tables

Program Risk Management Assessment Scale Example

		Technical Performance	Cost	Schedule
5 Severe	A risk event that, if it occurs, will have a severe impact on achieving desired results, to the extent that one or more of its critical outcome objectives will not be achieved	Performance unacceptable; Does not meet a KPP requirement.	Program budget impacted by greater than $20 million.	Key program event or milestone delayed by more than 3 months.
4 Significant	A risk event that, if it occurs, will have a significant impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below acceptable levels.	Performance unacceptable; Significant changes required; Does not meet a Threshold requirement.	Program budget impacted by greater than $10 million but less than $20 million.	Increases critical path schedule by 2-3 months.
3 Moderate	A risk event that, if it occurs, will have a moderate impact on achieving desired results, to the extent that one or more stated outcome objectives will fall well below goals but above minimum acceptable levels.	Performance below goal; Moderate changes required; Does not meet a Threshold requirement.	Program budget impacted by greater that $2 million, but less than $10 million. Does not require significant use of program cost and/or schedule reserves	Moderate schedule slip. 1 – 2 month schedule slip.
2 Minor	A risk event that, if it occurs, will have a minor impact on achieving desired results, to the extent that one or more stated outcome objectives will fall below goals but well above minimum acceptable levels.	Performance below goal but within acceptable limits; No changes required; Does not meet an objective requirement.	Program budget impacted by less than $2 million; Development or production cost goals exceeded by 1-5%.	Minor schedule slip. Non-critical path activities late; impact to critical path up to 1 month slip.
1 Minimal	A risk event that, if it occurs, will have little or no impact on achieving outcome objectives.	Requires minor performance trades within the threshold – objective range; No impact on program success.	Program budget not affected; Cost increase can be managed within plan.	Schedule not affected; Schedule adjustments can be managed within plan. Able to meet key milestones with no schedule float

Risk Assessment

- Risk Assessment is thinking:
  - What can go wrong?
  - How likely is it to go wrong?
  - How bad is it if it goes wrong?
- Once you know this, you need to think about two responses
  - Mitigation – if it happens, how will I deal with it
  - Management – how can I make this less likely to happen
- Make them useful!
  - Generics are not really helpful as they often have no management- might get ill, laptop might break etc.
  - What can uniquely go wrong with this project and how do you manage it?

Summary

- Details of Initial Project Report
- Writing a Research Report
- Planning your project carefully
- Risk assessment is not a dry, useless exercise, it is about finding the solution to serious problems before they happen