UNIVERSITY OF LEEDS

HumanIC

Starting your Research Career

HumanIC CBT1

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HumanIC project has received funding from the European Union's Horizon Europe research and innovation program under the Marie Sklodowska-Curie (HORIZON-MSCA-2022-DN-01, project no 101119726

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Session Objectives

- Starting out as a researcher
  - To explore what a PhD is and some of the opportunities and challenges

- Starting your project
  - Critical thinking
  - Getting started with literature
  - Project management

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Congratulations, you are a PhD Researcher!

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What makes a PhD?

Learning outcomes for PhD at Leeds:

- To discover, interpret and communicate new knowledge through original research which satisfies peer review
- To present and defend original research outcomes which extend the forefront of a discipline
- To demonstrate systematic and extensive knowledge of the subject area and expertise in generic and subject/professional skills
- To take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate
- To independently and proactively formulate ideas and hypotheses and to design, develop, implement and execute plans by which to evaluate these
- To critically and creatively evaluate current issues, research and advanced scholarship in the discipline
- To demonstrate systematic knowledge of and be able to critically assess, analyse and engage with the ethical and legal context and implications of their research.

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Its not as scary as it sounds!

- Independent research with support from your supervisors – you are not alone – you also have the HumanIC team
- A PhD is a training programme – you are here to learn as well as do research
- Original research is important – but you don't need to save the world/win a Nobel prize!
- Research of publishable quality – you will be supported to prepare journal publications and present at conferences
- Critical thinking – open mind and your research in context – more on this later.

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The PhD journey

A PhD has many opportunities

- Flexible working
- The chance to work on cutting edge science
- The chance to work with great (!) supervisors
- The chance to travel to conferences and meet other scientists – and see places around the world
- The chance to make friends for life

- HumanIC adds even more
  - You are part of an international team – lots of different views/experience
  - The chance to undertake placements at different partners/use facilities
  - The chance to work on projects with a common goal
  - Collaboration with hospitals and industry

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The PhD journey

A PhD is very personal - that can make it more challenging than an UG/MSc or a job

- Setbacks or challenges can feel bigger – and successes can also be greater – ups and downs
- There will be times of frustration, slow progress, things not working
- There may be times when you are having to work longer hours
- There may be times when you question whether you can do it
- There may be times when you feel overwhelmed by lots going on
- Flexible working can be a curse as well as a blessing

This is all normal…and you can do it!

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What may be your opportunities & challenges?

Discuss in small groups

- What are the things you hope that HumanIC will give you?
- What are the things that worry you/you think may be challenging?

https://universityofleeds.padlet.org/cjnoakes/humanic-starting-your-phd-7xh8kfxbo4kg81i5

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Some tips that may help

- Take (and plan) opportunities – placements, conferences, outreach etc are great for your development and do also help your research
- Recognise that you can't be an expert straight away – it is normal that some things will go wrong or take time
- Set a good work-life balance
  - Enjoy and plan things outside your PhD - don't feel guilty when you are not working
  - Eat, sleep, exercise!
- Recognise that sometimes you will have days that are not productive
  - If its not working take a break
  - Work out how and when you work best – have a good routine

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Some tips that may help

- Meet your supervisor regularly - having a regular scheduled meeting slot can help keep you motivated
- Use your diary – even just to keep track of HumanIC meetings!
- Keep a record of what you do – build your CV – and identify any gaps

- When things get tough
  - Talk to people – your HumanIC peers, your supervisor, fellow students in your office, the postgrad tutor in your department, your friends and family….
  - If things get really hard, seek help – it is not weakness

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The beginning of a PhD project

- You have a project title, outline scope and lots (and lots!) of ideas from your supervisors
- You have to come up with a plan…

- Understanding what has been done before and where your work fits
- Understanding what approaches are useful and feasible
- Determining what skills and knowledge you will need to develop
- Determining what aspects are doable in the time
- Understanding how your project fits with the rest of HumanIC

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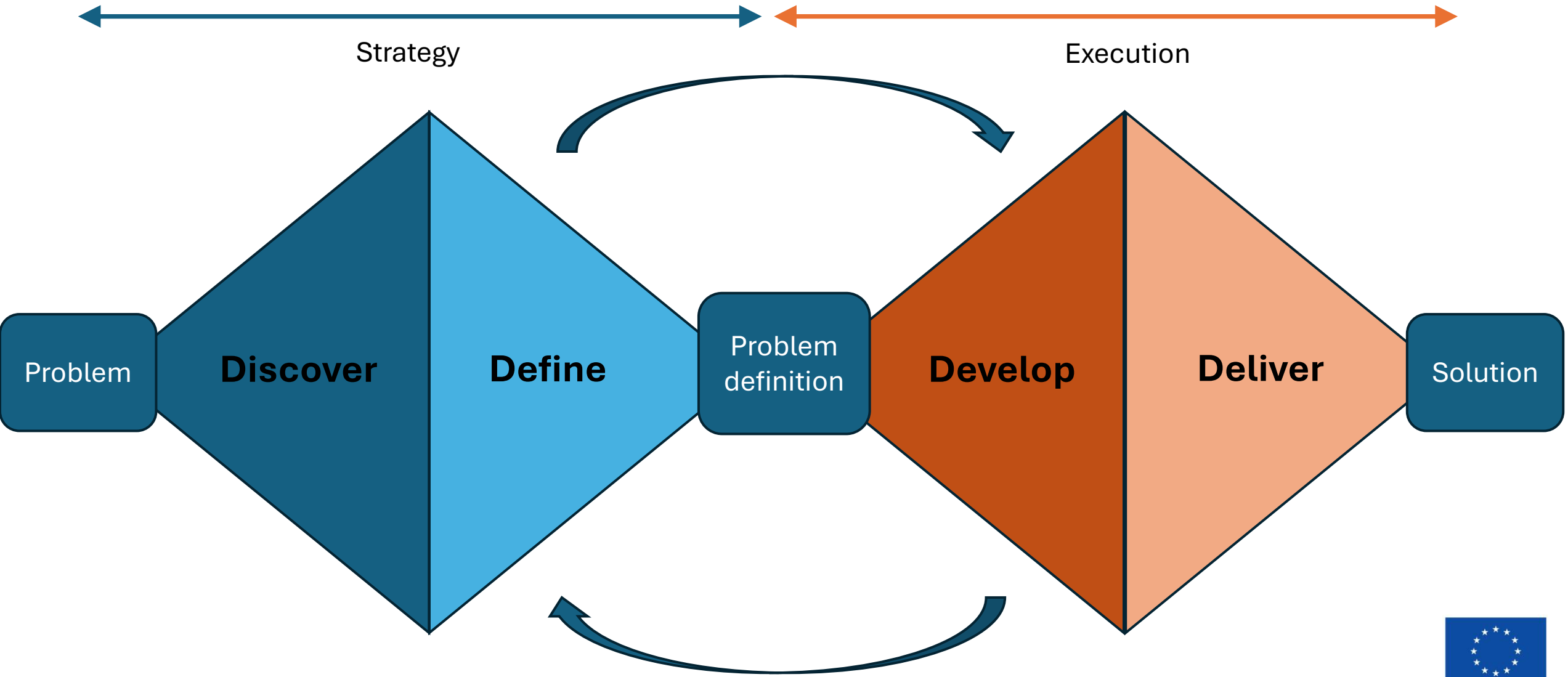
The Double Diamond Process



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Discovery Phase – Exploring Options

- Building your baseline knowledge and understanding
- Determining the possible direction of your work
- Identifying the methods that you might use
- Setting what you will do in context
- Literature review is a major part - but its not the only thing
  - Attending seminars
  - Discussing with supervisors, peers, HumanIC
  - Articles, videos relating to the topic area
  - Learning experimental and/or computational techniques
  - Technical and personal dev training
  - Asking lots of questions

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Critical thinking

"It is the mark of an educated mind to be able to entertain a thought without accepting it." – Aristotle

- Not accepting everything you read or hear at face value – a famous or high-profile person is not always right
- Questioning information, ideas and theories to determine whether it is accurate or believable
- Learning with an open mind to new ideas or changes in evidence
- Looking at the bigger picture and recognising the benefits and limitations in a study
- Recognising there may be different interpretations of the same data

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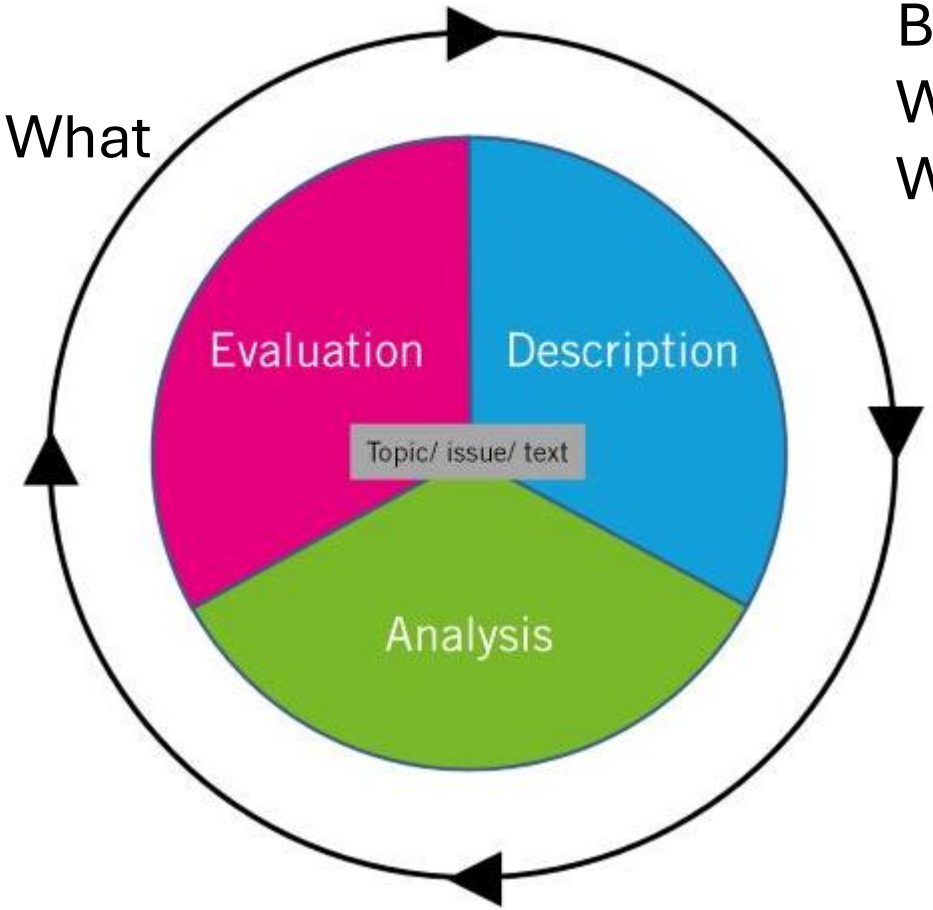
A model for Critical Thinking

Relevant, significance, implications – So What? What Next?



Background and context - What? Where? When? Who?

Methods, processes, reasons – How? Why? What if?

Model adapted from LearnHigher via https://library.leeds.ac.uk/info/1401/academic-skills/105/critical-thinking/2

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Getting started with literature

- Why do you need to review?
  - Understand the background and context
  - Awareness of different methods and their pros and cons
  - Familiarity with key studies that will shape your research

- What will you review?
  - Journal papers, conference papers
  - Standards and guidance (e.g. for hospital design)
  - Information from key government and industry sources
  - Information in the media?

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Reading Strategies

Not all studies are equally important - you can use different approaches to assess the relevance of papers

- **Predicting** - making an educated guess about what the text is about before you start to read.
- **Scanning** - looking through the text very quickly to look for keywords.
- **Skimming**- reading the introduction and the first line of each paragraph to work out what the text is about.
- **Intensive reading-** reading a short section of text slowly and carefully.

Spreeder - online tool useful for skim-reading text whilst still gaining an understanding of the context.

Critical thinking questions can help you review articles and start reading critically

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Critical thinking questions

Description

- Who is the author?
- What is the purpose/conclusion?
- When was it written/what context?

Analysis

- Is the author an expert?
- What evidence is provided & how reliable?
- Is the argument convincing – why?
- Are there unsupported assertions?
- Has something been omitted?
- How effective is the language?
- Does the conclusion match the evidence?

Evaluation

- How is this significant to your research?
- What are the strengths & weaknesses?
- What is your position & how will you use it?
- How does it relate to other information you have?
- What else needs considering?

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Critical Writing

- Show how you have interpreted evidence and used it to make a structured argument
- Think about the questions that a reviewer could ask – does a paper support or challenge a particular argument
- Keep descriptive/background information to that which is needed for the context

Descriptive	Critical
Stating what someone did	Identify the significance
Stating the theory	Explaining the relevance of the theory
Describing a method	Discussing the appropriateness of the method

Some further examples of descriptive vs critical writing

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Information and biases

Where and how will look for information for your PhD?

What could influence whether you review information objectively?

Discuss in your groups

https://universityofleeds.padlet.org/cjnoakes/humanic-information-and-bias-wppsc6p2l64g6z4h

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Some practical hints

- Decide what the focus of your literature search is and identify keywords
- Keep a record of search terms/literature databases that you used for your main searches
- Make notes on everything you read – come up with a way of doing this in a structured way
- Use a literature management tool
- Consider whether any of your research could follow a systematic review approach
  - Structured searching to address particular research questions
  - Criteria for inclusion/exclusion and grading of evidence
  - Can be a good way to write your literature review into a paper

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What about using AI?

Can be useful to help and support your work – finding initial information, helping to write code, supporting grammar, and as a primary research tool - BUT:

- Generative AI outputs can look highly convincing but they can be flawed – only as good as the data behind it (which may also be AI)
- Your PhD needs to be your work, and you need to be able to evidence this – AI can't write it for you
- AI can have copywrite issues with the original content/code
- Be very wary about putting any sensitive data into AI tools, and may need to consider in ethics applications
- Carbon footprint of AI is huge – do you need it?

University of Leeds has guidance on AI for PhD students

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Defining Phase – Setting out your Plan

- Draws on your critical analysis of the research area
- Understanding where there are gaps in knowledge and what is needed to address them
- Identifying the key research questions/ coming up with a hypothesis
- Defining aims and objectives
- Confirming the methods you will use and theories you will draw on
- Setting out a realistic timeline

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Elements in project planning

Aspect	Purpose
Research questions/hypothesis	Identifies the relevant gaps in knowledge and in some cases proposes a hypothesis to test
Aims and Objectives	Why the project exists and specifically what it is trying to achieve
Work Breakdown Structure	Major groups of activities and identifies the primary tasks to be undertaken
Project task list	Describes the detailed tasks and to show how different stages of the project will be delivered
Time plan (e.g. Gantt chart)	Sequence of activities and timescales for completion of the project. May include key deliverables/milestones
Risk plan	Identifies the key risks within the project and considers how the project will manage these risks.

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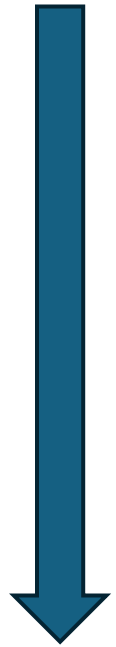
Aims and Objectives

TERM	DEFINITION	A PERSONAL EXAMPLE
Mission	Overriding purpose in line with the values of stakeholders	Be fit and healthy
Goal (Aim)	General statement of aim or purpose	Lose weight and strengthen muscles
Objective	Quantification and precise statement of goal	1. Lose 10kg by 1 Dec 2. Run the London marathon next year



More specific

Increased detail

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SMART objectives

- ✓ Specific
- ✓ Measurable
- ✓ Achievable
- ✓ Realistic
- ✓ Time-Framed

1. To understand how infection transmits in buildings.

2. To develop a CFD model to predict the dispersion of Staph aureus bacteria from bed making in a hospital single room.

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Work Breakdown and Tasks

Work Breakdown Structure

- Breaks the project down into a hierarchy that groups elements of work together
- Creates a clear project structure which enables high-level planning
- Avoids the risk of missing project elements

Task list

- Sets out specific tasks and sub tasks under each project area

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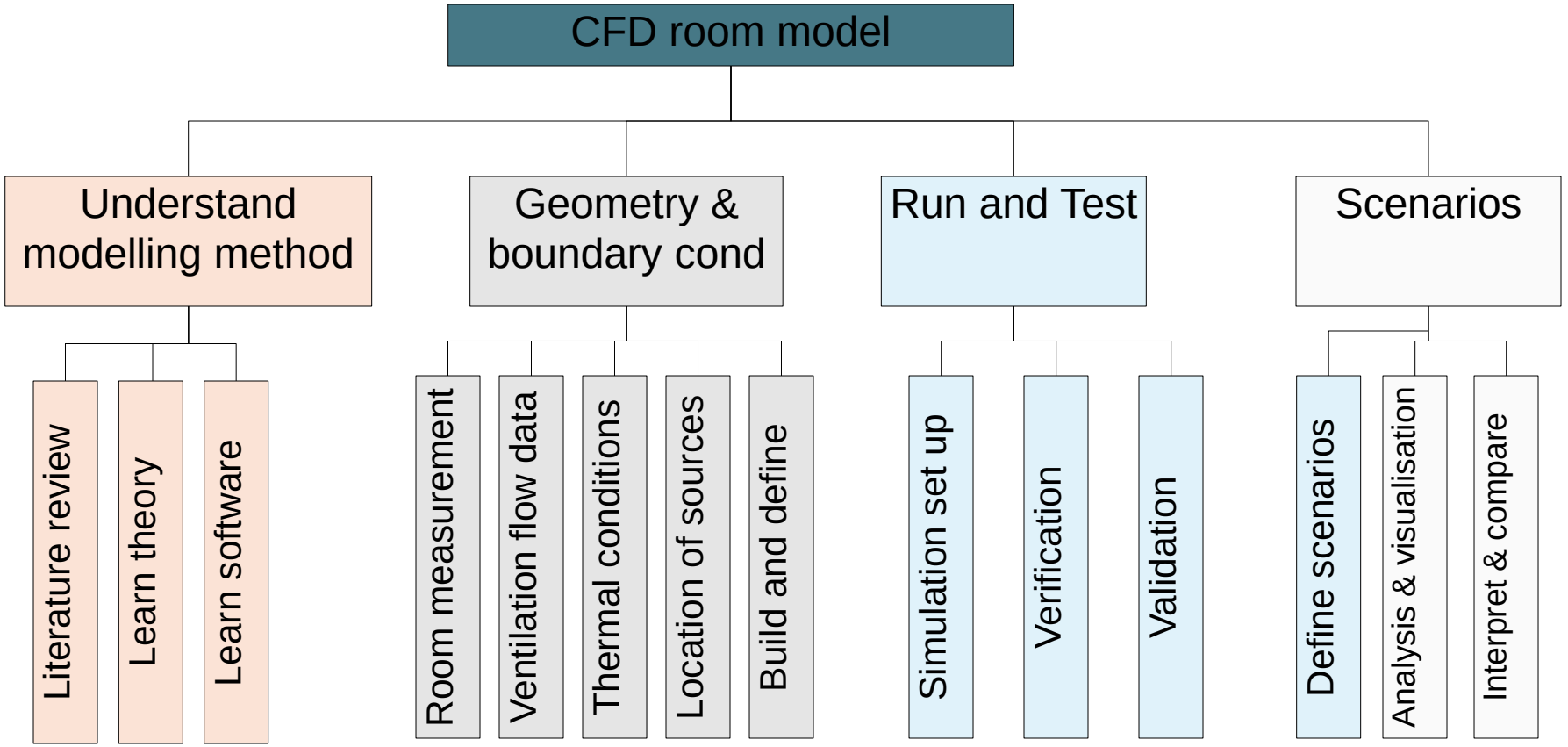
Work Breakdown Structure



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Creating a plan

- Dependencies
  - What order do you need to do things in?
  - What are your pre-requisites?
- Timing
  - How long do you think different activities will take?
  - Where do you need to build in contingency?
  - Where do you have the most confidence?
  - What about other aspects (holidays, training, conferences)?
- Resourcing
  - Do you have the people/facilities/computing to do the work?
  - Are there other factors outside your project that need to be considered?

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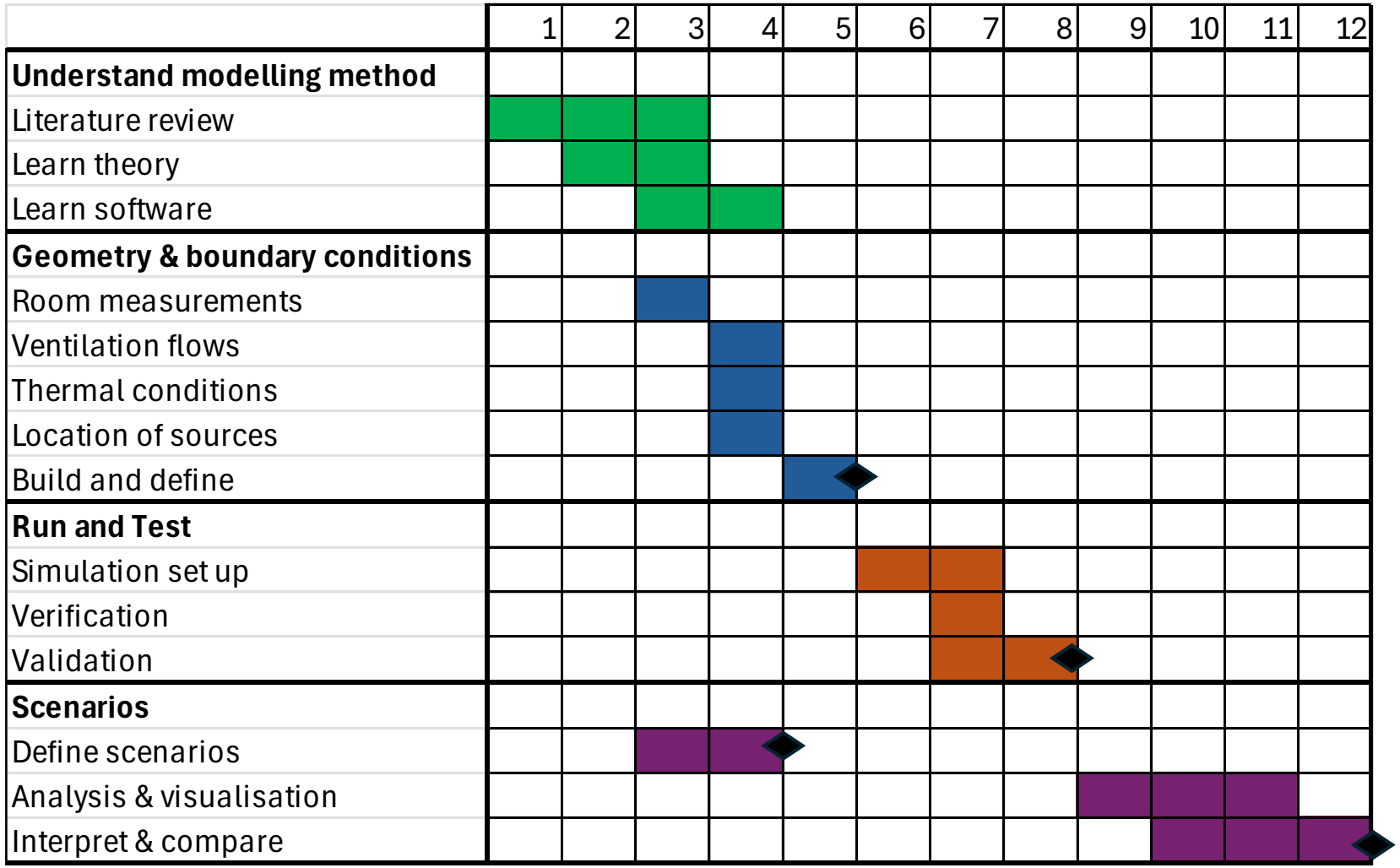
Gantt chart



Milestones

1. Definition of model scenarios
2. Model built
3. Model validated
4. Project complete

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Tolerance of risk?

Probability

High (3)	3	6	9
Medium (2)	2	4	6
Low (1)	1	2	3
	Low (1)	Medium (2)	High (3)

Impact

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Reduce the risk

Probability

High (3)	3	6	9
Medium (2)	2	4	6
Low (1)	1	2	3
	Low (1)	Medium (2)	High (3)

Impact

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Risk plan

Risk Description	Prob (1-3)	Impact (1-3)	Exposure (1-9)	Mitigation
Delay in getting geometry and boundary information	2	2	4	Reduce the **probability** of this occurring by: • Good communication and planning with people responsible for the space/collecting data Reduce the **impact** if this occurs by: • Building and testing the initial model with less data and then updating
Mesh validation is more challenging than expected	3	1	3	Reduce the **probability** of this occurring by: • Planning a well-structured approach which is not excessive • Good pre-reading/peer support to give guidance on meshing and picking appropriate sizes

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Summary

- There is no one way to do a PhD, but good planning and organisation can help
- Your work needs to be original and set in context – so you need to know and critically evaluate the field
- There are lots of tips and tools out there to help – look for the things that help you
- Remember to look after yourself as well as your research
- Look out for each other – you are all in the HumanIC team

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Q&A

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