



# Developing Short Courses for our Future Specifiers

Professor Robert Hairstans

Director of the Centre for Advanced Timber Technology (CATT)  
New Model Institute for Technology and Engineering (NMITE)

# CATT

*“stimulate collaboration across the industry both vertically (seed to end product) and horizontally (architecture, construction, digitalisation) as a common theme together with showing a wider audience how rewarding a career in timber can be.”*





# CATT Building – Living Lab

[Site Eye Portal](#)

Password and login both NMITE

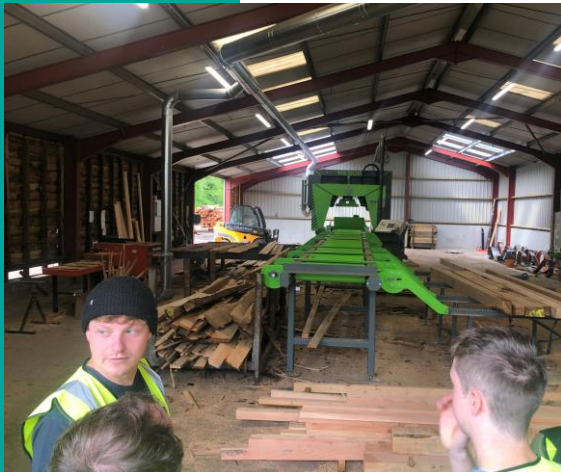






## The Educational Approach

- **Apply a student-centric learning methodology** with a curriculum fuelled by real-world challenges.
- **A distinctive approach in the marketplace** that will attract a different sort of engineering learner.
- **The degrees to be delivered will be conceived and will be taught via a partnership approach** working with external stakeholders, industry practitioners and academic collaborators.



**IMPORTANT:** The partnership approach is core to the NMITE ethos and critically important to ensure those that are educated create value return to the sector and the community.



# Partnership Approach

- CATT is being established in partnership with Edinburgh Napier University (ENU) and Timber Development UK
- ENU is the lead UK and internationally recognised University of timber construction and wood science research and hosts Built Environment Smarter Transformation (BE – ST)
- ENU and BE-ST have advanced timber technology testing and manufacturing facilities respectively as well as a Trimble Technology Lab at ENU for digital built environment research and education.



TIMBER DEVELOPMENT UK  
SOUTHSIDE HEREFORD  
UNIVERSITY DESIGN CHALLENGE 2022



IN PARTNERSHIP  
WITH...



Edinburgh Napier  
UNIVERSITY

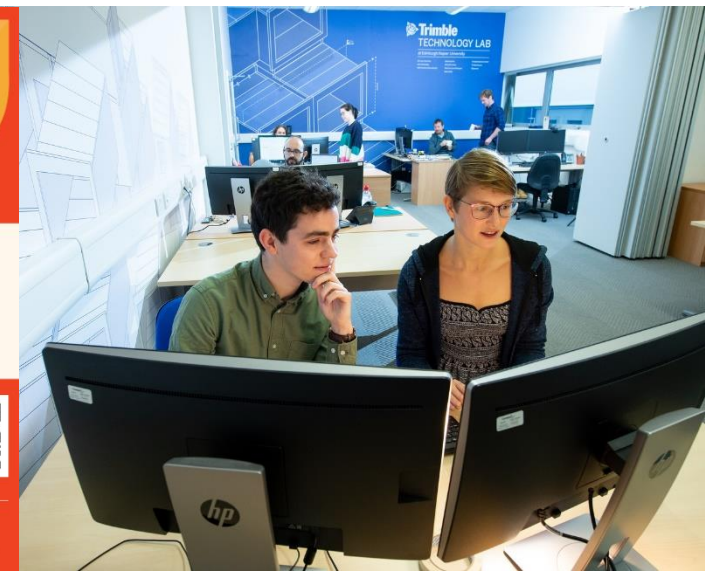


SIGN UP NOW:  
[www.tdca.co.uk/academic-competitions/southside-hereford-university-design-challenge-2022/](http://www.tdca.co.uk/academic-competitions/southside-hereford-university-design-challenge-2022/)

#TDChallenge22



our sponsors  
and supporters





**DELIVERY PARTNERS:**

- Edinburgh Napier University
- New Model Institute for Technology and Engineering
- Timber Development UK

**STEERING COMMITTEE:**

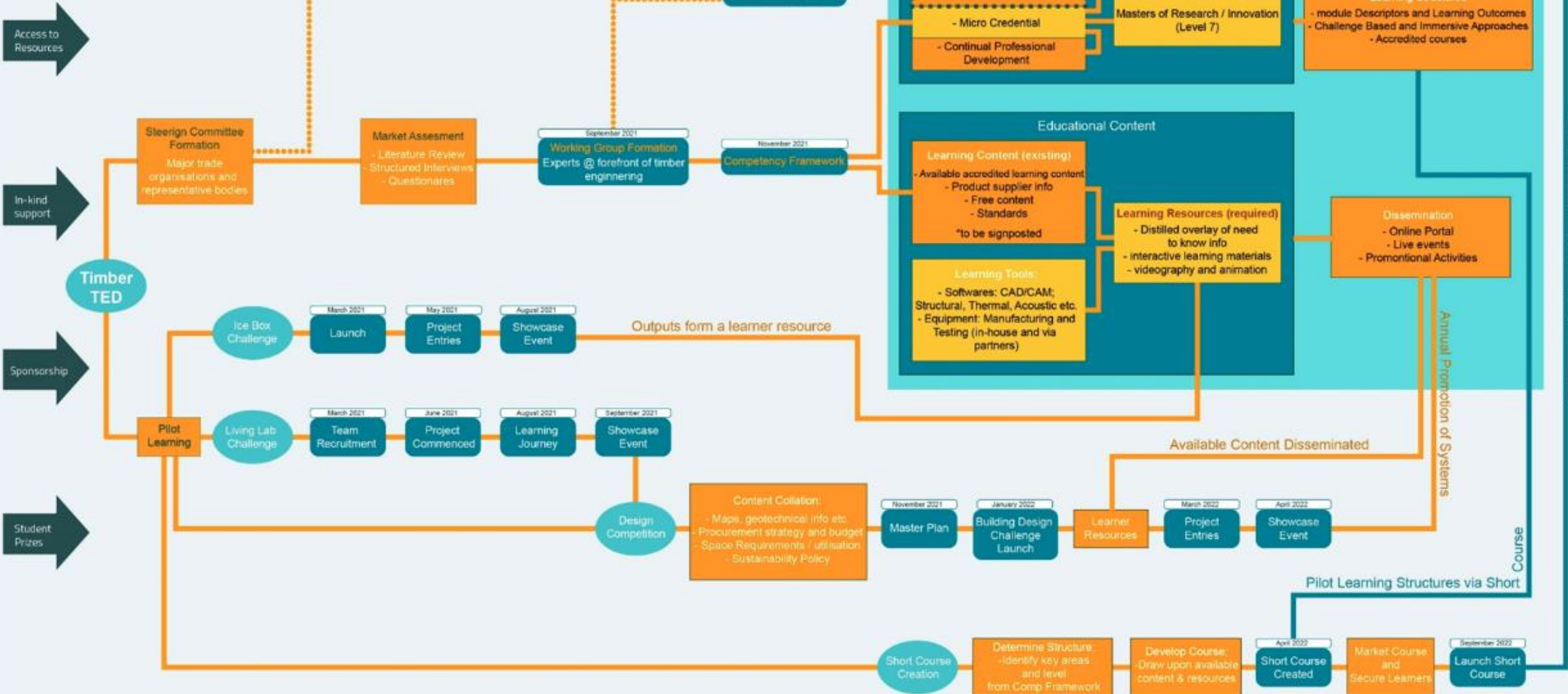
- Timber Research and Development Agency
- Timber Trades Federation
- Construction Scotland Innovation Centre
- Structural Timber Association
- Swedish Wood
- Truss Rafter Association

**KEY**

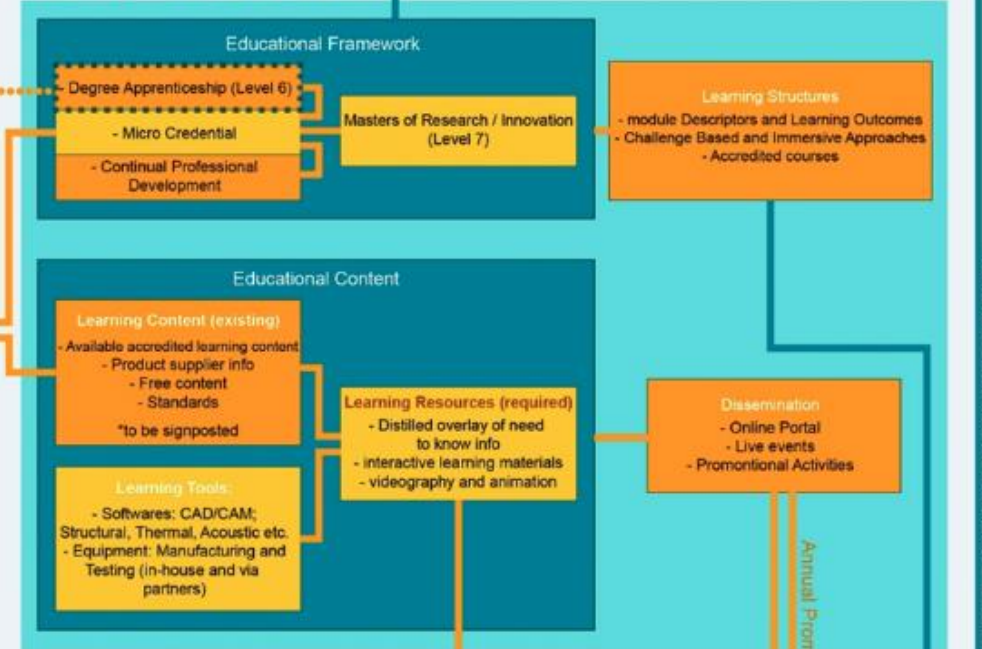


**OUTPUTS:**

- Industry Endorsed Framework
- Accredited Learning
- Timber Eng Pathway
- Flexible Learning Content
- Alternative Delivery Model
- UK Wide Learner Audience
- Maximum Outreach



**ENABLED EDUCATIONAL SYSTEM**



Short Course mobilises Educational Framework

Course

Available Content Disseminated

Annual Promotion of Systems

Outputs form a learner resource

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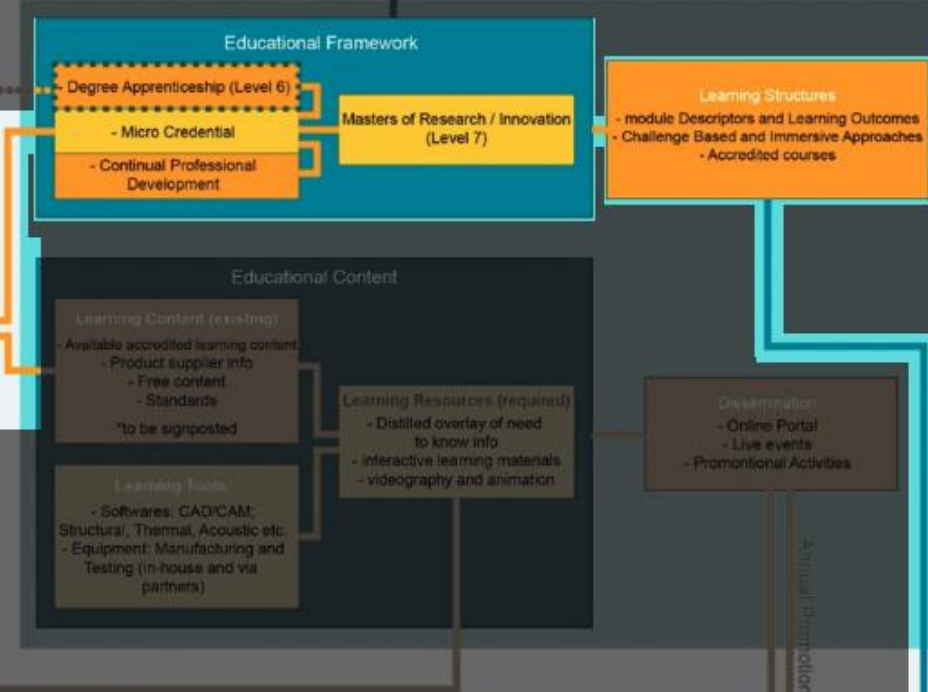
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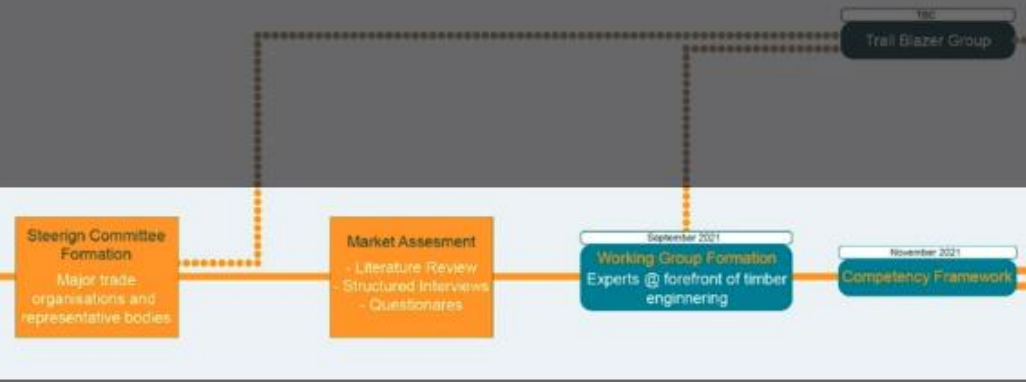
**ENABLED EDUCATIONAL SYSTEM**



Short Course mobilises Educational Framework

- Access to Resources
- In-kind support
- Sponsorship
- Student Prizes

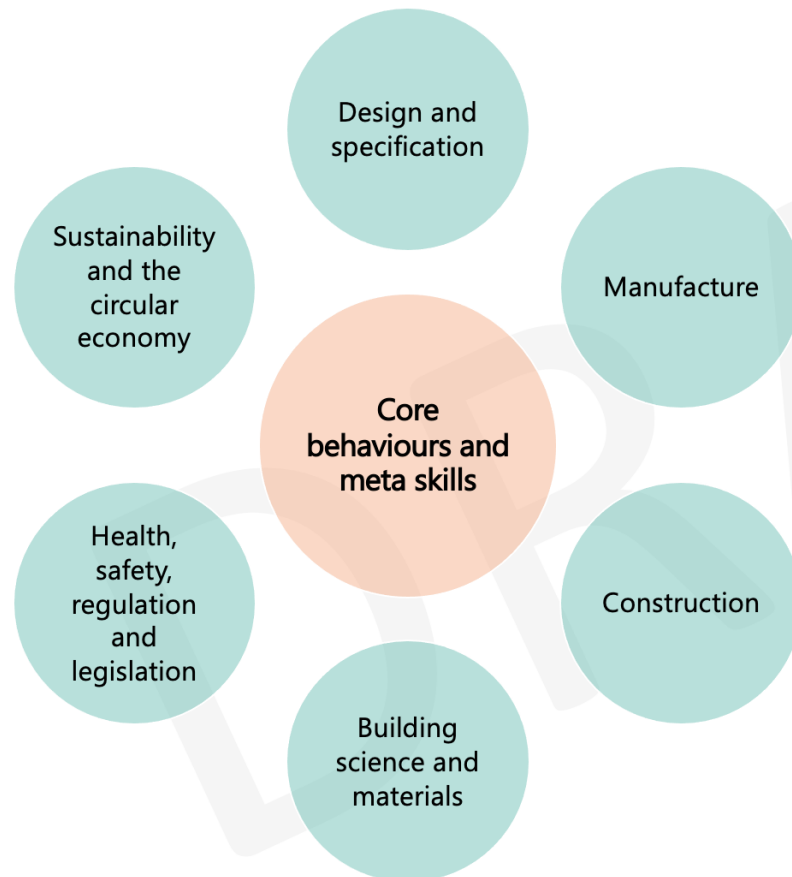
Timber TED



Pilot Learning Structures via Short

# Competency Framework

## Core technical competencies



## Cross-disciplinary competencies





# Development process



The development of the framework began with desk research using a range of sources:

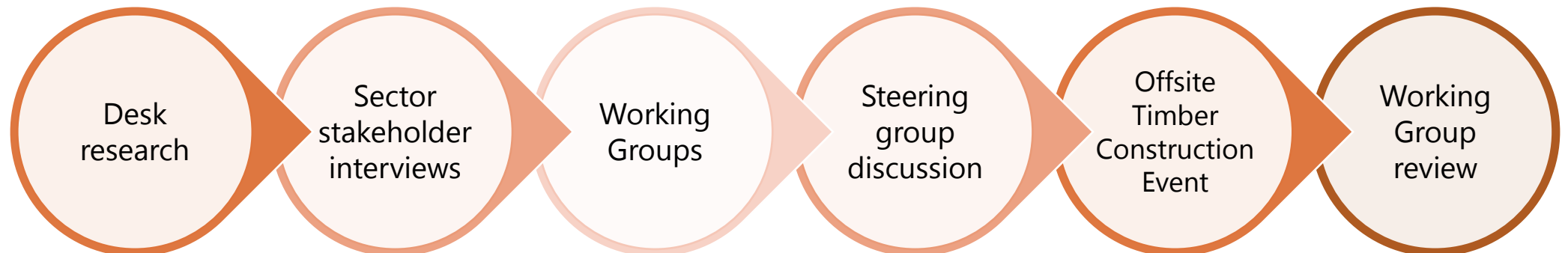
- Job descriptions
- Existing, relevant competency frameworks
- iStructE Initial Professional Development Chartered Member requirements
- Engineering Council Professional Engineering Competence (UK-SPEC)
- Structural Timber Association (STA) bulletins
- RICS Requirements and Competencies guide

The desk research and interviews with key sector stakeholders enabled us to draw together a first draft of the framework which has been presented to working group members for discussion and feedback. As a result, revisions were made and, further content developed and refined.

Feedback on the framework draft was also been obtained at two events:

- Timber Engineering and Design Steering group meeting
- Offsite/Mass Timber Construction Virtual Conference

A further review by the working group finalised the structure and content of the framework.



# Contributors



OAKWRIGHTS®



**XYLOTEK**

change building



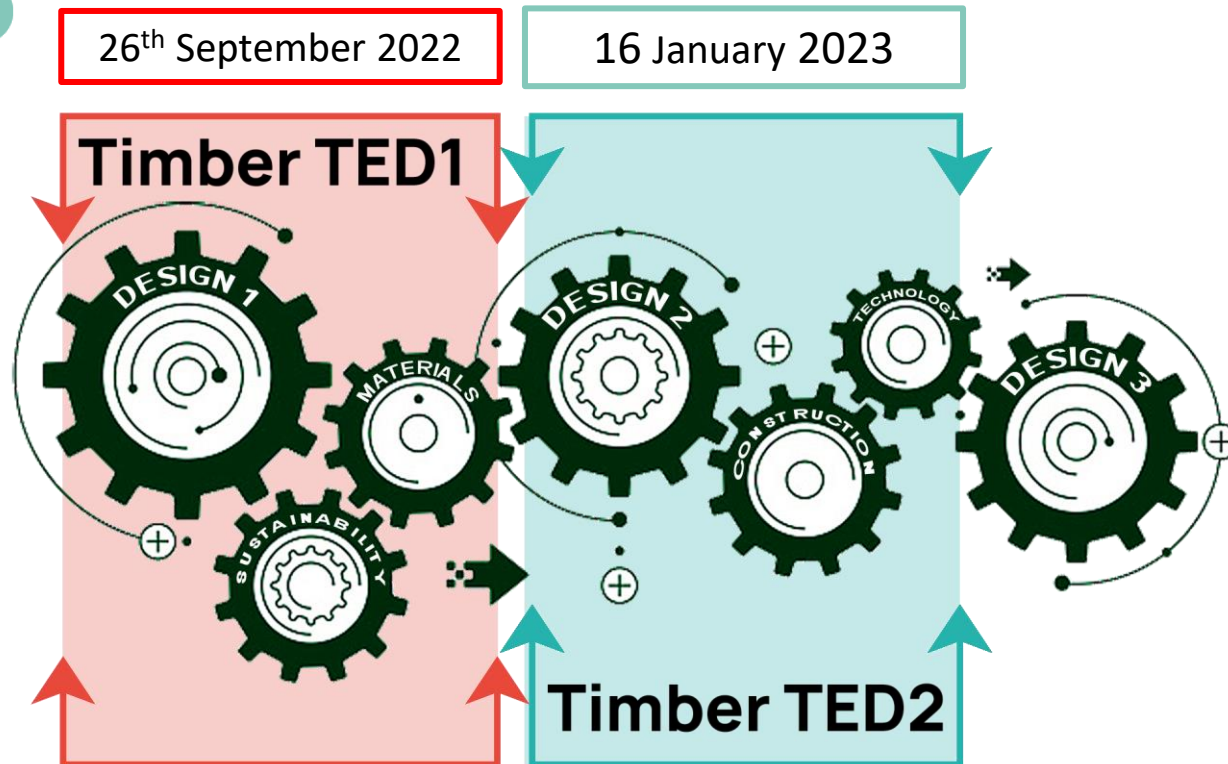
TAYLOR LANE



# Core technical competencies

Building science and materials	Health, safety, regulation and legislation	Sustainability and the circular economy
<p><b>Knowledge</b></p> <p><b>Engineering</b> Core structural engineering principles</p> <p>Building performance: building acoustics and sound insulation</p> <p>Factors effecting the energy performance of timber buildings</p> <p><b>Products and materials</b> Availability, behaviour, costs and manufacture of:</p> <ul style="list-style-type: none"> <li>• Timber and timber products               <ul style="list-style-type: none"> <li>○ Timber species: Hardwoods; Softwoods</li> <li>○ Engineered timber products: Glulam, CLT, Veneer; plywood</li> <li>○ Manufactured/reconstituted timber products: fibreboard, OST,</li> </ul> </li> <li>• Insulation materials</li> <li>• Other materials: concrete, steel, glass, plastics</li> </ul> <p>Appropriate uses and applications of timber and timber products</p> <p>Material testing procedures</p> <p><b>Fire science and protection</b></p> <ul style="list-style-type: none"> <li>• Principles of Heat transfer</li> <li>• Principles of Fire chemistry</li> <li>• Principles of Fire dynamics</li> <li>• Passive fire protection systems</li> <li>• Active fire protection systems</li> <li>• Fire detection and alarm systems</li> <li>• Fire suppressions systems</li> </ul> <p><b>Skills</b> Research and locate new information</p> <p>How to identify and investigate material defects</p>	<p><b>Knowledge</b></p> <p><b>Legislation and regulation</b> Relevant legislation, regulations, statutory guidance and standards of performance relevant to the construction industry in the UK/four nations – as appropriate – specifically with regard to:</p> <ul style="list-style-type: none"> <li>• Health and safety</li> <li>• Insurance</li> <li>• Contract law</li> <li>• Contractual obligations</li> </ul> <p><b>Standards and warranties</b> Relevant principles and technical standards for building safety</p> <p>The requirements of warranty providers</p> <p><b>Risk</b> The role of hazard and risk assessments in avoiding or mitigating the potential risks posed by both construction materials and construction activities to:</p> <ul style="list-style-type: none"> <li>• site personnel</li> <li>• building users</li> <li>• the general public</li> </ul> <p><b>Skills</b> Use the appropriate standards/Codes of Practice and specifications within specification or design criteria</p> <p>Develop hazard and risk assessments</p> <p>Develop, manage, distribute and maintain information about the design which is critical to ensuring that structures are designed to be safe, built to be safe, operated safely and maintained to be safe throughout the project lifecycle</p>	<p><b>Knowledge</b> Relevant environmental and sustainability objectives, issues and legislation, and their influence on timber engineering and design</p> <p>Potential sources of contamination (solid, liquid or gas), investigation measures required, and design solutions adopted to mitigate risk</p> <p>The importance of protecting vegetation and wildlife at the planning, design and construction stages</p> <p>The importance and benefits of material efficiency</p> <p>The importance of preserving the value of materials beyond their initial use</p> <p><b>Skills</b> Adopt sustainable practices</p> <p>Carry out/contribute to environmental impact assessments</p> <p>Manage best practice environmental management systems, e.g. ISO 14000</p> <p>Manage risks to minimise adverse impacts to people or the environment</p> <p>Use resources efficiently and effectively</p>

# Short Courses: Timber Technology Engineering Design (Timber TED)



## Length and mode of delivery

- Total 12 Weeks Blended (9 online + 3 x 1 week blended challenge sprints)
- Online: 9 weeks at 5 hours/week
- Challenge Sprints: 3 challenge weeks, of which 60% on campus and 40% at the workplace

Learning Activity	Hours	Mode
Content Review	24	Online
Practical Classes & Workshops	12	Campus
Fieldwork & Visits	12	Campus
Directed learning activities	42	Online
Online Participation	36	Online
Portfolio Preparation	30	Online
Critique Panel	4	Campus
<b>Total</b>	<b>160</b>	





# Audience

**To Upskill & Reskill Built Environment Professionals of the future including, but not limited to:**

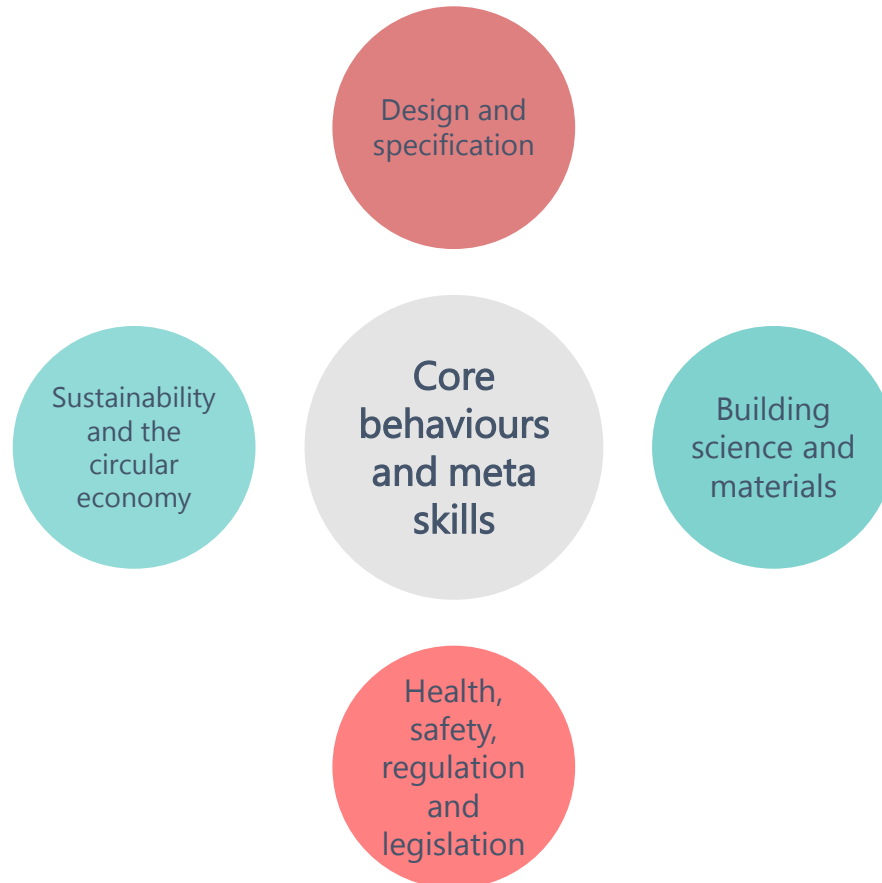
- Trainee engineer
- Architectural Assistant
- Architectural Technologist
- Designer
- Technical Sales

**Entry requirements:**

- Learners will come from a built environment profession.
- Ideally have prior experience of the sector.
- No pre-requisites
- Want to gain value and create value return

# Timber TED 1

## Core technical competencies



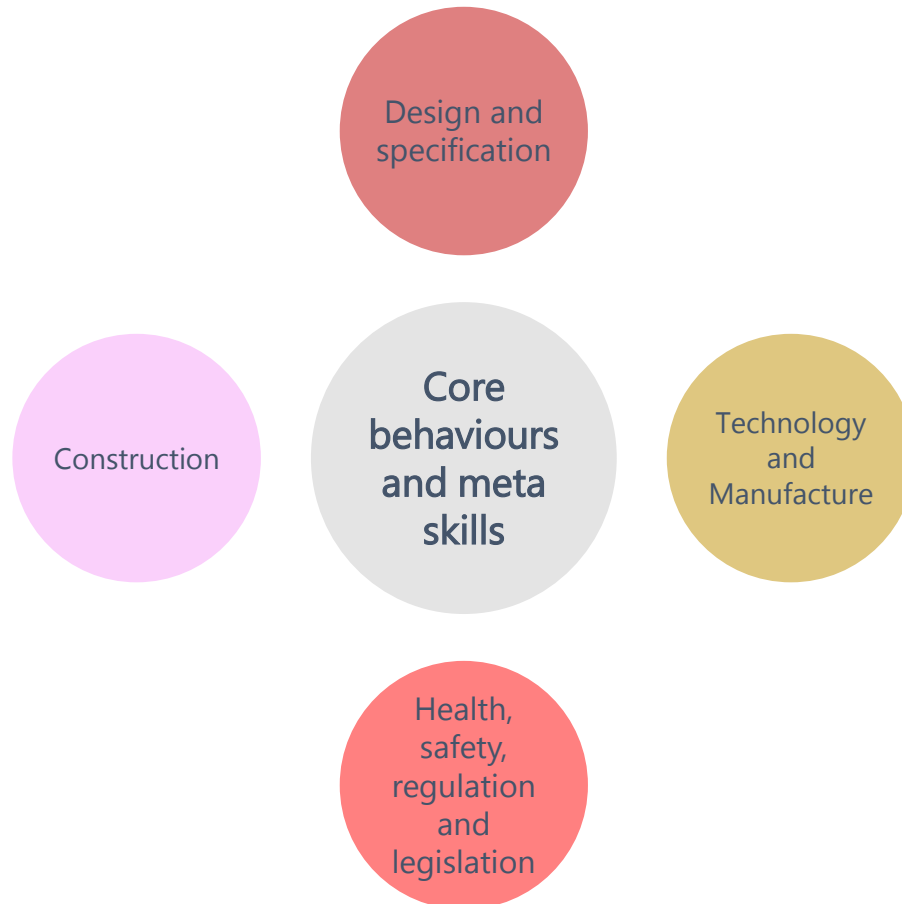
## Cross-disciplinary competencies





# Timber TED 2

## Core technical competencies



## Cross-disciplinary competencies





**Material Science**



Material Science

Sustainability





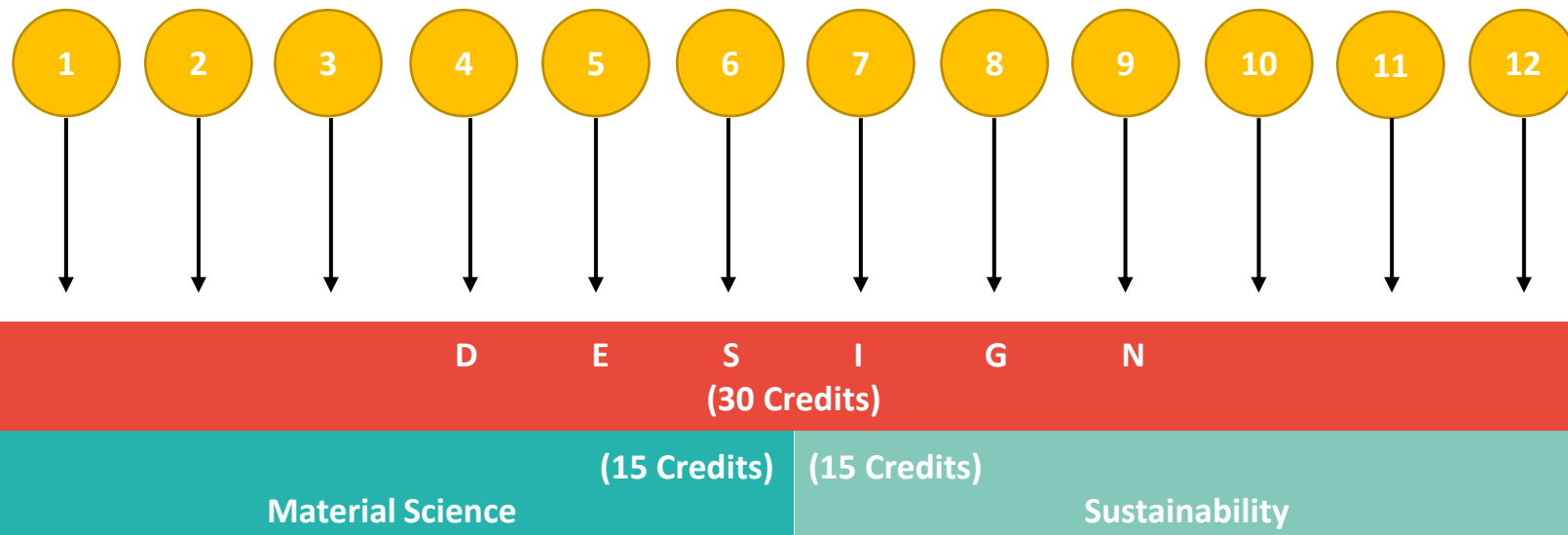
D E S I G N

Material Science

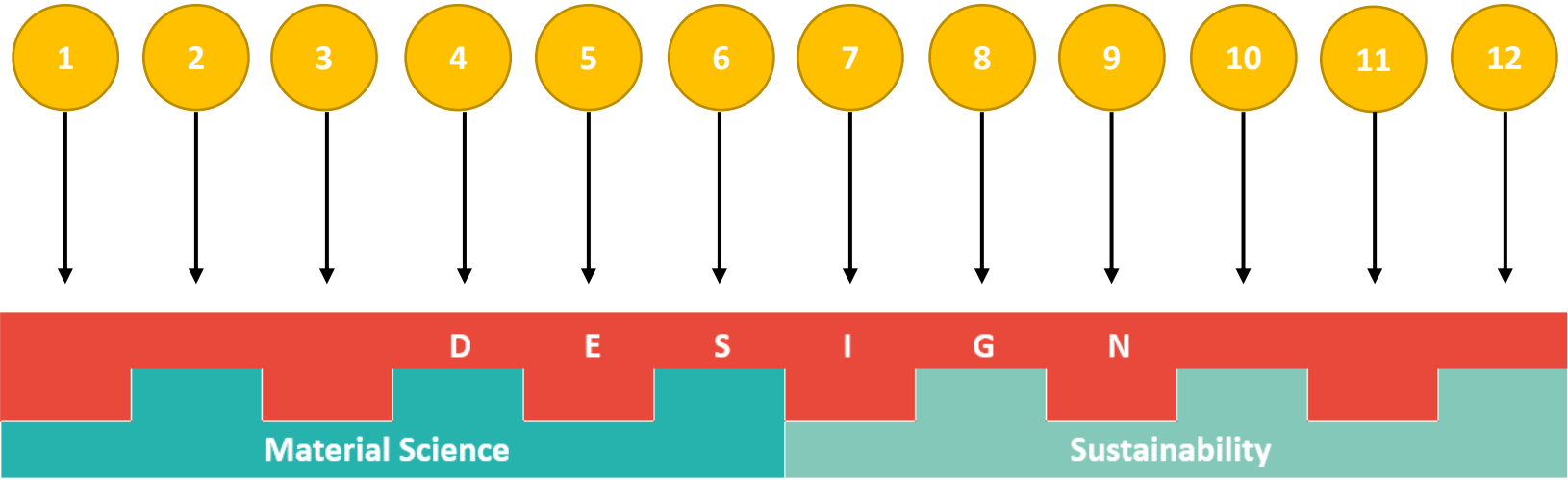
Sustainability

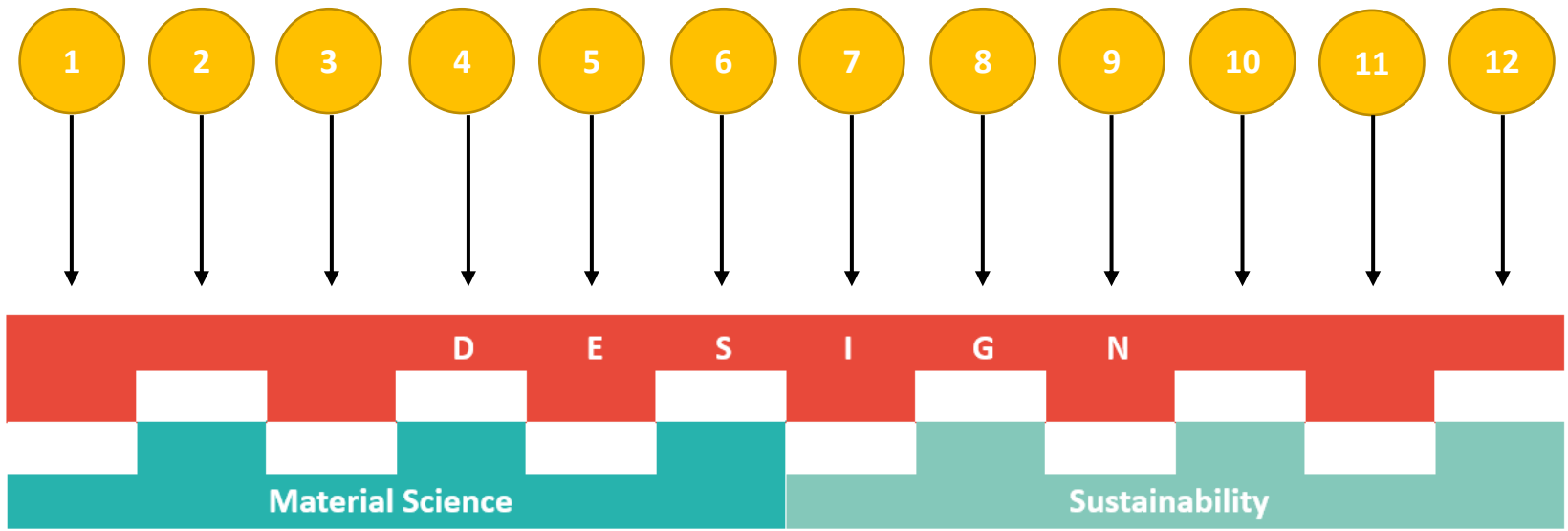


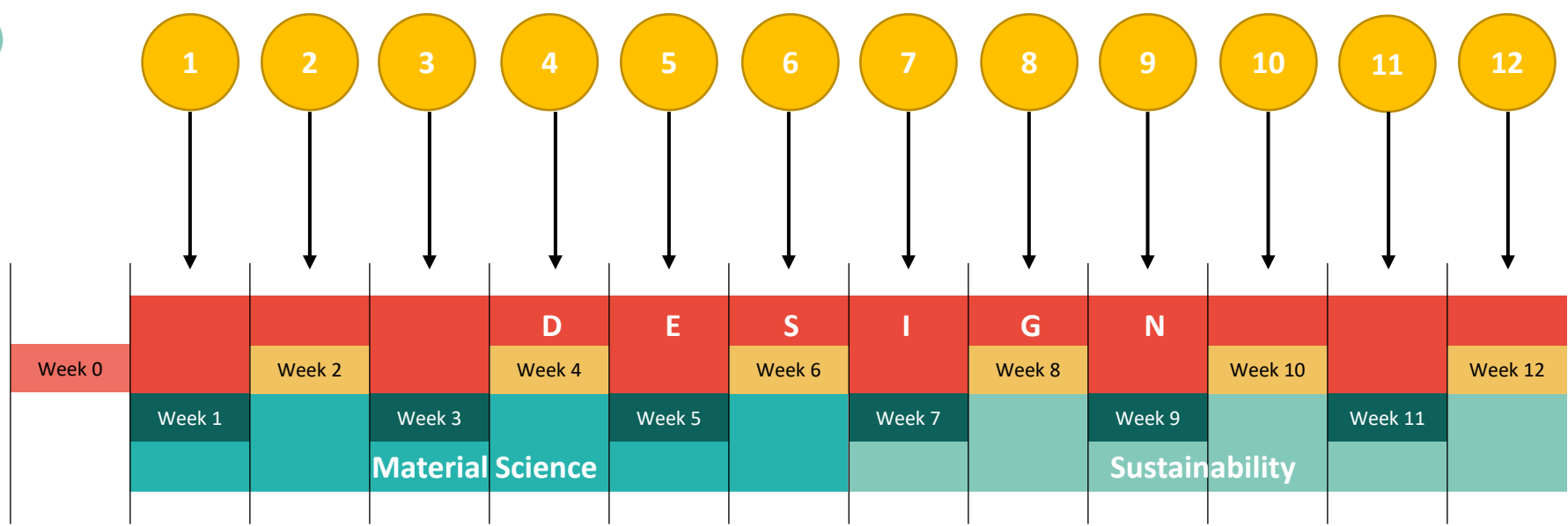
DESIGN (30 Credits)			
Material Science (15 Credits)	(15 Credits)	Sustainability	



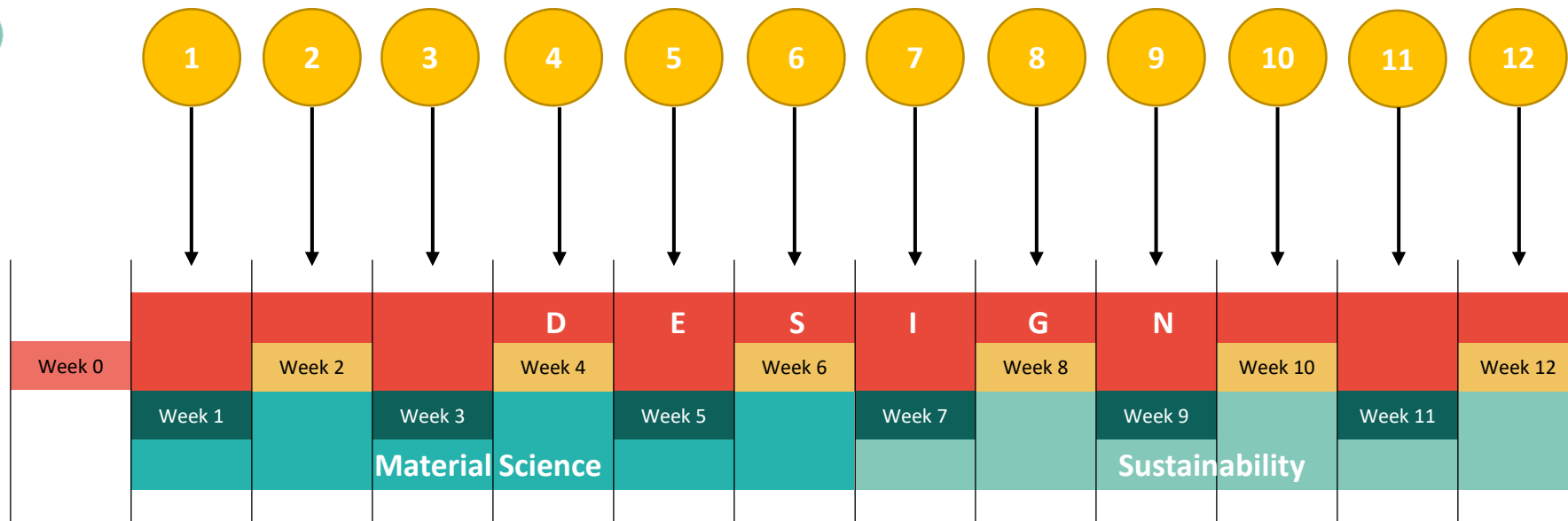












- Presentation



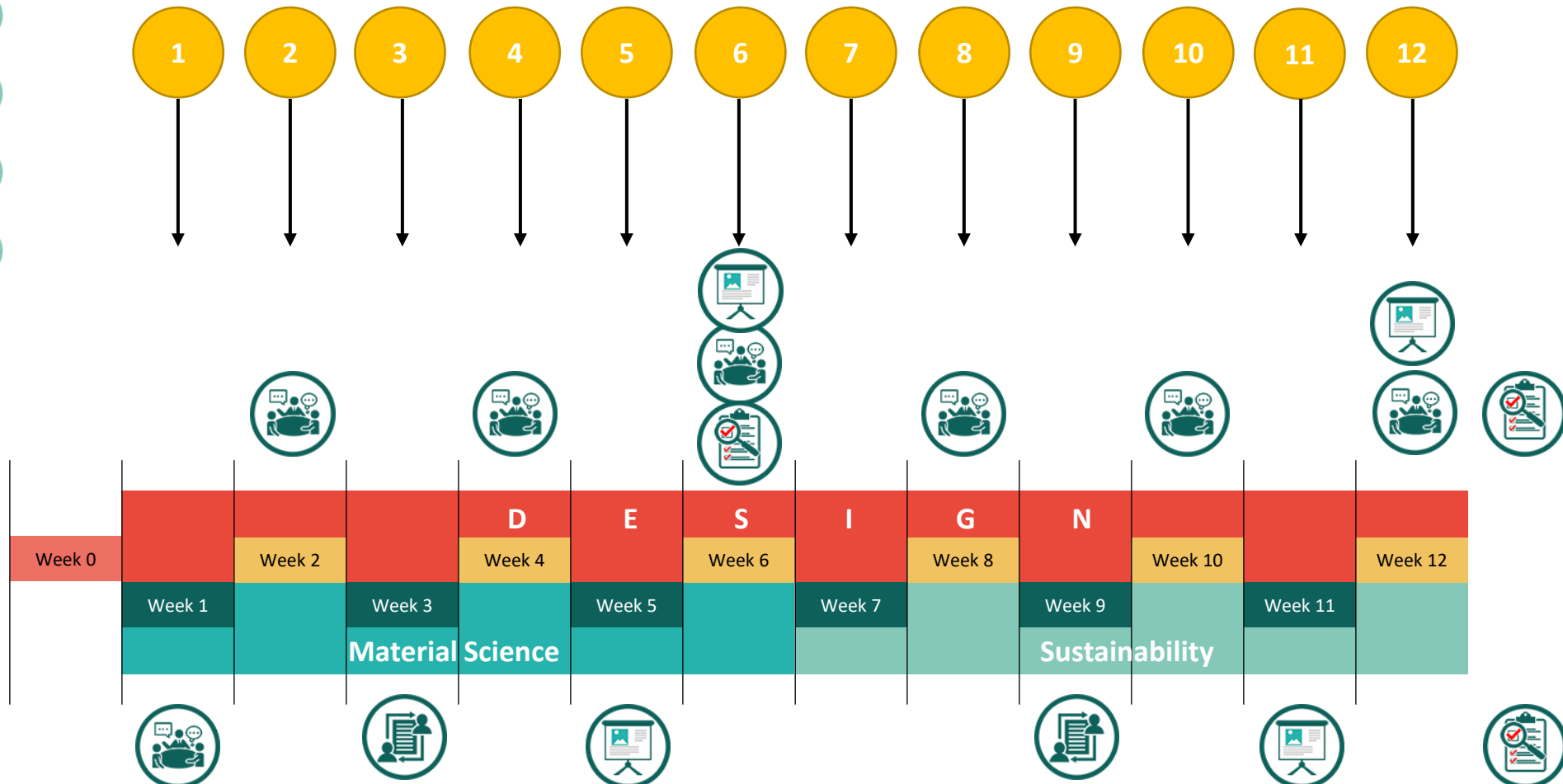
- Online Discussion







- Peer Assessment and Commentary



- Formal Assessment



-  • Presentation
-  • Online Discussion
-  • Peer Assessment and Commentary
-  • Formal Assessment

# Week 0

- Enrolment commences
- Access to online services
- Access to Virtual Learning Environment
- Welcome Letter
- Key contact details





- First Project
  - Introduce design brief 1:
    - The connection/Joint/link



- The tree: from macrostructure to chemical structure
  - Trunk anatomy.
  - Field trip: from seed to building.
  - Measuring wood properties (e.g., density and moisture).
  - Different wood species and their use.



# Residential

Week  
1

Day	Activity
Monday	Intro Day; Team Building & Design Brief
Tuesday	Seed to Building
Wednesday	Timber Material Properties
Thursday	Optional CPD
Friday	Optional CPD







# Design Brief 1

1. Select and then detail the joining of two timber members:
  - a. Describe and justify the timber joint you wish to use
  - b. Describe the characteristics of your chosen timber
  - c. Explain why you picked this type(S) of timber
  - d. If you eliminated a potential option, then please explain why it did not meet your criteria.

- Select Materials
  - Discuss and justify choice
  - Present design concept(s)
  - Comment on Colleagues choices (online)

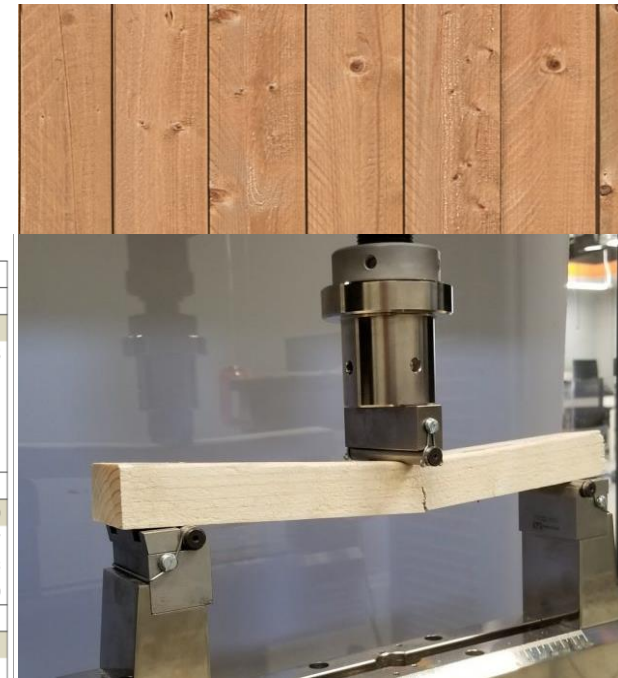
- Mechanical properties of wood

- Mechanical behaviour of wood.
- Measuring wood properties (e.g., strength and stiffness).
- Grading timber (visual and mechanical).
- Strength classes.



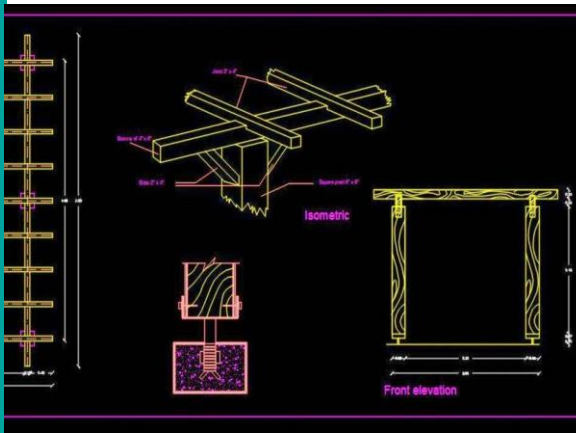
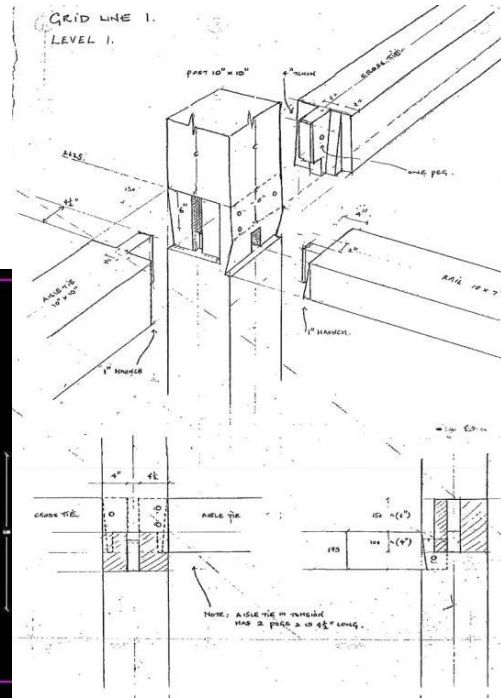
Softwood based on edgewise bending tests - strength, stiffness and density values

Class	C14	C16	C18	C20	C22	C24	C27	C30	C35	C40	C45	C50
$f_{t,k}$	14	16	18	20	22	24	27	30	35	40	45	50
$f_{l,k}$	7,2	8,5	10	11,5	13	14,5	16,5	19	22,5	26	30	33,5
$f_{s,k}$	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
$f_{t,90,k}$	16	17	18	19	20	21	22	24	25	27	29	30
$f_{s,90,k}$	2,0	2,2	2,2	2,3	2,4	2,5	2,5	2,7	2,7	2,8	2,9	3,0
$f_{k}$	3,0	3,2	3,4	3,6	3,8	4,0	4,0	4,0	4,0	4,0	4,0	4,0
$E_{0,05m}$	7,0	8,0	9,0	9,5	10,0	11,0	11,5	12,0	13,0	14,0	15,0	16,0
$E_{0,05k}$	4,7	5,4	6,0	6,4	6,7	7,4	7,7	8,0	8,7	9,4	10,1	10,7
$E_{0,90,05m}$	0,23	0,27	0,30	0,32	0,33	0,37	0,38	0,40	0,43	0,47	0,50	0,53
$G_{05m}$	0,44	0,50	0,56	0,59	0,63	0,69	0,72	0,75	0,81	0,88	0,94	1,00
$\rho_k$	290	310	320	330	340	350	360	380	390	400	410	430
$\rho_{05m}$	350	370	380	400	410	420	430	460	470	480	490	520



- Develop/select concept
  - Produce technical drawing:
    - Section
    - Isometric

- Moisture, fire, and time-dependent effect
  - Effect of water on wood and on buildings.
  - Creep effect.
  - Fire and timber structures.





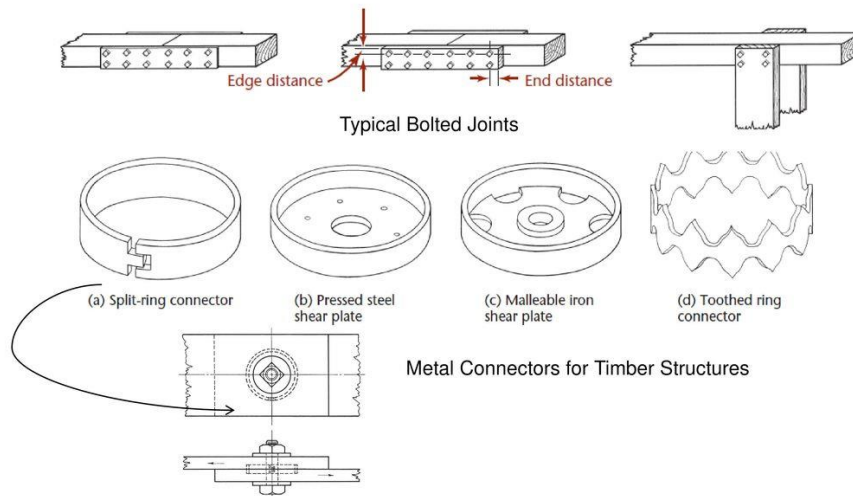
- Further Development
  - Explore manufacture techniques and discuss with colleagues and instructors

- Degradation: biotic and abiotic actions
  - Atmospheric, thermal, and chemical damage of wood.
  - Damage of animals, microorganisms, and fungi.



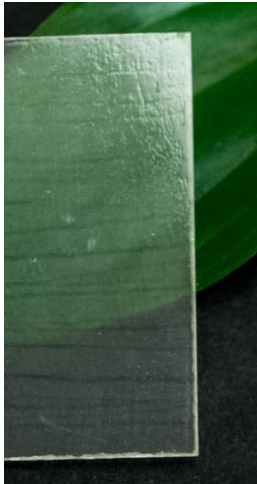
- Pre-final preparations
  - Presentation for week 6
  - Drawings ready for manufacture

## Joints and Connectors



- Durability: protection and treatments

- Protection of before, during, and after the manufacturing processes.
- Treatments and preservatives.
- Wood modifications.
- Protective elements and good practice.





- Final Submission

- Technical Drawings
- Manufacture onsite model
- Present project to Class and critique panel
- Discuss submission

- Engineered wood products

- Log transformation processes and adding value to the timber resource.
- Lamellae-, veneer-, strand-, particles-, and fibre-made materials
- Composite products.



# Residential



Day	Activity
Monday	Review of outputs / presentation Design Brief 2
Tuesday	Sustainable Development Tour
Wednesday	Sustainability Workshop
Thursday	Optional CPD
Friday	Optional CPD



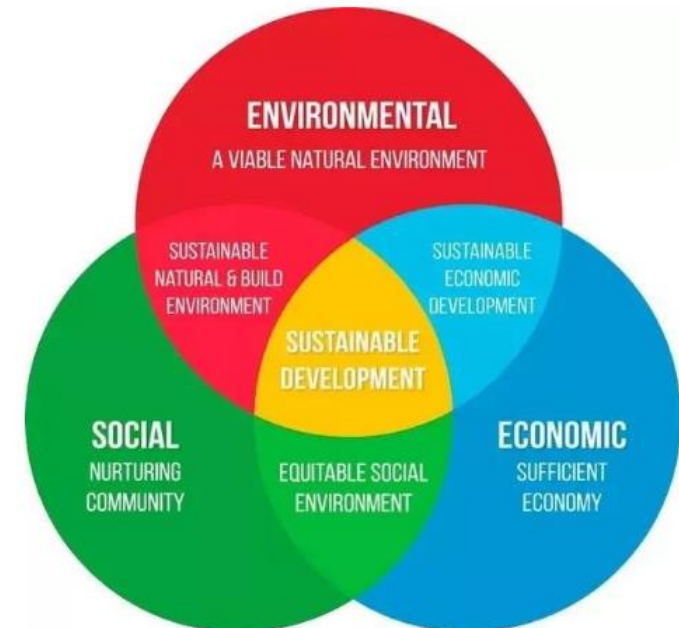
Week  
6



- Second Project
  - Introduce design brief 2:
    - Design a structure



- Sustainable Development as a concept, its definition and evolution
  - The problem of environmental change
  - Economic, Social and Environmental



# Design Brief 2a

Your client is a Victorian house owner who has double height ceiling of 6 metres. The owner of the Victorian house would like to utilise the space but in a non-invasive way by designing an extra floor using timber for the ease of off-site manufacture and on-site assembly.

Using the plans and details provided below:

1. Respond to the brief by creating a programme of spaces and activities required by the owner.
  - a. Usage Bubble Diagram including importance, priority, distribution and sizes
  - b. Proposed layout within the existing space
2. Develop your concept and produce
  - a. Section scale 1:50 crossing through any stairs
  - b. Plan of both floors
  - c. A detail of the connection between the new part and the old part
3. Submit the final 3D model using digital format to be printed 3D on site or if using manual format, then you need to produce a maquette off-site
4. Prepare a presentation of no more than 10 minutes to present your design and its concept and development



# Design Brief 2b

Your client is a home owner who would like to convert their loft into an extra bedroom. In order to do that and due to the inclination of the roof, they will need to add extra headroom and space including windows to introduce light into the space.





# Design

- Develop concept
  - Discussion with instructor



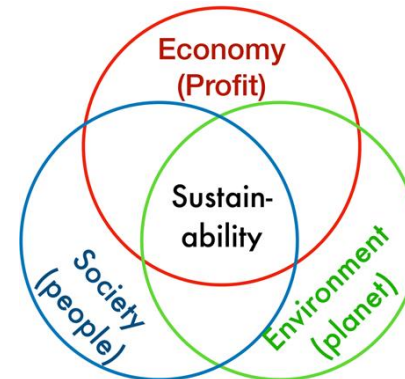
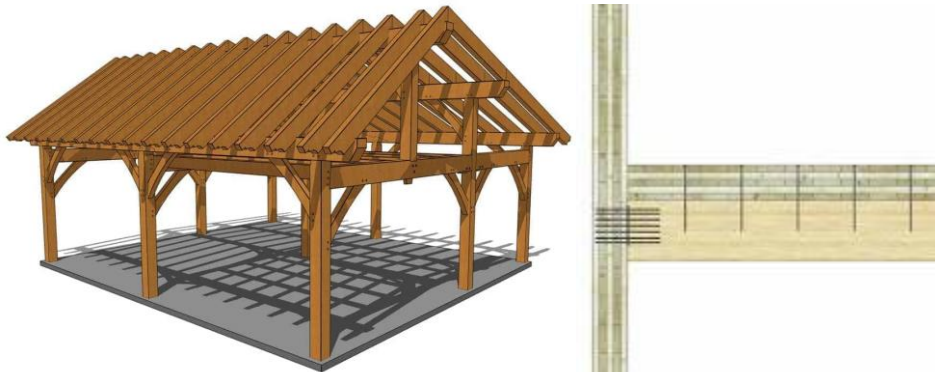
# Sustainability

- Alternative approaches on the concept of sustainability in the Built Environment

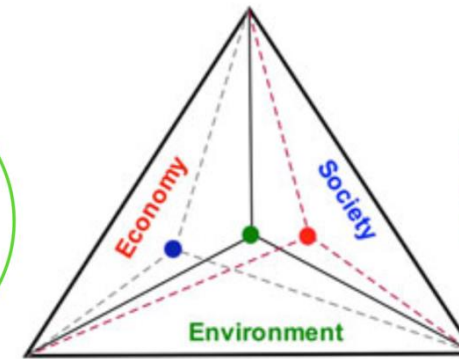


- Develop/select concept
  - Produce technical drawing:
    - Section
    - Isometric

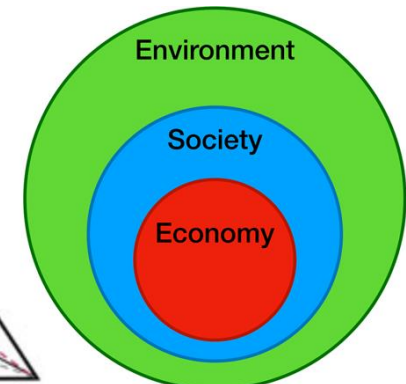
- Types of sustainability
  - Mainstream
  - Strong
  - Weak



Triple bottom line



Weak sustainability

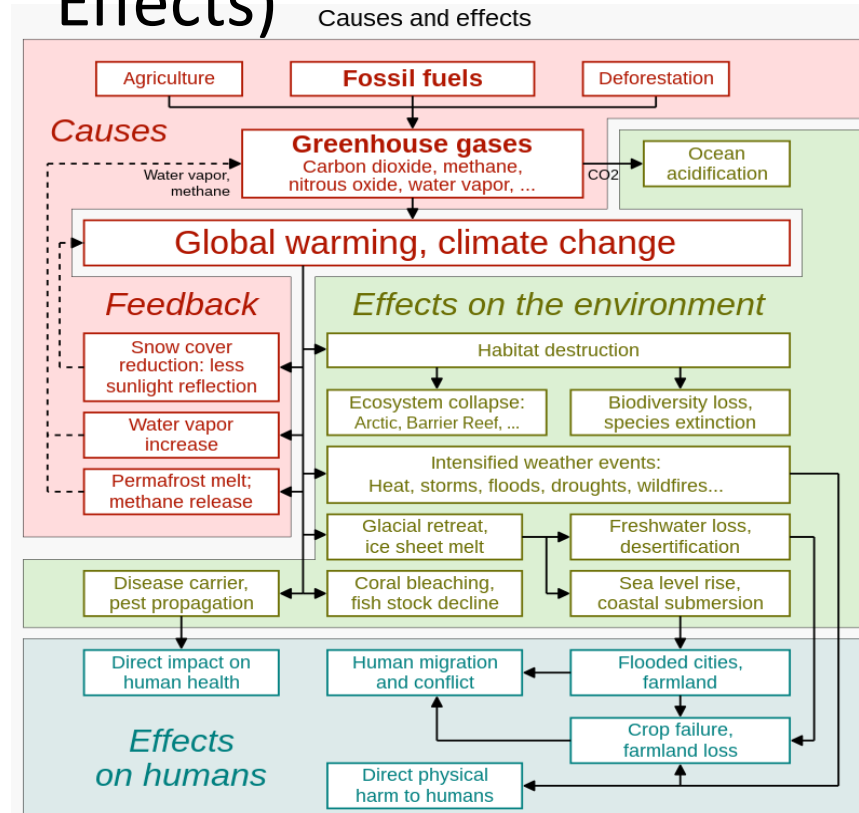


Strong sustainability

- Further Development
  - Explore manufacturing techniques and discuss with colleagues and instructors

- Climate Change and its relation to sustainability (Definition, Causes and Effects)

Week  
10

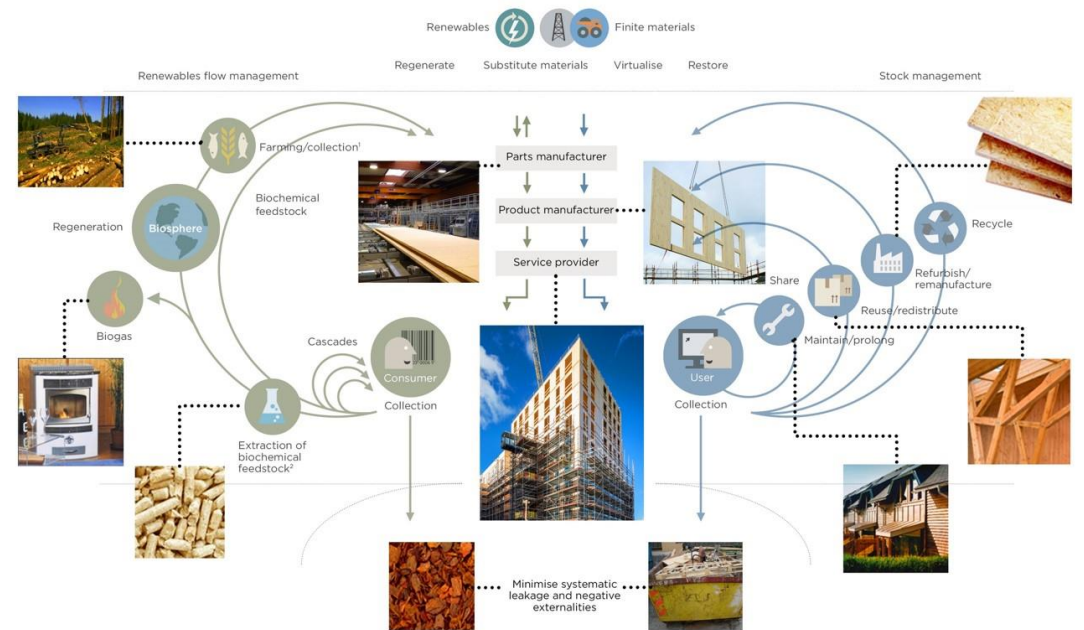




- Pre-final preparations
  - Presentation for week6
  - Drawings ready for manufacture



- The role of economy in sustainable Built Environment
- Timber and the Circular Economy



- Final Submission
  - Drawings
  - Manufacture onsite model (to scale)
  - Present project to Class and critique panel
  - Discuss submission

- Sustainability in the built environment; linking the two strands and highlighting the Role of built environment in both climate change and sustainability





# Residential

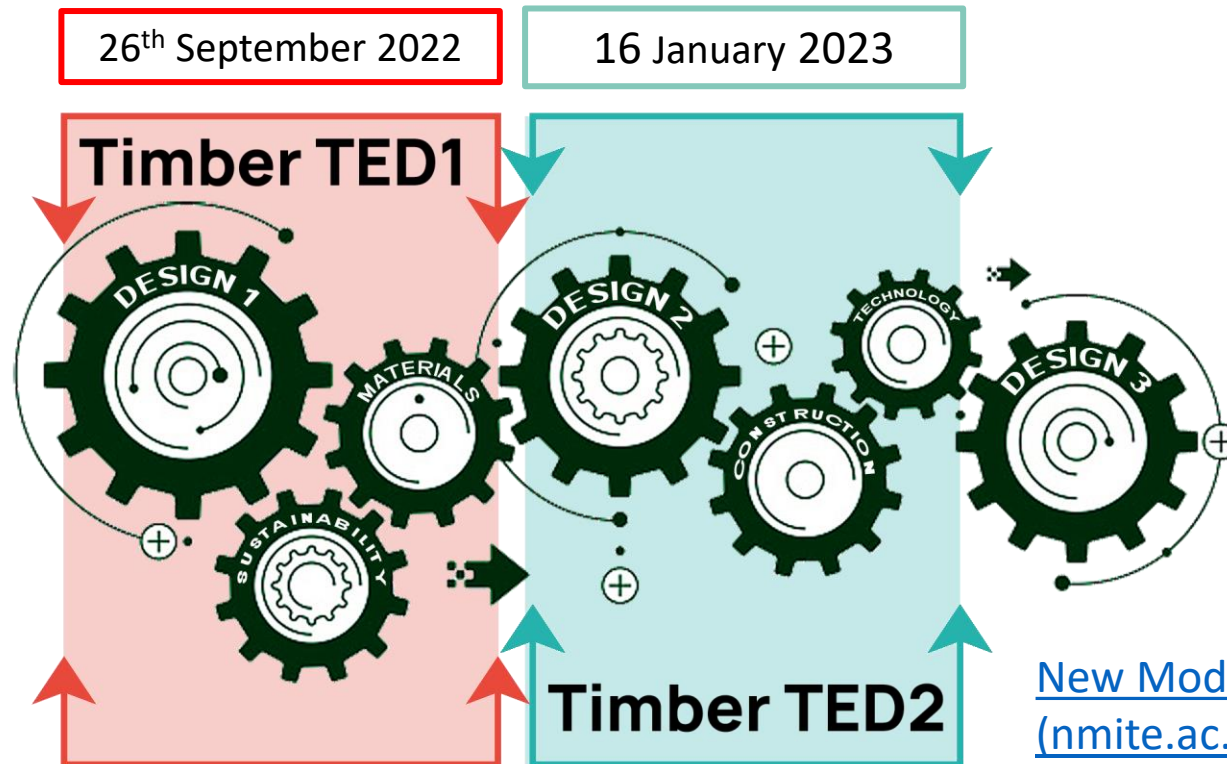
Week  
12

Day	Activity
Monday	Review of outputs Making
Tuesday	Making
Wednesday	Making
Thursday	Portfolio Review Employer Day
Friday	Optional CPD



# Layering up understanding of timber

- Expand students understanding and knowledge of the principles and applications of Timber Design Construction and Engineering Methods within the context of the Built Environment.
- Provide students with an understanding of the principles of timber design and construction technologies
- Introduce and demonstrate the professional use of software to design, develop and communicate timber design.
- Understand the methods deployed in construction of different systems, and how to read construction technical drawing and its different layers



## Course Fees & Registration

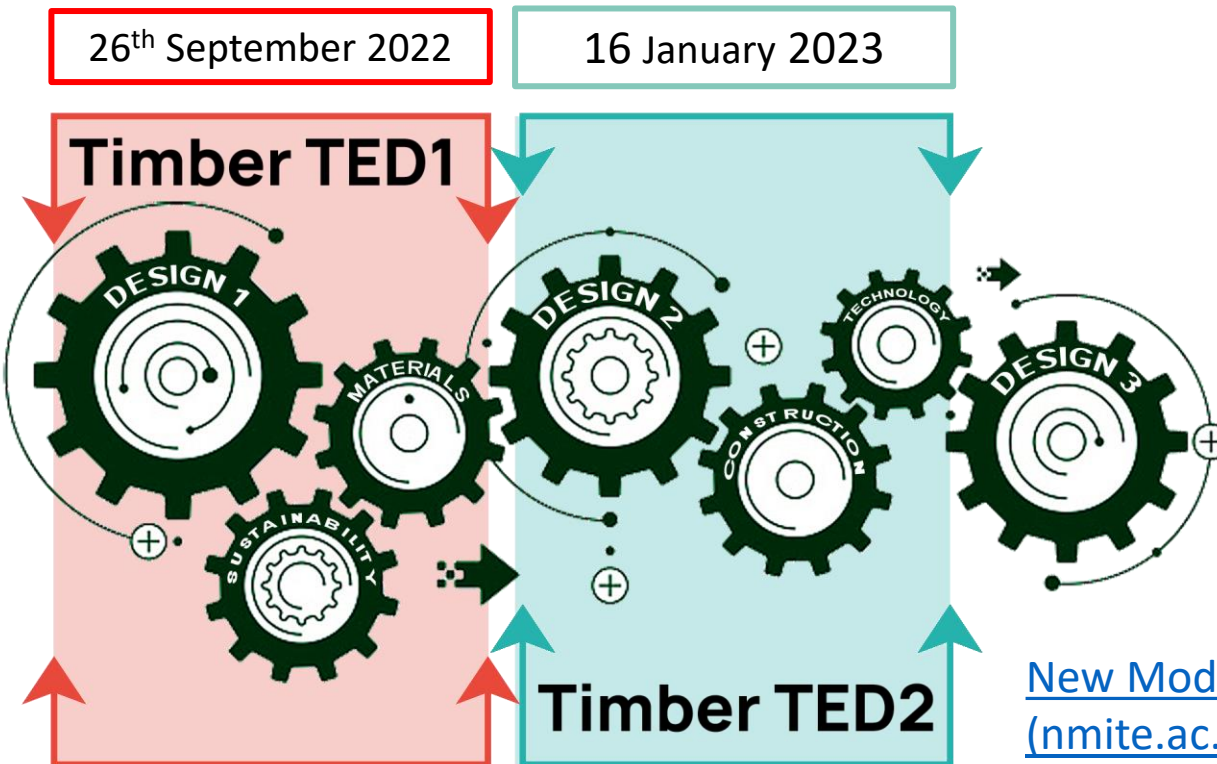
TED 1: £3000 (excluding accommodation)

TED 2: £3000 (excluding accommodation)

[New Model Institute for Technology & Engineering, Hereford \(nmite.ac.uk\)](http://nmite.ac.uk)

# Create the specifiers of the future

- Build a community of knowledge in timber as a building material
- Contribute to the UK community of practice in sustainable built environment
- Prepare a generation of timber professionals to transform the built environment



## Course Fees & Registration

TED 1: £3000 (excluding accommodation)

TED 2: £3000 (excluding accommodation)

[New Model Institute for Technology & Engineering, Hereford  
\(nmite.ac.uk\)](http://nmite.ac.uk)





# Questions

