**PDST**
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

An Roinn Oideachais agus Scileanna
Department of Education and Skills

# National Workshop 5 (day 2)

LEAVING CERTIFICATE
COMPUTER SCIENCE

# Schedule

| | |
|---|---|
| **Session 1** | ALT1 - I<br>Introduction to ALT1 (Investigate and Plan) |
| 11.00 – 11.30 | Tea/Coffee |
| **Session 2** | ALT1 – II (Design) |
| 13.00 – 14.00 | Lunch |
| **Session 3** | ALT1 – III (Create)<br>Q&A |

# Key Messages

All learning outcomes (LOs) are interwoven.

This means that the specification can be used in many different ways.

Group work is a key feature in the teaching, learning and assessment of LCCS.

ALTs provide an opportunity to teach theoretical aspects of LCCS.

Digital technologies can be used to enhance collaboration, learning and reflection.

LCCS can be mediated through a constructivist pedagogical approach.

LCCS is suitable for all! This includes students with SEN and of all ability levels.

# CPD Schedule for 2021/22

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Sept '21 — Oct '21 — Nov '21 — Dec '21 — Jan '22 — Feb '22 — Apr '22 — June '22

Timeline events:
- NW 5 (day 1)
- NW 5 (day 2)
- Skills Workshop JavaScript I
- Clusters (CoP)
- Skills Workshop JavaScript II
- Winter Webinar
- NW 6 (CWA)
- NW 6 (day 2)
- Skills Workshop (Elective)
- Clusters (CoP)
- Spring Webinar
- National Workshop 7 (2 day residental)

CoP labels between events.

**Next CPD event: Community of Practice cluster meetings – online late Oct./early Nov.**

**Day 2 Session 1**

**ALT1 – Interactive Information Systems**

# By the end of this session participants will have:

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worked in groups to **share and evaluate potential ideas** for ALT 1 (interactive information systems)

collaborated on **developing one** potential idea for ALT 1 **further**

acquired additional skills, knowledge and ideas on **how to facilitate ALT 1** in their own classrooms

enhanced their understanding of the **Investigate** and **Plan** stages of the **Design Process** with a particular focus on ALT 1

**Switch video / sound ON**

**Check in – introduce yourselves**

*Looking back at NW5 Day 1 …*

*… to what extent was your thinking extended in relation to LCCS*

'Students **work in teams** to carry out four applied learning tasks over the duration of the course each of which results in the **creation of a real or virtual computational artefact**.'

'These artefacts should relate to the **students' lives and interests**.'

'Examples of computational artefacts include **programs, games, web pages, simulations, visualisations, digital animations, robotic systems, and apps**.'
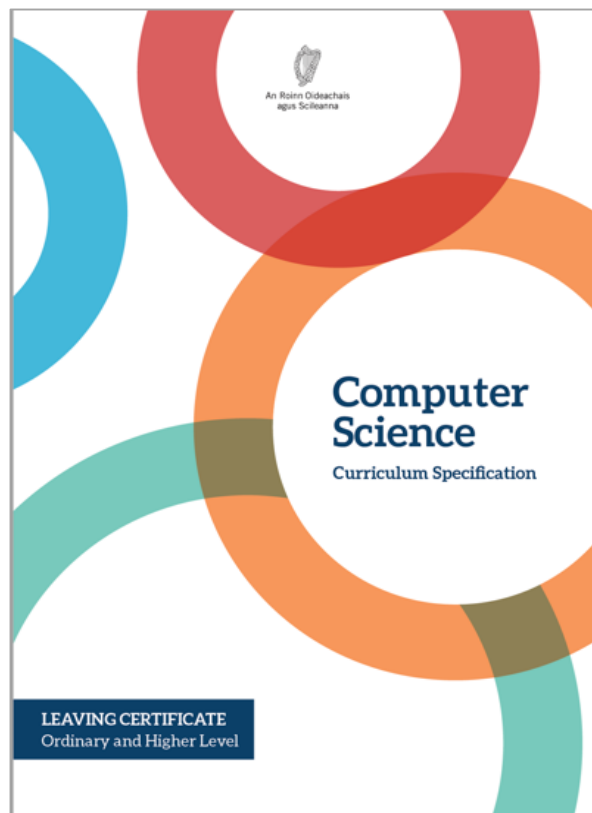
'Where possible, the artefacts should be **beneficial** to the community and society in general.'

'Students…document, reflect and present on each applied learning task.'

*LCCS Specification: pgs 10 & 22*

# LCCS Interwoven

The four applied learning tasks explore the four following contexts:

**1 - Interactive information systems**
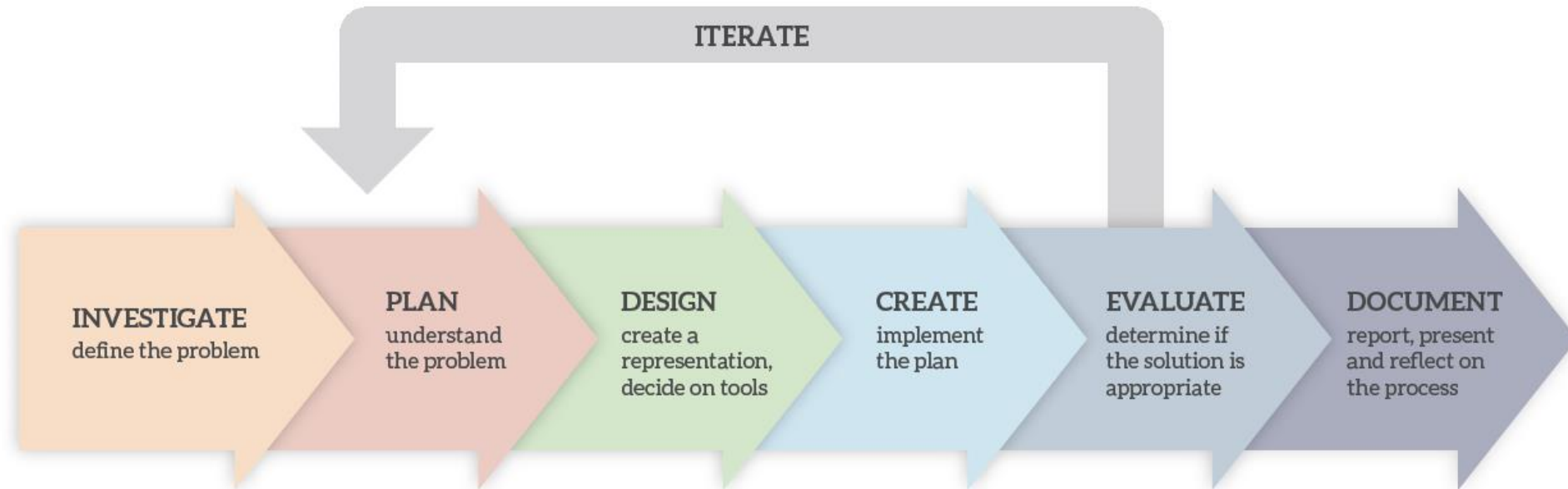2 - Analytics
3 - Modelling and simulation
4 - Embedded systems
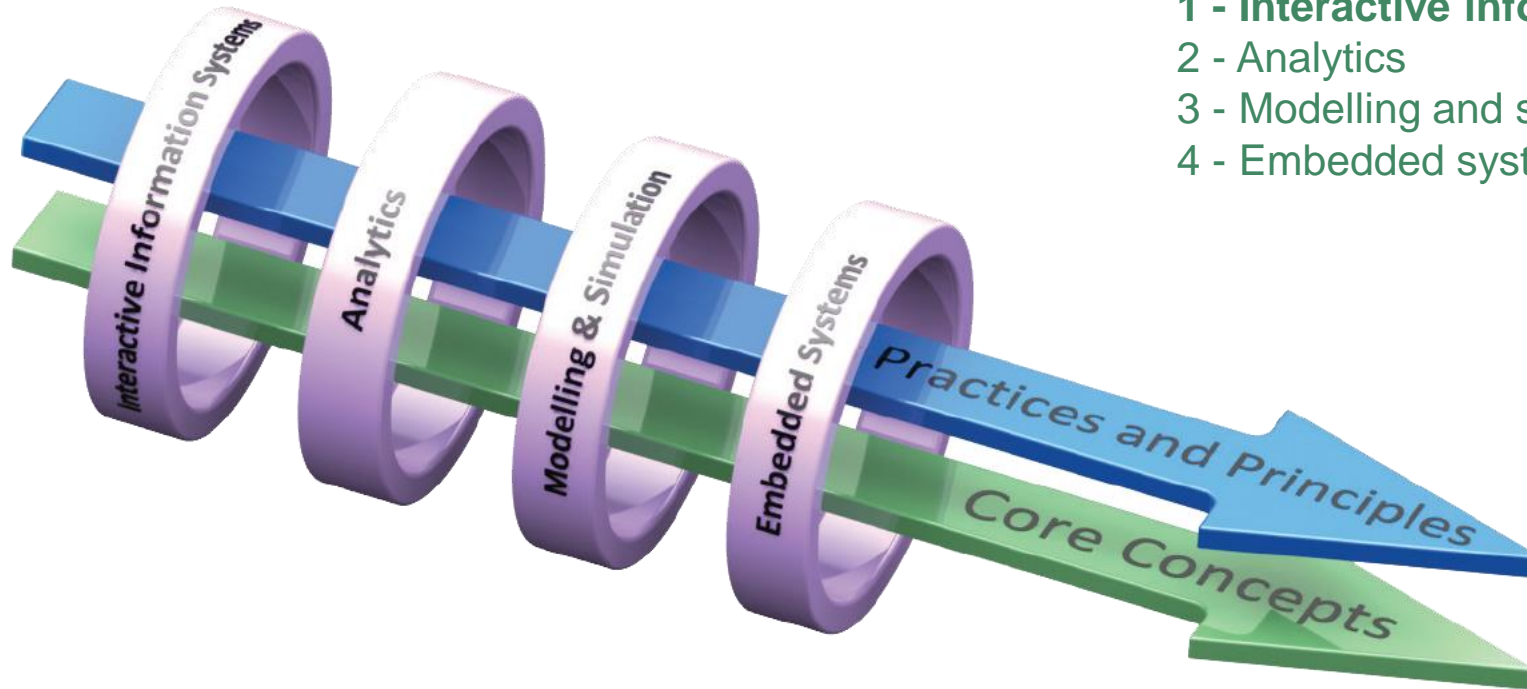


**Key to remember**:
*Explore and teach the LOs through the lens of ALTs.*

# ALT Output

'The output from each task is a **computational artefact** and a concise individual **report** outlining its development.



'The **structure** of the reports should **reflect the design process**...'

# ALT Reporting

'In the report, students outline where and how the **core concepts** were employed.'

| Strand 1: Practices and principles | Strand 2: Core concepts | Strand 3: Computer science in practice |
|---|---|---|
| ▸ Computers and society<br>▸ Computational thinking<br>▸ Design and development | ▸ Abstraction<br>▸ Algorithms<br>▸ Computer systems<br>▸ Data<br>▸ Evaluation/Testing | ▸ Applied learning task 1<br>   - Interactive information systems<br>▸ Applied learning task 2 - Analytics<br>▸ Applied learning task 3<br>   - Modelling and simulation<br>▸ Applied learning task 4<br>   - Embedded systems |

*LCCS Specification: p11*

'The learning outcomes from all strands are **interwoven** and to complete their strand 3 applied learning tasks students:

- approach problems in a systematic way and use **abstraction** to identify tasks and select appropriate strategies to generate solutions

- create visual representations or models, and decide which tools to use and which **algorithms** to use, adapt or create as they employ appropriate techniques to develop their solution

- develop **computer systems** as they use programming, analysis and design skills combined with hardware knowledge to create network/Internet/cloud-based applications

- **evaluate and test** their solutions to identify and remove errors from their programs and base their solutions upon integration, analysis and evaluation of qualitative and quantitative information and data

*LCCS Specification: p16*

# ALT 1

*Design is one of the key **practices and principles** of computer science. As designers and creators of technology, students can be innovative and expressive through the creation of artefacts.*

*'Students will develop an **interactive website** that can display information (either local or remote data) from a database to meet a set of user needs.'*

*'Students will develop their knowledge of the role computer systems can play in **communicating** with and **providing information** about the world around them.'*

*LCCS Specification: p22*

# ALT 1: Learning Outcomes

| Students learn about: | Students should be able to: |
|---|---|
| Information systems<br><br>User-centred design<br><br>Web design<br><br>File systems and **relational** databases<br><br>Design process | 3.1 understand and list user needs/requirements before defining a solution<br><br>3.2 create a basic **relational** database to store and retrieve a variety of forms of data types<br><br>3.3 use appropriate programming languages to develop an interactive website that can display information from a database that meets a set of users' needs |

# Considering links to other Strands…

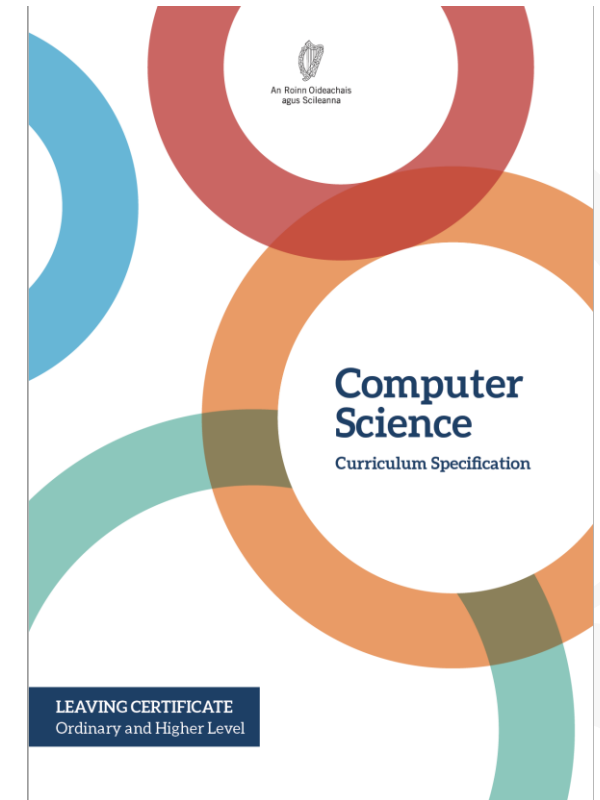| Strand 1: Practices and principles | Strand 2: Core concepts | Strand 3: Computer science in practice |
|---|---|---|
| ▸ Computers and society <br> ▸ Computational thinking <br> ▸ Design and development | ▸ Abstraction <br> ▸ Algorithms <br> ▸ Computer systems <br> ▸ Data <br> ▸ Evaluation/Testing | ▸ Applied learning task 1 <br>   - Interactive information systems <br> ▸ Applied learning task 2 - Analytics <br> ▸ Applied learning task 3 <br>   - Modelling and simulation <br> ▸ Applied learning task 4 <br>   - Embedded systems |

# Computers and Society - LCCS Learning Outcomes

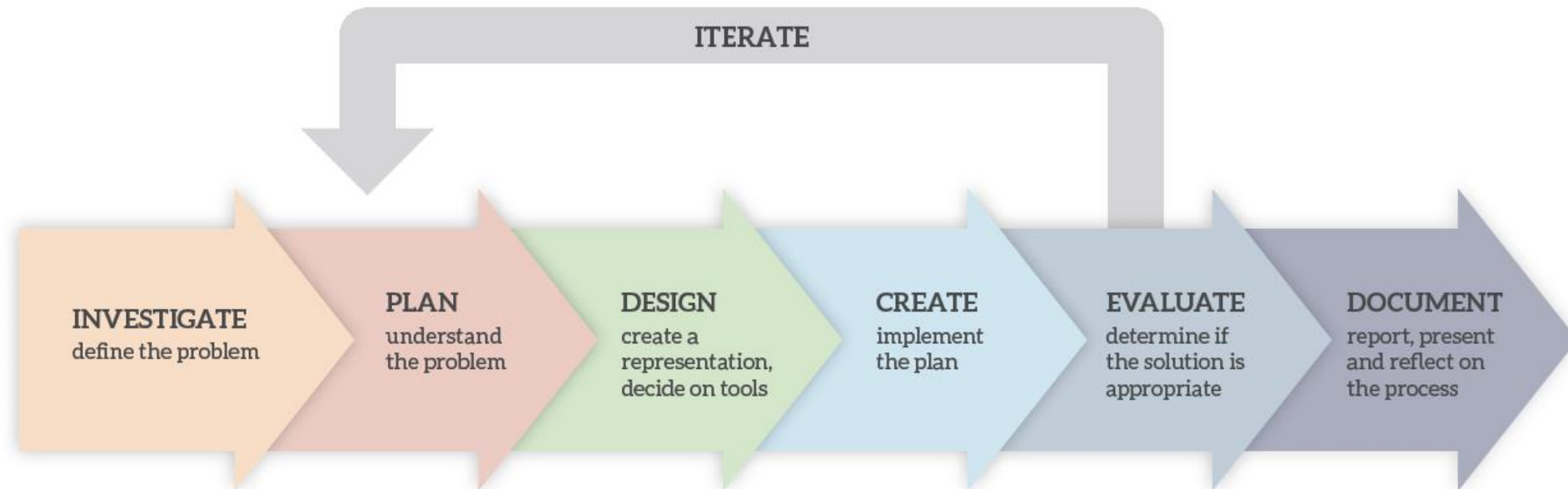| | |
|---|---|
| **S1: Computers and society**<br><br>Social and ethical considerations of computing technologies<br><br>**Turing machines**<br><br>The Internet<br><br>Machine learning<br><br>Artificial intelligence<br><br><br><br>User-centred design | 1.11 discuss the complex relationship between computing technologies and society including issues of ethics<br><br>1.12 compare the positive and negative impacts of computing on culture and society<br><br>1.13 identify important computing developments that have taken place in the last 100 years and consider emerging trends that could shape future computing technologies<br><br>1.14 explain when and what machine learning and AI algorithms might be used in certain contexts<br><br>1.15 consider the quality of the user experience when interacting with computers and list the principles of universal design, including the role of a user interface and the factors that contribute to its usability<br><br>**1.16 compare two different user interfaces and identify different design decisions that shape the user experience**<br><br>1.17 describe the role that adaptive technology can play in the lives of people with special needs<br><br>1.18 recognise the diverse roles and careers that use computing technologies |

Computer Science
Curriculum Specification

LEAVING CERTIFICATE
Ordinary and Higher Level

# Computer systems - LCCS Learning Outcomes

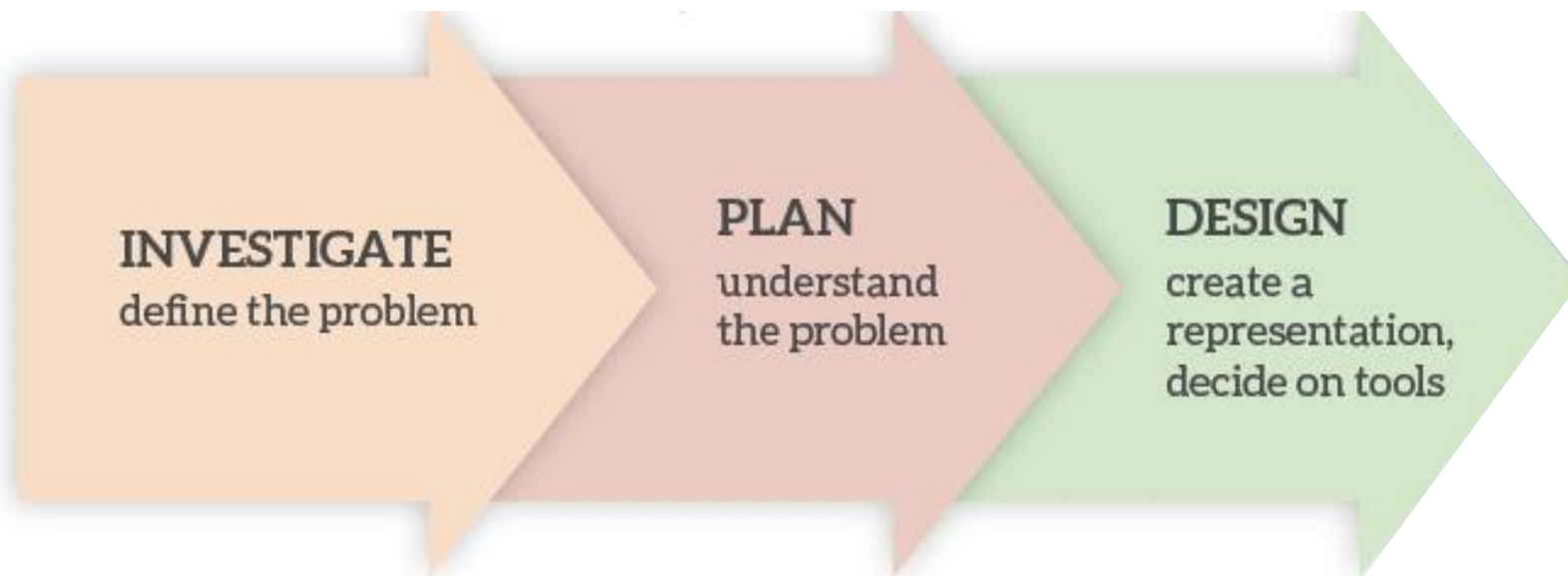| S2: Computer systems | |
|---|---|
| **CPU: ALU, Registers, Program counter, Memory** | 2.11 describe the different components within a computer and the function of those components |
| Basic electronics: voltage, current, resistors, capacitors, transistors | 2.12 describe the different types of logic gates **and explain how they can be arranged into larger units to perform more complex tasks** |
| Operating system layers: Hardware, OS, Application, User | 2.13 describe the rationale for using the binary number system in digital computing and how to convert between binary, hexadecimal and decimal |
| | 2.14 describe the difference between digital and analogue input |
| Web infrastructure - Computer Network Protocols: HTTP, **TCP, IP, VOIP** | 2.15 explain what is meant by the World Wide Web (WWW) and the Internet, including the client server model, hardware components **and communication protocols** |

# Group Activity
## Groups will begin to develop a new ALT1

The Design Process

1

INVESTIGATE
define the problem

# Group Activity / Breakout

# Group Activity ALT 1: Investigate

1. In your assigned groups, share potential ideas for ALT 1

2. Aim for as many ideas as you can

3. Add your ideas to the Google doc for your Group Number (corresponds to breakout room number)

4. Nominate a timekeeper, notetaker, chairperson and spokesperson

# 15 minutes

# 5 minute stretch break

**2**

**PLAN**
understand
the problem

# Group Activity ALT 1: Plan

1. In your assigned groups, **evaluate** your potential ideas for ALT 1

2. Choose **one idea** for further development

3. Develop your chosen idea further – you may use the prompt questions in the Google doc to help you

What will your project do? Aims? Limitations?

Who are the end users and how will they interact with it?

Is there a broad theme or a specific topic?

Tools/materials... what technology could you use?

What is new and have to be researched further?

What other LOs can be taught through the lens of this project?