Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professiona Learning of School Leaders and Teachers

Leaving Certificate Computer Science

National Workshop 5

Day 2

Workshop Overview

Session 1 09:00 - 11:00	ALT1 – Introduction
Tea/Coffee 11:00 - 11:30	
Session 2 11:30 - 13:00	ALT1 - Investigate and Plan
Lunch 13:00 - 14:00	
Session 3 14:00 - 15:30	ALT1 – Design and Create

Key Messages

All learning outcomes (LOs) are interwoven. This means that the specification can be used in many ways.

ALTs provide an opportunity to teach theoretical aspects of LCCS.

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

LCCS can be mediated through a constructivist pedagogical approach.

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

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Session 1

Introduction to Interactive Information Systems (ALT 1)

By the end of this session

Participants will be enabled to:

- reflect on what the specification says about ALTs and particularly ALT 1 (Interactive Information Systems)
- develop an understanding of Interactive Information Systems
- gain an appreciation of UX design and principles of good design
- consider the use of assistive and adaptive technologies
- acquire additional skills, knowledge and ideas on how to facilitate ALT1 in their own classrooms

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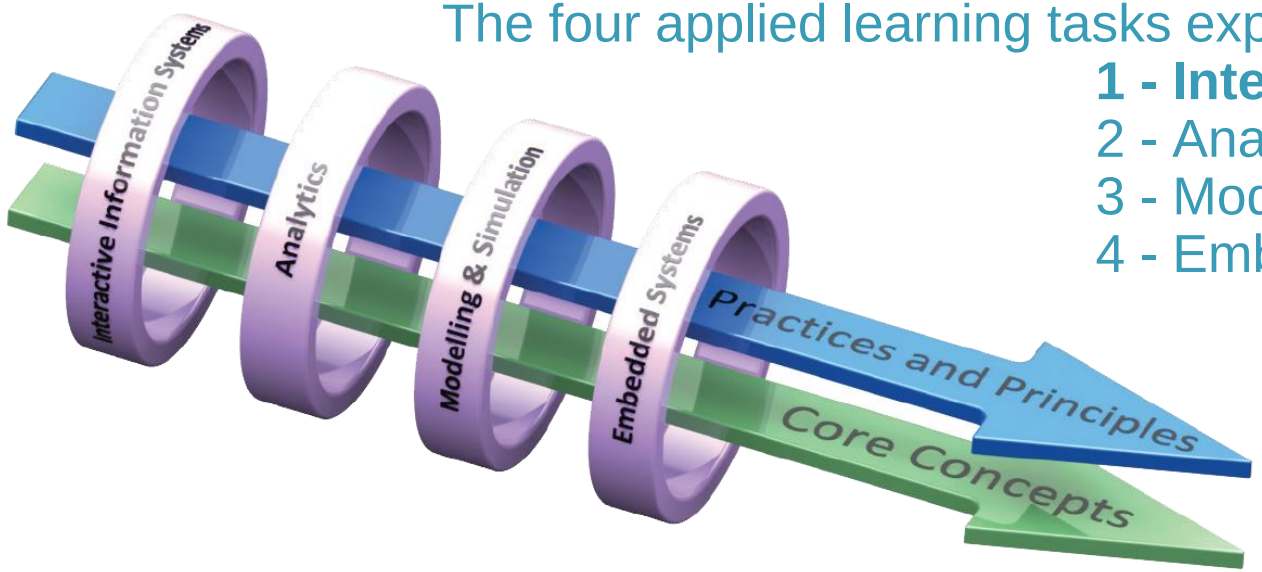
Introduction to ALTs (recap)

LCCS Interwoven



The four applied learning tasks explore the four following contexts:

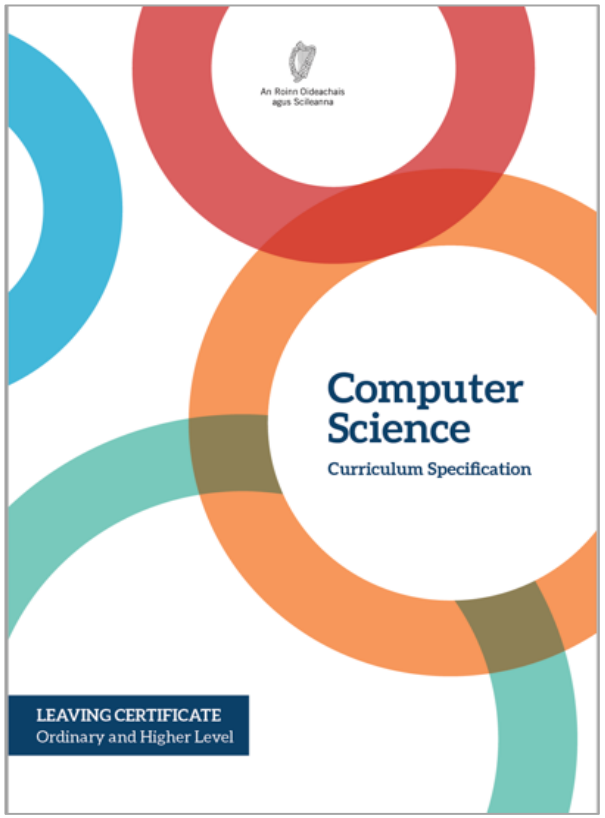
1 - Interactive information systems
2 - Analytics
3 - Modelling and simulation
4 - Embedded systems

Key point to remember: explore and teach the LOs through the lens of ALTs.

"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."



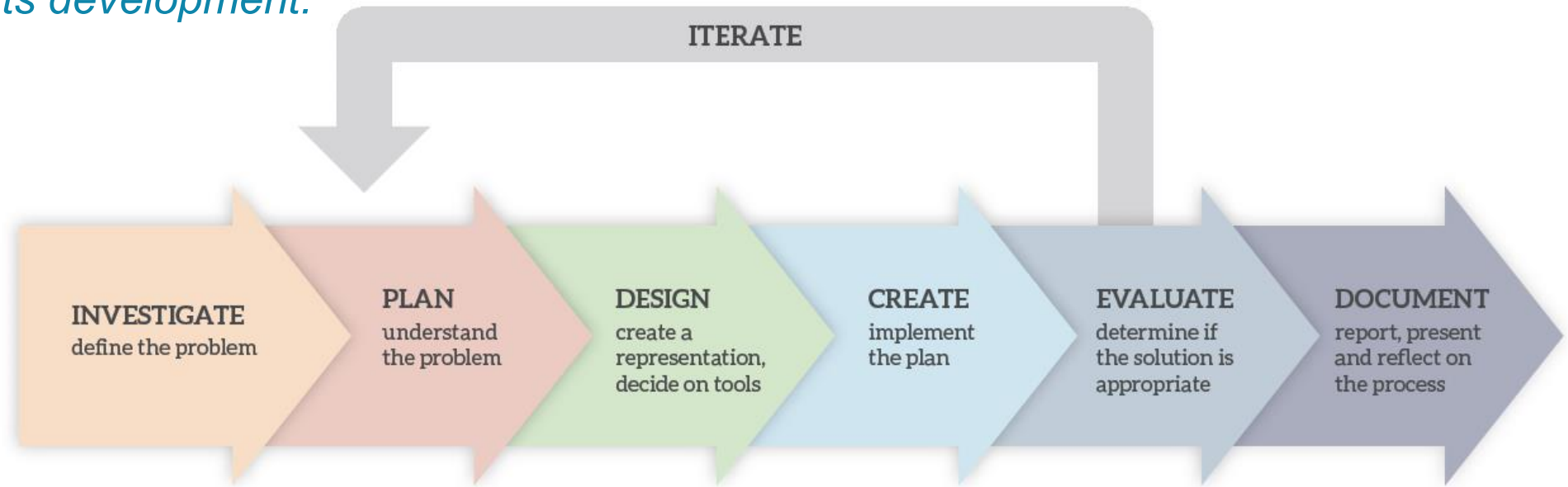
"Where possible, the artefacts should be beneficial to the community and society in general."

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

LCCS Specification: pgs. 10 & 22

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…"

LCCS Specification: p11

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 ▸ Computational thinking ▸ Design and development	▸ Abstraction ▸ Algorithms ▸ Computer systems ▸ Data ▸ Evaluation/Testing	▸ Applied learning task 1 - Interactive information systems ▸ Applied learning task 2 - Analytics ▸ Applied learning task 3 - Modelling and simulation ▸ Applied learning task 4 - Embedded systems

LCCS Specification: p11

Learning outcomes interwoven

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

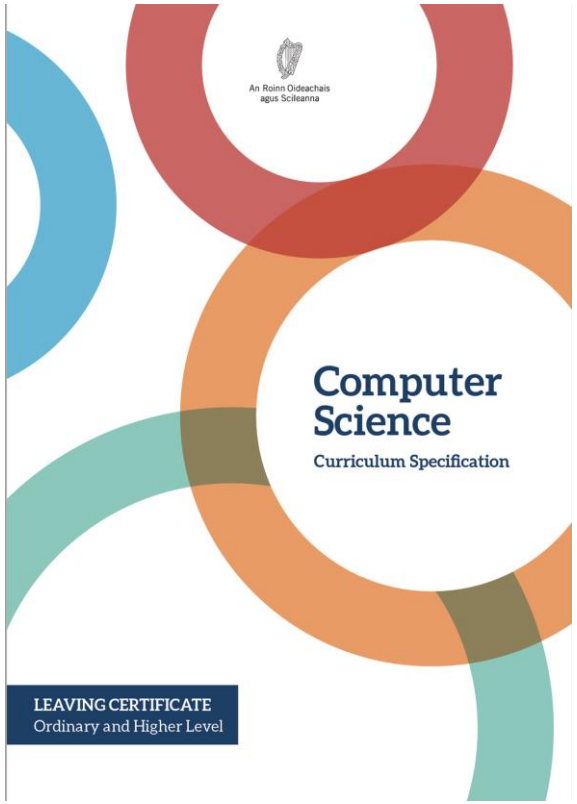
Students learn about:	Students should be able to:
Information systems User-centred design Web design File systems and **relational** databases Design process	3.1 understand and list user needs/requirements before defining a solution 3.2 create a basic **relational** database to store and retrieve a variety of forms of data types 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	▸ Abstraction	▸ Applied learning task 1 - Interactive information systems
▸ Computational thinking	▸ Algorithms	▸ Applied learning task 2 - Analytics
▸ Design and development	▸ Computer systems	▸ Applied learning task 3 - Modelling and simulation
	▸ Data	▸ Applied learning task 4 - Embedded systems
	▸ Evaluation/Testing	

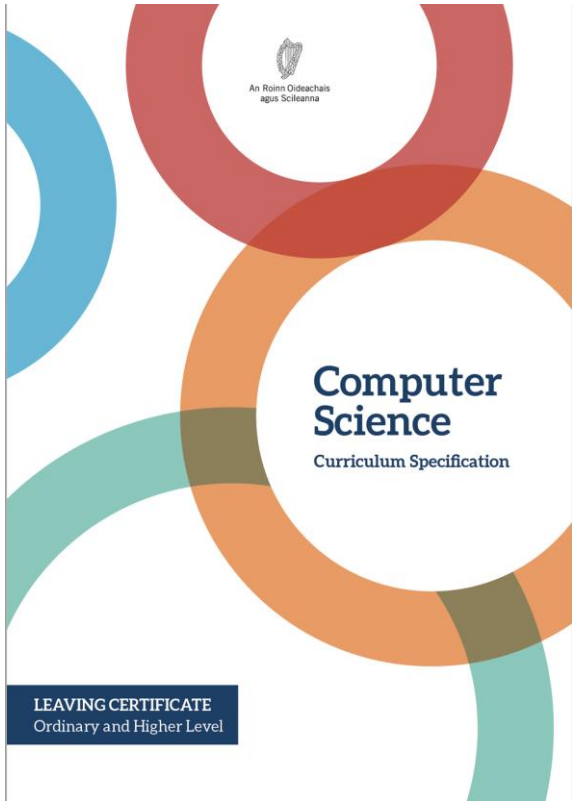
S1: Computers and Society

S1: Computers and society Social and ethical considerations of computing technologies **Turing machines** The Internet Machine learning Artificial intelligence User-centred design	1.11 discuss the complex relationship between computing technologies and society including issues of ethics 1.12 compare the positive and negative impacts of computing on culture and society 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 1.14 explain when and what machine learning and AI algorithms might be used in certain contexts 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 **1.16 compare two different user interfaces and identify different design decisions that shape the user experience** 1.17 describe the role that adaptive technology can play in the lives of people with special needs 1.18 recognise the diverse roles and careers that use computing technologies



S2: Computer systems

S2: Computer systems **CPU: ALU, Registers, Program counter, Memory** Basic electronics: voltage, current, resistors, capacitors, transistors Operating system layers: Hardware, OS, Application, User Web infrastructure - Computer Network Protocols: HTTP, **TCP, IP, VOIP**	2.11 describe the different components within a computer and the function of those components 2.12 describe the different types of logic gates **and explain how they can be arranged into larger units to perform more complex tasks** 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 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**



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Interactive Information Systems

Activity: Think-Pair-Share

Participants spend time in silence writing or thinking about their own ideas

Participants turn to the person beside them to discuss their ideas

Pairs share their answers with other pairs (square) or the wider group

Consider and discuss:

1. What are Interactive Information Systems?

2. Give some examples of Interactive Information Systems.

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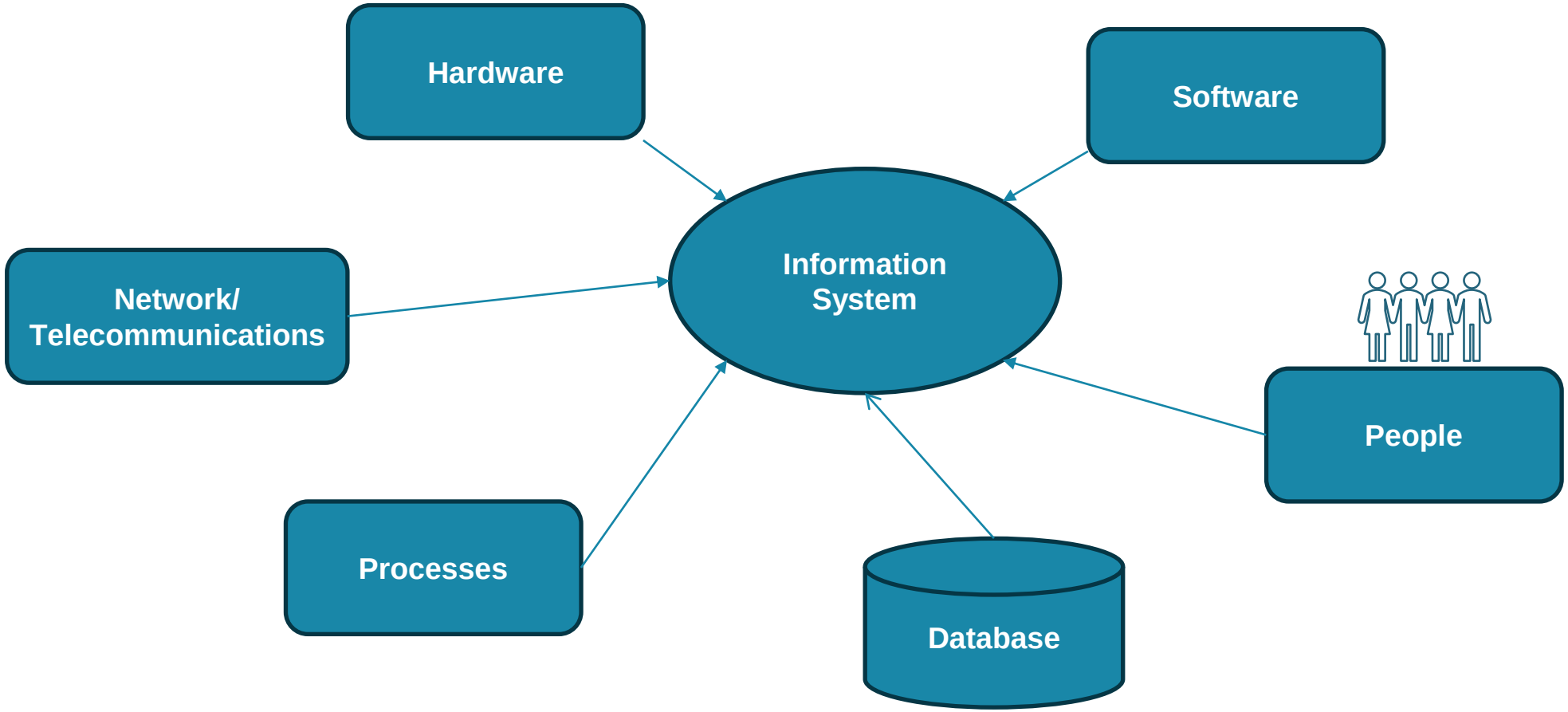
Components of an Information System



Matching Exercise

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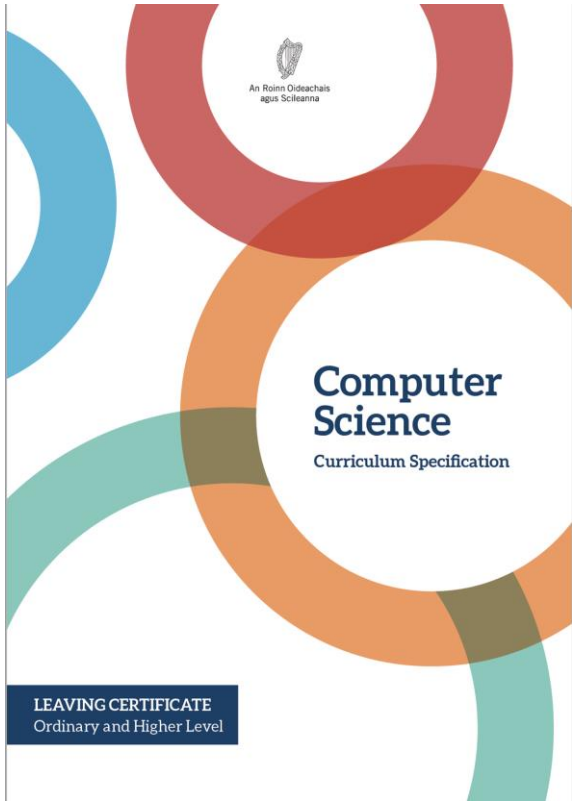
S1: User-centred design

Artificial intelligence	algorithms might be used in certain contexts
User-centred design	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 **1.16 compare two different user interfaces and identify different design decisions that shape the user experience** 1.17 describe the role that adaptive technology can play in the lives of people with special needs 1.18 recognise the diverse roles and careers that use computing technologies



UX/UI Design

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UX vs UI Design

UX vs UI

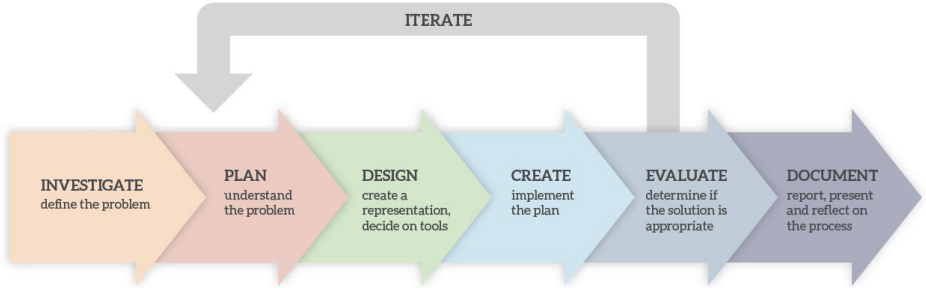
User Experience (UX):

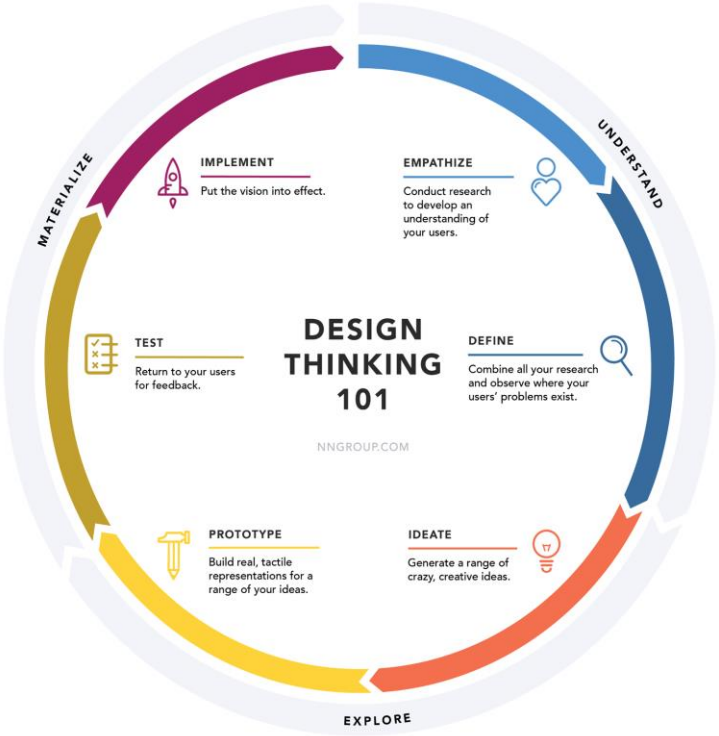
UX design concentrates on the overall experience a user has when interacting with a product or service. It aims to make the interaction as efficient, enjoyable, and effective as possible.

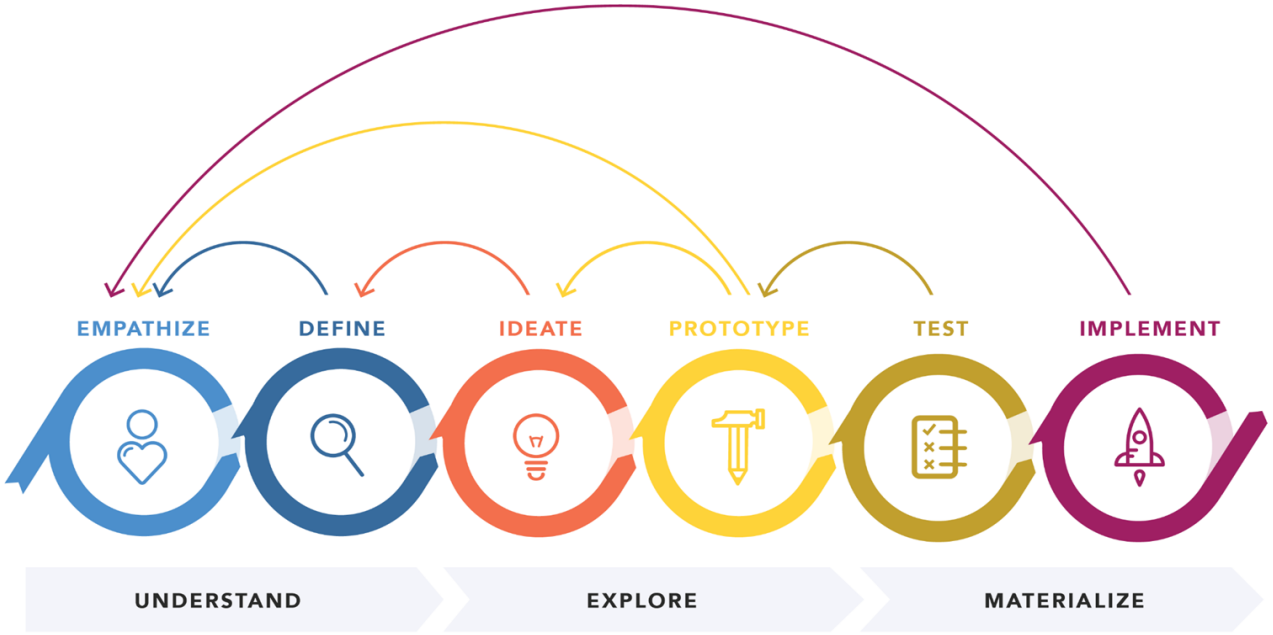
User Interface (UI):

UI design focuses on the visual and interactive elements of a product or service. It deals with the layout, aesthetics, and interactivity of the user interface.

Design process

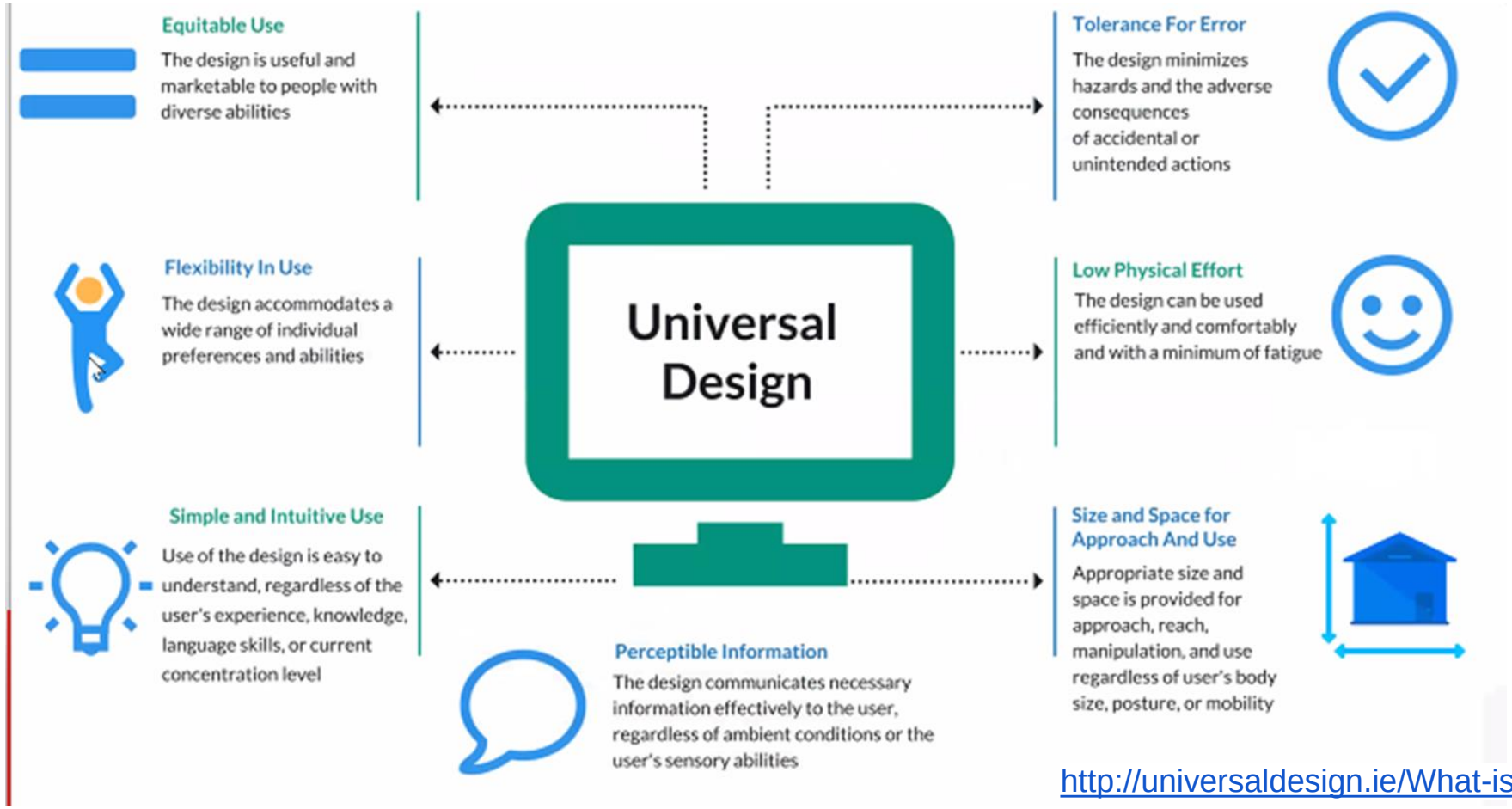






Source: https://www.nngroup.com/articles/design-thinking/

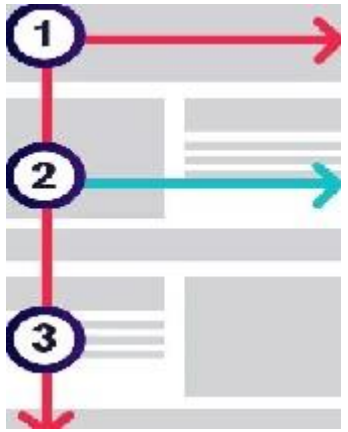
Universal Design Principles



http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/

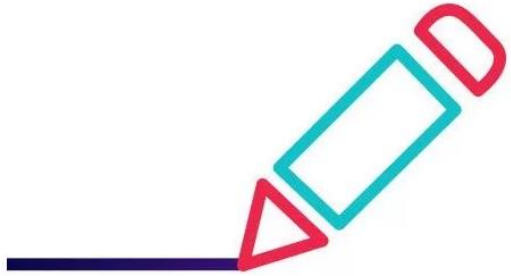
Principles of Good Website Design

1. Website Purpose
2. Simplicity – Colour, Type, Imagery
3. Navigation
4. F-Shape Reading Pattern



Principles of Good Website Design

5. Visual Hierarchy



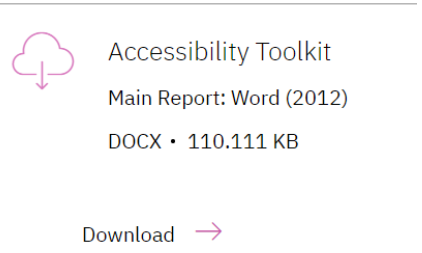
6. Content – webpage needs good design and good content

7. Grid-based layout

8. Mobile-friendly

https://www.feelingpeaky.com/9-principles-of-good-web-design/

Údarás Náisiúnta Míchumais
National Disability Authority



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- text equivalent for everything that's not text?
- Can customers get all the important information from your videos and audio, even if they can't see /hear them?
- customer's technology understand its structure?
- enough colour contrast between the website's written information and its background?
- enough volume contrast between your website's spoken information and its background noises?
- visual alternatives to textual material?
- Can your customers use your website with only a keyboard?
- enough time to read and use your website?
- nothing flashes quickly?
- Can customers find what they're looking for?
- Can customers read your information easily, and can they understand it?
- Does your website work as your customers would expect it to work?
- Does your website help prevent your customers making mistakes? explain your customers' mistakes clearly?
- Will it work on as many modern computers, phones, and browsers as possible?

https://nda.ie/publications/accessibility-toolkit

Centre for Excellence in Universal Design

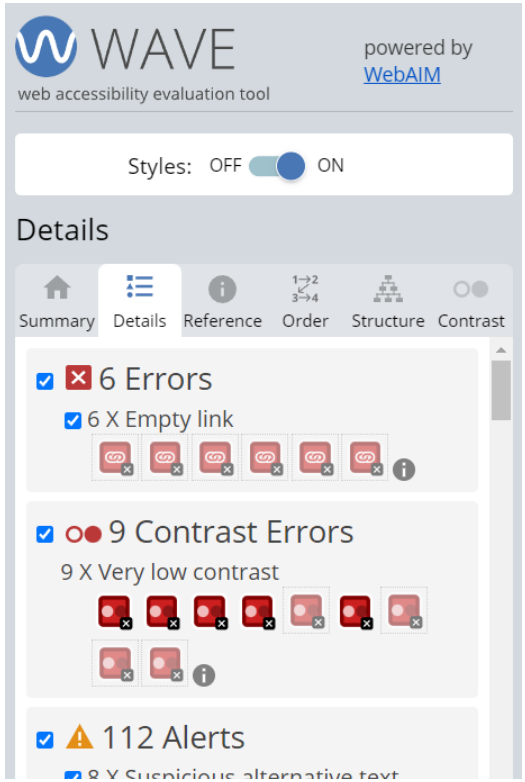
The Centre for Excellence in Universal Design (CEUD) is dedicated to enabling the design of environments that can be accessed, understood and used regardless of a person's age, size, ability or disability. The CEUD is part of the National Disability Authority.

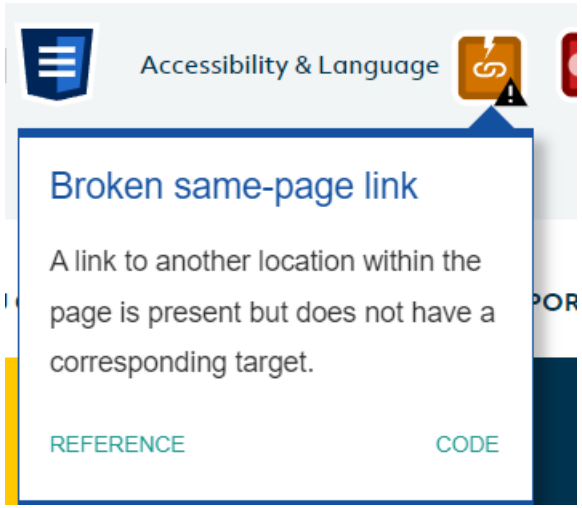
"Take a quick look at your site":

https://universaldesign.ie/technology-ict/universal-design-for-ict/web-accessibility-auditing/take-a-quick-look-at-your-site/

WAVE


WAVE
web accessibility evaluation tool


WAVE
web accessibility evaluation tool
powered by
WebAIM
Styles: OFF ON
Details
Summary
Details
Reference
Order
Structure
Contrast
6 Errors
6 X Empty link
9 Contrast Errors
9 X Very low contrast
112 Alerts


Accessibility & Language
Broken same-page link
A link to another location within the page is present but does not have a corresponding target.
REFERENCE
CODE

Activity: Website Analysis

- Agree on 4 principles of good web design to use for this activity
  - *include accessibility (from NDA guidelines)
- Pick two websites of your choice
- Using your selected principles compare the two websites

1. **Usability (Ease of Use)**
2. **Layout Design (Alignment, Use of Space, Images)**
3. **Visual Design (Typography, Colour)**
4. **Content & Language**
5. **Accessibility**
6. **Feedback**
7. **Navigation**
8. **Hierarchy (structure)**

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National Disability Authority

WAVE web accessibility evaluation tool

Assistive Technology

"Assistive Technology (AT) concerns the practical tools that can support the functional needs of people who experience difficulties linked to disability or ageing"

Údarás Náisiúnta Míchumais
National Disability Authority

An Roinn Oideachais
Department of Education

Digital Strategy for Schools to 2027

enable ireland

Activity:

- Question*: "…adaptive and assistive technologies are in place for anyone who should need them. Name two types of such technologies and describe…"*

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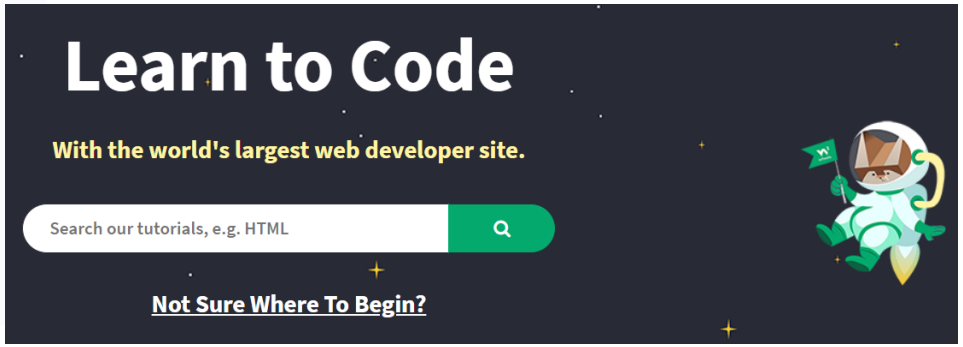
Web Editors

What Web Editor to use?

WiX



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Department of Education