DESIGN, TECHNOLOGY AND ENGINEERING

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The design and realisation process

The design and realisation process is a flexible framework and forms the structure of the subject. The following diagram shows the components of a coherent and dynamic design progression. This process is rarely linear, and designing should be seen as a cyclical process with many possible solutions, rather than a simple step-by-step process.

CONTEXT SUBJECT NAME AND CODE:	
DIGITAL COMMUNICATIONS SOLUTIONS	DCS
INDUSTRY AND ENTREPRENEURIAL SOLUTIONS	IES
MATERIAL SOLUTIONS	MRS
ROBOTIC AND ELECTRONIC SYSTEMS	RES

INVESTIGATION AND ANALYSIS

- Identify end users, need, problem or opportunity.
- Research and analyse factors to inform a design brief.
- Create design brief outlining context, constraints and considerations.
- Identify criteria to evaluate how well the finished product satisfies the design brief.

DESIGN DEVELOPMENT AND PLANNING

- Demonstrate critical and creative thinking.
- Create concept sketches, drawings, prototype.
- Test and model potential ideas.
- Design options, selection and justification.
- Show product specifications through working technical drawings and or content tables.
- Create a sequence plan and timeline.

SOLUTION REALISATION

- Demonstrate evidence of product or solution.
- Create solution using safe work practises.

EVALUATION

- Evaluate how effectively the design specifications have been met.
- Recommended improvements.
- Record any refinements and modifications.

Any stage can be revisited throughout the Design and Realisation Process

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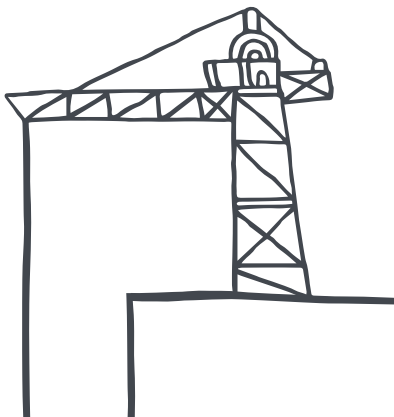

INVESTIGATION AND ANALYSIS

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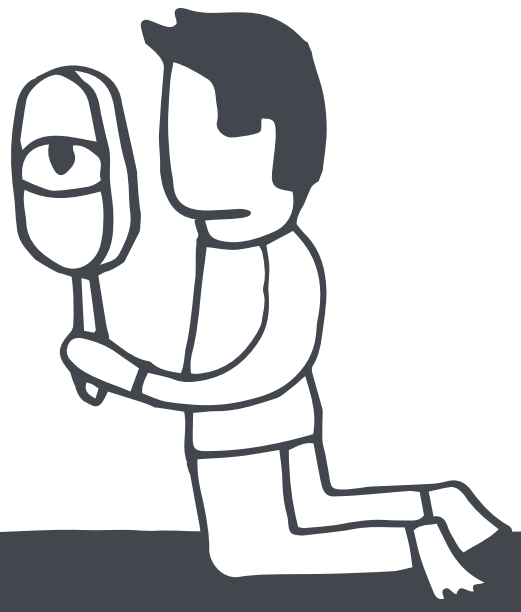
The design and realisation process should begin with the identification of a problem or opportunity, followed by an initial investigation and research analysis.

The design brief should specify constraints and considerations, and propose creative and innovative solutions. Students define criteria to evaluate how well the finished solution meets the requirements of the design brief.

Possible strategies or techniques may include:

- using creative thinking techniques (e.g. visualisation, lateral thinking, brainstorming) to define the problem and seek solutions
- collaborating with peers to use visual tools (e.g. mind mapping) to explore concepts, problems, or opportunities
- investigating and interpreting solution design factors such as:
  - technologies: tools, processes, and manufacturing methods
  - materials: characteristics and properties
  - innovation and creativity: inventing or improving products
  - sustainability: life-cycle analysis, carbon footprint, potential to reuse or recycle, fair trade, customs, carbon footprint
  - target audience, end user and potential for entrepreneurship and marketing
  - ethical use and application of the end product
  - ethical concerns related to health and safety, discrimination, social media, advertising, use of data and images, and conflicts of interest
  - historical and cultural influences including social trends, the changing nature of work, technological change
  - legal responsibilities: patents, safety requirements, intellectual property, creative commons, Australian International Standards, regulations and legislation including OH&S, safety of the product for the user
  - economic considerations: costing of products including materials, labour, and equipment and machinery, responsible use of resources, product longevity, time management, and material availability
- creating a written or multimodal design brief that includes key criteria and/or constraints such as function and/or aesthetics
- analysing existing product or system characteristics and features to inform the design and realisation process
- collecting and analysing data from target or end-point users for a purpose (e.g. survey, questionnaire)
- researching and analysing ideas from different contexts such as the manufacturing sector or emerging technologies
- researching historical design, period influences, or different cultural traditions
- acknowledging and correctly referencing sources of information and ideas
- conducting peer review and collecting feedback about the design brief
- critically analyse sources of information for reliability and validity.



DESIGN DEVELOPMENT AND PLANNING

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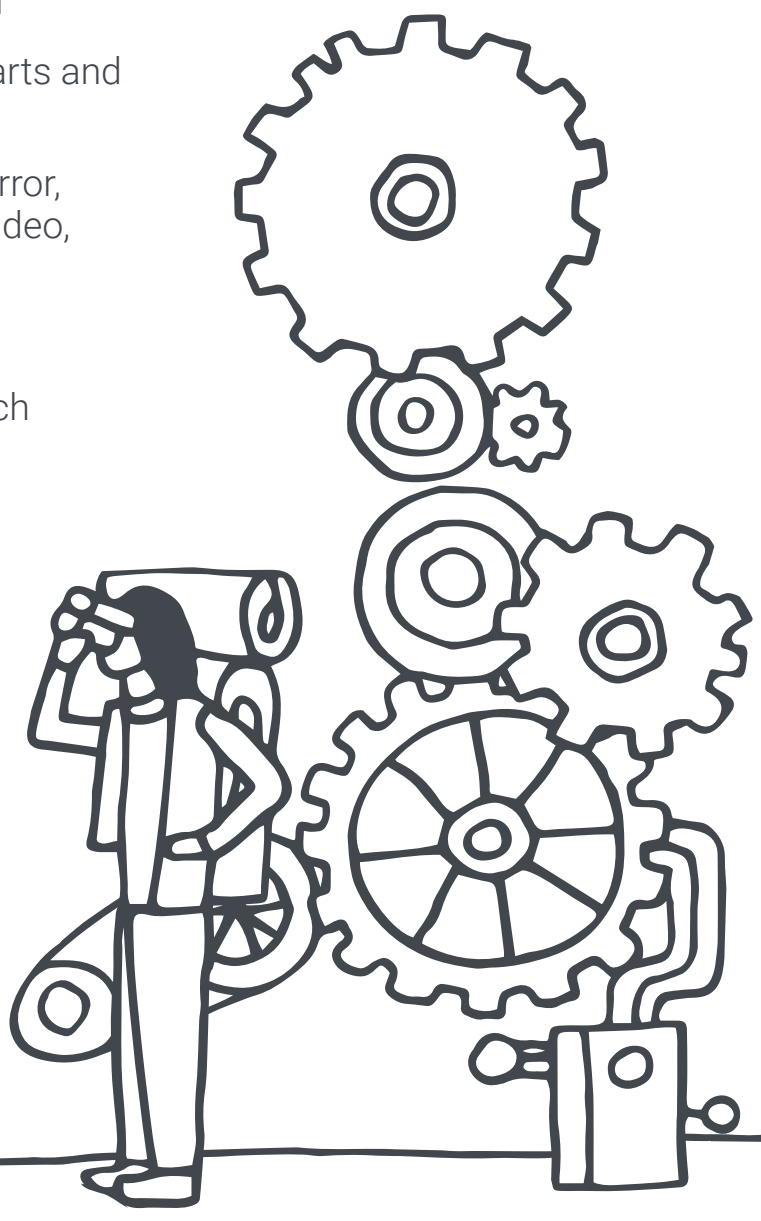
Another component of the design and realisation process is design development and planning in response to an established brief.

This involves innovation, invention, iteration, and creativity in order to develop a solution for a problem or opportunity.

Students document their design ideas and make plans to use the available resources such as time, materials, and technologies to realise the solution. They test, adapt, and validate the design prior to realisation.

Possible strategies or techniques may include:

- using critical and creative thinking to devise a solution
- using ideation strategies such as adapting, modifying, substituting, or rearranging to improve the solution
- creating a design brief that shows specific aspects of the design development and planning
- creating working drawings, concept sketches, prototypes, story boards, flow charts, simulation, or 3D modelling
- working collaboratively, either face-to-face or online, with peers, industry, tertiary education, or communities to develop imaginative, innovative, and enterprising outcomes
- applying interdisciplinary concepts (e.g. artistic, scientific, mathematical, and engineering concepts) appropriate to the planning and designing of the product or system
- preparing timelines and procedures using visual organisers such as Gantt charts and tables that show sequencing
- testing possible materials and processes through experimentation, trial and error, or applying secondary research, and recording the results (e.g. photo essay, video, result tables, annotated images)
- collecting qualitative and quantitative data using scientific methodologies
- adapting the design development in response to results of testing and research
- justifying design solutions based on investigations and research analysis
- creating a table, chart, or diagram to define product specifications (e.g. measurement, materials to be used, processes required)
- applying the scientific method to the design and construction processes of the solution (e.g. testing material characteristics or suitability)
- using relevant digital technologies to communicate design intent.



SOLUTION REALISATION

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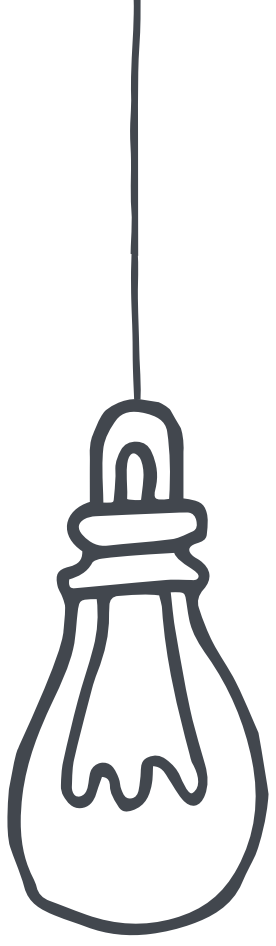
This component of the design and realisation process involves realising a solution.

A solution is the outcome of applying technological skills in order to meet the requirements of a design and realisation brief.

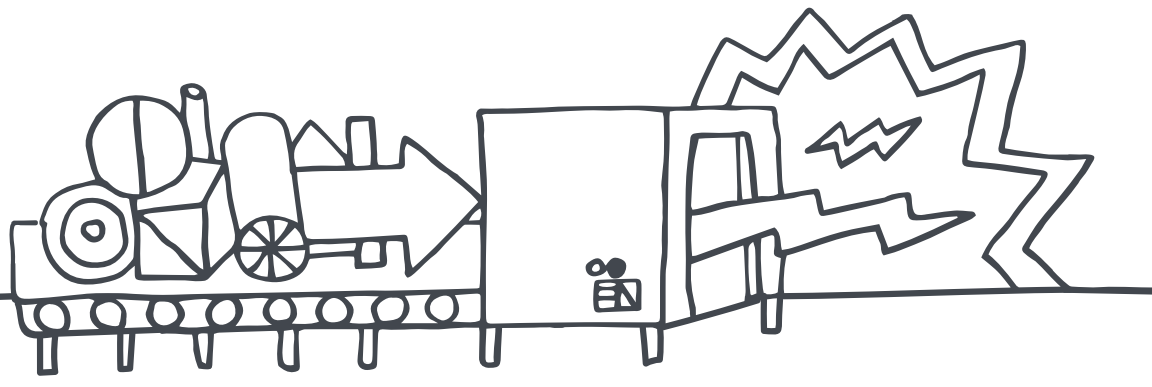
In this subject, a 'solution' is an outcome of the design and realisation process in relation to the chosen context.

A solution may be fully realised or a model, prototype, system, part, process (i.e. procedures to output a product), or product.



Possible strategies or techniques may include:

- producing a solution that is captured in multimodal form (e.g. photo story or short film)
- using appropriate processes and production techniques
- creating solutions that meet the planned design specifications
- developing skills and applying them to a range of applications
- creating an annotated multimodal product record of the creation of the product
- developing solutions to technical and engineering problems that may arise during realisation, such as accuracy of machinery, quality of materials and components, and understanding of software programs
- applying appropriate safety processes in physical and online environments



EVALUATION

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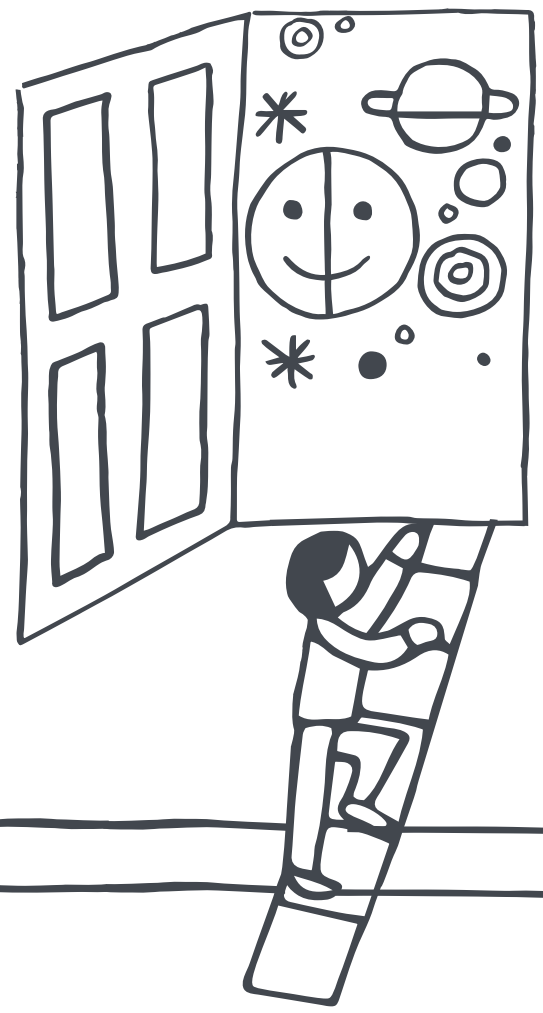
The evaluation component of the design and realisation process involves judging the quality of the product against the criteria specified in the design brief, and identifying improvements.

Possible strategies or techniques may include:

- evaluating (individually and/or collaboratively) how effectively the requirements of the design brief specifications have been met
- reviewing criteria, standards, reliability, safety, quality, and cost-effectiveness
- reflecting on product or system outcomes in order to recommend modification or redevelopment of designs or ideas
- reflecting on the effectiveness of procedures used in the design and realisation process
- reflecting on personal learning (e.g. project management, practical skills, capabilities)
- testing of product or system with end-point users, and recording feedback in written or multimodal form
- collecting feedback from peers or an industry evaluation of solution
- creating a weekly journal to record the ongoing evaluation of the process and product
- evaluating potential publishing or entrepreneurship opportunities (e.g. patents, marketing and distribution, mass production, online publishing, crowd sourcing).



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