# Design and Technologies glossary

## A

aerial view

A drawing from above (i.e. from an elevated or bird’s-eye position) that gives a broader view of a large area, showing the surroundings and landscape.

See also: top view

aesthetics

The subjective visual impact or appeal of a product or an environment, influenced by social, emotional and demographic factors.

anthropometric data

Measurements and information about the size, shape and physical characteristics of the human body.

## B

biomimicry

Drawing inspiration from nature and adapting natural features and functions into the design of a product, service or environment. Successful applications of biomimicry in product design across the Technologies Contexts include how sustainable agricultural practices such as agroecology draw inspiration from the diversity and resilience in natural ecosystems; how biodegradable and compostable packaging is designed to break down naturally over time, much like organic matter in nature; how the use of precision agriculture, such as drones, sensors and data analytics, enables accurate monitoring of crops, optimises irrigation and fertiliser usage, and reduces environmental impact; how food supply chain technologies can facilitate transparency and tracking to ensure ethical sourcing, reduce food fraud and enhance food safety; and how the design of Velcro fastening was inspired by the way burrs, a type of plant seed, attach themselves to fur and clothing.

## C

characteristic

A distinguishing attribute or behaviour of an object, material, living thing, system or event in relation to its appearance, functionality or performance or to end-user experience in relation to, for example, texture, colour, shape, size, materials, ergonomics, usability, durability or sustainability. Together, characteristics influence the choices people make about materials and processes.

circular economy

An economic system that aims to reduce waste and make the most of resources. Items are used, re-used and recycled instead of being thrown away. Items are used for as long as possible, finding new ways to use them, and making sure they do not harm the environment.

co-design

Cooperative work to create a designed solution, using shared decision-making, equal participation and a collective effort to come up with ideas and to plan. Co-design can be between individual students or between students and teachers. Co-design is a subset of collaboration and co-development.

See also: co-development, collaboration, teamwork

co-development

A planned approach in which individuals work together cooperatively to create and refine an idea or product, combining their skills, knowledge and resources. Co-development emphasises active participation, open communication, shared decision-making and collective responsibility of all team members, which fosters a cooperative environment that maximises the joint potential of the team. Co-development involves both collaboration and teamwork. This may involve co-design.

See also: co-design, collaboration, teamwork

collaboration

Cooperative efforts towards a shared goal by individuals working together on and contributing equally to an activity. Collaboration involves shared responsibility and collective ownership, with active engagement from all individuals. Examples of collaboration are group discussion, brainstorming, analysing problems and reaching consensus about processes.

See also: co-design, co-development, teamwork

component

A part or element of a whole that performs a function. For example, a motor vehicle includes the chassis (holds all parts on it), engine (to convert energy to make the vehicle move), transmission (including controlling the speed and output from the engine and to rotate the wheels), steering system (to control the direction of movement), brake system (to slow down or stop), fuel delivery system (to supply fuel to the cylinders), exhaust system (to get rid of gases) and electrical system (for operating features such as wipers and air conditioning).

computational thinking

A problem-solving method that involves various techniques and strategies to solve problems and that can be implemented by digital tools, such as organising data logically, breaking down problems into components, and designing and using algorithms, patterns and models.

concept sketch

A preliminary visual representation of a design idea that captures an initial design idea and is typically created quickly and without much detail. It is a starting point for further exploration and development, and can be created using manual or digital tools. It is also referred to as a sketch.

convergent thinking

A way of thinking that supports the evaluation, selection and refinement of ideas based on specific criteria or goals. It is closely linked to critical thinking.

See also: convergent thinking strategy, critical thinking

convergent thinking strategy

A tool or approach to support design thinking by narrowing down options through analysis and logical reasoning, aiming to select the most viable design solutions from a range of possibilities. Examples are decision matrices, SWOT (strengths, weaknesses, opportunities, threats) analysis, collaborative discussions, prototyping and testing, and concept evaluation frameworks such as decision trees.

See also: convergent thinking, critical thinking

Country

The physical environment that a particular Aboriginal and Torres Strait Islander Peoples’ group has a relationship with. Referring to this territory as ‘Country’, rather than land, indicates a reciprocal and deep relationship and one where Country both owns and is owned by the People. The concept of Country includes lands, waters and sky.

creative thinking

The act of ideating and stimulating the broadening of ideas that are imaginative and unique. This aligns with divergent thinking aspects of a design process.

See also: critical thinking, design thinking, speculative thinking

critical thinking

Objective questioning, analysis and/or evaluation of information or ideas to make reasoned judgements and decisions. It aligns with convergent aspects of a design process.

See also: creative thinking, design thinking, speculative thinking

## D

data

A general term for a set of observations or measurements collected during an investigation. Primary data is collected by the person carrying out the investigation; secondary data is collected by others.

design brief

A statement clarifying a project task, defining the need or opportunity to be resolved and encouraging critical and creative thinking. It usually identifies the end user/s, design criteria, constraints, resources and timeframe.

design criteria

Criteria used to determine if a proposed solution meets requirements. These are drawn from the solution requirements, end-user stories, if appropriate, and constraints.

design process

A process that involves investigating and defining, generating and designing, producing and implementing, evaluating, and planning and managing to create designed solutions that meet needs or opportunities.

See also: production process

design thinking

An approach that helps people to understand and be sensitive to needs, opportunities and problems; generate, iterate and represent innovative, user-centred ideas; and analyse and evaluate those ideas. Design thinking includes critical, creative and speculative thinking.

See also: creative thinking, critical thinking, speculative thinking

designed solution

A product, service or environment created for a specific purpose or intention as a result of design thinking, design processes and production processes.

See also: design process, design thinking, production process

divergent thinking

A way of thinking that fosters the generation of diverse ideas and possibilities. Divergent thinking is closely associated with creative thinking.

See also: creative thinking, divergent thinking strategy

divergent thinking strategy

A tool or approach to support design thinking, in particular the generation of design ideas and fostering of a creative and expansive mindset that promotes exploration and originality. For example, brainstorming, free association, open-ended questioning and role-play techniques are unstructured and encourage creativity.

See also: creative thinking, divergent thinking

## E

economic sustainability

A dimension of sustainability that relates to using resources efficiently so that economic growth continues over time, longevity of resources is ensured and negative economic impacts are minimised. Economic sustainability encompasses factors such as cost-effectiveness, resource efficiency, financial viability and long-term economic benefits, all while considering the broader economic context and future economic wellbeing. It also includes the contribution of industries to the Australian and global economies, the creation of employment opportunities, and the costs of a product, system or environment across its life cycle. Considerations include the comparison of costs of different materials and production settings and the value that resources have today, as well as their possible value in the future.

See also: environmental sustainability, ethical considerations, social sustainability, sustainability

electromagnetic force

Interactions between electrically charged particles, which can attract or repel each other. For example, a magnet stays on a refrigerator because of the electromagnetic force between the magnet and the metal surface.

electrostatic force

A force that occurs when charged particles attract or repel each other due to differences in electrical charge. For example, rubbing a balloon against hair causes a static charge, resulting in the hair being attracted to the balloon.

enterprise

The result or process of creating and managing a business or project.

enterprise skill

An ability and disposition to generate and apply new ideas to practical situations, including identifying new opportunities for change, managing risk and following through on initiatives.

environment

One of the outputs of technologies processes, referring to the places, spaces, surroundings and conditions in which something exists or operates that highlights the interconnectedness and interaction between various components. Environments may be natural, managed, constructed or digital. Managed environments (e.g. farms, forests, marine parks, waterways, wetlands and storage facilities) are controlled by people.

environmental sustainability

A dimension of sustainability that relates to ensuring that the resources of the planet are available for future generations. It includes the selection of resources used for manufacturing and production, as well as resources required for use after production, along with a focus on biodiversity and climate change, with investigation of protection, mitigation and rehabilitation strategies extending across land, soil, water and air. It relates to addressing the needs of a life cycle of a product, system or environment without depleting resources and/or having a lasting impact on the environment.

See also: economic sustainability, ethical considerations, social sustainability, sustainability

ethical considerations

Considerations concerned with human and non-human welfare, and aiming at positive impacts and minimisation of harm in regard to what is made and how it is made, for both present and future generations. Ethical considerations encompass sustainability and sustainable practices.

See also: sustainability

exploded view

A representation of an object, with individual components shown separately and spaced out from their original positions, which shows the relationship or order of assembly of various components. The individual components are often enlarged or ‘exploded’ to readily identify each component, observe its relative placement and understand how components fit together to form the complete object. An exploded view makes the assembly process easier to understand.

## F

food and fibre production

The process of producing food and fibre as natural materials for the design and development of a range of products. Fibre refers to both plant-based materials (e.g. cotton, bamboo, timber and hemp) and animal-based materials (e.g. wool and silk).

food system

The interconnected network of activities in the production, distribution and consumption of food, including farming, transportation, processing, packaging, marketing and waste management.

force

An interaction between objects that can lead to changes in their motion or shape. Forces are what cause objects to be pushed or pulled, causing them to undergo some form of action. They are the basis of various natural phenomena and engineering applications influencing how objects interact and behave in everyday experiences. They are the reason that objects move, accelerate, decelerate or deform.

See also: electromagnetic force, electrostatic force, frictional force, gravitational force, mechanical force

frictional force

The force that opposes the relative motion or intended motion of 2 moving surfaces in contact with each other. For example, when sliding a book across a table, frictional force opposes the motion, making it more challenging to move the book.

functional properties of food

Physical or chemical changes involving the behaviour, performance and interactions of food. Some common examples are caramelisation, forming golden-brown colours and distinct caramel flavours (e.g. on roasted sweet potato) at high temperatures; emulsification, stabilising 2 immiscible liquids as an emulsion (e.g. mayonnaise); foaming, creating and stabilising a light and airy mixture (e.g. whipped egg whites) by incorporating air bubbles into a liquid or semi-liquid ingredient; gelatinisation, the swelling of starches by absorbing liquid during heating, resulting in thickening (e.g. in sauces and gravies); and viscosity, resistance to the flow or thickness of a liquid (e.g. in sauces and dressings).

functionality

The fitness of purpose of products, services or environments, which are designed to meet an intended need or market opportunity and identified design criteria.

## G

graphical representation technique

A technique used to communicate ideas and plans through drawing systems (e.g. making patterns and drawings). (Graphical representation techniques are included in the level descriptions.)

gravitational force

An attractive force between objects with mass, pulling them towards each other. For example, when an object is dropped, it falls to the ground due to the gravitational force between Earth and the object.

## I

innovation

The process of turning a creative idea into a tangible and valuable outcome (product, service or environment).

## L

life cycle assessment

Assessment of the sustainability impacts associated with the stages of a product’s or system’s life, from raw material extraction through to material processing, design, production, distribution, use, repair and maintenance, and disposal or recycling.

life cycle assessment criteria

Parameters and categories used to evaluate the environmental impact of a product, system or process throughout its life cycle. These criteria help to quantify and assess various environmental aspects associated with the life of the product, system or process, from raw material extraction through to material processing, design, production, distribution, use, repair and maintenance, and disposal or recycling.

life cycle thinking

Consideration of environmental, social and economic impacts of a product, system or environment, from the beginning to the end of the life cycle, including raw material extraction, production, use and disposal. The aim is to make informed decisions that foster sustainability throughout the entire life cycle, considering how the product, system or environment is made and used, and what happens to it after its use, to encourage the adoption of environmentally responsible choices while also considering social and economic impacts.

## M

mechanical force

A physical force on an object that can cause motion or deformation. For example, pushing a toy car forward applies a mechanical force, which sets the car in motion.

model

A visual or physical representation that describes, simplifies, clarifies or explains the workings, structure or relationships within an object, system or idea. A model can be graphical (virtual) or actual (physical).

## O

orthogonal drawing

A scaled, multi-view drawing of a 3D object to show each view separately, in a series of 2D drawings.

## P

passive design

A design approach in which natural elements – often sunlight – are used to heat, cool or light a building. Systems that employ passive design reduce or minimise the need for auxiliary heating or cooling.

perspective drawing

A drawing that represents the way objects that are further away appear to be smaller and closer together. Perspective drawings show 3 different spatial viewpoints.

photovoltaic system

A set of solar panels that converts energy from the Sun into electricity, providing a clean and renewable source of energy with reduced impact on the environment.

physical representation technique

A technique (e.g. modelling or prototyping) to show the way an actual or virtual product will look and work in real life.

pictorial map

A map that uses illustrations rather than conventional map symbols. Often the area shown is viewed from above or at an oblique angle. Pictorial maps are not drawn to scale.

pictorial view

A drawing of an object, scene or map that shows 3D depth and perspective. There are different types of pictorial views, such as perspective and orthographic.

See also: orthogonal drawing, perspective drawing

Place

‘Place’ is significant for Aboriginal and Torres Strait Islander Peoples.

For Torres Strait Islander Peoples, ‘Place’ is a space mapped out that Torres Strait Islander individuals or groups occupy and regard as their own and that has varying degrees of spirituality. It includes lands, waters and sky.

For Aboriginal Peoples, ‘Place’ refers to the special places that exist within Country, the purposes of which vary significantly. They can include places of ceremony and initiation, birth and the provision of healing and health care; places of learning; and places for Sorry Business. These places vary greatly over the various landscapes and seascapes across the continent. There are some parts of Country that have landmarks that directly relate to the ancestor spirits and the creation of existence. These are especially important as culturally significant places and need to be cared for. There are also other places on Country that are important for ceremony, as mentioned above, which are also considered especially important for Aboriginal communities.

plan view

See: top view

product

The tangible end result of natural, human, mechanical, manufacturing, electronic or digital processes and production to address a need or opportunity.

production process

The context-specific process used to transform a technology into a product, service or environment (e.g. the steps used to produce a product).

See also: design process, production skill

production skill

The specific practical ability and expertise required to perform tasks within a production process; may be referred to as a practical skill.

See also: production process

project management plan

Documentation to manage a project as a whole, including aspects such as listing and sequencing tasks, roles and responsibilities, resources, costs and timelines; along with communication strategies, risk management and quality assurance. The plan provides guidelines on how the project will be managed, monitored and controlled to ensure its successful completion of a designed solution.

See also: project plan

project plan

Documentation that outlines the scope of a project by identifying the specific tasks, resources and timelines. A project plan focuses on the ‘what’ and ‘how’ of the project, detailing the tasks and steps required to make a designed solution.

See also: project management plan

property

A distinctive quality of a material that can be tested and used to help people select the most suitable one for a specific use (e.g. absorption, anti-corrosion, insulation, opacity or sensory).

## R

rapid prototyping

A range of techniques used to quickly fabricate a scale model of a physical part or assembly using 3D computer-aided drawing. Construction of the scale model can be done using 3D printing.

rendered drawing

A drawing that shows the relative relationship of elements or the forms of objects using texture, colour, light, shade and tone (lightness or darkness of a colour).

See also: rendered view

rendered view

A computer-generated visual representation that depicts how elements or objects are positioned in relation to each other, using aspects such as texture, colour, light, shade and tone (lightness or darkness of a colour).

See also: rendered drawing

## S

Safety by Design principles

A set of guidelines and practices aimed at incorporating safety considerations into the design and development of products, systems or processes from the very beginning. The goal is to show how to proactively identify and address potential safety hazards, risks and vulnerabilities during the design phase to create inherently safe and reliable solutions.

sectional view

A view of an object or structure drawn to show a cutaway or sliced portion to reveal the internal details, construction and relationships between different components or layers of the object or structure. Sectional views are commonly used in engineering, architecture and manufacturing.

sensory property

An attribute that can be perceived by human senses: taste, aroma, mouthfeel, appearance and sound. These properties are evaluated through sensory analysis. Some common sensory properties include taste (sweetness, sourness, bitterness, saltiness and umami (savoury)), aroma (e.g. nutty, floral, chocolate and smoky), mouthfeel (e.g. crunchiness, chewiness, tenderness and creaminess), appearance (e.g. colour, shape and glossiness) and sound (e.g. crispness, sizzle and crackle).

services

The less tangible outcomes of technologies processes (compared with products), related to addressing needs or opportunities of end users by providing them with assistance or expertise, or performing tasks on their behalf. End users experience or benefit from a service when it is performed. For example, a service may involve the development or maintenance of a system such as catering or water management.

side view

A perspective that when drawn shows what an object looks like when viewed from the side. It is an orthogonal drawing view.

See also: orthogonal drawing

sketch

See: concept sketch

social sustainability

A dimension of sustainability that relates to ensuring that current and future generations have access to social resources such as human rights, education, political empowerment and connection to community. Social sustainability extends to stewardship that is considerate of the broad community and future generations.

See also: ethical considerations, economic sustainability, environmental sustainability, sustainability

speculative thinking

Synthesis of information and consideration of the appropriateness and usefulness of a range of ideas or suggestions, with a focus on the future.

See also: creative thinking, critical thinking, design thinking

sustainability

Focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. The concept of sustainability is composed of 3 dimensions – economic, environmental and social – also known informally as profits, planet and people.

See also: economic sustainability, environmental sustainability, ethical considerations, social sustainability

system

A group of things or parts that work together to accomplish a particular result. Just as a motor vehicle has different components such as the engine, wheels and steering system, which work together to make it move, a system can be made up of various parts or processes that interact with each other to perform a specific task or function. Systems can be found in many areas, from everyday objects such as household appliances to complex structures such as transportation networks and the human body.

## T

teacher assistance (designing with)

Input or guidance from a teacher, who provides a supportive role by contributing insights, expertise and practical knowledge in the design process. In this teacher–student relationship, the teacher takes on the role of a facilitator, guiding and supporting the learning process.

See also: co-design

teamwork

The combined individual efforts of all members of a team towards a shared goal such as a designed solution. Teamwork may involve a structured division of tasks, where each individual within a team is assigned specific responsibilities or tasks, with individuals who have complementary skills and roles working together to complete the designed solution. Teamwork includes providing advice and support to others, such as demonstrating or providing guidance about how to do a specific technique or task. Teamwork encourages communication between students and mirrors professional design practice where designers, when developing designed solutions, have identified roles within transdisciplinary and interdisciplinary teams.

Examples of teamwork to make an item from recycled fabric may include deconstruction and inspection, pattern making, cutting, pinning, hand- and machine-sewing, top-stitching or decorative stitching, adding fasteners, adding embellishments, fitting and adjustments, and finishes such as hemming, pressing and ironing.

See also: co-design, co-development, collaboration

technique

A specific method or approach used in technologies contexts to design and make designed solutions tasks (e.g. pruning, sautéing, bending, measuring and welding).

thumbnail sketch

Quickly developed outlines or small representations of objects and ideas to inform development of designed solutions.

tool

A physical item, including equipment, utensils, appliances and machines, to carry out a specific process when working with materials. For example, a saw is used to cut timber; scissors are used to cut fabric, paper and cardboard; a tape measure is used to measure lengths and widths of wood and fabric; a blender is used to mix and blend food ingredients; and secateurs are used to prune plants.

top view

An overhead perspective of an object or specific area (e.g. a building or environment) that when drawn shows what the object or area and its features look like when viewed from above. It is a 2D drawing typically used to illustrate floor plans and site plans; or layouts of buildings, landscapes and interior spaces. It is an orthogonal drawing view that is also known as a plan view.

See also: aerial view, orthogonal drawing

Traditional Owners

The people recognised as having an unbroken connection to a particular Aboriginal or Torres Strait Islander Country or Place. They are often important knowledge keepers and responsible for caring for Country or Place and the people who live there.

## U

universal design principles

A set of guidelines and concepts that promote the creation of products, environments and systems that are accessible to, usable by and inclusive of people of all abilities, ages and backgrounds. The goal of universal design is to ensure that everyone, regardless of their physical or cognitive abilities, can effectively and comfortably interact with a designed solution.

## W

working drawing

A production drawing that details the requirements for the manufacture and assembly of a product or environment.

working model

A physical prototype or virtual engineering simulation that can be used to evaluate performance and test how components interact.

worldview

A person’s beliefs, values and ideas about how things work, which affects how they think, act and make decisions.