

Design Process Glossary

Terms defined in “Product Design Best Practices” by David G. Ullman, Joshua D. Summers and Jeremy Fielding Sr.

Numbers refer to the Best Practice in the text where the term is defined or used.

Term	Definition	Defined in	Used in
A			
Accessibility (Product)	The product can be used by all regardless sex, handedness, disability, or other stakeholder difference.	4.1	
Accuracy	A measure of how far from the truth or correctness a statement or value is. In design, the truth is often not known (uncertain) or knowable (aka lacks precision).	7.4	
Additive Manufacturing	The process of making three-dimensional solid plastic or metal objects from a computer model, aka 3D printing or rapid prototyping.	1.8	
Additive tolerance Stack-up	The most common tolerance analysis through adding the maximum and minimum dimensions to estimate the stack-up or worst-case clearance or interference.	7.4	
Affinity Diagram	Graph diagrams for generating, organizing, and consolidating product or process information.	1.7	
Agile Design Process	A flexible system that sequences task based on decisions made during the project in a just-in-time manner.	5.3	3.1, 3.2, 4.6, 5.4, 5.5
Agile/Scrum	A 21st century design process developed for software but applicable, with modifications, to hardware and systems. Best applied when uncertainty and innovation are major factors. The method focuses on short iterations to learn quickly and to achieve a minimum viable product as rapidly as possible.	5.3	

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Alpha testing	Testing by an internal team to support a research team's goals or tasks evaluating a new product or feature.	5.5	8.1
Alternative generation or Concept generation	Developing multiple potential solutions for the product needs.	Section 6	2.1, 2.4, 7.1
Ambiguous	Items or information that are left to interpretation by individual team members. See VUCA+	2.3	
Analysis of Means (ANOM)	A DOE method to analyze experimental data based on analyzing the mean experimental value for each variable at each level.	8.3	
Analysis of Ranges (ANOR)	A DOE method used along with ANOM to analyze experimental data based on the range for each variable at each level.	8.4	
Analysis of Variance (ANOVA)	A statistical method for reducing experimental data based on analyzing the data variance. ANOM and ANOR are used in its place in this book.	8.4	
Architecture	The arrangement of assemblies, modules, components, code etc., in a product, much like the architecture of a building.	6.3	1.7, 6.2
Assembly	A convenient grouping of mechanical, electrical, or software components.	6.3	
Assembly instructions	The steps for combining components into assemblies.	6.5	
Augmented and Virtual Reality Tools	Tools to support concept evaluation with virtual reality (VR), where the environment is completely artificial, or an augmented one (AR), where the artificial is mixed with the real.	1.6	8.1

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B			
Backlog	A listing of tasks to be done or problems to be addressed. See Problem Backlog and Task Backlog.	5.1, 5.4, 5.3	10.1
Behavior	The resulting actions or performance of a product.	1.3	1.1
Benchmarking	A method to: (1) compare multiple products with respect to their performance against various targets and requirements; (2) to understand how a product works during product decomposition; (3) dissect (or reverse engineer) a product to understand how it is made (manufactured).	4.5	4.7, 9.1
Benjamin Franklin	An early user of Pro-Con Analysis.	2.4	6.2
Best Practice	Professional methods that are accepted as being effective.	1.1	
Beta testing	External testing to support a research team's goals or tasks evaluating a new product or feature.	5.5	8.1
Black Swan	An unforeseeable event. See VUCA+	2.3	7.1
BOM (Bill of Materials)	A parts list or index to a product.	6.5	
Brainstorming	One of the most used idea-generation tools. The focus is to generate as many different ideas as possible.	6.1	
Brainwriting	An ideation method in which the collaborators write ideas in a shared space that all others can immediately read.	6.1	
C			
Champion	The owner of a concept or product who pushes it through its development.	2.4	
Change management	Controlling the documentation and manufacture of components and assemblies after they have been released for production.	10.1	1.4
Collaborative Sketching	A graphical idea generating method.	6.1	

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Complex Information	When new information or a change in an unexpected way. Part of VUCA+	2.3	
Concept	An idea that is sufficiently developed to evaluate the physical principles or software structures that govern its behavior.	6.0	
Concept Generation (Alternative Generation)	Developing multiple potential solutions for the product needs.	Section 6	2.1, 5.1, 6.6, 7.1
Concurrent Engineering	The simultaneous design of mechanical, electronic, and software elements of a product and their associated assembly and manufacturing processes	1.4	9.2
Configuration Design	The geometric problem of assembling components into a complete product (aka packaging design).	4.1	
Cost of Additive Manufacturing Components	A tool to estimate the cost of 3D Printing methods.	9.1	
Cost of Code	Methods to estimate the cost of writing code.	9.1	
Cost of Injection-Molded Components	A tool to estimate the cost of components made by injecting molten plastic into a mold.	9.1	
Cost of Printed Circuit Boards	A tool to estimate the cost of PCBs.	9.1	
Cost of Machined Components	A tool to estimate the cost of components made on a mill, lathe or other metal removing system.	9.1	
COTS (Commercial Off The Shelf)	Objects that can be purchased without the need for design effort.	6.3	
Creative solution	A solution to a problem that meets two criteria: it solves the problem in question, and it is original.	6.1	6.5
Critical Design Review (CDR)	A meeting to demonstrate that the technical effort is on track to complete the product and meets the requirements within the identified cost and schedule constraints.	5.5	

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Customer	The person or organization that purchases (or may purchase) the product or services being designed. A type of stakeholder who may or may not be the end user.	4.2	
D			
Daily Standup	A short inspect-and-adapt meeting that allows the team to coordinate by sharing the previous day's accomplishments (and challenges) and individual plans for the coming day.	5.5	
Dark Horse ideas	A design approach that forces designers to explore "extreme" ideas that might not initially appear feasible.	6.2	
Decision by chaos	Making decisions with no reasonable management.	2.4	
Decision by coercion	An alternative's champion forces their favorite on the team.	2.4	
Decision by fiat.	Autocratically using authority to select their favorite alternative.	2.4	
Decision by inertia	Choosing the alternative most closely matched to what was done before.	2.4	
Decision by running out of time	Choosing an option just because time is up.	2.4	
Decision making	Choosing the best possible course of action by understanding the issue, developing measures to judge alternative solutions, developing alternatives, evaluating the alternatives, and deciding what to do next.	2.4	3.1, 6.6, 7.2
Decision Matrix	An iterative evaluation method that tests the completeness and understanding of measures and alternatives, rapidly identifies the strongest alternatives, and helps foster new alternatives	2.4, 6.6	7.1
Decision Poker	A team method for making estimates.	5.2	8.2
Decomposition (or dissection)	Taking a product apart to find out how it is made, how it works and how it is manufactured.	4.5	2.1, 4.7, 6.6

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Deliverable	A promised object, code, document, analysis result or other entity.	5.1	6.5
Design iteration	Repetition while developing acceptable form and function.	1.1	5.5
Design freedom	Since design is a series of decisions and each decision eliminates alternative possibilities, design freedom is lost as the process proceeds.	1.1	1.1
Design learning	Design is leaning about the evolving product.	2.1	1.1
Design of Experiments (DOE)	A method used to understand the effect of variables on the key performance indicators (KPIs).	8.3	8.1, 8.4
Design Phases	The part of the product life cycle that includes product definition, project planning, conceptual design, and product development.	1.2	8.4
Design Process	The managed structure of people's knowledge so they can make the best possible design decisions fulfilling a need with an object.	1.1	1.2, 8.1
Design recursion	A characteristic of design where the same design process is applied to the product, systems, subsystems, components, and features, with each interdependent on the others	1.1	1.1
Design Review	A meeting focused on reviewing prototypes, analytical results, drawings, charts, or other representations of the evolving product.	5.5	2.1, 2.2, 1.1
Design space	The union of all products that meet the design requirements.	8.2	5.5
Design Structure Matrix	A diagrammatic tool to determine the sequence of tasks (for a project) or functions (for a system) and to cluster items into work or structure modules.	1.7	8.3, 8.4
Design Tools	A software or a physical object that either helps execute a design method or adds significantly to the design process.	1.6	1.3

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Communication Support Tools	Communication tools that include videoconferencing, and email.	1.6	
Planning Support Tools	Used for planning and project control.	1.6	
Lifecycle Support Tools	Used to manage product information and the product itself throughout its life.	1.6	
Form Generation Tools	CAD, sketch capture and other tools to manage form generation.	1.6	
Performance Analysis Tools	Help designers confirm the function of concepts and products.	1.6	
Human Interface Analysis Tools	Support the analysis of user-product interaction.	1.6	
Augmented and Virtual Reality Tools	Support concept evaluation with virtual reality (VR), where the environment is completely artificial, or an augmented one (AR), where the artificial is mixed with the real.	1.6	
Information Relationship Tools	Includes flow charts, Data Flow Diagrams, Design Structure Matrices, Mind Maps, Affinity Diagrams, and UML help teams to develop and organize information	1.7	
Measurement Tools	Gather data on physical measures such as heat, pressure, velocity, shape, waveform, voltage, current, or power.	1.6	
Design for Assembly (DFA)	Principles, guidelines, and analyses that focus on making the assembly process as efficient as possible.	9.3	3.2, 4.2, 5.5, 6.5, 9.1, 9.2, 9.5, 9.6
Design For Additive Manufacture (DFAM)	A collection of specific design rules and tools that aid in the creation of components optimized for 3D printing.	9.2	9.1
Design For Cost (DFC)	Using cost estimation during the process to drive design decisions.	9.1	4.2,4.3

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Design For Manufacture (DFM)	Principles, guidelines, and analyses that focus on how the product will be produced.	9.2	4.2, 4.3, 3.2, 9.1, 9.3
Design For Maintainability (DFM)	Principles, guidelines, and analyses that focus on how to improve a product to make it easier to maintain.	9.5	1.4, 4.2
Design For Reliability (DFR)	Principles, guidelines, and analyses that seek to make the product as reliable as is warranted.	9.4	1.4, 6.5, 7.3
Design For Sustainability (DFS)	Principles, guidelines, and analyses that seek to minimize the environmental impact of a product during production, use, and retirement).	9.6	1.2, 1.4, 7.3, 4.2, 4.3, 9.3, 9.5
Design For Test (DFT)	Principles, guidelines, and analyses that seek to make testing the final product to determine failures as easy as possible. Not to be confused with Test Driven Design	9.5	1.4, 4.3, 5.1
Design For Anything (DFX)	X = assembly, manufacture, cost, reliability, etc.	9.0	
Design Patent	A patent covering the look of an object.	10.2	
Design Structure Matrix (DSM)	A method that maps one engineering domain to another: e.g., problem to product, component to component, assembly to architecture. Used to help identify clusters of connected systems, helping to establish a product's architecture.	1.7	
Direct Safety	Safety designed into the product.	4.2	
Dissection	See Decomposition	4.5	
Digital Twin	A virtual representation of an object or system that spans its lifecycle. It is updated with real-time data and uses simulation, machine learning and reasoning to support decision-making.	1.8	

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E			
Electronic Design Automation (EDA)	Tools that are used to design and verify integrated circuits (ICs), printed circuit boards (PCBs), and electronic systems in general.	1.6	
Embodiment design	Giving form to concepts.	6.5	6.4
End-of-life product phases	That part of the product's life cycle that includes retirement, disassembly, reuse, recycling, and disposal.	1.2	
Engineering Change Notice (ECN)	A notice of a product modification made after the product is in production.	10.1	
Engineering specification	See Specification	4.6	
Estimates	Best guesses for task time and cost.	5.2	6.6
Estimation (or Agile) Poker	A method that helps teams make estimates when information is uncertain.	5.2	
Evaluation	The act of comparing concepts to engineering requirements and optimizing performance	Sections 7, 8 and 9	2.1, 2.4, 6.5, 6.6
Expertise (types of)	Expertise is measured both in breadth and depth. The agile community describes expertise as being of T, M, I or types.	3.2	3.3
F			
Factor of Safety	A factor included in the design of physical objects that accounts for uncertainty and lack of knowledge. Also see Safety Margin.	7.3	1.4, 6.5
Failure Mode and Effects Analysis (FMEA)	A method to for identifying and prioritizing potential failures and causes during product design (DFMEA) and manufacturing (MFMEA).	9.4	3.4, 5.3, 7.2, 9.5
Feature	The parametric, geometric, topologic, or semantic focus of interest that can be treated as a single element that has a specific intent/purpose.	4.1	4.5

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Feature creep	When new functions or elements are added to a project that expanding the initial scope of the underlying problem and result in extending development time and costs	2.3	4.4
Fidelity	A measure of how well a model or simulation analysis represents the state and behavior of a real-world object.	2.1	5.1, 8.1
Fixed, stable interfaces	Allows for the independence of modules and better products.	6.3	
Flow chart	A diagrammatic method to organize function, the flow of information, energy, control, materials, task work, and data.	1.7	
Focus group	A meeting designed to find out what is wanted in a product that does not yet exist. It relies on the customers' imaginations.	4.4	
Fractional Factorial Experiments	Evaluations where carefully selected combinations of independent variables are tested.	8.3	8.1
Fault Tree Analysis (FTA)	A method to identify sub-system failures and how these accumulate to the system level for products being developed.	9.4	
Full Factorial Experiments	Evaluations where every possible combination of independent variables are tested.	8.3	
Function	The transformation of energy, material, signal, forces or information between, across, or within objects, or the change of state of an object caused by one or more of these flows.	1.3, 6.4	1.3, 1.4, 1.5, 6.3, 6.2, 6.5, 7.4, 8.1, 9.6
Function Model	Black box models that explain the functions associated with sub-systems and components. An important early step in concept development.	6.4	1.3, 1.7, 2.3, 4.2, 4.4, 6.1, 6.3, 6.5, 9.4, 9.6

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G			
Gallery Method	A graphical idea generating method.	6.1	
Gantt Chart	A method to graphically represent known tasks, their order, schedule, and progress .	5.3	5.4
Generate and Test	A weak approach to optimizing performance, exploring the design space one point at a time.	8.2	
Generative Design	AI methods to develop 3D structures that maximize the load-carrying capability with the lightest possible components.	1.8	
Golden triangle	Representation of the balance between cost, time, and quality.	1.4	
Good Enough For Now (GEFN)	The balance (cost/time/people) needed to develop an object relative to the value of the function or form of the object at this point in development.	5.1	
H			
Hazard	A situation that, if not corrected, might result in death, injury, or illness to personnel or damage to, or loss of, equipment (What can go wrong?).	7.2	4.3
Hannover Principles	The basic principles of Design for Sustainability with respect to designing buildings and objects.	1.2	9.5, 9.6
Human factors	The users' interaction with a device as occupant of a workspace, as a power source, as a sensor, and as a controller	4.3	

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I			
Incomplete information	Information about an object is missing. See VUCA+	2.3	
Indirect Safety	Safety elements added to a product to indirectly protect people or other objects.	4.2	
Interface	The boundary between components, assemblies, modules, users, and other objects. Design starts at interfaces.	6.3	1.3, 1.5, 4.3, 5.3, 10.1
Intellectual Property	All the knowledge, drawings, documentation, test reports and other material generated during the design process that have value to the organization.	2.2, 10.2	6.5
Internet of Things (IoT)	In the IoT universe, individual products, or systems within them have processors that collect and share information with others to make collective decisions about their operation.	1.8	1.5, 9.5
Introspection	Team reflection, debriefing, and self-examination to discover how to improve their design process.	3.4	2.1, 3.1
ISO-9000	The International Standard Organization's quality management system that demonstrates that an organization has documented product development plan.	5.5	
Iteration	Revisiting a decision and re-executing tasks as a means of getting closer to an acceptable form or function.	5.5	6.5
J			
Journey Map	A block diagram of the steps taken by a product through its life cycle (a Product Journey Map) or a users' steps when interfacing with an object (a User Journey Map).	4.2	4.4

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K			
Kanban	A visual workflow project management process that organizes tasks into small value-added increments.	5.3	5.4
Kanban Board	An agile project management tool designed to help visualize work and manage work-in-progress. See Task Board.	5.4	
Kano's Model	A plot of customer satisfaction versus product function that helps in understanding how and why specifications exist and mature.	4.6	4.7
Key Performance Indicator (KPI)	A measure of product or system performance.	8.1	8.2, 8.3, 8.4
L			
Last possible moment	The latest time that a decision can be made without slowing down the project.	2.4	
Learning	See Design learning	2.1	
The Lifecycle Assessment (LCA)	Measures a product's or process's greenness or sustainability throughout its entire life cycle.	9.6	
Linear Design Process	Linear processes that consist of a series of pre-defined tasks.	5.3	
M			
Maintainability	See Design For Maintainability	9.5	
Maturity (product)	A measure of how stable and known the technologies that are used in a product.	7.1	4.1
Maturity (process)	A measure of how stable and known the tasks are to solve a problem.	4.1	5.4,5.5
Mean Time Between Failures (MTBF)	Average elapsed time between product, system, or component failures.	9.4	

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Mechatronics	The integration of mechanical, electrical, computational disciplines that result in design or products and manufacturing processes	1.5	
Meta information	Information about information, such as such as customer, author, approval date, revision, information type, project name, contact information, or page count.	2.2	
Method or Design Method	A set of steps and activities used to create or document information during the design process.	1.1	1.6
Mind Map	A diagram for representing tasks, words, concepts, or items linked to and arranged around a central concept.	1.7	
Minimum viable product (MVP)	A solution to a problem that meets the minimum goals or targets, is good enough for now. An MVP is often considered as "satisficing".	5.5	
Modality	The way information is represented such as, textual, graphical, auditory, non-verbal gestures, and physical.	2.2	
Modeling	Building an analytical, virtual, or physical method to evaluate performance.	8.1	
Module	A distinct system or assembly that provides unique functions and has interfaces designed so it can be treated as a single object added or removed from a larger system.	6.3	9.5
Morphological Charts	A table where each row is a characteristic or function that needs to be included in the concept, and the columns include various "means" to achieve each function. A complete concept is one means from each row combined with others.	6.1	

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N			
Non-Disclosure Agreement (NDA)	A written agreement between organization to keep each other's IP secure.	10.2	
Noise	Variation caused by parameters that are impossible to control or are chosen not to be controlled due to cost or other factors.	8.3	8.4
O			
Object	A system, sub-system, assembly, component, module, feature, or unit of code to be designed. Also often referred to as an artifact.		
Optimization	An iterative evaluation technique with the goal of maximizing performance. Formal Optimization is an analytical method that can only be used when there is a set of equations relating the variables to KPIs and VUCA+ effects are small or nonexistent.	8.2	8.1
Original Design	Developing a new process, assembly, or component.	4.1	
P			
Pairwise Comparison	Comparing alternatives two-at-a-time to find the better alternative.	2.4	6.6
Parallel Design	See Set-based design	6.2	
Parametric Design	Using algorithms to create complex, customized products, or structures.	4.1	
Patching	The activity of changing or fixing a design without changing its level of abstraction. Patching does not add value to the effort and wastes resources (aka reworking). Contrast to refining.	6.5	
Patent	Patents can be obtained for an object or code that is 1) new, 2) useful, 3) non-obvious, and 4) realizable.	10.2	

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Performance	The measure of function and behavior—how well the device does what it is designed to do.	1.3	
Personas	Wearing the hat of a specific stakeholder to aid in developing requirements.	4.2	
Plan	A detailed proposal for action that has the intent to achieve something through the completion of defined tasks.	5.3, 5.4	1.4, 1.6, 5.1
PMI Method	Plus-minus-interesting method for idea generation similar to Brainstorming.	6.1	
Precision	Having low variation. See Accuracy.	7.4	7.3
Preliminary Design Review (PDR)	Demonstrating that the design meets all requirements with acceptable risk and within the cost and schedule constraints.	5.5	10.1
Probabilistic Risk Assessment (PRA)	A quantitative method to analyze the risk of failure.	9.4	
Problem Backlog	The issues that will need to be addressed to solve the design problem; the known requirements to meet, the tasks to do and other issues to resolve.	1.1	5.3
Problem granularity	The scope of the problem, whether the object being designed is the entire product, a system within the product, a component, or a specific feature	4.1	
Problem solving style	Every member of the team has a personal problem-solving style. This "style" includes how they interact with others, manage information, deliberate, and reach conclusions.	3.2	
Problem understanding	Refining the stakeholders needs into customers' requirements and engineering specifications.	Section 4	2.1

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Problem understanding (how much time to spend)	Engineers who spend around 7% of their time understanding and developing requirements and specifications have significantly better solutions than those who spend less.	Overview and Organization of Best Practices	
Pro-Con Analysis	A design support method based on listing the pros and cons for comparing alternative solutions.	2.4	6.6
Product Decomposition	A method to tear-down (virtually or physically) an existing artifact to determine how it works (functions, behaves).	4.5	
Product	Any result of the design process, regardless of whether it is a one-off bookshelf, a space station, a consumer product, or a component of any of them.	1.1	
Product function	What an object does or should do, usually expressed by action verbs.	1.3	
Product Life Cycle	The progression of a product from cradle to grave. There are four stages in the Product life cycle: Design, Production and Delivery, Use, End of Life.	1.2	
PLM (Product Life Cycle Management)	An advanced system to store and control product information throughout the entire lifecycle, from the design phase through its production and sales, its service requirements, to its ultimate retirement.	1.6	6.5
Product Life Stages	see Product Life Cycle	1.2	
Product Plan Review (PPR)	A review of the plan for realizing the product.	5.5	
Product Portfolio Management	Approach to prioritizing and selecting backlogged projects.		
Product Proposal	Outlines the objective for the product as a beginning for the Problem Backlog.	4.1	
Product Use Phase	Part of the product life cycle that includes its use, cleaning, and maintenance.	1.2	

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Products Liability	The special branch of law dealing with alleged personal injury or property or environmental damage resulting from a defect in a product.	7.2	
Production and Delivery Phases	Part of the product life cycle that includes product manufacture, assembly, distribution, and installation.	1.2	
Program Evaluation and Review Technique (PERT)	A common method to make estimates based on optimistic, most likely, and pessimistic assessments.	5.2	
Project Proposal	The identification of the work to be done to develop a product.	4.1	
Proof-of-concept prototype	A prototype (aka proof-of-function prototype) focused on developing the product's function for comparison with the customers' requirements or engineering specifications.	5.1	
Proof-of-process prototype	A prototype used to verify the manufacturing process.	5.1	
Proof-of-product prototype	A prototype developed to help refine the components and assemblies.	5.1	
Proof-of-production prototype	A prototype used to verify the entire production process.	5.1	
Prototype	A physical, analytical, graphical, or other instantiation of a product or object, meant to: learn about object, test an evolving object, communicate with others, or resolve one or more issues during product development.	5.1	5.3, 5.4, 6.5, 9.1
Provisional Patent	A one-year placeholder for ideas that gives the inventor time to work toward perfecting the invention and exploring the market potential before the time and expense of applying for a utility patent.	10.2	
Pruning	Deciding which concepts to continue to develop. (aka down-selecting).	6.6	2.4

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Q			
QFD (Quality Function Deployment)	A method to manage the development of requirements and specifications.	4.7	8.2
Quality	The level of satisfaction of a customer based on product performance.	1.4	4.3, 7.4, 8.2
Quality Control	The inspection of incoming raw material and manufactured components for conformance to the design documentation.	7.4	
Quality measure	Any variable that is an indicator of product quality. These are generally identified when developing specifications and may be a measure of performance or any other significant product attribute.	8.2	
R			
Recursion	A characteristic of design where the same design process/method is applied to the product, systems, sub-systems, components, and features with each interdependent on the others.		
Redesign	Making changes to an existing product.	4.1	
Refining	Making an object less abstract (or more concrete) through iteration. Contrast to patching.	6.5	
Reliability	A measure of how well product behavior is maintained over time.	9.4	
Requirements or (Design Requirements)	What the object should do; a characteristic of it, how it should support a user, or what it should be; can be constraints, criteria, wishes, demands, or goals. Requirements are refined into specifications.	4.3, 4.4	1.6, 1.7, 2.3, 2.4, 3.1, 4.1, 4.2, 4.4, 4.7
Requirements for Specifications	What is needed for a good set of specifications.	4.6	4.1

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Retrospective	A meeting to review the design process and develop improvements for it.	3.4	5.3
Reverse engineering	The virtual or physical teardown of a product to learn how it is made/manufactured. See Benchmarking.	4.5	
Risk	An expected value, a probability that combines the likelihood of something happening times the consequences of it happening.	7.2	4.3, 5.3, 6.5, 9.4
Robust Design	A method that focuses on developing products that function while being insensitive to noise.	8.4	8.1, 8.3
S			
Safety	The desire to have low risk of causing injury or loss.	4.1	4.3, 6.5, 7.2, 7.3
Safety Margin	Another name for a factor of safety, commonly used in electronics.	7.3	
Scrum	An Agile project management method that adds more structure to Kanban with "sprints" that define short development cycles.	5.3	
Selection Design	A method that involves choosing one item (or more) from a list of similar items.	4.1	
Sensitivity analysis	A method for evaluating the statistical relationship of parameters and their tolerances in a design problem to support trade-offs.	8.2	7.4, 8.1, 8.3
Set-based design	A design philosophy to explore multiple sub-solutions and alternatives, carrying them through modeling, prototyping, and detailing them to delay decision-making (aka parallel design).	6.2	6.1, 6.3, 6.4
Simplicity	Striving for the ideal of providing the needed function with the fewest components and assemblies.	6.5	

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Specification or engineering specification	A formalized requirement includes a subject, units, target, and thresholds.	4.6	1.3, 2.3, 2.4, 3.1, 4.3, 4.7, 6.6
Spiral learning	Learning structured as spiral where each topic is built on the previous work on the same topic.	2.1	
Sprint	Short development design work based on 2-4 week cycles of: Organize, Plan, Do, and Review.	5.3	
Sprint Review	A meeting held at the end of the sprint review portion to critique the delivered sprint solution.	5.5	
Stage-gate	A sequential design process for mature products and systems with scheduled review/approval meetings.	5.3	5.4
Stakeholder	A person or organization that interacts (directly or indirectly) with the product being designed/manufactured. An alternative definition is everyone downstream of the designers who encounters or is affected by the product. Stakeholders are the primary source for requirements. Customers and users are types of stakeholders.	4.2	4.7
Statistical Tolerance stack-up	An accurate method to estimate the gap/interference.	7.4	
Stories	A method used in developing product requirements. A story has a specific format ("as a <user>, I would like <function, behavior> because <justification>").	4.4	
Sub-system	A system within a larger system.		
SWOT Analysis	A decision making method based on identifying Strengths, Weaknesses, Opportunities, and Threats.		
System	A group of interacting physical, virtual, or integrated objects performing a specific function.	1.3	

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System Definition Review (SDR)	A meeting that occurs at the end of conceptual design and is used to examine the proposed system architecture and the functional elements that define the concept.	5.5	
Systems Specifications Review (SSR)	A meeting that occurs at the end of the product definition phase. It ensures that the functional and performance requirements defined for the system will satisfy the product need.	5.5	1.7
T			
Target	The desired, ideal level of performance aimed for. (Also see Threshold).	4.6	4.7
Task	A unit of work with clear deliverables. A well-formed task has the syntax, "The <responsible party/team> will do <activity> to achieve <measurable deliverable> by <deadline>."	5.1	3.1, 4.1, 5.3, 5.4
Task Backlog	A listing of the tasks that need to be done and the order to do them.	5.3	1.7, 3.1, 4.1, 5.1, 5.4
Task Board	An Agile project management tool designed to help visualize work and manage work-in-progress (aka Kanban Board).	5.4	5.1
Tack criticality	Deciding which tasks to work on is a function of relative criticality, a function of each task's Importance, Technical difficulty, Dependency, Uncertainty, and Lead time.	5.3	
Team building activities	Activities that can be used to build strong teams.	3.1	
Team characteristics	The ten characteristics of successful teams.	3.1	

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Team contract	A working agreement among team members that state team member's roles, goals, and performance expectations.	3.1	
Team environment	Successful product development organizations ensure that the physical, virtual, and organizational environment is conducive to good design and design team support.	3.3	
Team health	Ensure that the team operates efficiently by monitoring and acting on the symptoms/causes/remedies for team performance issues.	3.4	3.1, 3.2, 3.3
Team meeting minutes	A record of what was discussed, what decisions were made and commitments for future work.	3.1	
Team member roles	A team member's responsibility on the team.	3.2	3.1
Team of teams	The organization structure where there are identified teams within teams.	3.1	
Team structure	Teams are organized in one of three patterns: centralized (i.e., job shop), system (dedicated to a project) or hybrid (a mix with a discipline (job shop) and a project manager).	3.2	
Technology Readiness Assessment	A measure of a technology's maturity and readiness to be used in a product.	7.1	6.6, 7.2, 8.1
Test Driven Development (TDD)	A method that emphasizes that tasks have measures, targets, and thresholds, and the tests that prove the task is done.	5.1	1.6, 8.1, 9.5+D70
Threshold	A design specification threshold is the level of performance minimally accepted. (Also see Target)	4.6	4.7
Tolerance analysis	Assessing how variations in manufacture influence (1) the performance of a product or (2) the ability to assemble it.	7.4	8.4

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Tolerance Stack-up	Assessing how assemblies fit or interfere. See Worst case or Statistical stack-up	7.4	
Tool	See "Design Tool"	1.6	
Trade-off	Decision making process that includes accepting a lower value/performance in one measure in exchange for a higher/value performance in a another.	8.2	4.6
U			
Uncertain	Information is not precise; its description or value may vary. See VUCA and accuracy	2.3	
User	A stakeholder who makes use of the product.	4.2	
User Centered Design	A popular term for understanding a user's demands, priorities, and experiences.	4.4	
User Experience (UX)	Concern for the entire users' experience with the object.	4.3	
User Interface (UI)	Concern for the interface between the user and object being designed.	4.3	
USPTO	The US Patent and Trademark Office.	10.2	
Utility Patent	"Utility" is effectively synonymous with "function," so the claims in a utility patent are about how an idea operates or is used.	10.2	
V			
Value	The monetary worth of a function or performance level.		
Variant design	A variant is a customized product designed to meet the needs of a specific customer.	4.1	
Variation	The distribution around a mean value.	7.4	8.4
Voice of the customer	A commonly used emphasizing the importance of the stakeholders' needs.	4.2	4.1, 4.7
Volatile	Information is changing and evolving (mean value moving) - See VUCA+		

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VUCA	The dimensions of uncertain information: Volatile, Uncertain, Complex, and Ambiguous.	2.3	
VUCA+	The dimensions of uncertain information: Volatile, Uncertain, Complex, and Ambiguous + Incomplete + Black Swans.	2.3	2.4, 6.6, 7.2, 8.1, 8.4
W			
Warnings	The weakest form of safety added to a product.	4.2	
Waterfall	See Stage-gate		
What to do next?	The primary question during design.	2.4	8.1
Worst Case Tolerance Stack-up	The most common tolerance analysis form. Adds the maximum and minimum dimensions to estimate the stack-up or worst-case.	7.4	
Numerical			
5 Whys	A method to get to the root of an issue.	3.4	6.2, 10.1
6-3-5 Method	6-3-5 is a method is typically used in conceptual design for expanding and exploring the design space. It is like brainwriting with some additional structure.	6.1	