Development Cycle

Successful products typically follow four stages of creation: requirements, design, development, and testing.

All products progress sequentially through basic stages of creation. Understanding and using effective practices for each stage allows designers to maximize a product's probability of success. There are four basic stages of creation for all products: requirements, design, development, and testing.[1]

Requirements

In formal processes, requirements are gathered through market research, customer feedback, focus groups, and usability testing. Informally, design requirements are often derived from direct knowledge or experience. Design requirements are best obtained through controlled interactions between designers and members of the target audience, and not simply by asking people what they want or like—often they do not know, or cannot clearly articulate their needs.

Design

This stage is where design requirements are translated into a form that yields a set of specifications. The goal is to meet the design requirements, though an implicit goal is to do so in a unique fashion. Excellent design is usually accomplished through careful research of existing or analogous solutions, active brainstorming of many diverse participants, ample use of prototyping, and many iterations of trying, testing, and tuning concepts. A design that is appreciably the same at the beginning and end of this stage is probably not much of a design.

Development

The development stage is where design specifications are transformed into an actual product. The goal of development is to precisely meet the design specifications. Two basic quality control strategies are used to accomplish this: reduce variability in the materials, creations of parts, and assembly of parts; and verify that specifications are being maintained throughout the development process.

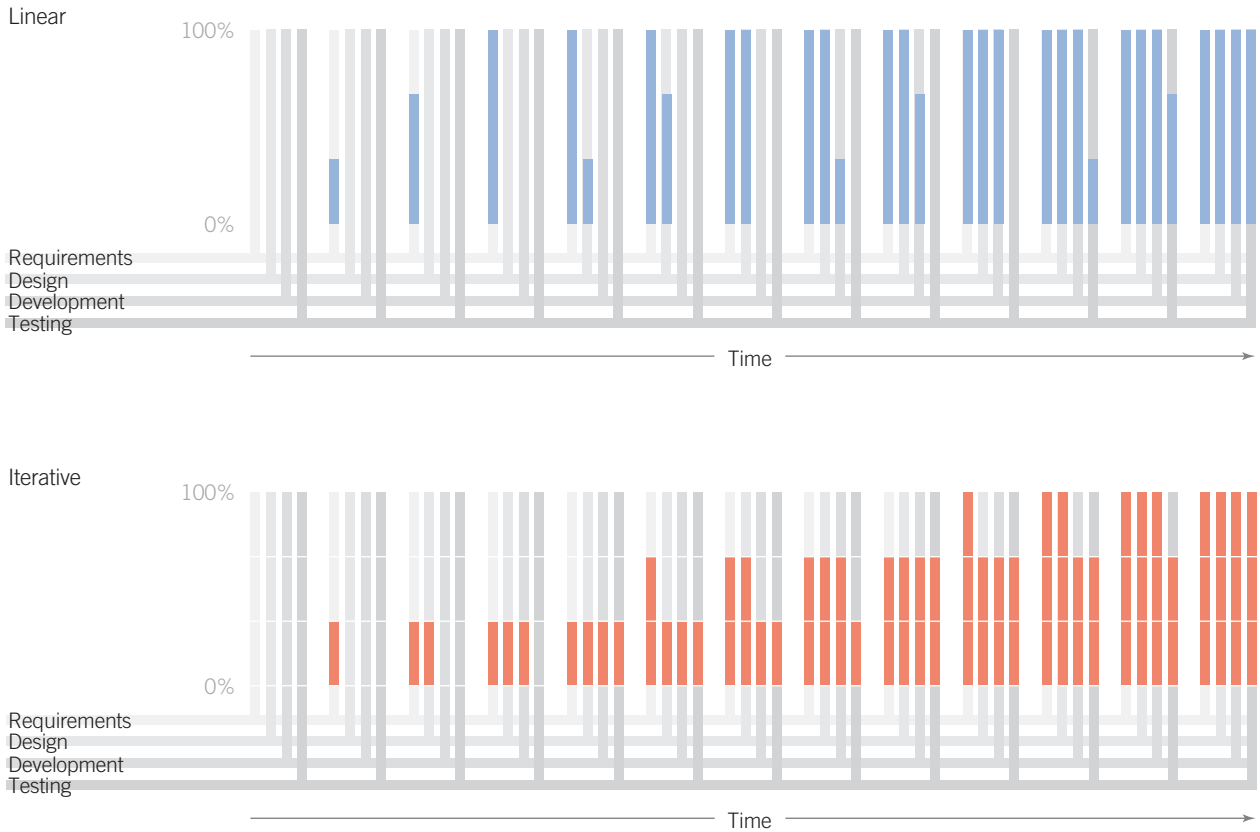
Testing

The testing stage is where the product is tested to ensure that it meets design requirements and specifications, and will be accepted by the target audience. Testing at this stage generally focuses on the quality of modules and their integration, real-world performance (real contexts, real users), and ease and reliability of installation.

Gather requirements through controlled interactions with target audiences, rather than simple feedback or speculation by team members. Use research, brainstorming, prototyping, and iterative design to achieve optimal designs. Minimize variability in products and processes to improve quality. Test all aspects of the design to the degree possible.

See also Design by Committee, Hierarchy of Needs, Iteration, Life Cycle, and Prototyping

[1] A nice treatment of contemporary product development issues and strategies is found in *Products in Half the Time: New Rules, New Tools* by Preston G. Smith and Donald G. Reinertsen, John Wiley & Sons, 2nd ed., 1997; and *Managing the Design Factory: The Product Developer's Toolkit* by Donald G. Reinertsen, Free Press, 1997.



Although progress through the development cycle is sequential, it can be linear or iterative. The linear model (also known as the *waterfall model*) proceeds through the development cycle once, completing each stage before proceeding to the next. The iterative model (also known as the *spiral model*) proceeds through the development cycle multiple times, completing an increasing percentage of each stage with each iteration. The linear model is preferred when requirements and specifications are exact and unchanging, and the cost of iteration is prohibitive. In all other cases, the iterative model is preferred.