Vertical and Horizontal Prototyping

Prototyping and problem solving

From the problem solving viewpoint prototyping can be classified as:

- explanatory prototyping
- exploratory prototyping
- experimental prototyping
- evolutionary prototyping

This classification is similar to that of Floyd (1984), but with the addition of explanatory prototyping. The role of prototyping in problem solving is not clear-cut, since there is no complete theory of how people solve problems. The categories indicate the general areas in which prototypes can provide assistance, rather than defining actual types of prototype.

Explanatory prototyping is the use of prototypes to explain, demonstrate, and inform. The prototypes tend to be horizontal in functionality (see later), and will usually be thrown away. Almost any type of prototype can be used in an explanatory role.

Exploratory prototyping is concerned with problem determination, clarifying the requirements and goals of the system, and in examining alternative solutions. Exploratory prototyping tends to be informal and unstructured, and the prototypes are usually thrown away once the necessary information is obtained from them.

Experimental prototyping evaluates the proposed solutions to find the optimum one, There is a wide variation in the literature about what experimental prototyping means, but in the view of the authors it is closest to the original definition of prototyping, as a means for modelling system behaviour The prototype may be thrown away, enhanced, or even used in a product, depending on its quality.

Evolutionary prototyping is used to refine a solution. It assumes that the nature of the problem will evolve with time, that the system requirements evolve, and that when used the system will generate new requirements.

Evolutionary prototyping should not be confused with the use of prototyping for evolutionary systems development.

What to prototype

The functional aspects of a prototype allow two broad classes of prototyping to be identified:

- vertical prototyping
- horizontal prototyping

Figure 2.3 shows an example of vertical and horizontal prototyping.

A vertical prototype builds only selected functions, but these are implemented in their final form. Only the most useful functions are built, and this means that the overall system design is largely fixed, Even though only limited functions are available, the vertical prototype should still allow useful tasks to be performed.

Vertical prototyping can be used to provide an early version of a system, which is sufficient for the users to gain experience, and which can be enhanced by adding further functions. Used in this way, the vertical prototype becomes the system, and is not thrown away.

Horizontal prototyping provides a partial implementation of almost all of the system functions. It can be used to show how the target system will look or behave, but will not usually be of production quality. Horizontal prototyping is used to simulate system behaviour, and to help identify possible problems before they appear in the system. A horizontal prototype may evolve into the complete system, but is more usually thrown out because quality has been traded for speed of building.

Vertical and Horizontal Prototyping

In many prototyping situations the functionality is a mixture of both vertical and horizontal prototyping. This is sometimes called diagonal prototyping, although in reality it is not a particularly useful classification. The distinction between horizontal and vertical prototyping is useful in defining the scope of a prototype.

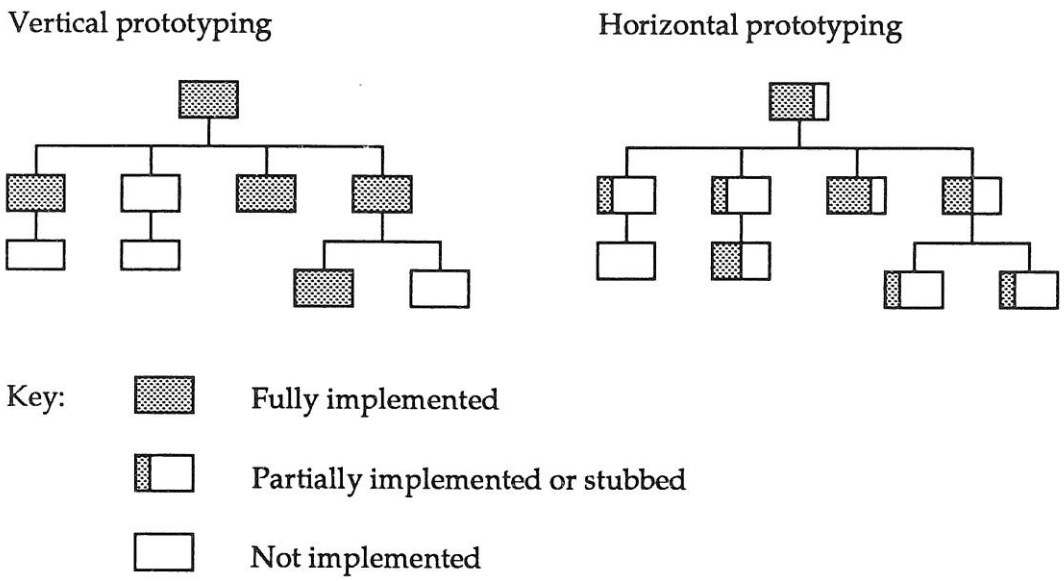

Figure 2.3 Vertical and horizontal prototyping
Note: In practice the distinction is rarely as clear as this