and describe briefly, by way of example, some of the mathematical techniques that have proved useful in their construction.

A model can be defined as a useful simplified representation of the essentially important aspects of a real object or situation. A model of a system can be a picture, a mechanical or electrical device, a set of mathematical equations, or anything else having characteristics representative of those that are fundamental to the system. Ordinarily, a model will be much simpler than the system it represents, since an important goal of model design is to leave out all detail that appears in the original system, but which plays no significant role in the system's operation. The purpose of this goal is to reduce as much as possible the effort required to analyze the interactions that exist among the different elements of the model.

If the model has been well-designed, such an analysis should then yield information about the corresponding interactions and interrelationships of the original system. In other words, a good model will be designed so that what happens in the model accurately reflects the important things that would happen in the system to which it corresponds. An obvious question at this point is, "How do we know what is important and what is not in a system?" There is no clear-cut answer to this question. Some elements of a system will be of obvious importance; others, not so obvious. Wherever there is a question about the significance of a system element it should be represented in the model, although it may be omitted later if subsequent analysis of the model shows that the questionable element is, in fact, not important.

On the whole, the design of an adequate model is something of an art and requires that the designer have a pretty good feel for the system with which he is concerned. When a model is used one is generally interested in determining quan-