2

The Computer Integrated
Enterprise

THE OVERALL ENTERPRISE VERSUS THE CIM REFERENCE MODEL

It is the ultimate aim of computer applications technology to bring all aspects of company operations, i.e., the overall enterprise, within the computer system. However, as noted earlier, there is, at least at present, a major difference in the functions which computers can carry out among the various operational units or entities which make up the enterprise.

In some cases, as with corporate management, engineering design, marketing and sales, etc., the computer system operates as a decision support tool to the individuals carrying out the functions assigned to them. In other cases, the computer can operate relatively independently of human intervention to carry out the assigned functions itself such as in process control.

It is the thesis of the CIM Reference Model Committee of the International Purdue Workshop on Industrial Computer Systems that the amount of human innovation that is involved in carrying out that task is the key into which category the par-
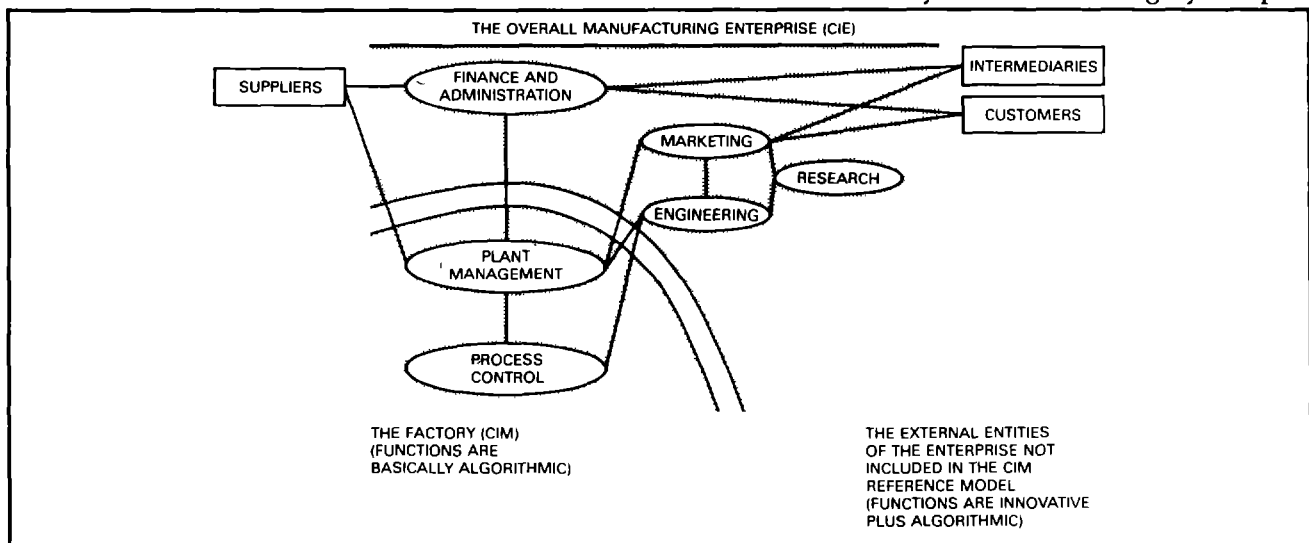

Figure 2-1 Relation of the Computer-Integrated Enterprise (CIE) to Computer Integrated Manufacturing (CIM) as Interpreted in this text.

ticular industrial task fits. In the first group of tasks listed just above, innovation is paramount. In the second set the fact that the computer can carry them out relatively independently indicates that human innovation is not needed or is minimal at best.

It is a further thesis of the CIM Reference Model Committee that there is a relatively sharp boundary in the enterprise between those functional units where the computer serves primarily only as a decision support tool and those where it primarily exercises the control function in its own right.

As stated in the Introduction and in Chapter 1 of this text, it is our decision in developing this exposition of the CIM Reference Model to restrict the definition of the term *Computer Integrated Manufacturing (CIM)* to those functions falling within the second category. Fortunately, these (again in our opinion) comprise the whole of the manufacturing functions of the enterprise. Thus our definition will differ little, if any, from the other popular definitions of the term. We will assure the overall integration of the enterprise by making certain that all data developed within the manufacturing functions is made readily available

to all other operational and administrative units of the plant to aid the decision support requirements at those latter locations. This is exemplified by Figures 1-2 and 1-3 of the previous chapter.

In order to further clarify our decision and to make clear the distinctions presented, it is important at this point to develop a model of the overall enterprise and to show clearly where our specific model fits within it. The overall model is often referred to as that for the *Computer Integrated Enterprise* or CIE [106]. Figure 2-1, modified from the same reference, shows in an abbreviated manner the overall enterprise versus the manufacturing plant which is the main subject of this text. The dashed line in Figure 1-3 separating the external entities from the manufacturing elements of the production factory system also emphasizes this difference. Figure 2-2 is a modification of Figure 1-2 to further illustrate this point.

Again, in those elements of the enterprise included in the CIM Reference Model, the computer system, in general, takes actions (process control, production scheduling, sequencing, etc.) directly on the plant equipment to accomplish the needed task. As noted earlier, the actual manufacturing
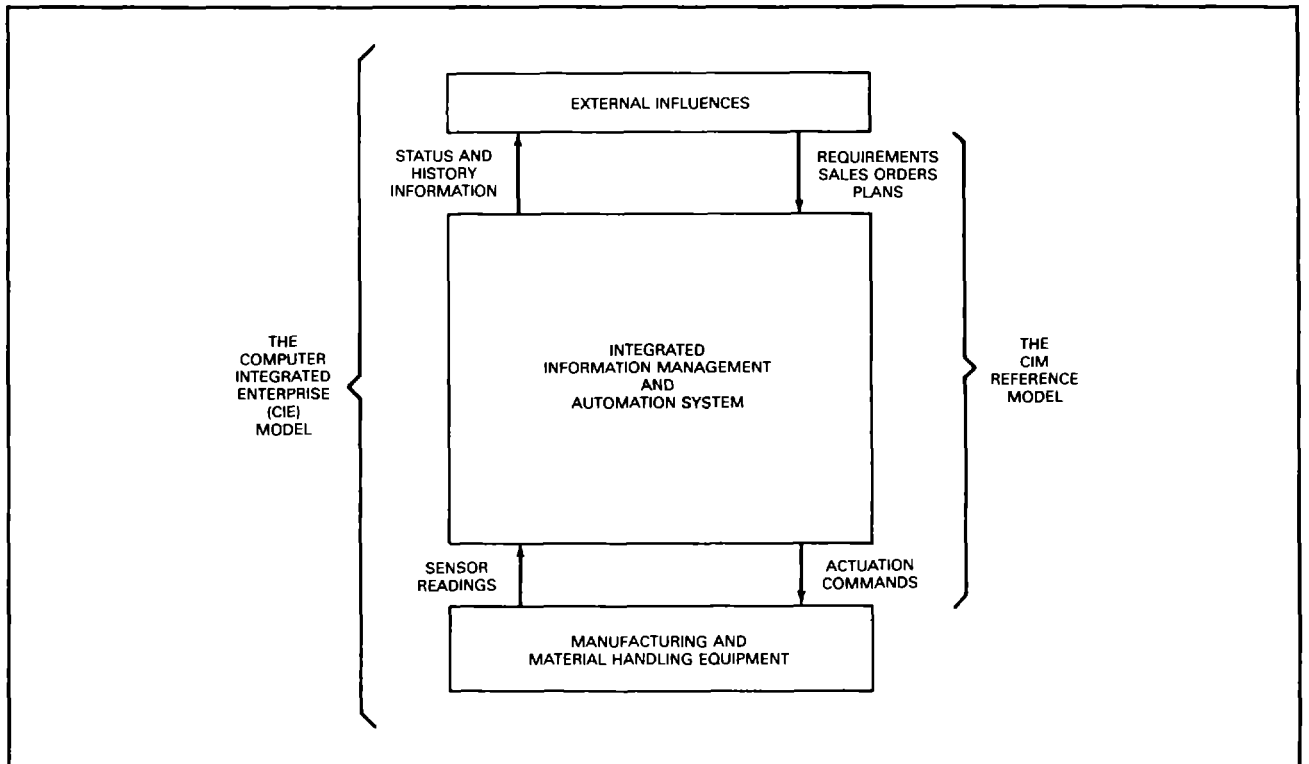

Figure 2-2 A further illustration of the distinctions between the Computer Integrated Manufacturing Model and that for the Computer Integrated Enterprise.

machinery itself is not treated here since it is by definition non-generic.

An excellent descriptive model of the Computer Integrated Enterprise is that developed by Nippon Steel Corporation [20] and presented in Appendix V. This is a data-flow diagram model like that of Chapter 4 for our present model. Distinctions between the factory elements and external entities are indicated. The data flow diagram (Figure AV-1) is due to the CIM Reference Model Committee. The Committee has also extensively revised the tables presented there.