There are several fundamental reasons for implementing a computer-aided design system.

l. To increase the productivity of the designer.

2. To improve the quality of design.

3. To improve communications.

4. To create a database for manufacturing.

The process of designing something is characterized by Shigley as an iterative procedure, which consists of six identifiable steps or phases:-

*Recognition of Need

*Definition of Problem - This specification includes physical and functional characteristics, cost, quality, and operating performance.

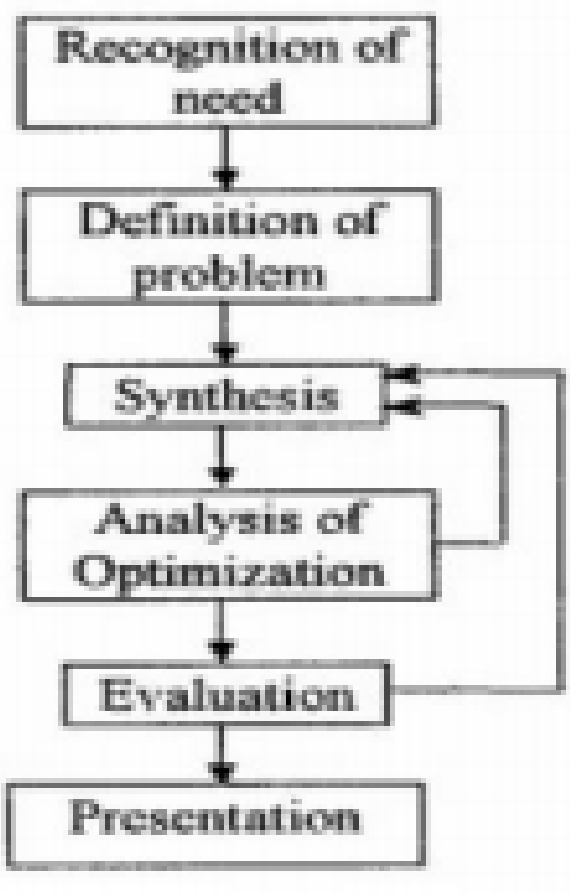
*Synthesis - The components and subsystems are synthesized into the final overall system in a similar interactive manner.

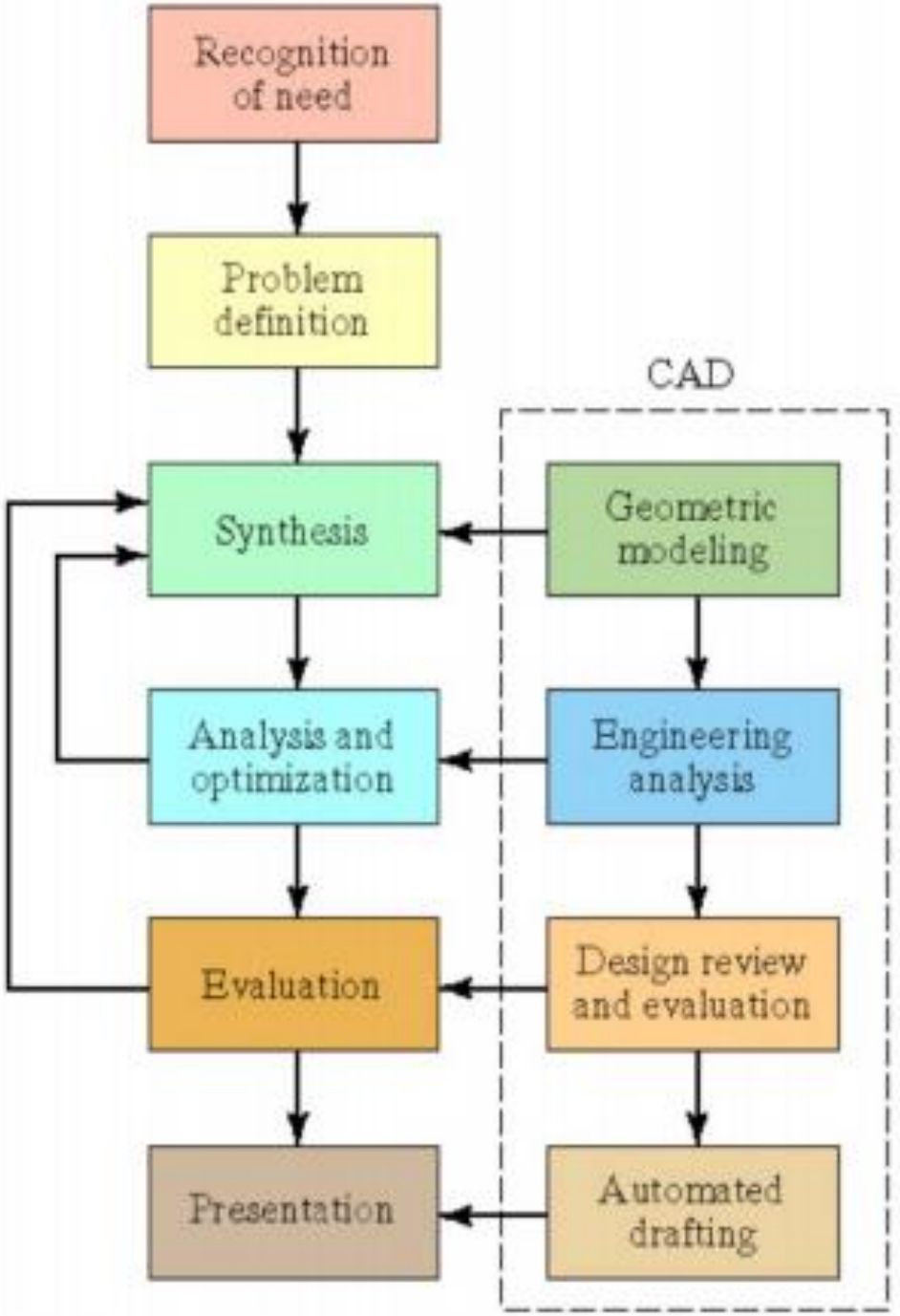
*Analysis and Optimization

*Evaluation - This evaluation often requires the fabrication and testing of a prototype model to assess operating performance, quality, reliability, and other criteria.

*Presentation

THE DESIGN PROCESS





Computer-aided engineering is the use of information technology for supporting engineers in tasks such as analysis, simulation, design, manufacture, planning, diagnosis and repair.

Computer-Aided Engineering (CAE)

CAE as a product design development philosophy that brings together all the Engineering activities.
Subsets: CAD, CAM
CAE: it is approach results in restructuring and stream lining of the entire engineering process itself.

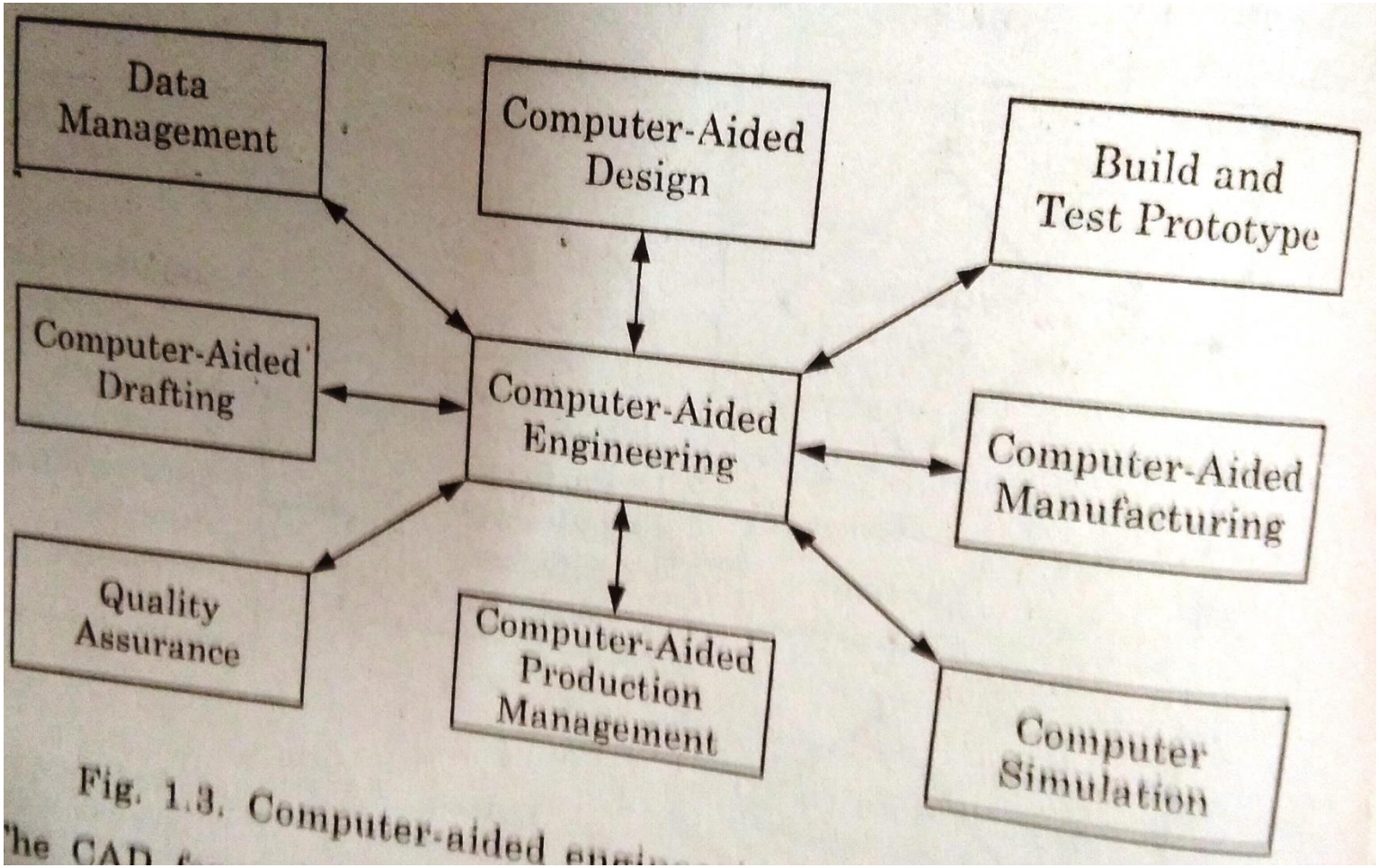


Fig. 1.3. Computer-aided engin

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Computer-Aided Engineering (CAE)

Optimization, Validation and Simulation activities are carried out using Computer Aided Engineering (CAE) software. These are used to perform various tasks such as: Computational Fluid Dynamics (CFD); Finite Element Analysis (FEA); and Mechanical Event Simulation (MES). Computer Aided Quality (CAQ) is used for activities such as Dimensional tolerance analysis. One more task carried out at this step is the sourcing of bought out components with the aid of procurement process

- Use of computer systems to analyze CAD geometry
- Allows designer to simulate and study how the product will behave, allowing for optimization
- Finite-element method (FEM)
  - Divides model into interconnected elements
  - Solves continuous field problems

CAD, CAM AND CIMS:

CAD/CAM = Computer Aided Design and Computer Aided Manufacturing. It is the technology concerned with the use of computers to perform design and manufacturing functions.

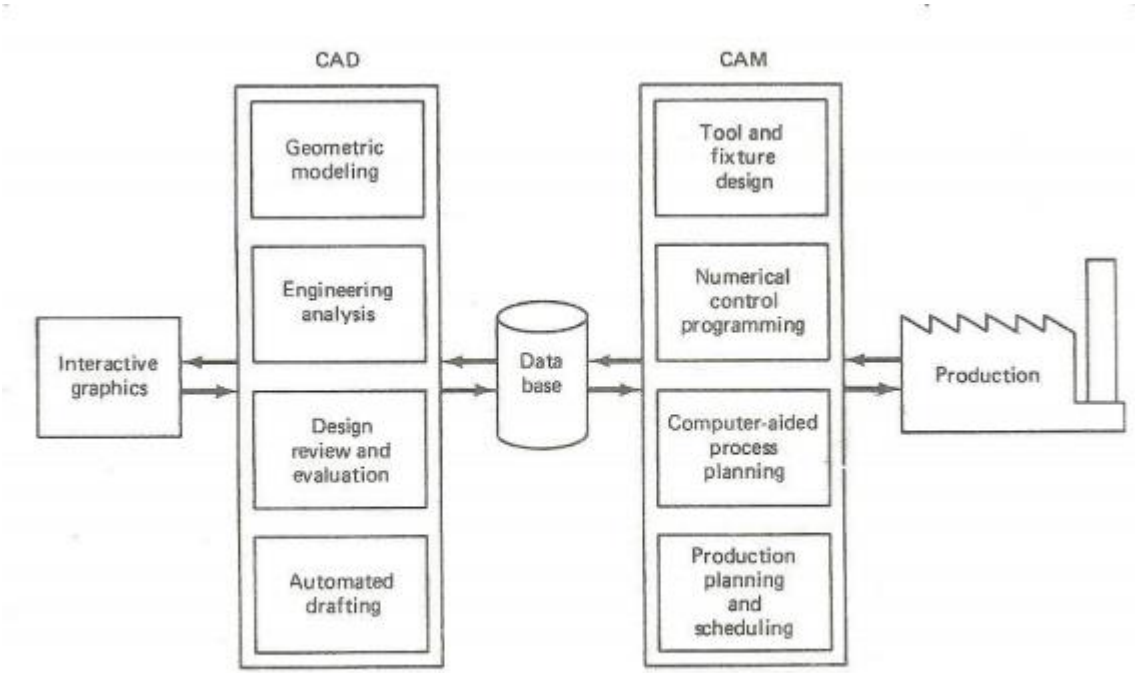


FIGURE 4.10 Desirable relationship of CAD/CAM data base to CAD and CAM.

•CIMS is an integration of CAD/CAM system that controls all activities from the planning, design of product to its manufacturing and shipping.

•The aim of CIMS is to optimize the entire operation from design to manufacture to sale.

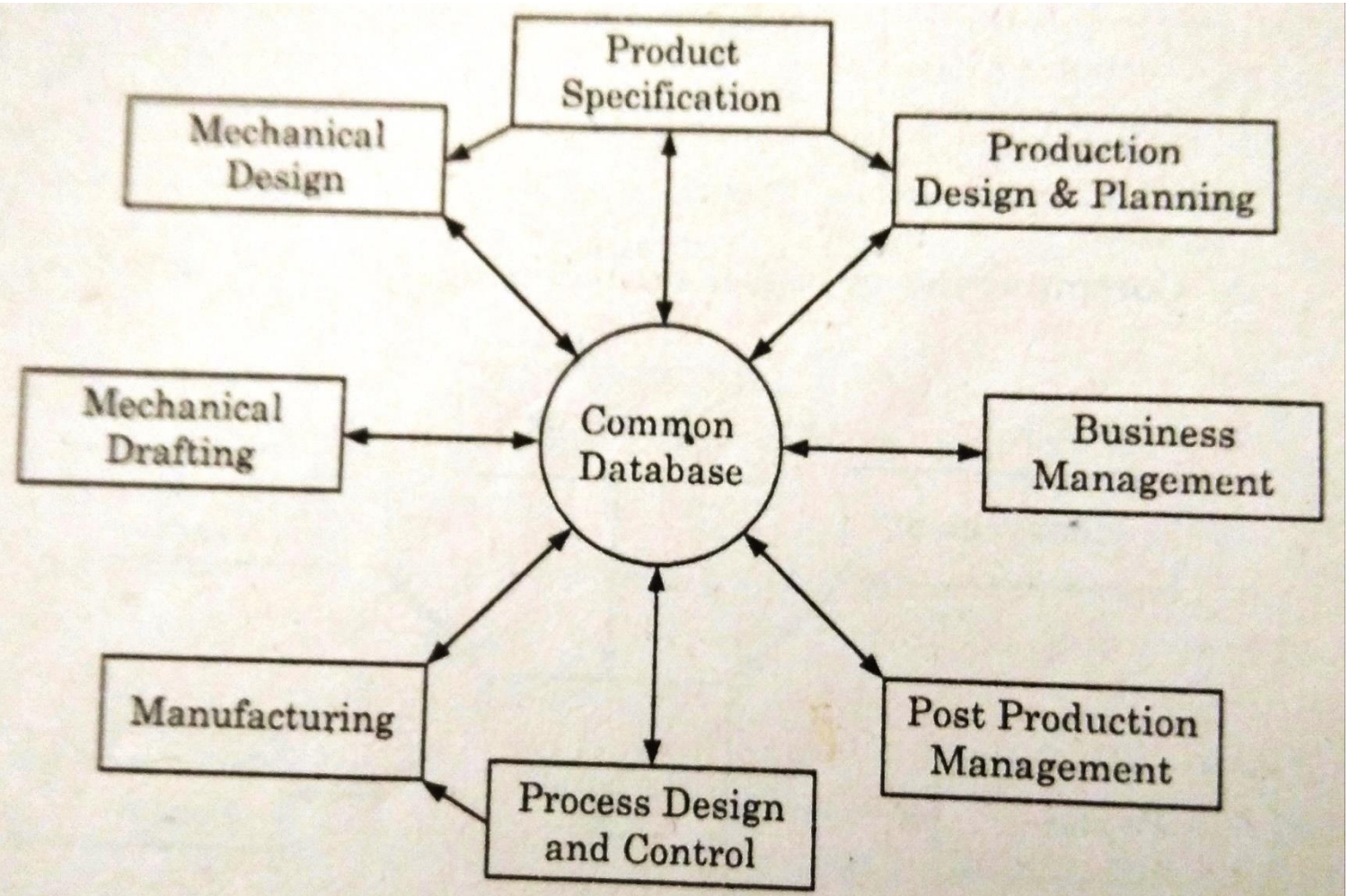
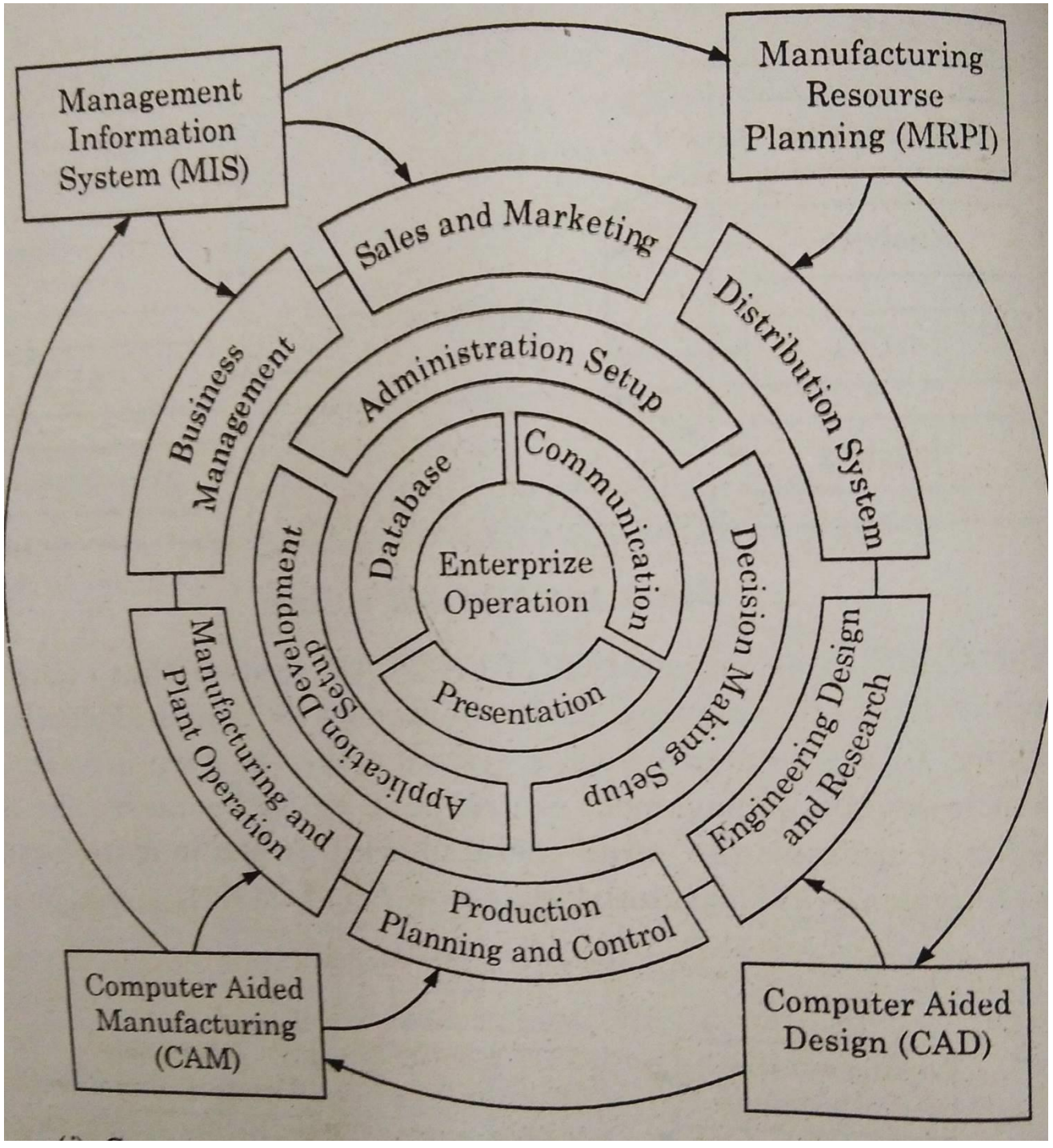
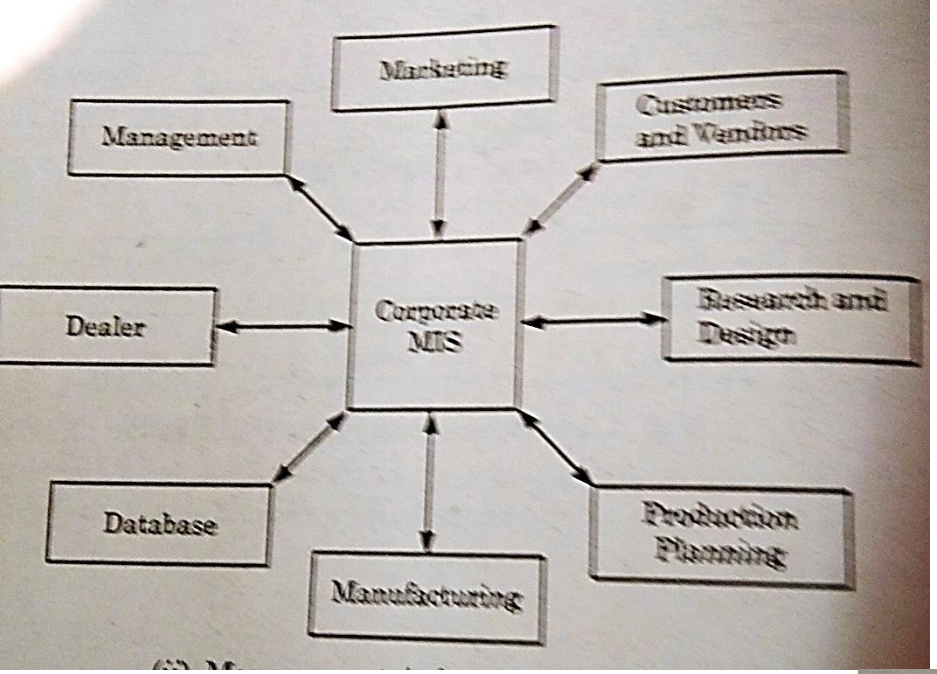


Fig. 1.5(*a*) Major components of CIMS.


Management Information System (MIS)
Manufacturing Resourse Planning (MRPI)
Sales and Marketing
Business Management
Distribution System
Administration Setup
Database
Communication
Enterprize Operation
Application Setup Development
Decision Making Setup
Presentation
Manufacturing and Plant Operation
Engineering Design and Research
Production Planning and Control
Computer Aided Manufacturing (CAM)
Computer Aided Design (CAD)



•The major area of CIM is marketing, engineering design, research and development, manufacturing and financial planning.

The CIM will benefit the enterprise. Some of these benefits are:

•Quick launch of new products.
•Reduced delivery time.
•Optimum inventories.
•Quick and fast production planning.
•Reduced lead time.
•Better quality product.
•Enhanced competition and responsiveness.