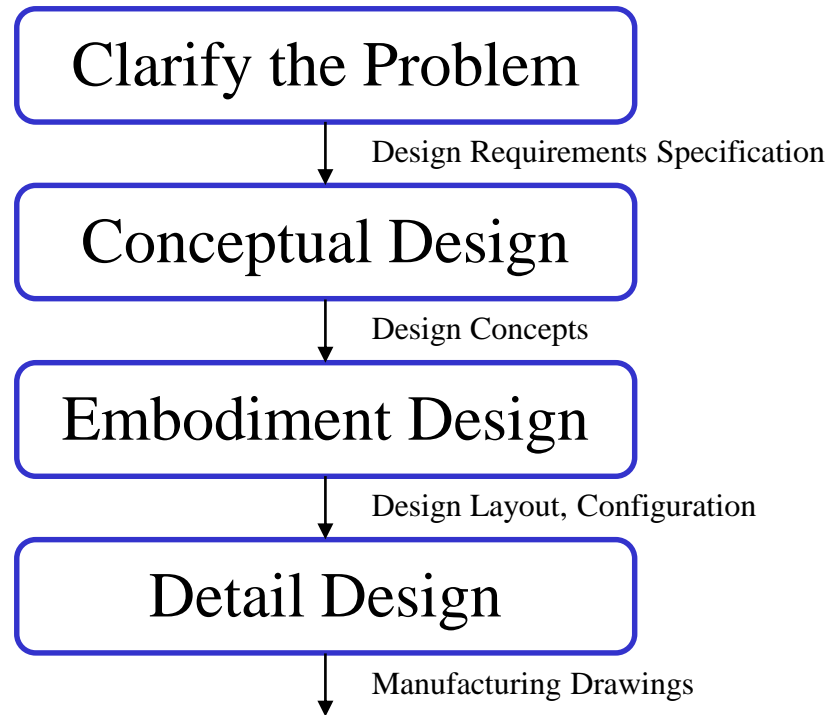

Introduction to CAD

What Do Those Letters Mean to
You?

Painting “The Big Picture”

- What is Computer-Aided Design (CAD)?
 - Creating drawings on a computer
 - Creating 3D shapes on a computer
 - Doing simulations
 - Finite Element Analysis
 - Dynamics
 - Fluid Flow
 - Visualization
 - Checking how things fit together to make sure they don't interfere
 - Checking how product will look to the customer

The Design Process



- What is Computer-Aided Design (CAD)?

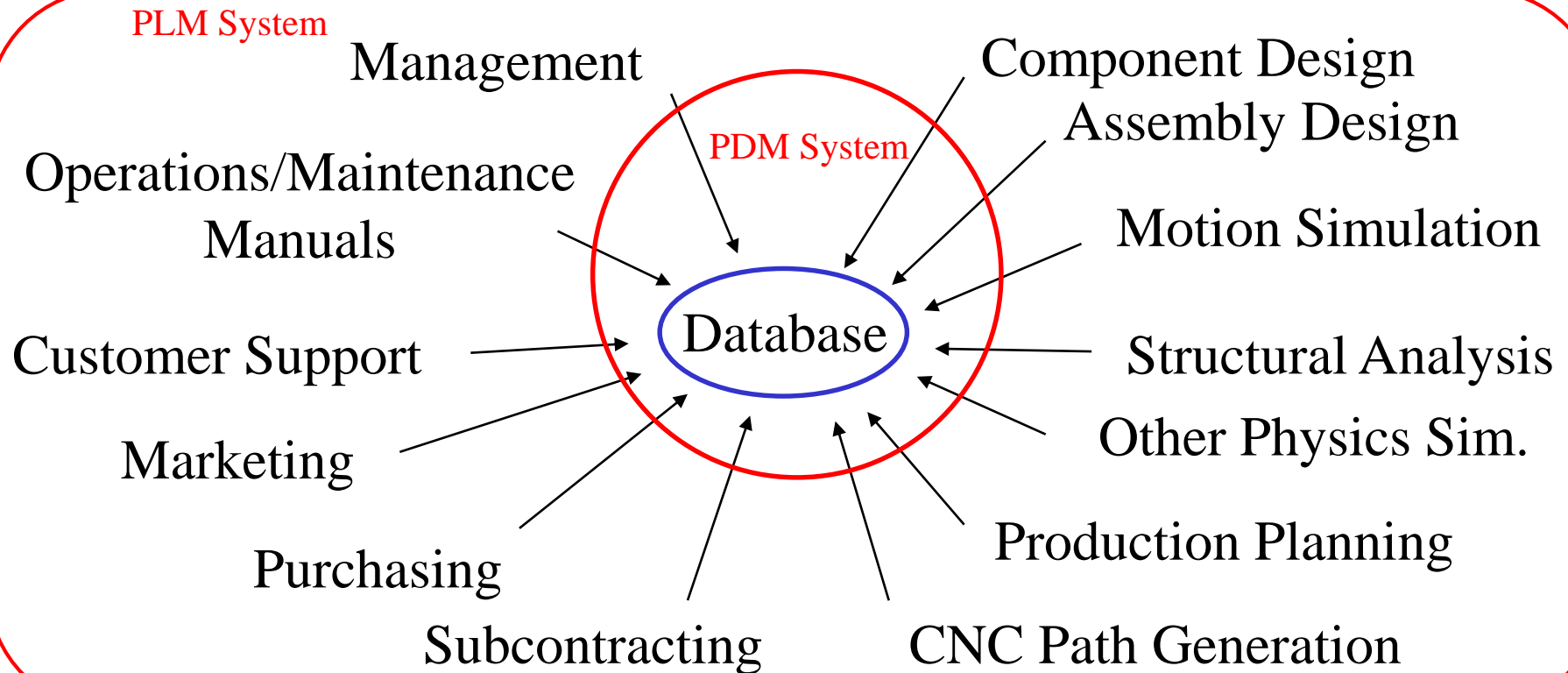
Using computers to help execute the design process.

More Specific Definitions

- *Computer-Aided Design (CAD)* is the technology concerned with the use of computer systems to assist in the creation, modification, analysis, and optimization of a design. [Groover and Zimmers, 1984]
- *Computer-Aided Manufacturing (CAM)* is the technology concerned with the use of computer systems to plan, manage, and control manufacturing operations.
- *Computer-Aided Engineering (CAE)* is the technology concerned with the use of computer systems to analyze CAD geometry, allowing the designer to simulate and study how the product will behave.

Modern CAD/CAM/CAE practice

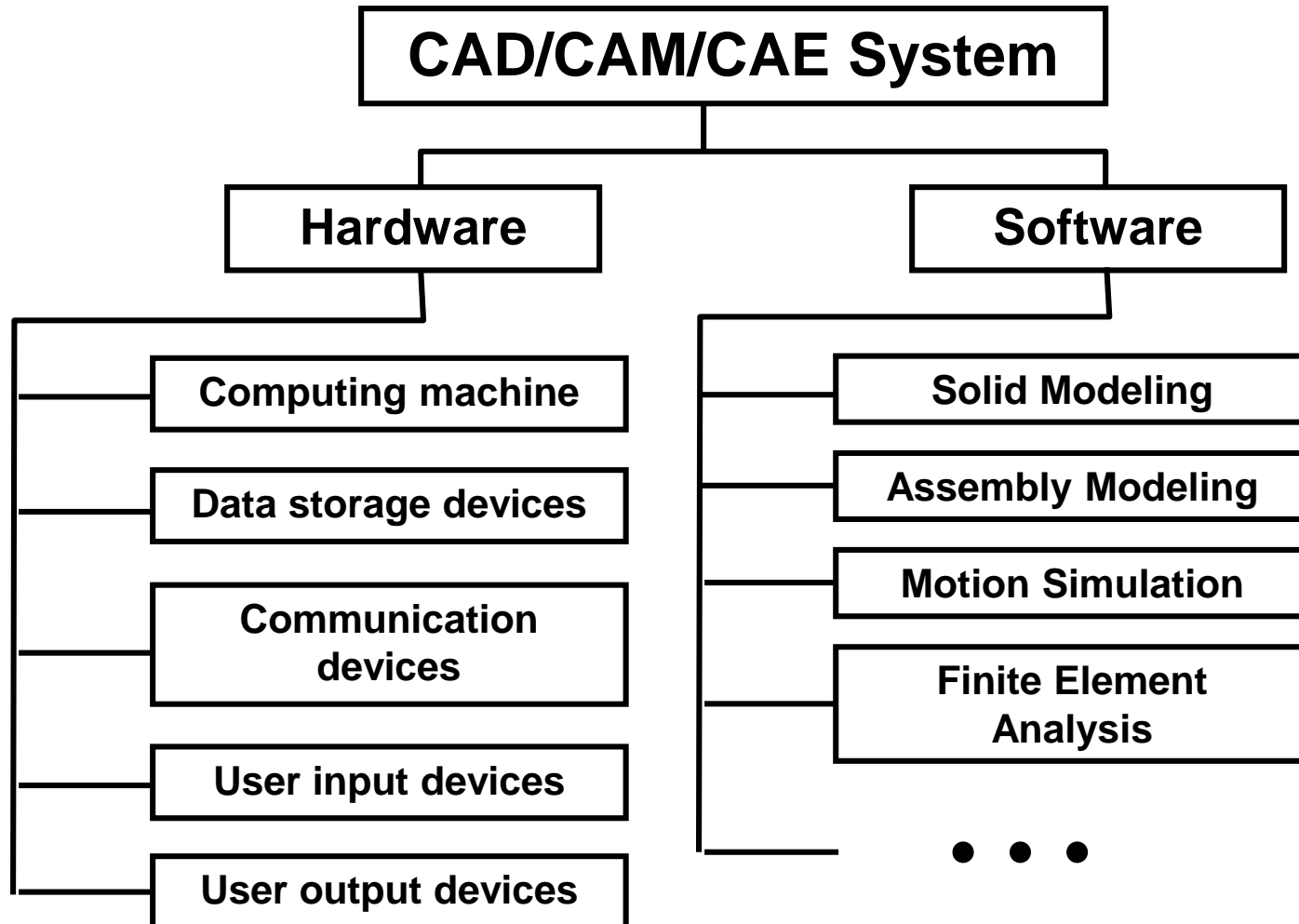
Information from all product lifecycle activities is available from a single database.



PDM and PLM

- **PDM – Product Data Management**
is the activity of storing, retrieving, and controlling the use of digital product data shared by multiple users.
- **PLM – Product Lifecycle Management**
is the strategic, integrated use of diverse software to support all product lifecycle activities of a manufacturing enterprise, from the conception of a product, through design, manufacturing, customer support, and product retirement.

Components of CAD Systems



Components of CAD Systems

- Input Devices



Image from YouTube



Image from DesignerTechniques.com – Allan Macdonald



Image from Mitutoyo (UK) Ltd



Image from YouTube

Components of CAD Systems

- Output Devices



Image from Interworld Electronics & Computer Industries Inc.



Image from InkSystem



Image from 3D Printing Geeks

Components of CAD Systems

- Integrated Input/Output Devices – Virtual Reality



Image from IGI | Blog



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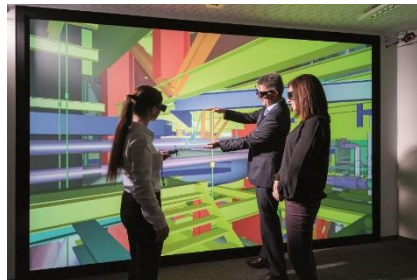


Image from Engineering.com

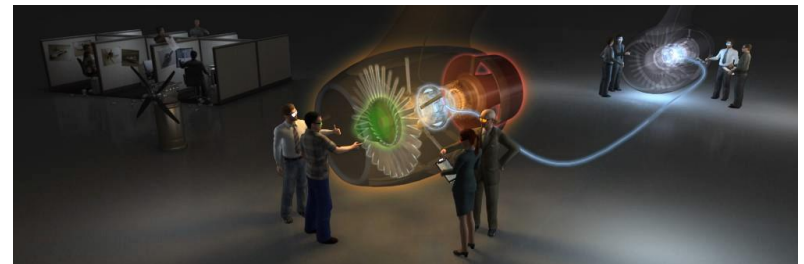


Image from Engineering.com

Components of CAD Systems

- Integrated Input/Output Devices – Virtual Reality



Image from Thomas Publishing Company

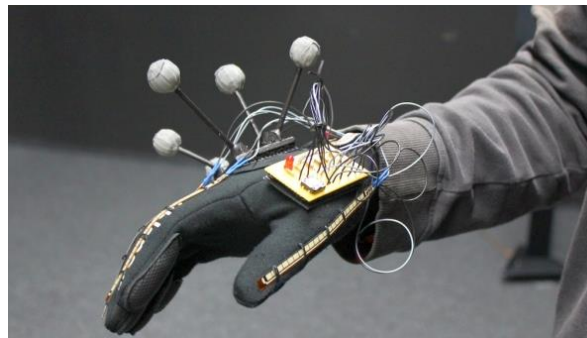


Image from AtCrux



Image from www.middlevr.com



Image from Tech Times



Image from Geomagic



Image from IndiaMART InterMESH Ltd.



Image from Thomas Hulin

SolidWorks versus other CAD software

	Drafting	Parametric Solid/Ass. Modeling	Integrated Simulation	Integrated Manufacturing
Siemens PLM NX				
Catia	●	●	●	●
Pro-Engineer				
SolidWorks				
Autodesk Inventor	●	●	●	
Solid Edge				
AutoCAD	●			

SolidWorks vs. Autodesk Inventor vs. Solid Edge

- Programs are similar but not equivalent:
 - Same class of software
 - Same types of tools available
 - Same general techniques used in each
 - Specific buttons, menus and input sequences different
 - Customer lists different
- Today vs. tomorrow
 - User interfaces will change
 - Fundamentals will stay the same

Course Goals

- Basic and Advanced Shape Modeling
- Parametric Modeling
- Working in Teams
- Advanced Top-Down Design Methodology
- Use of Solid Models for Downstream Applications
 - Design Documentation
 - Mechanism Analysis
 - Finite Element Analysis/Shape Optimization
 - Computer-Aided Manufacturing

Course Expectations

- Learning through doing (hands-on learning)
- Learning by studying theory
- Benefits from course
 - How to model products well, using state of the art CAD software
 - Understanding how computer is leveraged in design process