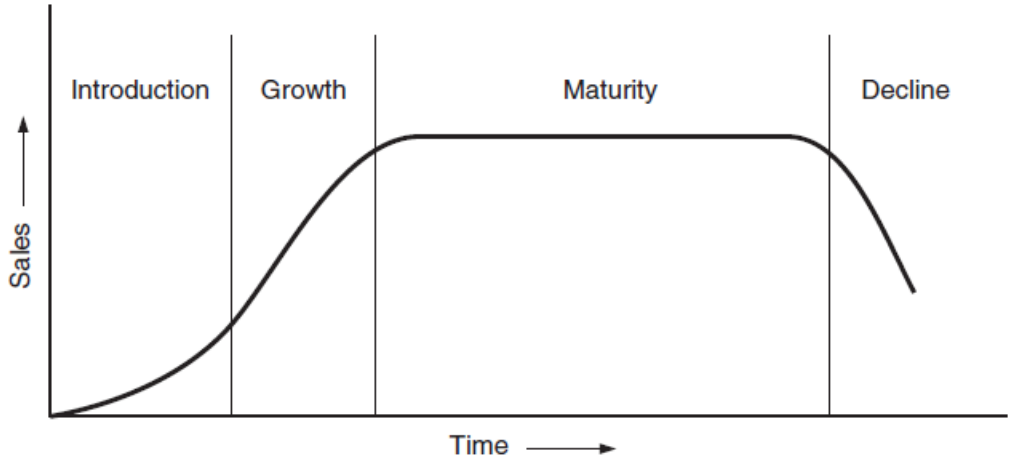
Unit no 06- Product lifecycle management and product data management

Different Phases of Product Lifecycle:

Product development represents the process where product is conceived, developed, produced and tested

Product management includes the launch efforts and all other activities that takes place after launch.



Above diagram represents a typical product lifecycle divided in four different phases of product like Introduction, growth maturity and decline.

A closer look at product lifecycle is given in below figure that explains various phases of product lifecycle compared with profits it makes.

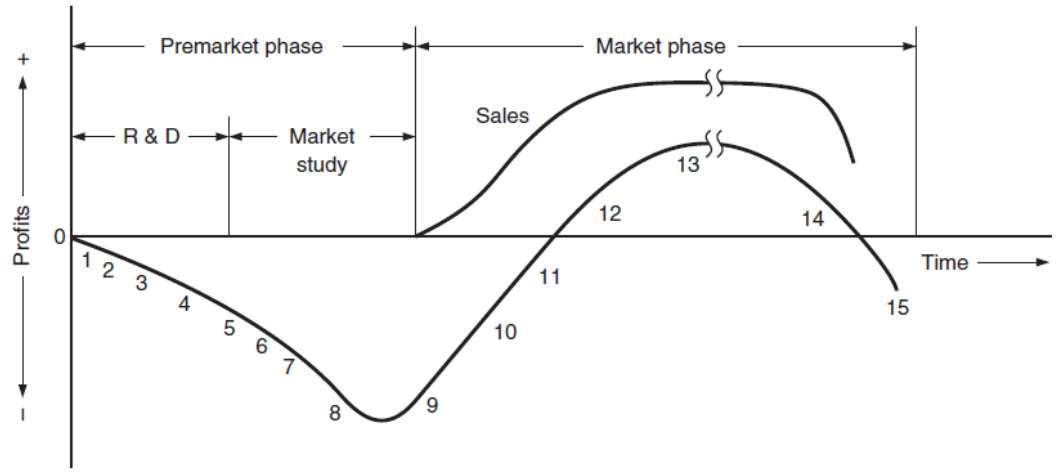


FIGURE 2.5
Expanded view of product development cycle.

In above diagram various product lifecycle phases are numbered whose detail names are in table below.

Premarket phase or new product development phase	**Market phase or post market phase of product development**
1)Idea generation	8)Product Introduction
2)Idea screening	9)Product growth
3)Concept development	10)Product Maturity
4)Business Analysis	11)Product decline
5)Prototype development	12)Product abandonment
6)Test Marketing	
7)Market Launch	

<u>Technologies related to various phases of product development</u>:

1) Idea generation-For idea generation tools like SCRAMPER can be used which stands for Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse

It is holistic way of applying critical thinking to modify ideas, concept or process that already exists

2)**Idea screening**-For idea screening following criteria are considered

Does idea achieve your objectives?

Is idea based on flawed assumptions?

Is that idea consistent with your constraints such as budget and resources?

Is the idea feasible?

How valuable is the idea?

What are risks?

3)Concept development-Common concept development techniques are brainstorming, counterfactual thinking and feasibility study.

Brainstorming is a group technique for generating ideas in a nonthreatening atmosphere. It is a group activity in which the collective creativity of the group is tapped and enhanced. The objective of brainstorming is to generate the greatest number of alternative ideas from the uninhibited responses of the group. Brainstorming is most effective when it is applied to specific rather than general problems. It is frequently used in the problem definition phase and solution-finding phase of problem solving.

Cause –Effect diagram:

The cause-and-effect diagram, also called the fishbone diagram (after its appearance), or the Ishikawa diagram (after its originator), is a powerful graphical way of identifying the factors that cause a problem. It is used after the team has collected data about possible causes of the problem which finally converges to most probable root cause of problem

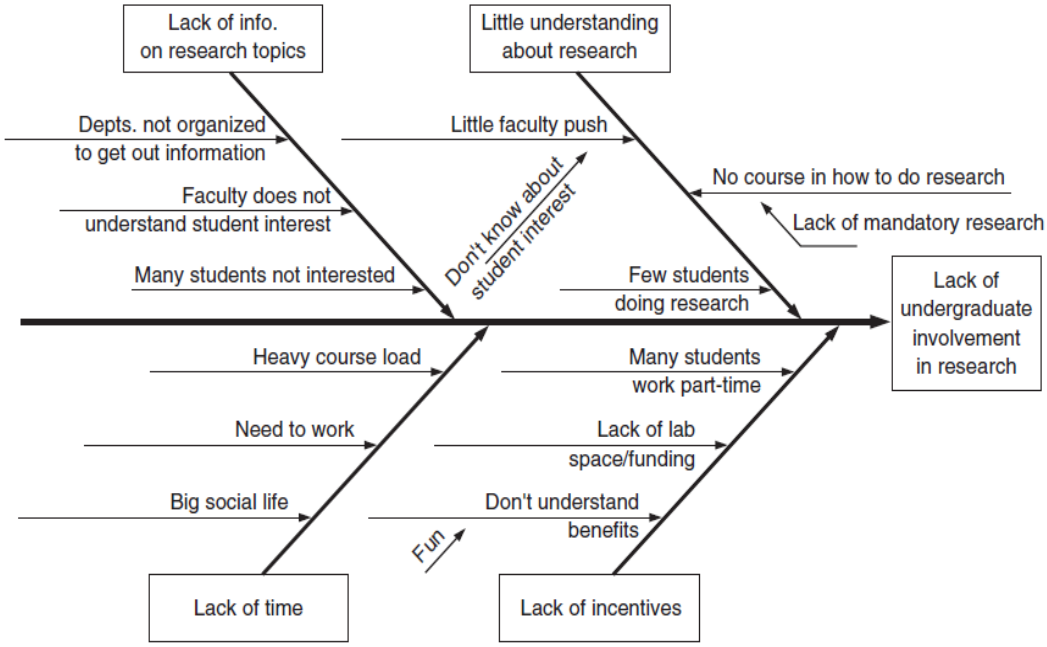


FIGURE 4.2
Cause-and-effect diagram for lack of undergraduate student involvement in research.

4)Business Analysis:

It is the practice of developing knowledge, measurements and evaluations and plans for organizations. It involves research on cost strategy, development of measurement matrices, calculation of Return on Investment (ROI), sales forecasting.

5)Prototype development-Tools like 3D printing and various additive manufacturing processes like SLS(selective Laser sintering) PDM(Powder Deposition Molding) are used in prototype development .It is done to check form ,fit and function of product

6)Test Marketing: Online tools such as Google Insight, Google Trends, and Google keyword planner can give you how often people are searching for specific term or you can make actual prototype to take feedback from class of customers.

7) Product launch: launching a new product is a huge responsibility; you can get help from various product launch tools. They can help you automate and streamline your processes to

create a buzz for your product with minimum effort on social media. Example Like Trello, Drift

Product Lifecycle Management (PLM)

In today's competitive global market, enterprises must possess the capability to design and deliver innovative products with great value to customer in timely manner. Every enterprise must understand its core competency .All industry partners associated with product or services should align their processes such that it creates value for customers. All Industry partners must align their business models to achieve common objectives. Product lifecycle management enables all activities in value chain to operate more efficiently. PLM is a strategic business approach that applies a consistent set of business solutions in support of the collaborative creation, management, dissemination of product information across the extended enterprise from the concept to the end of product life.-Integrating people, processes ,business systems, information,

There are three major subsystems to PLM.

1**) Product data management (PDM) software** provides a link between product design and manufacturing. It provides control of design databases (CAD models, drawings, BOM, etc. in terms of check-in and check-out of the data to multiple users, carrying out engineering design changes, and control of the release of all versions of component and assembly designs. Because data security is provided by the PDM system, it is possible to make the design data available electronically to all authorized users along the product development chain. Most CAD software has a built-in PDM functionality. PDM reduces time to market, It improves design and manufacturing accuracy Data integrity is safeguarded with PDM software and it manages engineering change effectively. Product data management (PDM) tools have been used for some time by manufacturing companies such as Mercedes-Benz and Ford to manage the data and documents accumulated in the design of their products

PDM process:

2) Manufacturing process management (MPM) bridges the gap between product design and production control. It includes such technologies as computer-aided process planning (CAPP), computer-aided manufacturing (NC machining and direct numerical control), and computer-aided quality assurance (FMEA, SPC, and tolerance stack up analysis). It also includes production planning and inventory control using materials requirements planning software (MRP and MRP II).

3) Customer relationship management (CRM) software provides integrated support to marketing, sales, and the customer service functions. It provides automation of the basic customer contact needs in these functional areas, but it also provides analytical capabilities for the data collected from customers to provide information on such issues as market segmentation, measures of customer satisfaction, and degree of customer retention.

There are 11 key functions of PLM

1)Documentation and content management 2)Engineering change process management 3)Collaborative product design, 4)Bill of materials management 5)Supply chain integration 6)Part classification management system 7)Product service management 8)Program and project management 9)Product portfolio management(PPM) and analysis 10)Data authoring and analysis 11)Digital manufacturing

Examples of PLM software available in market:

1)Windchill by PTC

2)Teamcentre siemens

3)AutoDesk valut by Autodesk

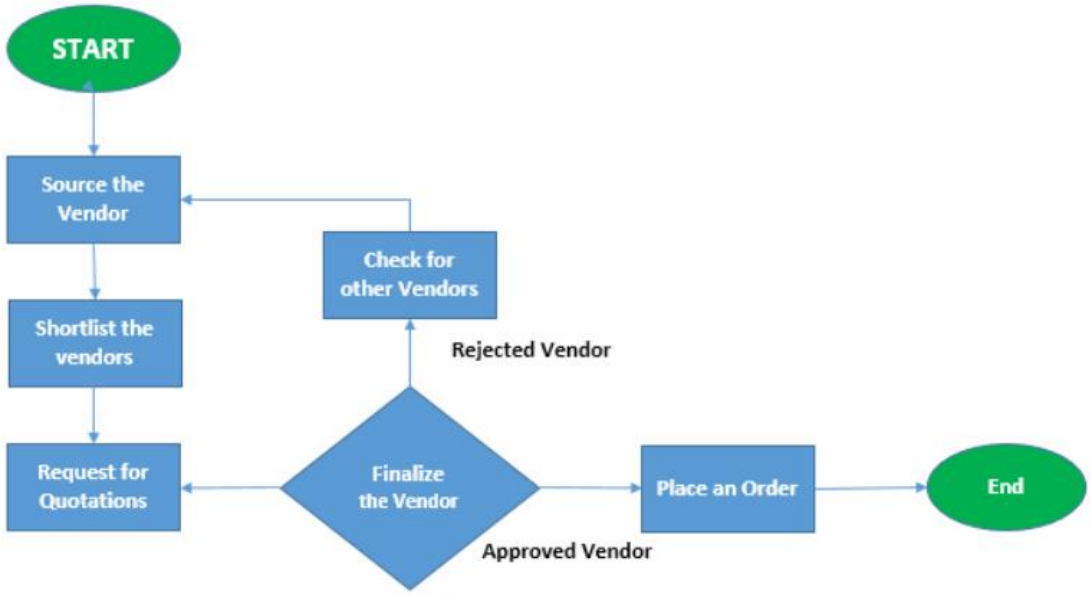
Product workflow:

A workflow consists of and repeatable pattern of activity, enabled by the systematic organization of resources into processes that transform materials or provide services or process information.

Practical Examples of workflow are: In machine shops, particularly job shops and flow shops, the flow of a part through the various processing stations is a workflow.

Insurance claims processing is an example of an information-intensive, document-driven workflow.

A simple workflow process of purchase department is shown in below diagram



A Product workflow diagram (also known as a workflow) provides a graphic overview of the business process. Using standardized symbols and shapes, the workflow shows step by step how your work is completed from start to finish. It also shows who is responsible for work at what point in the process.

A good product workflow ensures improved productivity, reduced error, less stress and quality consistent systems .Process is something that exists naturally and flows intuitively. A workflow is analyzed, planned, modeled and automated consciously and with well-defined purpose. Continually analyzing, modeling, and improving product to be more efficient and effective is a great way to make companies more profitable.

Link between product data and product workflow

PDMs have been successfully employed to control the data and documents emerging from the creative and collaborative stages of product design (e.g. CAD/CAM) where product structures tend to be hierarchical in nature and when access to documents needs to be controlled between groups of designers. However, although PDM systems provide good support for product documents and data particularly at the early stages of design, their use in supporting the unstructured processes inherent in product development is somewhat limited. Also PDM systems provide few facilities for activity definition and no facilities for the enactment of production activities.

Workflow management systems allow managers to coordinate and schedule the activities of organisations to optimise the flow of information or operations between the resources of the organisation

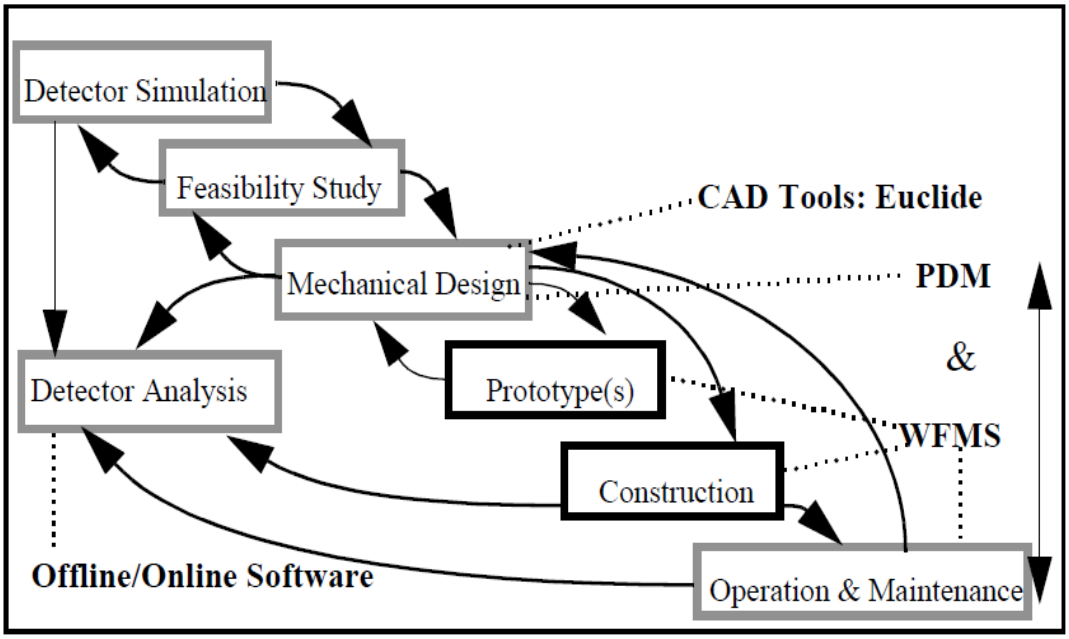


Figure 1 A typical product development lifecycle showing the role of CAD/ CAM tools, a PDM and a Workflow Management System (WFMS).

PDM can manage the definitions of the product and workflow data and the Workflow software can cater for the instantiation, scheduling and enactment of those definitions.

Above figure shows a product development lifecycle showing the role of CAD tools like Euclide and PDM system with Workflow management system (WFMS)

References:

1)Product design book by Kevin Otto and Kristin woods

2)Engineering Design by George E Dieter

3)Product Design and development by Karl T Ulrich and Steven Eppinger

4) The Integration of Product Data and Workflow Management Systems in a Large Scale Engineering Database Application
R McClatchey1, Z Kovacs, F Estrella1, J-M Le Goff, G. Chevenier, N Baker1, S Lieunard, S Murray, T Le Flour & A Bazan

5) Various Web sources

Note-These notes are prepared for subject of Product Design Development (PDD) as per syllabus of University of Pune .

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