SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE NAME: 19OE116 - PRODUCT DESIGN AND DEVELOPMENT

III YEAR / VI SEMESTER

Unit 1 - INTRODUCTION

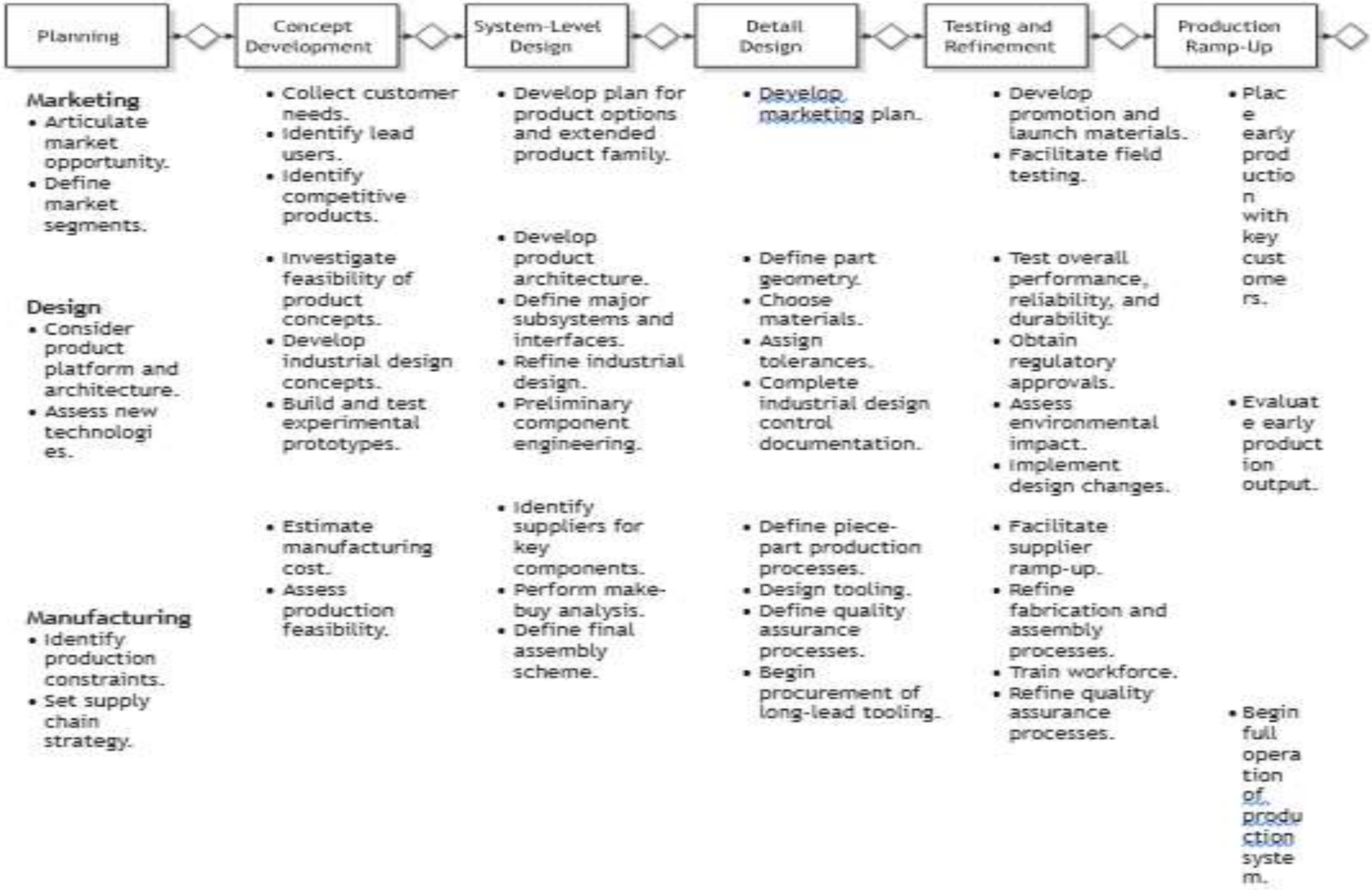
Topic 8 – Generic product development process

A process is a sequence of steps that transforms a set of inputs into a set of outputs

A product development process is the sequence of steps or activities that an enterprise employs to conceive, design, and commercialize a product

A well-defined development process is useful for the following reasons:

- Quality assurance
- Coordination
- Planning
- Management
- Improvement


Planning
Concept Development
System-Level Design
Detail Design
Testing and Refinement
Production Ramp-Up
Marketing
• Articulate market opportunity.
• Define market segments.
Design
• Consider product platform and architecture.
• Assess new technologies.
Manufacturing
• Identify production constraints.
• Set supply chain strategy.
• Collect customer needs.
• Identify lead users.
• Identify competitive products.
• Investigate feasibility of product concepts.
• Develop industrial design concepts.
• Build and test experimental prototypes.
• Estimate manufacturing cost.
• Assess production feasibility.
• Develop plan for product options and extended product family.
• Develop product architecture.
• Define major subsystems and interfaces.
• Refine industrial design.
• Preliminary component engineering.
• Identify suppliers for key components.
• Perform make-buy analysis.
• Define final assembly scheme.
• Develop marketing plan.
• Define part geometry.
• Choose materials.
• Assign tolerances.
• Complete industrial design control documentation.
• Define piece-part production processes.
• Design tooling.
• Define quality assurance processes.
• Begin procurement of long-lead tooling.
• Develop promotion and launch materials.
• Facilitate field testing.
• Test overall performance, reliability, and durability.
• Obtain regulatory approvals.
• Assess environmental impact.
• Implement design changes.
• Facilitate supplier ramp-up.
• Refine fabrication and assembly processes.
• Train workforce.
• Refine quality assurance processes.
• Place early production with key customers.
• Evaluate early production output.
• Begin full operation of production system.

Planning: The planning activity is often referred to as “phase zero” because it precedes the project approval and launch of the actual product development process

This phase begins with opportunity identification guided by corporate strategy and includes assessment of technology developments and market objectives

The output of the planning phase is the project mission statement, which specifies the target market for the product, business goals, key assumptions, and constraints

Concept development:

In the concept development phase, the needs of the target market are identified, alternative product concepts are generated and evaluated, and one or more concepts are selected for further development and testing.

A concept is a description of the form, function, and features of a product and is usually accompanied by a set of specifications, an analysis of competitive products, and an economic justification of the project.

System-level design:

The system-level design phase includes the definition of the product architecture, decomposition of the product into subsystems and components, preliminary design of key components, and allocation of detail design responsibility to both internal and external resources.

Initial plans for the production system and final assembly are usually defined during this phase as well.

The output of this phase usually includes a geometric layout of the product, a functional specification of each of the product's subsystems, and a preliminary process flow diagram for the final assembly process.

Detail design:

The detail design phase includes the complete specification of the geometry, materials, and tolerances of all of the unique parts in the product and the identification of all of the standard parts to be purchased from suppliers.

A process plan is established and tooling is designed for each part to be fabricated within the production system.

Detail design:

The output of this phase is the control documentation for the product, the drawings or computer files describing the geometry of each part and its production tooling, the specifications of the purchased parts, and the process plans for the fabrication and assembly of the product.

Three critical issues that are best considered throughout the product development process, but are finalized in the detail design phase, are materials selection, production cost, and robust performance.

Production ramp-up:

In the production ramp-up phase, the product is made using the intended production system.

The purpose of the ramp-up is to train the workforce and to work out any remaining problems in the production processes.

Products produced during production ramp-up are sometimes supplied to preferred customers and are carefully evaluated to identify any remaining flaws.

The transition from production ramp-up to ongoing production is usually gradual.

Production ramp-up:

At some point in this transition, the product is launched and becomes available for widespread distribution.

A postlaunch project review may occur shortly after the launch.

This review includes an assessment of the project from both commercial and technical perspectives and is intended to identify ways to improve the development process for future projects.

Concept Development: The Front-End Process:

. Identifying customer needs

. Establishing target specifications

. Concept generation

. Concept selection

. Concept testing

. Setting final specifications:

. Project planning

. Economic analysis

. Benchmarking of competitive products

Thank You...