Context of Software Product Design

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Objectives

- To explain how markets influence product types, which in turn influence design
- To explain the product planning process
- To describe the role and contents of a project mission statement
- To list the variety of software requirements specifications
- To describe the role and contents of an SRS

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Topics

- Markets and product categories
- Product planning
- Project mission statements
- Software requirements specifications
- Types of software requirements

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Markets

A **market** is a set of actual or prospective customers who need or want a product, have the resources to exchange something of value for it, and are willing to do so.

Organizations study markets to

- Choose which markets to sell to (**target markets**)
- Choose what products to develop
- Determine product features and characteristics

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Product Categories

- A **product category** is a dimension along which products may differ, for example
  - Target market size
  - Product line novelty
  - Technological novelty
- Product categories help managers
  - Choose target markets
  - Choose products to develop
  - Choose product characteristics
- A product's place in a category influences its design specifications and the design process

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Product Plans

- Management must decide which products to develop.
- This decision is documented in a product plan.

A **product plan** is a list of approved development projects, with start and delivery dates.

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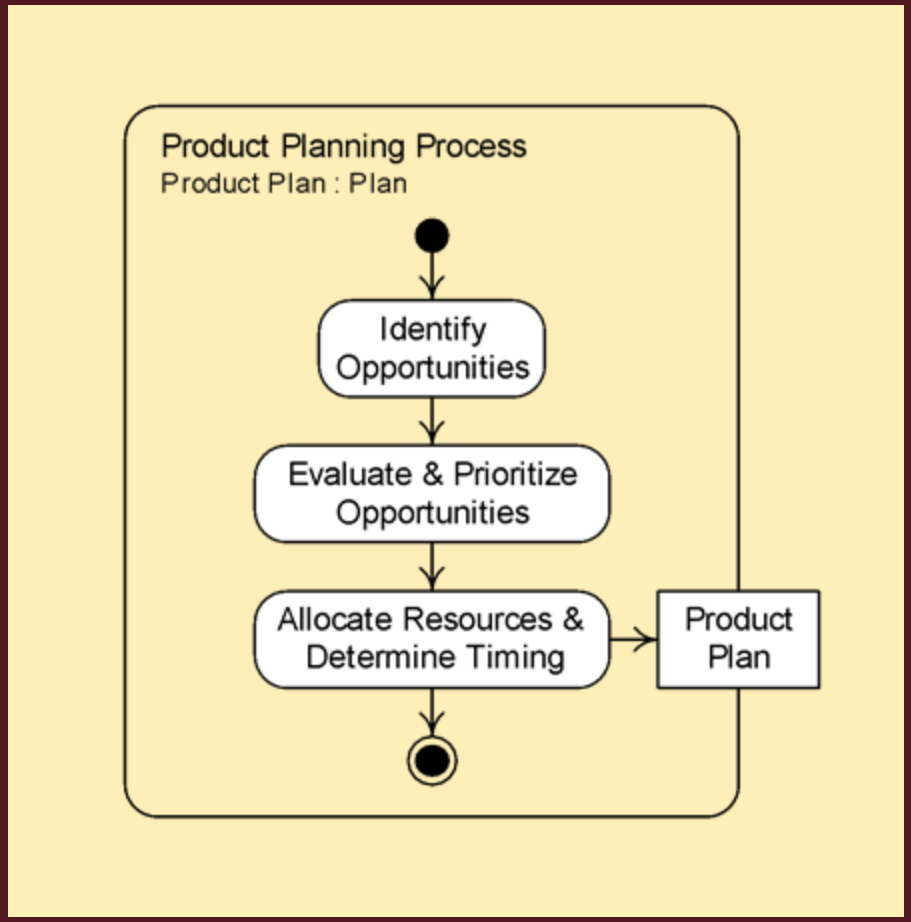
Product Planning Process



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Identifying Opportunities

- New product ideas come from
  - Customers
  - Developers
  - Entrepreneurs
  - Marketers
- An **opportunity funnel** is a mechanisms for collecting product ideas from diverse sources.
  - Passive channels
  - Active channels
- An **opportunity statement** is a brief description of a product development idea.

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Evaluating and Prioritizing Opportunities

- Management chooses to pursue opportunities based on
  - Competitive strategy
  - Market segmentation
  - Technology trajectories
  - Software reuse
  - Profitability
- Managers attempt to form a well-balanced and complete product portfolio.

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Alocating Resources and Determining Timing

- Usually there are more good opportunities than an organization can afford to pursue.
- Resources available for development are analyzed to determine which product to develop.
- Resource availability also determines the start time and duration or projects.
- The result is a product plan.

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Project Mission Statement

A **project mission statement** is a document that defines a development project's goals and limits.

- A project mission statement
  - Launches a development project
  - States the software design problem
- The project mission statement is the main input to the product design process.

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Project Mission Statement Template

1. Introduction
2. Product Vision and Project Scope
3. Target Markets
4. Stakeholders
5. Assumptions and Constraints
6. Business Requirements

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Introduction, Vision, and Scope

- The introduction contains background information to provide context.
- A **product vision statement** is a general description of the product's purpose and form.
- The **project scope** is the work to be done on a project.
  - Often only part of the product vision.
  - May list what will *not* to be done as well as what will be done.

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Target Market and Stakeholders

- A **stakeholder** is anyone affected by a product or involved in or influencing its development.
  - Product users and purchasers
  - Developers and their managers
  - Marketing, sales, distribution, and product support personnel
  - Regulators, inspectors, and lawyers
- Developers must know the target market and stakeholders to build a product satisfying stakeholders' needs.

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Assumptions and Constraints

- An **assumption** is something that developers take for granted.
  - Feature of the problem
  - Examples: target deployment environments, levels of user support
- A **constraint** is any factor that limits developers.
  - Restriction on the solution
  - Examples: cost and time limits, conformance to regulations

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Business Requirements

A **business requirement** is a statement of a client or development organization goal that a product must meet.

- Time, cost, quality, or business results
- Should be stated so that it is clear whether it is satisfied (quantitative goals)
- Broad goals related to business, not detailed product specifications

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Requirements Engineering

Requirements engineering is creating, modifying, and managing requirements over a product's lifetime.

- **Requirements development** is the portion of requirements engineering concerned with initially establishing requirements (aka product design).
- **Requirements management** is the portion of requirements engineering concerned with controlling and propagating requirements changes.

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SRS

A **software requirements specification (SRS)** is a document cataloging all the requirements for a software product.

- The SRS should contain
  - A statement of the product design problem (may cite the mission statement)
  - A solution to the product design problem
- An SRS is the output of the produce design process.

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Technical Requirements

A **technical requirement** is a statement of a feature, function, capability, or property that a product must have (that is not a business requirement).

- A **functional requirement** is a statement of how a program must map program inputs to program outputs.
- A **non-functional requirement** is a statement that a software product must have certain properties.
- A **data requirement** is a statement that certain data must be input to, output from, or stored by a product.

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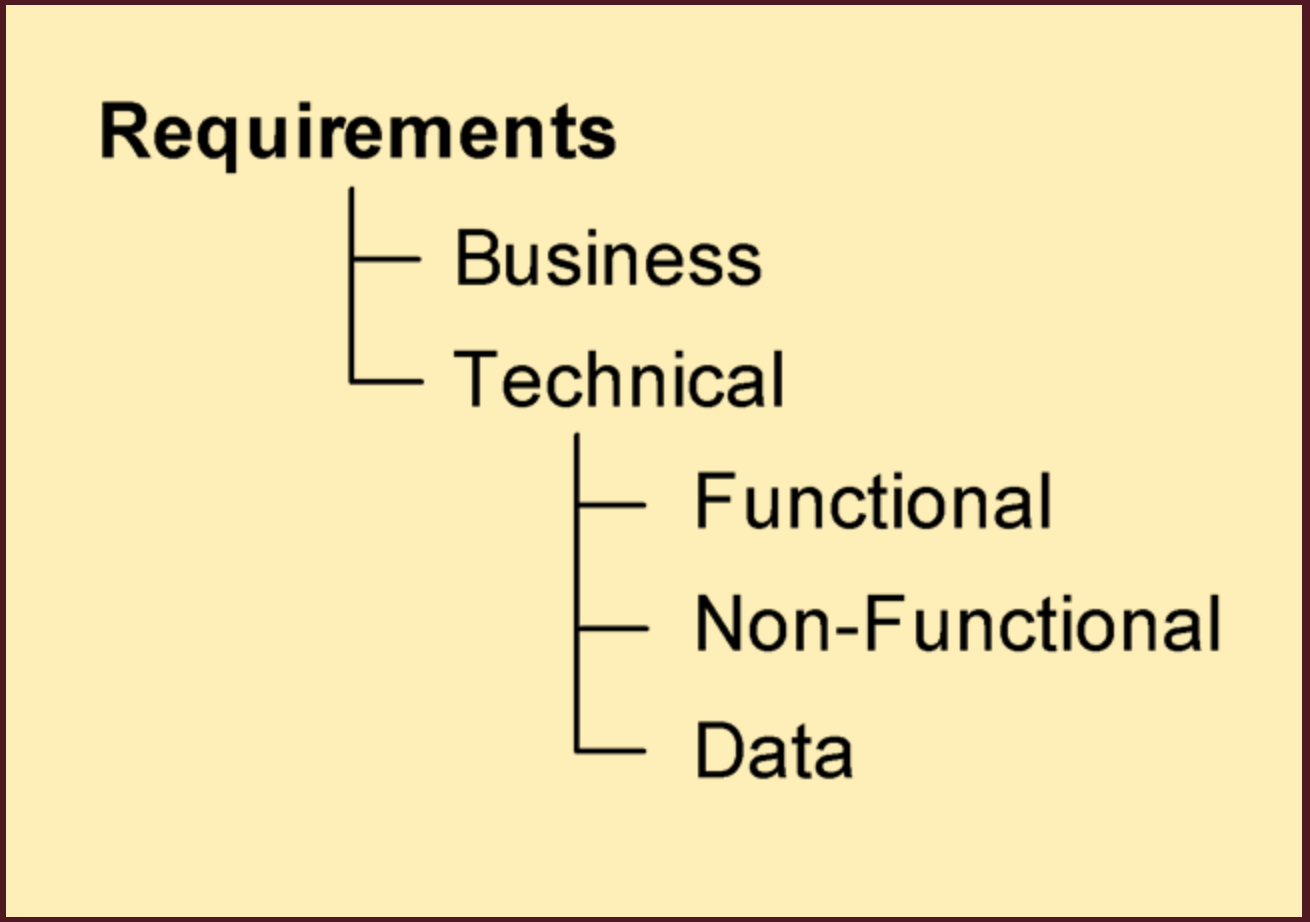
Requirements Taxonomy



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Levels of Abstraction

- A **user-level requirement** is statement about how a product must support stakeholders in achieving their goals or tasks.
- An **operational-level requirement** is a statement about inputs, outputs, operations, characteristics, etc. that a product must provide, without reference to physical realization.
- A **physical-level requirement** is a statement about the physical form of a product, its physical interfaces, or its data formats.

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Interaction Design

- **Interaction design** is the activity of specifying products that people can use effectively and enjoyably.
  - Dialog design—The dynamics of the interaction
  - Physical form design—The static characteristics and appearance of the interface (presentation)
- Interaction design should be part of requirements development.

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SRS Template

1. Product Description
   - 1.1 Product Vision
   - 1.2 Business Requirements
   - 1.3 Users and Other Stakeholders
   - 1.4 Project Scope
   - 1.5 Assumptions
   - 1.6 Constraints
2. Functional Requirements
3. Data Requirements
4. Non-Functional Requirements
5. Interface Requirements
   - 5.1 User Interfaces
   - 5.2 Hardware Interfaces
   - 5.3 Software Interfaces

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Summary

- Markets influence product development decisions; product types influence product design.
- Management performs a product planning process to produce a product plan listing development projects.
- Projects are launched with a project mission statement that frames the product design problem.
- The output of product design is an SRS that contains functional, non-functional, and data requirements stated at several levels of abstraction.
- An interaction design is an essential part of an SRS.

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