System Development Life Cycle

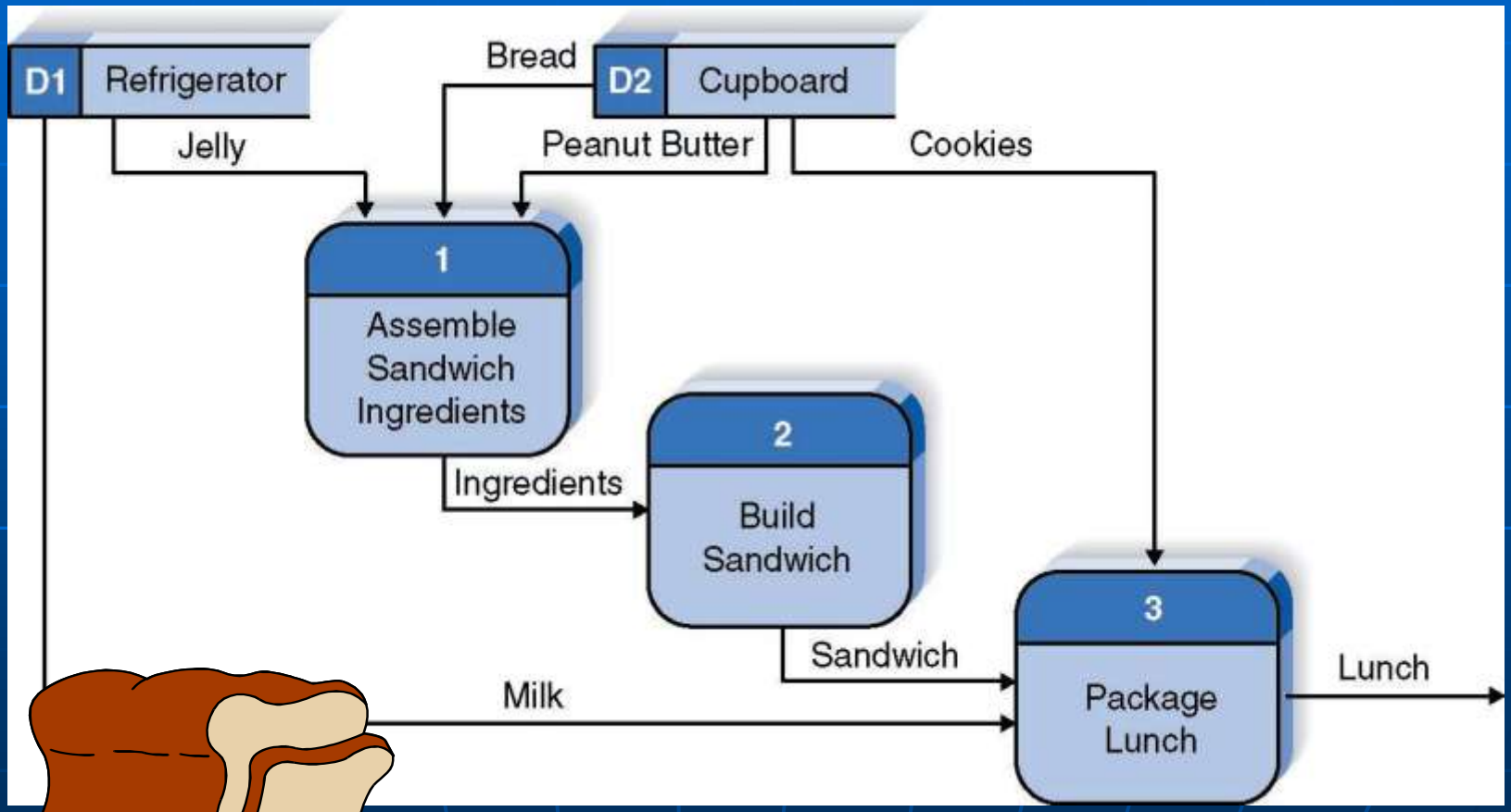
Major Attributes of the Life Cycle

- The Project
  - Moves systematically through phases where each phase has a standard set of outputs
  - Produces project deliverables
  - Uses deliverables in implementation
  - Results in actual information system
  - Uses *gradual refinement*

Project Phases

- Planning (Why build the system? How should the team go about building it?)
- Analysis (Who uses system, what will it do, where and when will the system be used?)
- Design (How will the system work?)
- Implementation (System delivery)

Simple Process of Making Lunch



Planning

- Identifying business value
- Analyze feasibility
- Develop work plan
- Staff the project
- Control and direct project

Analysis

- Analysis strategy
- Gathering business requirements
- Requirements definition use cases
- Process modeling
- Data modeling

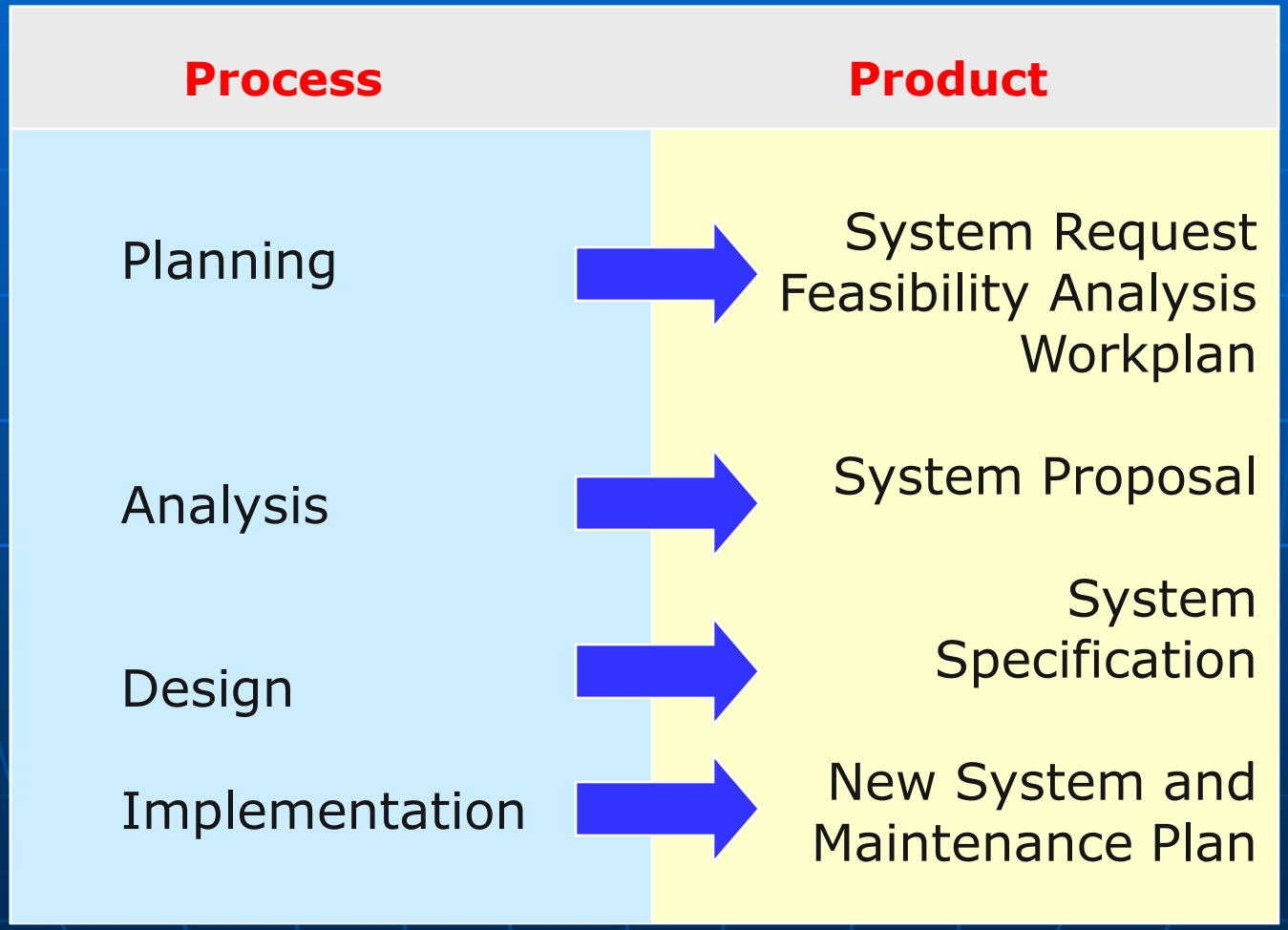
Design

- Design selection
- Architecture design
- Interface design
- Data storage design
- Program design

Implementation

- Construction
  - Program building
  - Program and system testing
- Installation
  - Conversion strategy
  - Training plan
  - Support plan

Processes and Deliverables

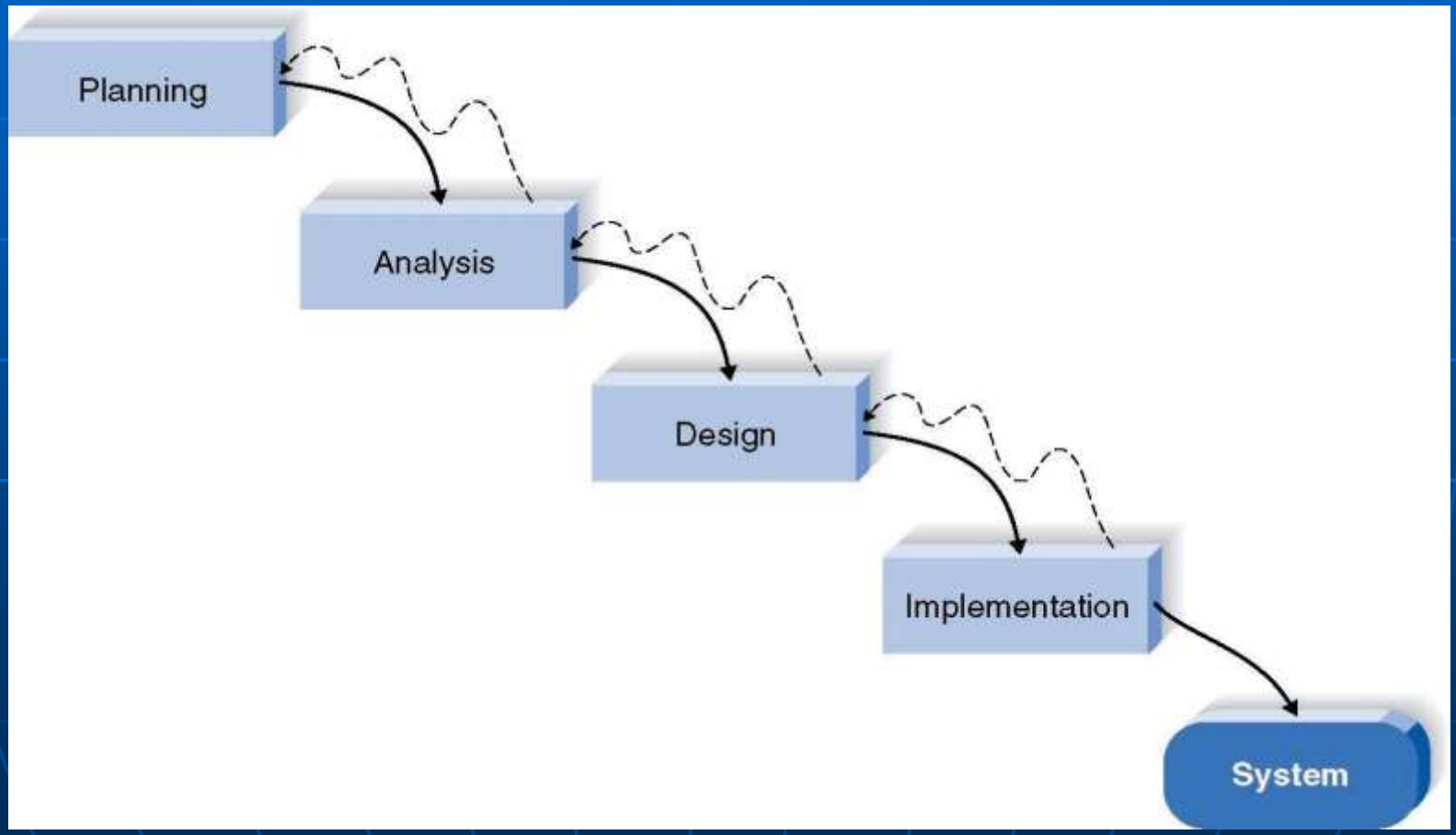


System Development Methodologies

- A formalized approach to implementing the SDLC
  - A series of steps and deliverables
- Methodology Categories

- Process-Centered
- Data-Centered
- Object-Oriented
- Structured Design
- Rapid Application Development
- Agile Development

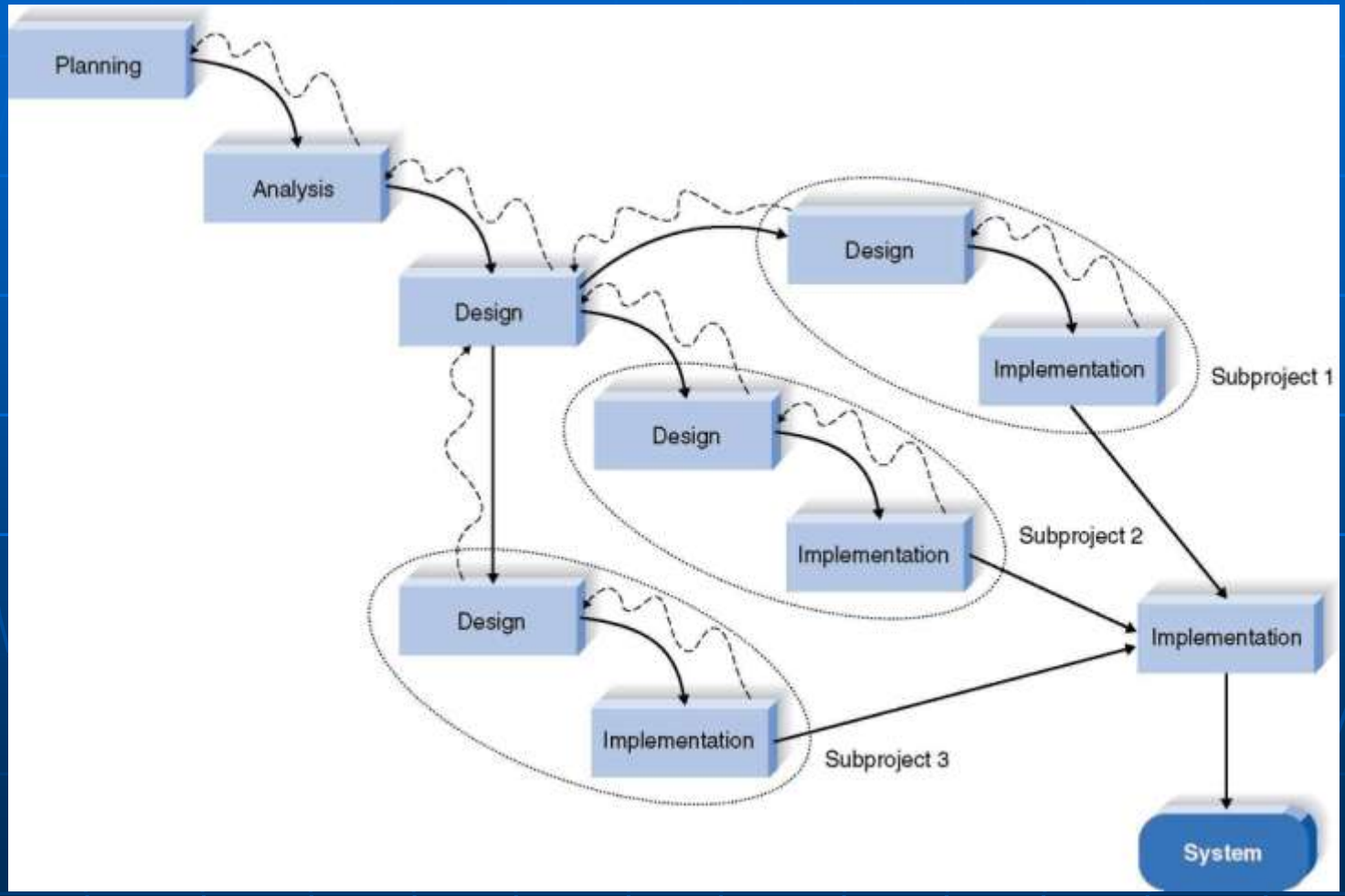
Waterfall Development Methodology



Pros and Cons of the Waterfall Methodology

Pros	Cons
Identifies systems requirements long before programming begins	Design must be specified on paper before programming begins
Minimizes changes to requirements as project progresses	Long time between system proposal and delivery of new system

Parallel Development Methodology



Pros and Cons of Parallel Development Methodology

Pros	Cons
Reduces Schedule Time	Still Uses Paper Documents
Less Chance of Rework	Sub-projects May Be Difficult to Integrate

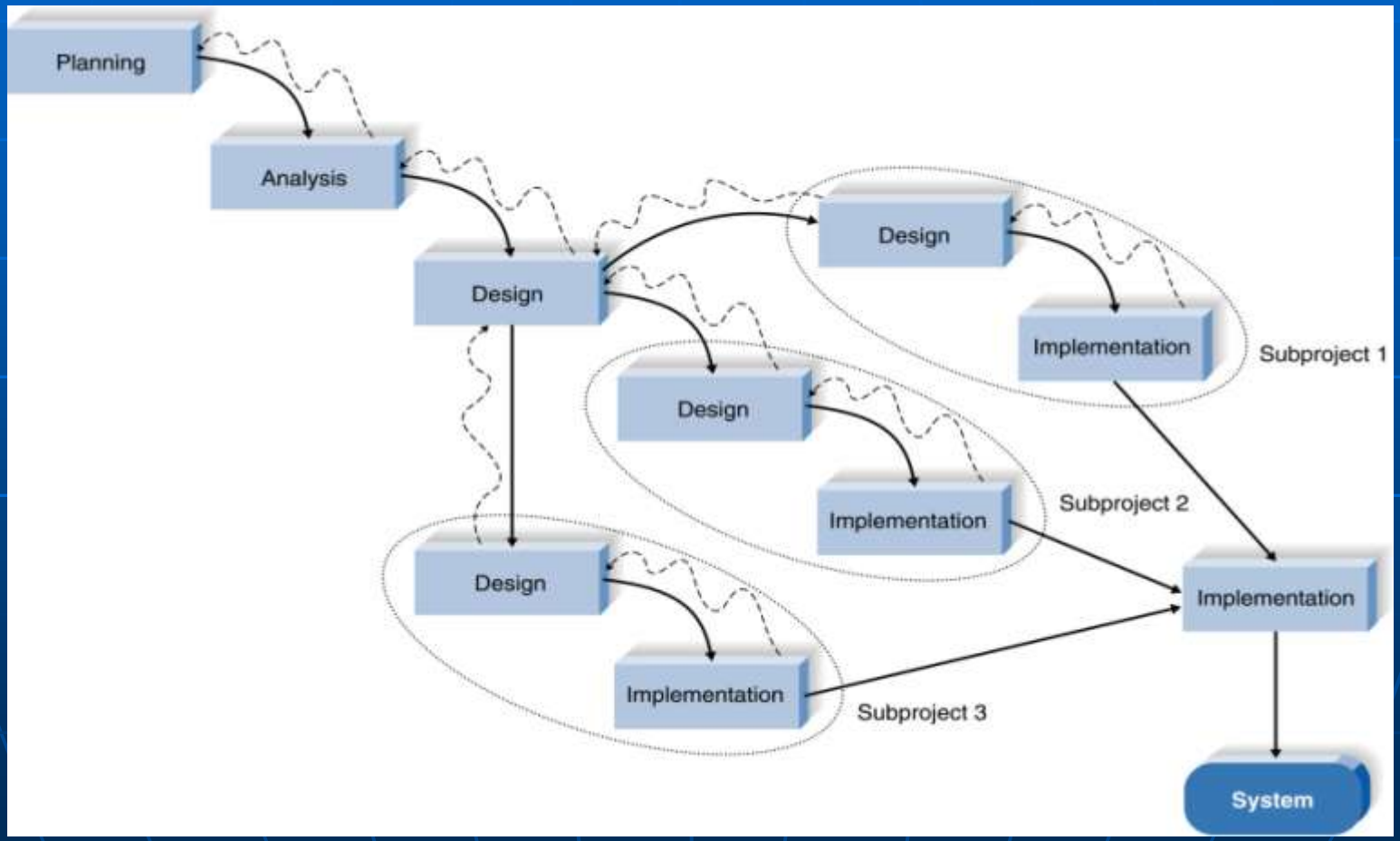
Rapid Application Development

- Incorporate special techniques and tools:
  - CASE tools
  - JAD sessions
  - Fourth generation/visualization programming languages
  - Code generators

Three RAD Categories

- Phased development
  - A series of versions developed sequentially
- Prototyping
  - System prototyping
- Throw-away prototyping
  - Design prototyping

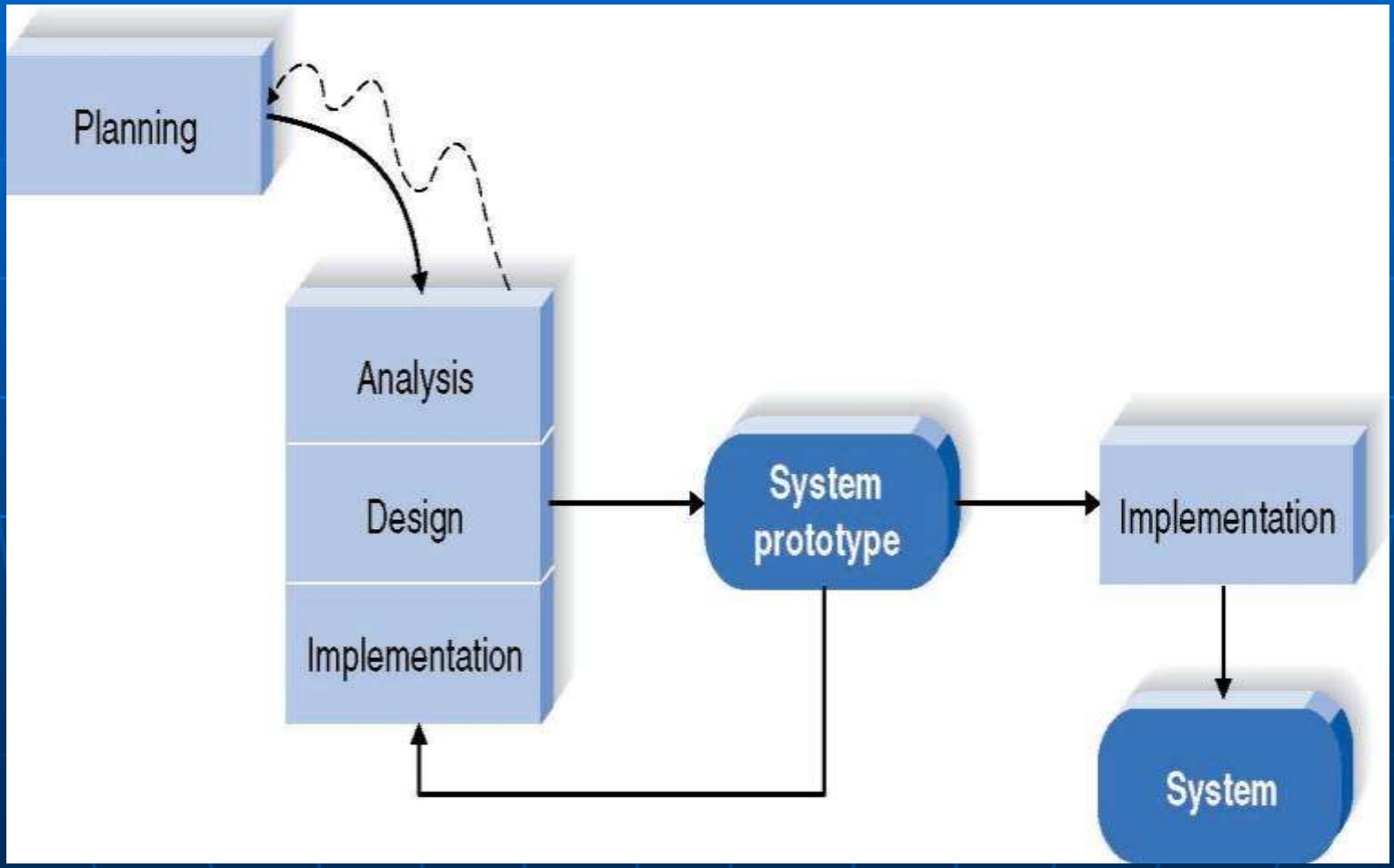
Phased Development Methodology



Pros and Cons of Phased Development Methodology

Pros	Cons
Users Get a System To Use Quickly	Users Work with a System that is Intentionally Incomplete
Users Can Identify Additional Needs For Later Versions	

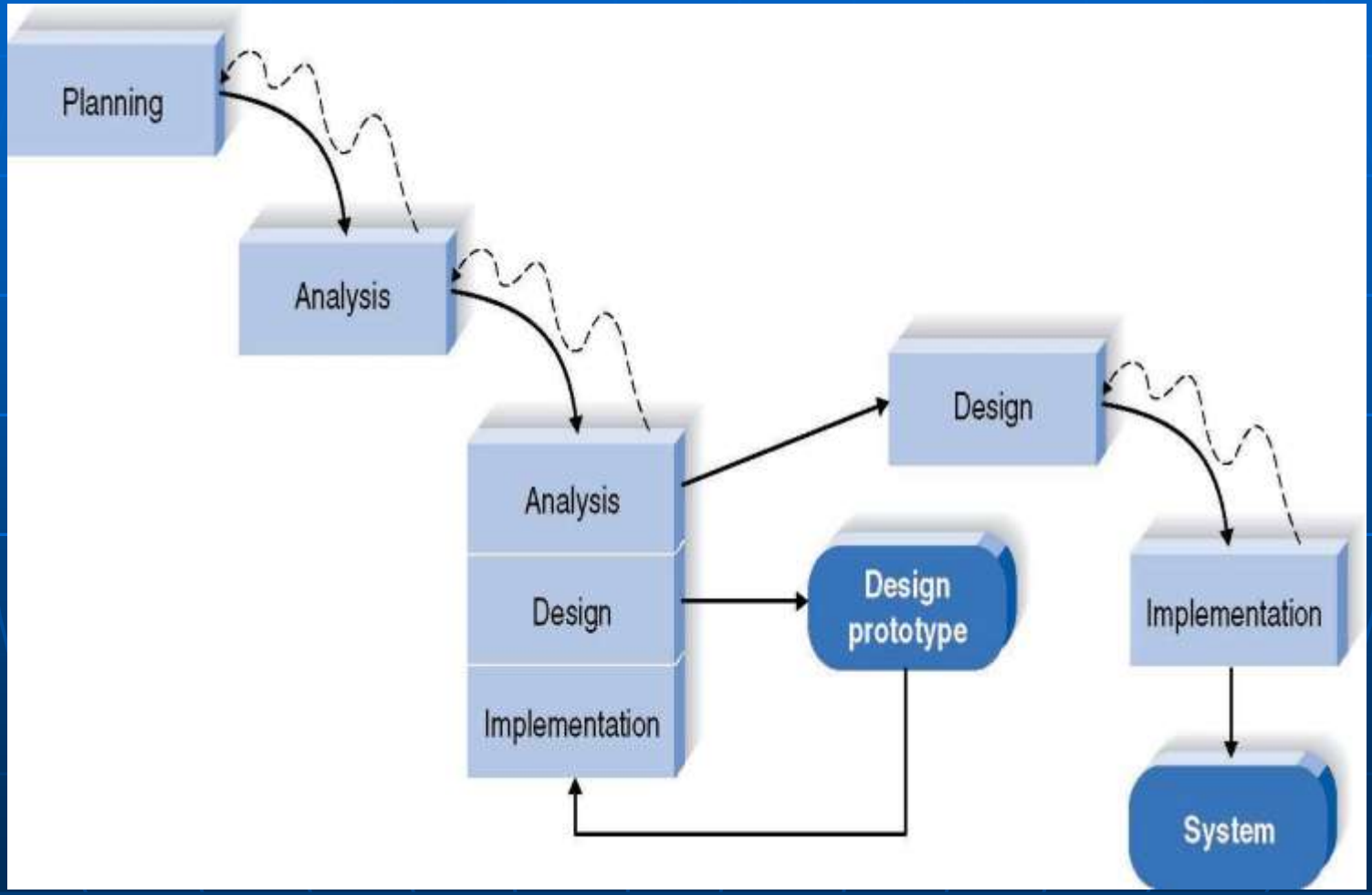
How Prototyping Works



Pros and Cons of Prototyping Methodology

Pros	Cons
Users Interact with Prototype Very Quickly	Tendency to do Superficial Analysis
Users Can Identify Needed Changes And Refine Real Requirements	Initial Design Decisions May Be Poor

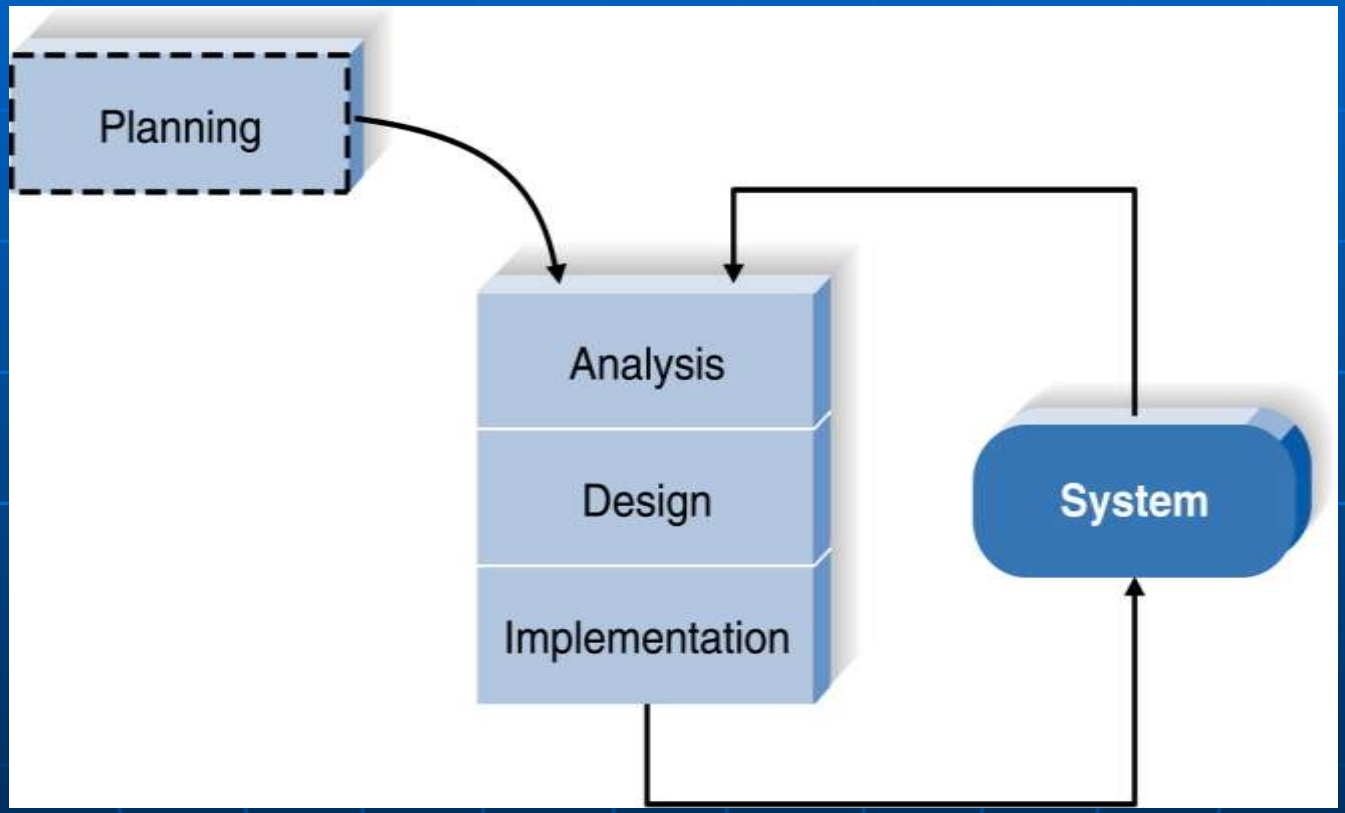
Throwaway Prototyping



Pros and Cons of Throwaway Prototyping Methodology

Pros	Cons
Risks are Minimized	May Take Longer Than Prototyping
Important Issues are Understood Before the Real System is Built	

Agile Development: Extreme Programming



Pros and Cons of Agile Methodologies

Pros	Cons
Fast Delivery of Results	Requires Discipline
Works Well in Projects With Undefined or Changing Requirements	Works Best in Small Projects
	Requires Much User Input

Criteria for Selecting the Appropriate Methodology

- Clear user requirements
- Familiarity with technology
- Complexity of system
- Reliability of system
- Time schedule
- Schedule visibility

Team Roles and Skills

Information Systems Roles

- Business analyst
- Systems analyst
- Infrastructure analyst
- Change management analyst
- Project manager

Project Initiation

How Do Projects Begin?

- Business needs should drive projects.
- Project sponsor recognizes business need for new system and desires to see it implemented.
- Business needs determine the system's functionality (what it will do).
- The project's business value should be clear.

System Request

- A document describing business reasons for project and system's expected value.
- Lists project's key elements
  - Project sponsor
  - Business need
  - Business requirements
  - Business value
  - Special issues or constraints

System Request Examples

- Project sponsor – VP of Marketing
- Business need – Reach new customers and improve service to existing customers
- Business requirements – Provide web-based shopping capability
- Business value - $750,000 in new customer sales; $1.8M in existing customer sales
- Special issues or constraints – System must be operational by holiday shopping season

Preliminary Project Acceptance

- System request is reviewed by approval committee
- Based on information provided, project merits are assessed.
- Worthy projects are accepted and undergo additional investigation – the feasibility analysis.

Feasibility Analysis

Feasibility Analysis

- Detailed business case for the project
  - Technical feasibility
  - Economic feasibility
  - Organizational feasibility
- Compiled into a feasibility study
- Feasibility is reassessed throughout the project

Technical Feasibility: *Can* We Build It?

- Users' and analysts' familiarity with the business application area
- Familiarity with technology
  - Have we used it before? How new is it?
- Project size
  - Number of people, time, and features
- Compatibility with existing systems

Economic Feasibility
Should We Build It?

- Identify costs and benefits
- Assign values to costs and benefits
- Determine cash flow
- Assess financial viability
  - Net present value
  - Return on investment
  - Break even point

Identify Costs and Benefits

	Costs	Benefits
Tangible	* * *	* * *
Intangible	* * *	* * *

Assign Cost and Benefit Values

- Difficult, but essential to estimate
- Work with people who are most familiar with the area to develop estimates
- Intangibles should also be quantified
- If intangibles cannot be quantified, list and include as part of supporting material

Assess Financial Viability –

Net Present Value

Net Present Value

The Net Present Value of a proposed investment is the sum of all the project's cashflows discounted to present values.

$$NPV = \sum_{t=1}^{n} \frac{FV_t}{(1+r)^t}$$

A positive NPV indicates that the investment is worthwhile.

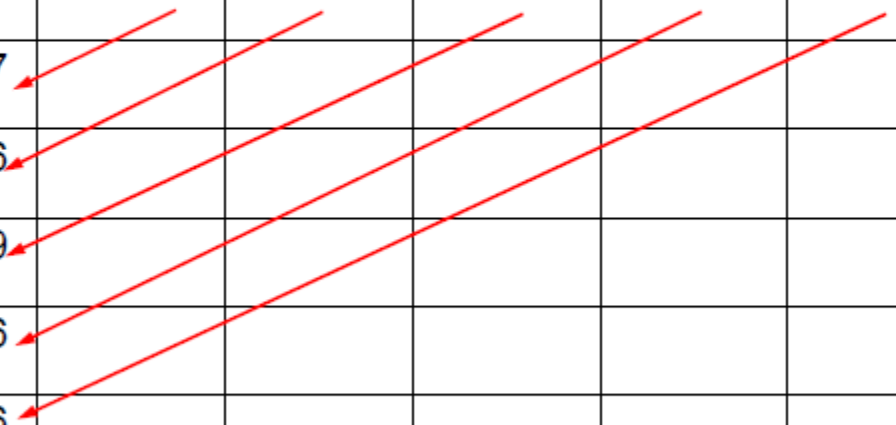
NPV Example Project

Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
-£1000	£200	£300	£500	£500	£600

A new IT system allows a company access to a new market opportunity. It costs £1,000,000 and is projected to increase the company's profits by £200,000 in year 1, £300,000 in year 2, £500,000 in years 3 and 4, and £600,000 in year 5. Assume a cost of capital of 10%.

NPV Example

Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
-£1000	£200	£300	£500	£500	£600
£178.57					
£239.16					
£355.89					
£317.76					
£340.46					



NPV = £431,835

Discount Rate = 10%

Determine NPV

Microsoft Excel

File Edit View Insert Format Tools Data Window S&P Help

A1 =

CostBenefitAnalysis.xls

	A	B	C	D	E	F	G
1		Year 1	Year 2	Year 3	Year 4	Year 5	Total
2							
3	**Costs**						
4	**Development**	$$					$$$$
5	**Operational**	$$	$$	$$	$$	$$	$$$$
6	**Total Costs**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
7	**PV of Costs**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
8							
9	**Benefits**						
10	**Tangible**	$$	$$	$$	$$	$$	$$$$
11	**Total Benefits**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
12	**PV of Benefits**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
13							
14	**Costs - Benefits**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
15							
16	**NPV**						$$$$
17							

Sheet1 Sheet2 Sheet3

Ready NUM

If NPV >= 0,

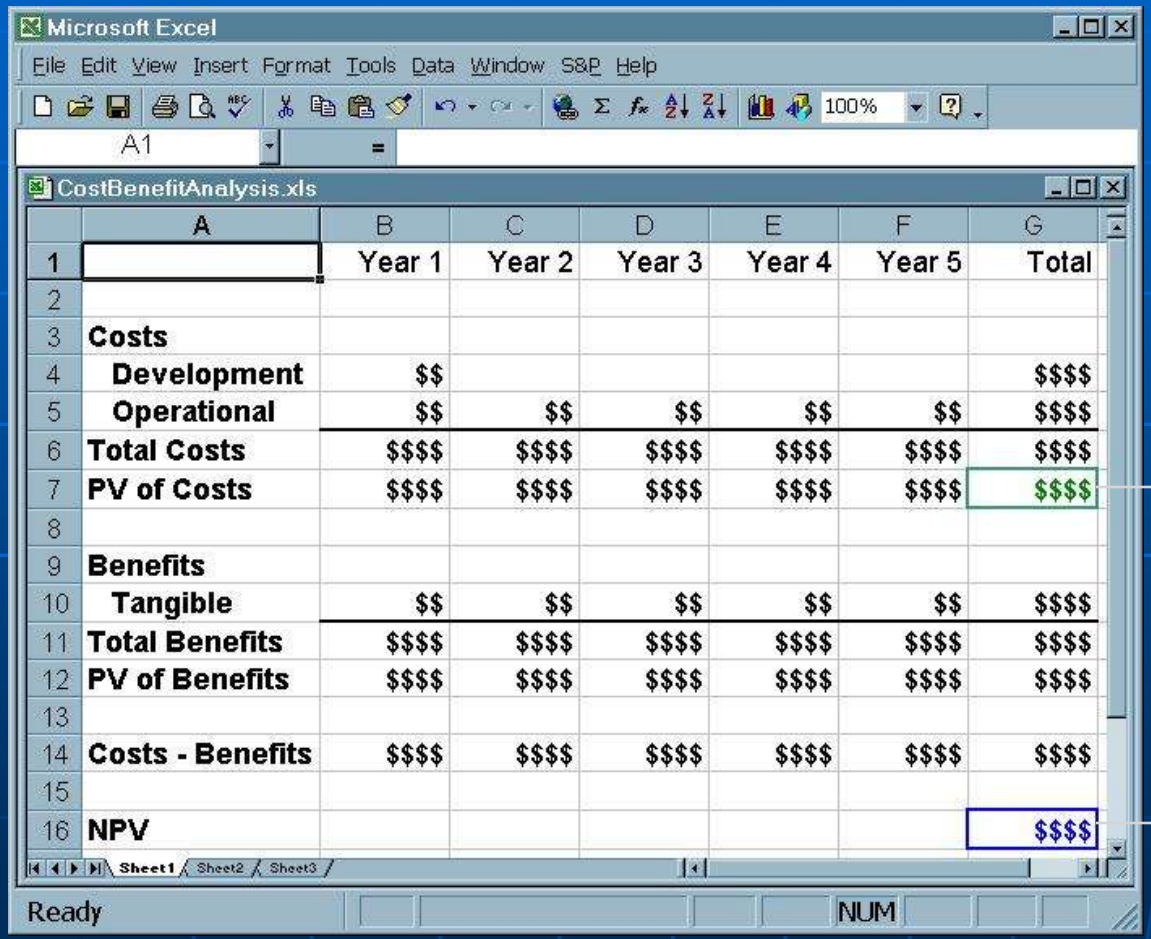
Project is OK

If NPV < 0,

Project is unacceptable

Assess Financial Viability –

Return on Investment



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13							
14	**Costs - Benefits**	$$$$	$$$$	$$$$	$$$$	$$$$	$$$$
15							
16	**NPV**						$$$$

$$ROI = \frac{NPV}{\sum PV(\text{cash outflows})}$$

Assess Financial Viability –

Break Even Point

- How long before the project's returns match the amount invested
- The longer it takes to break even, the higher the project's risk.

Organizational Feasibility

If we build it, will they come?

- Strategic alignment
  - How well do the project goals align with business objectives?
- Stakeholder analysis
  - Project champion(s)
  - Organizational management
  - System users

Project Selection

Project Selection Issues

- Approval committee works from the system request and the feasibility study
  - Project portfolio – how does the project fit within the entire portfolio of projects?
  - Trade-offs must be made to select projects that will form a balanced project portfolio
  - Viable projects may be rejected or deferred because of project portfolio issues.