SCS 3208 - Software Project Management

Topic 2: Project Initiation and Evaluation

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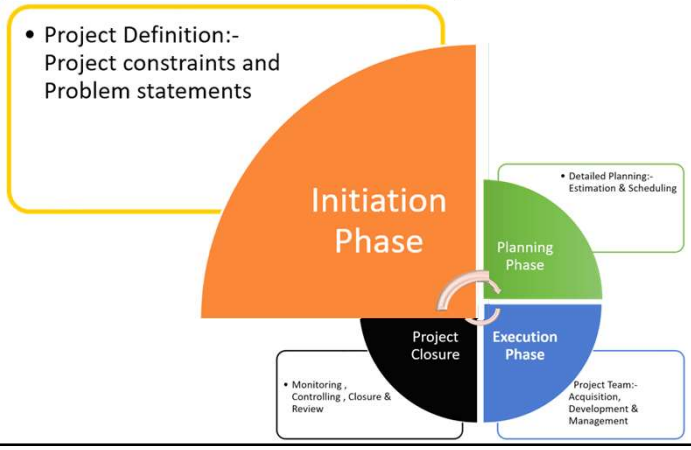
2.1 Project Initiation

- Starting a new project or a new phase of an existing project
- Obtaining authorization to start the project/phase



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Objectives of the Initiation phase

- Align the **stakeholders' expectations** with the **project's purpose**
- Provide visibility about the **scope and objectives**, ensuring that project will achieve the expectations
- Set the **vision** of the project—what is needed to be accomplished.
- Create a shared understanding of **success criteria**
- Reduce the overhead of **involvement**
- Improve deliverable acceptance, customer satisfaction, and other stakeholder satisfaction.

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Major Activities of Project Initiation

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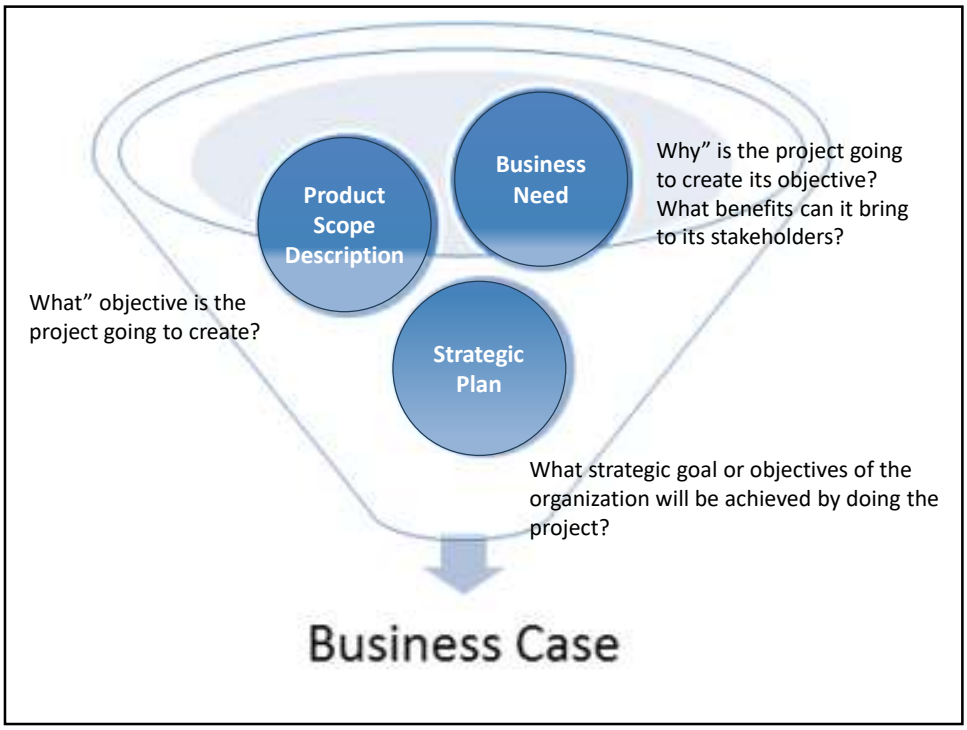

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Business Case Document

- **Justifies the start-up** of a project
- Includes a **description** of the **business problem** or opportunity
- Provides the **costs and benefits** of each alternative solution and the recommended solution for approval.
- Justifies **expenditure** on the project
- Requires **Sponsor's approval**
- Is **referred to frequently** during the project to determine whether it is currently on track
- Defines the **objectives** (The project's success is measured against the ability to meet those objectives) &
- Its **completion is critical to the success** of the project.

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Business Case Document: List of Content

1. **Introduction and background** to the proposal
2. **Proposed project**
3. **The market**: estimated demand, and likely competitors
4. **Organizational and operational infrastructure**
5. **Benefits**
6. **Outline implementation plan**
7. **Costs**: schedule of expected costs for planned activities
8. **Financial case** (An analysis of income and costs)
9. **Risks**: business risks
10. **Management plan**: Project Portfolio management

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Feasibility study

- An exercise that involves documenting each of the potential solutions to a particular business problem or opportunity.
- **Purpose:** identify the likelihood of one or more solutions meeting the stated business requirements – to decide whether the solution will deliver the expected outcome
- **Outcome:** a confirmed solution for implementation.

- How to assess the feasibility?

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Feasibility Study…contd.

- Describes business problem or opportunity
- Documents the business requirements for a solution
- Identifies all of the alternative solutions available
- Reviews each solution to determine its feasibility
- Lists any risks and issues with each solution
- Chooses a preferred solution for implementation
- Documents the results in a feasibility report

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Project Charter

- Defines the **purpose** (goal and objectives) of the project -**high-level requirements** may be documented
- Decides the **project duration**
- Identifies the **project scope and deliverables**
- Identifies **financial and other resource** requirements
- Identifies the **stakeholders** and defines **their roles** and responsibilities.
- Presents by the senior management to the sponsor
- Formally **authorizes the existence of the project**

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Project Charter includes

1. Project **vision and objectives**
2. **Scope** of the project
3. Project **deliverable**s
4. The list of project **stakeholders** and **their roles** and **responsibilities**
5. **Organizational structure** for the project
6. Project **plan**
7. Any **risks, issues and assumptions**

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Exercise:

1. What is the difference between Project Charter and Project Initiation Document (PID)?

2. What is the difference between a project proposal and a project charter?

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Project Announcement

- Publicly announce the start of the project
  - Do a press release or a press conference
- Publish sponsorship and ownership
- Formally delegate authority to the project manager
- Commit resources to initiate the project

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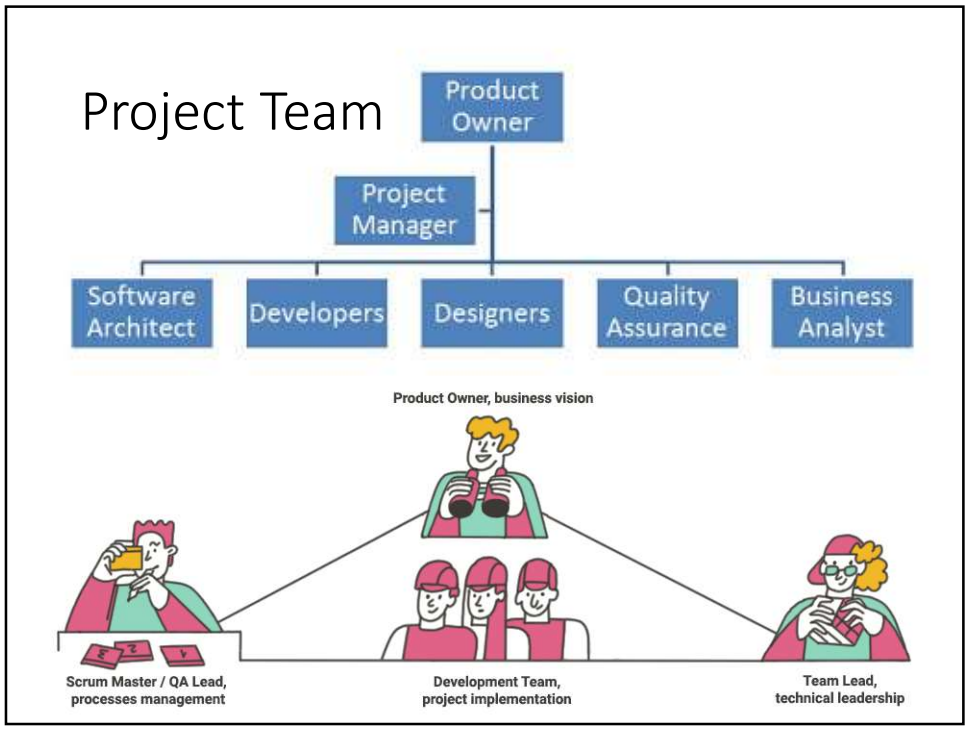
Project Team
Product Owner
Project Manager
Software Architect
Developers
Designers
Quality Assurance
Business Analyst
Product Owner, business vision
Scrum Master / QA Lead, processes management
Development Team, project implementation
Team Lead, technical leadership

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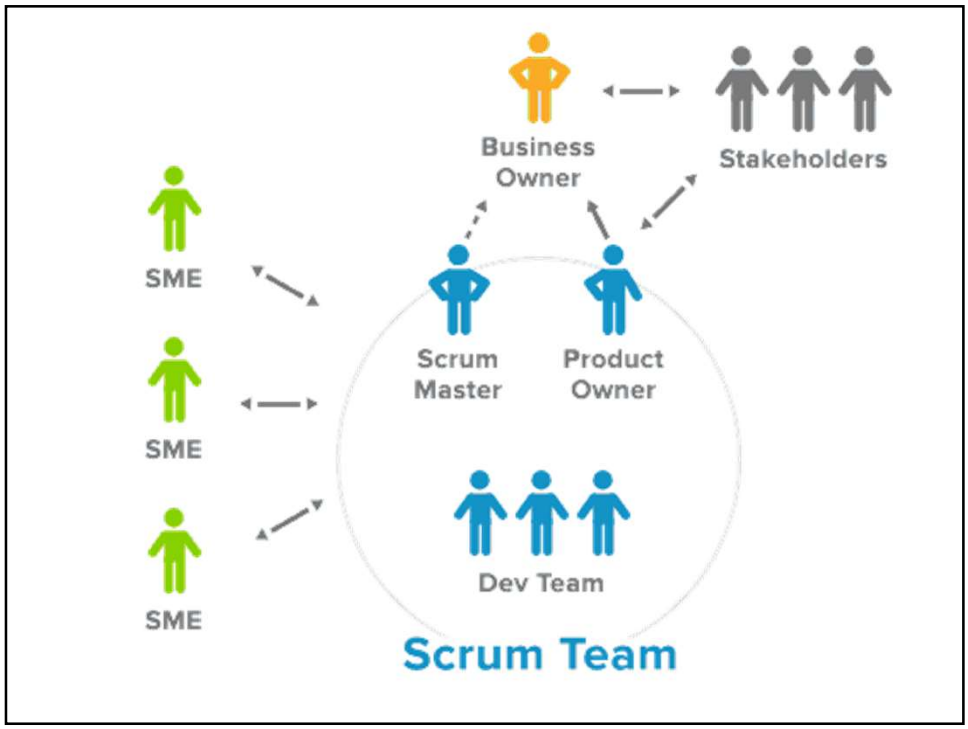
Business Owner
Stakeholders
SME
SME
SME
Scrum Master
Product Owner
Dev Team
Scrum Team

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Project Management Office (PMO)

- Organizing meetings and events
- Resource acquisition and allocation
- Support monitoring and controlling of the project
- Disseminate project information
- Communication handling
- Administrative records handling
- Reporting lessons learnt
- Preparing project reports

Staff: PMO manager, administrator/registrar, secretory, assistants…

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2. Project Initiation>

2.2 Project Evaluation

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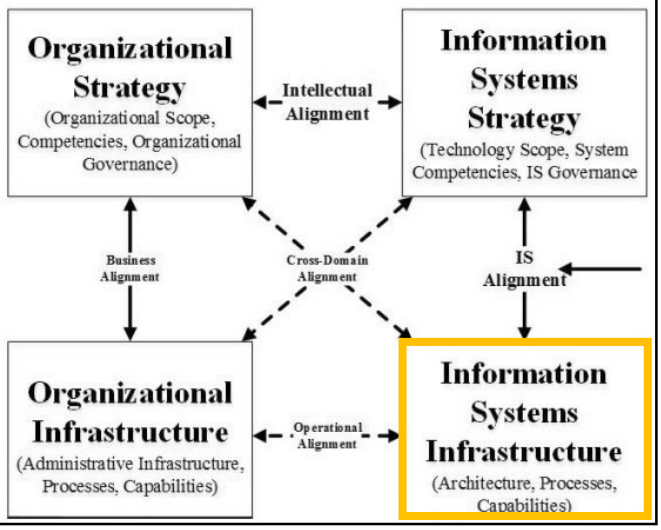
Purpose of Project Evaluation

To find;

- the value a project can offer,
- the benefits it can deliver, and
- how well it aligns with business strategy.



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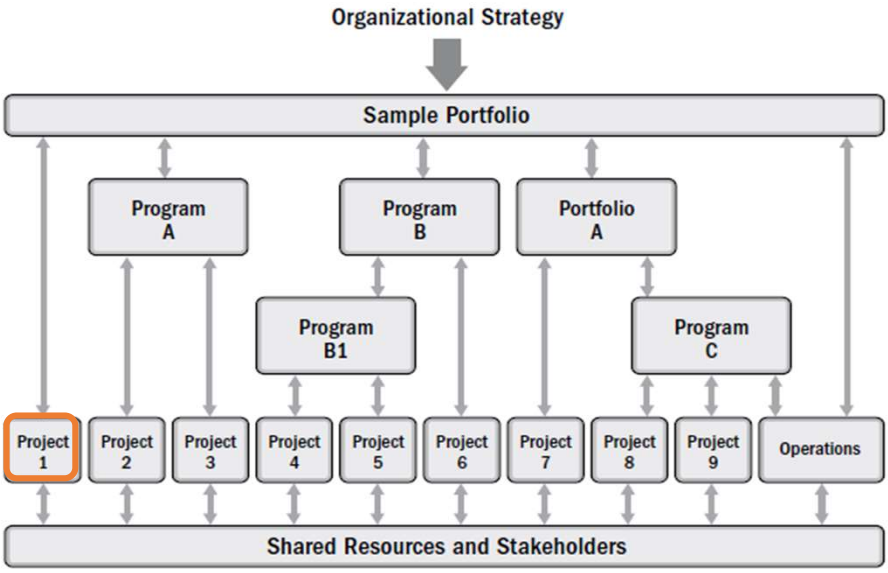

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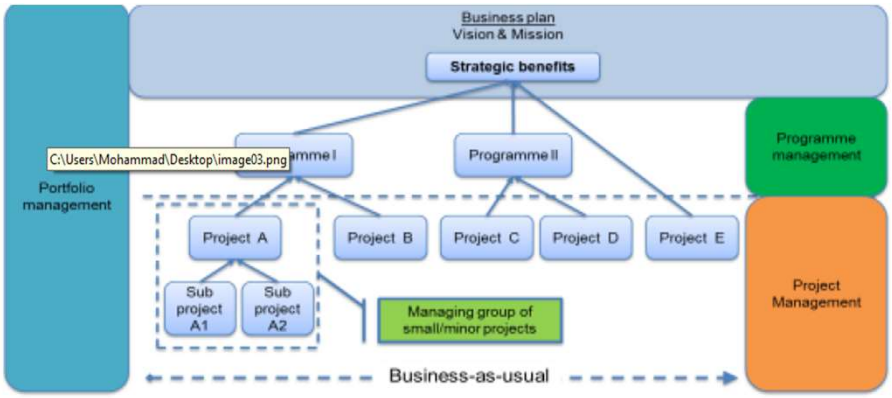
Portfolio Mgt. and Project Mgt.

- Program and project management focus on doing programs and projects the "right" way, and Portfolio management focuses on doing the "right" programs.



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Project Evaluation

- A high-level assessment of the project to see whether it is worthwhile to proceed with the project.

1. **Strategic assessment**
   - To see whether the project will fit in the strategic planning of the whole organization
2. **Technical assessment**
   - To determine whether it is desirable to carry out the development and operation of the software system
3. **Economic assessment**
   - To decide which of the several alternative projects has a better success rate, and a higher turnover

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1.Strategic Assessment

- Used to assess whether a project **fits in the long-term goal** of the organization
- Evaluates individual projects against the strategic plan or the **overall business objectives**
- carried out by senior management

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Need Assessment

Identifying opportunities, business requirements, or problems that need to be solved.

1. Market Demand
2. Strategic Opportunity/Business Need
3. Customer Request
4. Technological Advance
5. Legal Requirement
6. Environmental Consideration
7. Social Need

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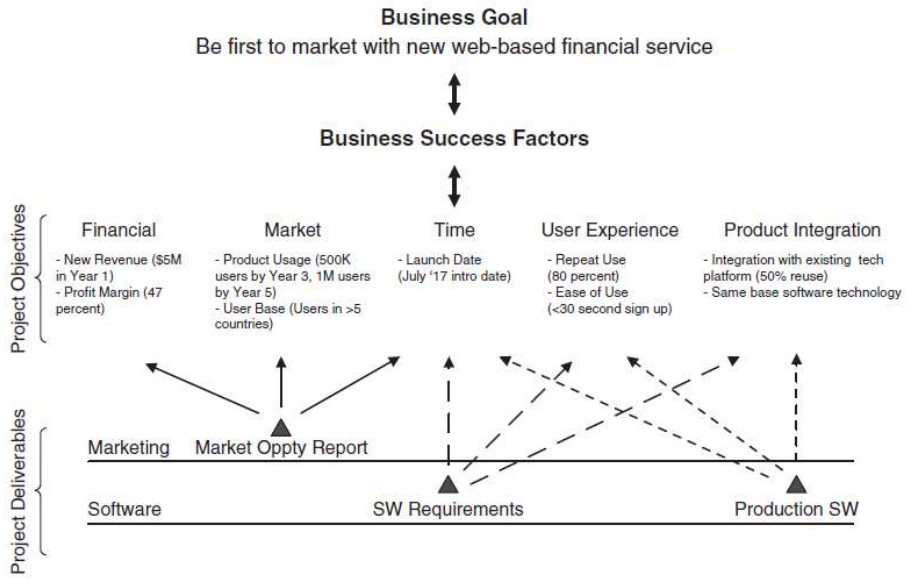
Benefit Map



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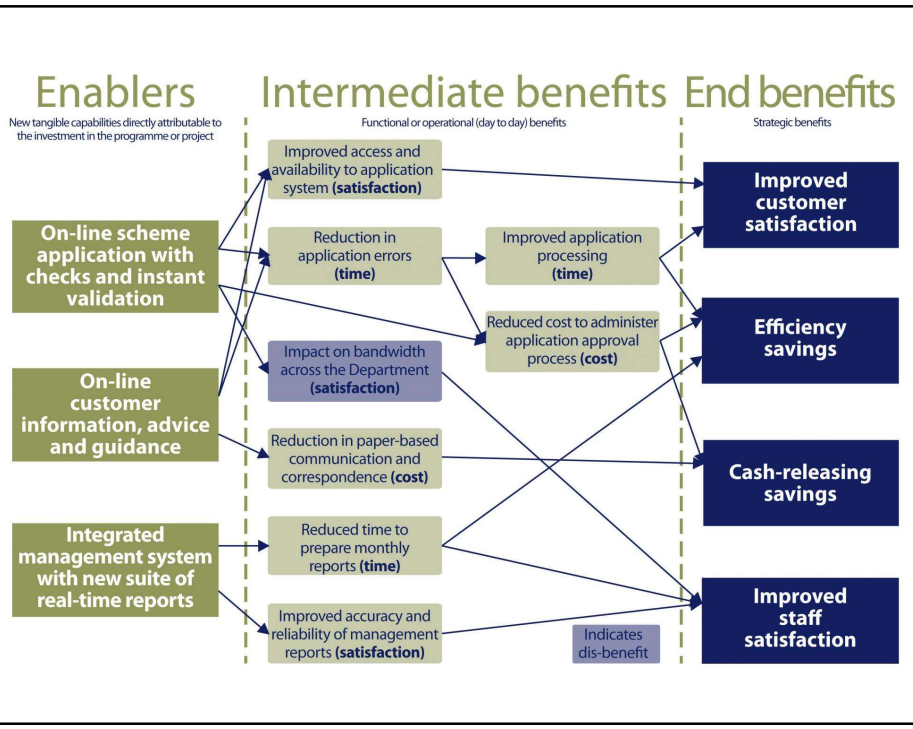

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Steps to Create a Benefit Map

1. Identify the Strategic Business Goals
2. Define the Business Success Factors
3. Identify Project Outcomes
4. Perform the Mapping

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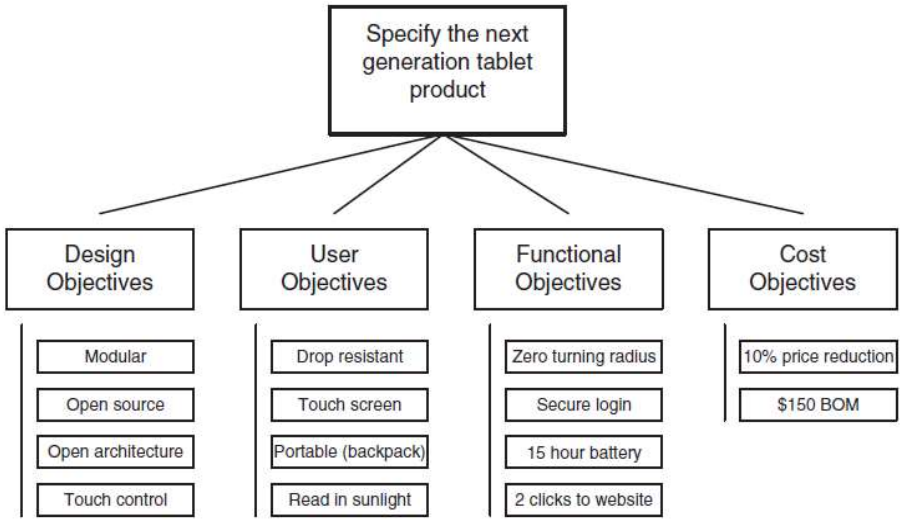
Objective Tree: An Example



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2. Technical Assessment

- Identifies **functions** that the software is expected to perform
- Evaluates whether the required functionality can be **achieved with** current or affordable **technologies**
- Considers the **organizational policy** on providing technical infrastructure
- Prepares the **strategic information system plan** (SISP) of the organization
- Identifies **any constraints that can** impact the IS plan

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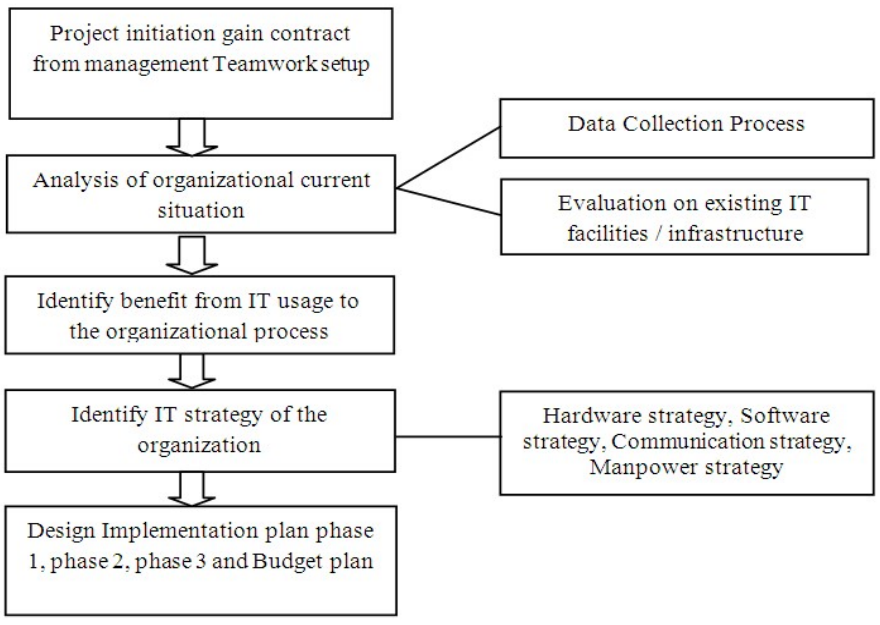
SISP (Strategic Information System Plan)



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3. Economic Assessment

- **Cost-benefit analysis**
  - **Net benefit**
  - **Benefit-Cost ratio (BCR)**
- **Cash flow forecasting**
- **Scoring models**

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Cost-benefit analysis

- **Costs**
  1. Development cost – Staff payments, Infrastructure cost
  2. Set up cost- For the new infrastructure, staff recruitment and training
  3. Operational cost – To operate the system after installation
  4. Maintenance cost – For updates or enhancements
- **Benefits**
  1. Quantified and valued – Sales income
  2. Quantified but not valued– Decrease in # of complains
  3. Identified but not easily quantified – Public approval for the organization

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Business Benefits as a Measure of Value

$$Value = \frac{Business\ Benefits\ Achieved}{Resources\ Expended}$$

$$\textbf{Benefit-Cost Ratio} = \frac{\text{PV of Benefit Expected from the Project}}{\text{PV of the Cost of the Project}}$$

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Example: BCR

Project **C** has the following estimated values

- PV of benefits = Rs 1,500,000
- PV of costs = Rs 1,000,000
- Benefit-cost ratio = 1,500,000/1,000,000
- The ratio is 1.5, which is greater than 1.0, so the benefits outweigh the costs.

If Project **A**'s BCR is 0.5 and Project **B**'s BCR is 1.7, then which project should be selected?

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Cash Flow Forecasting

- What?
  - Estimation of net profit (cash flow) over time
- Why?
  - Estimation of net-benefits is not sufficient
  - Need detailed estimation of benefits and costs versus time

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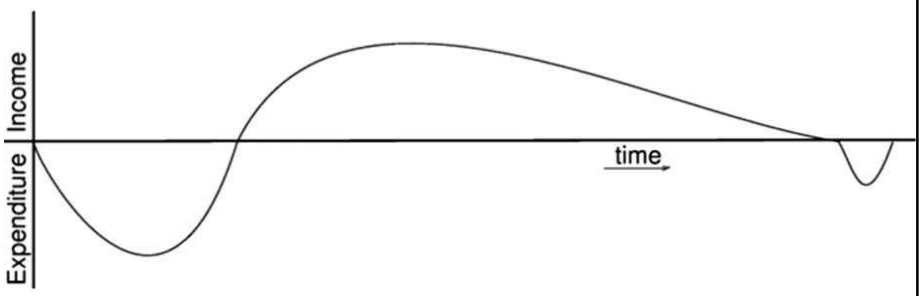
Typical product life cycle cash flow



- Not easy to estimate future cash flows accurately.
- Need to revise the forecast from time to time

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Methods of Comparing Projects Using Cash Flow Forecasts:

1. Net Profit
2. Payback Period
3. Return on Investment
4. Net present value
5. Internal Rate of Return

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Net Profit Estimation

Year	Project 1	Project 2
0	–100,000	–1,000,000
1	10,000	200,000
2	10,000	200,000
3	10,000	200,000
4	20,000	200,000
5	100,000	300,000
Net profit	50,000	100,000

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Payback Period

- Calculate the time taken to break even or pay back the initial investment
- Project with the shortest payback period will be selected.

Year	Expected Net Cash Flows	Cumulative Net Cash Flows
Year 0	($26,100)	($26,100)
Year 1	$2,500	($23,600)
Year 2	$4,000	($19,600)
Year 3	$6,000	($13,600)
Year 4	$8,000	($5,600)
Year 5	$16,000	$10,400

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Payback Period

Year	Project A	Project B
0	-$300,000	-$2,000,000
1	$100,000	$600,000
2	$100,000	$600,000
3	$100,000	$600,000
4	$100,000	$600,000
5	$100,000	$600,000
Total	$200,000	$1,000,000

Payback Period

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Return on Investment (ROI)

- *How does the project investment affect the company profits?*

ROI = Net Income (Profit) / Cost of investment x 100

- E.g. If an implementation of an IS costs 10M and, as a result, you can get a net profit of 20M, then the IS's ROI is
- 20M/10Mx100=200%
- i.e. You can earn Rs2 per every Rs1 you invest in the IS

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Annualized Return on Investment

Investment = £300,000
Total Profit = £90,000
Project duration = 3 years

$$\text{Return on Investment} = \frac{\text{Ave. An. Prof. X 100\%}}{\text{Initial Investment}}$$

$$\text{Return on Investment} = \frac{30{,}000 \quad \text{X 100 \%}}{300{,}000}$$

Return on Investment = 10 %

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Exercise 1: Find Annualized ROI

Year	Project 1
0	–100,000
1	10,000
2	10,000
3	10,000
4	20,000
5	100,000
Net profit	50,000

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Exercise 2

Calculate the Net Profit, Payback and ROI

Year	Project 1	Project 2	Project 3
0	-100,000	-100,000	-120,000
1	10,000	30,000	30,000
2	10,000	30,000	30,000
3	20,000	30,000	30,000
4	20,000	20,000	25,000
5	100,000	140,000	50,000
Net profit			
Payback			
A. ROI			

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Present value

- The current value of a future sum of money
- Takes into account the profitability of a project and the timing of the cash flows
- Discount rate is the annual rate by which we discount future earning

$$\text{Present Value} = \frac{\text{Value in year } t}{(1+r)^t}$$

r – discount rate expressed as a decimal value

t – number of years into the future that cash flow occurs

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Present value …contd.

e.g.

- If discount rate is 10% and the return of an investment in a year is Rs.110, the present value of the investment is;. =(110/(1+0.1)=110/1.1= Rs.100
- If discount rate is 20% and the expected return of an investment in a year is Rs.24,000 what would be the present value.

=24,000/1.2= Rs.20,000

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Net Present Value

$$D_n = \frac{1}{(1+r)^n}$$

Where D_n = discount factor
r = discount rate
n = number of years ahead

PV= CF X Discount Factor = Discounted Cash Flow

NPV of project = ∑ Discounted Cash Flows

$$NPV = -C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_T}{(1+r)^T}$$

$-C_0 = Initial\ Investment$
$C = Cash\ Flow$
$r = Discount\ Rate$
$T = Time$

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_o$$

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Example:

A software project which needs $100,000 to be invested, is expected to generate a total of $200,000 (in present value) over 5 years. What is the Net Present Value (NPV) of the project?

Since the Net Present Value (NPV) is the present value of all benefits minus all costs, i.e. NPV = $200,000 – $100,000 = $100,000.

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NPV Meaning

- **+ NPV:**
  - Profitable- the asset is worth more than what you are paying.
- **- NPV:**
  - Loss- the asset is worth less than what you are paying.
- **0 NPV:**
  - You're paying exactly what the asset is worth.
  - Rate of return=discount rate

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Exercise 3

- Calculate the NPV for each of the project A and B using each of the discount rates 10% and 8%

Year	Project A	Project B
0	-100,000	-100,000
1	10,000	30,000
2	20,000	30,000
3	20,000	30,000
4	100,000	60,000
Net profit	50,000	50,000

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Exercise 4:

Year	Project A	Project B	Discount factor at 10%
0	150,000	100,000	1
1	20,000	18,000	0.9091
2	40,000	32,000	0.8264
3	90,000	60,000	0.7513
4	100,000	80,000	0.6830

Find net profit, NPV (Present Net Value), Annualized ROI and Pay-back period of the projects.

Which project should better be selected? Explain your answer.

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Issues with NPV

- Choosing an appropriate discount rate is difficult
- Ensuring that the rankings of projects are not sensitive to small changes in the discount rate - NPV requires a lot of assumptions and estimates, which may not be reliable or accurate
- NPV might not be directly comparable with earnings from other investments or the costs of borrowing capital. -Does not give a complete picture of an investment's gain or loss

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Internal Rate of Return

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_o$$

- A discount rate results in an NPV of zero
- Use IRR or XIRR functions in Excel
- Estimates the profitability of potential investments
- Can be directly comparable with interest rates.
- Disadvantage –
  - does not indicate the absolute size of return
  - In some cases, it is possible to find more than one rate of return that will produce a zero NPV.

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Exercise 5:

1. What are the differences between NPV and IRR?
2. Try the following in MS Excel.

=IRR(A1:A5)
A
-$300,000
150000
150000
150000
10000
24%

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Exercise 6

Evaluation of IRR values of 4 projects resulted in the followings.

- Project A has an internal rate of return of 21%.
- Project B has an IRR of 7%.
- Project C has an IRR of 31%.
- Project D has an IRR of 19%.

Which project would be selected?

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Exercise 7:

- Suppose that ACE Company needs to decide if they should purchase a fully automatic printer for $300,000. The printer would be used only for three years, but it is expected to generate $150,000 of additional annual profit during each of those years. The company thinks, that it can sell the printer afterward for about $10,000.
- Use IRR, and advice the company whether the equipment purchase is a better use of its cash than its other investment options, which should return about 10%.

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Weighted Scoring Model

1. Prepare a criteria for scoring each project
2. Criteria is assigned a weight depending on its importance
3. Each project is rated on a numerical scale considering its outcome (the higher number for the more desirable outcome to the company)
4. This rating is multiplied by the weight of the criteria factor and added to other weighted criteria scores to get the total weighted score.

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Scoring Models: Example

	A	B	C	D	E	F
1	**Criteria**	**Weight**	**Project 1**	**Project 2**	**Project 3**	**Project 4**
2	Supports key business objectives	25%	90	90	50	20
3	Has strong internal sponsor	15%	70	90	50	20
4	Has strong customer support	15%	50	90	50	20
5	Realistic level of technology	10%	25	90	50	70
6	Can be implemented in one year or less	5%	20	20	50	90
7	Provides positive NPV	20%	50	70	50	50
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90
9	**Weighted Project Scores**	**100%**	**56**	**78.5**	**50**	**41.5**

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Risk Evaluation

- Identify risks and quantify their effects
- Can prepare a risk matrix
  - Prepare a checklist of possible risks
  - Classify risks according to their importance or impact (high[H], medium[M], low[L])
  - Classify risks according to their likelihood (high[H], medium[M], low[L], exceedingly unlikely[–])

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Risk Matrix

Likelihood	Consequence: Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A Almost Certain	High	High	Extreme	Extreme	Extreme
B Likely	Moderate	High	High	Extreme	Extreme
C Moderate	Low	Moderate	High	Extreme	Extreme
D Unlikely	Low	Low	Moderate	High	Extreme
E Rare	Low	Low	Moderate	High	High

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Risk and NPV

- A risk is an uncertainty attached to the future cash flows.
- NPV → present value of a rupee one year later is definitely less than one rupee.
- NPV with risk → A safe rupee is worthier than a risky one.
- There is risk associated with future cash flows.
- High risk → use a high discount rate to calculate NPV

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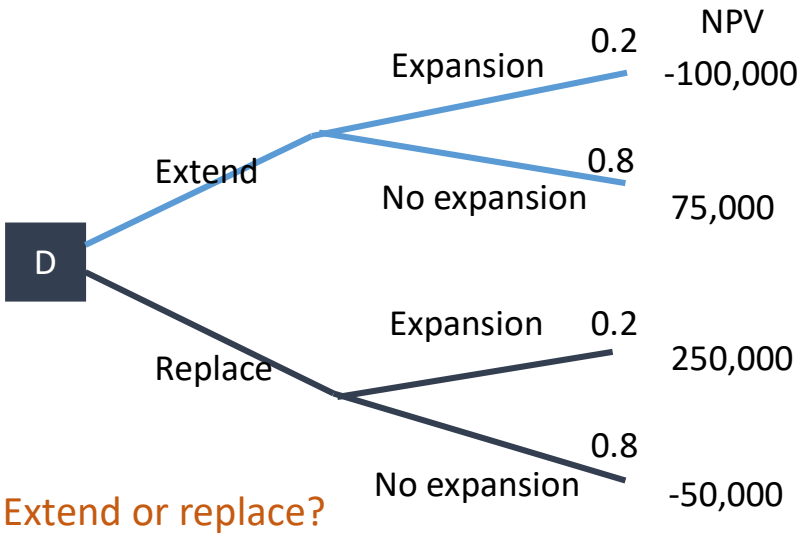
Risk Analysis Using Decision Trees



Extend or replace?

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Summary: 2.2 Project Evaluation

1. **Strategic assessment**
   - A. **Need Assessment**
   - B. **Benefit Maps**
2. **Technical assessment**
3. **Economic assessment**
   - A. **Cost-benefit analysis**
   - B. **Cash flow forecasting**
     - i. Net Profit
     - ii. Payback Period
     - iii. Return on Investment
     - iv. Net present value
     - v. Internal Rate of Return
   - C. **Scoring models**
   - D. **Risk evaluation**

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