



# FEASIBILITY STUDIES



# WHAT IS A FEASIBILITY STUDY?

A feasibility study is an analysis of the viability of an idea through a disciplined and documented process of thinking through the idea from its logical beginning to its logical end.

A feasibility study provides an ***Investigating*** function that helps answer “*Should we proceed with the proposed project idea? Is it a viable business venture?*”

A feasibility study should be conducted to determine the viability of an idea BEFORE proceeding with the development of a business.

# WHY A FEASIBILITY STUDY?

## **Objectives:**

- To find out if a system development project can be done:
  - ...is it possible?
  - ...is it justified?
- To suggest possible alternative solutions.
- To provide management with enough information to know:
  - Whether the project can be done
  - Whether the final product will benefit its intended users
  - What the alternatives are (so that a selection can be made in subsequent phases)
  - Whether there is a preferred alternative

A management-oriented activity:

- After a feasibility study, management makes a “go/no-go” decision.
- Need to examine the problem in the context of broader business strategy

# CONTENT OF A FEASIBILITY STUDY

Things to be studied in the feasibility study:

- The present organizational system
  - Stakeholders, users, policies, functions, objectives,...
- Problems with the present system
  - inconsistencies, inadequacies in functionality, performance,...
- Goals and other requirements for the new system
  - Which problem(s) need to be solved?
  - What would the stakeholders like to achieve?

# CONTENT OF A FEASIBILITY STUDY

- Constraints
  - including nonfunctional requirements on the system (preliminary pass)
- Possible alternatives
  - “Sticking with the current system” is always an alternative
  - Different business processes for solving the problems
  - Different levels/types of computerization for the solutions
- Advantages and disadvantages of the alternatives

Things to conclude:

- Feasibility of the project
- The preferred alternative.

# DATA SOURCES FOR A FEASIBILITY ASSESSMENT

Data required for a feasibility study can come from primary or secondary sources

- Primary data can include formal interviews and surveys
  - Collection of primary data can be expensive and time consuming
- Secondary data can include industry and trade publications, statistics of industry associations, and government agency reports

# FOUR TYPES OF FEASIBILITY

## **Technical feasibility**

- Is the project possible with current technology?
- What technical risk is there?
- Availability of the technology:
  - Is it available locally?
  - Can it be obtained?
  - Will it be compatible with other systems?

## **Economic feasibility**

- Is the project possible, given resource constraints?
- What are the benefits?
  - Both tangible and intangible
  - Quantify them!
- What are the development and operational costs?
- Are the benefits worth the costs?

# FOUR TYPES OF FEASIBILITY

## **Schedule feasibility**

- Is it possible to build a solution in time to be useful?
  - What are the consequences of delay?
  - Any constraints on the schedule?
  - Can these constraints be met?

## **Operational feasibility**

- If the system is developed, will it be used?
- Human and social issues...
  - Potential labour objections?
  - Manager resistance?
  - Organizational conflicts and policies?
  - Social acceptability?
  - legal aspects and government regulations?



# TECHNICAL FEASIBILITY

## **Is the proposed technology or solution practical?**

- Do we currently possess the necessary technology?
- Do we possess the necessary technical expertise
  - ...and is the schedule reasonable for this team?
- Is relevant technology mature enough to be easily applied to our problem?

## **What kinds of technology will we need?**

- Some organizations like to use state-of-the-art technology
  - ...but most prefer to use mature and proven technology.
- A mature technology has a larger customer base for obtaining advice concerning problems and improvements.

## **Is the required technology available “in house”?**

- If the technology is available:
  - ...does it have the capacity to handle the solution?
- If the technology is not available:
  - ...can it be acquired?

# ECONOMIC FEASIBILITY

## Can the bottom line be quantified yet?

- Very early in the project...
  - a judgement of whether solving the problem is worthwhile.
- Once specific requirements and solutions have been identified...
  - ...the costs and benefits of each alternative can be calculated

## Cost-benefit analysis

- Purpose - answer questions such as:
  - Is the project justified (I.e. will benefits outweigh costs)?
  - What is the minimal cost to attain a certain system?
  - How soon will the benefits accrue?
  - Which alternative offers the best return on investment?
- **Examples of things to consider:**
  - Hardware/software selection
  - Selection among alternative financing arrangements (rent/lease/purchase)
- **Difficulties**
  - benefits and costs can both be intangible, hidden and/or hard to estimate
  - ranking multi-criteria alternatives

# BENEFITS

## **Tangible Benefits**

- **Readily quantified as \$ values**
- Examples:
  - increased sales
  - cost/error reductions
  - increased throughput/efficiency
  - increased margin on sales
  - more effective use of staff time

## **Intangible benefits**

- **Difficult to quantify**
  - But maybe more important!
  - business analysts help estimate \$ values
- Examples:
  - increased flexibility of operation
  - higher quality products/services
  - better customer relations
  - improved staff morale

## **How will the benefits accrue?**

- When - over what timescale?
- Where in the organization?

# COSTS

## **Development costs (OTO)**

- **Development and purchasing costs:**
  - Cost of development team
  - Consultant fees
  - software used (buy or build)?
  - hardware (what to buy, buy/lease)?
  - facilities (site, communications, power,...)
- **Installation and conversion costs:**
  - installing the system,
  - training personnel,
  - file conversion,....

## **Operational costs (on-going)**

- **System Maintenance:**
  - hardware (repairs, lease, supplies,...),
  - software (licenses and contracts),
  - facilities
- **Personnel:**
  - For operation (data entry, backups,...)
  - For support (user support, hardware and software maintenance, supplies,...)
  - On-going training costs

# EXAMPLE: COSTS FOR SMALL CLIENT-SERVER PROJECT

## Personnel:

2	System Analysts (400 hours/ea \$35.00/hr)	\$28,000
4	Programmer/Analysts (250 hours/ea \$25.00/hr)	\$25,000
1	GUI Designer (200 hours/ea \$35.00/hr)	\$7,000
1	Telecommunications Specialist (50 hours/ea \$45.00/hr)	\$2,250
1	System Architect (100 hours/ea \$45.00/hr)	\$4,500
1	Database Specialist (15 hours/ea \$40.00/hr)	\$600
1	System Librarian (250 hours/ea \$10.00/hr)	\$2,500

## Expenses:

4	Smalltalk training registration (\$3500.00/student)	\$14,000
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## New Hardware & Software:

1	Development Server (Pentium Pro class)	\$18,700
1	Server Software (operating system, misc.)	\$1,500
1	DBMS server software	\$7,500
7	DBMS Client software (\$950.00 per client)	\$6,650

**Total Development Costs:**

**\$118,200**

## PROJECTED ANNUAL OPERATING COSTS

## Personnel:

2	Programmer/Analysts (125 hours/ea \$25.00/hr)	\$6,250
1	System Librarian (20 hours/ea \$10.00/hr)	\$200

## Expenses:

1	Maintenance Agreement for Pentium Pro Server	\$995
1	Maintenance Agreement for Server DBMS software	\$525
	Preprinted forms (15,000/year @ .22/form)	\$3,300

**Total Projected Annual Costs:**

**\$11,270**

# ANALYZING COSTS VS. BENEFITS

## Identify costs and benefits

- Tangible and intangible, one-time and recurring
- Assign values to costs and benefits

## Determine Cash Flow

- Project the costs and benefits over time, e.g. 3-5 years
- Calculate **Net Present Value** for all future costs/benefits
  - determines future costs/benefits of the project in terms of today's dollar values
  - A dollar earned today is worth more than a potential dollar earned next year

## Do cost/benefit analysis

- Calculate **Return on Investment**:
  - Allows comparison of lifetime profitability of alternative solutions.

$$\text{ROI} = \frac{\text{Total Profit}}{\text{Total Cost}} = \frac{\text{Lifetime benefits} - \text{Lifetime costs}}{\text{Lifetime costs}}$$

- Calculate **Break-Even point**:
  - how long will it take (in years) to pay back the accrued costs:

$$@T (\text{Accrued Benefit} > \text{Accrued Cost})$$

# CALCULATING PRESENT VALUE

A dollar today is worth more than a dollar tomorrow...

- Your analysis should be normalized to “current year” dollar values.

## The discount rate

- measures opportunity cost:
  - Money invested in this project means money not available for other things
  - Benefits expected in future years are more prone to risk
- This number is company- and industry-specific.
  - “what is the average annual return for investments in this industry?”

## Present Value:

- The “current year” dollar value for costs/benefits  $n$  years into the future
  - ... for a given discount rate  $i$

$$\text{Present\_Value}(n) = \frac{1}{(1 + i)^n}$$

- E.g. if the discount rate is 12%, then
  - $\text{Present\_Value}(1) = 1/(1 + 0.12)^1 = 0.893$
  - $\text{Present\_Value}(2) = 1/(1 + 0.12)^2 = 0.797$

# NET PRESENT VALUE

Measures the total value of the investment

- ...with all figures adjusted to present dollar values
  - $NPV = \text{Cumulative PV of all benefits} - \text{Cumulative PV of all costs}$

Cash Flow	Year 0	Year 1	Year 2	Year 3	Year 4
Dev. Costs	(\$100,000)				
Oper. Costs		(\$4,000)	(\$4,500)	(\$5,000)	(\$5,500)
Present Value	1	0.893	0.797	0.712	0.636
Time-adj Costs	(\$100,000)	(\$3,572)	(\$3,587)	(\$3,560)	(\$3,816)
Cumulative Costs	(\$100,000)	(\$103,572)	(\$107,159)	(\$110,719)	(\$114,135)
Benefits	0	\$25,000	\$30,000	\$35,000	\$50,000
T-adj Benefits	0	\$22,325	\$23,910	\$24,920	\$31,800
Cumulative Benefits	0	\$22,325	\$46,235	\$71,155	\$102,955
Net Costs+Benefits	(\$100,000)	(\$81,243)	(\$60,924)	(\$39,564)	(\$11,580)

- Assuming subsequent years are like year 4...
  - the net present value of this investment in the project will be:
  - after 5 years, \$13,652
  - after 6 years, \$36,168





# COMPUTING THE PAYBACK PERIOD

Can compute the break-even point:

- when does lifetime benefits overtake lifetime costs?
- Determine the fraction of a year when payback actually occurs:

$$\frac{|\text{beginningYear amount}|}{\text{endYear amount} + |\text{beginningYear amount}|}$$

- For our last example,  $51,611 / (70,501 + 51,611) = 0.42$
- Therefore, the payback period is approx 3.4 years

# RETURN ON INVESTMENT (ROI) ANALYSIS

For comparing overall profitability

- Which alternative is the best investment?
- ROI measures the ratio of the value of an investment to its cost.

ROI is calculated as follows:

$$\text{ROI} = \frac{\text{Estimated lifetime benefits} - \text{Estimated lifetime costs}}{\text{Estimated lifetime costs}}$$

or:

$$\text{ROI} = \frac{\text{Net Present value}}{\text{Estimated lifetime costs}}$$

- For our example
  - $\text{ROI} = (795,440 - 488,692) / 488,692 \approx 63\%$ ,
  - or  $\text{ROI} = 306,748 / 488,692 \approx 63\%$

Solution with the highest ROI is the best alternative

- But need to know payback period too to get the full picture
  - E.g. A lower ROI with earlier payback may be preferable in some circumstances

# SCHEDULE FEASIBILITY

## **How long will it take to get the technical expertise?**

- We may have the technology, but that doesn't mean we have the skills required to properly apply that technology.
  - May need to hire new people
  - Or re-train existing systems staff
  - Whether hiring or training, it will impact the schedule.

## **Assess the schedule risk:**

- Given our technical expertise, are the project deadlines reasonable?
- If there are specific deadlines, are they mandatory or desirable?
  - If the deadlines are not mandatory, the analyst can propose several alternative schedules.

## **What are the real constraints on project deadlines?**

- If the project overruns, what are the consequences?
  - Deliver a properly functioning information system two months late...
  - ...or deliver an error-prone, useless information system on time?
- Missed schedules are bad, but inadequate systems are worse!

# OPERATIONAL FEASIBILITY

## How do end-users and managers feel about...

- ...the problem you identified?
- ...the alternative solutions you are exploring?

## You must evaluate:

- Not just whether a system *can* work...
- ... but also whether a system *will* work.

## Any solution might meet with resistance:

- Does **management** support the project?
- How do the **end users** feel about their role in the new system?
- Which users or managers may resist (or not use) the system?
  - People tend to resist change.
  - Can this problem be overcome? If so, how?
- How will the working environment of the end users change?
- Can or will end users and management adapt to the change?

# WRITING FEASIBILITY REPORTS

## **INTRODUCTION:**

Include the statement of the problem. Subject and purpose of the study and its authorization.

## **BACKGROUND:**

Circumstances that created the necessity for this study.

## **DISCUSSION:**

The technical and financial feasibility analysis. Individual analysis of each alternative or proposed activities.

Use facts, data, calculations, graphics to explain your analysis and conclusions.

## **CONCLUSIONS:**

The natural results from the information presented in the discussion. This section is the link between the discussion and the recommendation.

## **RECOMMENDATIONS:**

Give recommendations about the most suitable option. Also, elaborate on its feasibility.

# FEASIBILITY STUDY CONTENTS

## 1. Purpose & scope of *the study*

- Objectives (of the study)
- who commissioned it & who did it,
- sources of information,
- process used for the study,
- how long did it take,...

## 2. Description of present situation

- organizational setting, current system(s).
- Related factors and constraints.

## 3. Problems and requirements

- What's wrong with the present situation?
- What changes are needed?

## 4. Objectives of the new system.

- Goals and relationships between them

## 5. Possible alternatives

- ...including 'do nothing'.

## 6. Criteria for comparison

- definition of the criteria

## 7. Analysis of alternatives

- description of each alternative
- evaluation with respect to criteria
- cost/benefit analysis and special implications.

## 8. Recommendations

- what is recommended and implications
- what to do next;
- E.g. may recommend an interim solution and a permanent solution

## 9. Appendices

- to include any supporting material.

# COMPARING ALTERNATIVES

## **How do we compare alternatives?**

- When there are multiple selection criteria?
- When none of the alternatives is superior across the board?

## **Use a Feasibility Analysis Matrix!**

- The columns correspond to the candidate solutions;
- The rows correspond to the feasibility criteria;
- The cells contain the feasibility assessment notes for each candidate;
- Each row can be assigned a rank or score for each criterion
  - e.g., for operational feasibility, candidates can be ranked 1, 2, 3, etc.
- A final ranking or score is recorded in the last row.

## **Other evaluation criteria to include in the matrix**

- quality of output
- ease of use
- vendor support
- cost of maintenance
- load on system



# EXAMPLE MATRIX

	Candidate 1 Name	Candidate 2 Name	Candidate 3 Name
Description			
Operational Feasibility			
Technical Feasibility			
Schedule Feasibility			
Economic Feasibility			
Ranking			



<b>Feasibility Criteria</b>	<b>Wt.</b>	<b>Candidate 1</b>	<b>Candidate 2</b>	<b>Candidate 3</b>	<b>Candidate I</b>
<b>Operational Feasibility</b>	<b>30 %</b>	<b>Score: 60</b>	<b>Score: 100</b>	<b>Score: 100</b>	
<b>Technical Feasibility</b>	<b>30%</b>	<b>Score: 50</b>	<b>Score: 95</b>	<b>Score: 100</b>	
<b>Economic Feasibility</b>  <b>Cost to develop:</b>  <b>Payback period (discounted):</b>  <b>Net present value:</b>  <b>Detailed calculations:</b>	<b>30%</b>	Approximately \$350,000.  Approximately 4.5 years.  Approximately \$210,000.  See Attachment A.  <b>Score: 60</b>	Approximately \$418,040.  Approximately 3.5 years.  Approximately \$306,748.  See Attachment A.  <b>Score: 85</b>	Approximately \$400,000.  Approximately 3.3 years.  Approximately \$325,500.  See Attachment A.  <b>Score: 90</b>	
<b>Schedule Feasibility</b>  An assessment of how long the solution will take to design and implement.	<b>10%</b>	Less than 3 months.  <b>Score: 95</b>	9-12 months  <b>Score: 80</b>	9 months  <b>Score: 85</b>	
<b>Ranking</b>	<b>100%</b>	<b>60.5</b>	<b>92</b>	<b>83.5</b>	

# THE YARDSTICK APPROACH

Comparison of alternatives

Organize comparison by topic OR by complete subject