

Software Project Management



Chapter Two Project evaluation and programme management

Main topics to be covered

- The business case for a project
- Project portfolios
- Project evaluation
 - Cost benefit analysis
 - Cash flow forecasting
- Programme management
- Benefits management

The business case

- **Feasibility studies** can also act as a 'business case'
- Provides a **justification** for starting the project
- Should show that the **benefits** of the project will exceed development, implementation and operational costs
- Needs to take account of business **risks**

Contents of a business case

1. Introduction/
background
2. The proposed project
3. The market
4. Organizational and
operational
infrastructure
5. The benefits
6. Outline
implementation plan
7. Costs
8. The financial case
9. Risks
10. Management plan

Content of the business case

- **Introduction/background:** describes a problem to be solved or an opportunity to be exploited
- **The proposed project:** a brief outline of the project scope
- **The market:** the project could be to develop a new product (e.g. a new computer game). The likely demand for the product would need to be assessed.

Content of the business case - continued

- **Organizational and operational infrastructure:** How the organization would need to change. This would be important where a new information system application was being introduced.
- **Benefits** These should be express in financial terms where possible. In the end it is up to the client to assess these – as they are going to pay for the project.

Content of the business case - continued

- **Outline implementation plan:** how the project is going to be implemented. This should consider the disruption to an organization that a project might cause.
- **Costs:** the implementation plan will supply information to establish these
- **Financial analysis:** combines costs and benefit data to establish value of project

Project portfolio management (PPM)

The concerns of project portfolio management include:

- Evaluating proposals for projects
- Assessing the risk involved with projects
- Deciding how to share resources between projects
- Taking account of dependencies between projects
- Removing duplication between projects
- Checking for gaps

Project portfolio management - continued

There are three elements to PPM:

1. Project portfolio definition

- Create a central record of all projects within an organization
- Must decide whether to have ALL projects in the repository or, say, only ICT projects
- Note difference between **new product development** (NPD) projects and renewal projects e.g. for process improvement

ICT-Information and communication technology

Project portfolio management - continued

2. Project portfolio management

Actual costing and performance of projects can be recorded and assessed

3. Project portfolio optimization

Information gathered above can be used achieve better balance of projects e.g. some that are risky but potentially very valuable balanced by less risky but less valuable projects

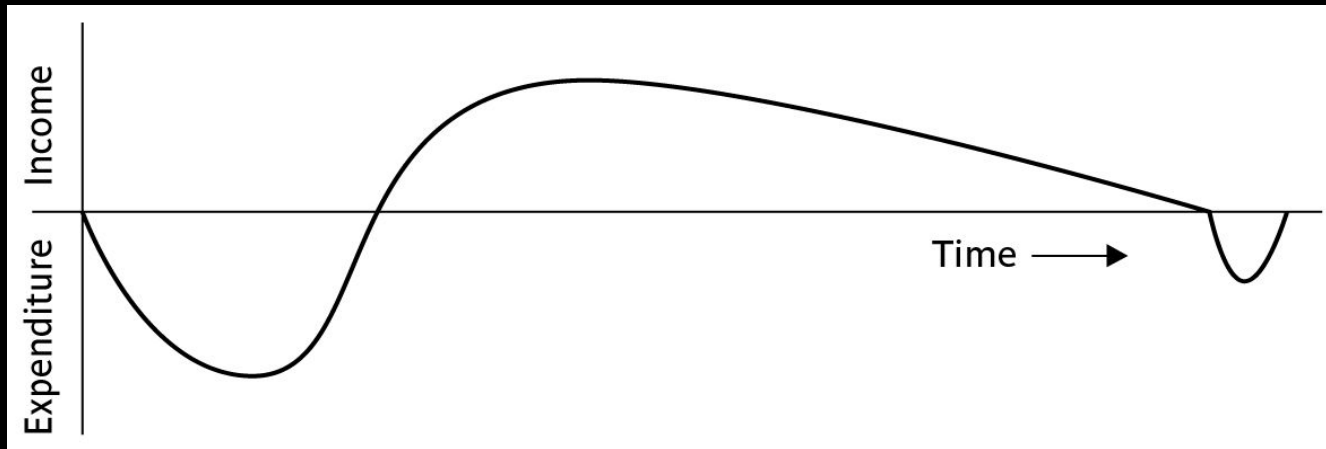
You may want to allow some work to be done outside the portfolio e.g. quick fixes

Cost benefit analysis (CBA)

This relates to an individual project. You need to:

- Identify all the costs which could be:
 - Development costs
 - Set-up
 - Operational costs
- Identify the value of benefits
- Check benefits are greater than costs

Product life cycle cash flows



- The timing of costs and income for a product or system needs to be estimated.
- The development of the project will incur costs.
- When the system or product is released it will generate income that gradually pays off costs
- Some costs may relate to decommissioning – think of demolishing a nuclear power station.

Net profit

Year	Cash-flow
0	-100,000
1	10,000
2	10,000
3	10,000
4	20,000
5	100,000
Net profit	50,000

‘Year 0’ represents all the costs before system is operation

‘Cash-flow’ is value of income less outgoing

Net profit value of all the cash-flows for the lifetime of the application

TABLE: A

Year	Project 1	Project 2	Project 3	Project 4
0	-100,000	-1,000,000	-100,000	-120,000
1	10,000	200,000	30,000	30,000
2	10,000	200,000	30,000	30,000
3	10,000	200,000	30,000	30,000
4	20,000	200,000	30,000	30,000
5	100,000	300,000	30,000	75,000
Net Profit	50,000	100,000	50,000	75,000

Pay back period

This is the time it takes to start generating a surplus of income over outgoings. What would it be below?

Year	Cash-flow	Accumulated
0	-100,000	-100,000
1	10,000	-90,000
2	10,000	-80,000
3	10,000	-70,000
4	20,000	-50,000
5	100,000	50,000

Exercise:

Consider the four projects' cash flow given in TABLE: A and calculate the payback period for each of them.

Ans.

Project 1 ----- 5yrs

Project 2 ----- 5

Project 3 ----- 4

Project 4 ----- 4

Pay back period....cont

Advantages:

1. Simple to calculate
2. Not sensitive to small forecasting errors

Disadvantages:

1. Ignores the overall profitability
2. Totally ignores any income after breakeven.
(project 2 and 4 are better than project 3)

Return on investment (ROI)

$$\text{ROI} = \frac{\text{Average annual profit}}{\text{Total investment}} \times 100$$

In the previous example of project 1

- average annual profit
= 50,000/5
= 10,000
- ROI = (10,000/100,000) X 100 = 10%

It provides a way of comparing the net profitability to the investment required..

Exercise:

Calculate the ROI for each of the other projects shown in TABLE: A and decide which, on the basis of criterion, is the most worthwhile.

Ans.

Project 1 10%

Project 2 2%

Project 3 10%

Project 4 12.5%

Return on investment.... Cont.

- Advantage

The return on investment provides a simple, easy-to-calculate measure of return on capital.

- Disadvantage

1. It takes no account of timing of the cash flow.
2. The rate of return bears no relationship to the interest rates charged by banks.
3. It is potentially very misleading.

Net present value

Would you rather I gave you Rs. 1,000 today or in 12 months time?

If I gave you Rs. 1,000 now you *could* put it in savings account and get interest on it.

If the interest rate was 10% how much would I have to invest now to get Rs. 1,000 in a year's time?

This figure is the *net present value* of Rs. 1,000 in one year's time

The annual rate by which we discount future earnings is known as *discount rate 10%*.

- The present value of Rs. 1,000 in a year's time is Rs. 910 i.e. Rs. 1000 in a year's time is the equivalent of Rs. 910 now.
- Rs. 1,000 received in two year's time would have a present value of approximately Rs. 830 i.e. Rs. 830 invested at the annual interest rate of 10% would yield approximately Rs. 1,000 in two years time.

For any future cash flow

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

Discount factor

$$\text{Discount factor} = 1/(1+r)^t$$

r is the interest rate (e.g. 10% is 0.10)

t is the number of years

In the case of 10% rate and one year

$$\text{Discount factor} = 1/(1+0.10) = 0.9091 \sim 0.91$$

In the case of 10% rate and two years

$$\text{Discount factor} = 1/(1.10 \times 1.10) = 0.8294 \sim 0.83$$

Applying discount factors (10%)

TABLE: C

Year	Cash-flow (Project-1)	Discount factor	Discounted cash flow
0	-100,000	1.0000	-100,000
1	10,000	0.9091	9,091
2	10,000	0.8264	8,264
3	10,000	0.7513	7,513
4	20,000	0.6830	13,660
5	100,000	0.6209	62,090
Net profit	50,000	NPV	618

Exercise:

Assuming 10% discount rate, the NPV for project (TABLE: A) would be calculated as in TABLE: C. The net present value (NPV) for project 1 (TABLE:C), using 10% discount rate, is therefore Rs. 618. Using a 10% discount rate, calculate the NPV for project 2, 3 and 4 and decide which, on the basis of this, is the most beneficial to pursue.

Note: Refer to TABLE: A (slide no. 14).

Answer:

Year	Discount factor	Discounted cash flow (Rs.)		
		Project 2	Project 3	Project 4
0	1.00	-1,000,000	-100,000	-120,000
1	0.90	181,820	27,273	27,273
2	0.82	165,280	24,792	24,792
3	0.75	150,260	22,539	22,539
4	0.68	136,600	20,490	20,490
5	0.62	186,270	18,627	46,568
NPV		-179,770	13,721	21,662

Exercise:

Calculate the NPV for each of the projects A, B and C shown in table below using each of the discount rate 8%, 10% and 12%. For each of the discount rate, decide which is the best project. What can you conclude from these results?

Year	Project A (Rs)	Project B (Rs)	Project C (Rs)
0	-8,000	-8,000	-10,000
1	4,000	1,000	2,000
2	4,000	2,000	2,000
3	2,000	4,000	6,000
4	1,000	3,000	2,000
5	800	9,000	2,000
6	500	-6,000	2,000
Net Profit	4,000	5,000	6,000

NPV Discount Factors

TABLE: D

Year	Discount rate (%)		
	8%	10%	12%
1	0.9256	0.9091	0.8929
2	0.8573	0.8264	0.7972
3	0.7938	0.7513	0.7118
4	0.7350	0.6830	0.6355
5	0.6808	0.6209	0.5674
6	0.6302	0.5645	0.5066

TABLE: B (Effect on NPV of varying the discount rate)

Year	Cash flow values (Rs.)		
	Project A	Project B	Project C
0	-8,000	-8,000	-10,000
1	4,000	1,000	2,000
2	4,000	2,000	2,000
3	2,000	4,000	6,000
4	1,000	3,000	2,000
5	500	9,000	2,000
6	500	-6,000	2,000
Net profit	4,000	5,000	6,000
NPV @ 8%	2,111	2,365	2,421
NPV @ 10%	1,720	1,818	1,716
NPV @ 12%	1,356	1,308	1,070

Internal rate of return

- Internal rate of return (IRR) is the discount rate that would produce an NPV of 0 for the project
- Can be used to compare different investment opportunities
- There is a Microsoft Excel function which can be used to calculate

Dealing with uncertainty: Risk evaluation

- project A might appear to give a better return than B but could be riskier
- Could draw up draw a project risk matrix for each project to assess risks – see next overhead
- For riskier projects could use higher discount rates

Example of a project risk matrix

Risk	Importance	Likelihood
Client rejects proposed look and feel of site	H	—
Competitors undercut prices	H	M
Warehouse unable to deal with increased demand	M	L
Online payment has security problems	M	M
Maintenance costs higher than estimated	L	L
Response times deter purchasers	M	M

TABLE 2.5 A fragment of a basic project/business risk matrix for an e-commerce application

Cost-benefit analysis

BuyRight's income forecast

Sales	Annual sales income (Rs.) <i>i</i>	Probability <i>p</i>	Expected value (Rs.) <i>i X p</i>
High	800,000	0.1	80,000
Medium	650,000	0.6	390,000
Low	100,000	0.3	30,000
Expected income			500,000

Development costs are estimated = Rs. 750,000

Sales levels are expected to be constant for 4 years

Annual marketing and product maintenance cost = Rs. 200,000

Would you advise going ahead with the project?

Expected sales per year = Rs. 500,000

Annual costs per year = Rs. 200,000

Expected net income / year = Rs. 300,000

-do- for 4 years = $300,000 \times 4 = 1,200,000$

Investment (development cost) = Rs. 750,000

Expected profit = Rs. 450,000

If sales will drop what happens to the benefits and costs?

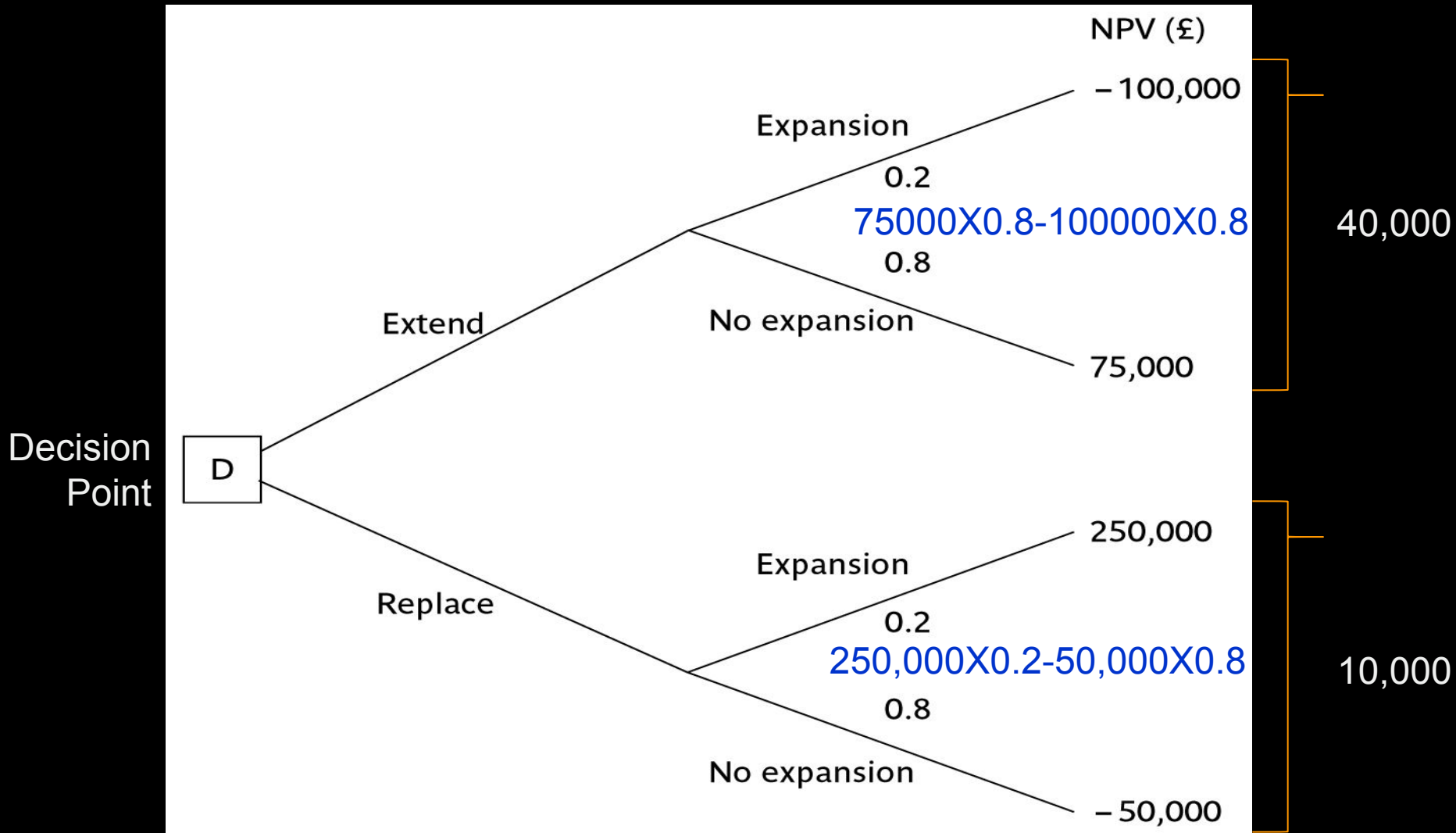
Then go for,

Risk profile analysis – sensitivity analysis

How a decision will affect future profitability of the project?

Decision trees

BuyRight software house



The company should therefore choose the option of extending the existing system

Programme management

- One definition:
‘a group of projects that are managed in a co-ordinated way to gain benefits that would not be possible were the projects to be managed independently’ Ferns

Programmes may be

- **Strategic** (e.g. merging two organization's computer system)
- **Business cycle programmes** (undertake the project within a particular planning cycle. Budgets and accounting period)
- **Infrastructure programmes** (different projects under one dept. Will require different distinct databases and information system) highway maintenance, refuse collection, education
- **Research and development programmes** (development of new product -risk of failure and potential returns, safe projects- where product is not radically different)
- **Innovative partnerships** (collaborative work on new technology in a 'pre-competitive' phase)

Programme managers versus project managers

Programme manager

- Many simultaneous projects
- Personal relationship with skilled resources
- Optimization of resource use
- Projects tend to be seen as similar

Project manager

- One project at a time
- Impersonal relationship with resources
- Minimization of demand for resources
- Projects tend to be seen as unique

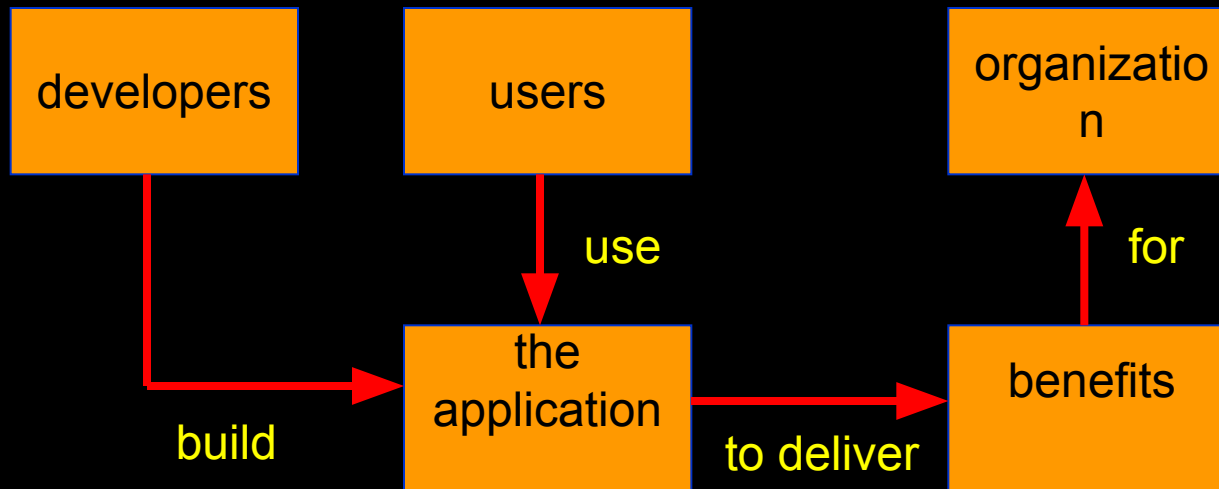
Strategic programmes

- Based on OGC approach
- Initial planning document is the **Programme Mandate** describing
 - The new services/capabilities that the programme should deliver
 - How an organization will be improved
 - Fit with existing organizational goals
- A **programme director** appointed a champion for the scheme

Next stages/documents

- **The programme brief** – equivalent of a feasibility study: emphasis on costs and benefits
- **The vision statement** – explains the new capability that the organization will have
- **The blueprint** – explains the changes to be made to obtain the new capability

Benefits management



- Providing an organization with a capability does not guarantee that this will provide benefits envisaged – need for *benefits management*
- This has to be outside the project – project will have been completed
- Therefore done at *programme level*

Benefits management

To carry this out, you must:

- Define expected benefits
- Analyse balance between costs and benefits
- Plan how benefits will be achieved
- Allocate responsibilities for their achievement
- Monitor achievement of benefits

Benefits

These might include:

- Mandatory requirement
- Improved quality of service
- Increased productivity
- More motivated workforce
- Internal management benefits

Benefits - continued

- Risk reduction
- Economies
- Revenue enhancement/acceleration
- Strategic fit

Quantifying benefits

Benefits can be:

- Quantified and valued e.g. a reduction of x staff saving £ y
- Quantified but not valued e.g. a decrease in customer complaints by $x\%$
- Identified but not easily quantified – e.g. public approval for a organization in the locality where it is based

Remember!

- A project may fail not through poor management but because it should never have been started
- A project may make a profit, but it may be possible to do something else that makes even more profit
- A real problem is that it is often not possible to express benefits in accurate financial terms
- Projects with the highest potential returns are often the most risky