

Day 2



EVALUATION

What are the four things against which we should evaluate an innovative idea?

What are the four risks against which we should evaluate an innovative idea?

1. Financial or Commercial risk (TODAY)
2. Technical risk
3. Commercial risk
4. Company strategic fit risk

Your company

- what process does your company follow?
- what tools does your company use to financially evaluate an idea or opportunity or investment?
- what are the 'hurdle rates'?

10 minutes

Why is knowing this important?

Cost Benefit Analysis

- finds, quantifies, and adds all the positive factors.
- identifies, quantifies, and subtracts all the negatives

The difference between the two indicates whether the planned action is advisable.

The real trick to doing a cost benefit analysis well is making sure you include all the costs and all the benefits and properly quantify them.

Cost Benefit Analysis – Financial calculators

- Net present value (NPV)
- Return on investment (ROI)
- Internal rate of return (IRR)
- Payback or Breakeven

Cost Benefit Analysis – Financial calculators

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Are the project future cash flows certain or uncertain?

Cost Benefit Analysis – Financial calculators

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Are the project future cash flows certain or uncertain?

- Risk-adjusted discount rate (RADR)
- Certainty co-efficients (CE)
- Capital asset pricing model (CAPM)
- Weighted average cost of capital (WACC)

Cost Benefit Analysis – Financial calculators

- Net present value (NPV)
- Return on investment (ROI)
- Internal rate of return (IRR)
- Payback or Breakeven

Are the project future cash flows certain or uncertain?

- Risk-adjusted discount rate (RADR)
- Certainty co-efficients (CE)
- Capital asset pricing model (CAPM)
- Weighted average cost of capital (WACC)

‘Super’ uncertain or sensitivity analysis

- Monte Carlo simulation (random)
- Fixed percentage increases (trigger points)

Net Present Value

What is it?

Net Present Value

The total present value (PV) of a time series of cash flows.

It is a standard method for using the time value of money to appraise long-term projects.

NPV is an indicator of how much value an investment or project adds to the firm

Net Present Value

In English....

Bank investment

- \$1000 for 1 year at 10% =

Net Present Value

In English....

Bank investment

- \$1000 for 1 year at 10% = \$1100

Future money

- In today's value what is \$1100 worth in 1 year?

Net Present Value

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

Where

CO = initial investment (\$)

C = annual cash flows (\$)

t = time period (years, where year 1 = 0)

r = rate of return or cost of capital (%)

Net Present Value

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

Where

CO = initial investment (\$)

C = annual cash flows (\$)

t = time period (years, where year 1 = 0)

r = rate of return or cost of capital (%)

Apply to Bank investment example (use Excel)
\$1000 for 1 year at 10% = \$1100

Net Present Value

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

Where

CO = annual capital investment (\$)

C = annual cash flows (\$)

t = time period (years, where year 1 = 0)

r = rate of return or cost of capital (%)

Apply to Bank investment example (use Excel)
\$1000 for 1 year at 10%

Financial Evaluation - NPV

\$1000 in a bank for 1 year at 10%

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

$$IRR = 0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - CO$$

NPV discount rate = 10%

NPV = \$ -

NPV Calc area

Investment	-1,000	0
Return	0	1,100
Cost of Capital	10%	10%
PV		1000

Project Alpha

Calendar Year	2009	2010	2011	2012
End of notional year	0	1	2	3

Capital Flows

Capital Outlay	-1,000
Upgrade	
After-tax salvage value	1,000

Operating flows

Sales income	100
Net cash flow	1,100

Net Present Value

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

Where

CO = annual capital investment (\$)

C = annual cash flows (\$)

t = time period (years, where year 1 = 0)

r = rate of return or cost of capital (%)

Apply to Bank investment example (use Excel)
\$1000 for 1 year at 10% now with 30% tax

Financial Evaluation - NPV

\$1000 in a bank for 1 year at 10%

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

$$IRR = 0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - CO$$

NPV discount rate = 10%

NPV = -\$ 27.27

NPV Calc area

Investment	-1,000	0
Return	0	1,070
Cost of Capital	10%	10%
PV		973

Project Alpha

Calendar Year	2009	2010	2011	2012
End of notional year	0	1	2	3

Capital Flows

Capital Outlay	-1,000
Upgrade	
After-tax salvage value	1,000

Operating flows

Sales income	100
Taxable income	100
Tax payable (@30%)	30
Net income	70
Cash flow: operations	
Net cash flow	1,070

Net Present Value

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

Where

CO = annual capital investment (\$)

C = annual cash flows (\$)

t = time period (years, where year 1 = 0)

r = rate of return or cost of capital (%)

Apply to Bank investment example (use Excel)
\$1000 for 5 years at 10% and reinvest each year

Financial Evaluation - NPV

\$1000 in a bank for 5 years at 10%

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

$$IRR = 0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - CO$$

NPV discount rate = 10%

NPV = -\$ 890.89

NPV Calc area

Investment (PV)	-1,000	-32	-23	-19	-17	
Return	0	0	0	0	0	1,102
Cost of Capital	10%	10%	10%	10%	10%	10%
PV		0	0	0	0	200

Project Alpha

Calendar Year	2009	2010	2011	2012	2013	2014
End of notional year	0	1	2	3	4	5

Capital Flows

Capital Outlay	-1,000					
Upgrade		-70	-77	-85	-93	
After-tax salvage value						1,000

Operating flows

Sales income		100	107	115	123	132
Taxable income		100	107	115	123	132
Tax payable (@30%)		30	30	30	30	30
Net income		70	77	85	93	102
Cash flow: operations						
Net cash flow		0	0	0	0	1,102

Industry Example

One of you has identified an idea and undertaken some preliminary trials that were successful. What should happen next?

Data....

Industry Example

One of you has identified an idea and undertaken some preliminary trials that were successful. What should happen next?

Data....

- Graduate \$250k/3yrs (1 yr completed)
- Trial costs to date are \$5k
- Potential company savings of \$50k/yr
- Estimated R&D costs \$70k over 2 yrs
 - Year 1 \$50k
 - Year 2 \$20k
- Unit cost estimated at \$10k to make
 - Maintenance costs of \$2,000
 - \$500 labour
 - \$1,500 spares
 - Industry market size 65 units
 - 5%, 30%, 45%, 15%, 5%
 - Units depreciate over 10 years
 - Commercialisation costs = \$15k/yr
 - Cost of capital MLA(0), Processor (8%), Commercialiser (12%)
 - Cost of buying IP = \$50k

Financial Evaluation - NPV

Graduate Idea - Processor

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

NPV discount rate =

NPV =

NPV Calc area

Investment (PV)
Return
Cost of Capital
PV

Project Alpha

Calendar Year

End of notional year

Capital Flows

Graduate Costs

R&D Costs

After-tax salvage value

Operating flows

Sales income

Other cost

Total cost

Depreciation initial

Depreciation upgrade

Taxable income

Tax payable (@30%)

Net income

Net cash flow

Graduate Idea - Commercialiser

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

NPV discount rate =

NPV =

NPV Calc area

Investment (PV)
Return
Cost of Capital
PV

Project Alpha

Calendar Year

End of notional year

Capital Flows

Buy IP

Operating flows

Forecast sales units

Unit selling price (15%)

Spare parts income

Spare parts profit (30%)

Total income

Unit cost

Production cost

Other cost

Total cost

Taxable income

Tax payable (@30%)

Net income

Net cash flow

Graduate Idea - MLA

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

NPV discount rate =

NPV =

NPV Calc area

Investment (PV)
Return
Cost of Capital
PV

Project Alpha

Calendar Year

End of notional year

Capital Flows

Graduate Costs

R&D Costs

Operating flows

Forecast sales units

Unit selling price (15%)

Maintenance costs

Spare parts profit (30%)

Total Industry Cost

Unit cost

Industry benefit

Taxable income

Tax payable (@30%)

Net income

Net cash flow

Financial Evaluation - NPV

Graduate Idea - Commercialiser

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

$$IRR = 0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - CO$$

NPV discount rate = 12%

NPV = \$ 3,887.83

NPV Calc area

Investment (PV)	-50,000	0	0	0	0						
Return	-7,350	11,445	27,195	16,380	39,585	19,425	19,425	19,425	29,925	29,925	29,925
Cost of Capital	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%
PV		10219	12141	4875	8836	3469	2891	2478	3340	2969	2672

Project Alpha

Calendar Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
End of notional year	0	1	2	3	4	5	6	7	8	9	10

Capital Flows

Buy IP -50,000

Operating flows

Forecast sales units	3	20	29	10	33						
Unit selling price (15%)	11,500	11,500	11,500	11,500	11,500						
Spare parts income		4,500	34,500	78,000	73,500	142,500	142,500	142,500	142,500	142,500	142,500
Spare parts profit (30%)		1,350	10,350	23,400	22,050	42,750	42,750	42,750	42,750	42,750	42,750
Total income	34,500	231,350	343,850	138,400	401,550	42,750	42,750	42,750	42,750	42,750	42,750
Unit cost	-30,000	-200,000	-290,000	-100,000	-330,000	0	0	0	0	0	0
Production cost											
Other cost	-15,000	-15,000	-15,000	-15,000	-15,000	-15,000	-15,000	-15,000			
Total cost	-45,000	-215,000	-305,000	-115,000	-345,000	-15,000	-15,000	-15,000	0	0	0
Taxable income	-10,500	16,350	38,850	23,400	56,550	27,750	27,750	27,750	42,750	42,750	42,750
Tax payable (@30%)	-3,150	4,905	11,655	7,020	16,965	8,325	8,325	8,325	12,825	12,825	12,825
Net income	-7,350	11,445	27,195	16,380	39,585	19,425	19,425	19,425	29,925	29,925	29,925
Net cash flow	-57,350	11,445	27,195	16,380	39,585	19,425	19,425	19,425	29,925	29,925	29,925

Financial Evaluation - NPV

Graduate Idea - MLA

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

$$IRR = 0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - CO$$

NPV discount rate = 0%

NPV = \$2,144,559

NPV Calc area

Investment (PV)	-88,333	-66,667	-34444	0	0							
Return	0	0	0	80,850	639,800	1,554,350	2,016,700	2,990,750	3,192,000	3,192,000	3,192,000	
Cost of Capital	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
PV		0	0	26950	159950	310870	336117	427250	399000	354667	319200	

Project Alpha

Calendar Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
End of notional year	0	1	2	3	4	5	6	7	8	9	10

Capital Flows

Graduate Costs	-83,333	-83,333	-83,333								
R&D Costs	-5,000	-50,000	-20,000								

Operating flows

Forecast sales units	0	0	0	3	20	29	10	33			
Unit selling price (15%)	0	0	0	11,500	11,500	11,500	11,500	11,500			
Maintenance costs		0	0		6,000	46,000	104,000	98,000	190,000	190,000	190,000
Spare parts profit (30%)		0	0		0	0	0	0	0	0	0
Total Industry Cost	0	0	0	-34,500	-236,000	-379,500	-219,000	-477,500	-190,000	-190,000	-190,000
Unit cost	0	0	0	0	0	0	0	0	0	0	0
Industry benefit				150,000	1,150,000	2,600,000	3,100,000	4,750,000	4,750,000	4,750,000	4,750,000
Taxable income	0	0	0	115,500	914,000	2,220,500	2,881,000	4,272,500	4,560,000	4,560,000	4,560,000
Tax payable (@30%)	0	0	0	34,650	274,200	666,150	864,300	1,281,750	1,368,000	1,368,000	1,368,000
Net income	0	0	0	80,850	639,800	1,554,350	2,016,700	2,990,750	3,192,000	3,192,000	3,192,000
Net cash flow	-88,333	-133,333	-103,333	80,850	639,800	1,554,350	2,016,700	2,990,750	3,192,000	3,192,000	3,192,000

Industry Example

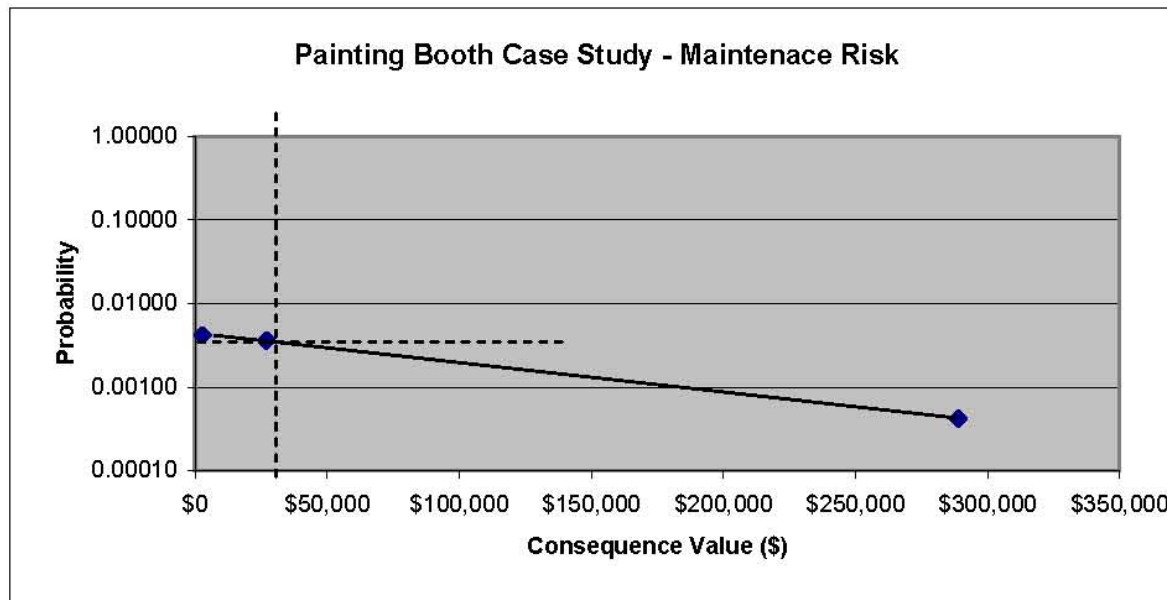
BLADESTOP

What are the issues if you are a processor with undertaking an evaluation on this type of project?

Uncertain cash flow theory (insurance projects)

	Consequence		
	Most Likely	Moderately Likely	Least Likely
Number of operational years =	5	15	25
Number of Events =	2	1	1
Number of breakdowns/week =	2	2	2
Number of weeks/year operating =	48	48	48
Probability =	0.00417	0.00360	0.00042
Consequence Cost =	\$2,836	\$27,000	\$288,925
Risk cost per annum =	\$11.82	\$97.20	\$120.39

Table 1 - Consequence costs



What are the four risks against which we should evaluate an innovative idea?

1. Financial or Commercial risk (TODAY)
2. Technical risk
3. Commercial risk
4. Company strategic fit risk

Technical Evaluation

1 Likelihood of technical success													0.77
1.1	Technical gap	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input checked="" type="radio"/> 9 <input type="radio"/> 10								9	0.45	4.05	
		Many poorly understood technical hurdles	Many well defined technical hurdles	Achievable challenge - a few technical hurdles, well-defined	Straight forward								
1.2	Program complexity	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input checked="" type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10								6	0.45	2.70	
		Many interacting groups, complex organisational structure and large number of interacting tasks	Many interacting groups or large number of interacting tasks	Moderate number of interacting groups and tasks	Few interacting groups and few tasks								
1.3	Fit with skills, knowledge and infrastructure	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input checked="" type="radio"/> 9 <input type="radio"/> 10								9	0.10	0.90	
		Most required skills, facilities and equipment are new to the research provider	Needs a significant number of skills, facilities or equipment new to the research provider	Needs supplementary skills, facilities or equipment	All skills, facilities and equipment are in place								


Commercial Evaluation

2 Likelihood of commercial success								0.53
2.1 Barriers - social, cultural, political, regulatory	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input checked="" type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				6	0.50	3.00	
	Substantial barriers	Some significant barriers	Some minor barriers	High congruence with environmental, social and political norms				
2.2 Strength of relevant customer/partner relationships	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input checked="" type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				7	0.20	1.40	
	No current significant managerial or technical relationships with any lead users	Weak managerial and technical / commercial relationships with lead user(s)	Strong, positive managerial or technical/ commercial relationships with one or more lead users	Strong, positive managerial and technical / commercial relationships with one or more lead users				
2.3 Time to implementation	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				0	0.20	0.00	From NPV 1.0
	>10 years	6-8 years	3-5 years	<1 year				
2.4 Definition of product & delivery systems	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input checked="" type="radio"/> 9 <input type="radio"/> 10				9	0.10	0.90	
	No product or delivery systems are documented	Product and delivery systems are documented in outline only	All relevant product and delivery systems clearly defined and documented in detail for most attributes	All relevant product and delivery systems completely and clearly defined and documented in detail				

Commercial Evaluation

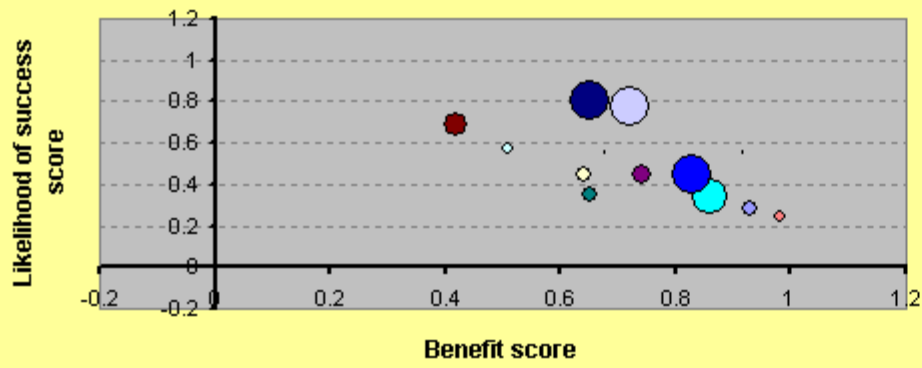
3 Benefit									0.58
3.1	Customer payback time (years)	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input checked="" type="radio"/> 10				10	0.40	4.00	From NPV
		>3years	2-3 years	1 - 2 years	<1 year				1.0
3.2	Labour productivity	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input checked="" type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				4	0.20	0.80	Eff. calc'n
		No improvement	0.5% improvement	2% improvement	5% improvement				0.0%
3.3	Risk reduction	<input type="radio"/> 1 <input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				3	0.30	0.90	Risk check
		Little positive effect or reduces only LOW risk elements	Reduces the number of MODERATE risk elements by 1 or more	Reduces the number of SIGNIFICANT risk elements by 1 or more	Reduces the number of HIGH risk elements by 1 or more				
3.4	NPV (\$K)	<input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10				1	0.10	0.10	NPV(\$K)
		1,000	34,000	67,000	100,000				-1,512

Commercial Evaluation

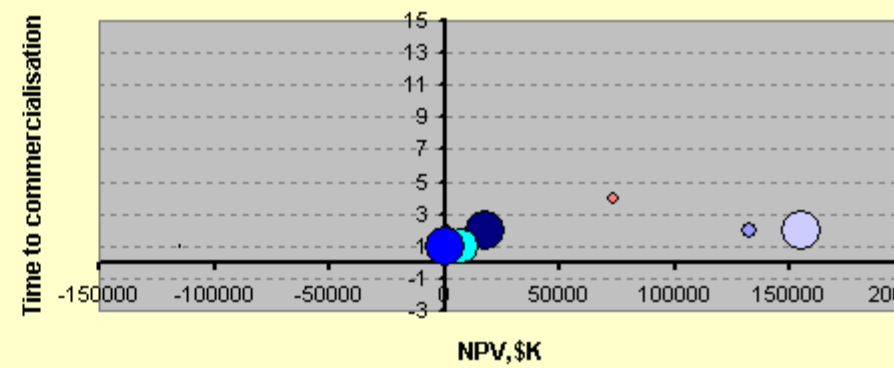
4 Strategic fit									1.00	
4.1	Fit	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input checked="" type="radio"/> 10				10	1.00	10.00	Fit calc'n	10
		Marginal effect on two or fewer strategies	Contributes to one major strategy or marginally effects to three major strategies	Contributes to two major strategies	Enables one major strategy or contributes to three major strategies					
7 Type							%			
7.1	Basic research	Enter the % of this component within the whole project ==>>					30%			
7.2	Development	Enter the % of this component within the whole project ==>>					70%			
7.3	Technical service	Enter the % of this component within the whole project ==>>					0%			
7.4	Commercialisation	Enter the % of this component within the whole project ==>>					0%			
7.5	Support	Residual = the % of this component within the whole project ==>>					0%			

Go to Navigator

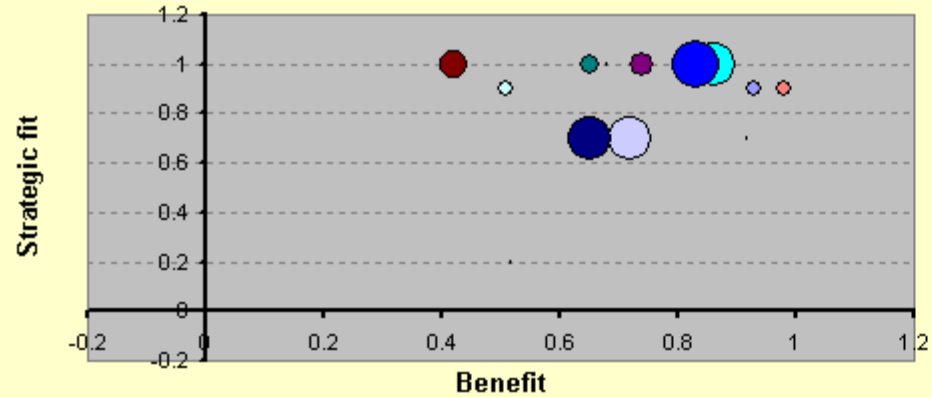
Likely to have value? (Bubble = total cost)



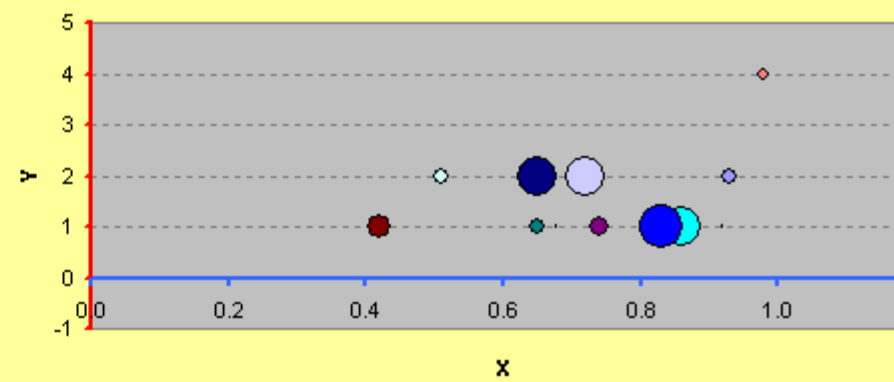
Is the return worth the wait? (Bubble = total cost)



Is the strategic fit appropriate? (Bubble = total cost)



Variable graph (Bubble = total cost)



Y axis:
Time to commerc-ialisation (yrs)

X axis:
Benefit (0-1)