Module No. 2

INITIATING PROJECTS

by

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Organizations Handling Multiple Projects

- It becomes difficult for smaller projects to get adequate support, or even the attention of senior management.
- Three particularly common problems in organizations trying to manage multiple projects are:

1. Delays in one project cause delays in other projects because of common resource needs or technological dependencies.
2. The inefficient use of corporate resources results in peaks and valleys of resource utilization.
3. Bottlenecks in resource availability or lack of required technological inputs result in project delays that depend on those scarce resources or technology.

Facts Observed in Research Study

- 30% of projects are canceled midstream, and over half of completed projects came in up to 190% over budget and 220% late.
- The primary motivation of organizations to improve and expand their project management processes was due to major troubled or failed projects, new upcoming mega-projects, or to meet competition or maintain their market share.

Selection of Projects

- As every organization has an appropriate mission statement and strategy, projects must be selected that are consistent with the strategic goals of the organization.
- Project selection is the process of evaluating individual projects or groups of projects and then choosing to implement some set of them so that the objectives of the parent organization will be achieved.
- Because considerable uncertainty may surround one's initial notions of precisely how most projects will be carried out, what resources will be required, and how long it will take to complete the project, risk analysis must be introduced into the selection process.
- Project Portfolio Process is process of selecting for implementation the set of projects that best meets the strategic goals of the organization.

Projects Selection Models

- When a firm chooses a project selection model, the following criteria, are most important.
- **Realism** The model should reflect the reality of the firm's decision situation, especially the multiple objectives of both the firm and its managers, bearing in mind that without a common measurement system, direct comparison of different projects is impossible. The model should also take into account the realities of the firm's limitations on facilities, capital, personnel, and so forth, and include factors that reflect project technical and market risks: performance, cost, time, customer rejection, and implementation.
- **Capability** The model should be sophisticated enough to deal with the relevant factors: multiple time periods, situations both internal and external to the project (e.g., strikes, interest rate changes), and so on.
- **Flexibility** The model should give valid results within the range of conditions that the firm might experience. It should be easy to modify in response to changes in the firm's environment; for example, tax law changes, new technological advancements that alter risk levels, and, above all, organizational goal changes.
- **Ease of use** The model should be reasonably convenient, not take a long time to execute, and be easy to use and understand. It should not require special interpretation, data that are difficult to acquire, excessive personnel, or unavailable equipment.
- **Cost** Data-gathering and modeling costs should be low relative to the cost of the project and less than the potential benefits of the project. All costs should be considered, including the costs of data management and of running the model.
- **Easy computerization** It should be easy and convenient to gather and store the information in a computer database, and to manipulate data in the model through use of a widely available, standard computer package such as Excel.

Types of Projects Selection Models

- There are two basic types of project selection models, numeric and nonnumeric.
- Many organizations use both at the same time, or they use models that are combinations of the two.
- Non-numeric models, as the name implies, do not use numbers as inputs.
- Numeric models do, but the criteria being measured may be either objective or subjective.
- It is important to remember that the qualities of a project may be represented by numbers, and that subjective measures are not necessarily less useful or reliable than objective measures.

Projects Selection Models (Non-Numeric)

- **Sacred Cow-** Project is suggested by a senior and powerful official in the organization
- **Operating Necessity -** Project is required to keep the system running
- **Competitive Necessity -** Project is necessary to sustain a competitive position
- **Product Line Extension -** Projects are judged on how they fit with current product line, fill a gap, strengthen a weak link, or extend the line in a new desirable way.
- **Comparative Benefit Model -** Several projects are considered and the one with the most benefit to the firm is selected

Projects Selection Models (Numeric)

- Payback Period (PB)
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Profitability Index (PI)

Payback Period (PB)

- The payback method is a method of evaluating a project by measuring the time it will take to recover the initial investment.
- The payback period is the number of months or years it takes to return the initial investment.
- It can be calculated in two different situations:

1. In case of constant or equal annual cash inflows:

Payback period = cash outlays (initial investment) / annual cash inflows

2. In case of unequal annual cash inflows:

Payback period is calculated with cumulative cash inflow

$$\text{Payback period} = \text{Years before full recovery} + \frac{\text{Unrecovered cost at start of the year}}{\text{Cash flow during the year}}$$

- The payback method also ignores the cash flows beyond the payback period; thus, it ignores the long-term profitability of a project.

Example 1: The Delta company is planning to purchase a machine known as machine X. Machine X would cost $25,000 and would have a useful life of 10 years with zero salvage value. The expected annual cash inflow of the machine is $10,000. Compute payback period of machine X and conclude whether or not the machine would be purchased if the maximum desired payback period of Delta company is 3 years.

Example 2: Due to increased demand, the management of a Beverage Company is considering to purchase a new equipment to increase the production and revenues. The useful life of the equipment is 10 years and the company's maximum desired payback period is 4 years. The inflow and outflow of cash associated with the new equipment is given below:

Initial cost of equipment: $37,500

Annual cash inflows:

Sales: $75,000

Annual cash Outflows:

Cost of ingredients: $45,000
Salaries expenses: $13,500
Maintenance expenses: $1,500

Non cash expenses:

Depreciation expense: $5,000

Should the Beverage Company purchase the new equipment? Use payback method for your answer.

Example 3: The management of Health Supplement Inc. wants to reduce its labor cost by installing a new machine. Two types of machines are available in the market – machine X and machine Y. Machine X would cost $18,000 where as machine Y would cost $15,000. Both the machines can reduce annual labor cost by $3,000. Which is the best machine to purchase according to payback method?

Example 4: A Bengaluru based software development company wants to hire an IT consultant for a new software system being developed by them in-house. They expect an annual return of Rs. 3,00,000/- once their newly developed software is released in the market. The IT consultant quotes Rs. 15,00,000/- as one-time consultation charges. The company's maximum desired payback period is 3 years. Using payback method, should the software development company hire IT consultant ?

Example 5: An educational institute decides to invest in online EduTech teaching-learning system which costs Rs. 25,00,000/-. They expect a relatively constant annual inflow of 10% of their initial investment. Should the educational institute consider it worth investing in the online EduTech system if the maximum desired payback period is 7 years ? Use the payback method for calculation.

PROBLEMS

1. Two new Internet site projects are proposed to a young start-up company. Project A will cost $250,000 to implement and is expected to have annual net cash flows of $75,000. Project B will cost $150,000 to implement and should generate annual net cash flows of $52,000. The company is very concerned about their cash flow. Using the payback period, which project is better, from a cash flow standpoint?

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Example 6: An investment of $200,000 is expected to generate the following cash inflows in six years:

Year 1: $70,000
Year 2: $60,000
Year 3: $55,000
Year 4: $40,000
Year 5: $30,000
Year 6: $25,000

Compute payback period of the investment. Should the investment be made if management wants to recover the initial investment in 3 years or less ?

Example 6: An investment of $200,000 is expected to generate the following cash inflows in six years:

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$$\text{Payback period} = \text{Years before full recovery} + \frac{\text{Unrecovered cost at start of the year}}{\text{Cash flow during the year}}$$

Compute payback period of the investment. Should the investment be made if management wants to recover the initial investment in 3 years or less?

Solution:

Because the cash inflow is uneven, the payback period formula (direct) cannot be used to compute the payback period. We can compute the payback period by computing the cumulative net cash flow as follows:

Example 7: A four year financial project has net cash inflows of $20,000, $25,000, $30,000 & $50,000 respectively for each of the (next) four years. It will cost the company $75,000 to initiate the project. Using payback period method, determine whether the company should go ahead with the project or not if the company wants to recover their initial investment by the end of two (02) years.

Initial investment: $200,000

Year	Cash inflow	Cumulative cash inflow
1	$ 70,000	$ 70,000
2	60,000	130,000
3	55,000	185,000
4	40,000	225,000
5	30,000	255,000
6	25,000	280,000

*Unrecovered investment at start of 4th year:
= Initial cost – Cumulative cash inflow at the end of 3rd year
= $200,000 – $185,000
= $15,000

Payback period = 3 + (15,000*/40,000)
= 3 + 0.375
= 3.375 Years

The payback period for this project is 3.375 years which is longer than the maximum desired payback period of the management (3 years). The investment in this project is therefore not desirable.

Advantages and Disadvantages of Payback Period

Advantages	Disadvantages
Simple to understand and easy to calculate	Does not measure profitability of the project
Serves as a guide to investment policy	Does not compare projects of different economic lives
Determines solvency and liquidity of the firm	Does not consider income beyond its duration
Used for measuring profitable internal investment opportunities	Does not give weightage to timings of cash flows
Helps to rank competitive projects	Ignores relative profitability of the project
Enables reduction on capital expenditure	Ignores cost of capital and interest factors

Net Present Value (NPV)

- **Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time.**

- **NPV is used in capital budgeting & investment planning to analyze the profitability of a projected investment or project**

Net Present Value (NPV)

Discounted Cash Flow Also referred to as the net present value (NPV) method, the discounted cash flow method determines the net present value of all cash flows by discounting them by the required rate of return (also known as the *hurdle rate, cutoff rate*, and similar terms) as follows:

$$\text{NPV (project)} = A_0 + \sum_{t=1}^{n} \frac{F_t}{(1+k)^t}$$

where

F_t = the net cash flow in period t,

k = the required rate of return, and

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To include the impact of inflation (or deflation) where p_t is the predicted rate of inflation during period t, we have

$$\text{NPV (project)} = A_0 + \sum_{t=1}^{n} \frac{F_t}{(1+k+p_t)^t}$$

Net Present Value (NPV)

- **While selecting the projects, the project with higher NPV is preferred to the one with lower NPV.**
- **The NPV may be positive, zero or negative.**
- **Positive NPV: If the present value of cash inflow is greater than the present value of cash outflow, then the NPV is said to be positive.**
- **Zero NPV: If the present value of cash inflow is equal to the present value of cash outflow, then the NPV is said to be zero.**
- **Negative NPV: If the present value of cash inflow is less than the present value of cash outflow, then the NPV is said to be negative.**

Example 1: A four year financial project has net cash inflows of $20,000, $25,000, $30,000 & $50,000 respectively for each of the (next) four years. It will cost the company $75,000 to initiate the project. If the required rate of return is 0.2, then conduct a discounted cash flow calculation to calculate net present value (NPV). Based on NPV determine whether the project should be undertaken or not.

Example 2: Using discounted cash flow calculation method, calculate net present value (NPV) for an initial investment of $1,00,000 with a net cash inflow of $25,000 per year for a period of eight years, required rate of return of 15% & inflation rate of 3% per year.

Early in the life of a project, net cash flow is likely to be negative, the major outflow being the initial investment in the project, A_0. If the project is successful, however, cash flows will become positive. The project is *acceptable* if the sum of the net present values of all estimated cash flows over the life of the project is positive. A simple example will suffice. Using our $100,000 investment with a net cash inflow of $25,000 per year for a period of eight years, a required rate of return of 15 percent, and an inflation rate of 3 percent per year, we have

$$\text{NPV (project)} = -\$100{,}000 + \sum_{t=1}^{8} \frac{\$25{,}000}{(1 + 0.15 + 0.03)^t}$$

$$= \$1939$$

Because the present value of the inflows is greater than the present value of the outflow—that is, the net present value is positive—the project is deemed acceptable.

Example 3: Sahil decides to invest Rs. 10,00,000/- for opening a shop in which he expects annual net cash inflows of Rs. 1,00,000/-, Rs. 1,20,000/-, Rs. 1,50,000/-, Rs. 2,00,000/- & Rs. 2,50,000/- respectively for the next 5 years. With a 7% required rate of return, determine the feasibility of the project (to open up the shop) using the discounted cash flow method (also called the net present value – NPV). Neglect any effects of inflation or deflation.

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Example 4: Using net present value (NPV) determine the feasibility of a project in which an investment of $5,00,000 is forecasted to generate a steady annual cash inflows of $18,000 over 3 years. Annual operational costs are of $3,000 in first year which increase by 10% each year. Assume 8% required rate of return with inflation rates of 2.5%, 3.2% & 4.1% for first, second & third years respectively.

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Q.4 (A) Determine the net present value for a project that costs Rs.2,40,000/- and would yield after-tax cash flows as follows. Assume cost of capital is 10 %. **10**

Year	Cash Flow [Rs]
1	25,000
2	75,000
3	80,000
4	100,000

Comment on feasibility of project based on NPV.

Q.4 (A) Swanson Industries has four potential projects all with an initial cost of 2,000,000. The capital budget for the year will only allow Swanson industries to accept one of the four projects. Given the discount rates and the future cash flows of each project, which project should they accept using NPV method. 10

Cash Flows	Project A	Project B	Project C	Project D
First Year	500000	600000	1000000	300000
Second Year	500000	600000	800000	500000
Third Year	500000	600000	600000	700000
Fourth Year	500000	600000	400000	900000
Fifth Year	500000	600000	200000	1100000
Discount Rate	6%	9%	15%	22%

3. A four-year financial project has net cash flows of $20,000; $25,000; $30,000; and $50,000 in the next four years. It will cost $75,000 to implement the project. If the required rate of return is 0.2, conduct a discounted cash flow calculation to determine the NPV.

4. What would happen to the NPV of the above project if the inflation rate was expected to be 4 percent in each of the next four years?

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4. What would happen to the NPV of the above project if the inflation rate was expected to be 4 percent in each of the next four years?

6. A four-year financial project has estimates of net cash flows shown in the following table:

Year	Pessimistic	Most Likely	Optimistic
1	$14,000	$20,000	$22,000
2	19,000	25,000	30,000
3	27,000	30,000	36,000
4	32,000	35,000	39,000

It will cost $65,000 to implement the project, all of which must be invested at the beginning of the project. After the fourth year, the project will have no residual value.

Using the most likely estimates of cash flows, conduct a discounted cash flow calculation assuming a 20 percent hurdle rate with no inflation. (You may use either

3. Internal Rate of Return (IRR)

- Internal Rate of Return is the **interest rate that makes the Net Present Value zero**.
- It is the rate at which the sum of discounted cash inflows is equal to that of discounted cash outflows.
- Like net present value method, **internal rate of return (IRR) method** also takes into account the time value of money.
- The **minimum required rate of return** is set by management. Most of the time, it is the cost of capital of the company.
- The project is **accepted** if IRR is greater than the cost of capital.
- The project is **rejected** if IRR is less than the cost of capital.

Steps to calculate IRR (If discount rates are given)

- Select the two discount rates.
- Calculate NPVs of the investment using these two discount rates.
- Calculate the IRR using the formula:

$$IRR = R_1 + \left\{ \frac{NPV_1 \times (R_2 - R_1)}{NPV_1 - NPV_2} \right\}$$

Where R_1 = Lower discount rate

R_2 = Higher discount rate

NPV_1 = Higher NPV (derived from R_1)

NPV_2 = Lower NPV (derived from R_2)

Steps to calculate IRR (If discount rates are not given)

- STEP 1: Guess the value of r and calculate the NPV of the project at that value.
- STEP 2: If NPV is close to zero then IRR is equal to r.
- STEP 3: If NPV is greater than 0 then increase r and jump to step 5.
- STEP 4: If NPV is smaller than 0 then decrease r and jump to step 5.
- STEP 5: Recalculate NPV using the new value of r and go back to step 2.

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Where R_1 = Lower discount rate

R_2 = Higher discount rate

NPV_1 = Higher NPV (derived from R_1)

NPV_2 = Lower NPV (derived from R_2)

Example: A project requires an initial investment of $225,000 and is expected to generate the following net cash inflows:

Year 1: $95,000

Year 2: $80,000

Year 3: $60,000

Year 4: $55,000

Compute net present value of the project if the minimum desired rate of return is 12%. Recalculate NPV for 14% and compute the IRR.

$$IRR = R_1 + \left\{\frac{NPV_1 \times (R_2 - R_1)}{NPV_1 - NPV_2}\right\}$$

Solution:

$$NPV = \sum \frac{cash\ flow}{(1+i)^t} - initial\ investment$$

where:

i=Required return or discount rate

t=Number of time periods

For discount rate R1 = 12%

$$NPV1 = \frac{95000}{(1+0.12)^1} + \frac{80000}{(1+0.12)^2} + \frac{60000}{(1+0.12)^3} + \frac{55000}{(1+0.12)^4} - 225000$$

$$= \$84821.43 + \$63775.51 + \$42706.81 + \$34953.49 - \$225000$$

$$= \$1257.25$$

For discount rate R2 = 14%

$$NPV2 = \frac{95000}{(1+0.14)^1} + \frac{80000}{(1+0.14)^2} + \frac{60000}{(1+0.14)^3} + \frac{55000}{(1+0.14)^4} - 225000$$

$$= \$83333.33 + \$61557.40 + \$40498.29 + \$32564.42 - \$225000$$

$$= -\$7046.56$$

$$IRR = 12\% + \frac{1257.25 \times (14-12)\%}{1257.25-(7046.56)} = 12\% + 0.30\% = 12.30\%$$

Example 2: A person is considering investing $250,000 in a business. The cost of capital for the investment is 13%. Following cash flows are expected from the investment:

Year	$
0	(250,000)
1	50,000
2	100,000
3	200,000

Calculate the IRR for the proposed investment and interpret your answer. Assume 10% (R_1) and 20% (R_2) as discount rates.

$$IRR = R_1 + \left\{\frac{NPV_1 \times (R_2 - R_1)}{NPV_1 - NPV_2}\right\}$$

Step 2: Calculate NPVs of the investment using the 2 discount rates

Net Present Value @ 10%

$$\boldsymbol{NPV1 = \frac{50000}{(1+0.1)^1} + \frac{100000}{(1+0.1)^2} + \frac{200000}{(1+0.1)^3} - 250000 = 28362.13}$$

Net Present Value @ 20%

$$\boldsymbol{NPV2 = \frac{50000}{(1+0.2)^1} + \frac{100000}{(1+0.2)^2} + \frac{200000}{(1+0.2)^3} - 250000 = -23148.15}$$

Step 3: Calculate the IRR

$$IRR = R_1 + \left\{\frac{NPV_1 \times (R_2 - R_1)}{NPV_1 - NPV_2}\right\} = 10\% + \left\{\frac{28362.13 \times (20-10)\%}{28362.13 - (-23148.15)}\right\} = 15.51\%$$

Step 4: Interpretation

The investment should be accepted by the person because the cost of capital (i.e. 13%) is lower than the IRR of 15.5%.

Example 3: What is the internal rate of return (IRR) of an investment which involves a current outlay of Rs. 300,000 and results in an annual cash inflow of Rs. 60000 for 7 years?

Solution:

The IRR is the value of r which satisfies the following equation:

$$Cash\ Outlay = \sum_{i=1}^{n} \frac{Cash\ Inflow}{(1+r)^i}$$

Given n =7 years

Cash Outlay = Rs. 300,000

Cash Inflow = Rs. 60,000

$$300{,}000 = \frac{60000}{(1+r)^1} + \frac{60000}{(1+r)^2} + \frac{60000}{(1+r)^3} + \frac{60000}{(1+r)^4} + \frac{60000}{(1+r)^5} + \frac{60000}{(1+r)^6} + \frac{60000}{(1+r)^7}$$

The calculation of r involves a process of trial and error. We try different values of r till we find that the right-hand side of the above equation is equal to 300,000. Let us, to begin with, try r = 9%. This makes the right-hand side equal to:

$$= \frac{60000}{(1+0.09)^1} + \frac{60000}{(1+0.09)^2} + \frac{60000}{(1+0.09)^3} + \frac{60000}{(1+0.09)^4} + \frac{60000}{(1+0.09)^5} + \frac{60000}{(1+0.09)^6} + \frac{60000}{(1+0.09)^7}$$

$$= 55045.87 + 50500.8 + 46331.01 + 42505.51 + 38995.88 + 35776.04 + 32822.05$$

$$= 301977.2$$

This value is slightly higher than our target value 300,000. So we increase the value of r from 9% to 10%.

The right-hand side becomes:

$$= \frac{60000}{(1+0.10)^1} + \frac{60000}{(1+0.10)^2} + \frac{60000}{(1+0.10)^3} + \frac{60000}{(1+0.10)^4} + \frac{60000}{(1+0.10)^5} + \frac{60000}{(1+0.10)^6} + \frac{60000}{(1+0.10)^7}$$

$$= 54545.45 + 49586.78 + 45078.89 + 40980.81 + 37255.28 + 33868.44 + 30789.49$$

$$= 292105.1$$

Since this value is now less than 300,000, we conclude that the value of r lies between 9% and 10%.

Calculate the ratio of the net present value of the smaller discount rate to the net present value of the higher discount rate : 301977.2 / 594082.3 = 0.508 4.

Add the number obtained to the smaller discount rate 9 + 0.508 = 9.508

The internal rate of return (IRR), calculated in this manner, is a very close approximation to the true internal rate of return.

Hence, **IRR = 9.508%**

Advantages and Disadvantages of IRR

Advantages	Disadvantages
It considers time value of money.	Its calculation is tedious and difficult.
It considers cash flows through the life span of the project.	It produces multiple rates of return which can be confusing.
It lays emphasis on the objective of welfare maximisation of shareholders.	It does not give valid results in case of unequal project span, unequal cash outflows and unequal timing of cash flows.
It is consistent with wealth maximisation objective.	It fails to evaluate mutually exclusive projects.

ROI vs IRR

MEANING	ROI is the increase or decrease in an investment made over a set period. IRR is discount rate that makes NPV of cash flows from specific project as zero.
USAGE	ROI is useful to find out the performance of an investment made for short-term. IRR is useful for calculating long term Return.
FORMULAE	In case of IRR : Current Invest – Future NPV @ IRR rate = Zero In case of ROI : [(Expected value – Original value)/ Original Value] x 100
COMPLEXITY	IRR is bit complex as it considers several factors into consideration. ROI does not take future value of money, thus calculation becomes relatively easy.

SIMILARITIES

Both represent the average annual return of investment.	Both can be used for backward looking evaluation of a completed investment as well as forward looking estimate of performance.	Both can be expressed in terms of percentage

Projects Selection Models (Numeric)

- **Payback Period (PB)**
- **Net Present Value (NPV)**
- **Internal Rate of Return (IRR)**
- **Profitability Index (PI)**

Profitability Index (PI)

- The Profitability Index (PI) measures the ratio between the present value of future cash flows and the initial investment.
- The index is a useful tool for ranking investment projects and showing the value created per unit of investment.
- The Profitability Index is also known as Profit Investment Ratio (PIR) or the Value Investment Ratio (VIR).

$$\text{Profitability Index} = \frac{\text{Present Value of Future Cash Flows}}{\text{Initial investment}}$$

$$\text{Profitability Index} = \frac{\text{(Net Present value + Initial Investment)}}{\text{Initial investment}}$$

Profitability Index (PI)

- If the PI is greater than 1, the project generates value and the company may want to proceed with the project.
- If the PI is less than 1, the project destroys value and the company should not proceed with the project.
- If the PI is equal to 1, the project breaks even and the company is indifferent between proceeding or not proceeding with the project.
- The higher the profitability index, the more attractive the investment.

Example 1: A company is undertaking a project at a cost of INR 50 lakhs which is expected to generate future net cash flows with a present value of INR 65 lakhs. Calculate the profitability index.

Solution:

Example 2: ABC Company is considering two projects:

- **Project A requires an initial investment of $1,500,000 to yield estimated annual cash flows of: $150,000 in Year 1, $300,000 in Year 2, $500,000 in Year 3, $200,000 in Year 4, $600,000 in Year 5, $500,000 in Year 6, $100,000 in Year 7. The appropriate discount rate for this project is 10%.**
- **Project B requires an initial investment of $3,000,000 to yield estimated annual cash flows of: $100,000 in Year 1, $500,000 in Year 2, $1,000,000 in Year 3, $1,500,000 in Year 4, $200,000 in Year 5, $500,000 in Year 6, $1,000,000 in Year 7. The appropriate discount rate for this project is 13%.**
- **Company A is only able to undertake one project. Using the profitability index method, which project should the company undertake?**

Example 2: ABC Company is considering two projects:

- **Project A requires an initial investment of $1,500,000 to yield estimated annual cash flows of: $150,000 in Year 1, $300,000 in Year 2, $500,000 in Year 3, $200,000 in Year 4, $600,000 in Year 5, $500,000 in Year 6, $100,000 in Year 7. The appropriate discount rate for this project is 10%.**
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- **Company A is only able to undertake one project. Using the profitability index method, which project should the company undertake?**

Solution:

- **Discounting the Cash Flows of Project A:**

$150,000 / (1.10) = $136,363.64

$300,000 / (1.10)^2 = $247,933.88

$500,000 / (1.10)^3 = $375,657.40

$200,000 / (1.10)^4 = $136,602.69

$600,000 / (1.10)^5 = $372,552.79

$500,000 / (1.10)^6 = $282,236.97

$100,000 / (1.10)^7 = $51,315.81

- Present value of future cash flows:

= $136,363.64 + $247,933.88 + $375,657.40 + $136,602.69 + $372,552.79 + $282,236.97 + $51,315.81

= $1,602,663.18

Profitability index of Project A: $1,602,663.18 / $1,500,000 = $1.0684.

Project A creates value.

- **Discounting the Cash Flows of Project B:**

$100,000 / (1.13) = $88,495.58

$500,000 / (1.13)^2 = $391,573.34

$1,000,000 / (1.13)^3 = $693,050.16

$1,500,000 / (1.13)^4 = $919,978.09

$200,000 / (1.13)^5 = $108,551.99

$500,000 / (1.13)^6 = $240,159.26

$1,000,000 / (1.13)^7 = $425,060.64

- Present value of future cash flows:

= $88,495.58 + $391,573.34 + $693,050.16 + $919,978.09 + $108,551.99 + $240,159.26 + $425,060.64

= **$2,866,869.07**

- Profitability index of Project B: $2,866,869.07 / $3,000,000 = 0.96.
- Project B destroys value.
- Using the PI formula, Company A should do Project A. Project A creates value.

Advantages and Disadvantages of PI

- **Advantages**:

1. *The profitability index tells about an investment increasing or decreasing the firm's value*
2. *The profitability index takes into consideration all cash flows of the project.*
3. *The profitability index takes the time value of money into consideration.*
4. *The profitability index also considers the risk involved in future cash flows with the help of cost of capital.*
5. *The profitability index is also helpful in ranking and picking projects while rationing of capital.*

- ***Disadvantages**:*

1. *An estimate about the cost of capital is required so as to calculate the profitability index of a firm.*
2. *The profitability index of a firm might not, sometimes, provide the correct decision while being used to compare mutually exclusive projects under consideration.*

Scoring Model for Project Selection

- **Scoring model is yet another method of project selection.**
- **In this method, you create a committee that lists the relevant criteria to select a project.**
- **The committee weighs the list according to the importance and priorities of each project under consideration.**
- **The committee then adds the weighted values and selects a project with highest score.**
- **One of the most common techniques used to select a project is the individual judgment. Such judgments are mostly a result of a guess work and might turn out to be biased in favor or against a project. As a result, the project can result in a failure if it gets biased favor. Similarly, you might drop a really great project if it is unfavorably biased.**
- **To avoid such a situation, you can create a scoring model that can help you to make an appropriate decision to select a project based on the merits and priorities of the project and organization.**

Principles of Scoring Model

- Try to limit scoring criteria into approximately three categories of requirements. You can select any of the categories, such as benefits, cost, size, impact, risk, technical feasibility, margin, or any other category that you deem fit to score the project requirements.
- Scoring criteria should comprise of ranges. When deciding on the scoring criteria, you can select any of the following types of ranges:
  - **Numeric or Cardinal Priority range**: In this type of range, you assign numeric values for scoring. Following are sample values with respective description to understand the values:
    - **0** – The requirement is not applicable to the project and is later removed from the list.
    - **1** – The requirement has a low priority.
    - **3** – The requirement has a medium priority and must be met.
    - **5** – The requirement has the highest priority and is essential for the project.
- Depending on the number of choices, you can also consider the 0 – 10 range as a scoring criteria.
  - **Descriptive or Ordinal Priority range**: In this type, you provide a descriptive priority, which you convert to an appropriate numeric value for further calculations. This criteria is more useful in the sense that for the numeric priority type, you must remind the team that 0 is the least favorable value while 5 is the most favorable value to make sure that there is no misinterpretation across the team. However, in this priority type, you use self explanatory values to score. Following are sample values with respective description to understand the values:
    - **Not Applicable (0)**: The requirement does not apply for the project. The requirement is later removed from the list.
    - **Nice to Have (1)**: The requirement is at a low priority. If included in the project, it is considered as an add-on requirement.
    - **Important (3)**: The requirement is important for the project and must be addressed in the product.
    - **Essential (5)**: The requirement is a must for the project and must be addressed in the product.

Example of Scoring Model

	Scores 1 - 5 5 = excellent ; 1 = poor				
	Weight (100)	Project A	Project A Weighted	Project B	Project B Weighed
Profit Level	15	3	3x15= 45	5	5x15= 75
Time to Enter New Market	10	4	4x10= 40	1	1x10= 10
Increase in Mkt Share	13	5	5x13= 65	4	4x13= 52
Manage with existing workforce	24	4	4x24= 96	2	2x24= 48
Payback Period < 2yrs	20	5	5x20= 100	4	4x20= 80
Consistent with Current Business	18	1	1x8= 18	1	1x8= 18
TOTAL	100		364		283

As you can see from the above table, the weighted score of project A is higher than the weighted score of project B. Therefore, project A is the best alternative and should be selected.

Effective Project Team

- Team building is a kind of art.
- Good and effective team building is an ability to turn the group of individuals into the strong and organized system walking towards the common goal.
- The importance of team building is difficult to overestimate, the human factor is still the king.
- An ability to form an effective team is probably one of the most important key competences of a successful project manager.
- Team building must have:

1. **A clear goal.**
2. **Getting the right people to do their job.**
3. **Distributing the roles and responsibilities.**
4. **Communication is the key.**
5. **You should be the team not only in the workplace.**

Stages of Team Development

- Bruce Tuckman's 5 stages of team development:

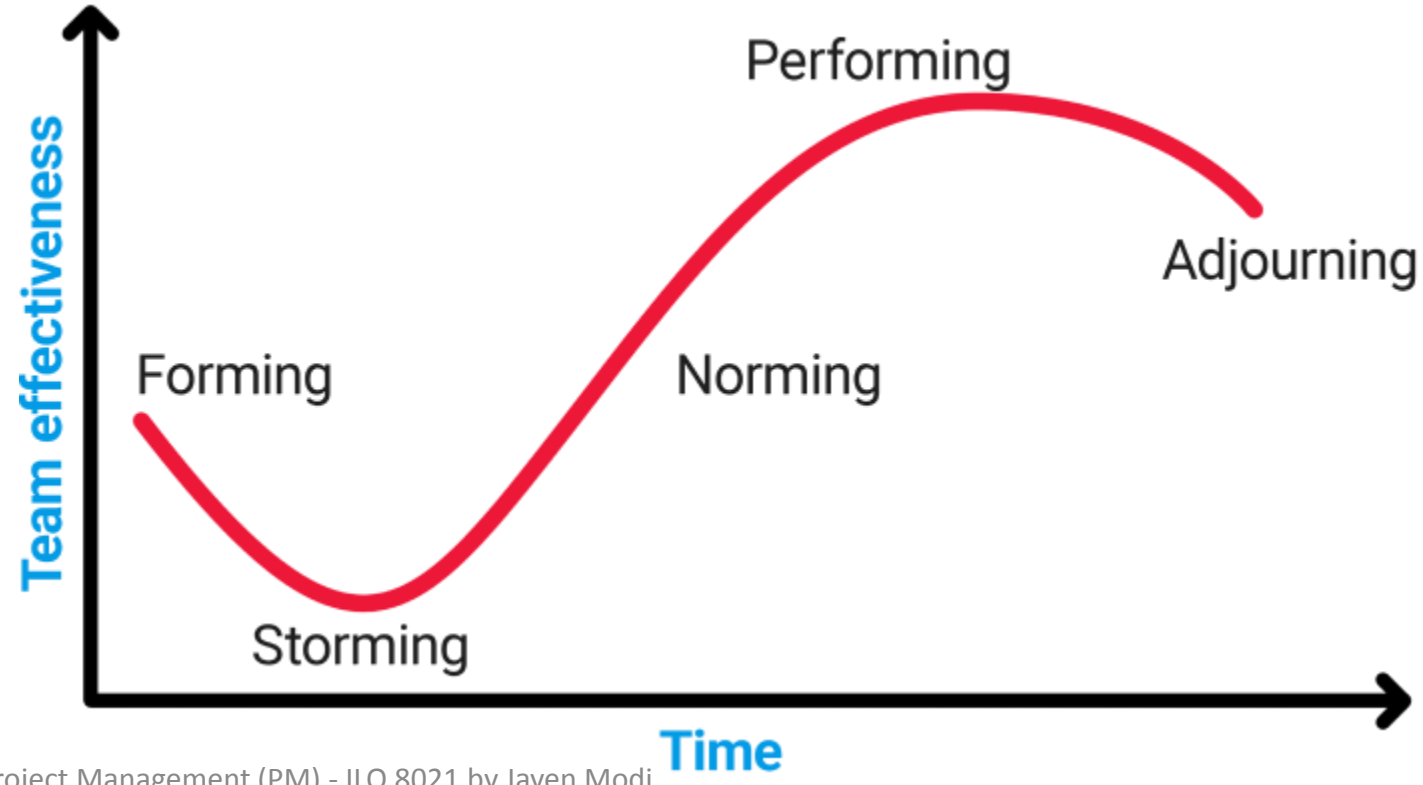
Stage 1: Forming

Stage 2: Storming

Stage 3: Norming

Stage 4: Performing

Stage 5: Adjourning



1. Forming Stage

- This is where team members first meet.
- It’s important for team leaders to facilitate the introductions and highlight each person’s skills and background.
- Team members are also given project details and the opportunity to organize their responsibilities.

2. Storming Stage

- At this stage, team members openly share ideas and use this as an opportunity to stand out and be accepted by their peers.
- Team leaders help teams in this stage by having a plan in place to manage competition among team members, make communication easier, and make sure projects stay on track.

3. Norming Stage

- By now, teams have figured out how to work together.
- There's no more internal competition, and responsibilities and goals are clear.
- Each person works more efficiently because he or she has learned how to share their ideas and listen to feedback while working toward a common goal.

4. Performing Stage

- There’s a high level of cohesion and trust between team members.
- Teams are functioning at peak efficiency with less oversight from team leaders.
- Issues still come up, but at this point, teams have strategies for resolving problems without compromising timelines and progress.

5. Adjourning Stage

- Teams complete their project and debrief on what went well and what could be improved for future projects.
- Afterwards, team members move on to new projects.

Advantages of Effective Team

- Working together facilitates **idea generation and creativity**.
- Teamwork improves **productivity** and brings better business results.
- Working in teams boosts employee **morale and motivation**.
- Teamwork encourages taking **healthy risks**.
- When we work together, we **learn faster**.
- Teamwork relieves **stress**.
- Working together **improves customer service.**

Barriers to Team Effectiveness

[1]The absence of trust among team members

[2] Failure to deal with conflict within the team

[3] Team composition lacking relevant perspectives/expertise

[4] Lack of clear operating agreement to guide team dynamics

[5] Lack of strategic context/shared vision and purpose

[6] Challenges of Knowing Where to Begin

[7] Dominating Team Members

[8] Poor Performance of Some Team Members

Team Dynamics

- Successful teams harness the expertise of all members.
- Teams are formed to solve a problem, make a critical decision, or fix a situation.
- A successful team brings together a diverse set of people with experiences and expertise to uncover new solutions.
- The more effective the team is in using unique perspectives, the more successful is the team.
- Good team dynamics start with an effective project manager.
- Failure to recognize the importance of team dynamics in project management may limit the team's achievements.
- Strategies that work for a set of people may not work for others.

Team Dynamics

Team Dynamics in Project Management can help you to:

- Define the best candidates for your project teams
- Consider methods to encourage building sound, professional relationships among team members
- Lead teams from initial goal and objectives development through project execution of results
- Proactively manage team member conflict when it occurs

The importance of team dynamics for team performance and how to improve it

Team dynamics is a broad concept and represents the way in which team members behave and the psychological processes underlying these interactions within the team.

Team cognition

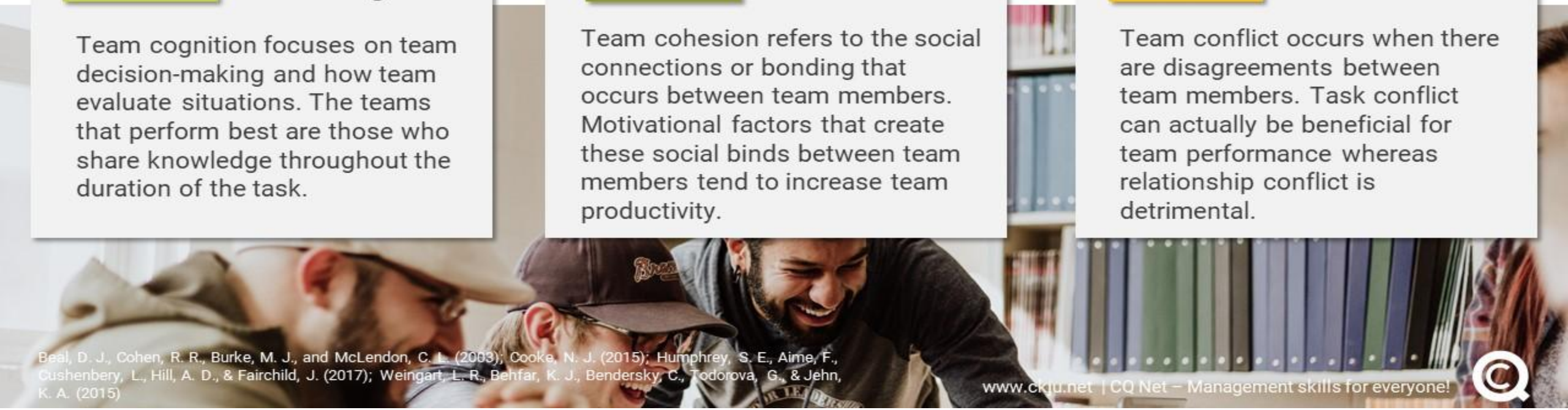
Team cognition focuses on team decision-making and how team evaluate situations. The teams that perform best are those who share knowledge throughout the duration of the task.

Team cohesion

Team cohesion refers to the social connections or bonding that occurs between team members. Motivational factors that create these social binds between team members tend to increase team productivity.

Team conflict

Team conflict occurs when there are disagreements between team members. Task conflict can actually be beneficial for team performance whereas relationship conflict is detrimental.



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Project Sponsor

- According to the Project Management Body of Knowledge (PMBOK), the project sponsor is “a person or group who provides resources and support for the project, program or portfolio for enabling success.”
- The project sponsor is that person or group who owns the project. Every project has one.
- The project sponsor is responsible for many aspects of the project, from initiating and ensuring the success to approving and establishing parts of the project.
- According to the Project Management Institute (PMI), the project sponsor role can be broken into three parts: vision, governance and value or benefits realization.

Vision

- Makes sure the business case is valid and in step with the business proposition
- Aligns project with business strategy, goals and objectives
- Stays informed of project events to keep project viable
- Defines the criteria for project success and how it fits with the overall business

Governance

- Ensures project is properly launched and initiated
- Maintains organizational priorities throughout project
- Offers support for project organization
- Defines project roles and reporting structure
- Acts as an escalation point for issues when something is beyond the project manager's control
- Gets financial resources
- Decision-maker for progress and phases of project

Values & Benefits

- Makes sure that risks and changes are managed
- Helps to ensure control and review processes
- Evaluates status and progress
- Approves deliverables
- Helps with decision-making
- Responsible for project quality throughout project phases

Project Portfolio Process (PPP)

- The project portfolio process is a method which can maximize the output potential of all projects undertaken by your organization at a given time, subject to limited resource constraints.
- The PPP attempts to link the organization's projects directly to the goals and strategy of the organization.
- This occurs not only in the project's initiation and planning phases, but also throughout the life cycle of the projects.
- PPP is also a means for monitoring and controlling the organization's strategic projects.

Steps in Project Portfolio Process

1. Establish a Project Council
2. Identify Project Categories and Criteria
3. Collect Project Data
4. Assess Resource Availability
5. Reduce the Project and Criteria Set
6. Prioritize the Projects within Categories
7. Select the Projects to Be Funded and Held in Reserve
8. Implement the Process

Step 1. Establish a Project Council

- The main purpose of the project council is to establish and articulate a strategic direction for those projects spanning internal or external boundaries of the organization, such as cross-departmental or joint venture.
- The project council must include:

1. Members from senior management
2. the project managers of major projects;
3. the head of the Project Management Office, if one exists;
4. particularly relevant general managers;
5. those who can identify key opportunities and risks facing the organization; and
6. anyone who can derail the progress of the PPP later on in the process.

Step 2. Identify Project Categories and Criteria

- In this step, various project categories are identified.
- Identifying separate categories not only facilitates achievement of multiple organizational goals (e.g., long term, short term, internal, external, tactical, strategic) but also keeps projects from competing with each other on inappropriate categories.
- Categories can be: Derivative Projects, Platform Projects, Breakthrough Projects and R&D Projects

Step 3. Collect Project Data

- For each existing and proposed project, assemble the data appropriate to that category's criteria.
- Be sure to update the data for ongoing projects and not just use the data from the previous evaluation.
- Challenge and try to verify all data; get other people involved in validating the data, perhaps even customers (e.g., market benefit).
- Document any assumptions made so that they can be checked in the future as the project progresses.

Step 4. Assess Resource Availability

- Assess the availability of both internal and external resources, by type, department, and timing.
- For instance, the availability of labour is assessed conservatively, excluding vacations, personal needs, illness, holidays, and regular functional (non-project) work.

Step 5. Reduce the Project and Criteria Set

- In this step, multiple screens are employed to try to narrow down the number of competing projects. The result of this step may involve canceling some ongoing projects or replacing them with new, more promising projects.
- Evaluation criteria:

1. Whether the project supports the goals of the organization
2. Whether the required competence exists in the organization
3. Whether there is a market for the offering
4. How profitable the offering is likely to be
5. How risky the project is
6. If the right resources are available at the right times
7. If the project is dominated by another existing or proposed project

Step 6. Prioritize the Projects within Categories

- Apply the scores and criterion weights to rank the projects within each category.
- When checking the results of this step, however, reconsider the projects in terms of their benefits first and their resource costs second.
- The council should summarize the “returns” from the projects to the organization.

Step 7. Select the Projects to Be Funded and Held in Reserve

- The first task in this step is an important one: determining the mix of projects across the various categories and time periods.
- Be sure to leave some percent (often 10–15 percent) of the organization's resource capacity free for new opportunities, crises in existing projects, errors in estimates, and so on.
- Overall, the focus should be on committing to fewer projects but with sufficient funding to allow project completion.
- Document why late projects were delayed and why some, if any, were defunded.

Step 8. Implement the Process

- The first task in this final step is to make the results of the PPP widely known.
- Top management must now make their commitment to this project portfolio process totally clear by supporting the process and the results.
- The council will have to concern itself with the reliability and accuracy of proposals competing for limited funds.
- The PPP needs to be repeated on a regular basis.
- The process should be flexible and improved continuously.

Project Charter

- A Project Charter is a formal document that authorizes the project team to execute project activities and provides the project manager, the ability to apply organizational resources to project activities.
- **Developing a project charter requires a few activities as follows:**
- **Identification of stakeholders / customers:** A project manager needs to identify all the stakeholders and the customers at the start of the project.
- **Identification of project scope:** Scoping is a critical activity to create a boundary of what work to be done and what not to be done.
- **Identification of project risks:** Identifying risks is an on-going activity of the project manager. This activity starts from the onset of the project and continues throughout the life-cycle of the project.

Project Charter (Contd..)

- **Identification of project assumptions:** There are multiple activities which are done based on organizational and project environmental factors. These activities are executed either because of process policies or certain assumptions. Thus, it is important to uncover all the assumptions. This is usually done by the project manager in discussion with other stakeholders.
- **Identification high-level project requirements and objectives:** Detailed level requirements and objectives are not possible at this stage of the project. Hence, the project manager should focus high-level project requirements and objectives.

Project Charter (contd..)

- **Identification of project success criteria:** Project manager should also identify the success criteria of the project. This is used as a baseline and compared with actual project performance.
- **Documentation of identified elements:** All the identified elements need to be documented to help standardize the project work by the project manager and this cannot be done by an individual project manager. This requires meeting with important stakeholders, subject matter experts and related process people.
- An important point to observe is that creation of project charter encompasses all the project areas including, scope, risk, time, cost, quality, human resources, communications, and procurement).

Project Charter Template

Project Charter Example

Project Name	IVR Project		
Project Sponsor	Dave Sponsor	Project Manager	Alice Michaels
Date of Project Approval	8th Mar 2015	Last Revision Date	17th Apr 2015
Project Description	To introduce a new automated telephone system to ensure all calls get answered.		
Scope	A IVR system will be introduced to assist the sales team in taking orders, and also to ensure no orders are missed. The system is only to help the sales team at this stage, other teams such as support are out of scope.		
Business Case	To increase orders per sales team member by 20% from current levels. To reduced unhandled calls to 0%. To increase customer satisfaction by 10 points.		
Constraints (in priority order)	Time	4 months	
	Budget	4 developers + 1 sales team rep	
	Scope	TBD	
	Quality	Prioritize time & budget over quality	
Project Deliverables	An IVS system to assist the sales team + training for the sales team + support during the first operational month of the system.		
Benefits (measurable results)	See KPIs below + business case above		
	KPI	Baseline	Goal
	Orders per sales person pd	20	24
	Unhandled calls pd	11	0
	Customer satisfaction	17	27
Steering Committee	CEO	Project Team	Sales Rep
	Finance Director		4x developers TBD
	Sales Director		
Key Stateholders	Name	Success Criteria	
Risks	Project Management (PM) - [illegible] of IVR setup, so there is a chance we've hugely underestimated the work involved.		