

Software Project Management (4 - 20191016)

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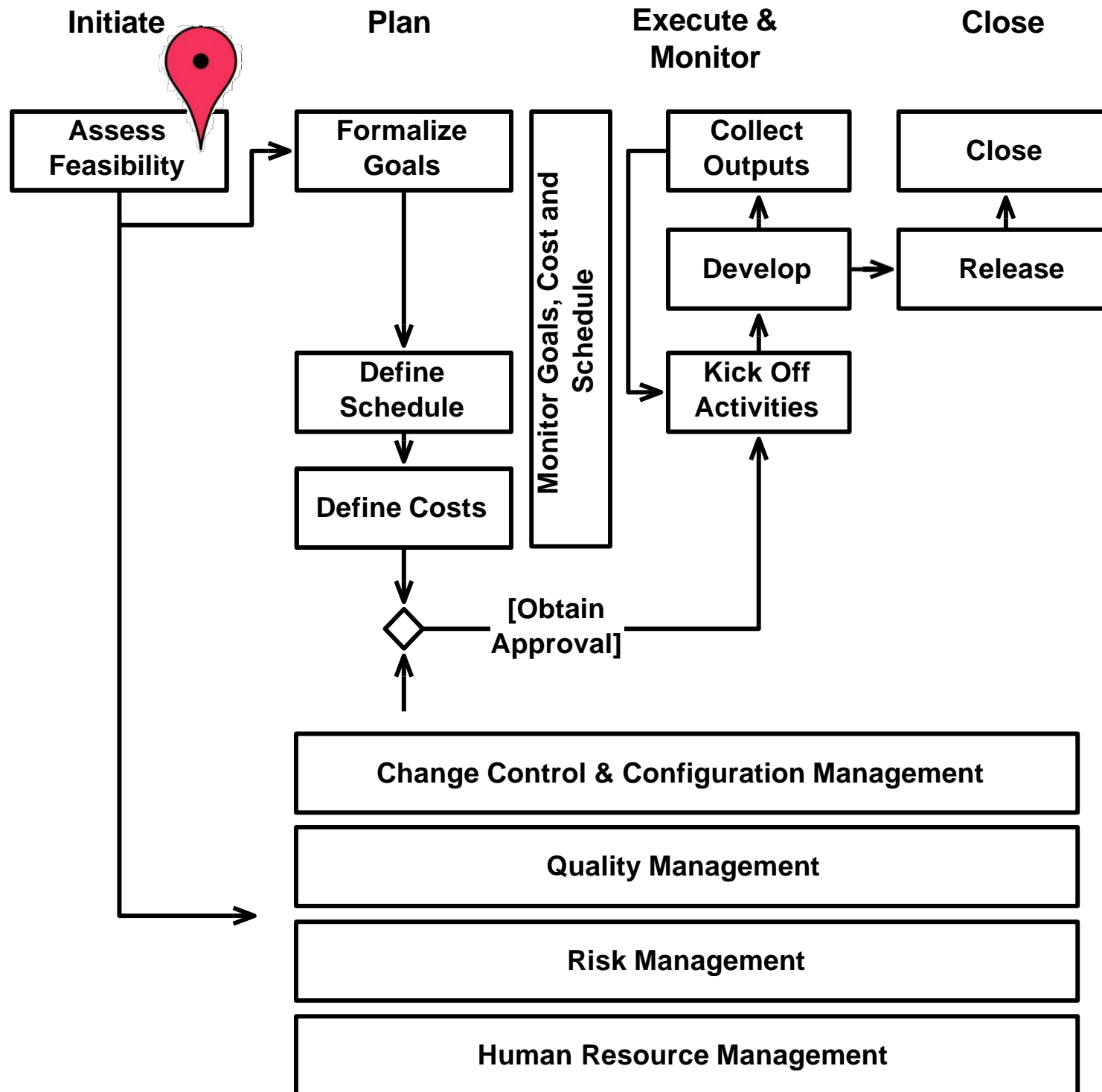
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Project Initiation: Feasibility and Project Authorization

Initiating a project

Goals of this Unit

- Learning qualitative and quantitative techniques to **select** among different **projects**
- Learning qualitative and quantitative techniques to choose the best **alternative** among different **implementations** of the same project
- Understanding how to write a **Feasibility Study**
- Choosing between internal development or external development (**make or buy**)



How does a project start?

- Initiation by some stakeholder (a company, a potential customer, ...) driven by a need (market, social, legal, technological advance, ...)
- Boundaries and process not always clear or very formalized
- First activities performed to:
 - Agree on the goals (scope)
 - Understand value and risks (for the performing organization and for the other stakeholders)
 - Choose a project approach

Project Value and Risks

Project Value and Risks

- Two main characteristics determine whether a project is worth starting:
 - The **value** generated by the project
 - The **risks** associated to the project
- The meaning of value and risk depend upon many factors
- Value and risks can be assessed qualitatively or quantitatively
- Sound assessments are difficult, given the unpredictability of projects (and of the world)

Project Value and Risks

- Project Value:
 - Direct and indirect **value** generated by the project
 - **Sustainability** of the project outputs
 - Alignment with **strategic objectives** of an organization
- Project Risks
 - **Resource** availability
 - **Timing**
 - **Technical** difficulties and uncertainties

Value: Direct and Indirect Value

- **Direct and Indirect Value** measures the positive and negative outcomes of a project and its outputs
- Some metrics to consider include:
 - Revenues, both direct and indirect
 - Social and environmental impact
 - Image and publicity
 - Know-how acquired
- Direct and indirect value are strictly related to the business model.

Value: Sustainability

- **Sustainability** refers to the capacity of sustaining the project and its outputs after the project end
- Taking into account the operational costs of a project's outputs and the way in which the project outputs will survive after a project end is an important consideration to understand whether a project is worth starting.
- Often overlooked, especially when project execution generates revenues

Value: Alignment with the Strategic Objectives

- The **alignment with the strategic objectives** measures how important and relevant a project is for the performing organization
- Priority, resource assigned, internal support, opportunities for the project team after the project end are all affected by how strategic a project is for an organization

Risks: Resource Availability

- Projects require the **availability of human, financial, and technical resources** in specific time-frames
- Although it might be difficult to preempt the resources in advance, a check on the projects needs is a good sanity-check
- Some aspects to consider include:
 - the required resource,
 - current load and availability,
 - projections on future load and availability,
 - priority and importance of the project

Risks: Timing

- Many projects have **specific time-windows for the delivery of their outputs**
- Deliver too early or too late and the outputs of the project might be useless
- Consider, for instance, the race of competing firms in delivering similar products

Risks: Technical Difficulty and Uncertainty

- The success of many projects relies on the **actual capability of solving various technical challenges**, when the time comes
- Understanding what these challenges are is an important factor in determining the risks associated to a project

Techniques to Assess Value and Risks

Payback Period

The payback period is the time taken to gain a financial return equal to the original investments

- Measured in months or years
- When using the payback period the projects/options that minimize the payback period are chosen in favor of the others

Example

	Project A		Project B		Project C	
Year 0	€	(50,000.00)	€	(20,000.00)	€	(15,000.00)
Year 1	€	30,000.00	€	(10,000.00)	€	15,000.00
Year 2	€	30,000.00	€	10,000.00	€	1,000.00
Year 3	€	1,000.00	€	60,000.00		
Year 4	€	1,000.00	€	50,000.00		
Expenses	€	(50,000.00)	€	(30,000.00)	€	(15,000.00)
Gains	€	62,000.00	€	120,000.00	€	16,000.00
Profit	€	12,000.00	€	90,000.00	€	1,000.00
Payback	2 years		3 years		1 year	

Remark: accounting style notation.

Negative numbers in red and in parentheses

Discussion

- **Advantages**

- Simple, readily available data
- It reduces exposure to risk
- Particularly effective in high-technology/fashion projects
- It favors shorter term benefits

- **Disadvantages**

- Difficult to use on longer term projects
- Based only on cash flows
- Does not quantify exposure to risk
- Does not look at total gains

Payback Weaknesses

- Different projects might have the same the same payback period, but different profiles in returning of the investments
- These profiles are not taken into account by the technique but could make the different between two projects

Payback Weaknesses

**Same payback period, but
Project A gets more money first
(and reduces risks)**

Year	Project A	Project B
Year 0	€ (10,000.00)	€ (10,000.00)
Year 1	€ (5,000.00)	€ (5,000.00)
Year 2	€ 10,000.00	€ 5,000.00
Year 3	€ 5,000.00	€ 10,000.00

Payback Weaknesses

**Different payback periods,
Project A earlier but gets
less money**

Year	Project A	Project B
Year 0	€ (10,000.00)	€ (10,000.00)
Year 1	€ (5,000.00)	€ (5,000.00)
Year 2	€ 5,000.00	€ 5,000.00
Year 3	€ 5,000.00	€ 11,000.00
Year 4	€ 20,000.00	

Return on Investment (ROI)

ROI calculates the average annual profit and transforms it into a percentage of the total investments

$\text{Profit} = \text{Returns} - \text{Investments}$

$\text{Annual Profit} = \text{Profit} / \text{Duration}$

$\text{ROI} = \text{Annual Profit} / \text{Investments}$

- When using ROI, choose the project with the highest ROI

Example

Suppose we have the following projections for a project we need to decide whether to start or not

	Project A		Project B		Project C	
Year 0	€	(50,000.00)	€	(20,000.00)	€	(15,000.00)
Year 1	€	30,000.00	€	(10,000.00)	€	15,000.00
Year 2	€	30,000.00	€	10,000.00	€	1,000.00
Year 3	€	1,000.00	€	60,000.00		
Year 4	€	1,000.00	€	50,000.00		

Example

- **Project A**

- Profit = $62000 - 50000 = 12000$
- Annual Profit = $12000 / 4 = 3000$
- ROI = $3000 / 50000 = 6\%$

- **Project B**

- Profit = $120000 - 30000 = 90000$
- Annual Profit = $90000 / 4 = 22500$
- ROI = $22500 / 30000 = 75\%$

- **Project C**

- Profit = $16000 - 15000 = 1000$
- Annual Profit = $1000 / 2 = 500$
- ROI = $500 / 15000 = 3\%$

SOLUTION: Project B (highest ROI)

Net Present Value

Net Present Value discounts sums in the future in order to provide a more realistic comparison between presents investments and future gains

Discounted Cash Flows/Inflation

- The value of money decreases over the years (inflation!) according to the inverse compound interests formula

$$\text{Discount Factor} = \frac{1}{(1 + i)^n}$$

- Thus, giving it the money we invest **now** the same weight of money we will get in five year is over optimistic
- DCF (Discounted Cash Flows) are techniques that take into account inflation
- Curiosity: where does inflation comes from?
A nice reference:
<http://en.wikipedia.org/wiki/Inflation>

Net Present Value Example

Hypothesis

Discount Rate: 10%

(this is “*i*”)

$$\text{Discount Factor} = \frac{1}{(1 + i)^n}$$

Year (n)	Cash Flow	Discount Factor	Present Value
0	€ (35,000.00)	1.00	€ (35,000.00)
1	€ 10,000.00	0.91	€ 9,090.91
2	€ 15,000.00	0.83	€ 12,396.69
3	€ 20,000.00	0.75	€ 15,026.30
Expenditure	€ (35,000.00)		€ (35,000.00)
Gains	€ 45,000.00		€ 36,513.90
Profit	€ 10,000.00		€ 1,513.90

Net Present Value: Discussion

- Advantages
 - More accurate profit-loss data
- Disadvantages
 - It uses a fixed discount rate (may be unrealistic)
 - It favors shorter terms projects

Questions

