



ESCOLA
POLITÀCNICA SUPERIOR
UNIVERSITAT DE LLEIDA

CHAPTER 6: EVALUATION OF INVESTMENT

Master's Degree in Informatics Engineering

POLYTECHNIC SCHOOL

University of Lleida

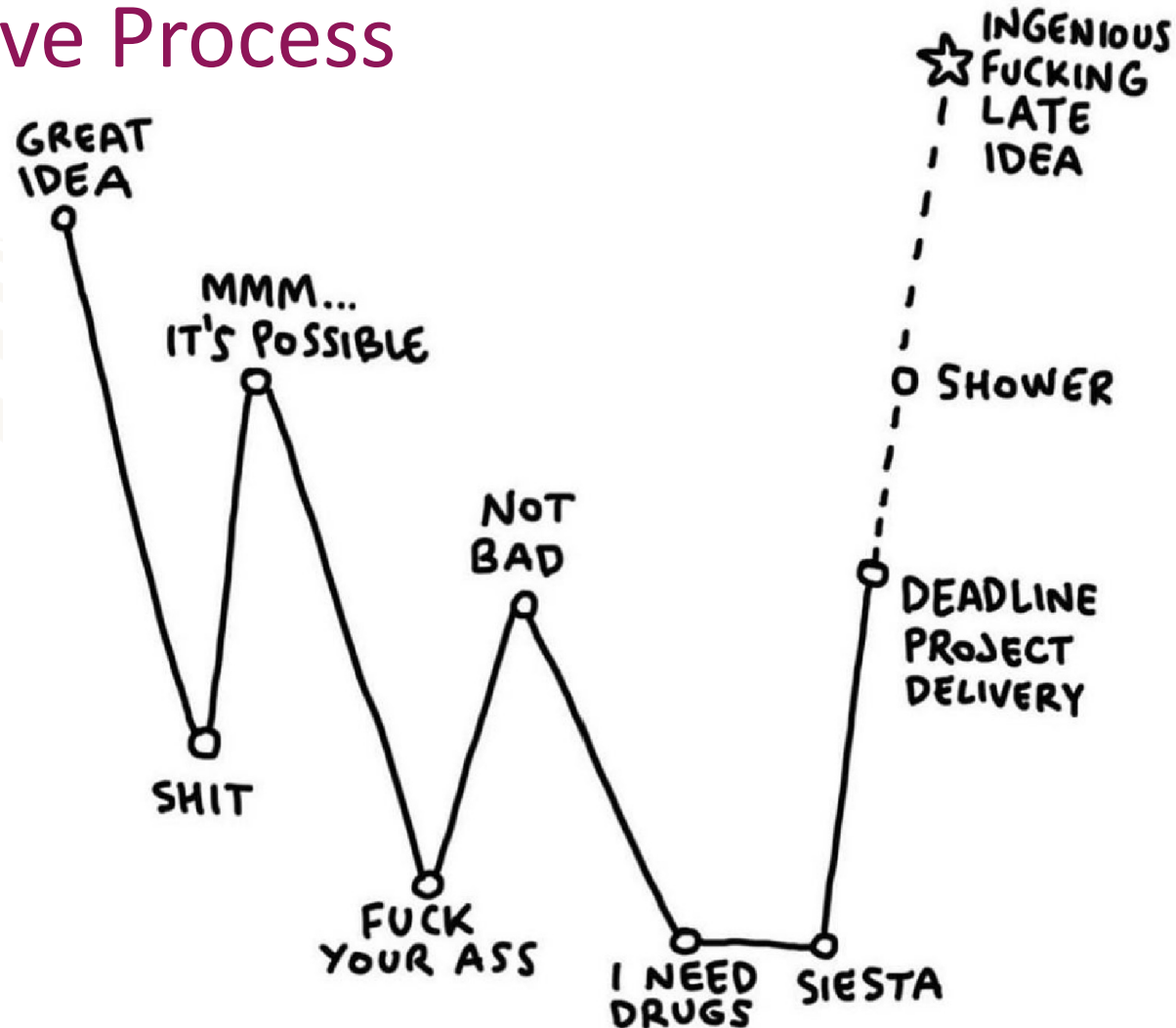


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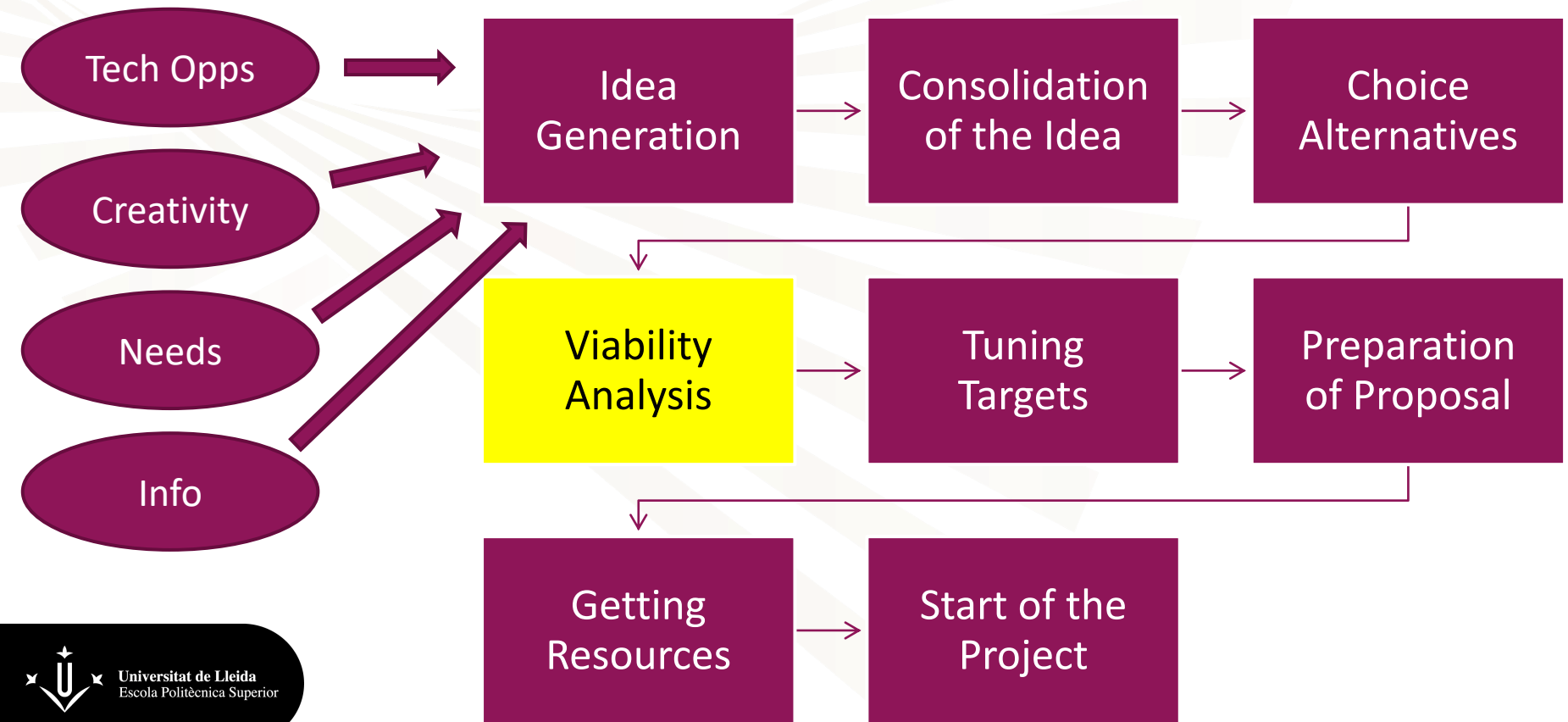
SECTION 6.1:

A Creative Process



SECTION 6.1:

Evaluation Of Investment



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Evaluation Of Investment

Viability Analysis:

ECONOMIC VIABILITY OF PROJECTS (CAPITAL BUDGETING)

- Estimation of cash flows generated by the project with a time horizon of at least 3 years => Cash flow chart of the project. It represents cash inflows and cash outflows referred to a specific moment of time inside the life of the project.



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- ***ROI (Return on investment)***

- A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of several different investments from a financial perspective. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio.

- Formula:

$$ROI = \frac{\text{Net Gain} - \text{Initial Cost of Investment}}{\text{Initial Cost of Investment}}$$

- Net Gain: gross profit – expenses for a period.

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- Return on investment is a very popular metric because of its versatility and simplicity. That is, if an investment does not have a positive ROI, or if there are other opportunities with a higher ROI, then the investment should be not be undertaken.
 - $ROI > \text{Interest rate} + \text{Risk rate}$

- Risk Rate

| Level of Innovation of the project | Risk rate |
|---------------------------------------|---------------------|
| Radical change | Between 20% to 100% |
| Innovative components | Between 10% to 30% |
| Minors change | Between 0% to 20% |



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- ***PBP (Payback Period)***

- The Payback Period is the length of time required to recover the cost of an investment. Also PBP reaches the BEP.
- Calculated as:

$$\text{PBP} = \text{Cost of Project} / C$$

- When the projected annual cash flows (C) are uniform or

$$\text{PBP} = t; \text{ Cost of Project} = \sum_{t=1}^{\text{PBP}} C t$$



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- ***PBP (Payback Period)***

- When the projected net cash flows are non-uniform.

Where

Cost of Project = the initial investment of the project.

C = the projected net cash flows per year from the investment.

PBP = Pay Back Period expressed in number of years.



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- ***PBP (Payback Period)***

- The payback period of a given investment or project is an important determinant of whether to undertake the position or project, as longer payback periods are typically not desirable for investment positions.
- The most important disadvantage of ROI and PBP is that both ignore the time value of money. Because of that reason, other methods of capital budgeting, like net present value or internal rate of return, are generally preferred.

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- ***NPV (Net Present Value)***
 - Net Present Value (NPV) is a method used to determine the present value of an investment discount to the current moment the sum of all cash flows received from the project and compare with the cost of the investment.
 - The NPV is the difference between the present value of cash inflows and the present value of cash outflows.
 - To calculate NPV, you need to know the initial investment in a project, how much cash you expect it to produce and at what intervals, and the required rate of return for capital.



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- ***NPV (Net Present Value)***

- If a project's net present value is positive, that means it generates more than the required rate of return for capital investments and management should go forward with the project. If it's negative, management should reject the project. NPV is used in capital budgeting to analyse the profitability of an investment or project.

- Formula:

$$NPV = \sum_{t=1}^T \frac{C_t}{(1+r)^t} - C^0$$

Where:

C^0 = Total initial investment costs

C_t = Difference between cash incomes and cash outcomes in t year of the project.

T = Number of years in the project.

r = Interest (discount) rate.

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- ***IRR (Internal Rate of Return)***

- Internal Rate of Return (IRR) is a discount rate that just makes the net present value (NVP) of the cash flow equal zero.
- It is considered to be the most useful measure of project worth and used by almost all the institutions including World Bank in economic and financial analysis of the project.
- It represents the average earning power of the money used in the project over the project life. It is also sometimes called yield of the investment.

The discount rate often used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero.



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- ***IRR (Internal Rate of Return)***
 - Generally speaking, the higher a project's Internal rate of return, the more desirable it is to undertake the project. As such, IRR can be used to rank several prospective projects a firm is considering. Assuming all other factors are equal among the various projects, the project with the highest IRR would probably be considered the best and undertaken first.
 - IRR is sometimes referred to as "economic rate of return (ERR)".

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- **IRR (*Internal Rate of Return*)**

- Mathematically, IRR is that discount rate 'r' such that

$$\sum_{t=1}^T \frac{C_t}{(1+r)^t} - C_0 = 0$$

Where:

C_t = Difference between incomes and outcomes in each year of the project.

T = number of years in the project.

r = Internal Rate of Return.



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- ***IRR (Internal Rate of Return)***

- While NPV and IRR methods are useful methods for determining whether to accept a project, both have their advantages and disadvantages.
- Advantages:
 - Both consider the time value of money.
 - With the NPV method, the advantage is that it is a direct measure of the dollar contribution to the stockholders. It is a measure of absolute return of the project.
 - With the IRR method, the advantage is that it shows the return on the original money invested in relative terms.



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- ***IRR (Internal Rate of Return)***
 - Disadvantages:
 - With the NPV method, the disadvantage is that the project size is not measured.
 - With the IRR method, the disadvantage is that, at times, it can give you conflicting answers when compared to NPV for mutually exclusive projects.

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- ***EBIT***

- EBIT stands for: Earnings Before Interest and Taxes.
- EBIT represents earnings (or net income/profit, which is the same thing) that have interest and taxes added back to them. So, the income statement shows how much money your business generates during an accounting period.
- $EBIT = \text{Net Profit} + \text{Interest and Taxes}$

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- **EBITDA**

- EBITDA stands for: Earnings Before Interest, Taxes, Depreciation, and Amortization.
- The additional adding back of Depreciation and Amortization is the only difference between EBIT vs EBITDA.
- EBITDA is often used by businesses that require a lot of depreciation calculations. These companies have high depreciation rates and large interest payments on debt.
- So, EBITDA can be harder to calculate from the income statement.

- $EBITDA = \text{Net Profit} + \text{Interest, Taxes, Depreciation, and Amortization}$

- $\text{Margin EBITDA (\%)} = \text{EBITDA} / \text{Total incomes} \times 100$



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- **EBT**

- Stands for: Earnings Before Taxes. Also called pre-tax income.
- Its calculation is revenue minus expenses, excluding taxes.
- It shows company earnings with the cost of goods sold (COGS), general and administrative expenses, and other operating expenses deducted from gross sales.
- Formulas:
 - $EBT = EBIT - \text{Interest Expense}$
 - $EBT = \text{Net Income} + \text{Taxes}$