# Project Initiation

## System Planning
## Feasibility Analysis

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## Outline

- Project Identification
  - System Request
- **System Planning**
- **Feasibility Analysis**
  - Technical Feasibility
  - Economic Feasibility
  - Organizational Feasibility
- Project Selection

# Project Identification

*A project is proposed when someone sees an opportunity to* ***create business value*** *from using information technology.*



# Project Identification: Key persons and roles

- Project sponsor: proposes the development or adoption of the new information technology
- Approval committee: reviews proposals from various groups and units in the organization and decides which to commit to developing.

# System Request

- It is a document that describes the **business reasons** for building a system and the **value** that the system is expected to provide.
- It lists key elements of the project
  - **Project name**
  - **Project sponsor**
  - **Business need**
  - **Functionality**
  - **Expected value**
  - **Special issues or constraints**



# System Request (examples)

- **Business need**
  - ***increase sales***
  - ***improve customer service***
  - ***decrease product defeacts***
  - ***decrease production costs***
- **Functionality**
  - ***provide online access to information***
  - ***capture customer demographic information***
  - ***produce management reports***
  - ***include online user support***
  - ***provide personalized services***
- **Business (expected) value**
  - ***5% increase in sales***
  - ***10.000 Euro savings from decreased supply costs***
- **Special Issues or Constraints**
  - ***System needed before next April***
  - ***System should be integrated with the existing system***

# System Planning

Related questions:

- ***What the customer wants ?***
- ***What projects he would like ?***
- ***Which IS technologies and applications will return the most value to the business?***



# System Planning

Aim at determining
long-term vision for business
and then to prioritize business issues
that can be resolved by the use of IT

System planning precedes software development and determines which products can be most effective to the organization

# System Planning

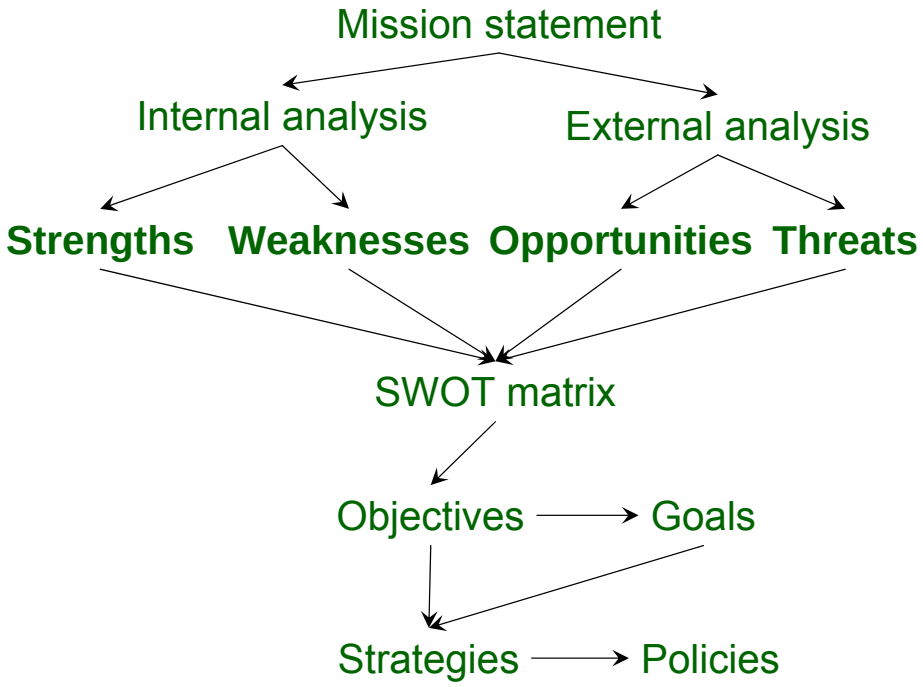
- IS projects have to be planned, i.e.:
  - **identified**
  - **classified**
  - **ranked** and selected for initial development, for improvement or perhaps for elimination
- **Business strategy** can be determined by various processes known as
  - ***strategic planning***
  - ***business modeling***
  - ***business process reengineering***
  - ***strategic alignment***
  - ***information resource mgmt***



# System Planning Approaches

- System planning can be carried according to various approaches:
  - **SWOT** (Strengths, Weaknesses, Opportunities, Threats)
  - **VCM** (Value Chain Model)
  - **BPR** (Business Process Reengineering)
  - **ISA** (Information System Architecture)
- All have an important common denominator: they are concerned with effectiveness (doing the right things) rather than efficiency (doing things right).

## SWOT (Strengths, Weaknesses, Opportunities, Threats)








## SWOT

### Mission statement

Questions:

- ***Where we would like our organization to be in 10 years?***
- ***How do we get from where we are now to where we want to be?***

## System Planning
## SWOT (Strengths, Weaknesses, Opportunities, Threats)

**Strengths**
- ownership of brand names and patents
- good reputation among customer and suppliers
- exclusive access to resources or technology
- cost advantage due to production of a potential strength

**Weaknesses**
- unreliable cash flow
- inferior skills of the staff and reliance on some key staff members
- poor location of the business

**Opportunities**
- new less restrictive regulations, removal of trade barriers
- a strategic alliance, a joint venture, or a merger
- the Internet as a new market
- the collapse of a competitor and the resulting opening of the market

**Threats**
- potential for a price war with competitors
- tecnology changes extending beyong the capability of assimilating them
- new tax barriers on the product or service



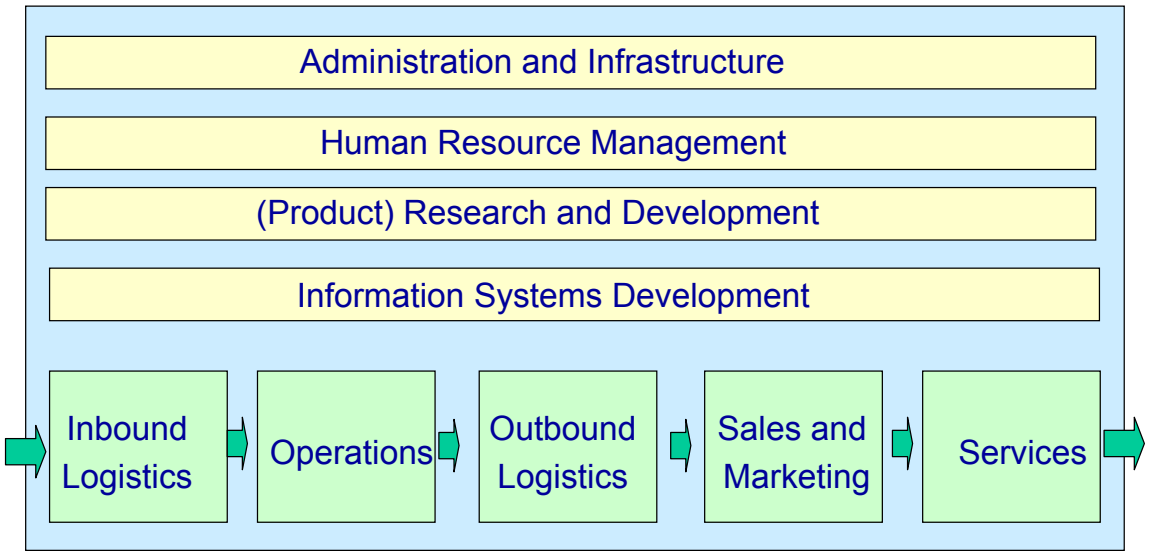
## System Planning
## VCM (Value Chain Model)

- Assesses competitive advantage by analyzing the full chain of activities in an organization
  - *from raw materials to final products sold and shipped to customers*
- ***Which value chain configurations will yield the greatest competitive advantages?***
- Organizational functions are categorized into:
  - primary activities
    - they create or add value to a final product
  - support activities
    - they are essential but they do not enrich the product

- **primary activities** (they create or add value to a final product)
  - 1. Inbound logistics (επιμελητεία εισερχομένων)
  - 2. Operations (λειτουργίες)
  - 3. Outbound logistics (επιμελητεία εξερχομένων)
    - e.g. distribution
  - 4. Sales and marketing (πωλήσεις και μαρκετινγ)
  - 5. Services (υπηρεσίες)
- **support activities** (they are essential but they do not enrich the product)
  - 1. Administration and infrastructure (διαχείριση και υποδομές)
  - 2. Human resource mgmt (διαχείριση ανθρώπινου δυναμικού)
  - 3. Research and development (έρευνα και ανάπτυξη)
  - 4. IS development (πληροφοριακά συστήματα)



System Planning
VCM (Value Chain Model)



Premise:

- today's organizations must reinvent themselves and abandon the functional decomposition, hierarchical structures and operational principles that they are now using
  - most current organizations are structured in **vertical units** (focused on functions, products or regions)
  - no-one employee or department is responsible for a business process which is defined as ***"… a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer***"
  - the most visible difference between a process enterprise and a traditional organization is the existence of process owners

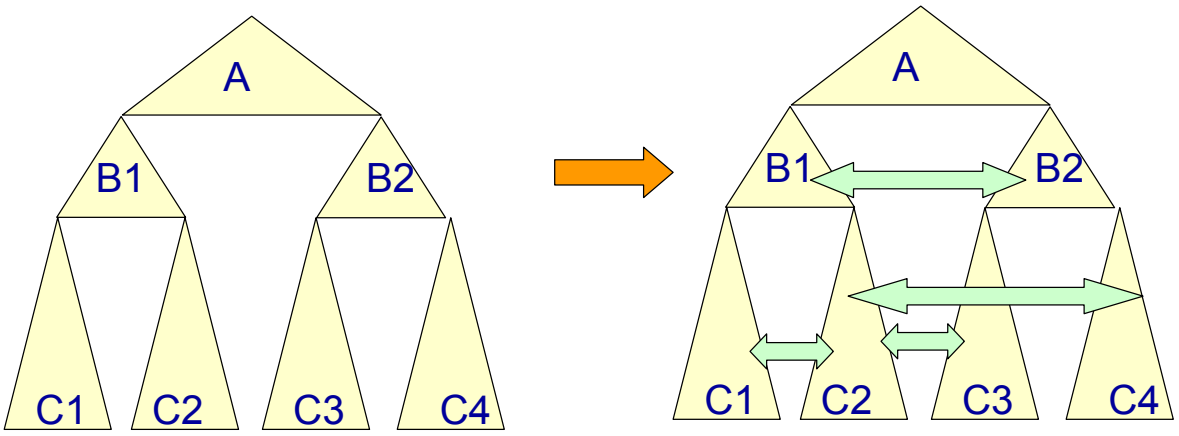


System Planning
BPR (Business Process Reeingineering)

Objective of BRP:

- to radically redesign business processes in an organization (hence, process redesign)
  - the major hurdle lies in the need to embed a **horizontal process** in a traditional vertical mgmt structure
  - BPR requires changing the organization around the development teams as the primary organizational units
    - these teams are responsible for one or more end-to-end business processes

Παράδειγμα: Από την κλασσική οργάνωση των δημοσίων υπηρεσιών στα ΚΕΠ (Κέντρα Εξυπηρέτησης Πολιτών)




C1 can communicate with C4 only through A





- A table of 5 rows (1..5) and 6 (A..F) columns
- Rows:
  - perspectives used in the construction of a complex engineering product, like an IS (-> 5 major players in the game)
- Columns
  - descriptions (or architectural models) that each each of the participants engages with

| | A. What | B How | C.Where | D. Who | E.When | F.Why |
|---|---|---|---|---|---|---|
| 1. Planner | | | | | | |
| 2. Owner | | | | | | |
| 3. Designer | | | | | | |
| 4. Builder | | | | | | |
| 5. Subcontractor | | | | | | |

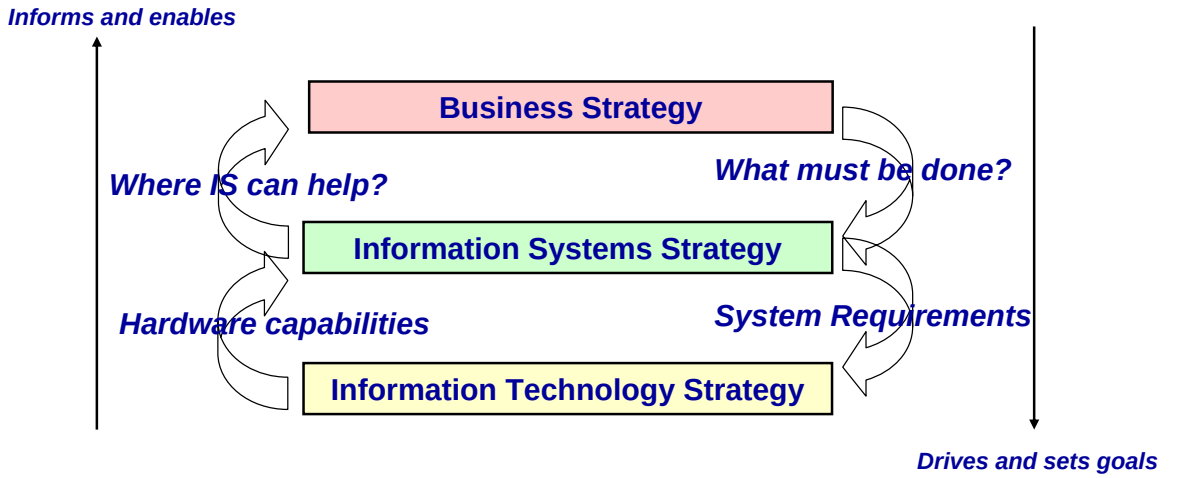


## Information Systems and Information Technology Strategies (the 3 layers of strategic thinking)

The best managed organizations separate their strategic thinking into 3 layers

- ***Business Strategy***
- ***Information Systems Strategy***
- ***Information Technology Strategy***

## Information Systems and Information Technology Strategies




- The key idea is that the development of new information systems should only be considered in the context of a well-thought-out business strategy, while purchases of information technology hardware should only be considered in the context of specific information systems that are planned for development



## Feasibility Analysis

- Once the need for the system and business requirements have been defined, it is time to create a more detailed business case to better understand the opportunities and limitations associated with the proposed project.

- Feasibility analysis guides the organization in determining ***whether to proceed*** with a project. It also identifies the important risks associated with the project that must be addressed if the project is approved.

# Feasibility Analysis

- Objective: Find out if an IS project can be done, and if so, how.
  - Expected costs and benefits
- A feasibility study should tell:
  - whether the project can be done
  - what are the alternative solutions?
  - What are the criteria for choosing among them?
  - Is there a preferred alternative ?
- After a feasibility study, management makes a START/CANCEL decision
- **=> A feasibility study is a management-oriented activity**



# Feasibility Analysis

- Dimensions of Feasibility
- Cost/Benefit Analysis
- Risk Analysis
- Comparing Alternatives
- Information Acquisition
- Feasibility Study Contents

# Dimensions of Feasibility

- **Operational** (organizational):
  - If we build the system will it be used?
  - How will the solution work?
- **Technical**
  - Is the technology needed available?
  - Are we familiar with the needed technology?
  - Can we undertake a project of this size?
- **Economic**
  - Return on investment
  - Development costs, annual operational costs, annual benefits, …
- **Schedule**
  - Can the system be delivered on time?



# Economic Feasibility

- It is about judging whether possible benefits of the projects are worthwhile
- This is often called **cost-benefit analysis**
  - As soon as a specific solution has been identified, the analyst can weight the costs and benefits of each alternative

# Cost-Benefit Analysis

- Its purpose it to answer the questions
  - Is the project justified (benefits outweight costs)?
  - Can the project be done, within cost constraints ?
  - What is the maximal cost to attain a certain system ?
- Difficulties
  - discovering and assessing benefits and costs
  - they can both be intangible, hidden and/or hard to estimate
  - it's also hard to rank multi-criteria alternatives

JM



# Types of Benefits

- Monetary
  - when Euro values can be calculated
- Tangible (Quantified)(χειροπιαστά)
  - when benefits can be quantified, but Euro values can't be calculated
- Intangible (απροσδιόριστα)
  - when neither of the above applies

How to identify benefits ?

- By organizational level (operational, lower/middle/higher management) or by department (production, purchasing, sales,…)

JM

# Types of Costs

- Project-related
  - Development and purchasing costs
  - Installation, training and conversion costs
- Operational (on-going)
  - Maintenance: hardware, software, facilities
  - Personnel: operation, maintenance
- For a small business that wants to introduce a PC-based IS, these cost categories amount to:
  - project costs: purchase hardware, software, furniture; customize software, train, install, file conversion
  - on-going costs: operating the system (data entry, backups, helping users, vendors, etc.) maintenance (software) and user support, hardware and software maintenance, supplies, ...



# Accounting Methods (τρόποι λογιστικής)

- **Payback Analysis** (Αποζημίωσης/Απόσβεσης)
  - how long it will take to pay back the project, and accrued costs:
    - Total costs (initial + incremental) - Yearly return (or savings)
- **Return on Investment Analysis** (Απόδοση Επένδυσης)
  - Compares the lifetime profitability of alternative solutions
  - (Lifetime benefits - Lifetime costs)/Lifetime costs
- **Net Present Value Analysis** (Καθαρή σημερινή αξία)
  - Determines the profitability of the new project in terms of today's monetary values. Will tell you that if you invest in the proposed project, after n year you will have X profit (or loss) on your investment

# Discount rate (προεξοφλητικό επιτόκιο)

- ***A Euro today is worth more than a Euro tomorrow…***
- So we should normalize the Euro values so that to refer to current year Euro values
- This requires using a ***discount rate***, which measures the opportunity cost of investing money. The number is company/industry-specific
- To calculate the ***present value***, I.e. the real Euro value given the discount rate d, y years from now, we the use the formula

$$\text{PresentValue}(y) = \frac{1}{(1+d)^y}$$

- For example, for d=0.12 we get:
  - PresentValue(1) = 1/(1+0.12)^1 = 0.893
  - PresentValue(2) = 1/(1+0.12)^2 = 0.797

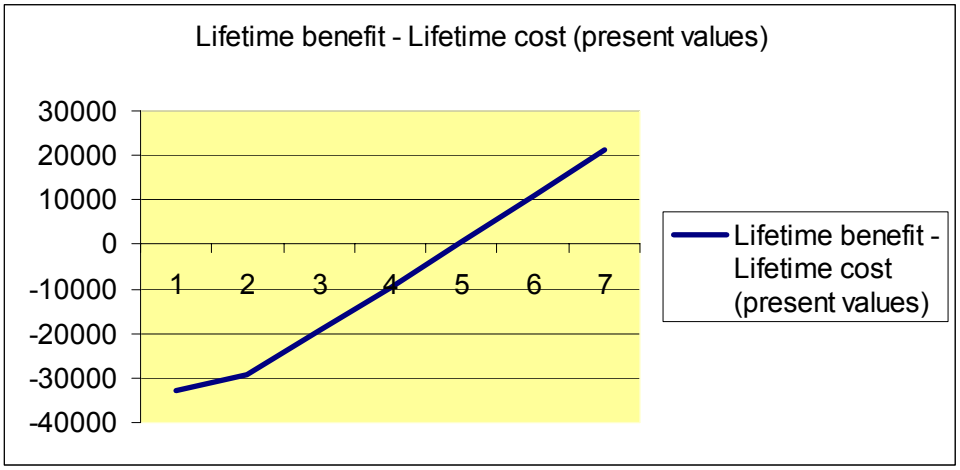


# Payback Analysis

- To calculate in present Euro values:
  - **Total costs (initial + incremental) - Yearly return (or savings)**
- Example:

| CASH FLOW | Year | Year | Year 2 | Year 3 | Year 4 | Year 5 | Year |
|---|---|---|---|---|---|---|---|
| COSTS | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Development cost | 33000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Operational cost | 0 | 0 | 4000 | 4500 | 5500 | 6000 | 6000 |
| *discount factors for 9%* | *1* | *0.91743* | *0.84168* | *0.77218* | *0.70843* | *0.64993* | *0.59627* |
| Present value of annual costs | 33000 | 0 | 3366.72 | 3474.826 | 3896.339 | 3899.588 | 3577.604 |
| Total present value of lifetime cost | 33000 | 33000 | 36366.72 | 39841.55 | 43737.88 | 47637.47 | 51215.08 |
| BENEFITS | | | | | | | |
| Benefit from opereration | 0 | 4000 | 16000 | 17000 | 20000 | 22000 | 23000 |
| *discount factors for 9%* | *1* | *0.91743* | *0.84168* | *0.77218* | *0.70843* | *0.64993* | *0.59627* |
| present value of annual benefits | 0 | 3669.725 | 13466.88 | 13127.12 | 14168.5 | 14298.49 | 13714.15 |
| Total present value of lifetime cost | 0 | 3669.725 | 17136.6 | 30263.72 | 44432.23 | 58730.72 | 72444.87 |
| | | | | | | | |
| **Lifetime benefit - Lifetime cost (present valu** | **-33000** | **-29330.3** | **-19230.1** | **-9577.82** | **694.3438** | **11093.25** | **21229.79** |
| | | | | | aposvesh | | |
| | | | | | | | |
| | | | | | | **ROI=** | **0.414522** |

# Payback Analysis






# Net Present Value

- After discounting all costs and benefits, subtract the sum of the discounted costs from the sum of the discounted benefits to determine the net present value
- When comparing multiple solutions or projects, the one with the highest positive net present value is the best investment.

| CASH FLOW | Year | Year | Year 2 | Year 3 | Year 4 | Year 5 | Year |
|---|---|---|---|---|---|---|---|
| COSTS | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
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| | | | | | aposvesh | | |
| | | | | | | | |
| | | | | | | **ROI=** | **0.414522** |

***Net present value after 5 years***

# Return on Investment (Απόδοση Επένδυσης)

- **(Lifetime benefits - Lifetime costs)/Lifetime costs**
- The alternative with the highest ROI is the best.

| CASH FLOW | Year | Year | Year 2 | Year 3 | Year 4 | Year 5 | Year |
|---|---|---|---|---|---|---|---|
| COSTS | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Development cost | 33000 | 0 | 0 | 0 | 0 | 0 | 0 |
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| | | | | | aposvesh | | |
| | | | | | | | |
| | | | | | | **ROI=** | **0.414522** |



# Risk Analysis

- One of the criteria for comparing alternatives often has to do with an evaluation of the risks for each alternative
- Examples
  - one alternative may have a higher risk of rejection by users of the system.
  - one alternative may have better support from top management, which means that it has lower risk of failure because top management changed its mind.

# Risk Factors

- **Requirements**
  - poorly understood requirements at scheduling time
  - customer changes requirements
  - IS staff insist on unnecessary features
- **Technological**
  - unsuitable target deployment environment
  - unsuitable development tools
  - New tools, no technology standards
- **Skill**
  - inadequate participation by users in development process
  - poor project management
  - poorly trained developers
- **Political/Environmental**
  - weak upper management commitment
  - changing environment, technological environment, government action



# Feasibility Analysis Matrix:

| Description | **Alternative 1** | **Alternative 2** | **Alternative 3** |
|---|---|---|---|
| *Operational feasibility* | | | |
| *Technical feasibility* | | | |
| *Economic feasibility*<br>Cost<br>Payback period<br>ROI | | | |
| *Schedule feasibility* | | | |

# Feasibility Analysis Matrix: Examples

| Description | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| ***Operational feasibility*** | | | |
| *Technical feasibility* | | | |
| *Economic feasibility*<br>Cost<br>Payback period<br>ROI | | | |
| *Schedule feasibility* | | | |

- *The business process should be changed because with this system ...*
- *The employees will use it right away*
- *the employees will love it because it will solve that problem*
- *The manager strongly supports this project*
- *There is one department director who is against this project*



# Feasibility Analysis Matrix: Examples

| Description | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|
| *Operational feasibility* | | | |
| ***Technical feasibility*** | | | |
| *Economic feasibility*<br>Cost<br>Payback period<br>ROI | | | |
| *Schedule feasibility* | | | |

- *We should hire an expert in C++*
- *We should hire an expert in COBOL because the existing system …*
- *We will have to master PowerBuilder*
- *We don't yet know if this is technical possible because ….*

# Feasibility Analysis Matrix: Examples

| Description | Alternative 1 | Alternative 2 | Alternative 3 |
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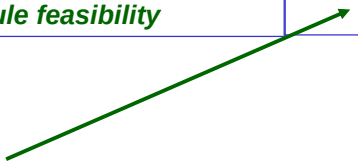

- *6 months*
- *9 months*
- *5 months assuming that we will not be blocked by ...*



# Comparing Alternatives with Multiple Criteria

(a) Prioritise the criteria
- <Economic, Technical, Operational, Schedule>

(b) Assign a weight to each criterion
- 0.3*Economic + 0.3* Technical + 0.3* Operational + 0.1* Feasibility

(c) Eliminate unsatisfactory alternatives by “acceptability” threshold values
- e.g. Economic>80, Technical >60, Operational >90, Schedule>30
- and then apply (a) or (b)

(d) Do a more detailed analysis based on multi-criteria decision making taking into account the associated risks and preferences over risks (decision theory, utility theory)

# Feasibility Analysis Matrix: ranking using weights

| Description | Weight | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---|---|---|---|
| *Operational feasibility* | 30% | 50 | 90 | 60 |
| *Technical feasibility* | 30% | 60 | 60 | 80 |
| *Economic feasibility* | 30% | | | |
| Cost | | see Appendix B | see Appendix B | see Appendix B |
| Payback period | | | | |
| ROI | | 60 | 40 | 80 |
| *Schedule feasibility* | 10% | 90 | 60 | 80 |
| SCORE | 100% | **72** | **57** | **74** |



# Expressing Preferences over Alternatives with Uncertainty

- >> Decision Analysis and Utility Theory

# Feasibility Study: How to acquire the needed information?

- Techniques:
  - Study available documents and data
  - Sampling
  - Interviews
  - Questionnaires
  - Observation



# Feasibility Study Contents

- Purposes and scope of the study
  - objectives, who commissioned it, who did it, sources of information, process used for the study, how long did it take, …
- Description of the current situation
  - organizational setting, current system(s), ..
- Related factors and constraints
- Problems and requirements
- Objectives of the new system
- Possible alternatives (including possible the present situation)
- Analysis of alternatives
  - description of each alternative, evaluation w.r.t. criteria, cost/benefit analysis
- Recommendations
  - what is recommended, implications, what to do next, sometimes it makes sense to recommend an interim solution and a permanent solution
- Appendices that include supporting material

# Reading and References

- **Systems Analysis and Design with UML Version 2.0** (2nd edition) by A. Dennis, B. Haley Wixom, D. Tegarden, Wiley, 2005. CHAPTER 3
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