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Computer skills advanced problem solving and project management

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Problem solving and project management

What are the contact points between Problem Solving and Project Management?

- There are many.
- For example:

. . .

- Usually a project is what we face to set up the solution steps in a problem.
- A project must be well-defined (as a problem) to have an efficient solution.
- Many problem solving methodologies are useful for project management and vice versa.





The seesaw problem (1)

- Used in ICT, can be used in general
- This methaphore helps to understand why words, influenced by personal background, are not often indicated to describe the problem:
 - Difficulties in translating the problem in a solution





Think to differences in languages...

Capitale	Fine	Metro
Moto	Rosa	Corrente

- In English: SVOPT (subject, verb, object, place, time soggetto, verbo, oggetto, luogo e tempo). If you change the order of the words in a sentence, the meaning could be completely different!
- Vice versa, sponsors, via, per, media, and so on (quid pro quod)...



Italian

Think to how many times you feel inadequate because of your pronunciation in English/Italian/other or because you miss a word in another language!



Think to difficult to understand a new concept in your

The seesaw problem (2)

 As you see, because of various misunderstanding, we often miss the real needs and we could create a wrong solution



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What is the solution?

- We need to find, alternatively:
 - an universal language (Esperanto? Math?)
 - a symbolic way to express a process or an idea
- We also need to define fixed step in facing a problem!



Light bulb = the perfect metaphor

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Definition of a project

- Project: it necessarily must be defined in the correct way
 It is not sufficient to tell: we want to build a pyramid in short
 time
- we need to specify:

We want to build a 100 meters pyramid, in Milan, ready for the 12nd of December 2013 (and we also have to specify the costs and resources)

- WELL-DEFINED project: it is important to define
 - objectives,
 - context,
 - constraints (boundaries),
 - expectations,
 - Involved/to-be-involved resources.
 - time.
 - Difficulties: in each start, manage and control processes many professional figures are involved
 - often difficult to be coordinated correctly
- Problem: often an expert Project Manager is missing







- Define a problem (a complex step)
- Feseability study (analysis) to identify the solution:
 - AS IS
 - TO BE
 - Actions planning
- Actions implementation
- Evaluation and test
- SOLUTION!!!



Feasibility study: AS IS

Current situation (AS IS), important to correctly define the

problem originating the project. It could be composed by:

- the description of the state of the art,
- Market/competitors analysis,
- company processes analysis,
- systems analysis,
- production analysis,
- technical description of the products/services/processes



P.M. (Project Management) Cycle

• The following schemata represents the different phases of the PM cycle, after the start of the project (phase 0 and feasibility study)



 Anyway, there are various representations for a project cycle, different following the context or the adopted standard.

Other Project life cycles representations: the USA defence model

- Phases and deliverables follow the schemata shown in the figure:



Other Project life cycles representations: Murphy

- Used in pharmaceutical projects. Characterized by a long duration, due to the experimental phase.



Other Project life cycles representations: the spiral

- Used in software development. Characterized by an incremental approach





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Other Project life cycles representations:waterfall



Other Project life cycles representations

There is a lot of other project life cycle representation:

- Fountain,
- Incremental,
- Iterative,

and so on...

agile Prince 2 (certification) Six sigma (certification)

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Project Management in the Internet

Project Management Institute (PMI) <u>www.pmi.org</u>

International Project Management Association https://www.ipma.world/

Certifications open promising career opportunities





Free courses on the Internet

Cursera (www.cursera.org)

Udemy (<u>www.udemy.com</u>)

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AS IS - a useful analysis: SWOT model

Born at the Stanford Research Institute (1960-1970)

Example:

- <u>http://www.provincia.modena.it/allegato.asp?ID=86568</u>
- <u>http://www.marketingteacher.com/SWOT/nike_swot.htm</u>

FREE TOOL:

• <u>http://www.sharewareconnection.com/titles/swot-analysis.htm</u>

Free template:

• <u>http://www.businessballs.com/swotanalysisfreetemplate.htm</u>

Not-free products:

- SmartDraw
- <u>http://www.smartdraw.com/specials/swotanalysis.htm?id=45390&gclid=CNm</u> <u>mmI6a95ECFQIJZwodzUt0qA</u>



Feasibility study: AS IS - SWOT ANALYSIS

It is a tool to combine internal and external factor through a comparison matrix.

	OPPORTUNITIES	THREATS
STRENGHTS	Offensive Keep the maximum advantage form these opportunities	Adjust Equilibrate forces
WEAKNESS	Defensive Control very carefully the competitors	Survive Go around the problem

Often these two columns points in opposite directions and so we have to apply the right strategy to align them.

In these cases the strategies we can use can be the Outside-in (Market strategy) or the Inside-in (resources-driven).

The SWOT analysis can also be applied to competitors, to evaluate new perspectives...

Feasibility study: aims definition

A first level definition of the objectives:

- List the objectives, also if they are temporary.
- To help this phase, the SMART test is often used. It helps to verify if what we have detected is sufficient to define all our objectives:

The SMART test means that the objectives have to be:

- **S**pecific (have the objectives been defined in a clear way?)
- Measurable (can we measure the results, at the end of the project?)
- Achievable (are the objective realistic and achievable in the indicated time?)
- Remunerative (what are the benefit deriving from the project for the organization, the team or for the individuals?)
- **Time (is the deadline clearly identified?)**



The WHAT-IF analysis: definition

- To perform this kind of analysis, **useful to identify possible** evolution scenarios, we must to compile some tables using values describing the current situation.
- With these values we need to apply formulas (for example the variability of the interest rate, if the project needs an economic effort)
- After that, we can vary the values trying to plan different scenarios on the basis of different conditions
- Generally, a medium scenario is considered, but if you are in your first experiences, you should prefer the worst case.
- The what-if analysis can also be useful during the project (to control the forecast and the state of the project.
- Very used in the USA (and in marketing).



The WHAT-IF analysis: tools

- You can perform it **both manually and using a tool**. The most used tool is MS Excel.
- 1) First create the tables of values to have a quantitative evaluation of the simulation
- 2) After create, in a different sheet, different scenarios. You can save the scenarios to have different prevision models.
- To compare the different scenarios, you can create a summary sheet. Values can be compared in this sheet or you can use a pivot table
- 4) It is also possible to perform the opposite process, that is, knowing the final results, you can use the Excel function goal seek (ricerca obiettivo) menu tools (strumenti) to find what (and how) values of the selected cells have to be varied to obtain the requested value.



Feasibility study: TO BE

It describes the situation expected at the end of the project (TO BE):

- Each point of the AS IS section must correspond to a result, showing the benefit deriving from the performed actions.
- You can perform, if you have enough experience, a COST-BENEFIT analysis and calculate the break-even-point.
- Also in this case you can use the WHAT IF analysis to design different scenarios (usually projection in 3 or 5 years)
- You can verify data and information using the SQUID formula





Feasibility study: TO BE - the S.Q.U.I.D. formula

- To verify information and to evaluate the project
- The S.Q.U.I.D. formula:
- Soon (subito): how much faster we answered to the requirements
- Quality (qualità) of the product and of the ideas
- Information (informazioni) that need to be given
- Date (data) in which we will deliver the results or end the project



• We need to collect as more as possible information on desiderata from customers (stakeholders, internal or external sponsores)



Other representations used in Project Management

- There are many ways to express
 - The problem and the solution
 - The relationship between the problem and the solution
 - The phases to achieve the solution
- The choice depends on the situation





The cause-effect diagram

- Also called *Fishbone* or *Ishikawa diagram*
- Used in quality control but also to identify and organize the causes of an event, a problem or a result.
- It shows the hierarchical report between causes, following the importance or detail levels, and a result
- It identifies all the causes of an effect or a problem
- It analyses and links some interactions among the factors influencing a process
- It allows the corrective action
- It is not useful and appropriate for complex problems



Cause-effect diagram: schemata

- The problem or the effect is on the final (right) part of the Fishbone
- You have to identify the main categories
- You have to identify detailed level of causes
- After you have to analyse the schemata and remove the causes of the problem



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The Deming cycle

- Also called *the PDSA cycle* (Programming, Doing, Studying, Acting)
- It is a model for the continuous (qualitative) improvement
- Logical sequences of four repetitive phases for continuous improvement and learning
- Also known as the continuous improvement spiral
- In relationship with the *just-in-time production*
- Benefits:
 - Project management
 - Proof of process
 - Systematic daily management for the individual and/or the team
 - Solution process for problems
 - Continuous development
 - Customer development
 - Human resources development
 - <u>New products development</u>





The Deming cycle

- 4 parts:
 - *PLAN*: anticipate changes. Analyse and predict results.
 - *DO*: execute the plan, through little steps in controlled circumstances.
 - *STUDY* (control): study the results.
 - ACT: act to standardize or improve the process.





8D methods

- 8D = 8 Disciplines
- Methodology to represent (and solve) problems about the improvement of products and processes
- Also known as Global 8D, Ford 8D or TOPS 8D
- Phases:
 - D1: set up the team (interdisciplinary, with a team leader)
 - D2: describe the problem (who, what, when, where, why, how, how much 5W2H analysis)
 - D3: implement and verify the intermediate actions (temporary difficulties)
 - D4: identify and verify the causes from the root (potential causes cause-effect diagram)
 - D5: choose and verify the corrective actions
 - D6: implement and validate the permanent corrective actions
 - D7: prevent the recurrence
 - D8: congratulate with the team (recognize collective efforts, disseminate the success, share the knowledge with the organization)



The 8D methods: the schemata



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