PEE – Project in Electrotechnical Engineering

Project Management Concepts

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What is a Project?

ISO 10006 (1, 3)	PMBOK (2, 3)
Unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources.	A temporary endeavour undertaken to create a unique product or service.

(1) ISO 10006:2003 - Quality management systems -- Guidelines for quality management in projects
http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=36643

(2) PMI ProjectManagement Institute, Project Management Body of Knowledge
http://www.pmi.org/pmbok-guide-and-standards/pmbok-guide.aspx

(3) Combining the ISO 10006 and PMBOK To Ensure Successful Projects
http://bia.ca/combining-the-iso-10006-and-pmbok-to-ensure-successful-projects/

Which Projects are we interested on?

"Engineering projects!...

– *What makes an engineering project different from a non-engineering project?*

- *Engineering projects involve solving problems using science and technology, e.g.:*
  - *Delivering internet access to a part of a country where it still does not exist.*

- *Non-engineering projects involve issues where science and technology are not the dominant factors, eg:*
  - *Someone finding a new way of organizing life after retirement – finding a new "project of life".*

– *Many times the nature of projects is mixed.*

About the concept of engineering (1):

"Engineering, … (is) … the application of science to the optimum conversion of the resources of nature to the uses of humankind."

Encyclopædia Britannica

"Engineering is the art of doing what is necessary,…
…spending the minimum of what is available."

An Anonymous Engineer

About the concept of engineering (2):

For the current purposes:

Engineering is a set of activities that use science and technology in order to solve problems with relevance to people, under constraints of cost and time.

About the profession of engineer:

"…

- *A good scientist is a person with original ideas.*
- *A good engineer is a person who makes a design that works with as few original ideas as possible.*
- *There are no prima donnas in engineering.*

…"

Freeman Dyson

Ordem dos Engenheiros (the professional association of engineers, in Portugal) states that :

(Artigo 4.º do Estatuto da OE)

> ***"…designa-se por engenheiro o titular de licenciatura, ou equivalente legal, em curso de Engenharia, inscrito na Ordem como membro efectivo, e que se ocupa da aplicação das ciências e técnicas respeitantes aos diferentes ramos de engenharia nas actividades de investigação, concepção, estudo, projecto, fabrico, construção, produção, fiscalização e controlo de qualidade, incluindo a coordenação e gestão dessas actividades e outras com elas relacionadas."***

http://www.ordemengenheiros.pt/fotos/editor2/ordem/atribuicoeseorganizacao/estatutos_da_ordem_dos_engenheiros.pdf, visited on February 22nd, 2012.

Engineering Projects General Methodology (1)

- Identification of an idea or an opportunity needing to be addressed.
- Analysis and characterisation of the problem(s) to be solved:
  - Objectives, Requirements, Constraints.
- Identification of possible technical solutions.
- Construvtion of possible economic scenarios.
- *Ex-ante* technical and economic evaluation :
  - Is it feasible in technical and economic terms to go into market with the product or service coming out of the project?
- Decision: **go** or no **go**, under which technical solutions and economic scenarios?

If decision is **go**:

- Plan market deployment:
  - To whom? Where? When? How much?
- Plan development, documentation, test, validation, installation, operation and maintenance.
- Develop (in laboratory, in factory, in dockyard, etc) products or services and documentation.
- Test and validate.
- Promote and comercialize
- Install, operate and provide maintenance support.

Engineering Projects General Methodology (2)

Main Phases of an Engineering Project

Concept Phase	▪ Identification of an idea, a need or an opportunity
	▪ Analysis of the problems to be solved: – Objectives, Requirements, Constraints
	▪ Identification of possible solutions and scenarios
	▪ Evaluation of technical and economic feasibility
	▪ Decisions about technical solutions and economic scenarios
Deployment Phase	▪ Planning
	▪ Development (in laboratory, factory, field, etc)
	▪ Test and validation (in laboratory, factory, field, etc)
	▪ Documentation
	▪ Promote and comercialize
	▪ Install, operate and provide maintenance support

Project Management Approach in PEE (1)

- **A 2 step approach is recomended:**
  - **Step 1: Concept phase:**

    This corresponds, basically to what is being done in PEE project.
  - **Step 2: Deployment phase**
    - **The nature of PEE is not to deploy the results of the projects in real world conditions.**
    - **However it is expected from students that they already elaborate some ideas about the possible industrialisation and commercialisation of the product or service coming out of the proof of concept phase.**
    - **This assumes, obviously, that the proof of concept phase has been successful, ie: the project seems feasible in both technical and economical terms**

Project Management Approach in PEE (2)

- **Step 1: Proof of concept phase:**

  This corresponds, basically to what is being done in PEE project:

  - **Identify the technical solution to be subject to proof of concept;**
  - **Identify the cost elements associated with this solution (components, materials, software, etc) and confirm that they lead to a global value not higher than the available budget for this phase (aprox. €100);**
  - **Make sure that all elements are available at the time they will be needed in the proof of concept phase.**
  - **Develop the prototype of the product or service under consideration and make its tecnical evaluation: does what it is supposed to do in good terms?**
  - **Construct possible economic scenarios about the industrialisation and commercialisation of the product or service coming out of the proof of concept phase and make its economic evaluation:**
    - **Is it likely to provide the return on investment and on operational costs?**
    - **What are the critical factors for economic success?**

Project Management Approach in PEE (3)

- **Step 2: Market deployment phase**

  This corresponds, basically, to the possible industrialisation and commercialisation of the product or service coming out of the proof of concept phase.

  It assumes, obviously, that the proof of concept phase has been successful: the project seems feasible in both technical and economic terms

  - **Plan development, implementation (which includes test, validation, installation, operation and maintenance)**
  - **Develop and implement (in laboratory, in factory, in dockyard, etc)**
  - **Test and validate**
  - **Create support**
  - **Promote and commercialize**
  - **Install**
  - **Operate and maintain (this requires ex-ante operations and maintenance manuals and ex-post evaluation of technical and economical aspects of the project)**

Final Notes

- Not all the above methodological steps have to be present in all PEE projects.
- Sense and sensibility is expected from groups in defining the methodology that they will adopt, taking into consideration the available time and resources.
- The most important to have in mind is that:
  - Projects are done by humans (even if supported by machines or other non-human resources).
  - Projects have a time to start and a time to end.
  - Projects have a cost that should not exceed what you have available as a budget (in money or in physical resources).