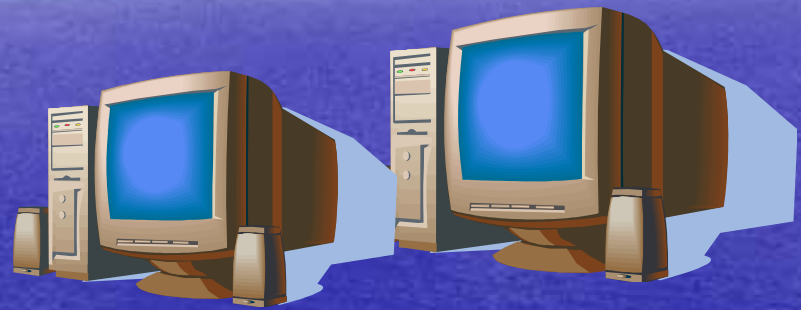


4- Tasks on PRE-PROJECT (DRAFT) stage



Main objectives in Pre-project (or draft) stage:

- Selecting the most convenient solution
- Developing and defining this solution
- Improving previous designs
- Determining the project profitability

It is a calculation stage

Pre-Project important facts:

Precise technical values are reached Investment errors must not exceed 15%.

It is used to ask / look for economic aid (**funds**) and as a **management document**.

The best experts are incorporated at this stage.

Fees are 25% of the project.

It involves the most important decisions of all the project activity:
GO-WAIT-STOP

Tasks on Pre-Project stage

- 4-1 Model formulation
- 4-2 Awareness, compatibility and stability variable analysis
- 4-3 Optimization
- 4-4 Tests, expected performance and simplifications
- 4-5 Project solution selection
- 4-6 Final report
- 4-7 Organization tasks and tools

4-1 Model formulation

Or using project simulation tools

They can be:

Iconic: they are based on science and on the art of drawing, and on symbol and line regulations (scale models). Today everything is changing a cause the **3D technology** for rapid prototyping

Symbolic: they are the mathematical representation of the problems that establish the system variables (unimportant variables must be discarded), contour...
(**mechanics equations**)

Analogical: they simulate a system performance, which is difficult to directly study by means of another system that can reproduce the characteristics of the first system in more simple conditions (more simple but comparable conditions).

They must respect **similarity laws** (Froude, Reynolds, Mach...) (aerodynamics, hydraulics..)

Numerical: They simulate a system performance whose performance equations can be programmed in a computer (Heat and cold...) .This kind of models pursue:
to simulate the performance, to establish numerical results and to exchange variables and parameters
ANSYS, ABACUS, NASTRAN, ADAMS,...

4-2 Sensibility, compatibility and stability variable analysis

SENSIBILITY ANALYSIS: it identifies the project critical parameters

COMPATIBILITY ANALYSIS: geometrical and physical tolerances, chemical tolerances, security...

STABILITY ANALYSIS: it is the study of the system performance and of its parts when it faces the expected functioning conditions perturbations.

4-3 Optimization

It determines the project parameters given certain contour conditions. When these parameters are applied to intake variables, they must provide as positive results as possible. Optimizers software for multivariable analysis are a good alternative.

4-4 Tests, expected performance and simplifications

TESTS: they allow to watch the defects of a project before getting into the detail design stage. (Corrosion, fatigue, fire resistance, circuit performance, model, ergonomics...)

EXPECTED PERFORMANCE: project running analysis throughout time. How does it vary with the physical environment (physical, legal...)

SIMPLIFICATIONS: when putting together the different components, additional complexities usually appear. It is convenient to **delete/resolve/simplify** these complexities.

4-5 Project solution selection

Determining factors that will influence when selecting the solution.

Establishing the advantages and disadvantages of every factor.

Determining the possibilities every solution has in order to become real.

Analysing how every solution can influence other project objectives.

Justifying that the solution chosen is the best

4 - 6 Final report

Results are evaluated and checked. A complete solution report is made, including the economic study solution.

The document will have the same sections as the final project, although in the final project they will be described in greater detail.

4-7 Organization tasks and tools

Pre-Project stage must contain tasks and knowledge related with project organization, planning, programming and time and quality control.

Project management from human side

Aspects related:

Group activities

Objective achievements

Workpackages

Decision taking

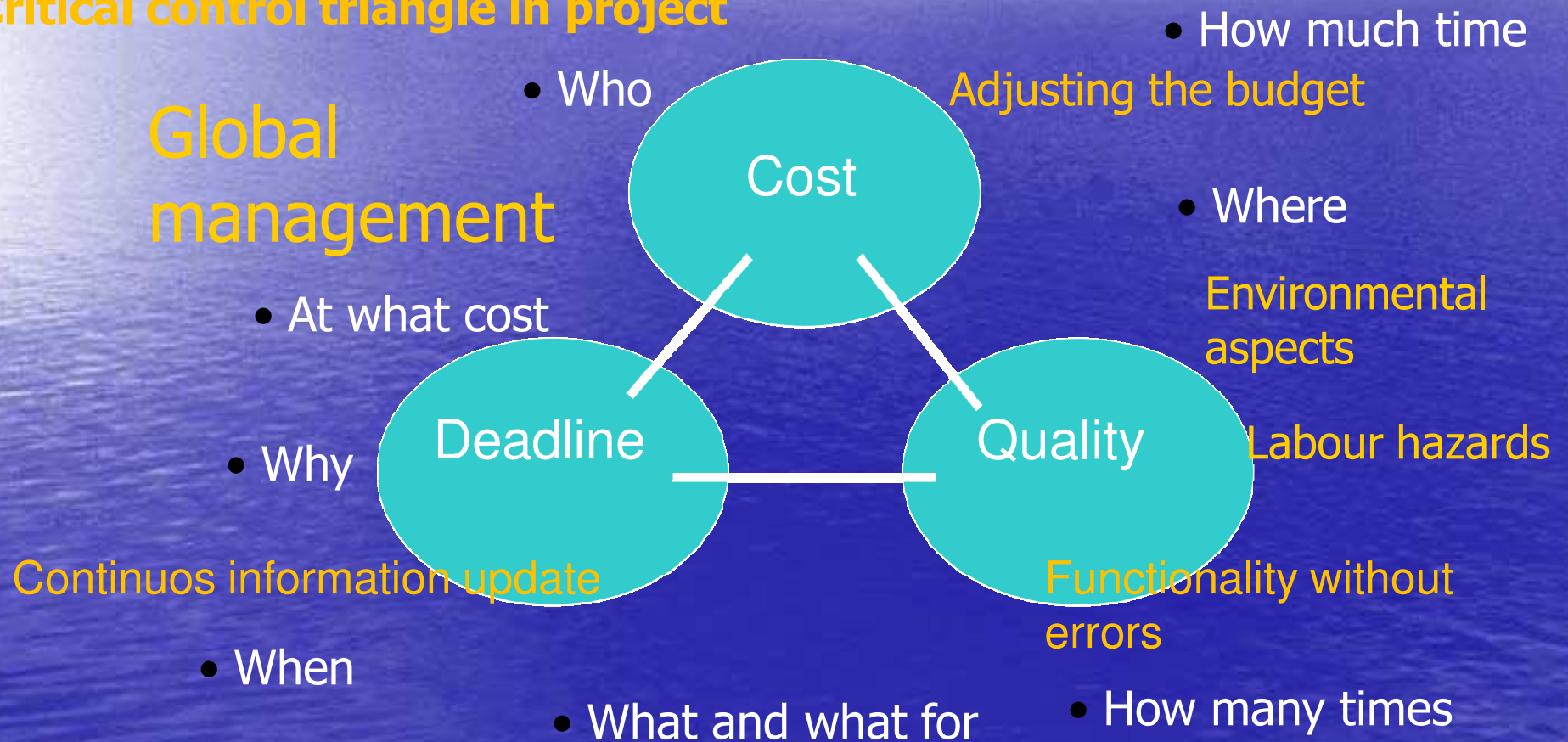
Results through the work of others

Motivation

Leadership

Critical control triangle in project

Global management



Project manager role

It is the person that incorporates the internal and external efforts of the organization and manages them to attain the project execution successfully.

Little presence, in some cases, until the project ends.

Common in multinational companies.

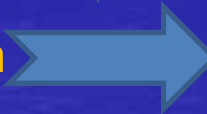
- **Definition:** project management consists of a group of activities, techniques and methods that using all the available resources allow the objectives to be achieved in the most economical conditions.
- **It causes** internal tensions that are solved by a wealth of information (correct definition of information systems) and a change of mind (use of **formal** and **informal** structures of the organization).

Old management



Current management

Functional organization



Matrix organization

Project manager activities under his/her responsibility and authority

Needs to achieve cost objectives, execution and quality deadlines. For this he has to have the legal authority (position on the organization, hierarchy, status...) and/or the real (experience, technical knowledge, negotiation skills, personal prestige).

Manage, plan and control the project accomplishing the budget and deadlines.

Define the project basic characteristics and control the task assignment of the people responsible.

Demand quality performance from the assigned workers.

Take technical and economical decisions necessary for the appropriate work development .

Clear and precise definition of the project scope.

Division and clear task assignment to the different units (**Work packages**)

Clear establishing of the objectives for each work group.

Establishing of the information and communication system.

Definition and application of **corrector actions** (control) in a useful time.

Motivation.

To represent the organization in front of the **external contributors**.

To represent the organization in front of the **public organizations**.

- **Demands:**
 - To set objectives: clear, specific and measurable
 - Organize resources: management
 - Planning and programming: Temporal view
 - Establishing budgets: economy
 - Execution coordination: human factor
 - Result control: technological factor

Manager's success factors:

Maximum consensus in decisions made. (**COMPANY IT IS NOT A DEMOCRACY**)

Existence of a formal and explicit relation model in the **working matrix**.

Taking the maximum advantage of the **negative attitudes**

Real participation of personnel in the project.

Creation of a **correct atmosphere** by management.

Organizational structure, authority and responsibility lines with tendency to **flexibility**.

Procedure to **give more priority** between management and functional managers.

Company types – future situation (H high, N normal, V very)

	SME	Bigmulti	Civil Servant	Freelance	Entrepreneur	Student
Achieve experience	H	N-H	N	H	H	-
Social promotion	H	H	N	?	?	H
Stability	N	N-H	VH	H	?	-
Formation	N	N	H	H	H	VH

Control reports

Key documents:

Coordination manual

Or management procedures.

Project quality plan

Aspects to control in the project execution to maintain the quality offered to the customer.

Coordination manual

- Its objective is to regulate in the most clear and precise way the external relations (with owner, supplier, official organization..) and internal, from the project team, establishing the project organization, the work methods, the communication and information circuits and the control procedures.

Coordination manual example

- Introduction
- General
- Project organization
- Project criteria
- Document distribution and circulation
- Communications
- Programming control procedure
- Cost control procedure
- Changes and additions to contract procedure

Introduction

- Project title
- Situation
- Customer name
- Identification number
- Abbreviations that will be used
- Complete addresses of the main entities related to the project

Project organization

- Office service organization, organization chart
- Field work organization, organization chart
- Functions and responsibilities
- Authority
- Signature
- Modification of common procedures

General

- Project summary
- Project division (services provided by:)
 - The engineer's company
 - The supplier of the process
 - The owner
 - Suppliers and contractors
 - Other third parties
- General planning
- Budget
- Contract documents:
 - Offer
 - Letter of intention
 - Contract

Project criteria

- Language
- Units
- Rules, codes and regulations (*,*)
- Formats
- Symbols
- Numbering:
 - Plans of the engineering company
 - Supplier plans
 - Specifications
 - Offers and buying orders
 - Reports and other documents
- Codification and identification:
 - Areas, equipment, instruments, lines...

Cost control procedure

- Periodic reports
- Accounting codification

Document distribution and circulation

- Distribution chart
- Copy number and type

Communications

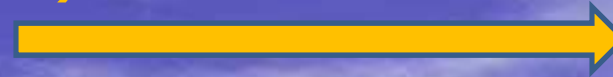
- Periodic reports
- Updates and revisions

Program control procedure

- Periodic reports
- Updates and revisions
- Special studies

Project quality plan (evolution)

TIME



Quality Control	Quality assurance	Total Quality
A chain policy doesn't exist in a company	A quality policy exists	
It gets carried out on a finished product or service	It is applied in all the company's functions in relation with the product or service regulation	It is applied throughout the company and to external groups related to the company (suppliers...)
Its objective is error detection	Its objective is error prevention	Its objective is continuous improvement
It's an expensive method because it doesn't avoid errors, it only detects them	It's a method that saves money	
	Takes into account human resources, training	Main human resources in the method
	Takes into account the costs within the quality point of view	The customer is the most important thing, he is the one who generates benefits

- In 1987 the ISO published quality rules, the ISO-9000 rules:
 - ISO-9000: Rules for the quality management and assurance.
 - ISO-9001: Quality systems. Model for the quality assurance in the design/development, the production, the installation, and the after-sales service.
 - ISO-9002: Quality systems. Assurance model for the quality in the production and installation.
 - ISO-9003: Quality systems. Model for the quality assurance in the inspection and in the final attempts.
 - ISO-9004: Quality and quality system elements management. General rules.

Project management tools

- ROY and PERT methods
- Gantt Diagrams
- Load curve

ROY and PERT methods

- ROY and PERT methods: obtaining the critical path and critical activities.
- ROY method works with activities and PERT works with stages.
- It is based on the calculation of a pair of t values associated to each node on a graph.
- Allows to know the delay margins in the different project activities.
- It is usual use the Work Breakdown Structure (WBS)

Roy Method

- $M.Roy = T_u - t_u$
- Critical activity
 $M.Roy = 0$
- Critical path

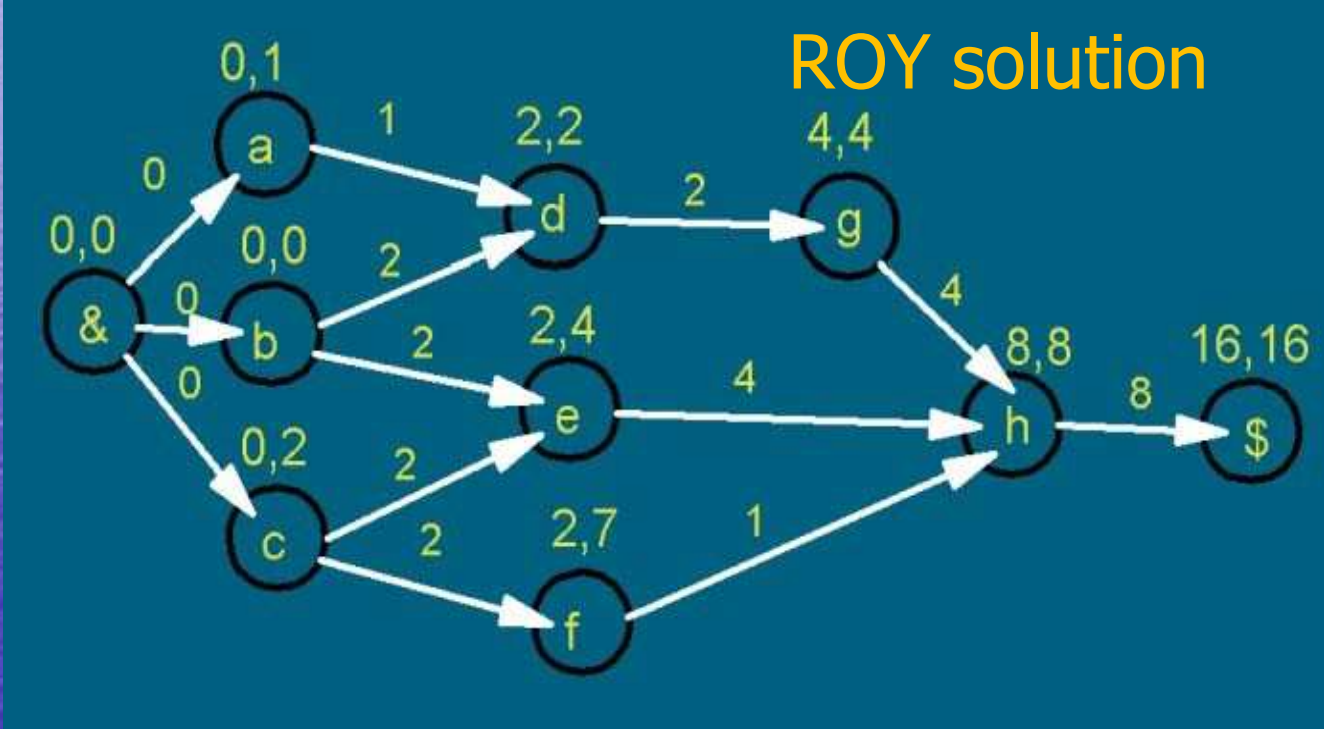
Pert Method

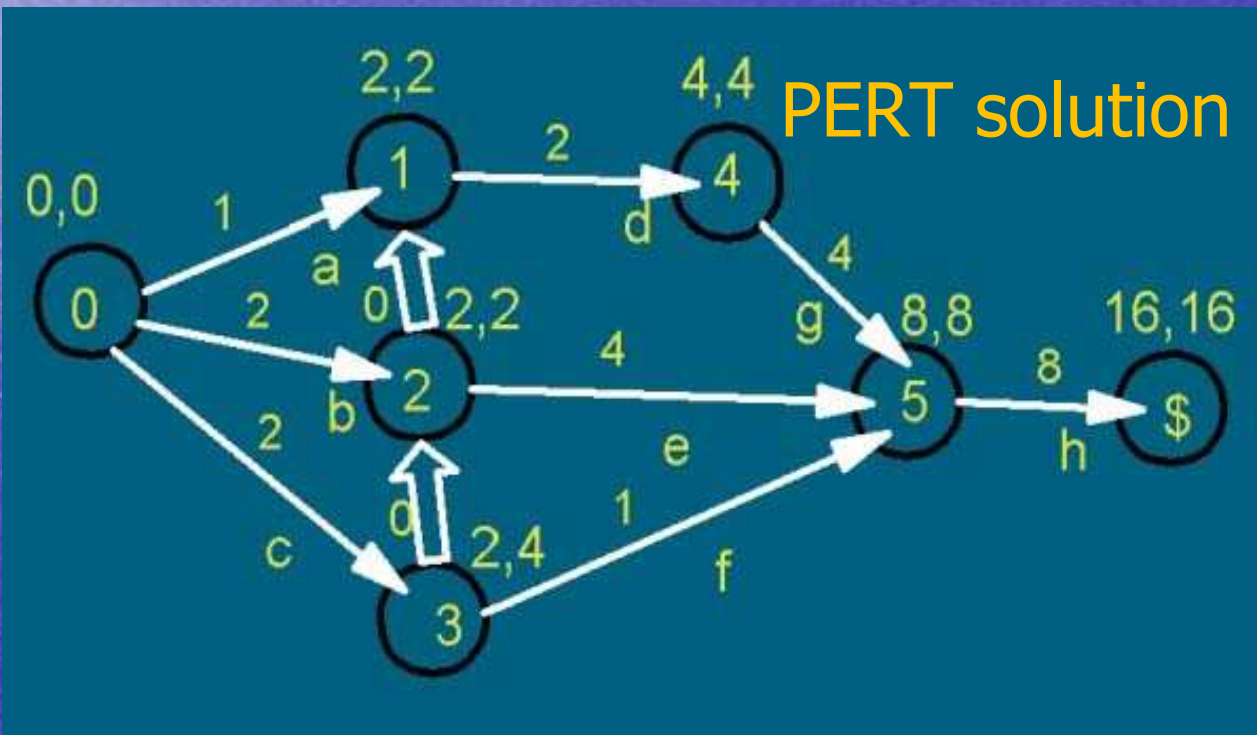
- $MT = (T_v - t_u) - (u, v)$
Max. margin. Activ.
- $MI = (t_v - T_u) - (u, v)$
Independent margin
- $ML = (t_v - t_u) - (u, v)$
Free margin
- $MC = (T_v - T_u) - (u, v)$
Conditional margin
- Stages and critical path

Starting with this WBS

Both the ISO and the PMI (Project Management Institut) say that the WBS is a hierarchical decomposition oriented to the deliverable of the project relative to the work that will be carried out by the project team to reach the objectives of the same and useful to create the deliverables required by the client

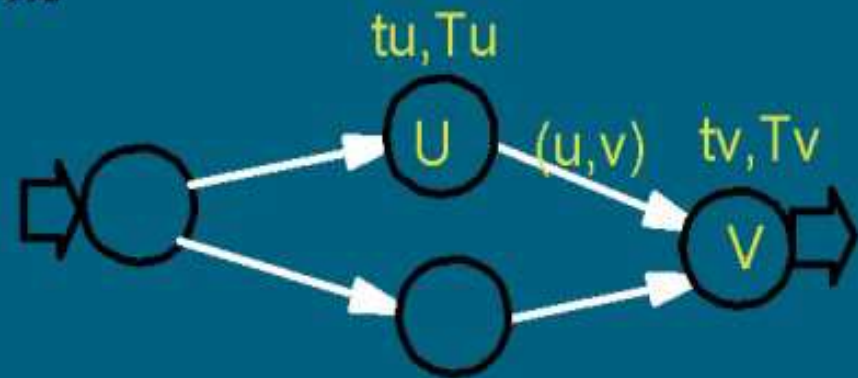
Activity	Description	Act. Inm.Pre	Duration	Resources
A	-	-	1	2
B	-	-	2	2
C	-	-	2	4
D	-	A,B	2	6
E	-	B,C	4	2
F	-	C	1	1
G	-	D	4	2
H	-	G,E,F	8	1





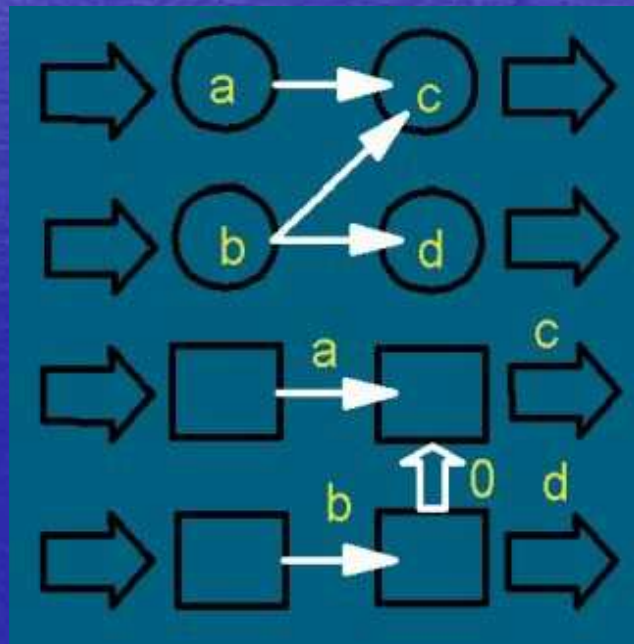
Calculation of t and T in each node:

$$t_v = \max[(t_u + (u,v))]$$
$$T_u = \min[(T_v - (u,v))]$$



- Differences between ROY and PERT:

ROY

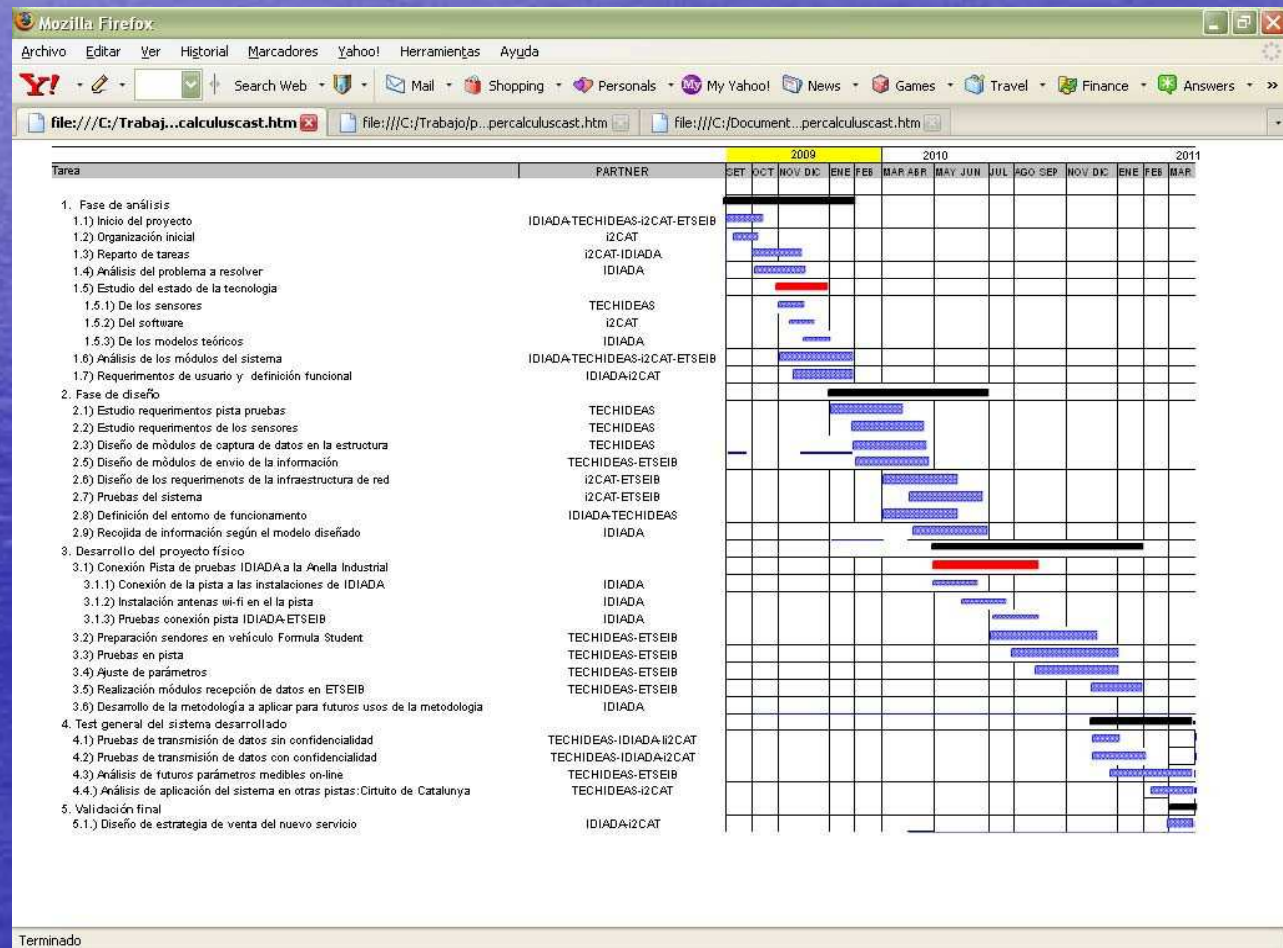


PERT

Other used management tools

- **GANTT DIAGRAMS:** Representation of project activities during the project.
- **LOAD CURVES:** Use of resources during the project.

GANT DIAGRAMS:



LOAD CURVES

