# Dynamic Scheduling

## Integrating baseline scheduling, schedule risk analysis and project control

# But … what is baseline scheduling?

*"A goal without a plan is just a wish" (Antoine de Saint-Exupéry)*

## Dynamic Scheduling

**Dynamic Scheduling** is a Project Management methodology to plan, monitor and control projects in progress in order to deliver them on time and within budget to your client. Its main focus lies in the integration of three crucial aspects, as follows:

- Baseline Scheduling: Plan your project activities to create a project timetable with time and budget restrictions
- Risk Analysis: Analyze the risk of your schedule and its impact on your time and budget
- Project Control: Measure and analyze your project performance data and take actions to bring your project on track

In this "**What is baseline scheduling?**" brochure, the various inputs and outputs of baseline scheduling are highlighted. The two other aspects are summarized in the "**What is schedule risk analysis?**" and "**What is project control?**" folders.

## What is baseline scheduling?

Baseline scheduling is the act of determining start and finish times of each project activity within the activity network and resource constraints and results in an expected timing of the work to be done as well as an expected impact on the project's time and budget implications.

### Inputs

**Activities.** A list of tasks defined at the lowest level of the work breakdown structure (WBS)

**Relations.** Links between activities that determine when activities can start or finish (FS, SS, FF, SF)

**Estimates.** Estimates of activity durations and costs

**Resources.** Estimates of resource requirements with corresponding costs (optional)

### Outputs

**Gantt chart.** A timetable with start and finish times for each activity

**Time and cost forecasts.** A total expected duration (Planned Duration (PD)) and budget (Budget At Completion (BAC))

**Management reserves.** A margin or buffer on the total time and cost predictions

## Why

Constructing a baseline schedule is a crucial step in the dynamic scheduling PM methodology since your project schedule will act as a **point-of-reference** for your schedule risk and project control steps.

## How

Baseline scheduling can be easily done on a computer using the **critical path** scheduling techniques as well as the **resource leveling** extensions of the stand-alone tool ProTrack (www.protrack.be). For a more integrated baseline scheduling approach, OR-AS relies on the P2 Engine (www.p2engine.com) tools to fully integrate the tools in current or newly developed business systems.

**OR-AS: Operations Research - Applications and Solutions**

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## Reports

The project baseline schedule information is summarized in an example baseline scheduling report and contains the following relevant information that can be used to monitor and control your project:

- Network analysis: The project characteristics of a project network are measured by the network topology indicators (SP, AD, LA, TF, see report) that describe the degree and amount of relations between activities
- Resource analysis: A detailed analysis of the resource use and its corresponding cost outline for the project
- Gantt chart timetable: An indication of expected start and finish times for each project activity
- Planned Value: The planned value is a cumulate increase of the project costs and will act as the point-of-reference during project control

**<An example baseline scheduling report for a patient transport IT system project (Source: www.or-as.be)>**

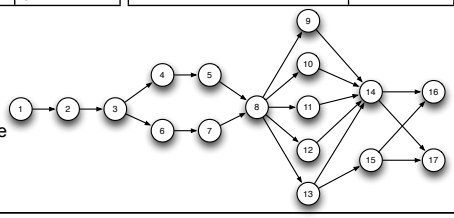
| | | | |
|---|---|---|---|
| OR-AS Operations Research Applications and Solutions | Project Name: **Patient transport system** | Sector | Medical - IT |
| | **OR-AS**<br>Operations Research - Applications and Solutions<br>www.or-as.be<br>info@or-as.be | Type Report | ES Performance report |
| | | File Name | Project 2 - 0,5SP - Patient Transport System XXX.p2x |
| | | Status Date | Project Finish |

### Network Analysis

| General | |
|---|---|
| # Activities | 17 |
| Planned Duration (PD) | 25 weeks |
| Budget At Completion (BAC) | 137,000 € |
| # Renewable Resources | 5 |
| # Consumable Resources | 0 |

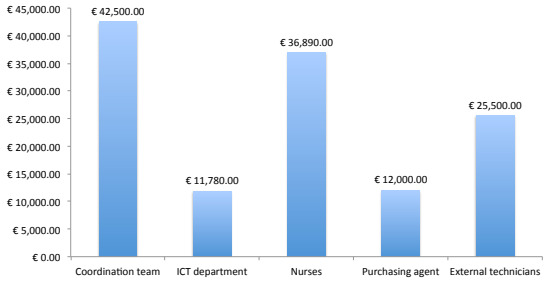
| Network topology | |
|---|---|
| Serial/Parallel (SP) | 50% |
| Activity Distribution (AD) | 50% |
| Lengths of Arcs (LA) | 53% |
| Topological Float (TF) | 0% |

- The SP = 50% indicating a network somewhere between a parallel and serial structure
- The activity-on-the-node network is displayed in the picture



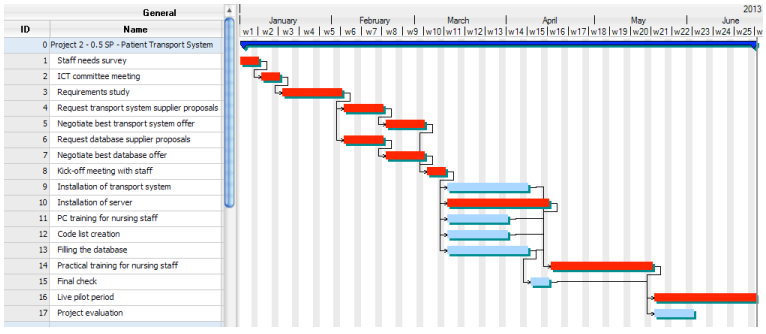

### Resource Analysis

- Five renewable resources have been allocated to various project activities, leading to the total resource cost outline displayed in the graph



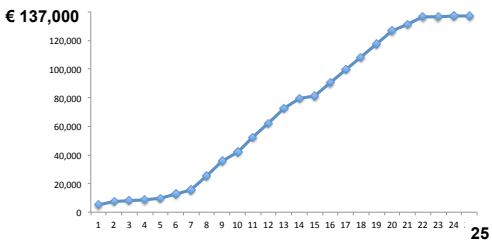

### Gantt chart

- The Gantt chart displays the expected start and finish times of all project activities, and the critical path is highlighted in red
- A more refined view on the critical path can be obtained from the schedule risk report




### Planned Value

- The cumulative increase in the total costs results in the Planned Value line, and leads to two important indicators:
  - Planned Duration (PD) = 25 weeks
  - Budget At Completion (BAC) = € 137,000




## Did you know that...

... the network topology metrics (SP, AD, LA, TF, see report) contain crucial information to determine where your focus must be during project control. They are crucial for the quality of a bottom-up risk approach and/or top-down control approach (Omega - International Journal of Management Science, 2011, 39, 416-426).