Rough Order of Magnitude (ROM)
Resource Planning
Table of Contents

- Fundamental resource questions that we need to find answers to
- Important resource data parameters needed for each activity
- From the planning database, very important calculations can be made that define the resource parameters of the project
- Detail resource planning requirements
- Organizational jurisdiction (who does it?)
Resource Questions

- What type of resources are needed to accomplish this project?
- How much of each resource is needed to accomplish this project?
- When are the resources needed?
- How much staff is needed to provide necessary resources to meet the schedule?
- How much budget is needed to acquire the necessary resources?
- What other considerations need to be made?
Issues With Resource Planning

- Legacy of top-down planning
- No experience, no history of accomplishment
- Lack of knowledge of how to do it
- Organizational jurisdiction (Who does it?)
- Software is confusing and doesn’t seem to work
Requires Additional Parameters

- OEC (Original Estimate to Complete) – Need to have an estimate of labor hours needed to accomplish each and every task

- RES – Resource Type (individual or group / pool)

- ETC (Estimate to Complete)
  - In-progress tasks – need an estimate of labor hours to complete the remainder of the task
  - Near term tasks – Should reassess and revise the OEC values if it is believed that they have changed
Define Detail Resource Estimates

- Compute Total Resource Requirement (TRR) in labor-hours for an individual, or a pool/group, or even the project in total

  - As a rule, any task that is > 200 hours of estimated work time should be decomposed into more detailed tasks

- Compute Total Resource Requirement (TRR) in labor-hours

  - $\sum$ of all task OECs = TRR

For an individual, a resource pool, a department, even the project in total
Further Compile Resource Requirements

Resource Capacity per Day (DRC)

- \[ \text{DRC} = (\text{No. of resources in group}) \times 6 \text{ hrs} / \text{day} \]
  
  Note – we use 6 hours / day to take *Effectivity* into account

Shortest possible Length Of the Project (LOP) in work-days

- \[ \text{LOP} = \frac{\text{TRR}}{\text{DRC}} \]

Example:

- \[ \text{TRR} = 10,000 \text{ hrs w/ 15 resources in the pool} \]
  
  \[ \text{DRC} = 15 \text{ res} \times 6 \text{ hrs} / \text{day} = 90 \text{ hrs} / \text{day} \]
  
  \[ \text{LOP} = \frac{10,000 \text{ hrs}}{90 \text{ hrs} / \text{day}} = 111 \text{ days} \]
Calculating a Project’s Finish Date

- Earliest possible completion date of the project
  \[(\text{EF of Project}) = (\text{ES of Project}) + \text{LOP} - 1\]

The easiest way to do this is to create a task in the project file that is assigned the appropriate calendar

Example:

- Start Date = 14 Feb & the LOP = 111 days
  \[\text{EF} = 14 \text{ Feb} (31) + 111 - 1 = 141 (18 \text{ Jul})\]

Note: This does NOT take work dependencies into account
The common project management environment:
- Has a known start date and a desired / required finish date (time bound)
- Must determine and then acquire the resources necessary to meet the schedule requirements

The essential two questions are:
- How much of each type of resource is needed to meet the project’s schedule requirements?
- When are they needed (time-phased need)?
Calculating a Project’s Resource Needs

Calculating a project’s resource needs to meet a schedule is a very complex process (time-phased resource needs)

This process was thoroughly covered in Course #2 (Section 10 – Resource Modeling)

ROM resource needs analysis can still be done in a simple fashion

Here is how it works!
We can determine a ROM of a project’s total resource need – but it is more practical to calculate:

- A resource need ROM of a particular type of resource (pool / group) or an individual
- A relative short span of time (< 6 Months)
- The total project resource need is the sum of the parts

Calculating resource needs (RN)

- Required Project Duration (RPD)
  \[ RPD = (\text{LF of Project}) - (\text{ES of Project}) + 1 \]

- RN = \( \text{TRR} \div RPD \div 6 \)
Calculating a Project’s Resource Needs - Example

Example:

- Start Date = 14 Feb (31) – Required Finish Date = 17 Jun (120)
  RPD = 17 Jun – 14 Feb + 1
  = 120 – 31 + 1
  = 90 days

- Total Resource Need (RN) to meet schedule
  RN = TRR ÷ RPD ÷ 6
  = 10,000 ÷ 90 ÷ 6
  = 18.5 people

To accomplish the defined amount of work (10,000 hrs), we will need 18.5 resources working continuously over 90 days – A lesser amount of resources will cause the end date to slip.
Example: Resource plan for one individual – our self or someone else – Next three month window

- Determine available work-hours in the next three months = # of days in window (66) and multiply this by 6 (75% Effectivity) = 396 labor-hours

- If total work hours = 390 labor-hours – OK – However cannot take on additional work without deferring, deleting, or reassigning other work

- If total work hours = 300 labor-hours – OK – Can take on some additional work as long as the total work load does not exceed 396 labor-hours

- If total work hours = 420 labor hours – NOT OK – Must defer, delete, or reassign some of the work until the total does not exceed 396 labor-hours
What Is Wrong With This Analysis?

The problem with this analysis is that it 1) does not take into account the dependencies of tasks or 2) specific time constraints on tasks.

It also does not take future requirements into account.

To get better answers requires a very detailed analysis as is presented in PMT’s second course.
Detail resource planning requires a very rigorous analysis of all detail tasks that have been scheduled in time.

- It can be conducted for an individual resource asset, a pool of like skilled resources, or even the project as a whole.

- The detail analysis process first schedules the tasks based on work dependency (relationships) and initiating date constraints.

- Then task durations and resource assignments have to be defined.

- We would then need to examine the resource situation on a week-to-week basis and try to balance each resource’s availability with their requirement.
Calculating Resource Needs In a Month – 1

This is where it gets very complicated

1 – Task starts & ends in month
2 – Task starts but does not end in month
3 – Task does not start but ends in month
4 – Task does not start or end in month, but spans the month
Calculating Resource Needs In a Month – 2

How many resources are needed in the month?

<table>
<thead>
<tr>
<th>Task</th>
<th>Duration</th>
<th>Work</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10 days</td>
<td>60 hrs</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>12 days</td>
<td>144 hrs</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>10 days</td>
<td>60 hrs</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>8 days</td>
<td>96 hrs</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>20 days</td>
<td>360 hrs</td>
<td>3</td>
</tr>
</tbody>
</table>

Total hrs in month
720 hrs

Total Resources
720 hrs / 120 = 6 Res

Another Way
Wk 1 – 5 Res
Wk 2 – 7 Res
Wk 3 – 8 Res
Wk 4 – 7 Res

Hours in the month
A – (All 10 days) = 60 hrs
B – (All 12 days) = 144 hrs
C – (10 of 30 days) = 60 hrs
D – (8 of 15 days) = 96 hrs
E – (20 of 40 days) = 360 hrs
Told you it was going to get complicated
Resource Planning Tools

- We need a **good** computer tool to help us with detail resource planning (modeling)

- How am I doing?

- We must answer the fundamental resource question

- This tool has very specific requirements with respect to resource planning / modeling

- We must introduce the concepts of *Aggregation* and *Effectivity*
Resource Planning Tool Requirements

There are several specific requirements of our resource planning / modeling tool:

- Essential resource parameters on each task: Resource ID, quantity (total labor-hrs), & number of resource assets assigned

- The tool must properly Aggregate resource totals for each resource type for each work-week – expressed in labor-hours as well as equivalent effective heads or assets

- It is most useful to display resource aggregation in a Resource Histogram format (weekly periods versus resource needs)

- Equivalent resource heads are calculated taking into account the effectivity of resources – 70% = 28 hrs/wk, 75% = 30 hrs/wk, 80% = 32 hrs/wk, etc.
Calculating Resource Needs Per Week

Aggregation of resources per week

Per this schedule aggregation calculate the cumulative resource hours for each week

This is based on resource hours per day for each task

For this month: total = 720 hrs or 6 equivalent heads
The Resource Histogram

Resource Histogram displayed in equivalent heads

- This shows that resource requirement is a very dynamic variable

- So how do you match a relatively static resource variable (availability) to a very dynamic resource variable (requirement)?
You Want To Learn More About This

- Take PMT’s course – There is just not enough time to explain it all here!

- There is a problem with project management tools meeting all of their resource aggregation requirements

Excellence in the science of project management
Resource planning / modeling is crucial to project schedule and cost success

There are some simple calculations that can be made for ROM or long range planning

To actually plan and manage any project successfully – you will have to conduct detail Resource Planning / Modeling

Good luck and Good Planning!