Finally: the resource leveling feature explained

May4, 2016 @ 12pm-1pm EST

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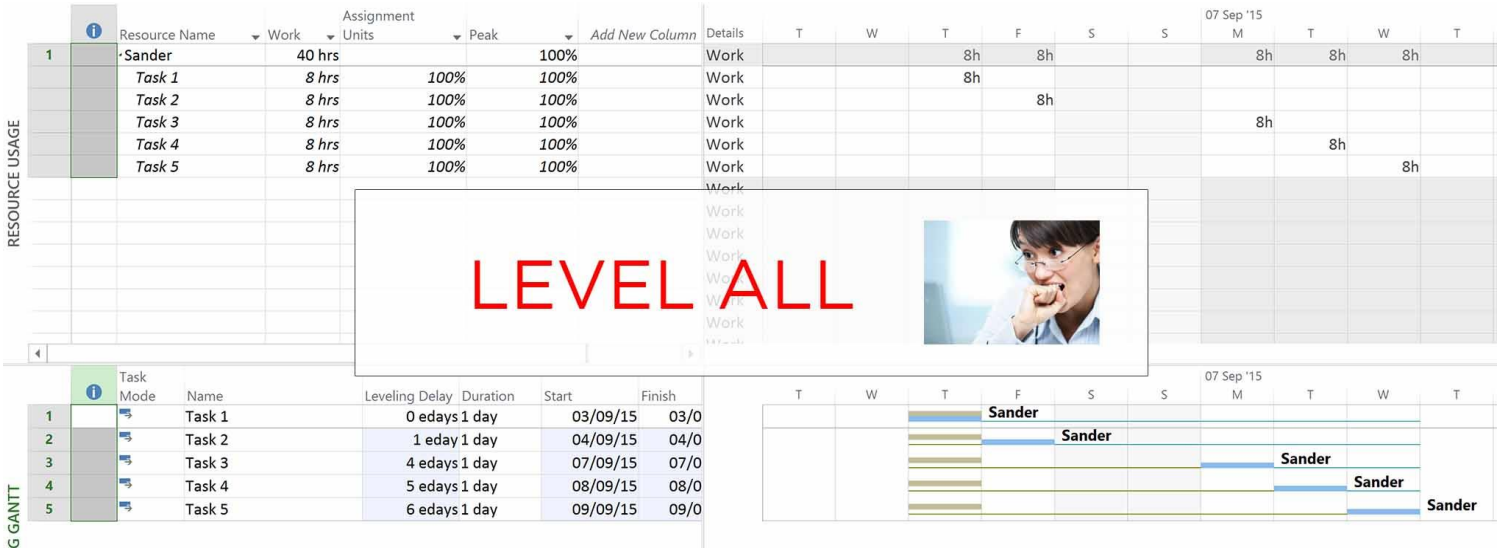
In which group are you?

- Group 1: It's a buggy feature
- Group 2: Not buggy, just a huge pain
- Group 3: A feature I can not live without!

95% of all customers say group 3 **after the course!**



I can tell you - It works great!

- There are only some things you need to know.
- If you do not know about these things, MS Project will do strange things to your schedule…
  - FI – if you did not put a link between *Write document* and *Review document*

About me

- Start with EPM (Sept 2006)
  - 1st project – train and coach 70 project teams
- + 500 training sessions
  - Various user levels
- Preferred supplier for
  - Since 2013
- + 30 companies
  - Impl/conf/change
- June 2015 founded
  - With Edwin van den Broek

Agenda

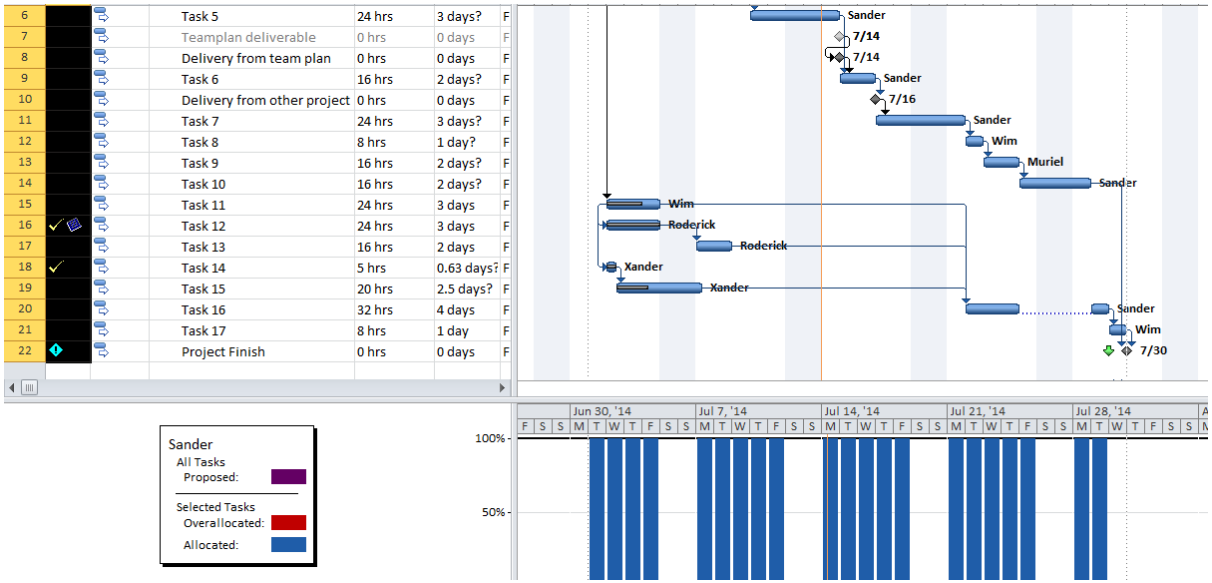
- How to spot over allocations? - 15 mins
- Questions - 7 mins

- How to solve over allocations? - 30 mins
- Questions - 8 mins

- Webinar Special Offer

Part 1: How to spot over allocations?

Resource graph

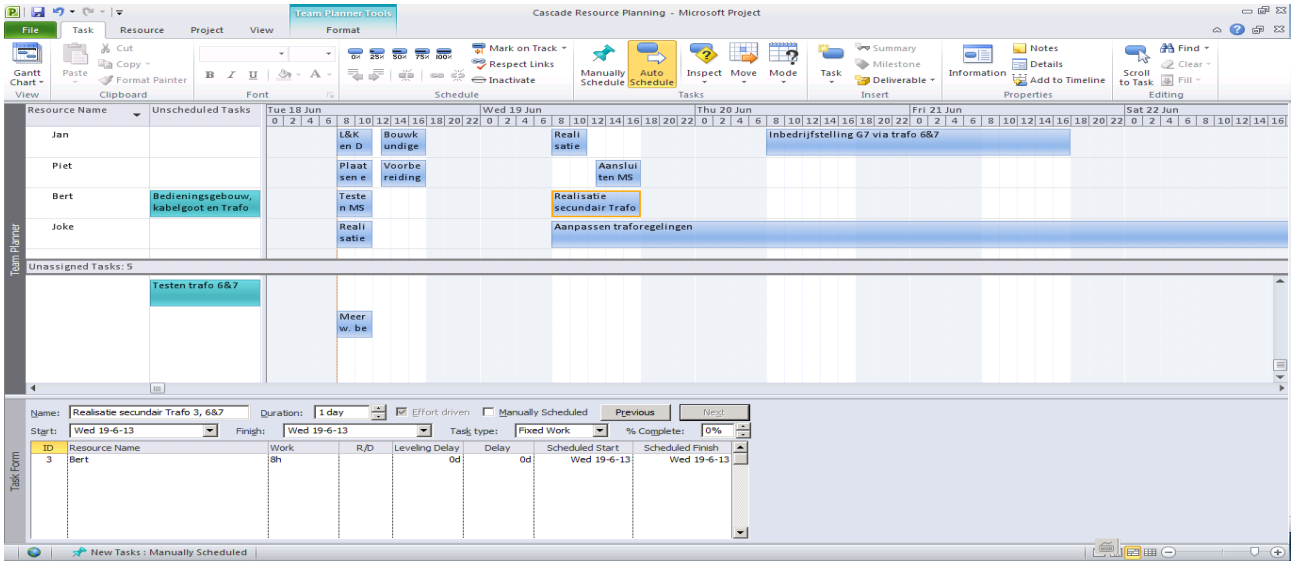


Know that there is a trick to select multiple resources at once!

The Resource Graph view: individual resource's workload and availability.

- If the resource name is listed in red, then the resource is over allocated.
- Resources listed in black are allocated either exactly at or under their full capacity.
- Peak units are listed at the bottom of the graph.
- To view the bar graph for the next resource, either press **page down** or use the scroll bar or the arrow keys.

Team Planner

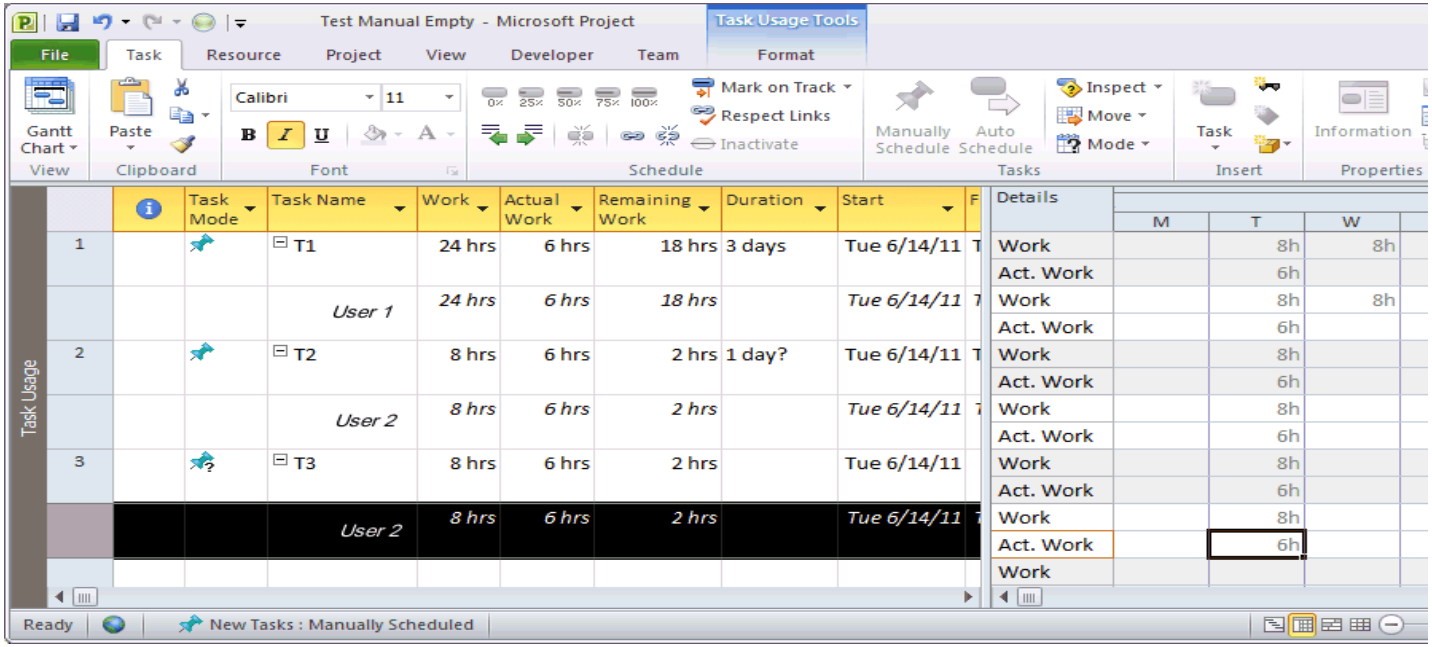


Team Planner: for a quick and easy way to see which tasks are assigned to which resources

- drag and drop tasks is not recommended as moving tasks will create a constraint on that task.
- An over allocation would also show red in the Team Planner.

When using the Team Planner, see it as a quadrant where each of the four corners has a distinct meaning.

For viewing assignments: Resource usage and Task usage



Resource Usage is one the assignment views, just like the view Task Usage.

- shows f.i. hours/remaining availability per day per assignment.
- Use these views if you need to deviate from the default 100% on assignment units. For instance if you want people to work 50% of their time to this task and 50% on another task
- Also use this view if you want to learn more about the assignment, like the **work contour, assignment units or peak units**
- With the Timescale **Months** it could be great input for your resource demand

Questions???

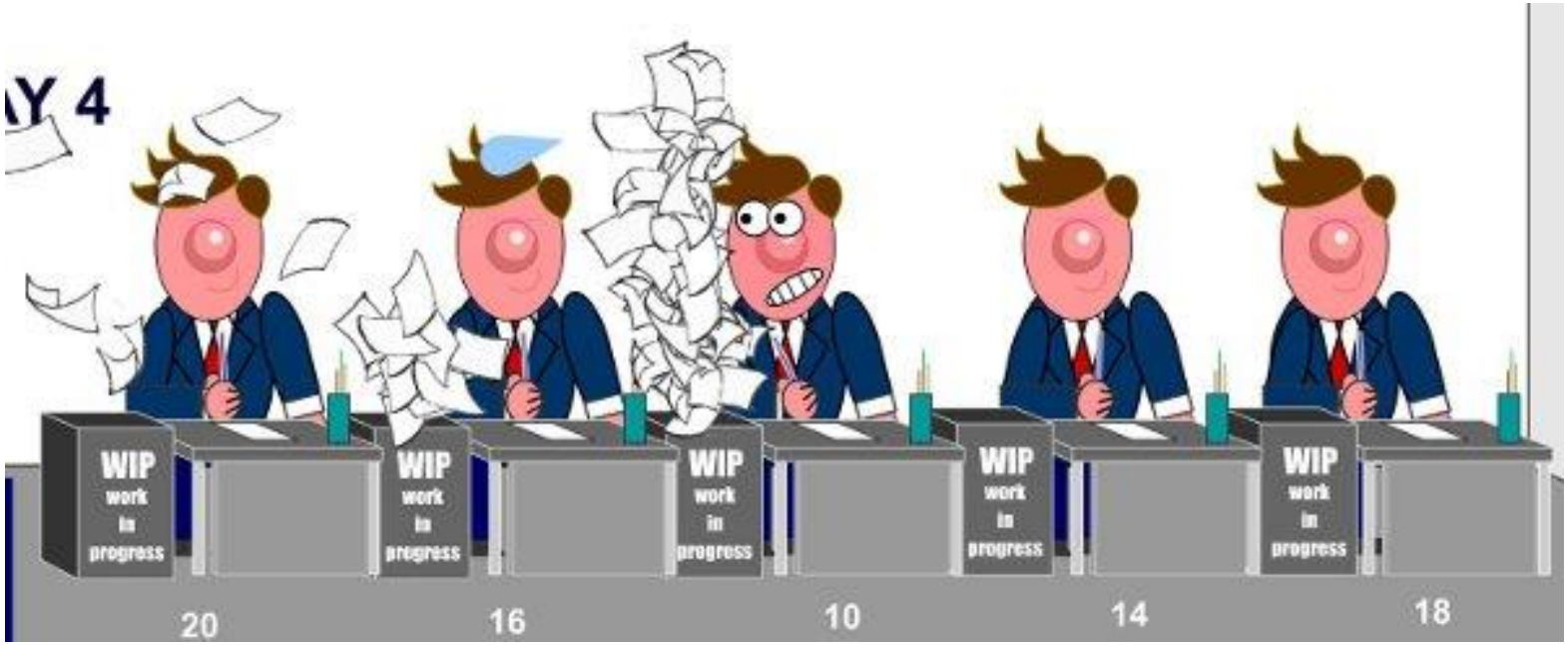
How to solve over allocations?

Solving over allocations

Resource leveling is the act of taking a resource-loaded schedule, and making it so that people don't have to work (too much) overtime.

Main goal is to have a critical path that is corrected for resource dependencies. Furthermore, all other tasks and deliverables should have reliable plan dates.

Where is the bottleneck?



Do leveling yourself or have it done by MSP?

Manual resource leveling:

- Reassign tasks to other people
- Reschedule tasks to resolve this.

MSP Resource leveling:

- Microsoft Project adjusts your schedule so that your resources have no over allocations.
- Will be explained in a couple of slides

Should you level the resources yourself or have it done by MSP?

This totally depends on:

- whether you have checked the completeness and correctness of your schedules network logic
- If for instance you did not use a dependency to indicate that *'reviewing document'* has to take place after *'writing document'*, resource leveling might put the order incorrect since it solely relies on the leveling algorithm.
- If your network logic is correct, MSP will give you a satisfying solution 95% of the time

Method 1: Solve manually

Approach:

1. See if any other resources still have available time; the first option should always be to distribute the work equally.
   - The quickest way to see this is by having a look at the Team Planner.

2. Distributing the work over other resources only goes to a certain point, especially when you are working with experts, the only option will be to spread this work for this resource over time, in a logical manner.
   - Assign the % that fits and see if the calculated duration is acceptable

3. Should the whole task be done by this resource/now?
   - Maybe parts of the task that can be done by someone else (documenting/preparation)
   - Maybe parts of the task can de done sooner/later (nice to haves, documentation)

Do not use task relationships to relocate scheduled work – if you decide later that an other resource will do the task, this task relationship makes your schedule unnecessarily long.

Method 2: Let MSP level for you

Why do things manually if you can have the tool do it for you automatically?

- MSP resource leveling will solve the over allocations based on the settings, just like Excel would do the calculation for you based on the formulas you put in.

As MSP resource leveling respects all settings within your schedule, your schedule should follow basic scheduling guidelines.

Next to these settings, MS Project uses a certain logic to determine which task to put first and which ones to delay based when resolving the over allocation.

- This logic, the leveling algorithm will be explained in a couple of slides
- Basically, MS Projects takes tasks with most slack and reschedules these later in time

Method 2: Let MSP level for you

If you do not want to level your whole project at once (**Level all**), you can also level on a per allocation basis.

- This keeps you very much in control and on top of the changes.
- Always start with the most critical resource (on the critical path) and work your way through as resources become less important for the timing of your project.

In order of the smallest incremental changes to your schedule, you have the following options:

- **Reschedule to available date:** Only one task will move
- **Level selection:** only the tasks you select will be levelled
- **Level resource:** only one resource you select will be levelled

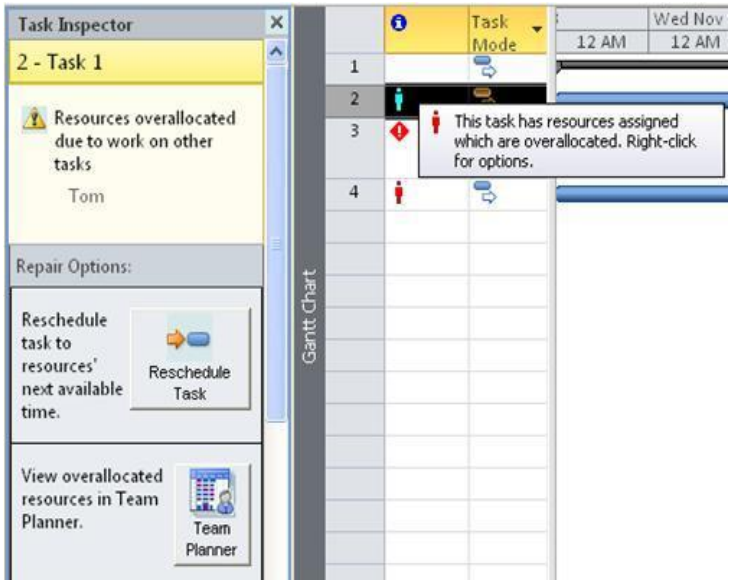
For leveling your whole project at once, or by using any of the incremental steps, the MSP leveling algorithm and the levelling options apply.

Level one task at a time

To spread the work in a logical manner, with this option you have most control over how the tasks will be ordered.

- Notice the tasks with the ‘red puppet’.
- Hover on the red puppet for the task with the least priority (the least critical task)
- **Right-click \ Reschedule to available date**
- Check to see that the task has now moved to the first location where the resource has availability

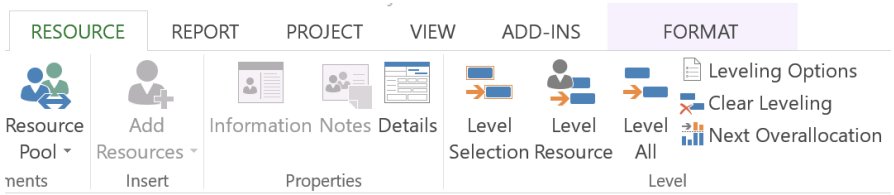
The benefit of solving over allocation this way is that you are completely in control of what happens.



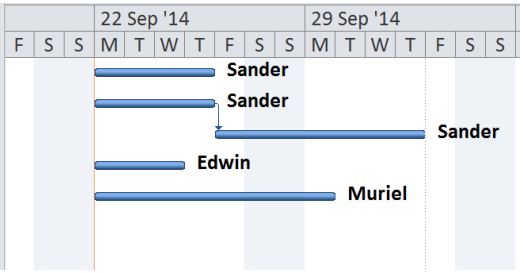
Level selection

You could also level a selection of tasks:

- Select the tasks you want to level
- In tab **Resource**, click **Level Selection**



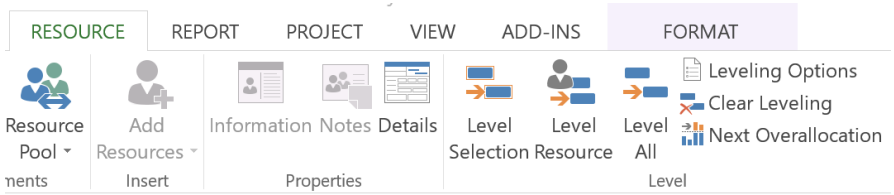
	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		Task 1	4 days	Mon 22/09/14	Thu 25/09/14		Sander
2		Task 2	4 days	Mon 22/09/14	Thu 25/09/14		Sander
3		Task 3	5 days	Fri 26/09/14	Thu 02/10/14	2	Sander
4		Task 4	3 days	Mon 22/09/14	Wed 24/09/14		Edwin
5		Task 5	6 days	Mon 22/09/14	Mon 29/09/14		Muriel

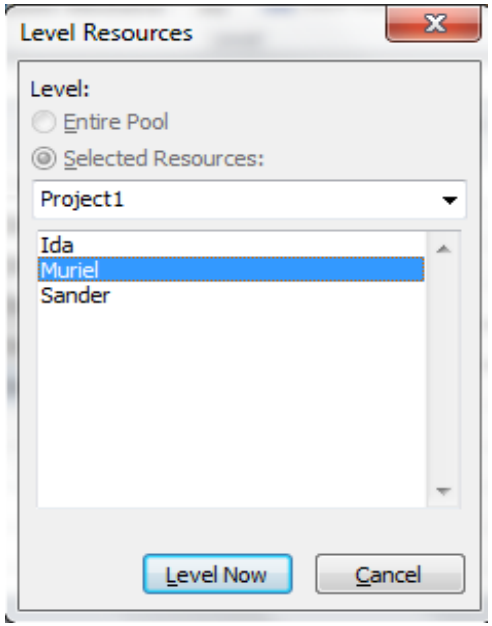


Level Resource

You could also level all the tasks belonging to one resource at once:

- In tab **Resource**, click **Level Resource**
- In the screen that pops up, always start with selecting the most critical resource.
- Click **Level Now**

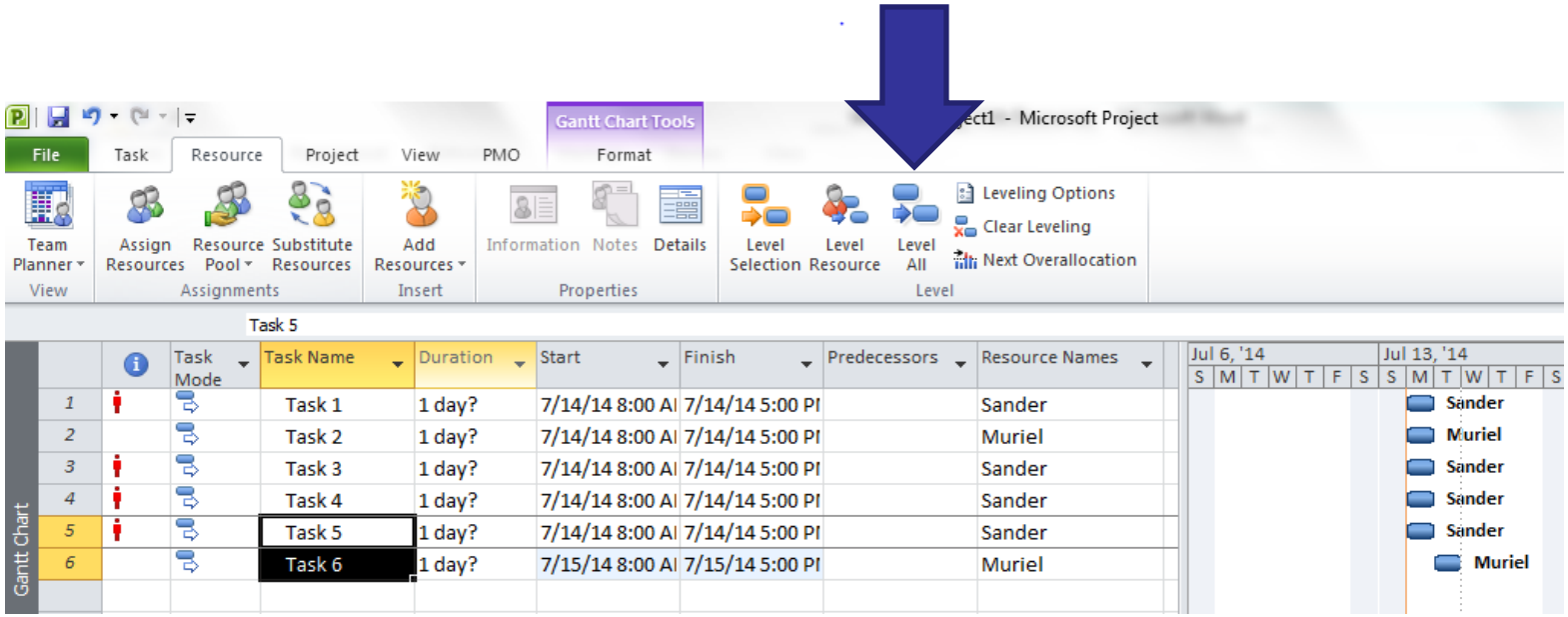




Level all

To level your schedule all at once you click:

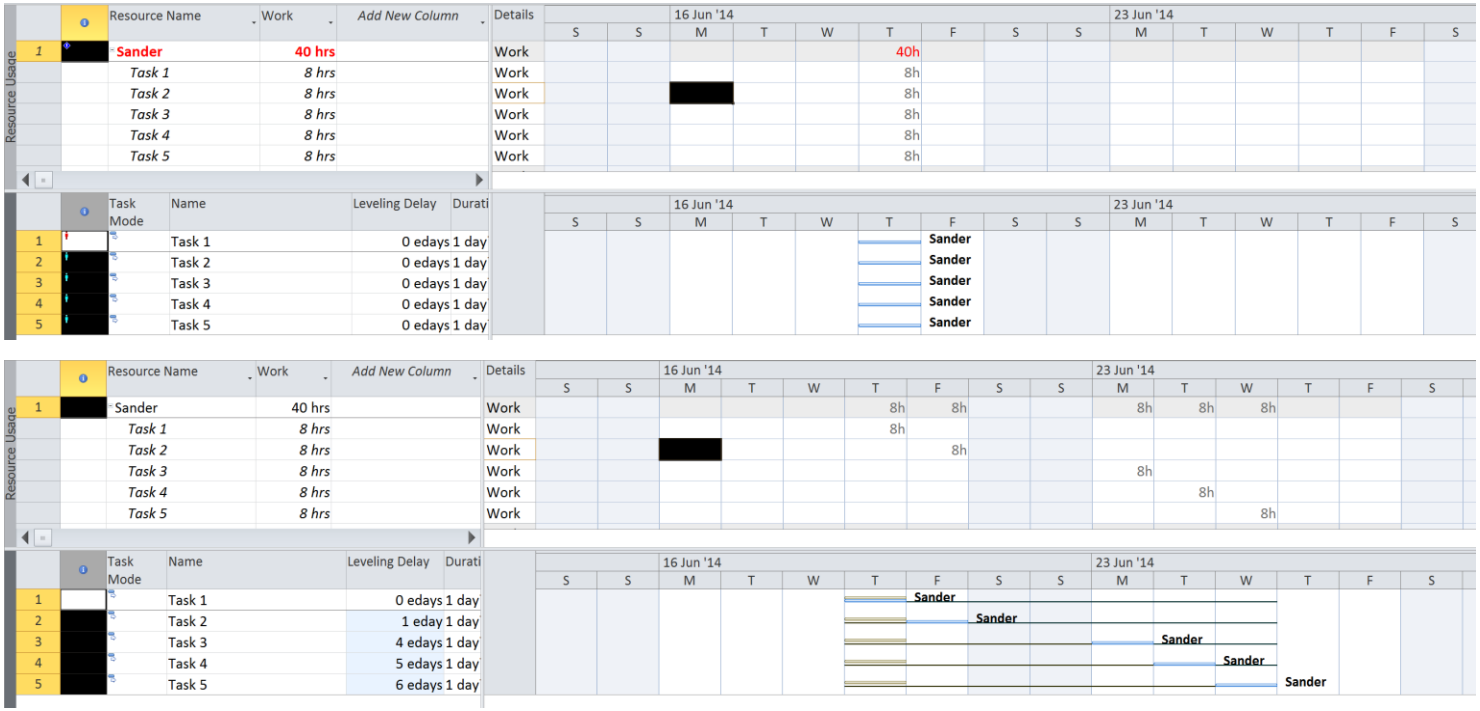
- **Resource tab > Level all**



Resource allocation view

The Resource Allocation view **(view → more views → resource allocation view)** is perhaps the best view to use when you have MSP do the levelling for you.

- This **combination view** combines the resource usage view and the levelling Gantt view.



- The yellow bar represents the **pre-levelled task** and the black line is the levelling delay.
- The **field leveling delay** keeps track of the number of days the task was delayed as consequence of the leveling action. These are called ‘edays’, short for elapsed days.

The leveling algorithm explained

When solving over allocation, Microsoft Project chooses which task to put first and uses some logic to achieve this.

For each task in the schedule, a score value is calculated based on all factors that have an impact on the levelling process:

- Tasks are scheduled in the order of the calculated value. Tasks with a lower score are pushed out further in time
- Resource levelling only splits and delays (!) tasks. So tasks will never be scheduled to start earlier than initially planned, even if possible
- e.g. levelling twice without clearing levelling will result in introducing more delay

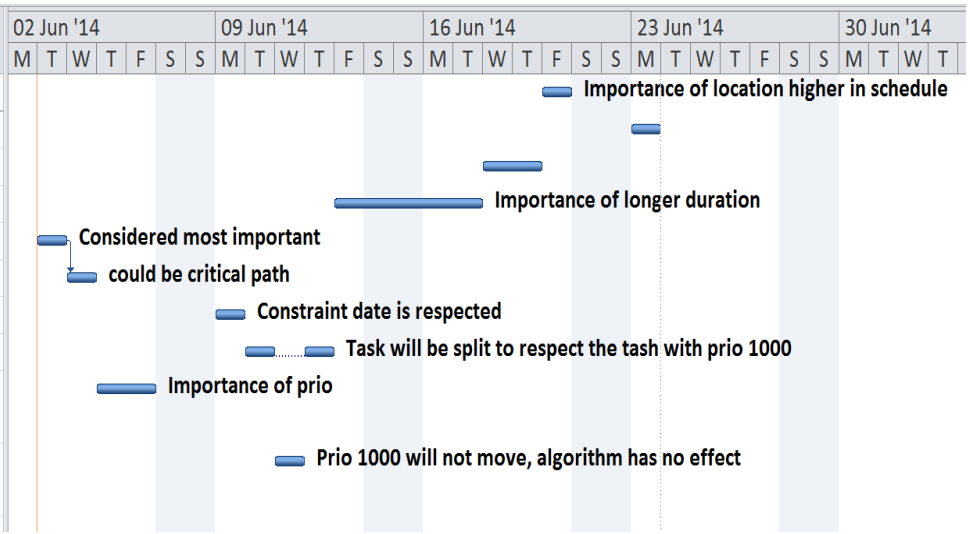
The leveling score

The leveling 'score' for each task is calculated based on:

- **Task ID**: This is the order in the plan from top to bottom. Tasks with a lower ID (higher in plan) get a better score (very little impact on the score though).
- **Duration:** Tasks with a longer duration get a higher score
- **Constraints and Dependencies:** they have a negative impact on the score, as project will honour constraints and dependencies (if set in options).
- **Resource availability**
- **Priorities:** have a big impact on the score -> higher priority is higher score. (Priorities are only a 'hint' for Microsoft Project, and are NOT always honoured). Priorities can be set in **Task information > General > Priority**. Off course this field can also be added as a column to the task views.
- For priorities to **overrule**, select the option **Leveling order > Priority, Standard.**
- The RIGHT PERSON should set the priorities.

Try to recreate this yourself!

	Task Mode	Task Name	Duration	Priority	Resource Names
1		Short task, high in schedule	1 day?	500	Sander
2		Short task lower in schedule	1 day	500	Sander
3		Longer task	2 days	500	Sander
4		Longest task	3 days	500	Sander
5		Linked task	1 day?	500	Sander
6		Linked task	1 day?	500	Sander
7		Constrained task	1 day?	500	Sander
8		Longer task with higher prio	2 days	520	Sander
9		Longer task with even higher prio	2 days	540	Sander
10		Task prio 1000 not allowed to move	1 day?	1000	Sander



Purpose of leveling

1. To back up your claim to your stakeholders that current scope, time and resources is not possible
2. You need a decision

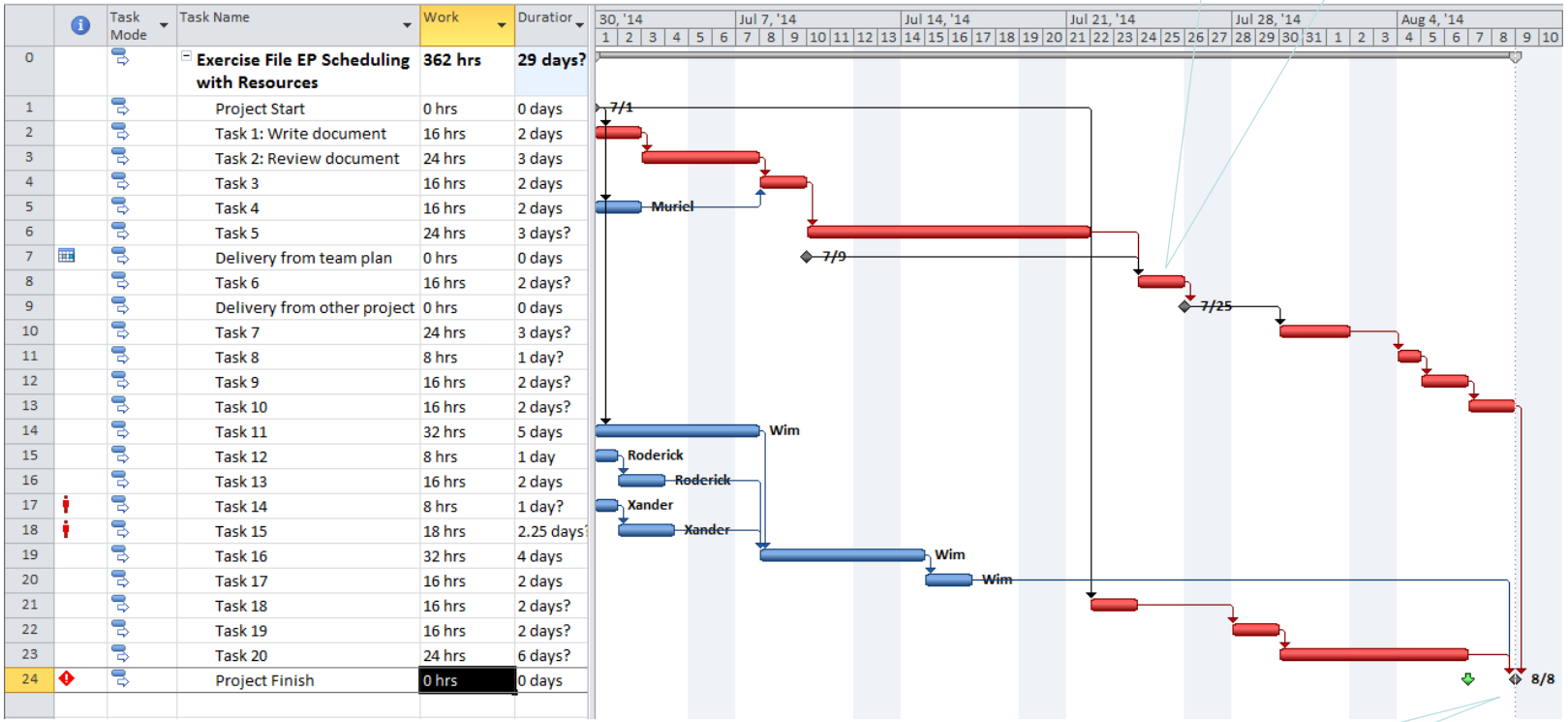
- I have to paint an entire building with only three resources in 1 day > I need more time
- I have to paint an entire building on my own in three days > I need more resources

- Or, let me skip the doors for now, then I will make it…

Scenario 1: Constrained resources

2

This task was delayed because Sander also needs to do task 18, if we can get task 18 out of scope, the finish date will be 6 aug.



	Task Mode	Task Name	Work	Duration
0		**Exercise File EP Scheduling with Resources**	**362 hrs**	**29 days?**
1		Project Start	0 hrs	0 days
2		Task 1: Write document	16 hrs	2 days
3		Task 2: Review document	24 hrs	3 days
4		Task 3	16 hrs	2 days
5		Task 4	16 hrs	2 days
6		Task 5	24 hrs	3 days?
7		Delivery from team plan	0 hrs	0 days
8		Task 6	16 hrs	2 days?
9		Delivery from other project	0 hrs	0 days
10		Task 7	24 hrs	3 days?
11		Task 8	8 hrs	1 day?
12		Task 9	16 hrs	2 days?
13		Task 10	16 hrs	2 days?
14		Task 11	32 hrs	5 days
15		Task 12	8 hrs	1 day
16		Task 13	16 hrs	2 days
17		Task 14	8 hrs	1 day?
18		Task 15	18 hrs	2.25 days
19		Task 16	32 hrs	4 days
20		Task 17	16 hrs	2 days
21		Task 18	16 hrs	2 days?
22		Task 19	16 hrs	2 days?
23		Task 20	24 hrs	6 days?
24		Project Finish	0 hrs	0 days

1

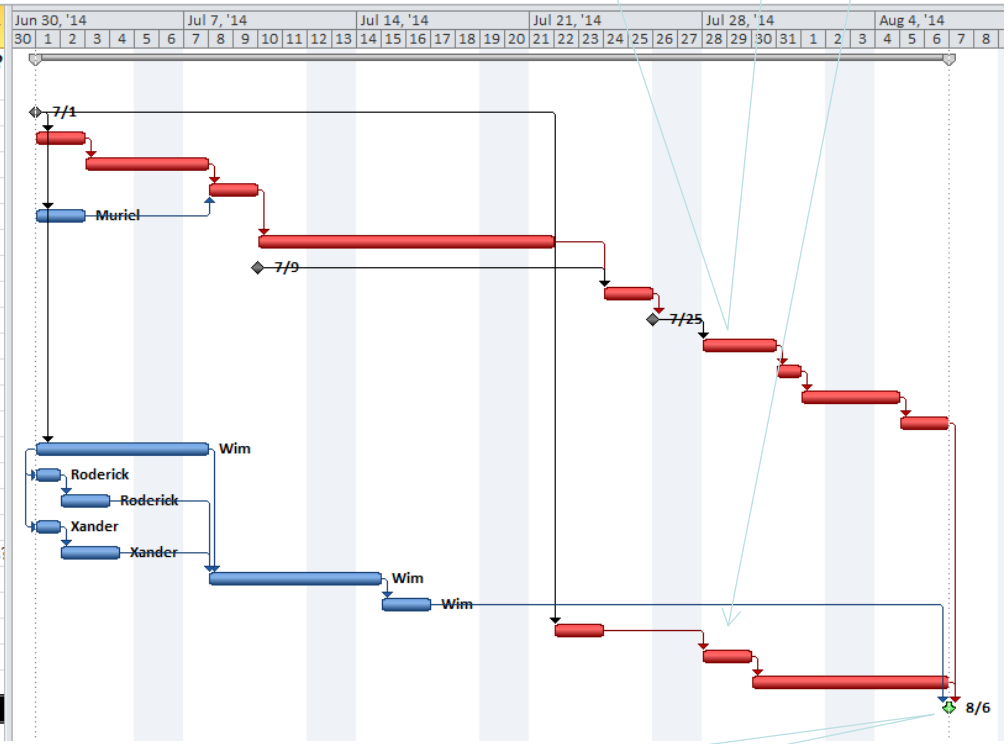
If we don't have any resources extra, this will be the finish date

Scenario 2: Constrained timing

…we need an extra resource to help out Sander on task 7 or 19. If resources are also constraint, we need to take either task 7 or task 19 out of scope!!!

2

	Task Mode	Task Name	Work	Duration
0		**Exercise File EP Scheduling with Resources**	**362 hrs**	**27 days?**
1		Project Start	0 hrs	0 days
2		Task 1: Write document	16 hrs	2 days
3		Task 2: Review document	24 hrs	3 days
4		Task 3	16 hrs	2 days
5		Task 4	16 hrs	2 days
6		Task 5	24 hrs	3 days?
7		Delivery from team plan	0 hrs	0 days
8		Task 6	16 hrs	2 days?
9		Delivery from other project	0 hrs	0 days
10		Task 7	24 hrs	3 days?
11		Task 8	8 hrs	1 day?
12		Task 9	16 hrs	2 days?
13		Task 10	16 hrs	2 days?
14		Task 11	32 hrs	5 days
15		Task 12	8 hrs	1 day
16		Task 13	16 hrs	2 days
17		Task 14	8 hrs	1 day?
18		Task 15	18 hrs	2.25 days?
19		Task 16	32 hrs	4 days
20		Task 17	16 hrs	2 days
21		Task 18	16 hrs	2 days?
22		Task 19	16 hrs	2 days?
23		Task 20	24 hrs	6 days?
24		Project Finish	0 hrs	0 days



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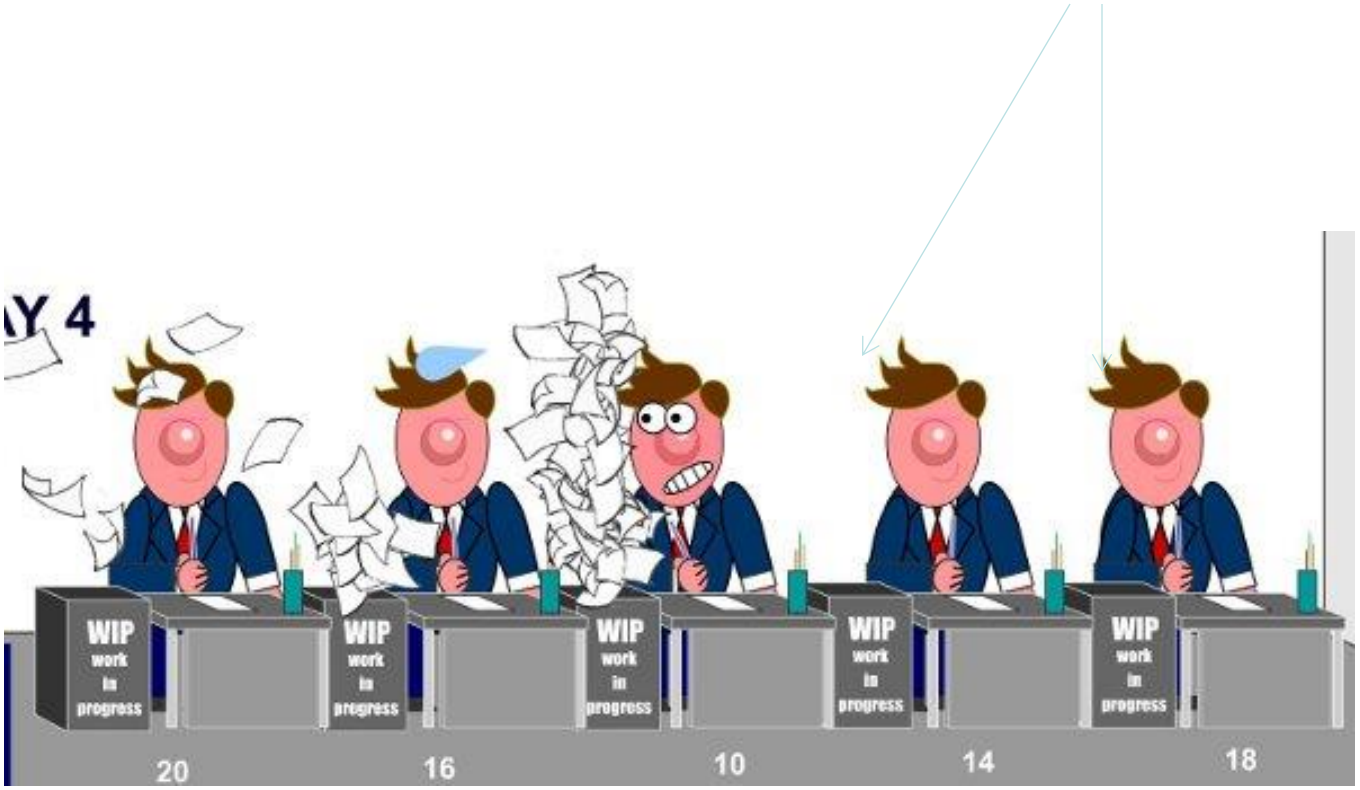
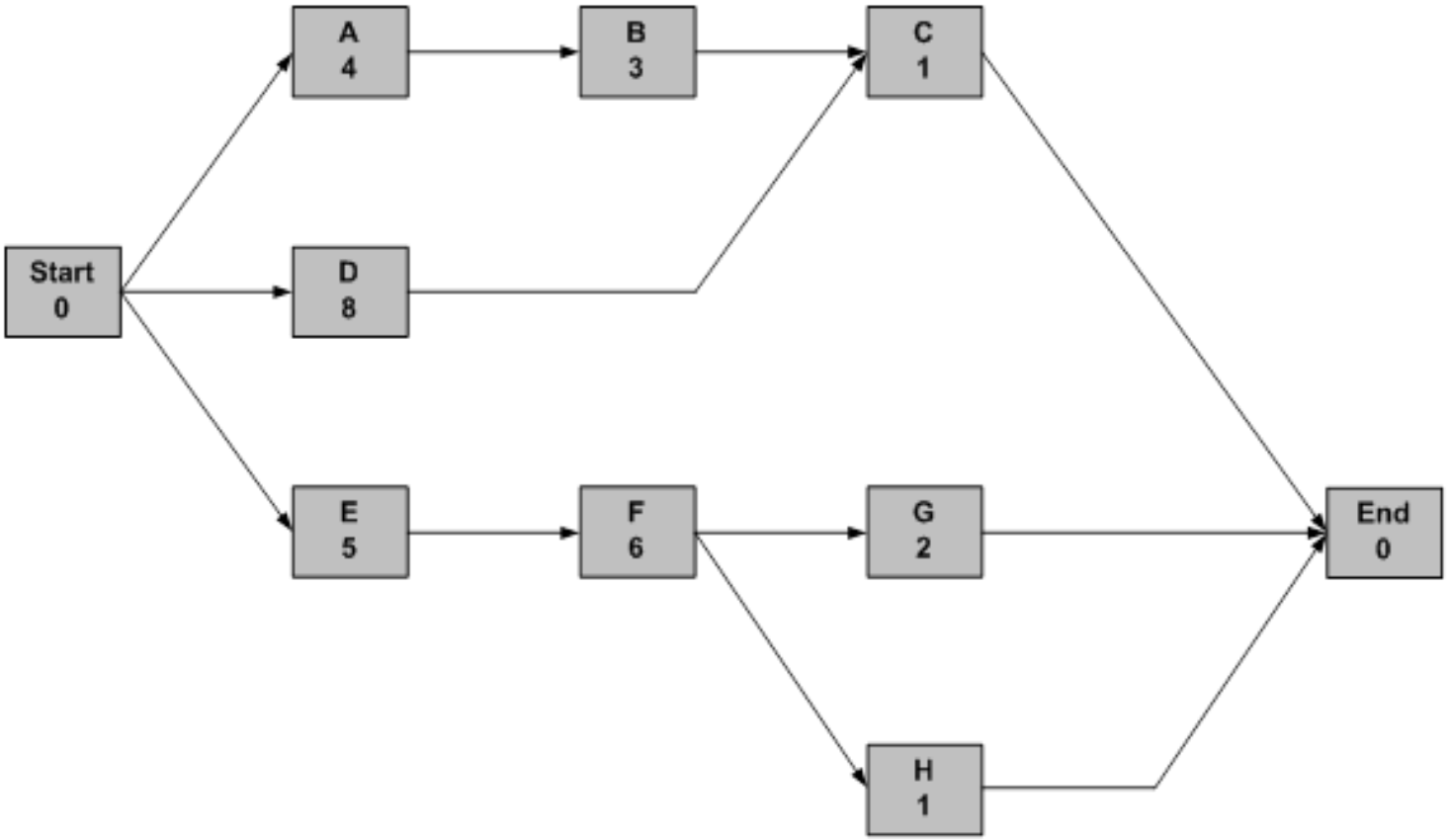
If we don't have any time beyond 6 aug (we cannot move the deadline)…

Should you worry about these guys?



Your critical path is determined by (the capacity off) the bottleneck!

Only one task at a time

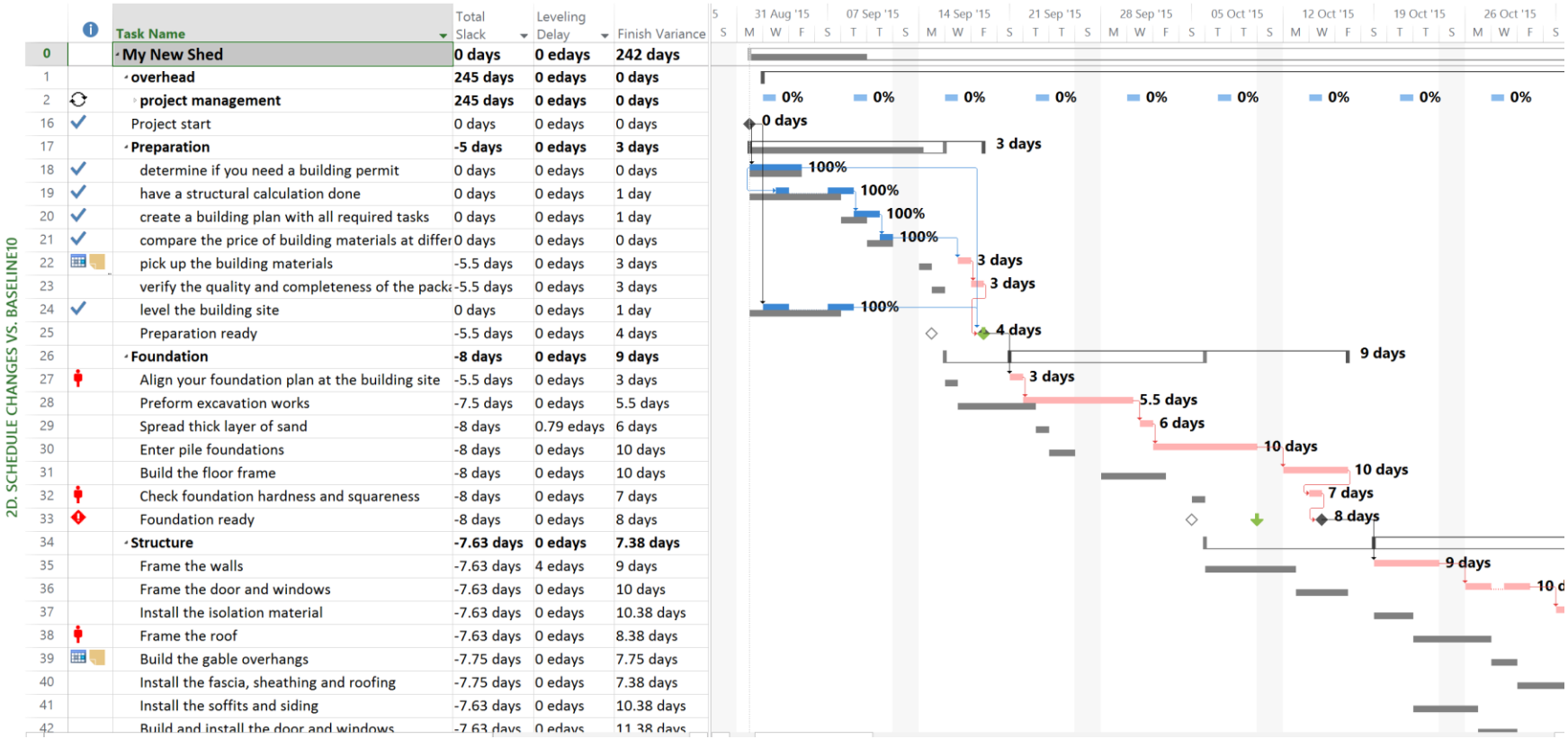


After solving resource over allocation

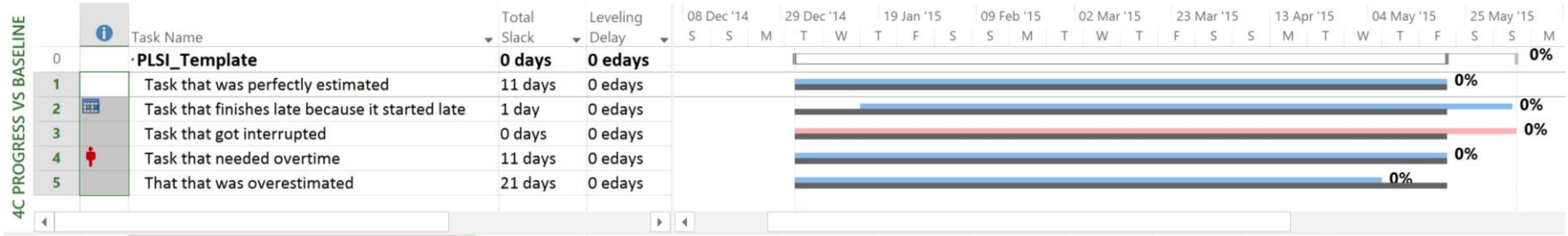
- The steps you just took could have consequences for your schedule, for instance your finish date(s) could now be scheduled later.

- Take necessary actions to deal with this delay.

Advise: Use Baseline 10



Or a template with this view…

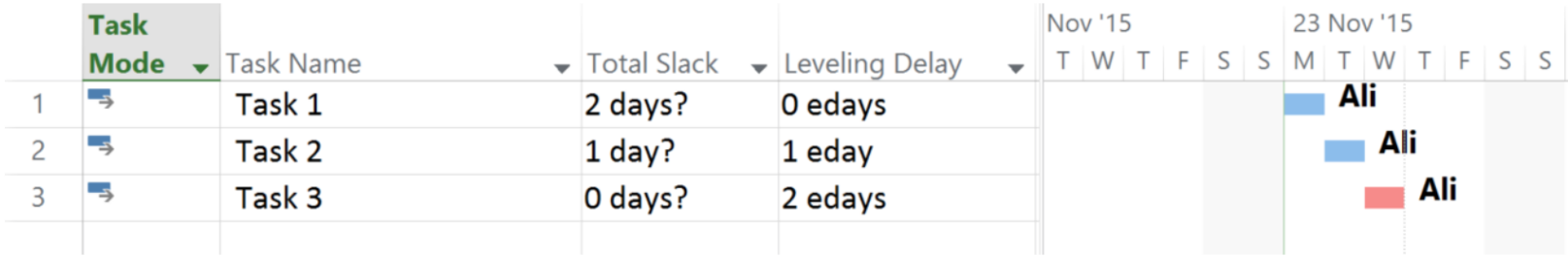


	Task Name	Total Slack	Leveling Delay
0	**PLSI_Template**	**0 days**	**0 edays**
1	Task that was perfectly estimated	11 days	0 edays
2	Task that finishes late because it started late	1 day	0 edays
3	Task that got interrupted	0 days	0 edays
4	Task that needed overtime	11 days	0 edays
5	That that was overestimated	21 days	0 edays

	Task Name	Duration	Baseline Duration	Duration vs Baseline	Work	Baseline Work	Work vs Baseline	Finish	Baseline Finish	Finish vs Baseline
1	Task that was perfectly estimated	100 days	100 days	🙂	800 hrs	800 hrs	🙂	20/05/15	20/05/15	
2	Task that finishes late because it started late	100 days	100 days	🙂	800 hrs	800 hrs	🙂	03/06/15	20/05/15	
3	Task that got interrupted	111 days	100 days	☹	800 hrs	800 hrs	🙂	04/06/15	20/05/15	
4	Task that needed overtime	100 days	100 days	🙂	900 hrs	800 hrs	☹	20/05/15	20/05/15	
5	That that was overestimated	90 days	100 days	–	720 hrs	800 hrs	–	06/05/15	20/05/15	

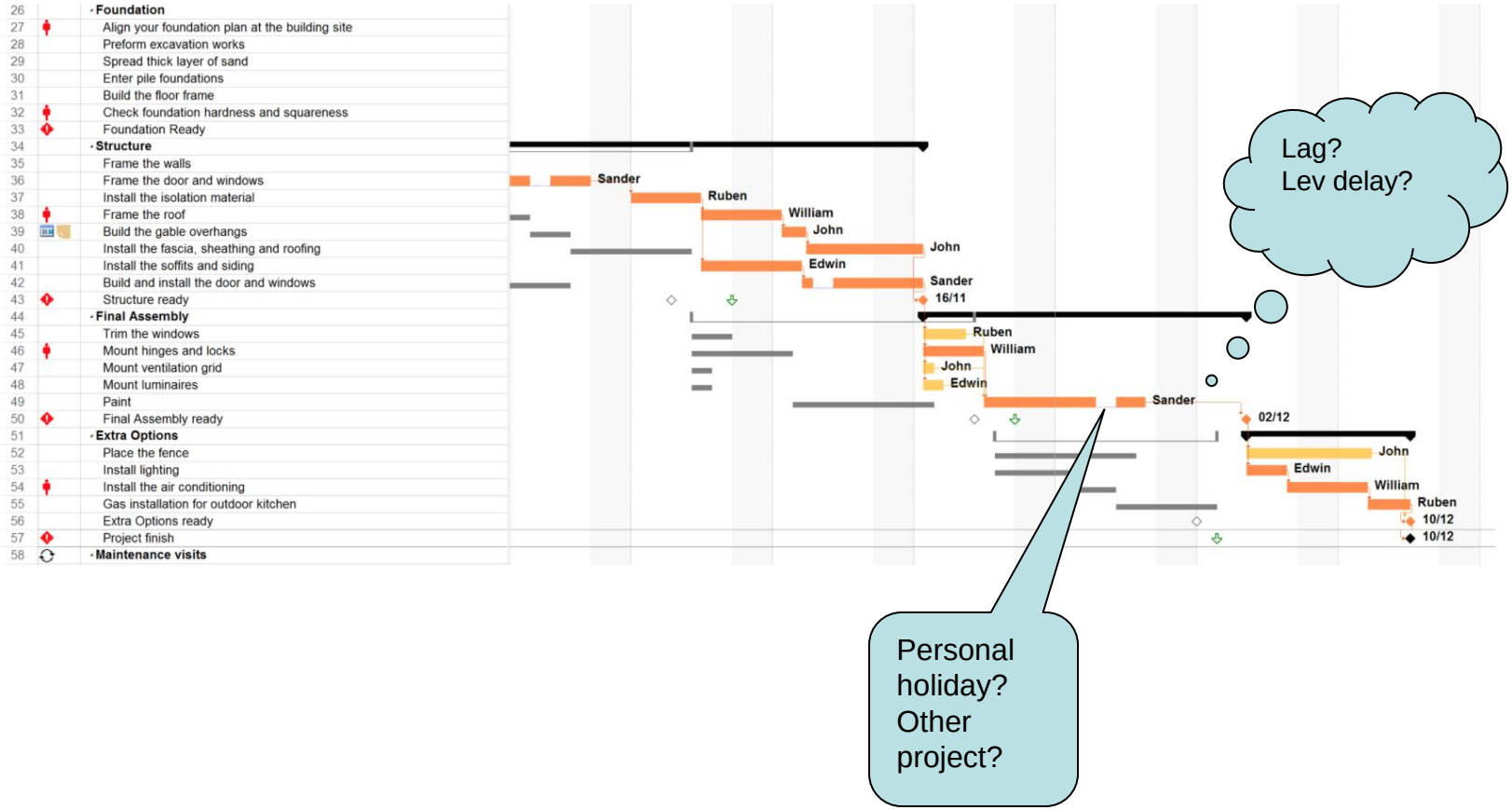
- **Green emoji** = value has not changed
- **Amber emoji** = value has increased, but not more than 10%
- **Red emoji** = value has increased by more than 10%
- **Green minus symbol** = value has decreased, but not more than 10%
- **Amber minus symbol** = value has decreases by more than 10%

MS Project is limited



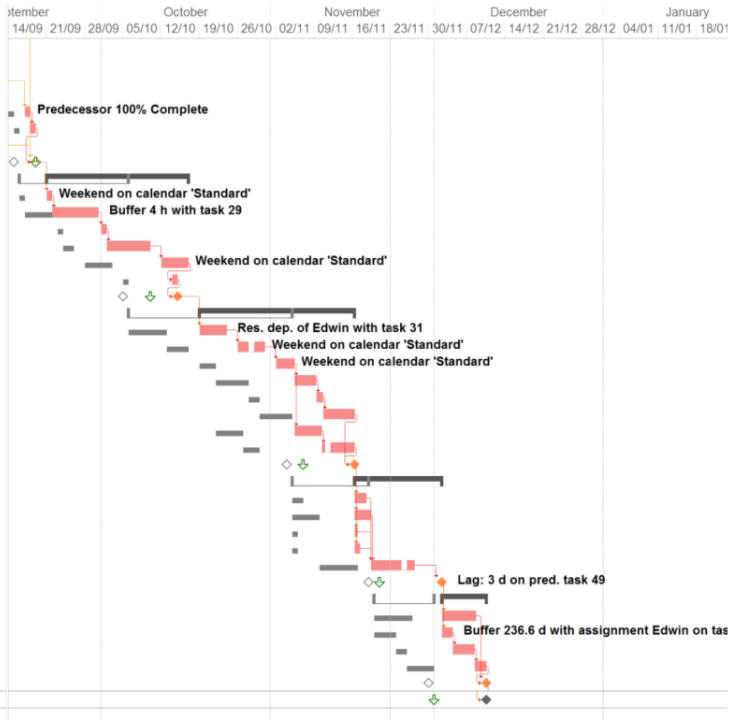
	Task Mode	Task Name	Total Slack	Leveling Delay
1		Task 1	2 days?	0 edays
2		Task 2	1 day?	1 eday
3		Task 3	0 days?	2 edays

It will not display why there are gaps…



You need this information to inform your stakeholders about why you delayed…

	Task Name	Duration	Start	Finish	Predecess	Total Slack
19	Have a structural calculation done	3 days	03/09/15	08/09/15	16	0 days
20	Create a building plan with all required tasks	2 days	09/09/15	10/09/15	19	0 days
21	Compare the price of building materials at different hardware stores	1 day	11/09/15	11/09/15	20	0 days
22	Pick up the building materials	1 day?	17/09/15	17/09/15	21	-5.5 days?
23	Verify the quality and completeness of the package	1 day?	18/09/15	18/09/15	22	-5.5 days?
24	Level building site	4 days	02/09/15	08/09/15	16	0 days
25	Preparation Ready	0 days	18/09/15	18/09/15	24,23,18	-5.5 days
26	**Foundation**	**20 days**	**21/09/15**	**16/10/15**		**-8 days**
27	Align your foundation plan at the building site	1 day	21/09/15	21/09/15	25	-5.5 days
28	Preform excavation works	4.5 days	22/09/15	30/09/15	27	-7.5 days
29	Spread thick layer of sand	1 day	01/10/15	01/10/15	28	-8 days
30	Enter pile foundations	6 days	02/10/15	09/10/15	29	-8 days
31	Build the floor frame	5 days	12/10/15	16/10/15	30	-8 days
32	Check foundation hardness and squareness	1 day	14/10/15	14/10/15	31FS-3 days	-8 days
33	Foundation Ready	0 days	14/10/15	14/10/15	32	-8 days
34	**Structure**	**20.38 days**	**19/10/15**	**16/11/15**		**-7.63 days**
35	Frame the walls	5 days	19/10/15	23/10/15	33	-7.63 days
36	Frame the door and windows	4 days	26/10/15	30/10/15	35	-7.63 days
37	Install the isolation material	3.38 days	02/11/15	05/11/15	36	-7.63 days
38	Frame the roof	2 days	05/11/15	09/11/15	37	-7.63 days
39	Build the gable overhangs	2 days	09/11/15	10/11/15	38	-7.88 days
40	Install the fascia, sheathing and roofing	4 days	10/11/15	16/11/15	39	-7.88 days
41	Install the soffits and siding	3 days	05/11/15	10/11/15	37	-7.63 days
42	Build and install the door and windows	3 days	10/11/15	16/11/15	41	-7.63 days
43	Structure ready	0 days	16/11/15	16/11/15	40,42	-7.63 days
44	**Final Assembly**	**12 days**	**16/11/15**	**02/12/15**		**-7.63 days**
45	Trim the windows	2.25 days	16/11/15	18/11/15	43	-6.88 days
46	Mount hinges and locks	3 days	16/11/15	19/11/15	43	-7.63 days
47	Mount ventilation grid	1 day	16/11/15	16/11/15	43	-6.38 days
48	Mount luminaires	1 day	16/11/15	17/11/15	43	-5.63 days
49	Paint	5 days	19/11/15	27/11/15	48,45,46,47	-7.63 days
50	Final Assembly ready	0 days	02/12/15	02/12/15	49FS+3 days	-7.63 days
51	**Extra Options**	**6.25 days**	**02/12/15**	**10/12/15**		**-7.63 days**
52	Place the fence	5 days	02/12/15	08/12/15	50	-5.88 days
53	Install lighting	2 days	02/12/15	04/12/15	50	-7.63 days
54	Install the air conditioning	2 days	04/12/15	08/12/15	53	-7.63 days
55	Gas installation for outdoor kitchen	2.25 days	08/12/15	10/12/15	54	-7.63 days
56	Extra Options ready	0 days	10/12/15	10/12/15	55,52	-7.63 days
57	Project finish	0 days	10/12/15	10/12/15	56	-7.63 days
58	**Maintenance visits**	**197 days**	**02/02/16**	**02/11/16**		**0 days**



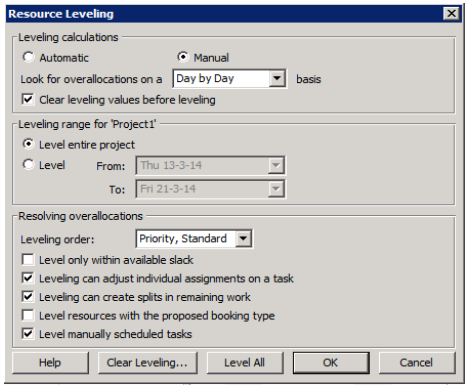
Quiz…

1. Will manual resource levelling give you a shorter project or will MSP Resource leveling?
2. What three scenarios can MS Project create for you when leveling the workloads? When do you need this?
3. In your own words, how does MS Project's workload leveling affect the calculation and the display of the Critical Path? (PathsPro by https://www.projectprocorp.com/
4. Name three reasons why finding the Resource-Critical Path might be an good idea.
5. There are many methods with which you can shorten the Resource-Critical Path. Name as many as you can.
6. How would you determine which resources to ask to work overtime in order to make up the slippage?

Appendix: The leveling options

Next to the regular scheduling options (constraints, dependencies), and the leveling algorithm it is important to discuss the resource leveling options that can be found by clicking **Resource tab > Leveling Options.**

These settings are personal so you can choose to deviate from the default settings where you prefer.



Option	Meaning
Automatic vs Manual	Choosing automatic will calculate and level your schedule automatically each time something changes. When choosing manual you need to click the level resources button.
Day by Day, Week by Week etc.	Determines when the red puppet will appear. Day by day basis means that puppets will be red at more than 8 hrs. on a day. Week by week more than 40 hrs. in a week, etc.
Clear leveling values before leveling	Having this option on makes sure each leveling action uses a new start, instead of continuing on top of the already levelled tasks.
Leveling order	Choosing ID, it will only use the location in schedule to determine which task goes first. Choosing standard will use the algorithm logic as explained in the previous paragraph and weighs in the priority field for the leveling score. Choosing priority, standard means that the priority will always preceed the factors of the standard algorithm.
Level only within available slack	Having this option on will not increase the duration of your schedule. This also means that it will only solve the over allocation up to the point that there is available slack.
Leveling can adjust individual assignments on a task	Having this option on allows that resources could start on a task when they are available. This means that tasks which are scheduled to start at the same time could start at a different moment depending on the resource availability. Additionally, if you have more than one resource assigned to a task, this allows one person to already start and another person to join when available.
Leveling can create splits in remaining work	Tasks are allowed to split for another task or meeting and resume at a later moment. Without this option ticked, a 10 day task would be planned when there is a 10 day gap in the availability of the resource. With this option ticked, it will split the work over shorter periods of availability. This means that this option ticked will create much shorter lead times for the schedule.
Level resources with the proposed booking type	Microsoft Project has the ability to indicate whether an assignment is only proposed or definitively booked. Default is always definitively booked. This option will have no consequences for you, if you did not change the booking type of the resource.
Level manually scheduled tasks	Manually scheduled tasks are not moved by MS Project. With this option you can have MSP level these tasks as well.

Questions???

MS Project E-Learning.com

Send me an email, anytime:
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Do you know all answers to our MS Project questions?
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Only valid for **48 hours** after end of the webinar!

Thank You!

Finally: the resource leveling feature explained!

May 4, 2016 @ 12pm-1pm EST

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