



# Resource Leveling: The Complete Series

November 8, 2017 @ 12pm-1pm EST  
Daryl Deffler

## Part II

# Presenter Background

- Project Management 25+ Years
- Small Projects thru Large Programs
- Multiple Scheduling Tools,  
Project Server 2013 – 3+ Years
- Large Company
  - 240+ Project Mangers
  - 4,300+ Timesheet Users
  - 1700+ Schedules in Server
  - ~400 Active Schedules
- Two Support Teams
  - Tool Environment
  - Tool Use

# Before We Start

- A Lot of Information
  - You won't remember everything
- Leveling Involves
  - Indicators
  - 4 -10 Hierarchy levels
  - 4 Leveling Mechanics options
  - **5 Resolution options**
  - **2 Scheduling options**
  - **2 Task override fields**
  - **1 Resource override field**
  - **3 Background fields**
  - **3 Leveling functions**
  - **Errors, and Limitations**
- Examine each individually



# Before We Start

- 12 MPUG Companion Articles
  - Search “Daryl Deffler”

All Articles and Webinars by Daryl Deffler

## Resource Leveling: Recommendations

Written on August 14, 2017, by [Daryl Deffler](#)

Welcome to the final article in the “Resource Leveling” series. If you’ve read the prior articles, you may have noticed a lack of recommendations. I did that purposely to keep those articles focused on the “black and white” aspects of tool functionality and so that I could present recommendations all together in one final article,...

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## Resource Leveling: The Leveling Cycle

Written on August 7, 2017, by [Daryl Deffler](#)

There’s an old joke: How do you eat an elephant? The answer is: one bite at a time. While the joke may be goofy, it illustrates an important concept. A step-by-step ordered approach can be used to address any big problem. Leveling a new schedule for the first time can be just like that. The...

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## Resource Leveling: It’s Time to Level Your Schedule

Written on July 31, 2017, by [Daryl Deffler](#)

You’ve hit that magical point. Your knees are weak, you’re nervous and your palms are sweating. Yes, it’s time to level your schedule. But there’s different leveling buttons and beyond that there are also leveling controls. Which options should be set? Which leveling button should be used? The answers to those questions depend upon what...

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## Resource Leveling: Preparing to Level

Written on July 24, 2017, by [Daryl Deffler](#)

# Agenda

## Part I – 10/25/2017

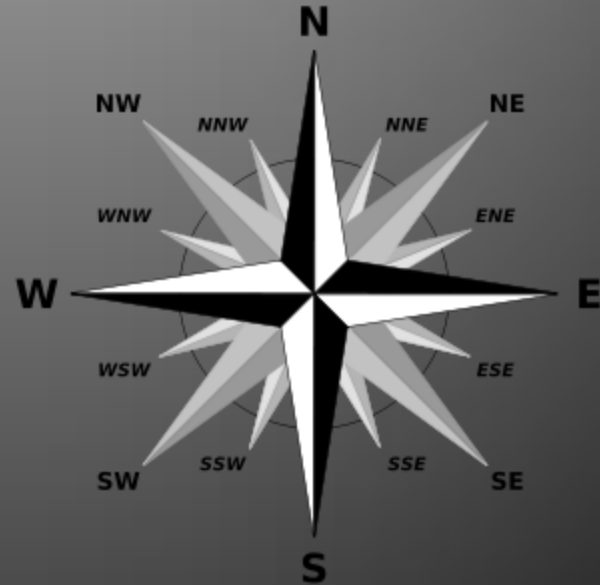
- Scheduling vs. Leveling
- Problem Indicators
- Controlling Leveling
  - Leveling Mechanics  
What & When
  - Leveling Hierarchy  
Tie Breakers

## Part II – Today

- Controlling Leveling
  - Resolution Options  
Resolving Over Allocations
  - Leveling Fields
  - Limitations
- Performing Leveling
  - Leveling Functions
  - Leveling Cycle
  - Guidelines &  
Recommendations
- Final Thoughts

# Resource Leveling: The Complete Series

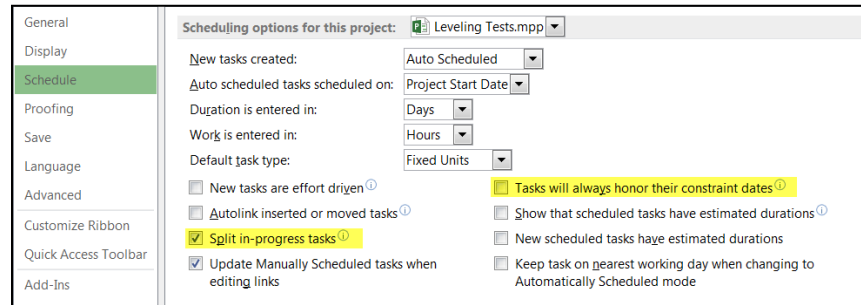
## Resolution Options



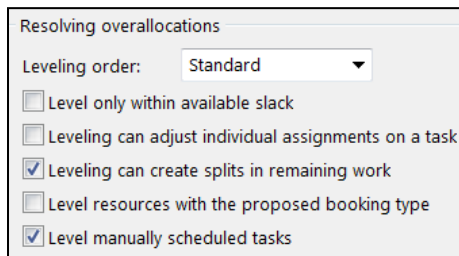
# Resolution Options

- Controls how Project resolves over allocations
- Results are driven by the interaction of

- Project Scheduling Options

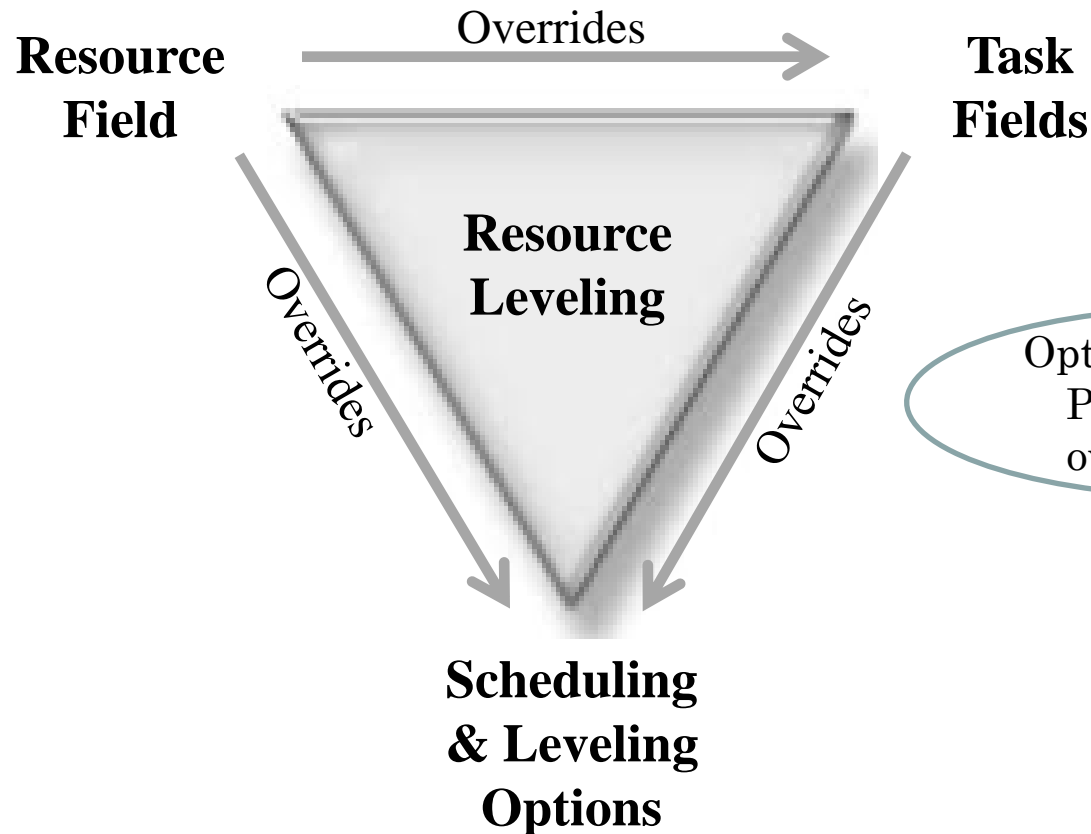


- Resource Leveling Options



- Task/Resource Fields

# Resolution Options



Options impact how  
Project resolves  
over allocations





# Resource Leveling Window

Resource Leveling

Leveling calculations

☐ Automatic ☒ Manual

Look for overallocations on a **Week by Week** basis

☒ Clear leveling values before leveling

Leveling range for 'Project2'

☒ Level entire project

☐ Level From: 07/11/16 To: 07/11/16

Resolving overallocations

Leveling order: Standard

☐ Level only within available slack

☐ Leveling can adjust individual assignments on a task

☒ Leveling can create splits in remaining work

☐ Level resources with the proposed booking type

☒ Level manually scheduled tasks

**Leveling Options**

Help Clear Leveling... Level All OK Cancel

# Level only within available slack

- Levels resources as much as possible trying to not change the project finish date
- Constrains resolution

Resolving overallocations

Leveling order: Standard

☒ Level only within available slack

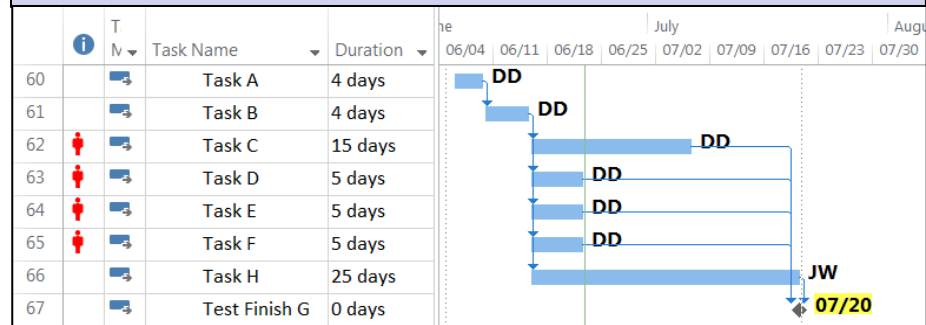
☐ Leveling can adjust individual assignments on a task

☐ Leveling can create splits in remaining work

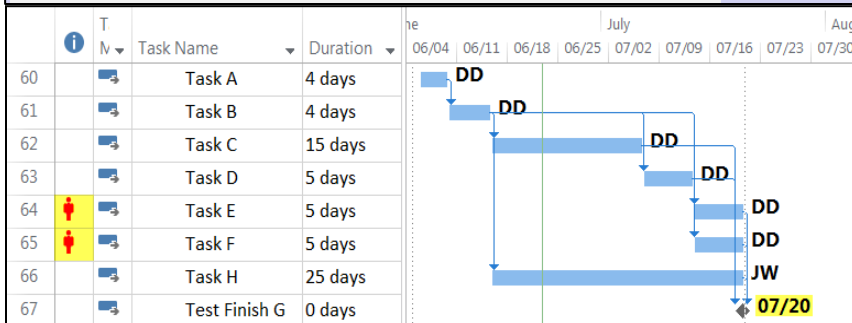
☐ Level resources with the proposed booking type

☐ Level manually scheduled tasks

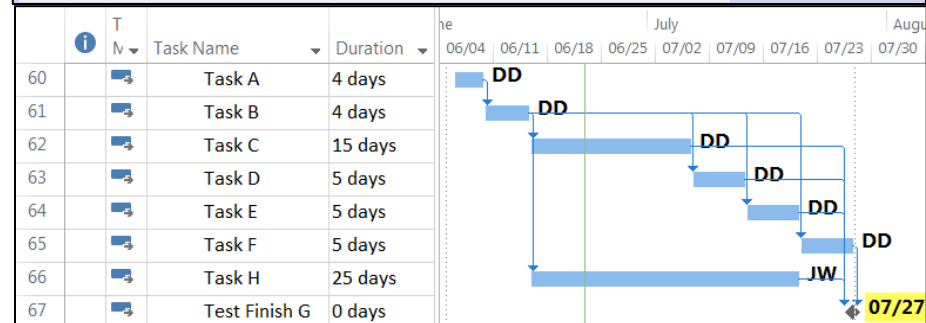
## Before Leveling



## ☒ Level only within available slack



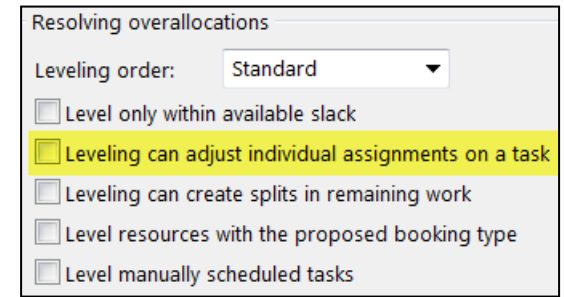
## ☐ Level only within available slack



**Leveling within available slack can leave over allocated resources**

**Don't confuse with "Slack" in the Leveling Hierarchy**

# Leveling can adjust individual assignments...



Resolving overallocations

Leveling order: Standard

☒ Leveling can adjust individual assignments on a task

☐ Level only within available slack

☐ Leveling can create splits in remaining work

☐ Level resources with the proposed booking type

☐ Level manually scheduled tasks

- When Checked
  - Assigned resources can have different task start dates
  - Could enable more effective resource use
  - May extend task duration
  - Avoid using if resource must work concurrently
- When Unchecked
  - All resources must be available before task starts

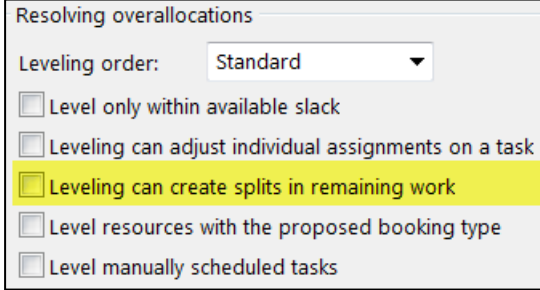
# Leveling can adjust individual assignments on tasks

Tasl	Mo	i	Task Name	Work	Durati	Details	M	T	W	T	F	S	S	Jun 11, '16	Before Leveling
37			Task 1	40.8 hrs	5 days	Work	13.6h	6.8h	6.8h	6.8h	6.8h				
			Daryl	6.8 hrs		Work	6.8h								
			Sue	34 hrs		Work	6.8h	6.8h	6.8h	6.8h	6.8h				
38			Task 2	42.2 hrs	5.36 day	Work	16.4h	9.6h	9.6h	2.8h	2.8h			1h	
			Daryl	6.8 hrs		Work	6.8h								
			Sue	20.4 hrs		Work	6.8h	6.8h	6.8h						
			Joe	15 hrs		Work	2.8h	2.8h	2.8h	2.8h	2.8h			1h	
39			Task 3	13.6 hrs	1 day	Work								8.75h	4.85h
			Daryl	6.8 hrs		Work								4.37h	2.43h
			Sue	6.8 hrs		Work								4.37h	2.43h

Tasl	Mo	i	Task Name	Work	Durati	Leveling can adjust individual assignments on a task
37			Task 1	40.8 hrs	5 days	Work 13.6h 6.8h 6.8h 6.8h 6.8h
			Daryl	6.8 hrs		Work 6.8h
			Sue	34 hrs		Work 6.8h 6.8h 6.8h 6.8h 6.8h
38			Task 2	42.2 hrs	8 days	Work 2.8h 9.6h 2.8h 2.8h 2.8h 7.8h 6.8h 6.8h
			Daryl	6.8 hrs		Work 0h 6.8h
			Sue	20.4 hrs		Work 0h 0h 0h 0h 0h 6.8h 6.8h 6.8h
			Joe	15 hrs		Work 2.8h 2.8h 2.8h 2.8h 2.8h 1h
39			Task 3	13.6 hrs	1 day	Work 13.6h
			Daryl	6.8 hrs		Work 6.8h
			Sue	6.8 hrs		Work 6.8h

Tasl	Mo	i	Task Name	Work	Durati	Leveling can adjust individual assignments on a task
37			Task 1	40.8 hrs	5 days	Work 13.6h 6.8h 6.8h 6.8h 6.8h
			Daryl	6.8 hrs		Work 6.8h
			Sue	34 hrs		Work 6.8h 6.8h 6.8h 6.8h 6.8h
38			Task 2	42.2 hrs	5.36 day	Work 16.4h 9.6h 9.6h 2.8h 2.8h
			Daryl	6.8 hrs		Work 6.8h
			Sue	20.4 hrs		Work 6.8h 6.8h 6.8h
			Joe	15 hrs		Work 2.8h 2.8h 2.8h 2.8h 2.8h
39			Task 3	13.6 hrs	1 day	Work
			Daryl	6.8 hrs		Work
			Sue	6.8 hrs		Work

# Leveling can create splits in remaining work



Resolving overallocations

Leveling order: Standard

☐ Level only within available slack

☐ Leveling can adjust individual assignments on a task

☒ Leveling can create splits in remaining work

☐ Level resources with the proposed booking type

☐ Level manually scheduled tasks

- Allows Project to create one or more splits when leveling remaining work
- Leveling splits occur after the Resume Date (Resume Date set by Scheduling)
- Scenarios:
  - Intermingle remaining work into allocation gaps
  - Splitting a started task

# Leveling can create splits in remaining work

Look for overallocations on a Day by Day ▼ basis

## Intermingle Remaining Work Example

i	Task Mode ▾	Task Name ▾	Work ▾	Duration ▾	Start ▾	Sep 24, '16											Before Leveling									
						Details	M	T	W	T	F	S	S	M	T	W								T		
	→	Project1	60 hrs 9 days		09/19/16	Work	8h	9h	8h	9h	10h				8h	6h	0h	2h								
	→	Task 1	8 hrs 1 day		09/19/16	Work	8h																			
		A	8 hrs		09/19/16	Work	8h																			
🚧	→	Task 2	7 hrs 5 days		09/20/16	Work		1h	0h	1h	2h				0h	1h	0h	2h								
🚧		A	7 hrs		09/20/16	Work		1h	0h	1h	2h				0h	1h	0h	2h								
	→	Task 3	45 hrs 5.63 days		09/20/16	Work		8h	8h	8h	8h				8h	5h										
		A	45 hrs		09/20/16	Work		8h	8h	8h	8h				8h	5h										

		Task Mode ▾	Task Name ▾	Work ▾	Duration ▾	Start ▾	Details	M	T	W	T	F	Sa	Su	Leveling can create splits in remaining work										
0			Project1	60 hrs	14.63 days	09/19/16	Work	8h	1h	0h	1h	2h			0h	1h	0h	2h	8h			8h	8h	8h	8h
1			Task 1	8 hrs	1 day	09/19/16	Work	8h																	
			A	8 hrs		09/19/16	Work	8h																	
2			Task 2	7 hrs	5 days	09/20/16	Work		1h	0h	1h	2h			0h	1h	0h	2h							
			A	7 hrs		09/20/16	Work		1h	0h	1h	2h			0h	1h	0h	2h							
3			Task 3	45 hrs	5.63 days	09/30/16	Work												8h			8h	8h	8h	8h
			A	45 hrs		09/30/16	Work												8h			8h	8h	8h	8h

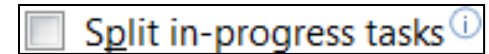
		Task Mode ▾	Task Name ▾	Work ▾	Duration ▾	Start ▾	Details	M	T	W	T	F	S	S	<input checked="" type="checkbox"/> Leveling can create splits in remaining work										
0			Project1	60 hrs	11.63 days	09/19/16	Work	8h	1h	8h	1h	2h			8h	1h	8h	2h	8h			8h	5h		
1			Task 1	8 hrs	1 day	09/19/16	Work	8h																	
			A	8 hrs				8h																	
2			Task 2	7 hrs	5 days				1h	0h	1h	2h			0h	1h	0h	2h							
			A	7 hrs					1h	0h	1h	2h			0h	1h	0h	2h							
3			Task 3	45 hrs	5.63 days	09/21/16	Work				8h	0h	0h		8h	0h	8h	0h	8h			8h	5h		
			A	45 hrs		09/21/16	Work				8h	0h	0h		8h	0h	8h	0h	8h			8h	5h		

Task 3 now  
contains  
3 splits

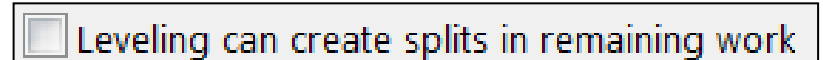
# Leveling can create splits in remaining work

## Splitting Started Task Example

- Scheduling Option:
  - Part of Scheduling processing
  - File > Options > Schedule > “Split in progress tasks”
  - Sets Remaining Work Resume Date




- Resource Leveling Option:
  - Part of the Resource Leveling
  - Resource Leveling Options window
  - “Leveling can create splits in remaining work”
  - Splits Remaining Work ***after*** the Resume Date



## Split in-progress tasks

Before checking “Split in-progress tasks”

Task Name	Resume	Start	Actual Start	Actual Work	June				July				August			
					05/29	06/05	06/12	06/19	06/26	07/03	07/10	07/17	07/24	07/31	08/07	08/14
▲ Daryl Leveling Test	06/06/16	06/06/16	06/06/16	13.6 hrs												
▲ Test for Split Reso	06/06/16	06/06/16	06/06/16	13.6 hrs												
Task 1	NA	06/06/16	NA	0 hrs												
Task 2	NA	06/13/16	NA	0 hrs												
Task 3	06/07/16	06/06/16	06/06/16	6.8 hrs												
Task 4	06/07/16	06/06/16	06/06/16	6.8 hrs												
Task 5	NA	06/13/16	NA	0 hrs												
Task 6	NA	06/20/16	NA	0 hrs												

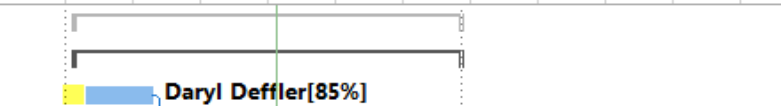
## Split in-progress tasks

After checking “Split in-progress tasks”

Task Name	Resume	Start	Actual Start	Actual Work	June				July				August			
					05/29	06/05	06/12	06/19	06/26	07/03	07/10	07/17	07/24	07/31	08/07	08/14
▲ Daryl Leveling Test	06/06/16	06/06/16	06/06/16	13.6 hrs	<p>Retains Dependency Logic</p>											
▲ Test for Split Reso	06/06/16	06/06/16	06/06/16	13.6 hrs												
Task 1	NA	06/06/16	NA	0 hrs												
Task 2	NA	06/13/16	NA	0 hrs												
Task 3	06/20/16	06/06/16	06/06/16	6.8 hrs												
Task 4	06/24/16	06/06/16	06/06/16	6.8 hrs												
Task 5	NA	06/30/16	NA	0 hrs												
Task 6	NA	07/08/16	NA	0 hrs												

## Leveling can create splits in remaining work

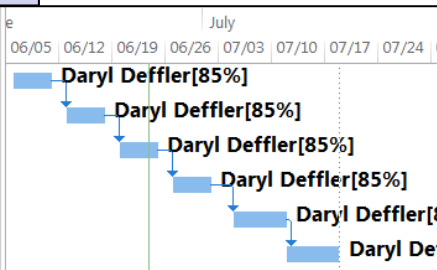
After resource leveling

Task Name	Resume	Start	Actual Start	Actual Work	June				July				August			
					05/29	06/05	06/12	06/19	06/26	07/03	07/10	07/17	07/24	07/31	08/07	08/14
▲ Daryl Leveling Test	06/07/16	06/06/16	06/06/16	13.6 hrs												
▲ Test for Split Reso	06/07/16	06/06/16	06/06/16	13.6 hrs												
Task 1	NA	06/07/16	NA	0 hrs												
Task 2	NA	06/14/16	NA	0 hrs												
Task 3	06/21/16	06/06/16	06/06/16	6.8 hrs												
Task 4	06/27/16	06/06/16	06/06/16	6.8 hrs												
Task 5	NA	07/01/16	NA	0 hrs												
Task 6	NA	07/11/16	NA	0 hrs												



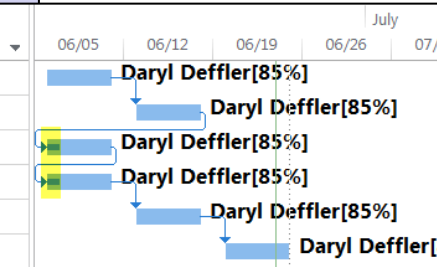
## Before Actuals or Leveling

Task Name	Work	Actual Work	Resume
Task 1	34 hrs	0 hrs	NA
Task 2	34 hrs	0 hrs	NA
Task 3	34 hrs	0 hrs	NA
Task 4	34 hrs	0 hrs	NA
Task 5	34 hrs	0 hrs	NA
Task 6	34 hrs	0 hrs	NA



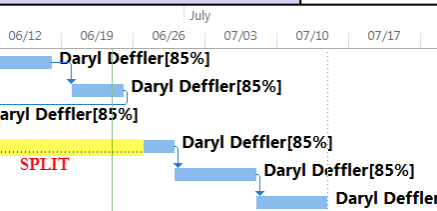
## After Actuals, No Leveling

Task Name	Work	Actual Work	Resume
Task 1	34 hrs	0 hrs	NA
Task 2	34 hrs	0 hrs	NA
Task 3	34 hrs	6.8 hrs	06/07/16
Task 4	34 hrs	6.8 hrs	06/07/16
Task 5	34 hrs	0 hrs	NA
Task 6	34 hrs	0 hrs	NA



## After Leveling: Gantt & Resource Usage

Task Name	Work	Actual Work	Resume
Task 1	34 hrs	0 hrs	NA
Task 2	34 hrs	0 hrs	NA
Task 3	34 hrs	6.8 hrs	06/07/16
Task 4	34 hrs	6.8 hrs	06/07/16
Task 5	34 hrs	0 hrs	NA
Task 6	34 hrs	0 hrs	NA



Resource Name	Details	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Daryl Deffler	Work	13.6h	13.6h	6.8h	6.8h	6.8h			6.8h	6.8h	6.8h	6.8h	6.8h			6.8h	6.8h	6.8h	6.8h	6.8h	
	Act. Wc	13.6h																			
Task 1	Work																				
	Act. Wc																				
Task 2	Work																				
	Act. Wc																				
Task 3	Work	6.8h	6.8h	6.8h	6.8h	6.8h															
	Act. Wc	6.8h																			
Task 4	Work	6.8h	6.8h	0h	0h	0h															
	Act. Wc	6.8h																			

☐ Split in-progress tasks ⓘ

☒ Leveling can create splits in remaining work

- This option combination:
  - Leaves over allocations
  - Remaining work on started tasks scheduled inconsistently

Split in-progress tasks unchecked allows dependency logic override

# Splitting Remaining Work

## Split in progress tasks

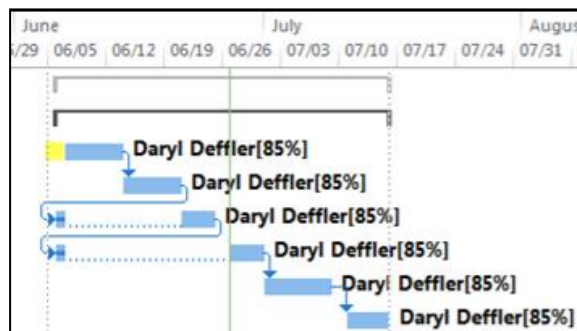
- **Recommendation: Check**
- Cleanly schedules remaining work based on dependency relationships
- Sets Resume Date: 1<sup>st</sup> day remaining work starts

Scheduling

## Leveling can create splits in remaining work

- **Recommendation: Check**
- Enables one *or more* splits in the remaining work *after* the Resume date

Resource Leveling



# Level resources with the proposed booking type

Resolving overallocations

Leveling order: Standard ▾

☐ Level only within available slack

☐ Leveling can adjust individual assignments on a task

☐ Leveling can create splits in remaining work

☒ Level resources with the proposed booking type

☐ Level manually scheduled tasks

- Booking Type field identifies the resource as Proposed or Committed

Build Team Window

	Project Resources	Booking	Work
	Daryl	Committed	864h
	Joe	Committed	96h
	Sue	Committed	64h

- **Recommendation: Check** Level Proposed resources as well

Resource Sheet

(Booking Type column added)

Resource Name ▾	Booking Type ▾
Daryl	Committed
Joe	Committed
Sue	Committed

# Level resources with the proposed booking type

Resolving overallocations

Leveling order: Standard

☐ Level only within available slack

☐ Leveling can adjust individual assignments on a task

☐ Leveling can create splits in remaining work

☒ Level resources with the proposed booking type

☐ Level manually scheduled tasks

		Resource Name	Booking Type
1		A	Committed
2		B	Proposed
3		C	Committed

		Task Name	Duration	Work	Actual Work	May 06, '17	May 13, '17	May 20, '17
0		Project1	5 days	184 hrs	0 hrs	S S M T W T F	S S M T W T F	S S M T W T F
1		Task 1	4 days	32 hrs	0 hrs			
2		Task 2	3 days	24 hrs	0 hrs			
3		Task 3	5 days	40 hrs	0 hrs			
4		Task 4	4 days	32 hrs	0 hrs			
5		Task 5	2 days	16 hrs	0 hrs			
6		Task 6	5 days	40 hrs	0 hrs			

Unchecked, only  
Committed resources are  
leveled.  
In this example, only “A”  
is leveled

		Task Name	Duration	Work	Actual Work	May 06, '17	May 13, '17	May 20, '17
0		Project1	12 days	184 hrs	0 hrs	S S M T W T F	S S M T W T F	S S M T W T F
1		Task 1	4 days	32 hrs	0 hrs			
2		Task 2	3 days	24 hrs	0 hrs			
3		Task 3	5 days	40 hrs	0 hrs			
4		Task 4	4 days	32 hrs	0 hrs			
5		Task 5	2 days	16 hrs	0 hrs			
6		Task 6	5 days	40 hrs	0 hrs			

Checked, both Committed  
and Proposed resources  
are leveled.  
In this example, both “A”  
and “B” are leveled

		Task Name	Duration	Work	Actual Work	May 06, '17	May 13, '17	May 20, '17
0		Project1	12 days	184 hrs	0 hrs	S S M T W T F	S S M T W T F	S S M T W T F
1		Task 1	4 days	32 hrs	0 hrs			
2		Task 2	3 days	24 hrs	0 hrs			
3		Task 3	5 days	40 hrs	0 hrs			
4		Task 4	4 days	32 hrs	0 hrs			
5		Task 5	2 days	16 hrs	0 hrs			
6		Task 6	5 days	40 hrs	0 hrs			

# Level manually scheduled tasks

Resolving overallocations

Leveling order: Standard

☐ Level only within available slack

☐ Leveling can adjust individual assignments on a task

☐ Leveling can create splits in remaining work

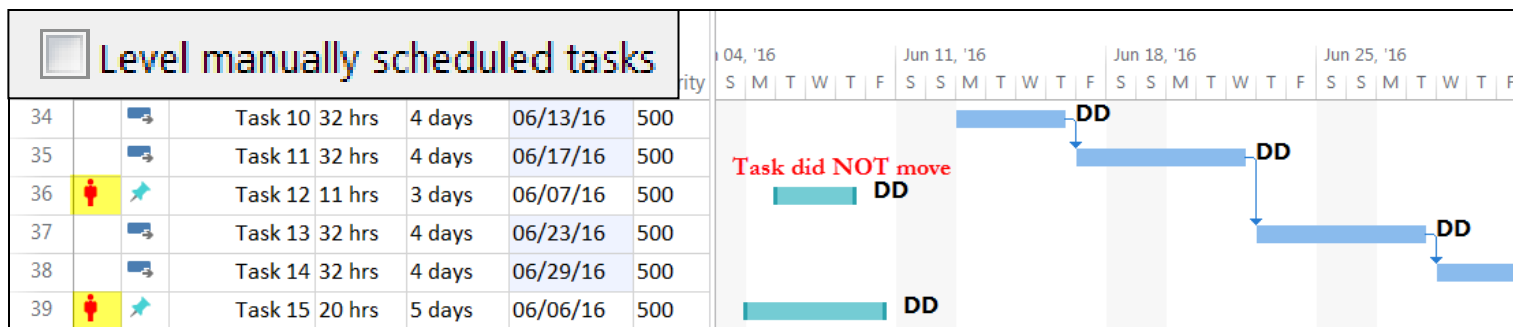
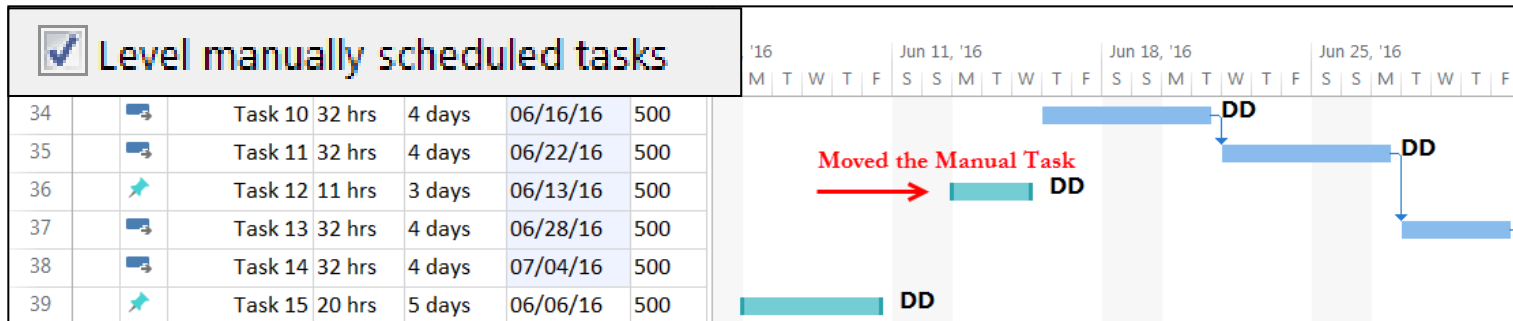
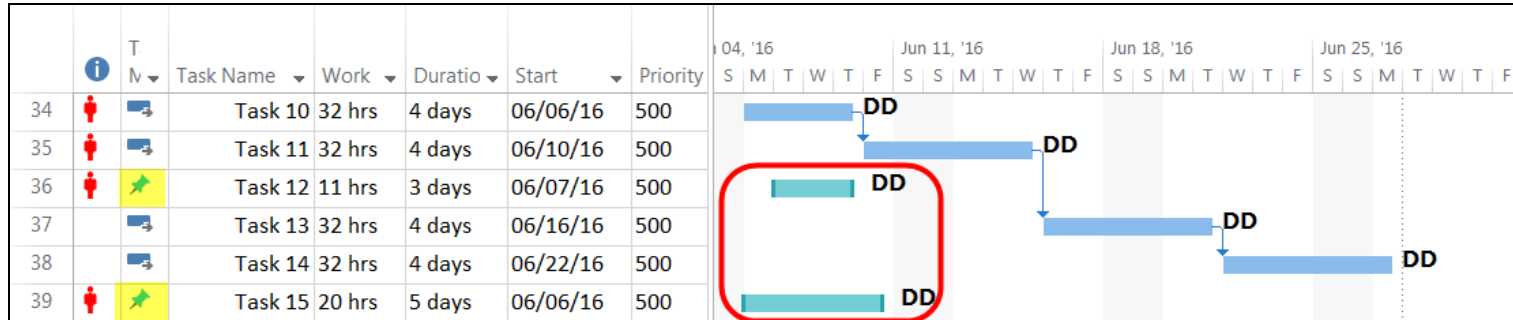
☐ Level resources with the proposed booking type

☒ Level manually scheduled tasks

- MS Project delays one manual task when it conflicts with another manual task
- All other tasks still schedule around the manual tasks



# Level manually scheduled tasks

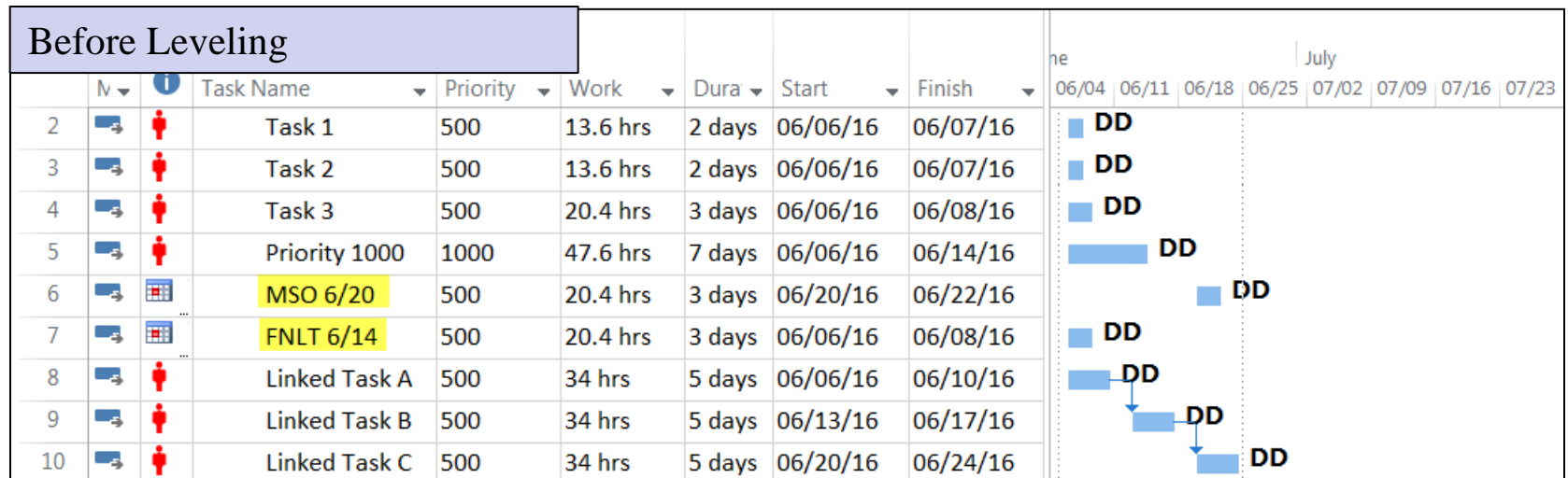


# Honoring constraint dates

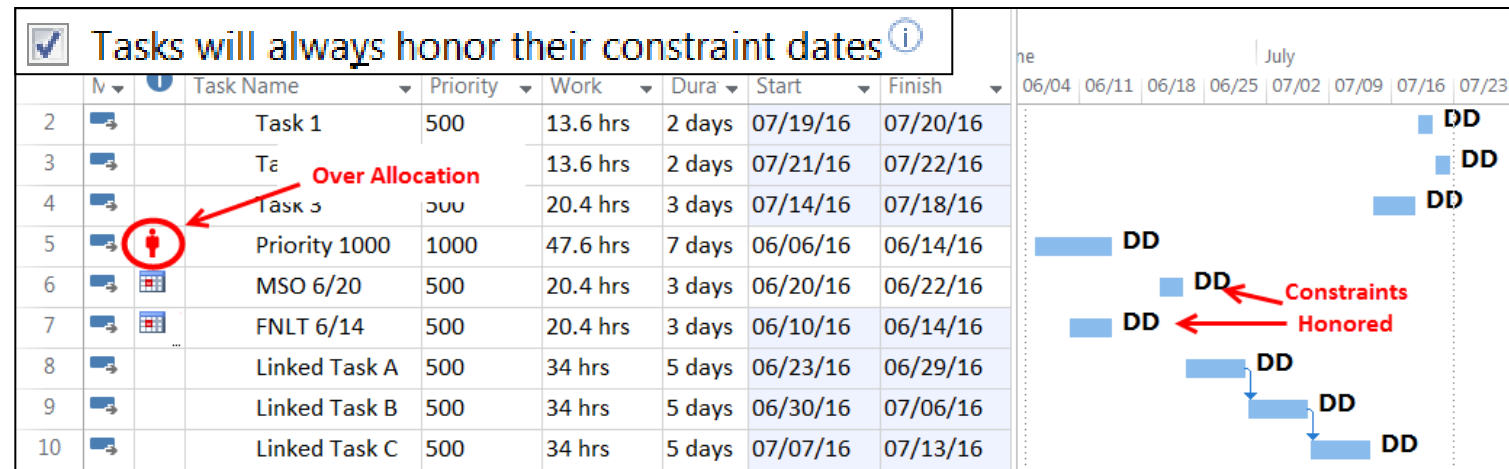
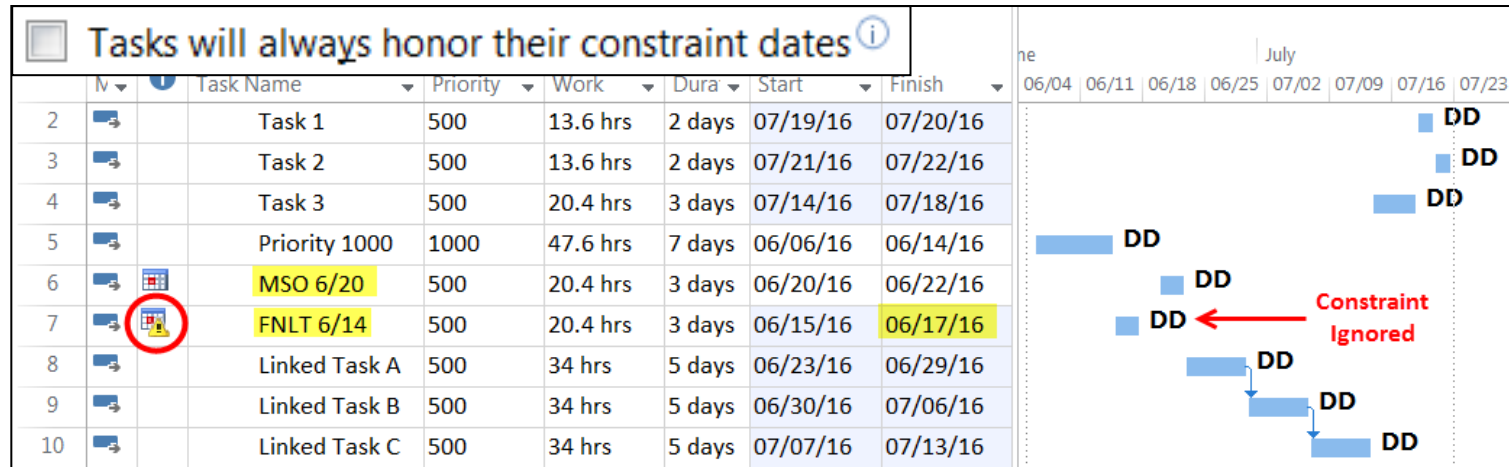
- Scheduling Option: (File>Options>Schedule)

☐ Tasks will always honor their constraint dates ⓘ

- Indicates Project will schedule based on Constraints
- Impacts leveling as well








# Honoring constraint dates










# Task Level Field: Level Assignments

- Task level override for  
“Leveling can adjust individual assignments on a task”
  - Yes/No
  - No: Leveling cannot adjust task assignment start dates
  - Fixed Duration Tasks:
    - Field is locked with a “No” value
    - Leveling assignments may change the task duration
- Can only exempt a task from splitting individual assignments to resolve an over allocation, meaning if “Leveling can adjust individual assignments on a task” is not checked, this field cannot override the resolution option and turn it on for a specific task

		T N ▼	Task Name ▼	Level Assignments ▼
2			Short Task, ID = 1	Yes
3			Started Short Task, ID = 2	Yes
4			Four Day Task	Yes
5			Five Day Task	Yes

# Task Level Field: Leveling Can Split

- Task level override for  
“Leveling can create splits in remaining work”
  - Yes/No
  - No: Leveling cannot split remaining work
- Can only exempt a task from splitting remaining work, meaning if “Leveling can create splits in remaining work” is not checked, this field cannot override the resolution option and turn it on for a specific task

		T M ▼	Task Name ▼	Leveling Can Split ▼	Duration ▼
2			Short Task, ID = 1	Yes	3 days
3			Started Short Task, ID = 2	Yes	3 days
4			Four Day Task	Yes	4 days
5			Five Day Task	Yes	5 days

# Task Level Fields:

## Preleveled Start & Finish

- Holds task Start & Finish dates before leveling

								Before Leveling													
	T N	Task Name	Leveling Delay	Preleveled Start	Preleveled Finish	Start	Finish	04, '16							Jun 11, '16						
34	→	Task 10	0 edays	06/06/16	06/09/16	06/06/16	06/09/16	S	M	T	W	T	F	S	S	M	T	W	T	F	S
35	→	Task 11	0 edays	06/06/16	06/09/16	06/06/16	06/09/16														
36	→	Task 12	0 edays	06/06/16	06/08/16	06/07/16	06/09/16														
37	→	Task 13	0 edays	06/06/16	06/09/16	06/06/16	06/09/16														
38	→	Task 14	0 edays	06/06/16	06/09/16	06/06/16	06/09/16														
39	→	Task 15	0 edays	06/06/16	06/10/16	06/06/16	06/10/16														

								After Leveling													
	T N	Task Name	Leveling Delay	Preleveled Start	Preleveled Finish	Start	Finish	04, '16							Jun 11, '16						
34	→	Task 10	7 edays	06/06/16	06/09/16	06/13/16	06/16/16														
35	→	Task 11	10 edays	06/06/16	06/09/16	06/23/16	06/28/16														
36	→	Task 12	0 edays	06/06/16	06/08/16	06/07/16	06/09/16														
37	→	Task 13	4 edays	06/06/16	06/09/16	06/17/16	06/22/16														
38	→	Task 14	12 edays	06/06/16	06/09/16	06/29/16	07/04/16														
39	→	Task 15	0 edays	06/06/16	06/10/16	06/06/16	06/10/16														

# Task Level Field: Leveling Delay



- Indicates the number of calendar days Leveling delayed the task  
(Start – Preleveled Start)

Task Name	Duration	Priority	Leveling Delay	Start	July				August							
					06/04	06/11	06/18	06/25	07/02	07/09	07/16	07/23	07/30	08/06	08/13	08/20
Task Priority 551	5 days	551	36 edays	07/12/16												
Task Priority 550	5 days	550	43 edays	07/19/16												
Five Day Task	5 days	500	50 edays	07/26/16												
Four Day Task	4 days	500	57 edays	08/02/16												
Short Task, ID = 1	3 days	500	63 edays	08/08/16												
Short Task, ID = 2	3 days	500	66 edays	08/11/16												

edays = Elapsed (calendar) days

# Resource Level Field: Can Level

- Resource level override
- Can Project level this resource?
  - Yes/No
  - No: Leveling ignores the Resource

		Resource Name ▼	Can Level ▼	Type ▼
1		<b>Daryl</b>	<b>Yes</b>	<b>Work</b>
2		Joe	Yes	Work
3		Sue	Yes	Work

# Resolution Options Summary

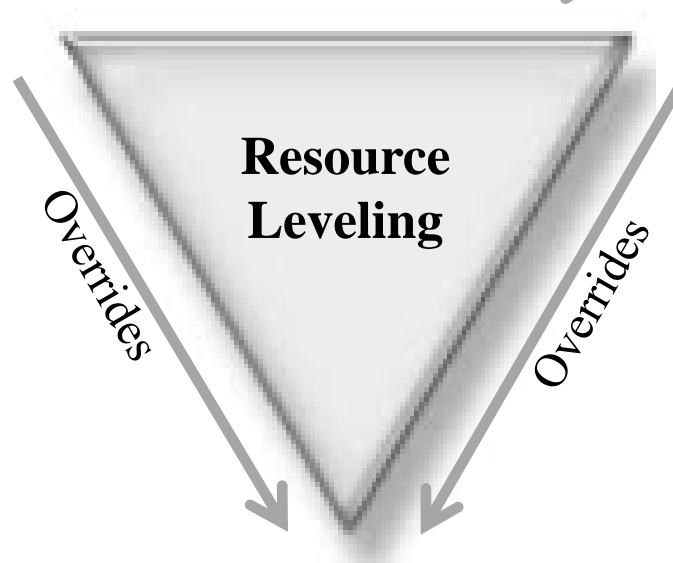
## Resource Field

- Can Level

Overrides

## Task Fields

- Level Assignments
- Leveling Can Split



## Scheduling & Leveling Options

- ☐ Level only within available slack
- ☐ Leveling can adjust individual assign
- ☒ Leveling can create splits in remain
- ☐ Level resources with the proposed
- ☒ Level manually scheduled tasks

- ☐ New tasks are effort driven<sup>①</sup>
- ☐ Autolink inserted or moved tasks<sup>①</sup>
- ☒ Split in-progress tasks<sup>①</sup>
- ☒ Tasks will always honor their constraint dates<sup>①</sup>
- ☐ Show that scheduled tasks have estimated duration
- ☐ New scheduled tasks have estimated durations

# Resource Leveling: The Complete Series

## Limitations



# Limitations

- Leveling may not fix all over allocations
  - Priority 1000 / Manual tasks; conflicts with other Priority 1000 / Manual tasks
  - Not allowing “Split in-progress tasks”; with tasks starting out of sequence
  - Leveling only within available slack; with insufficient slack
  - Hard Constraints (Must finish on, etc.); conflicts with other constrained tasks
  - Not leveling Proposed resources
- The PM still needs to look for over allocations and other issues after leveling



# Limitations

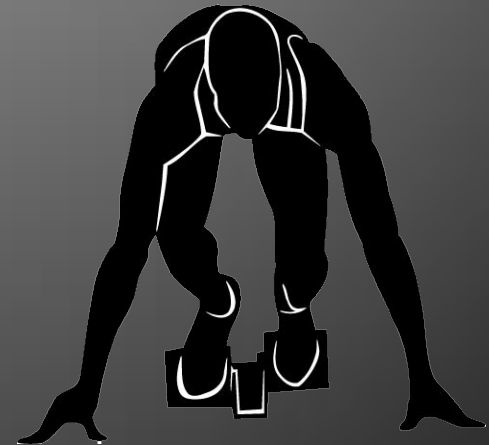
- When scheduling the project from the start date, an “As Late As Possible” constraint prevents leveling that task
  - Leveling delays tasks
  - No room to delay an ALAP task
- When scheduling the project from a finish date, an “As Soon As Possible” constraint prevents leveling that task

# Limitations

- Leveling will not adjust
  - Task configuration problems  
(3 days duration to complete 80 hours work)
  - Fixed Duration:  
(Sets task field “Level Assignments” = NO)
  - Problems caused by dependency relationships
  - Priority 1000

# Resource Leveling: The Complete Series

## Preparing to Level



# Preparing to Level

- Correct known problem scenarios before leveling
  - WBS construction
  - Project resource commitment
  - Task configuration
- Illustrated views available in the “Preparing to Level.MPP” download file

If you haven't established a good foundation by fixing all the Scheduling issues...  
You're not ready to Level



# WBS Construction

- Incomplete construction
- Adherence to best practices

## Missing Dependencies

		Task Name ▾	Start ▾	Finish ▾	Actual Work ▾	Remaining Work ▾	Predecessor: ▾	Successors ▾	May 13, '17							May 20
									S	M	T	W	T	F	S	S
1		Task 1	05/16/17	05/16/17	0 hrs	8 hrs		2								
3		Task 3	05/18/17	05/18/17	0 hrs	0 hrs	2									
4		Task 4	05/16/17	05/16/17	0 hrs	0 hrs		5								
6		Task 6	05/18/17	05/18/17	0 hrs	8 hrs	5									

View: Prelevel – Tasks Missing Pred/Succ

## Manual Constraints

		Task Name ▾	Constraint Type ▾	Constraint Date ▾	Start ▾	Finish ▾	Actual Finish ▾	Work ▾	May 27, '17							
									F	S	S	M	T	W	T	F
8		Task 8	Must Start On	05/30/17	05/30/17	05/30/17	NA	0 hrs								

View: Prelevel – Manual Constraints

# WBS Construction

## Missing Resource Assignments

		Task Name ▾	Start ▾	Finish ▾	Work ▾	Duration ▾	Resource Names ▾	May 13, '17						
								S	S	M	T	W	T	F
3		Task 3	05/18/17	05/18/17	0 hrs	1 day								
4		Task 4	05/16/17	05/16/17	0 hrs	1 day								

View: Prelevel – No Resources Assigned

## Manual, Priority 1000 Tasks

		Task Mode ▾	Task Name ▾	Start ▾	Finish ▾	Work ▾	Priority ▾	7			
								T	W	T	F
7			Task 7 - Manual	05/16/17	05/16/17	0 hrs	500				
9			Task 9 - Priority 1000	05/16/17	05/16/17	0 hrs	1000				

View: Prelevel – Manual / Priority 1000

## Summary Tasks with Assigned Resources or Dependency Relationships

	Task Mode ▾	Task Name ▾	Summary ▾	Predecessors ▾	Successors ▾	Resource Names ▾
5		Summary Task 2	Yes			Bob[25%]
9		Summary Task 3	Yes		13	
13		Summary Task 4	Yes	9		

View: Prelevel – Sum Tasks w/Res or Relationships

# Project Resource Commitment

- Primarily applicable to
  - Project Server environment
  - Enterprise resources with enterprise calendars
  - Fractional project commitments  
(Joe is 35% on project “A” and 55% on project “B”)



# Project Resource Commitment

- Set Resource Max Units to correct project allocation

- $$\text{Max Units} = \frac{\text{weekly project allocation (hrs)}}{\text{weekly enterprise availability (hrs)}}$$

- 20 hr / wk = 50% (40 hr / week employee)
- 17 hr / wk = 56% (30 hr / week employee)

- Value entered is for current session only

		Resource Name ▾	Type ▾	Max. Units ▾	Allocation (Number1) ▾
3		Daryl	Work	100%	0
4		<b>Joe</b>	<b>Work</b>	<b>35%</b>	<b>35</b>
5		Sue	Work	100%	0

- Can use custom field to store project allocation



# Task Configuration

- Identify and Fix Task Configuration Issues
  - Assignment Units exceed Max Units
  - Peak exceeds Assignment Units

Top: Resource Usage																		
		Resource Name	Work	Start	Max Units	Assignment Units	Peak	Finish	Remaining Work	Details	M	T	W	T	F	Jun 11		
																S		
2		Joe	525 hrs	06/06/16	35%		868%	07/20/16	525 hrs	Work	42.8h	56.13h	56.13h	56.13h	42.8h			
		Task 10	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs	Work	8h	8h	8h	8h	8h			
		Task 11	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs	Work	8h	8h	8h	8h	8h			
		Task 13	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs	Work	8h	8h	8h	8h	8h			
		Task 14	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs	Work	8h	8h	8h	8h	8h			
		Task 15	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs	Work	8h	8h	8h	8h	8h			
		Task 12	40 hrs	06/07/16		85%	167%	06/09/16	40 hrs	Work		13.33h	13.33h	13.33h				
		Test Task	200 hrs	06/20/16		85%	833%	06/22/16	200 hrs	Work								
		Task 2	15 hrs	06/13/16				06/13/16	15 hrs	Work	7.8h	7.8h	7.8h	7.8h	7.8h			
Compare Max Units to Assignment Units and Assignment Units to Peak																		
Click Task above displays Task on bottom																		
Bottom: Task Usage																		
		Task Mode	Task Name	Start	Finish	Work	Actual Work	Remaining Work	Actual Start	Actual Finish	Cons Type	Details	M	T	W	T	F	Jun 11
																		S
51			Task 12	06/07/16	06/09/16	40 hrs	0 hrs	40 hrs	NA	NA	As Sc	Work		13.33h	13.33h	13.33h		
												Act. Wc						
			Joe	06/07/16	06/09/16	40 hrs	0 hrs	40 hrs	NA	NA		Work		13.33h	13.33h	13.33h		
												Act. Wc						

Resource View: Prelevel – Pre Leveling Check

# Resource Leveling: The Complete Series

## Leveling Functions



# Leveling Functions

- Level All:
  - Levels all resources, levels all tasks
  - Primary leveling option



- Level Selection:
  - Levels only the selected tasks
  - Useful in
    - Schedule debugging
    - Excluding later phases not yet ready to level



# Leveling Functions

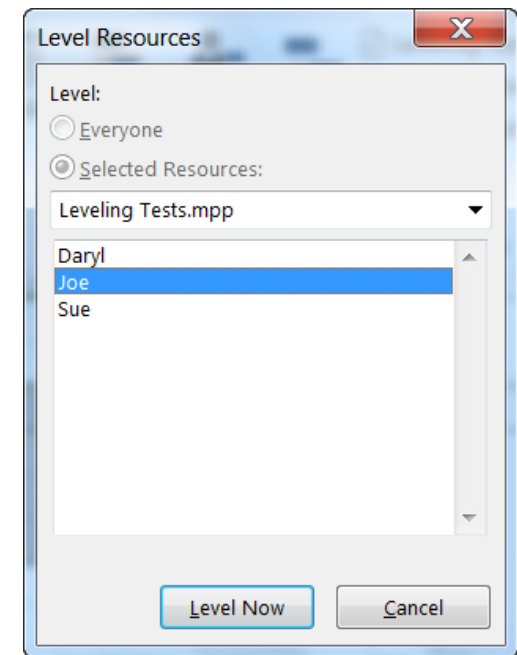
- Level Resource:
  - Levels the selected resource(s) across all their task assignments
  - Primarily used with schedule debugging to determine who is causing a leveling issue



## *Tips:*

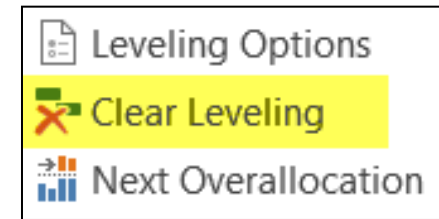
*If some resources should never be leveled, set their “Can Level” field to No and use Level All*

*Pre-highlighted names in the Level Resources window are based on selected resources in the Resource Sheet*

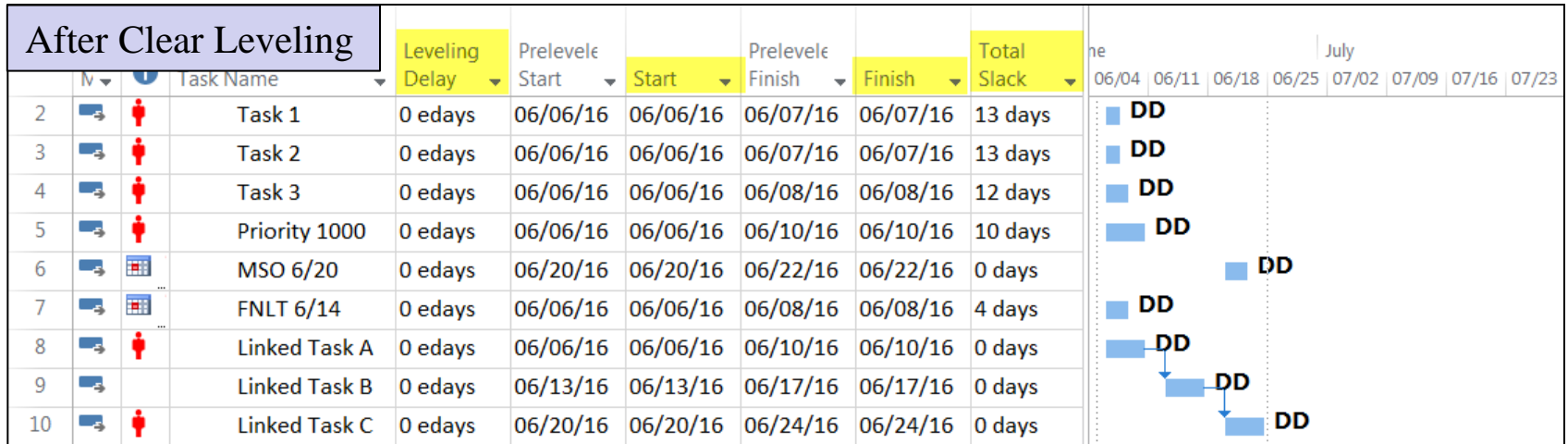
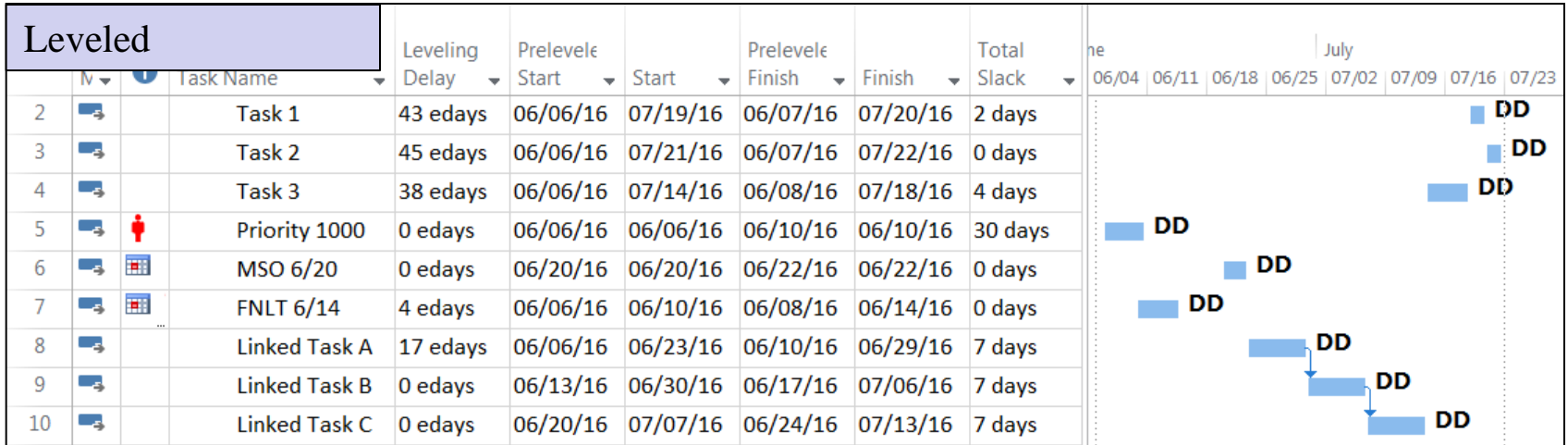


# Leveling Functions

- Clear Leveling
  - Removes the effects of leveling
  - Resets tasks to pre-leveled state
    - Leveling Delay field values to zero
    - Start/Finish set to Pre-Leveled Start/Finish
    - Recalculates Total Slack
    - Resets Work Contour if Project generated custom load pattern
  - **Recommendation: Set leveling option: “Clear leveling values before leveling”**



# Clear Leveling

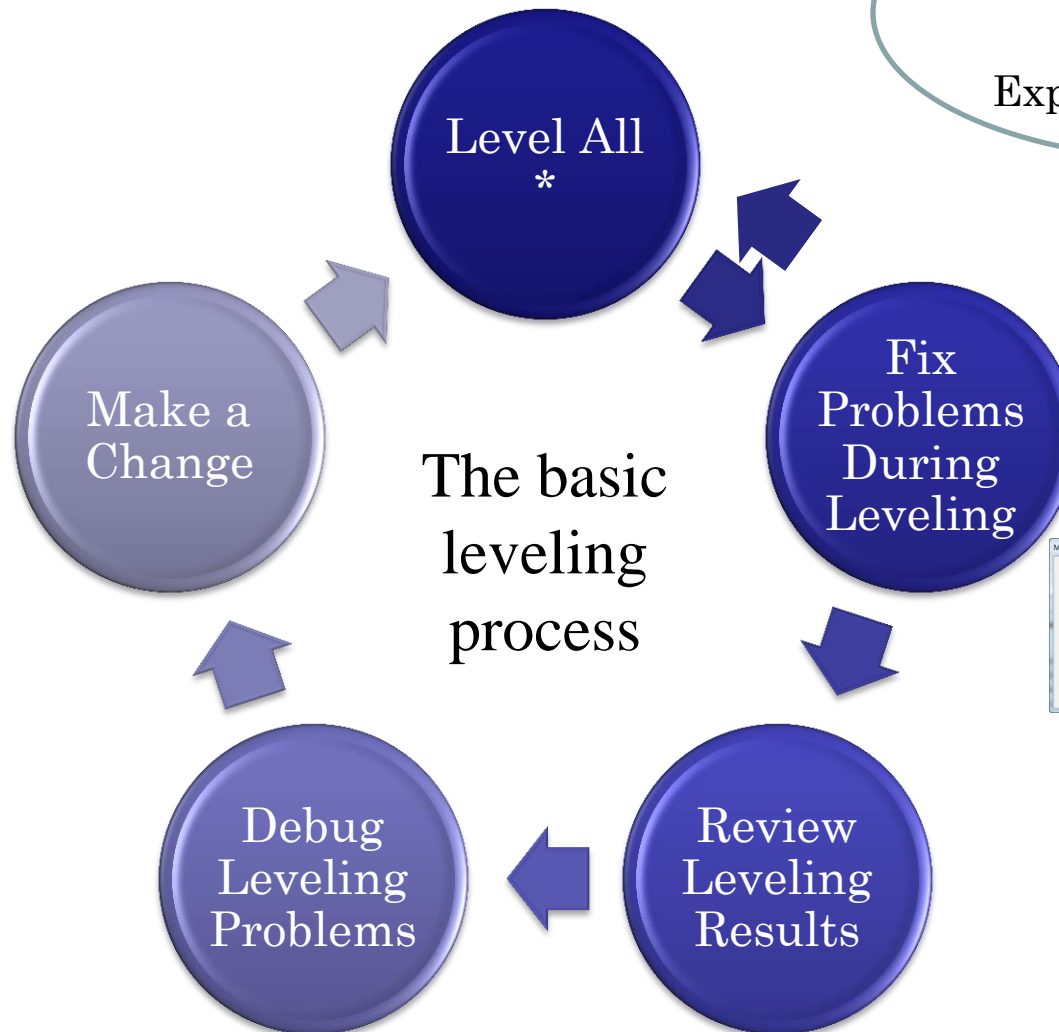


# Resource Leveling: The Complete Series

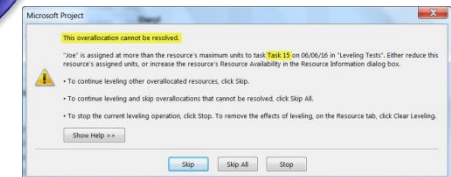
## Leveling Cycle



# Leveling Cycle



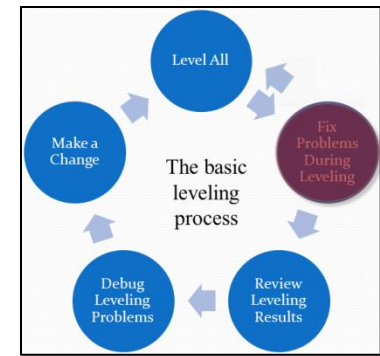
A new schedule may take dozens of iterations! Expect it, plan for it.



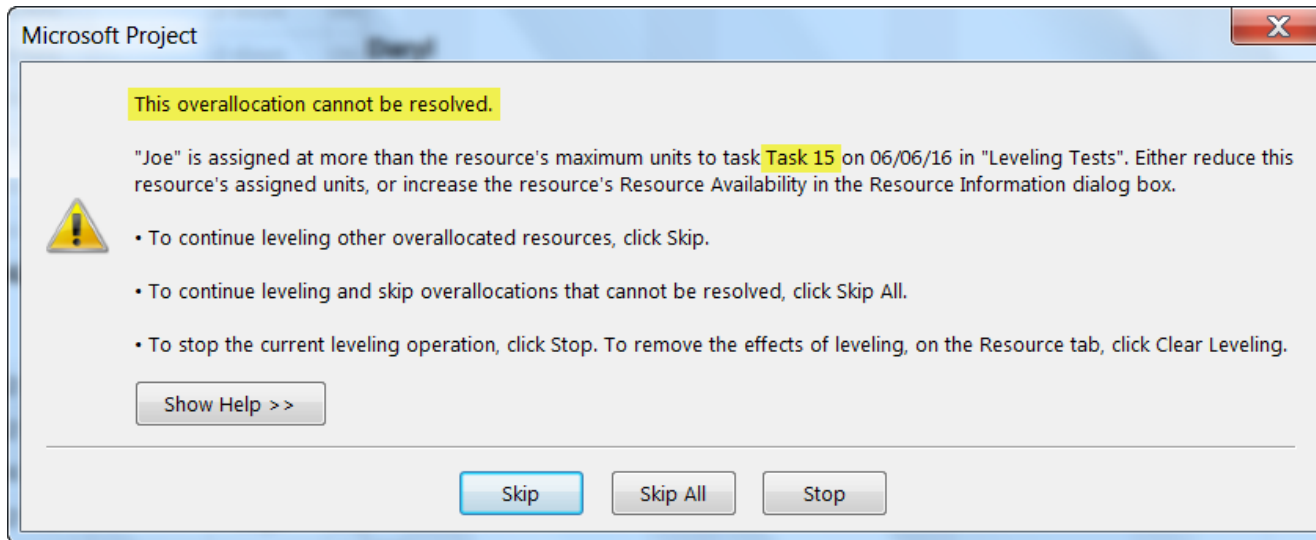
\* Level All or  
Level Select or  
Level Resources



# Problems During Leveling

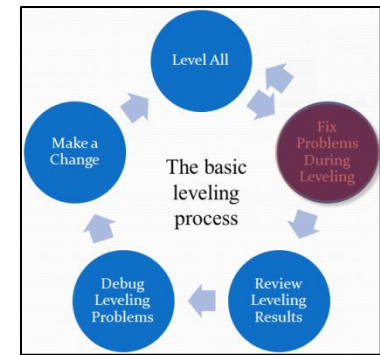


- Action Error Messages

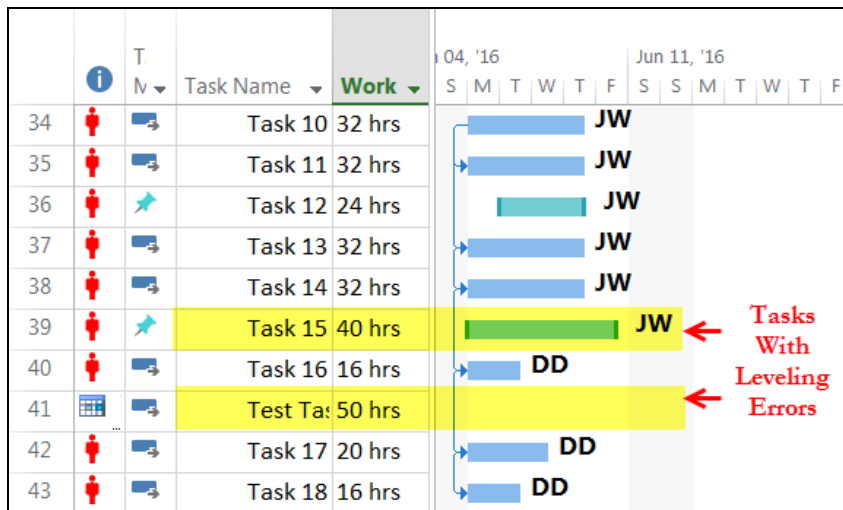


- This example identifies a Task Specific over allocation
- Skip option bypasses leveling all tasks for the Resource

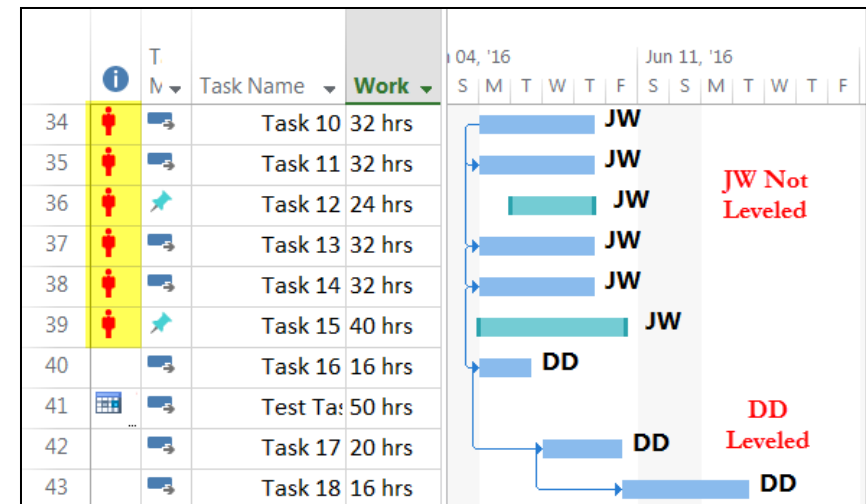
# Problems During Leveling



## Before Leveling

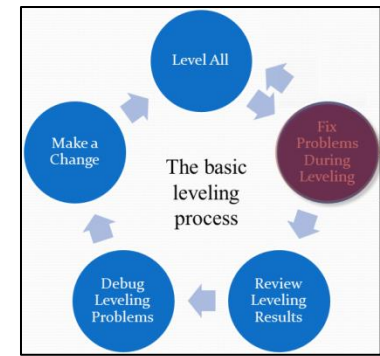


## After “Skipping”

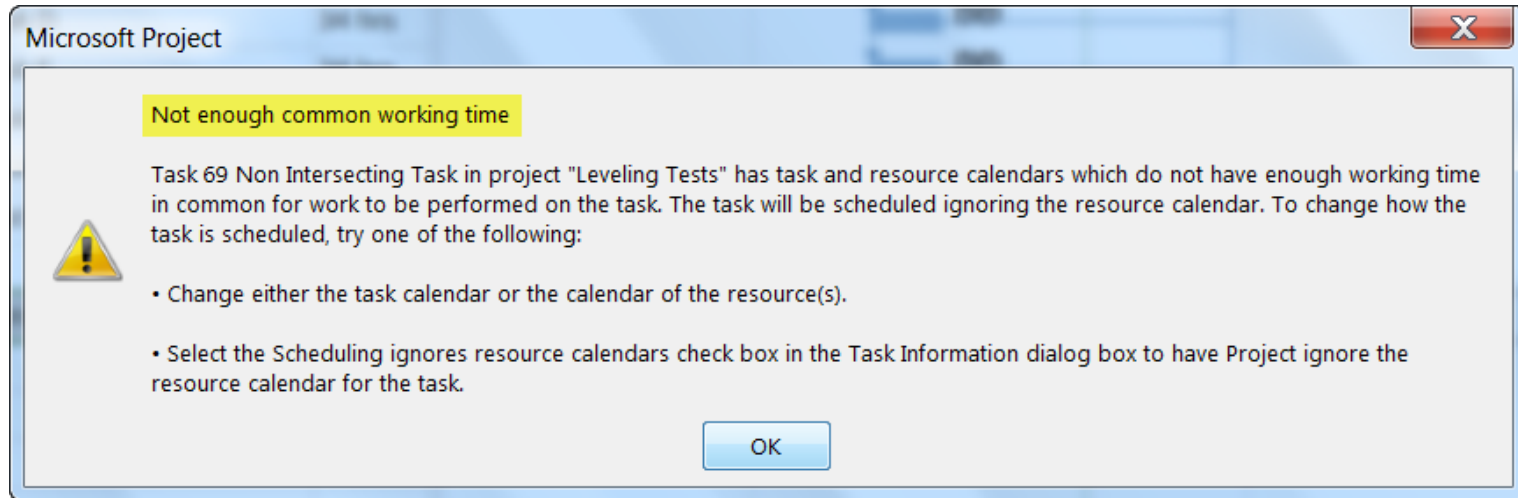


- No task for JW is leveled because of two over allocations that could not be fixed
- These errors need to be fixed before leveling results can be examined

# Problems During Leveling

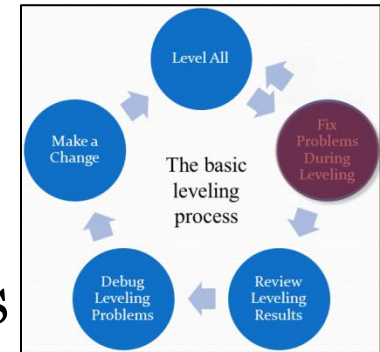


- Informational Error Messages



- Indicates task and assigned resource do NOT have sufficient *common* working time to schedule the task
- Task should be reviewed after leveling completes

# Problems During Leveling



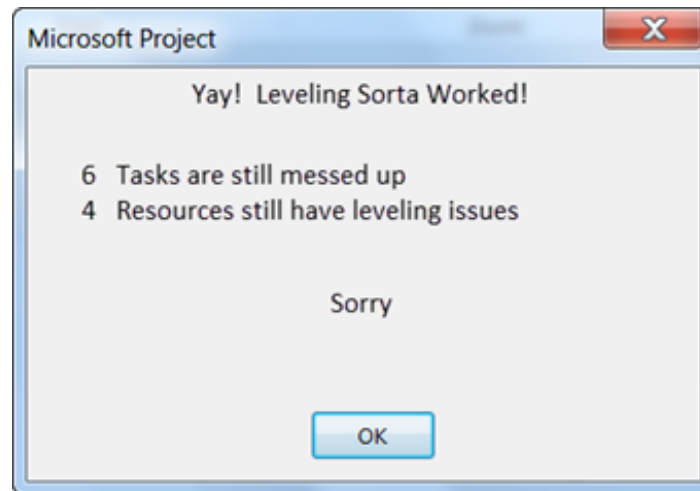
- Leveling Process Takes 5 – 10 minutes
  - Typically caused by needed resource allocation exceeding available resource commitment:  
Peak > Max Units
  - Ex: Assignment Units = 85% but Peak = 167%
  - Use “**Prelevel – Pre Leveling Check**” view to identify and correct the issue

Top: Resource Usage																
	Resource Name	Work	Start	Max Units	Assignment Units	Peak	Finish	Remaining Work		Details	M	T	W	T	F	S
2	Joe	525 hrs	06/06/16	35%		868%	07/20/16	525 hrs		Work	42.8h	56.13h	56.13h	56.13h	42.8h	
	Task 10	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs		Work	8h	8h	8h	8h	8h	
	Task 11				100%	100%	06/10/16	40 hrs		Work	8h	8h	8h	8h	8h	
	Task 13				100%	100%	06/10/16	40 hrs		Work	8h	8h	8h	8h	8h	
	Task 14				100%	100%	06/10/16	40 hrs		Work	8h	8h	8h	8h	8h	
	Task 15	40 hrs	06/06/16		100%	100%	06/10/16	40 hrs		Work	8h	8h	8h	8h	8h	
	Task 12	40 hrs	06/07/16		85%	167%	06/09/16	40 hrs		Work		13.33h	13.33h	13.33h		
	Test Task	200 hrs	06/20/16		85%	833%	06/22/16	200 hrs		Work						
	Task 2		06/16/16				06/13/16	15 hrs		Work	7.8h	7.8h	7.8h	7.8h	7.8h	
Bottom: Task Usage																
Task Mode	Task Name	Start	Finish	Work	Actual Work	Remaining Work	Actual Start	Actual Finish	Cons	Details	M	T	W	T	F	S
51	Task 12	06/07/16	06/09/16	40 hrs	0 hrs	40 hrs	NA	NA	As Sc	Work		13.33h	13.33h	13.33h		
	Joe	06/07/16	06/09/16	40 hrs	0 hrs	40 hrs	NA	NA		Act. Wc		13.33h	13.33h	13.33h		
										Work		13.33h	13.33h	13.33h		
										Act. Wc						

Resource View: Prelevel – Pre Leveling Check

# The Level Function Finishes

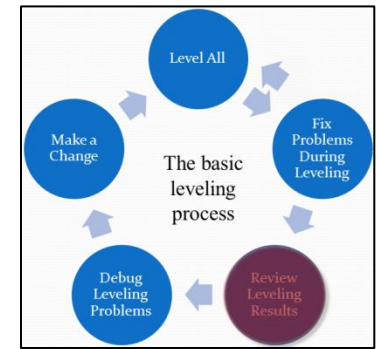
*There is NO leveling completion window telling you there are still issues*







Fictitious window  
made up by the presenter

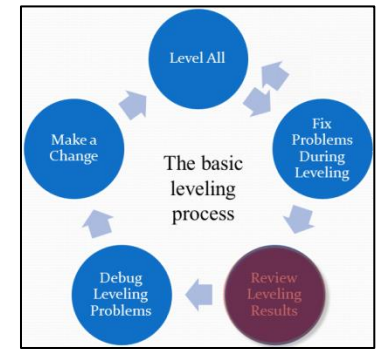
*You need to reevaluate leveling results manually  
after each leveling*

# Review Leveling Results



- What can we look for to check leveling results?
  - If we think we fixed a problem, is it fixed?
  - Indicators Column -    
  - Views - Red Text/Numbers
  - Key schedule dates - Hitting target dates?
  - Resource usage - Unacceptable gaps?

# Review Leveling Results

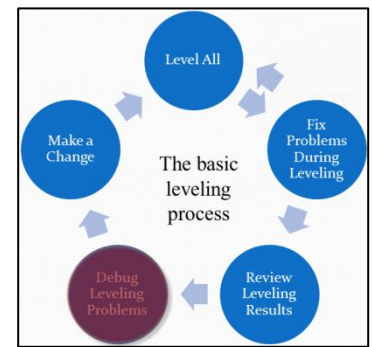


- Analyze Resource Usage
  - Use Resource Usage views to look for gaps
    - Identify what's going on in the schedule during these gaps
    - Is another activity causing the gap?
    - Are they on vacation?
  - Focus analysis effort on key resources
  - Not all over allocations are worth fixing

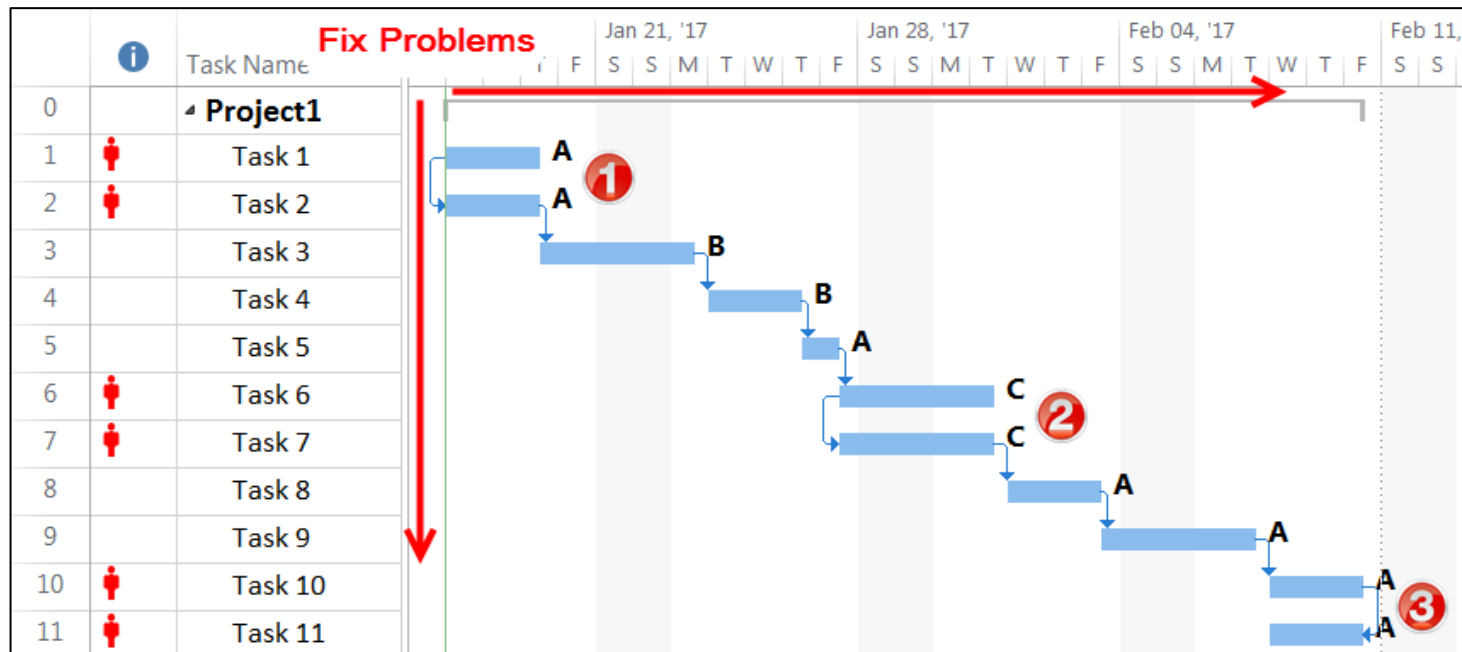
		Resource Name ▾	Work ▾	Details	June						July					Aug
	i				05/20	05/27	06/03	06/10	06/17	06/24	07/01	07/08	07/15	07/22	07/29	
1		▸ Joe	280 hrs	Work	40h	40h				4h	40h	40h	40h	40h	36h	
2		▸ Sue	236 hrs	Work	40h	40h	40h	40h	40h	36h						
3		▸ Bob	76 hrs	Work	36h								4h	36h		

Sample Resource Usage Showing Gaps

# Debug Leveling Problems

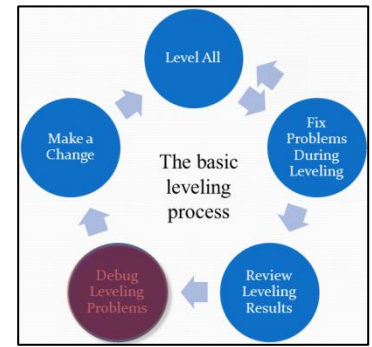


- Locate and resolve leveling problems
  - Top to bottom on the dependency chain
  - Left to right on the timeline





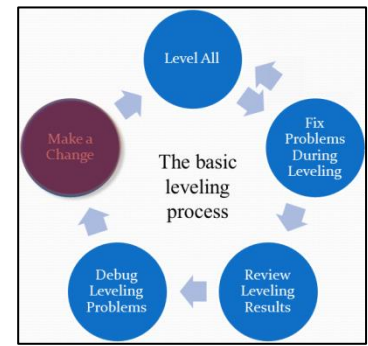
# Debug Leveling Problems



- Understand the source of the problem
  - Task configuration
    - Manually over allocated
    - Manual constraints
  - WBS Construction
    - Dependencies
    - Summary task level dependencies
  - Assignments
    - Over allocation (Units)
    - Too many assigned resources
  - Options
    - Schedule/Level Options

# Make a Change

- One or two changes per cycle
  - Simplifies analysis of results
  - Use Undo to back it out
- Start Leveling Cycle again



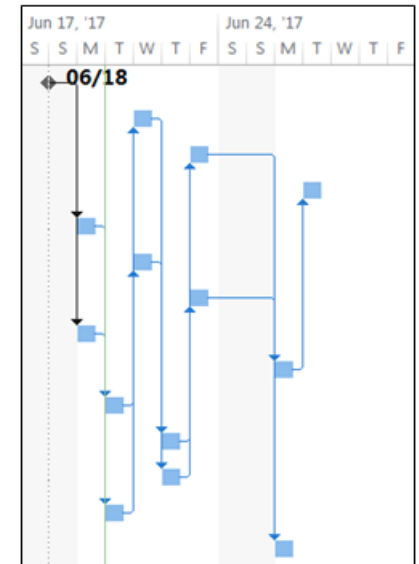
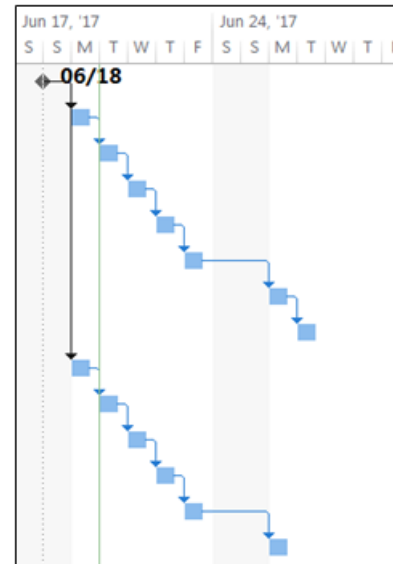
# Resource Leveling: The Complete Series

## Guidelines & Recommendations



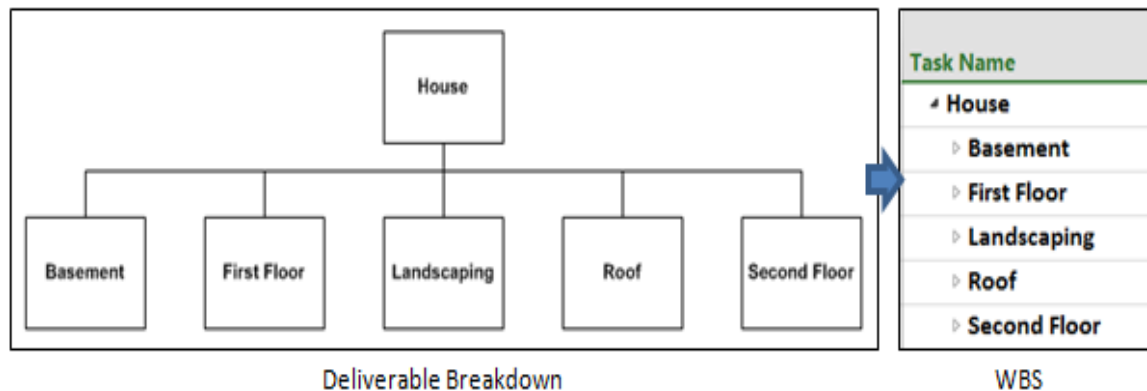
# WBS is K-E-Y

- WBS structure directly impacts your ability to maintain the schedule
- A good WBS involves three disciplines;
  - Planning
  - Organizing
  - Minimizing Complexity



# Planning

- Pre-schedule development
- Developing a “deliverable oriented” hierarchical work decomposition that translates directly into the Work Breakdown Structure



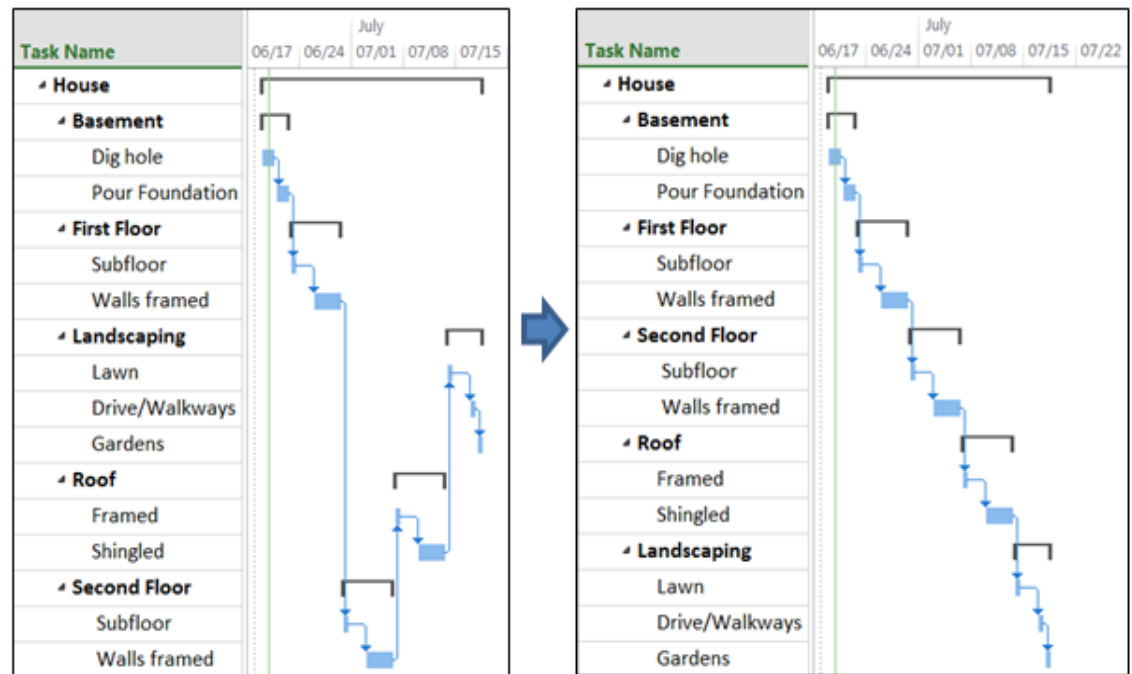
[Work Breakdown Structure Method](#) - (Toolbox.com)

[The Work Breakdown Structure](#) (MPUG.com)

[Prince2 Product Based Planning](#) (Prince2Primer.com)

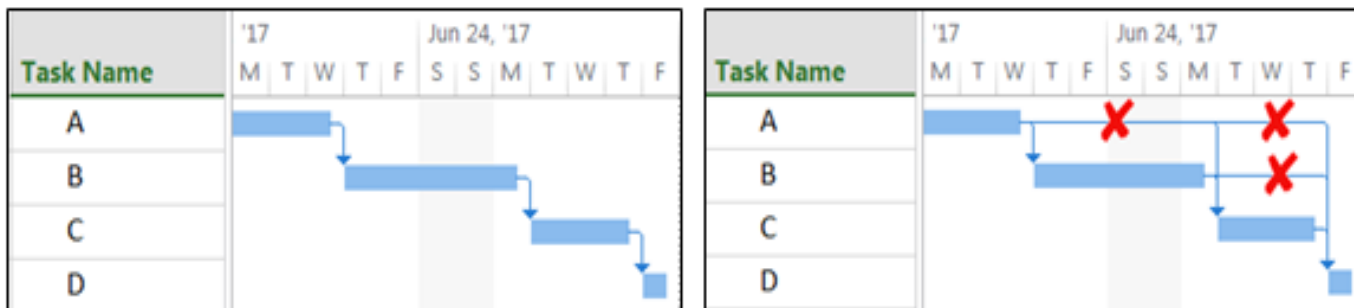
# Organizing

- Occurs as the schedule is being built
- Arranging deliverables and tasks in a logically structured and readable manner
  - Top to Bottom
  - Left to Right



# Minimize Complexity

- Take control
  - All tasks should have at least one predecessor and successor (except start and end)
  - Don't let MS Project interpret what *it* thinks the work sequence should be. Tell it.
- Minimize dependencies



# Minimize Complexity

- When creating the schedule, avoid techniques that cause scheduling and leveling complexity/issues or create more work for you such as;
  - Manually scheduled tasks
  - Priority 1000
  - Hard coded constraints (ex: Must Start On)
  - Manually entered work contours
  - Fixed duration
- Strive for one task/one resource





# Leveling Options

Scheduling options for this project: Project1

New tasks created: Auto Scheduled

Auto scheduled tasks scheduled on: Project Start Date

Duration is entered in: Days

Work is entered in: Hours

Default task type: Fixed Units

☐ New tasks are effort driven

☐ Autolink inserted or moved tasks

☒ Split in-progress tasks

☐ Update Manually Scheduled tasks when editing links

☒ Tasks will always honor their constraint dates

☐ Show that scheduled tasks have estimated durations

☐ New scheduled tasks have estimated durations

☐ Keep task on nearest working day when changing to Automatically Scheduled mode

Resource Leveling

Leveling calculations

☐ Automatic ☒ Manual

Look for overallocations on a Week by Week basis

☒ Clear leveling values before leveling

Leveling range for 'Project1'

☒ Level entire project

☐ Level From: 06/18/17 To: 08/08/17

Resolving overallocations

Leveling order: Priority, Standard

☐ Level only within available slack

☒ Leveling can adjust individual assignments on a task

☒ Leveling can create splits in remaining work

☐ Level resources with the proposed booking type

☒ Level manually scheduled tasks

Help Clear Leveling... Level All OK Cancel

- My starting points
- Don't be afraid to experiment!

# Resource Leveling: The Complete Series

## Final Thoughts



*Understanding can overcome any situation, however mysterious or insurmountable it may appear to be. - Norman Vincent Peale*

- Final Thoughts
  - Leveling is a complex process that takes time to learn and understand, don't get frustrated
  - Long term benefits far outweigh learning curve
  - Project only does what you tell it to do
  - Set yourself up for success – avoid features or techniques that cause problems
  - Don't be afraid to experiment – with structure
- Primary Objective: Help you transition from fighting the tool to controlling the tool



# Resource Leveling: The Complete Series

November 8, 2017 @ 12pm-1pm EST  
Daryl Deffler

## Thank You For Attending