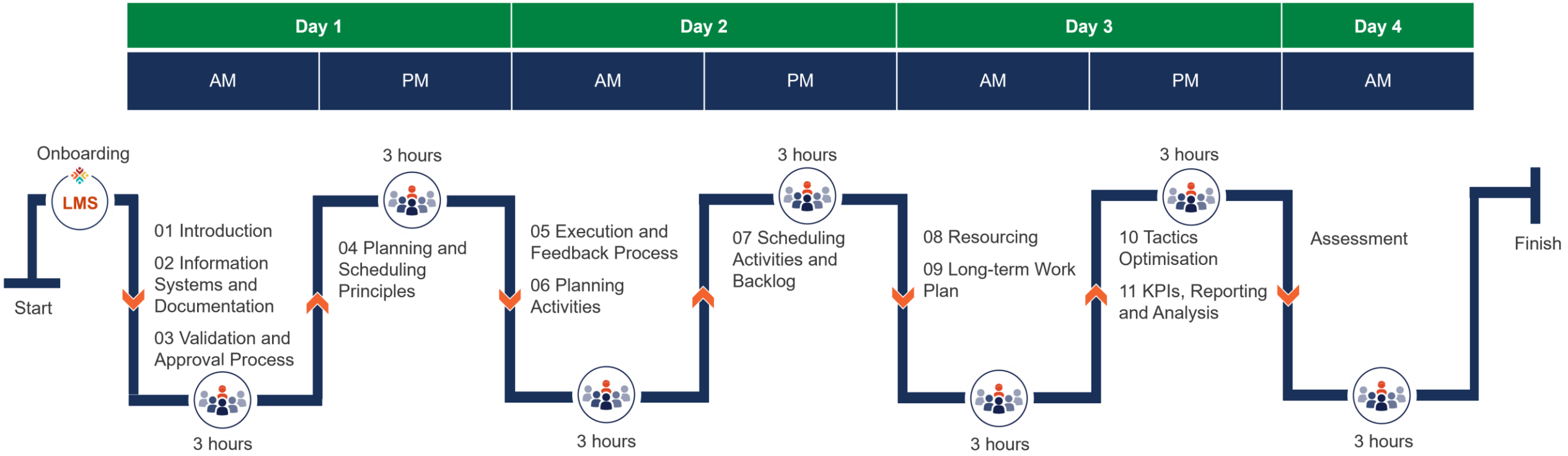
Module 07: Scheduling Activities

Maintenance Work Management

Illovo MWM learning journey



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Schedule for this session – Day 2

Time	Content to be covered
	Welcome
60 minutes	**Module 05: Execution and Feedback Process**
120 minutes	**Module 06: Planning Activities**
	Lunch
180 minutes	**Module 07: Scheduling Activities**

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Ice-breaker

Name a place (town, city or country) that you would like to visit.

Type your answer using the public chat feature.

Learning objectives for this module

1. Describe the concept of scheduling work and explaining the different relationships between work and the optimal utilisation of manpower.
2. Prioritise, sort and allocate work for optimal scheduling logistics.
3. Review the priority requirements and schedule work from the backlog.
4. Distinguish between scheduling and daily allocation.
5. Explain the importance of the scheduling meeting and the schedule release.
6. Explain and apply good scheduling practice to achieve optimal benefits for the organisation.

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Scheduling

The schedule driver

What drives your schedule?

A. The man hours available

B. The requirements of the asset

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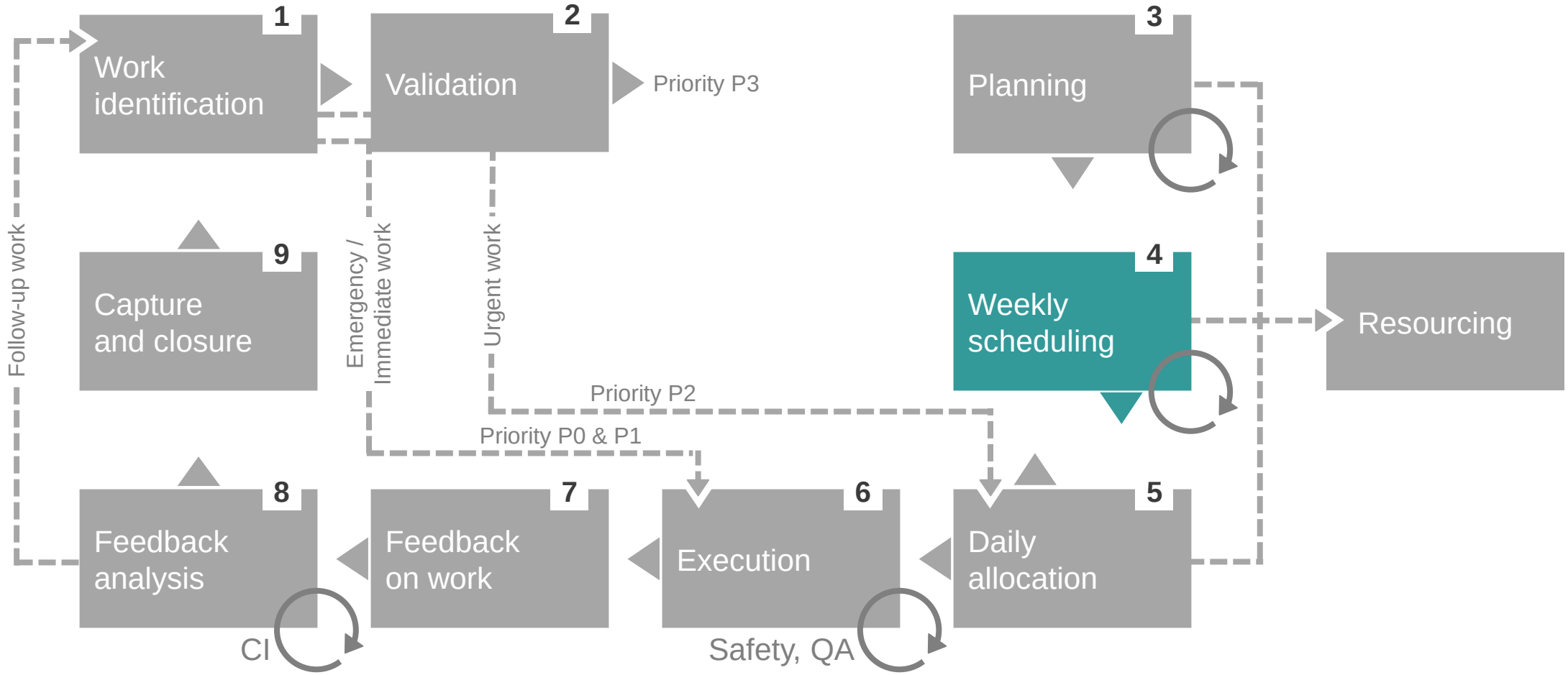
Position in the maintenance work management cycle



The activities for weekly scheduling

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Schedule for the week

Think back to the principles of good scheduling. Answer the following question using the public chat feature.

Why should advanced scheduling be per week and not per day?

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Weekly scheduling activities

Weekly scheduling consists of the following sub-activities:

A. Forecasting work hours of all the sections
B. Sorting work orders
C. Assigning work orders to a weekly schedule

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Scheduling versus allocation

Advanced or weekly **scheduling** means assigning an amount of work orders for a week for a section without setting specific days or times to begin or complete individual work orders.

Daily **allocation** means a section supervisor assigning specific work orders to specific individuals to begin the next day.

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A. Forecasting work hours Activity 1

Estimate available work hours

Use the worksheet on the next slide to illustrate the use of the availability forecast worksheet for a maintenance section working a ten-hour shift. B. Jones, supervisor of section A, has just received the availability forecast worksheet from Planning. The section consists of five people: one boilermaker, one semi-skilled helper, one electrician, one millwright and one apprentice boilermaker. Jones knows that nobody in the section will be in any training next week; however the electrician will be off for two days on leave. Jones considers the current work in progress. The boilermaker's current work order will not be finished today and needs about five hours next week to finish. The millwright has been working on a work order for the past two days and claims it will take five hours next week as well. The apprentice will finish one work order and start another work order today that will also take about five hours next week to finish. The other section members should finish their current work today as well. Jones plans to have them start and finish a new assignment. With this information, Jones estimates the total carry-over work to be five hours of boilermaking, five hours of highly skilled millwright work, and five hours of lesser-skilled apprentice boilermaker work.

1. Start with a trade skill level listing for this specific section.
2. Enter all the quantities for the trades and the hours.
3. Finally, complete the totals line for each type of work hour.

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Activity 1

Estimate available work hours

WORK HOURS AVAILABILITY FORECAST FOR SECTION A OF B. JONES

Trade	Nr			Paid hrs		Leave		Train		Misc		Carry-over		Avail. hrs
Millwright		x40	=		-		-		-		-		=	
Boilermaker		x40	=		-		-		-		-		=	
Fitter		x40	=		-		-		-		-		=	
Electrician		x40	=		-		-		-		-		=	
Apprentice BM		x40	=		-		-		-		-		=	
Semi-skilled helper		x40	=		-		-		-		-		=	
TOTALS		x40	=		-		-		-		-		=	

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The availability forecast worksheet – Activity 2

Estimate available work hours

Join your breakout room and complete the availability forecast worksheet. Download the Excel sheet from the LMS and use it to complete this activity.

Illustrate the use of the availability forecast worksheet for another maintenance section. J. Field, supervisor of section B, has just received the availability forecast worksheet from the scheduler. The section consists of 15 people who work four ten-hour shifts every week. The section has two boilermakers, two fitters, three millwrights, one apprentice boilermaker and two apprentice fitters. Five semi-skilled helpers make up the remaining five employees. Field will forecast the section available work hours from the following information. One of the boilermakers requested two days of leave next week. Three helpers must attend an entire day of classroom training. Section B will have a one-hour safety meeting on Wednesday. After checking on work in progress, Field makes an estimate for carry-over work. Carry-over work will consist of two days of welding, which will require a boilermaker and a helper, one day of apprentice fitter work, one day of fitter work, one day of skilled millwright work, and another day of less-demanding helper work.

1. Start with a trade skill level listing for this specific section.
2. Enter all the quantities for trades and the hours.
3. Finally, complete the totals line for each type of work hour.

Download the spreadsheet from the LMS to complete the Forecasting Work Hours activity.

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Activity 2

Estimate available work hours

WORK HOURS AVAILABILITY FORECAST FOR SECTION A OF J. FIELD

Trade	Nr				Paid hrs		Leave		Train		Misc		Carry-over		Avail. hrs
Millwright		x	40	=	0	-		-		-		-		=	0
Boilermaker		x	40	=	0	-		-		-		-		=	0
Fitter		x	40	=	0	-		-		-		-		=	0
Electrician		x	40	=	0	-		-		-		-		=	0
Apprentice BM		x	40	=	0	-		-		-		-		=	0
Apprentice FIT		x	40	=	0	-		-		-		-		=	0
Semi-skilled helper		x	40	=	0	-		-		-		-		=	0
TOTALS	0	x	40	=	0	-	0	-	0	-	0	-	0	=	0

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B. Sort the work orders

Sort the work orders

The next step is to apply the sorting rules as per the specifications for your site.

There are four scheduling rules that we will use:

1. Group the work orders by priority.
2. Within each priority grouping, move the tactical work to before the non-tactical work.
3. Within each priority grouping and tactical / non-tactical group, rank by the size of the job (total estimated hours).
4. Across all priority groups, combine work orders that have the same location.

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Sorting work orders Activity 4

Sort the work orders

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration
001	N00	ZE	5	Ad hoc	1 boiler	35	35
002	N01	CP	2	Breakdown	1 app BM	10	10
003	N01	CV	4	FOL	1 elec	38	38
004	N01	FC	2	Breakdown	1 app BM 1 help	7 7	7
005	N01	CP	3	Usage-base	1 app BM 2 help	6 12	6
006	N01	FC	4	Ad-hoc	1 app BM 1 help	15 15	15
007	N01	JC	3	Breakdown	1 millw 1 help	20 20	20
008	N01	JX	4	FOL	1 elec	4	4
009	N01	CP	5	Ad-hoc	1 millw 1 help	2 2	2
010	N01	IF	4	FOL	1 appr BM 1 help	3 3	3
011	N01	CD	3	Ad-hoc	1 millw 1 help	10 10	10
012	N01	BV	2	Breakdown	1 boiler 1 help	8 8	8
013	N01	IF	5	FOL	2 app	6	3

Schedule the following work orders from the backlog. The backlog belongs to Maintenance section A.

The table shows the plant backlog listed by work order number.

FOL = follow-up work (tactical)

Sorting work orders Activity 4

Sort the work orders

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration

Use the table to sort the work orders.

Sorting work orders Activity 5

Sort the work orders

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration
021	N02	BV	2	Breakdown	2 app FIT	6	3
022	N32	UA	4	FOL	2 app FIT	14	7
023	N00	FC	5	FOL	1 app BM 1 help	20 20	20
024	N00	JX	3	Usage-based	1 app FIT 1 help	20 20	20
025	N00	HC	3	Ad-hoc	1 app BM	17	17
026	N00	FC	3	Breakdown	1 boiler	3	3
027	N00	HD	3	Usage-based	1 fitter	2	2
028	N00	HP	2	Breakdown	1 fitter 1 help	8 7	8
029	N00	FW	5	FOL	2 help	12	6
030	N00	HD	5	Breakdown	1 millw 1 help	1 1	1
031	N02	DA	4	Design Improvement	1 millw 1 help	22 20	22
032	N02	ZE	4	FOL	1 help	40	40
033	N00	FC	3	FOL	1 fitter 1 app FIT	14 14	14
034	N00	FC	3	Ad-hoc	1 fitter 1 app FIT	6 5	6
035	N00	KD	2	Breakdown	1 app FIT	20	20
036	N00	FW	2	Breakdown	1 millw 2 help	6 12	6
037	N00	FC	3	Usage-based	1 millw 2 help	4 8	8
038	N31	UZ	3	Ad-hoc	1 app BM 1 help	3 3	3
039	N00	FC	3	Ad-hoc	1 boiler 1 help	2 2	2
040	N02	FD	4	Condition-based	1 boiler 1 help	10 10	10

Download the answer sheet from the LMS and join your breakout room to complete the activity on work order sorting.

Use your single-page decision tool to schedule the following work orders. The backlog belongs to Maintenance section A.

The table shows the plant backlog for section A listed by work order number. FOL = follow-up work (tactical).

Sorting work orders Activity 5

Sort the work orders

Use the tables to sort the work orders.

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration

C. Assigning work orders

Assign the work orders

The final step is to assign the work to each of the trades according to their availability:

- Work orders effectively planned and scoped cannot be split over multiple resources unless specifically planned that way.
- Apply the calculated available hours.
- Balance resources.
- Document assumptions.
- Consider options.

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Assigning work orders Activity 6

Assign the work orders

WO number	Unit	Location	Priority	Type of work	Trade	Estimate hours	Estimate duration
001	N00	ZE	5	Ad hoc	1 boiler	35	35
002	N01	CP	2	Breakdown	1 app BM	10	10
003	N01	CV	4	FOL	1 elec	38	38
004	N01	FC	2	Breakdown	1 app BM 1 help	7 7	7
005	N01	CP	3	Usage-base	1 app BM 2 help	6 12	6
006	N01	FC	4	Ad-hoc	1 app BM 1 help	15 15	15
007	N01	JC	3	Breakdown	1 millw 1 help	20 20	20
008	N01	JX	4	FOL	1 elec	4	4
009	N01	CP	5	Ad-hoc	1 millw 1 help	2 2	2
010	N01	IF	4	FOL	1 appr BM 1 help	3 3	3
011	N01	CD	3	Ad-hoc	1 millw 1 help	10 10	10
012	N01	BV	2	Breakdown	1 boiler 1 help	8 8	8
013	N01	IF	5	FOL	2 app	6	3

Use the work order assignment worksheet to combine the previous forecast for section A and previous backlog sorting for section A into a week's worth of work, the weekly schedule assignment.

Assigning work orders Activity 6

Assign the work orders

Use the work order assignment worksheet to combine the previous forecast for section A and previous backlog sorting for section A into a week's worth of work, the weekly schedule assignment.

WORK HOURS AVAILABILITY FORECAST FOR SECTION A OF B. JONES

WO number														
Millwright														
Boilermaker														
Fitter														
Electrician														
Apprentice BM														
Semi-skilled helper														

WO number														
Millwright	35													
Boilermaker	35													
Fitter														
Electrician	20													
Apprentice BM	35													
Semi-skilled helper	40													

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Scheduling meetings

Scheduling meeting

After creating the draft weekly schedule, a scheduling meeting needs to be conducted to involve all the stakeholders in obtaining agreement on the next week's schedule.

Stakeholders:

- Planner (owner of the meeting)
- Maintenance supervisor
- Production supervisor
- Material planner or material management representative

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Schedule release

Scheduling meeting

After the meeting, the planner makes any modifications to the weekly schedule and circulates to the production and maintenance supervisors.

All related WOs are also released to enable the maintenance supervisor to start allocation.

At this point, the planner is finished with that specific week's work and starts planning the WOs for the week thereafter.

Any problems with any WO now need to be handled by the maintenance supervisor.

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Benefits of scheduling

The most important work for an organisation is sorted and grouped from the backlog and has received the required attention.

Maintenance and Production have a clear and aligned understanding of the maintenance workload aligned for the next week.

An achievable amount of work is awarded to a section and a control tool becomes available for managing productivity.

Together with planning, good scheduling improves productive time (wrench time).

Properly planned work reduces delays during tasks.

Properly scheduled work reduces delays between tasks.

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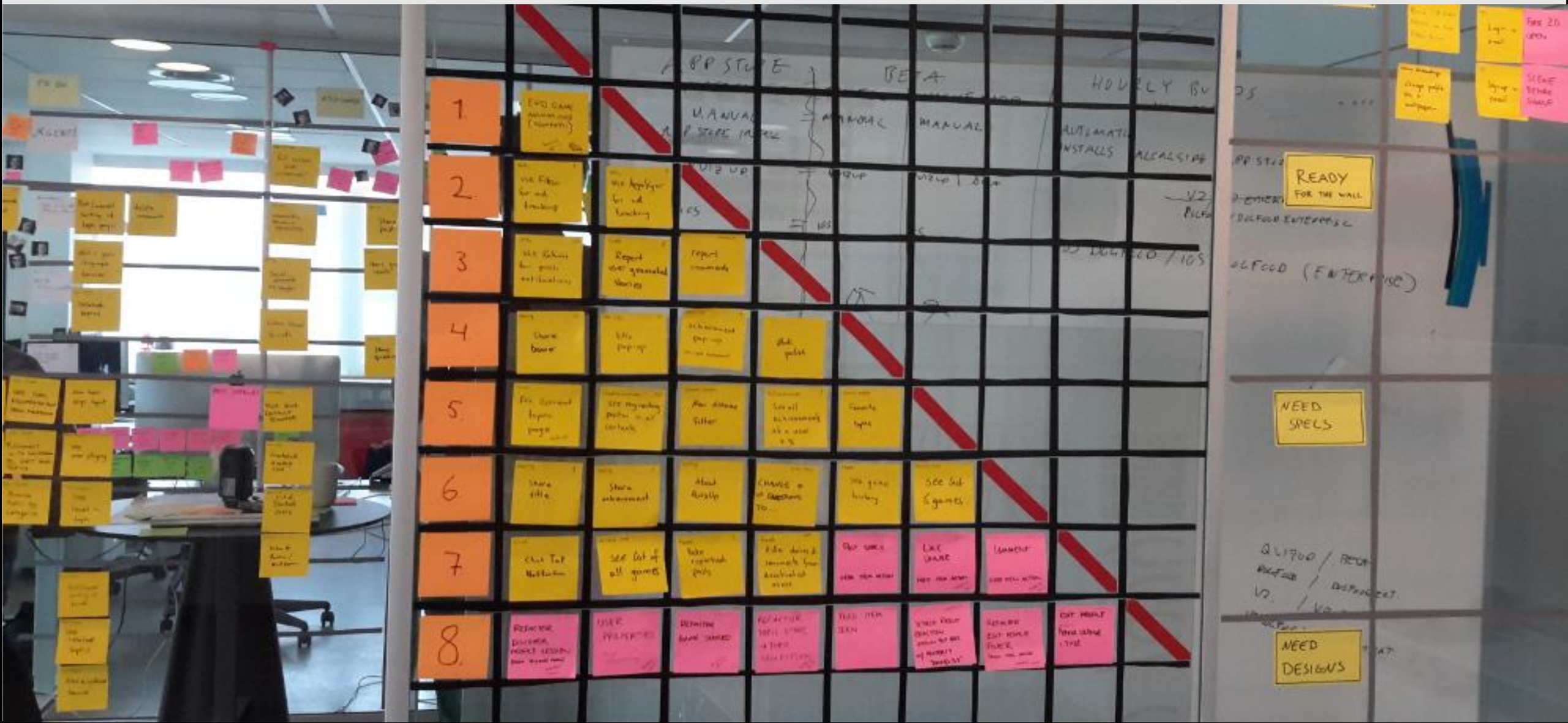
Backlog



The measuring backlog

Backlog management

How do you measure your backlog?

A. Number of hours' work not done

B. Number of work orders not done

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The definition of backlog

Backlog management

Backlog is all work due for the next scheduling period (typically a week) plus overdue work, divided by the available labour capacity to do the work.

Having some amount of backlog is generally acceptable. Having no backlog may be indicative of overstaffing – the idea is not to eliminate the backlog, but to manage it.

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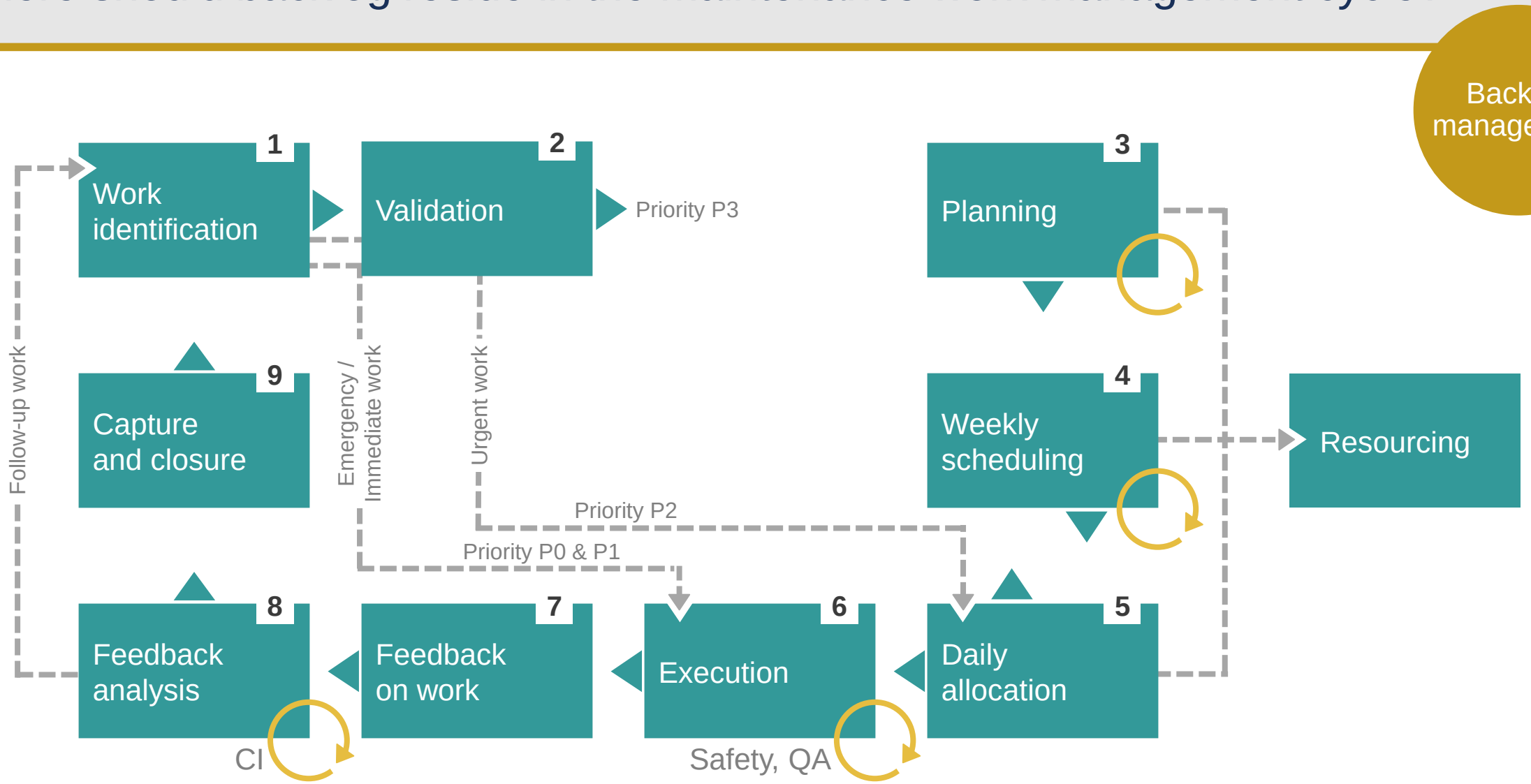
Where should backlog reside in the maintenance work management cycle?



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Position in the maintenance work management cycle

Backlog management

Traditionally, the backlog resides in activities Daily Allocation or Work Execution, where it can become out of control.

Ideally, the backlog should reside between Planning and Scheduling.

Through proper scheduling, the most important work is passed to the supervisor.

The supervisor can then focus on completing the weekly schedule and not get caught up in the backlog.

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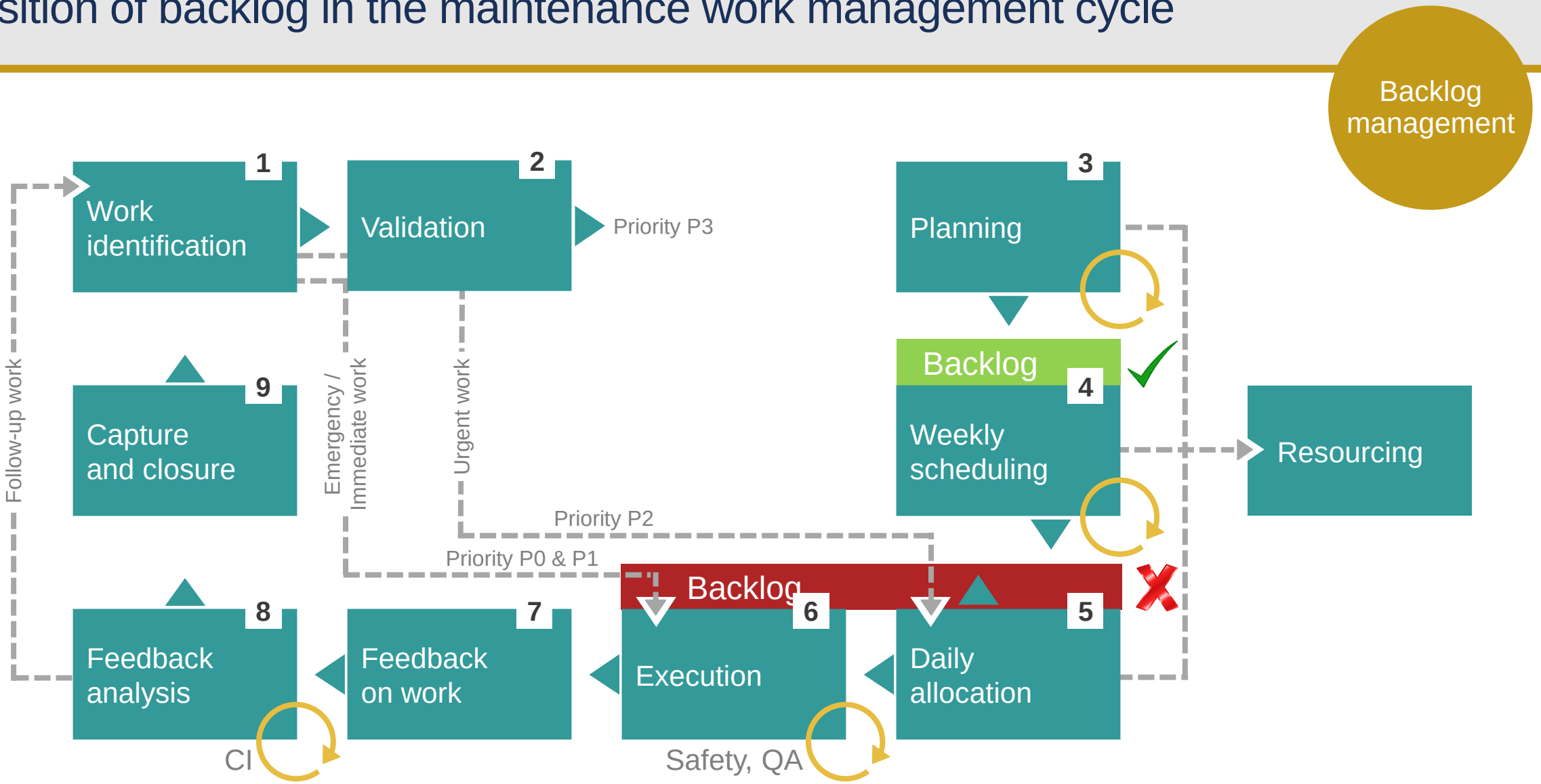
Position of backlog in the maintenance work management cycle



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Taking responsibility for backlog

Backlog management

The responsibility of backlog goes hand in hand with the authority to:

- outsource work
- approve planned overtime
- employ additional resources.

If left unmanaged, the backlog will simply grow out of control.

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Managing the backlog

Backlog management

Good long-term scheduling is essential to ensure that backlog stays under control.

At least on a monthly basis, the responsible engineer (or relevant position) should evaluate the backlog by:

- identifying and grouping WOs that can be outsourced (ideally the non-strategic ones)
- identifying and grouping WOs that can be performed during scheduled overtime
- possibly arranging tradespeople from one section to help another section to reduce the backlog.

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Measuring backlog

Backlog management

For organisations with a low WPC maturity, backlog is normally expressed by the outstanding WO count.

For organisations with a higher WPC maturity, backlog is expressed in time.

All WOs in the backlog therefore need to have estimated work hours for completion.

Backlog measure analogy: if everything stops today, how long will the normal maintenance sections take to complete all the work currently residing in the backlog?

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Measuring backlog

Backlog management

Backlog = 0

There is no work to be done at the current point in time

Backlog = 1 week

Little flexibility during scheduling to sort and group WOs together

Backlog = 2 weeks

1 week due + 1 week outstanding gives you enough flexibility to create a good 1-week schedule for the following maintenance period

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Reflect on the learning objectives of this module

Are you able to:

- describe the concept of scheduling work and explain the different relationships between work and the optimal utilisation of manpower
- prioritise, sort and allocate work for optimal scheduling logistics
- review the priority requirements and schedule work from the backlog
- distinguish between scheduling and daily allocation
- explain the importance of the scheduling meeting and the schedule release
- explain and apply good scheduling practices to achieve optimal benefits for the organisation?

A. Yes

B. No

C. Partially