Planning and Scheduling Basics

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- Master Electrician's license for Delaware in 2002 and Maryland in 2006
- Certified Reliability Leader certification in 2019
- Certified Educational Facilities Professional in 2020
- Certified Maintenance & Reliability Professional in 2021
- Previously held NABCEP certification for Solar Installation from 2009-2013
- 10 years of functional Maximo experience

Learning Lessions

SOME TARGETED GOALS AROUND YOUR PLANNING AND SCHEDULING FROM WEEK TO WEEK

CONTROL YOUR BACKLOG BY USING THE METHODS DESCRIBED TO GARNER PLANNING AND END USER SUPPORT

IDENTIFY WAYS TO GAIN THE MOST PRECIOUS OF COMMODITIES IN MAINTENANCE & RELIABILITY

TIME

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A Good Way to Look at Planning & Scheduling

Planning
reduces delays
during jobs

Scheduling
reduces delays
between jobs

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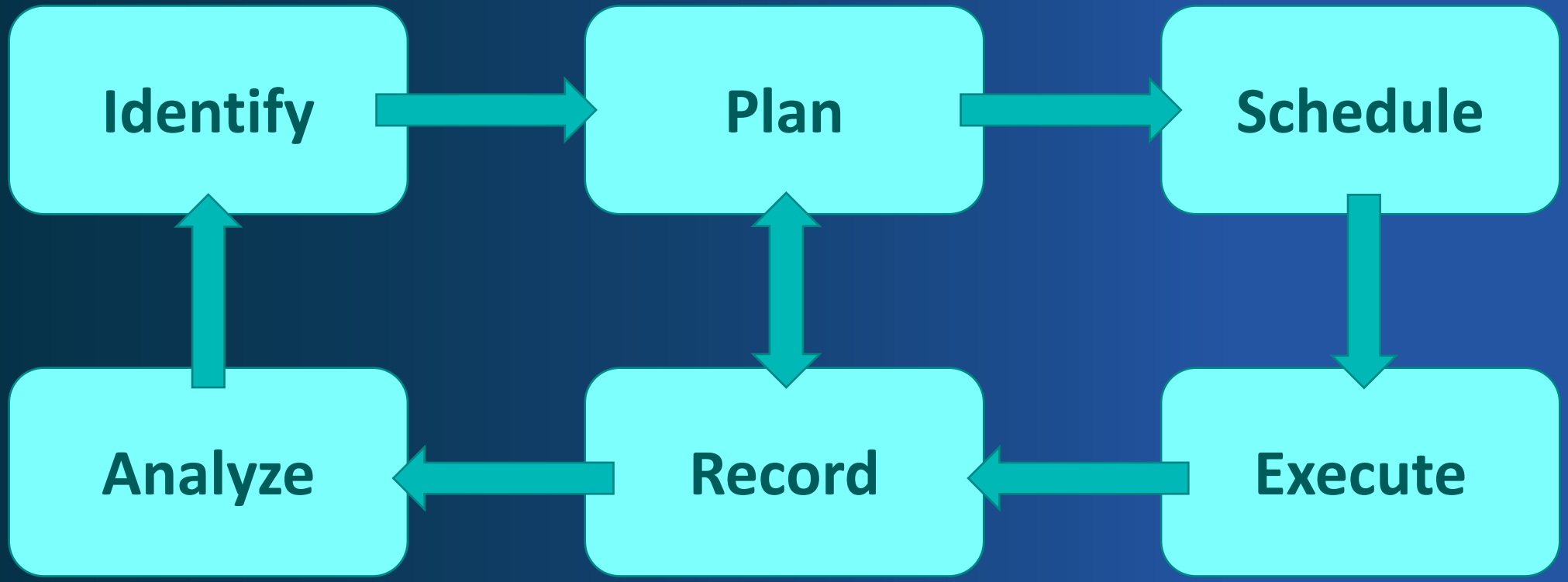
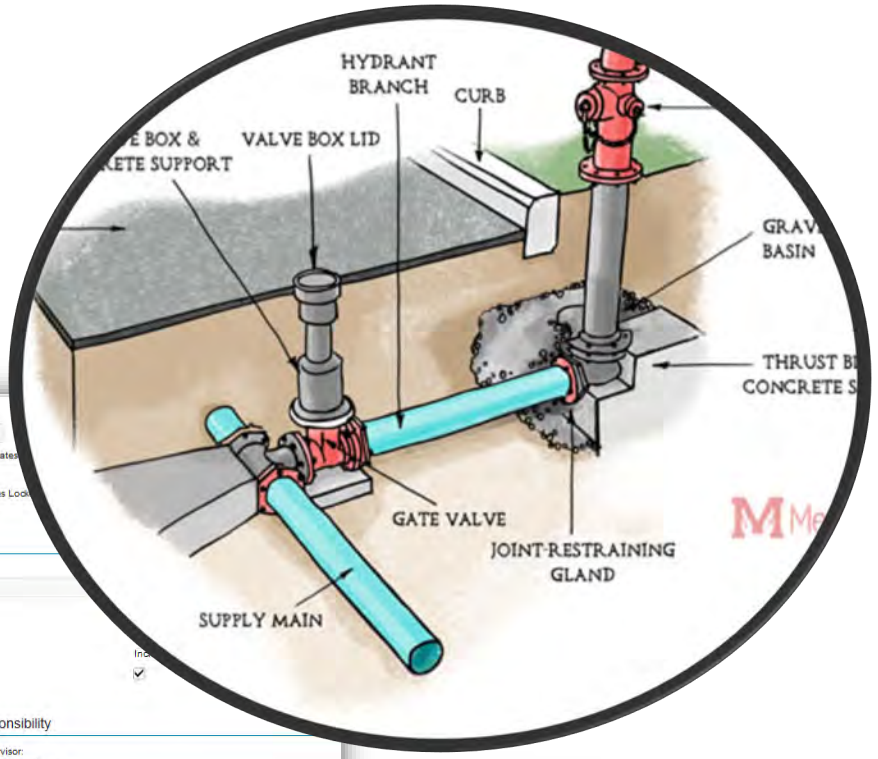
Maintenance Lifecycle

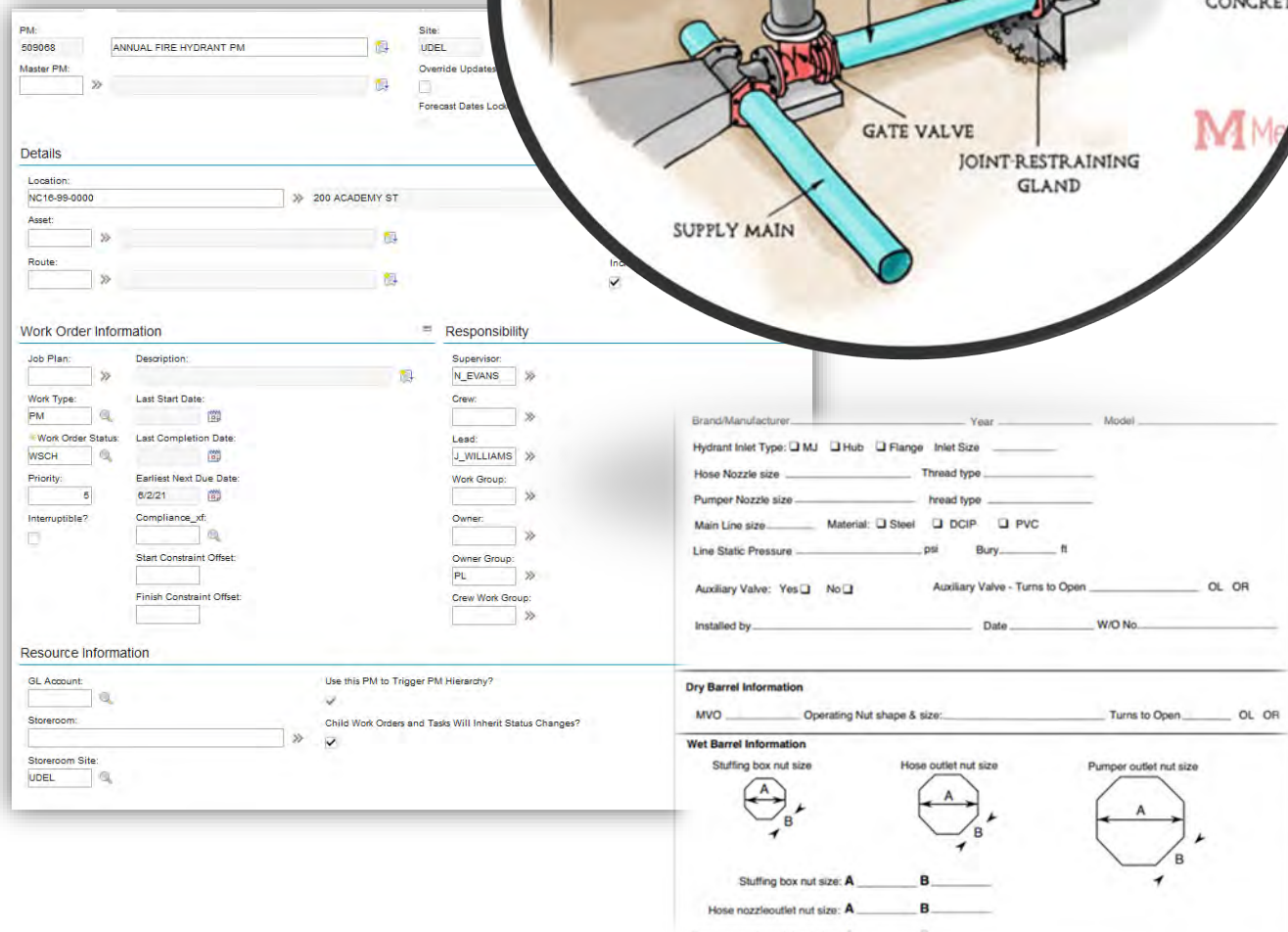


Identify

Get the information about the needs and what it will take to do the work

- Location
- Persons involved (contact info)
- Safety needs
- Specialty equipment needs
- Actual work needed to accomplish the task(s)





Plan

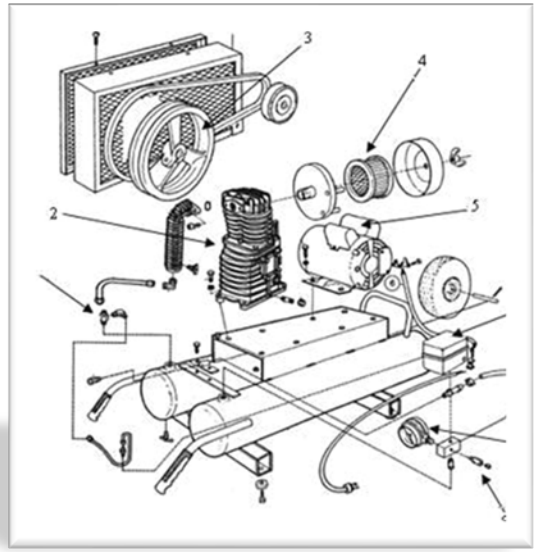
From the identified information develop a plan of attack on how the work should be performed.

- Step by step tasks or directions
- Material needed to complete the work
- Tools needed to complete the work
- Specialty equipment procurement
- Number of hours and technicians needed to complete the work
- Proposed schedule

1. Ensure unit is off and disconnect from the power source
2. Ensure compressor is on a flat and level surface
3. Remove fill cap / plug
4. Place collection container underneath the oil drain cap.
5. Remove the oil drain cap, and let the oil drain out.
6. Replace the oil cap and be sure to tighten this nut securely. White plumbers tape (PTFE) is generally a good idea to help create a tighter seal. Fill crankcase with appropriate oil, be sure it does not exceed the halfway point.

Checking the air filer element
For the more common reciprocating air compressors.

1. Ensure unit is off and disconnect from the power source
2. Allow compressor pump to cool off.
3. Unscrew the filter top from the filter base by turning (generally) counter-clockwise.
4. Separate the filter top cover from the base.
5. Remove the element from the filter base
6. Blow out dust and debris from the filter element.
7. Replace element if needed.
8. Reconnect filter top to the base and secure filter.



General Preventive Maintenance Schedule				
Procedure	**Daily**	**Weekly**	**Monthly**	**Annually (200 Hours)**
Check Pump Oil Level	X			
Oil Leak Inspection	X			
Drain water in tank	X			
check for weird noise and vibration	X			
Inspect all air leaks	X			
Inspect belts	X			

Job Plan Details

JP10067: AIR COMPRESSOR - ANNUAL PM

Organization:	UDORG	**Priority:**	2	**Owner:**	
Site:	UDEL	**Interruptible?:**	N	**Group Owner:**	HVAC
Type:	MAINTENANCE	**Supervisor:**		**Labor Group:**	
Duration:	04:00	**Crew:**			

Job Plan Tasks

Task ID	Description	Duration	Nested Job Plan	Meter Name	Owner	Owner Group
10	CHECK AUTOMATIC DRAIN OPERATION & RECEIVER	00:00				
20	DEENERGIZE UNIT & APPLY LOTO LOCALLY	00:00				
30	REMOVE NECESSARY COVERS, DOORS, GUARDS TO ACCESS	00:00				
40	CHANGE OIL & BELTS(AS NECESSARY OF UNIT)	00:00				
50	CHECK/LUBRICATE SHEAVES, COUPLINGS, BEARINGS AS NEEDED	00:00				
60	CHECK RECEIVER TANK, WELDS, SUPPORTS FOR DAMAGE/WEAR	00:00				
70	CHECK CONDITION OF WIRING & CONNECTIONS, TIGHTEN AS NEEDED	00:00				
80	SECURE NECESSARY COVERS, DOORS, GUARDS REMOVED IN STEP 30	00:00				
90	REMOVE LOTO& RE-ENERGIZE UNIT	00:00				
100	CHECK/CONFIRM REFRIGERANT DRYER IS POWERED, OPERATING, DRAINING AND TEMP IS ACCURATE	00:00				
110	CHECK FOR LEAKS AT COMPRESSOR & PIPING	00:00				
120	IF UNIT IS ON BAS, CONTACT THEM FOR STEP 100 VERIFICATION	00:00				
130	CONFIRM START/STOP, CUT OUT, ALTERNATOR & LAG COMPRESSOR OPERATION	00:00				
140	RETURN UNIT TO STANDARD OPERATION	00:00				

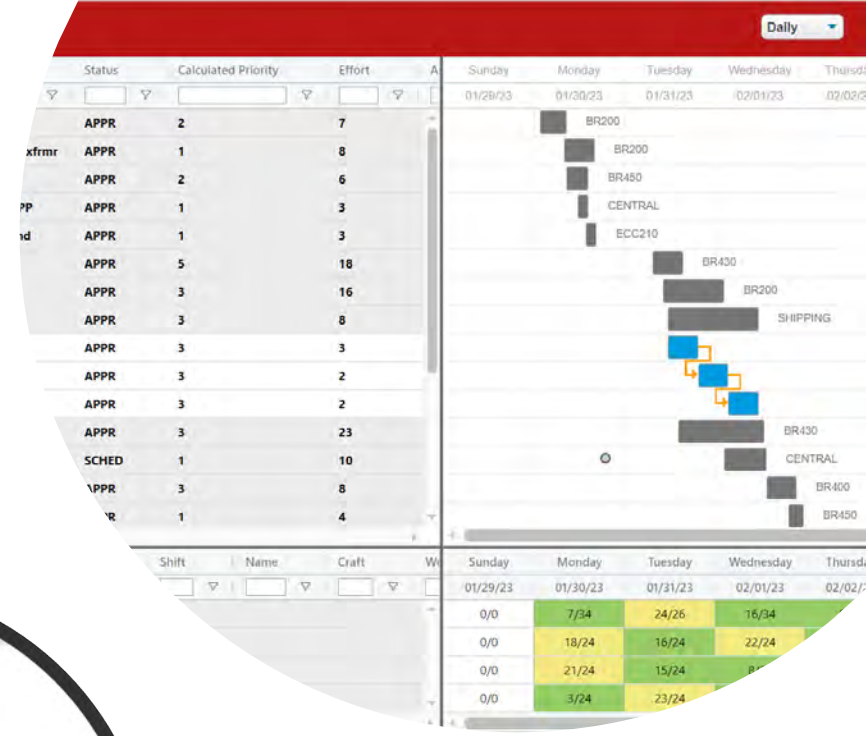
Labor

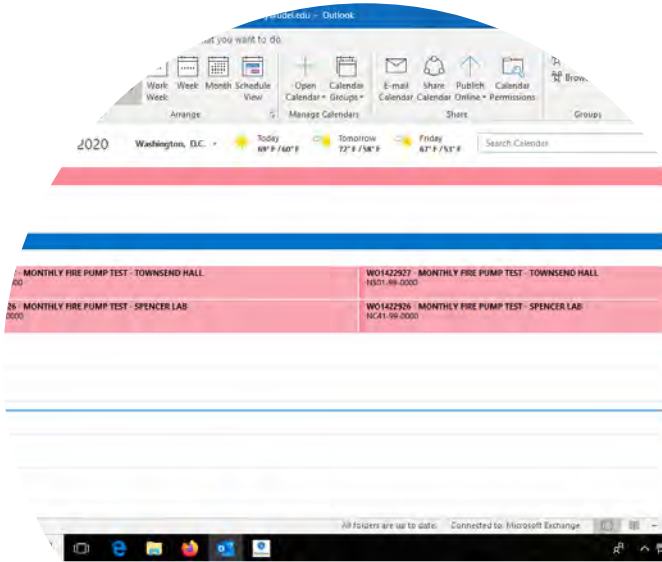
Task ID	Craft	Skill Level	Vendor	Contract	Labor	Qty	Hours	Rate	Line Cost
	HV-CM					1	04:00		

Schedule

Plans have been completed, now we need to schedule the work. Things to consider during this step

- Day & Time
- End user/client availability
- Holidays
- Technician availability (vacation/sick)
- Process timeline/Grant needs
- Time of year
- Weather (work indoors or outdoors)

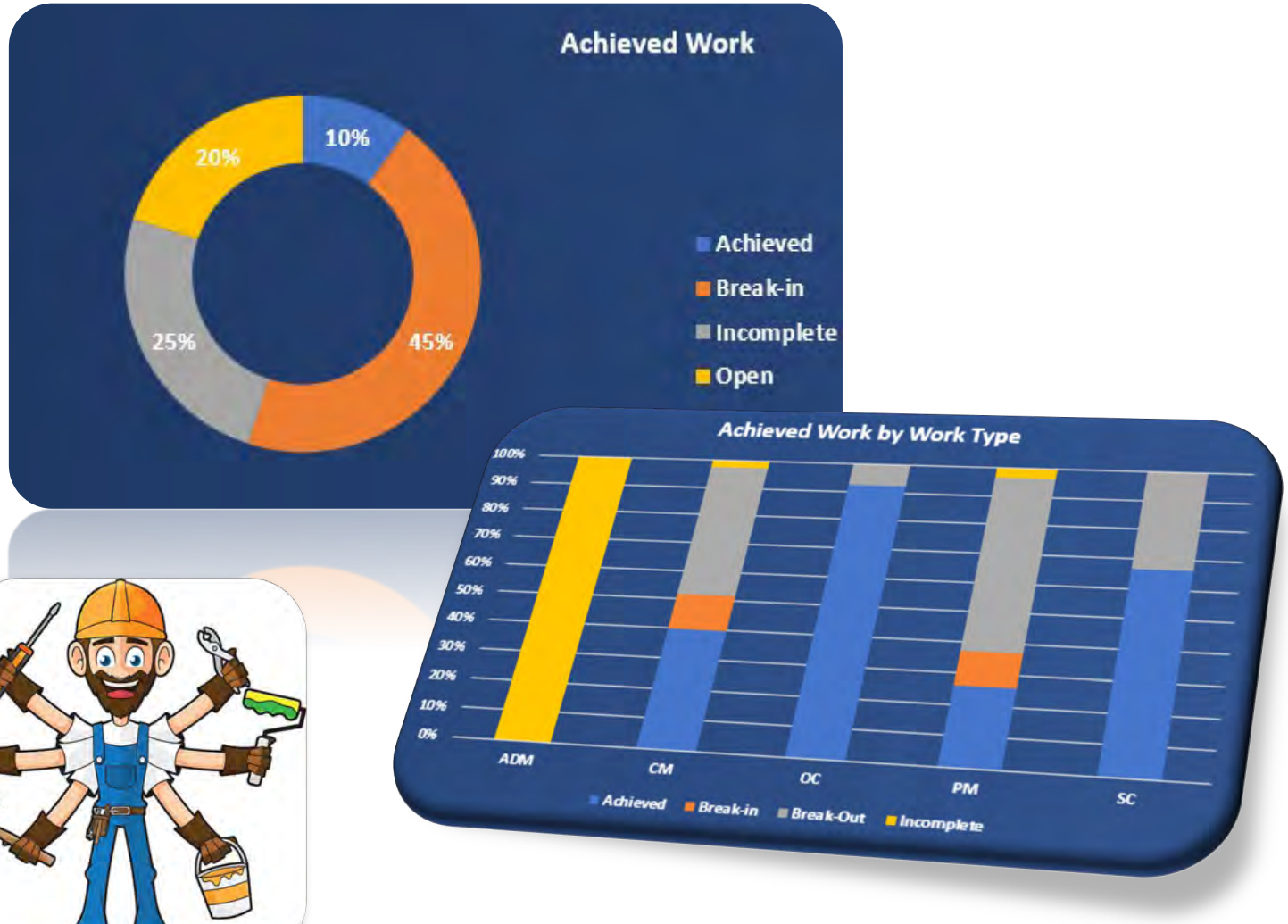




Execute

Time to do the work!! Your technicians are there for this very thing. They are Subject Matter Experts in the work that needs to be completed.

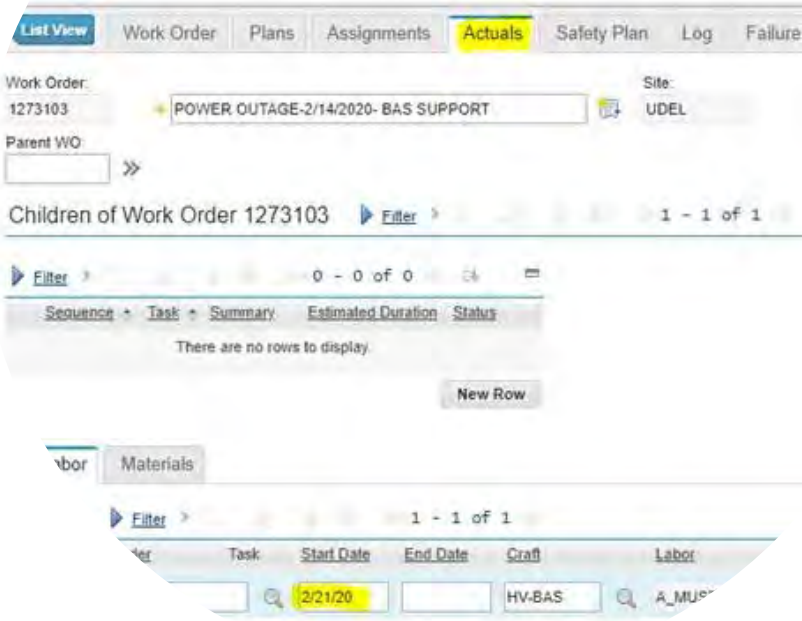
- Empower them to make decisions
- Use their skills to perform the work more effectively
- Take their input into account when planning is good or bad
- Follow up with them on the work and tasks

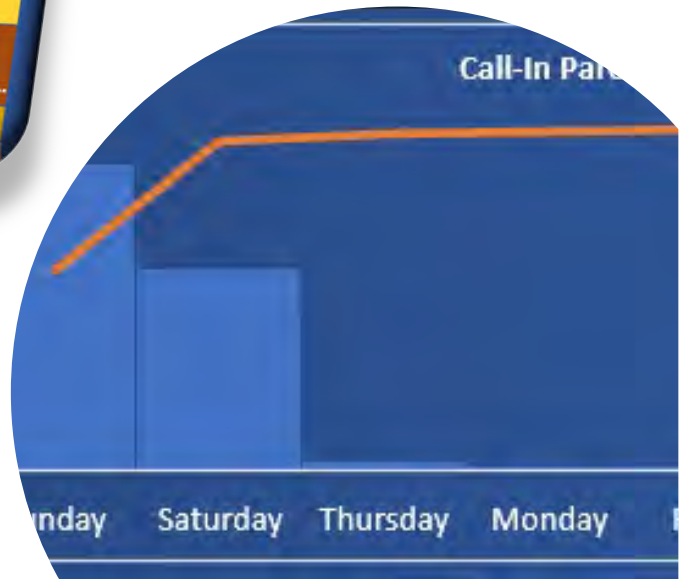


Record

Log notes, failure coding, labor reported, and attachments are a large part of the work being done.

- Tells what was done
- Finds failures during corrective work
- Provides cost accounting
- Estimated vs. Actual hours comparison
- Manufacturer specifications

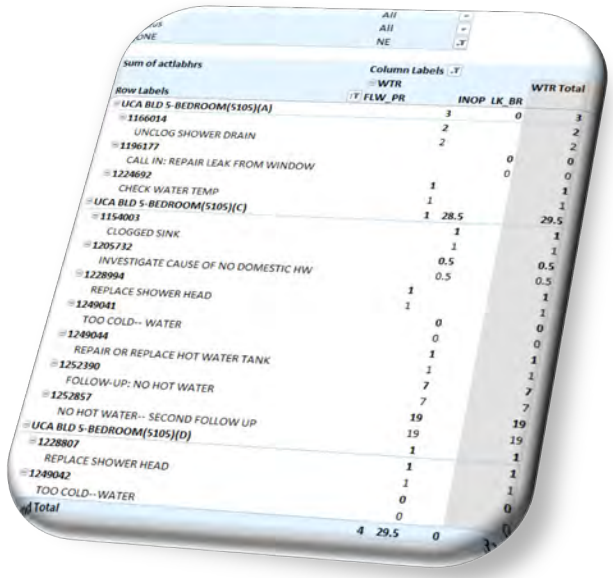




Analyze

Data driven decisions about your asset portfolio aid planning & scheduling.

- Eliminating defects
- Identify manufacturer recommendations
- Cost analysis for plans
- Better alignment of resources
- Continuous improvement



sum of actlabhrs	Column Labels		
	WTR		
Row Labels	FLW_PR	INOP	LK_BR	WTR Total
UCA BLD 5-BEDROOM(5105)(A)		3	0	3
1166014		2		2
UNCLOG SHOWER DRAIN		2		2
1196177			0	0
CALL IN: REPAIR LEAK FROM WINDOW			0	0
1224692		1		1
CHECK WATER TEMP		1		1
UCA BLD 5-BEDROOM(5105)(C)		1	28.5	29.5
1154001		1		1
CLOGGED SINK		1		1
1205732		0.5		0.5
INVESTIGATE CAUSE OF NO DOMESTIC HW		0.5		0.5
1228994	1			1
REPLACE SHOWER HEAD	1			1
1249041		0		0
TOO COLD-- WATER		0		0
1249044		1		1
REPAIR OR REPLACE HOT WATER TANK		1		1
1252390		7		7
FOLLOW-UP: NO HOT WATER		7		7
1252857		19		19
NO HOT WATER-- SECOND FOLLOW UP		19		19
UCA BLD 5-BEDROOM(5105)(D)		1		1
1228807	1			1
REPLACE SHOWER HEAD	1			1
1249042		0		0
TOO COLD-- WATER		0		0
Total	4	29.5	0	33.5

Year	All
Backlog	All
Zone	All
laborcode	All
transtype	All
WW_Ref	All

REQUIRED DAYS FOR BACKLOG	47
# OF MECHANICS	65
IF WORK STOP GENERATING TODAY BACKLOG WOULD BE COMPLETE BY	7/7/2022

127 DAYS REMAINING IN THE YEAR

38 WORK ORDERS — Total Hrs: Plan Hrs 281, Reg Hrs 42, OT Hrs 30, Total Hrs 72, Total Cost $ 2,264.23

workorder wonur	worktype	locations description	workorder description	ownergroup	actfinish	Plan Hrs	Reg Hrs	OT Hrs	Total Hrs	Total Cost
1070707	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - CHILLED WATER SHUTDOWN	PPD	11/10/2020 15:24	16	0	0	0	$ -
1112722	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - STEAM AND CONDENSATE SHUTDOWN	PPD	11/11/2020 10:05	16	0	0	0	$ -
1112723	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - STEAM AND CONDENSATE SHUTDOWN - UPS SHOP SUPPC	UPS	10/10/2019 16:01	1	0	0	0	$ -
1112727	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - STEAM AND CONDENSATE SHUTDOWN - BAS SHOP SUPPC	HV-BAS	8/21/2019 13:30	16	1	4	5	$ 172.24
1165526	RFS	LIFE SCIENCES AND MRI/CBBI-NON-CLASS LAB (F	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR	PPD	11/11/2020 11:34	20	0	0	0	$ -
1165527	RFS	LIFE SCIENCES AND MRI/CBBI-NON-CLASS LAB (F	LOTO - ELECTRICAL SHUTDOWN - EL SHOP SUPPORT	EL	10/14/2019 11:46	2	0	0	0	$ -
1180299	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR	PPD	11/11/2020 13:06	16	2	3	5	$ 158.20
1180301	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - EL SHOP SUPPORT	EL	10/22/2019 13:51	4	0	0	0	$ -
1192010	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR	PPD	11/11/2020 13:13	16	2.5	0	3	$ 79.10
1192011	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - EL SHOP SUPPORT	EL	11/1/2019 16:06	2	1	0	1	$ 31.64
1215303	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR	PPD	11/11/2020 16:04	16	0	0	0	$ -
1215304	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - EL SHOP SUPPORT	EL	12/6/2019 15:44	16	0	0	0	$ -
1225320	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - CHILLED WATER SHUTDOWN - CONTRACTOR	PPD	11/11/2020 16:12	9	0	0	0	$ -
1225321	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - CHILLED WATER SHUTDOWN - HVAC SHOP SUPPORT	HVAC	6/5/2020 12:37	9	0	0	0	$ -
1231483	NCAP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR	PPD	11/11/2020 16:20	16	0	0	0	$ -
1231484	NCAP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - EL SHOP SUPPORT	EL	2/21/2020 9:09	1	0	0	0	$ -
1259126	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - SHUTDOWN AT EXTERIOR TRANSFORMER - CONTRACTOR !	PPD	11/12/2020 10:27	1	0	0	0	$ -
1259128	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - SHUTDOWN AT EXTERIOR TRANSFORMER - EL SHOP SUPPC	EL	2/21/2020 9:09	1	12	4	16	$ 506.24
1259129	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - SHUTDOWN AT EXTERIOR TRANSFORMER - ER SHOP SUPPI	ER	2/6/2020 13:43	8	0	0	0	$ -
1269298	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - SHUTDOWN AT EXTERIOR TRANSFORMER - ER SHOP SUPPI	ER	3/2/2020 13:37	8	0	3	3	$ 87.93
1269442	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - FIRE SPRINKLER SHUTDOWN - CONTRACTOR SUPPORT	PPD	11/12/2020 10:32	3	0	0	0	$ -
1269443	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - FIRE SPRINKLER SHUTDOWN - ER SHOP SUPPORT	ER	2/19/2020 13:56	2	0	0	0	$ -
1272642	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - CONTRACTOR SUPPORT	PPD	11/12/2020 11:12	16	0	0	0	$ -
1272643	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - HVAC SHOP SUPPORT - 02/17/2(	HVAC	2/18/2020 6:34	8	3	0	3	$ 82.65
1272644	CAPP	LIFE SCIENCES AND MRI/CBBI	LOTO - ELECTRICAL SHUTDOWN - HV-BAS SHOP SUPPORT - 02/17/	HV-BAS	2/26/2020 13:36	8	0	3	3	$ 105.45

Increase your workforce without hiring??

The Leverage of Planning

3 Technicians without any “planning”

3 x 35% = 105%

Benefits of Planning & Scheduling

You will be able to realize a planning and scheduling strategy by seeing the benefits of using this valuable resource for extra TIME!

- Doc Palmer, “Maintenance Planning & Scheduling Handbook, 4th Ed”, 2019

Increase your workforce without hiring??

The Leverage of Planning

1 Planner with 2 Technicians

1 x 0% + 2 x 55% = 110%

Benefits of Planning & Scheduling

Good Ratio for
Planner to Technician
1 : 20-30

Productivity Factor
55% / 35% = 1.57
(57% improvement)

30 technicians x 1.57 =

47 technicians worth of work

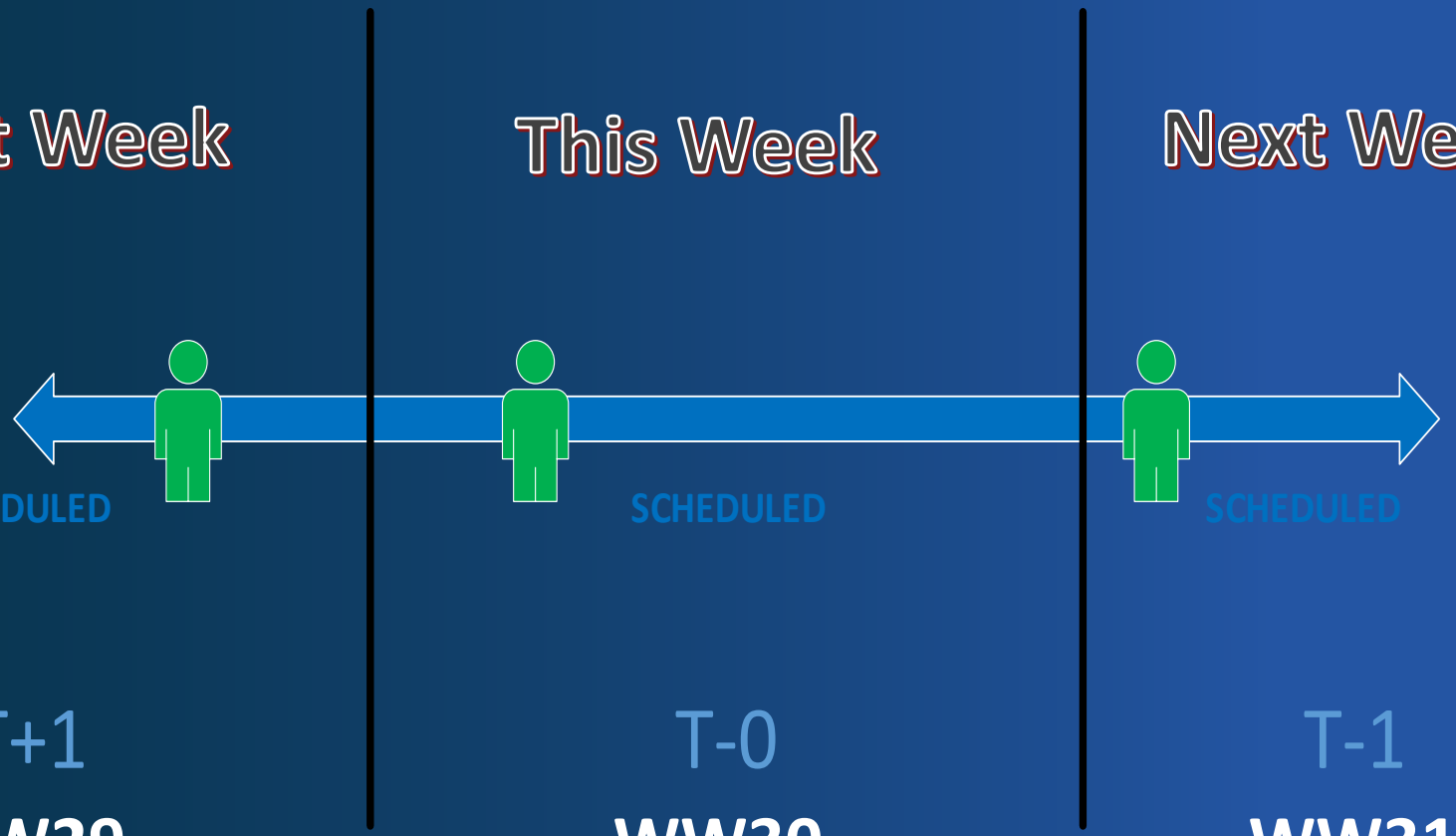
Scheduling Meetings

❑**Last week's work and complete vs. incomplete**
- Did the mechanics complete their portion and not change status?
- Does work need to be rescheduled in the current week or further out?

❑**This week's work**
- Do we feel we can achieve it?
- Does anything need to be moved due to break-in work pushing? Identify those and input log notes to the effect
- Have the hours been input from the mechanics? Are there any that need review?

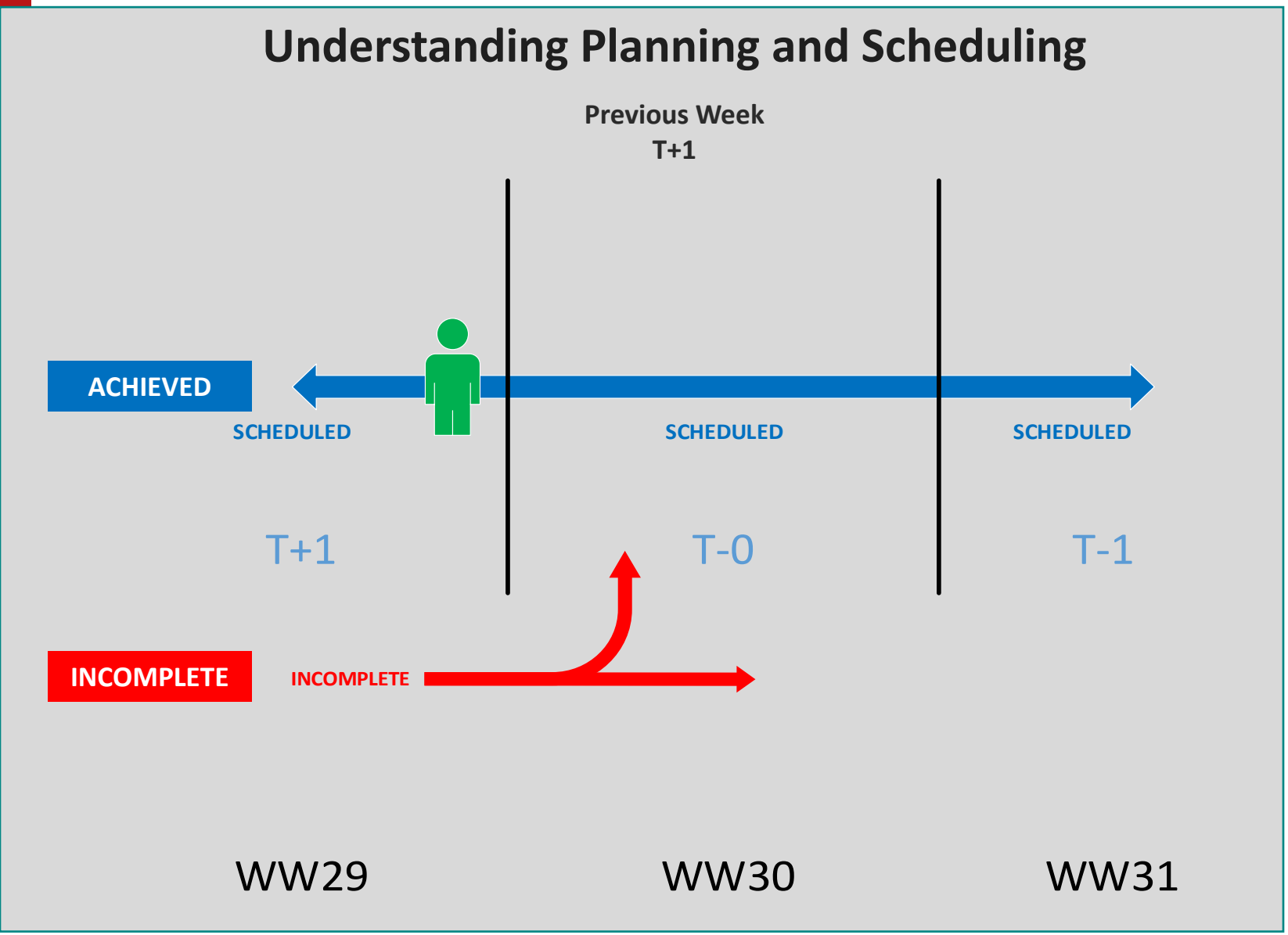
❑**Next week and beyond**
- Work within the remaining backlog to identify barriers, material needs, reschedules, etc.

A Work Week Explained



Planning & Scheduling Terms

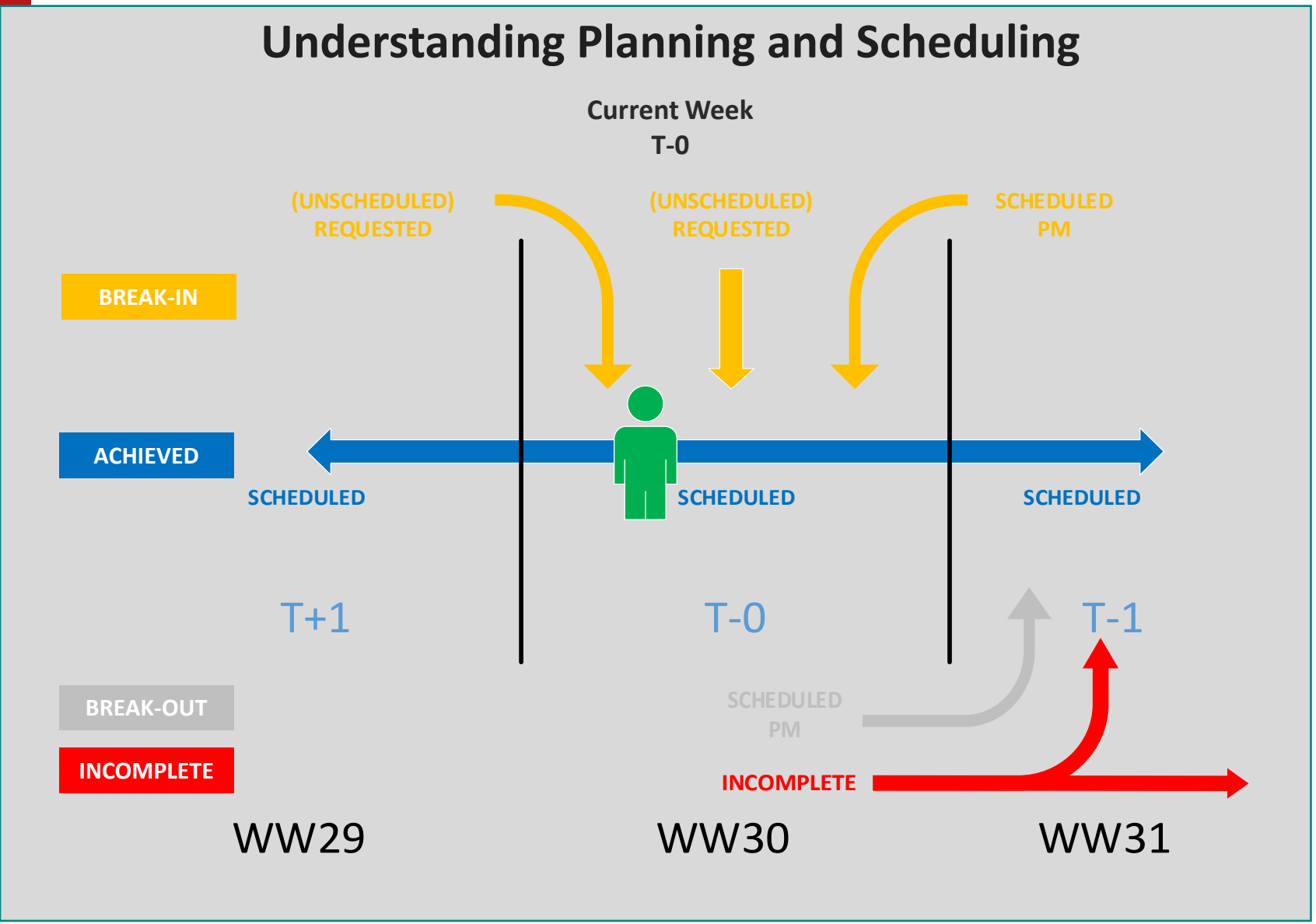
BREAK-IN	Work completed within the work week that was not scheduled previously or within the work week
ACHIEVED	**Work that was planned & scheduled for the current work week and completed in that work week**
BREAK-OUT	Work completed that was planned & scheduled in a particular work week and put into another work week without being rescheduled
INCOMPLETE	**Work that was planned & scheduled for the current work week and not completed in that work week**



Previous Work Week

Your schedule was planned, however, like anything else there were barriers you came across.

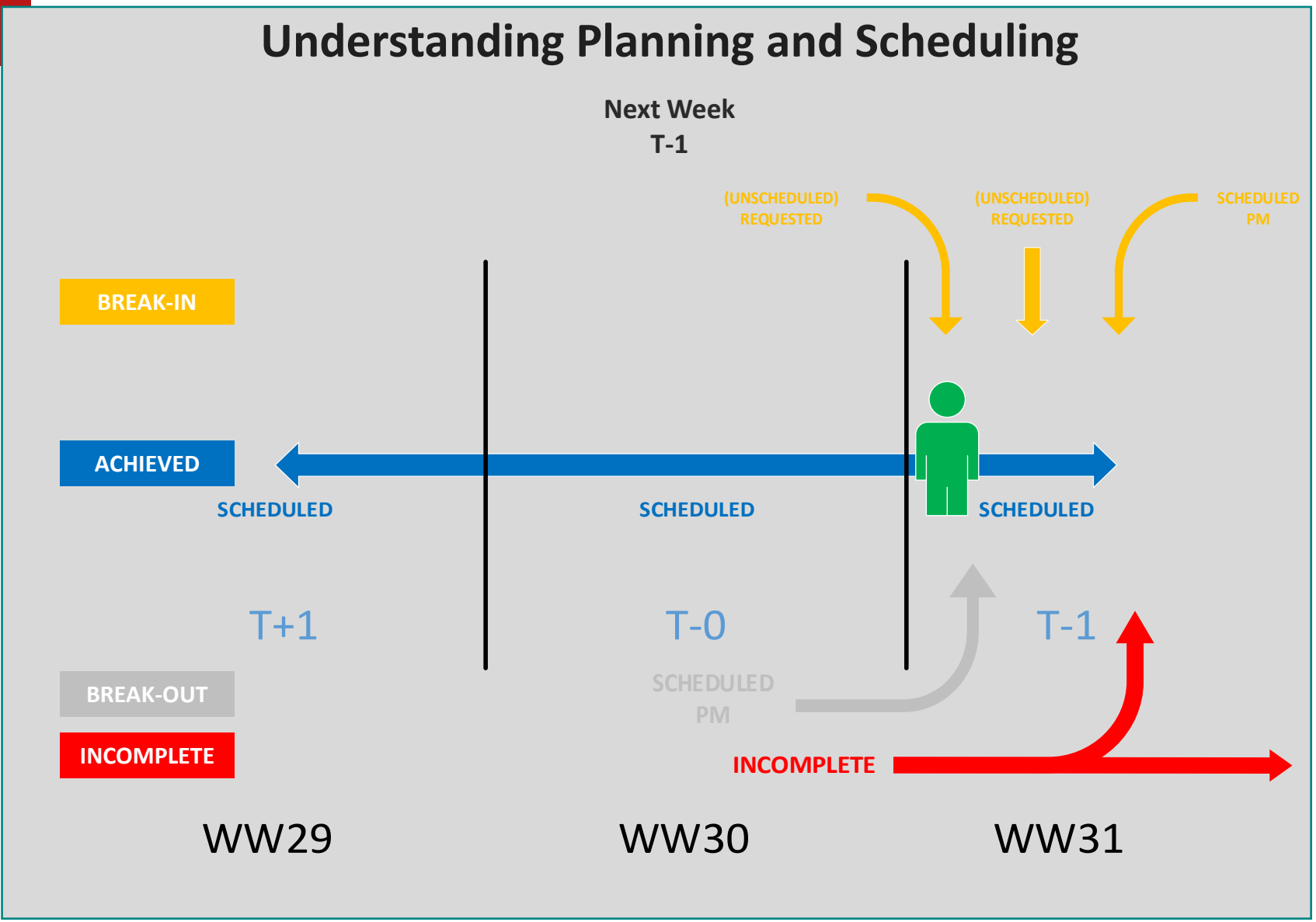
How to deal with them and coordinate your work for future weeks is within the P&S Strategies you will need to setup.



Current Work Week

Planned Work aligns your strategies.

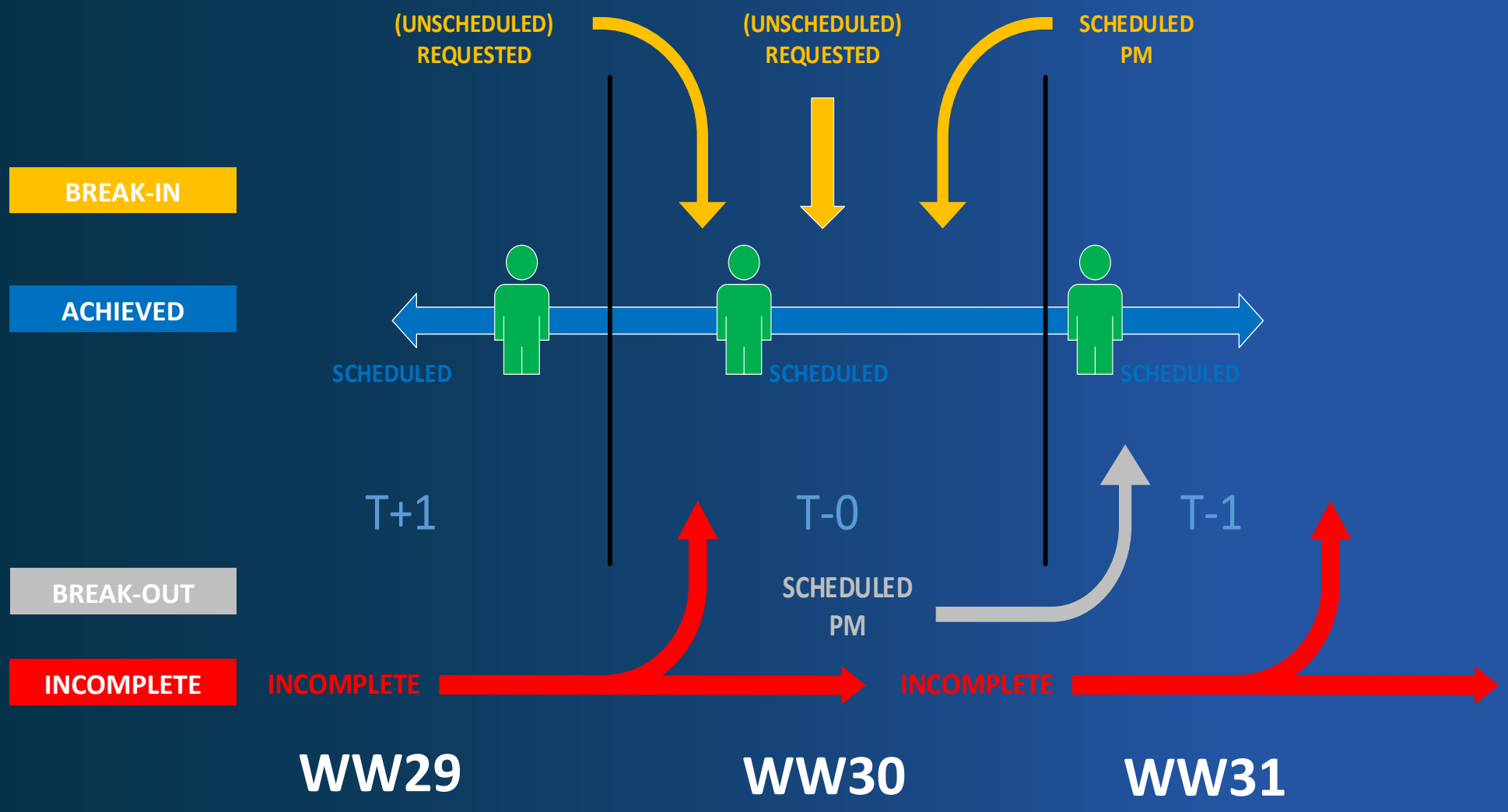
Break-in work destabilizes those strategies. Remember however that is ok and will give you a means to talk to improvement as you progress.



Next Work Week

As with the current work week you will have planned for the forecasted weeks to align your strategies. Like previous week there will undoubtedly be some of the same hurdles.

There is no true way to remove ALL reactive work, but you can mitigate with strategy.



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Understanding Planning and Scheduling

Don’t forget to ANALYZE!

Where does the analysis take place?

Scheduling Meetings

Engineering

Learning Lessons

SOME TARGETED GOALS AROUND YOUR PLANNING AND SCHEDULING FROM WEEK TO WEEK

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THANK YOU FOR YOUR TIME!

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Questions?

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