Making Everything Easier

TRUST ME I'M A SURGEON

WRRRRRRRRRRR
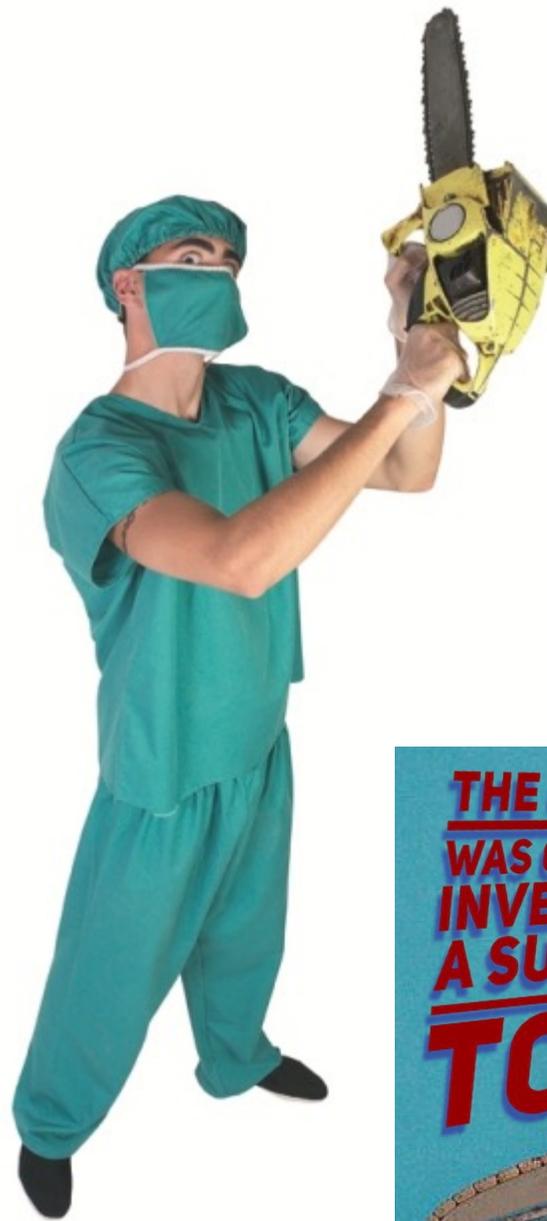
THE CHAINSAW WAS ORIGINALLY INVENTED AS A SURGICAL TOOL

In 1780!

A Reference for the Rest of Us! FREE eTips at dummies.com

Legal Disclaimer

Do NOT try liver transplantations at home!

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Unfortunately….
First few didn't go well…

Please buy our books so we can pay our lawyers….

But we quickly improved...

With some help!

Making Everything Easier

Schedule Analysis

FOR

DUMMIES

How to quickly & easily assess
project performance
If you aren't Robin or Michelle

© Dmitry Kann, yktoo.com

Reality….

- Our perspective
  - <u>Experienced</u> project managers know if their project has a few issues….
    - Few know how bad
    - Or want to admit it
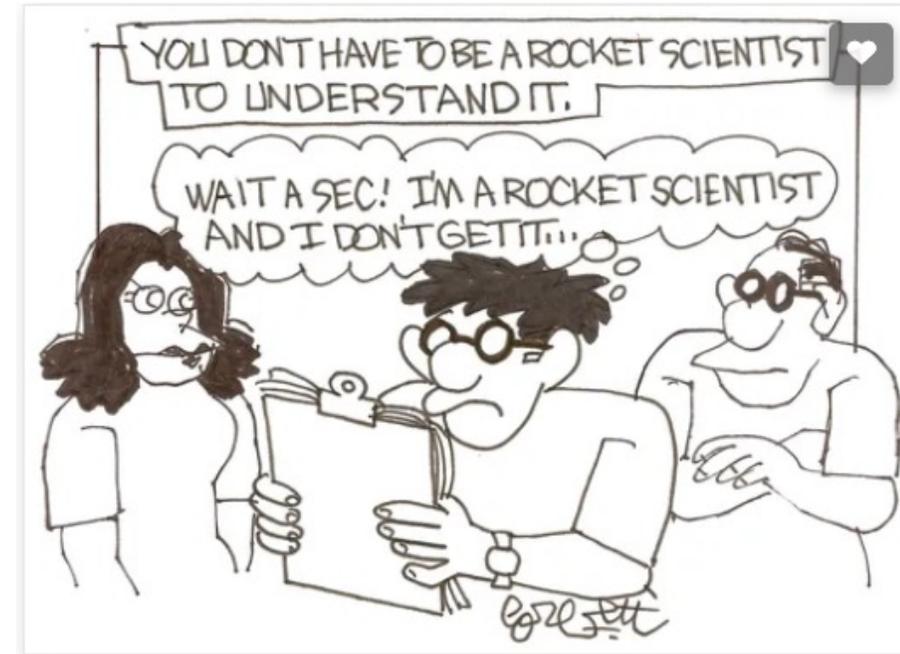   - Hope for miracle…

"I see all this data and I see all these reports, and I hear you, but I don't understand our status"
Mark Geyer, former Orion project manager

Schedule Health Check Results

- Analyst: I ran a health check on schedule

- Manager: Ok… what is this telling me?

- Analyst: The schedule is bad!

- Manager: Sooo… What is this telling me?

- **Analyst: Well…..**

							DCMA 14 Point										
1. Logic	2. Leads	3. Lags	4. SS/FF Relations	4. SF Relations	5. Hard Constraint	6. High Float	7. Negative Float	8. High Duration	9. Invalid Forecast Dates	9. Invalid Actual Dates	10. Resources	11. Missed Activities	12. Critical Path Test	13. CPLI	14. BEI	Score
0	0	640	1443	0	0	1,929	0	70	3	0	492	61	N/A	1	1.12	27
0%	0%	11%	25%	0%	0%	73%	0%	3%	0%	0%	19%	2%				

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DCMA 14-Point Assessment Metric Descriptions

Defense Contract Management Agency (DCMA) 14-Point metrics look only at activities that are baselined with a duration > 0d. Two exceptions are Critical Path Test & BEI. In accordance with DCMA guidelines so as not to consider activities that have not been approved to be baselined. Best practices broken down into list of 14 checks:

Field	Description
Logic	Incomplete tasks with missing logic links or links that don't make sense. Number of tasks without predecessors and/or successors should not exceed 5%. Formula: Missing Logic % = (# of tasks missing logic / # of incomplete tasks) x 100.
Leads	Incomplete tasks with logic links with leads (negative lag) in predecessor relationships. Ideally, there should not be any leads as they distort total float. Formula: Leads % = (# of logic links with leads / # of logic links) x 100.
Lags	Incomplete tasks with lags in predecessor relationships. Lags shouldn't exceed 5%. Formula: Lags % = (# of logic links with lags / # of logic links) x 100.
Relationship Types	Incomplete tasks containing each relationship type. Because Finish-to-Start (FS) relationship is most logical, it should account for at least 90% of relationship types being used. Check counts uses number of Start-to-Start (SS), Finish-to-Finish (FF) & Start-to-Finish (SF) relationship types to work out % of Finish-to-Start (FS) relationship types. Formula: % of FS Relationship Types = (# of logic links with FS Relationships / # of logic links) x 100.
Hard Constraints	Number of hard constraints used in incomplete tasks. Hard constraints may prevent schedule from being logic-driven & should be used sparingly. Tasks with hard constraints shouldn't exceed 5%. Formula: Hard Constraint % = (Total # of incomplete tasks with hard constraints / Total # of incomplete tasks) x 100.
High Float	Metric counts incomplete tasks with total float greater than 44 working days. May indicate missing predecessors / successors. Formula: High Float % = (Total # of incomplete tasks with high float / Total # of incomplete tasks) x 100.
Negative Float	Metric counts incomplete tasks with total float less than 0 working days. These tasks should have an explanation & corrective action plan. Formula: Negative Float % = (Total # of incomplete tasks with negative float / Total # of incomplete tasks) x 100.
High Duration	Metric looks at incomplete tasks with baseline duration greater than 44 working days & baseline start date within detail planning period or rolling wave. This helps determine if tasks can be broken into two or more tasks or leave it as single task. Number of tasks with higher duration should not exceed 5%. Formula: High Duration % = (Total # of incomplete tasks with high duration / Total # of incomplete tasks) x 100.
Invalid Dates	Metric looks at incomplete tasks that have no actual dates in future beyond status date & no forecast dates in past before status date. There should not be any invalid dates in schedule.
Resources	Metric reports on all tasks with durations greater than zero & have currency or hours assigned. Some projects may not have resources loaded directly into schedule. If they are loaded into schedule, then this metric uses following formula to identify missing resources: Missing Resource % = (Total # of incomplete tasks with missing resource / Total # of incomplete tasks) x 100.
Missed Tasks	Tasks that have finished late compared to baseline. Helps identify how well schedule is meeting baseline plan & is good check to gauge if project will finish on time. Formula: Missed % = (# of tasks with actual/forecast finish date past baseline date / # of tasks with baseline finish dates on or before status date) x 100.
Critical Path Test	Integrity check of critical path. Metric checks whether introducing a delay into schedule results in projects finish date being equally delayed.
Critical Path Length Index (CPLI)	Gauges if project can realistically be completed on time. Measures ratio of project critical path length plus project total float to project critical path length.
Baseline Execution Index (BEI)	Metric determines how many activities are behind or ahead of schedule against baseline.

Manager Reaction….
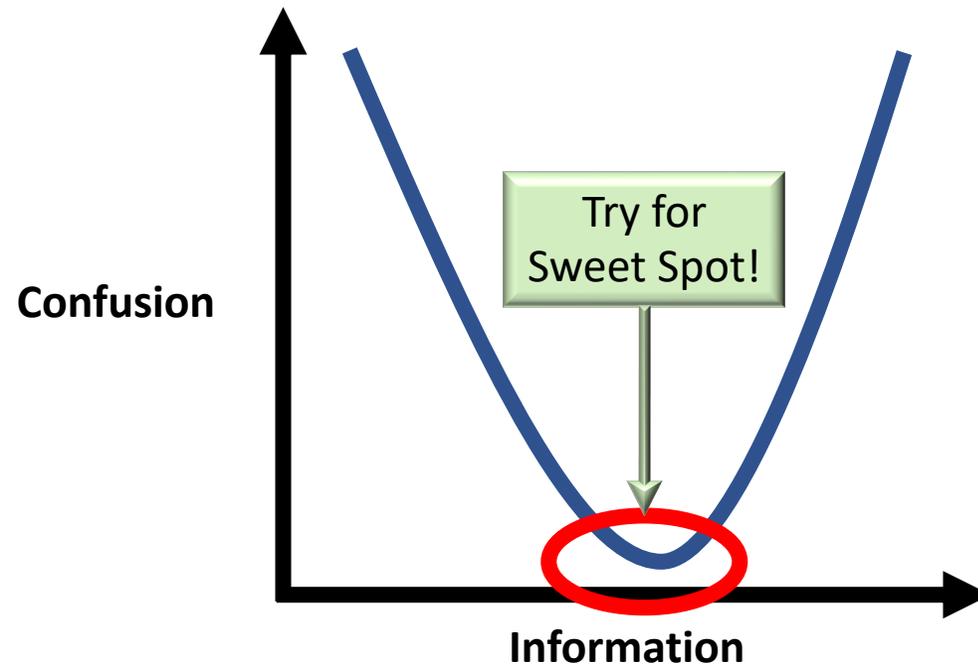
Acumen Fuse Has Many Reporting Capabilities:

Acumen Fuse provides a number of reports, which can be directly published to PDF or Microsoft Office applications:

- **Executive Briefing**: High-level synopsis of overall project status, characteristic descriptions, schedule quality analysis and resolution recommendations.

- **Analyst Report**: In-depth "to-do" list of analysis results, with a detailed view of project quality and schedule strength either over time or by ribbons (activity groupings).

- **Dashboard**: Interactive summary of project status, schedule quality and analysis results, all integrated into a single view. Acumen Fuse dashboard is configurable to simultaneously display multiple metrics options as charts, graphs or gauges.

- **API Custom Reports**: Flexible means of extracting analysis results directly into third-party custom reports or external applications. Acumen Fuse's Application Programming Interface [API] lets the user generate custom reports or publish directly to web-based services and applications, to portals such as Microsoft SharePoint, or to third-party tools such as Crystal Reports.

Most are far to detailed for management

Confusion

Information

Try for
Sweet Spot!

When briefing management too little or too
much information can cause confusion

- Overall Project Status
- Activities Completed
  - Plan v. Actuals
- Tasks
  - Float
  - Added
  - Slipped
  - Started
  - Completed
  - Average Duration

Key Performance Indicators (KPIs) Because NASA Loves Three Letter Acronyms (TLAs)

Clearly This Plan Will NOT Be Met
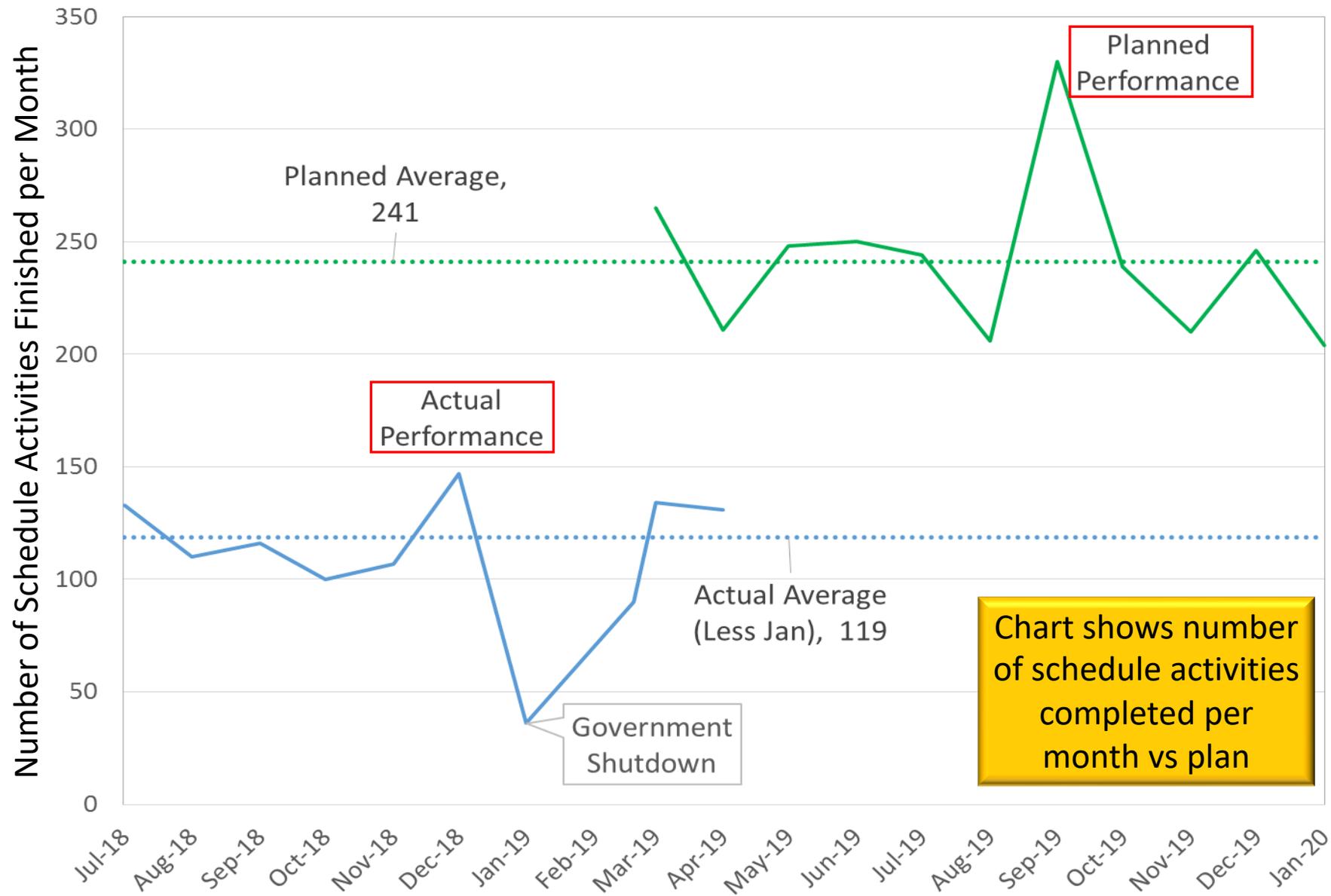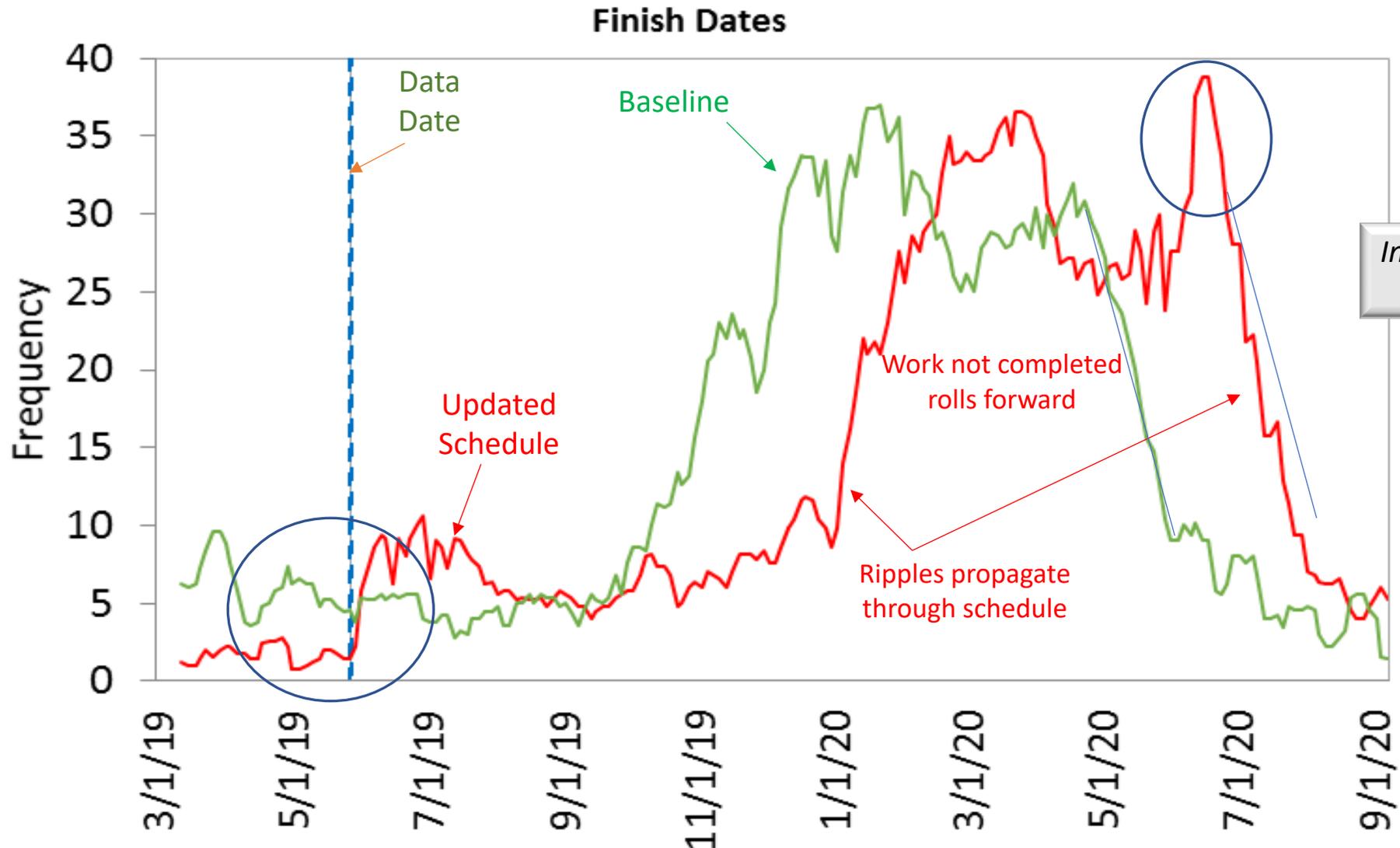

Project behind schedule, which means they should be under budget...

If they aren't it indicates budget issue

Number of Schedule Activities Finished per Month

Planned Average, 241

Planned Performance

Actual Performance

Actual Average (Less Jan), 119

Government Shutdown

Basic chart, very easy to make in Excel

Chart shows number of schedule activities completed per month vs plan

Completion Date Slipped by 1.5 Months in 3 Months

Finish Dates

Similar to previous chart...

Except this chart shows entire project plan

Data Date

Baseline

Updated Schedule

Work not completed rolls forward

Ripples propagate through schedule

Intermediate chart, made in Excel

Schedule contains 2,966 activities and looks at change over 3 month period

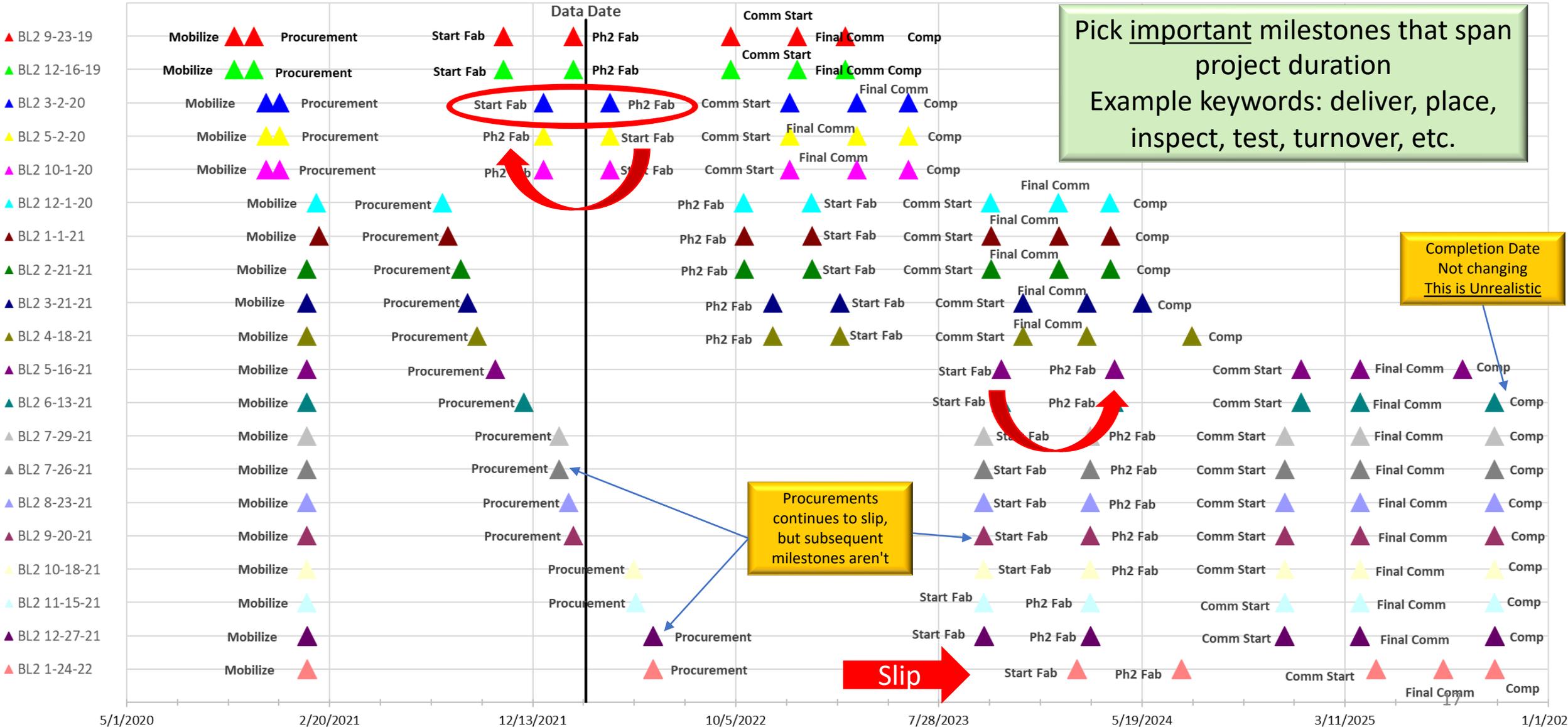Key Milestone Slips
29.6 Months Since Project Award

Advanced Chart, more difficult to make in Excel

Pick important milestones that span project duration
Example keywords: deliver, place, inspect, test, turnover, etc.

Completion Date Not changing This is Unrealistic

Procurements continues to slip, but subsequent milestones aren't

Slip

Project Status

- Basic steps for most projects
  - Design
  - Procure materials
  - Receive materials
  - Fabricate project
  - Integration & Test (I&T) project
- If design is delayed, materials can't be ordered
- If materials aren't ordered, they can't be fabricated
- If materials aren't fabricated, they can't be integrated & tested
- If I&T is not completed project cannot be turned over

Overall Project Status

WBS Name	Entire Project		Remaining Tasks			Completed Tasks		
	All Normal Activities	% of Total	To Go Normal Activities	% of To Go Activities	% of Total	Completed Normal Activities	% of Completed Normal Activities	% of Total
Total	**12,657**	**100%**	**5,551**	**100%**	**44%**	**7,109**	**100%**	**56%**
Reporting Level	33	0.3%	-	0%	0.0%	33	0%	0.3%
Design	7,946	63%	2,149	39%	17%	5,803	82%	45.8%
Procurement	1,049	8%	223	4%	2%	822	12%	6.5%
Material	487	4%	136	2%	1%	351	5%	2.8%
Fabrication	2,658	21%	2,564	46%	20%	95	1%	0.8%
Commissioning	484	4%	479	9%	4%	5	0%	0.0%

By checking status of initial steps, the overall project status can be assessed

Schedule Float Summary

- Low Free Float indicates high probability that schedule will slip
  - **Total float** = days activity can be delayed without **delaying overall project duration**. Total float is shared between activities in a sequence.
  - **Free float** = days activity can be delayed without **delaying early start of any immediate successor activity**.

All Tasks

To-Go Activities with Float of 10 days or less		
To Go Activities		6,375
Total Float	7.8%	496
Free Float	71.1%	4,532

Total Float Chart
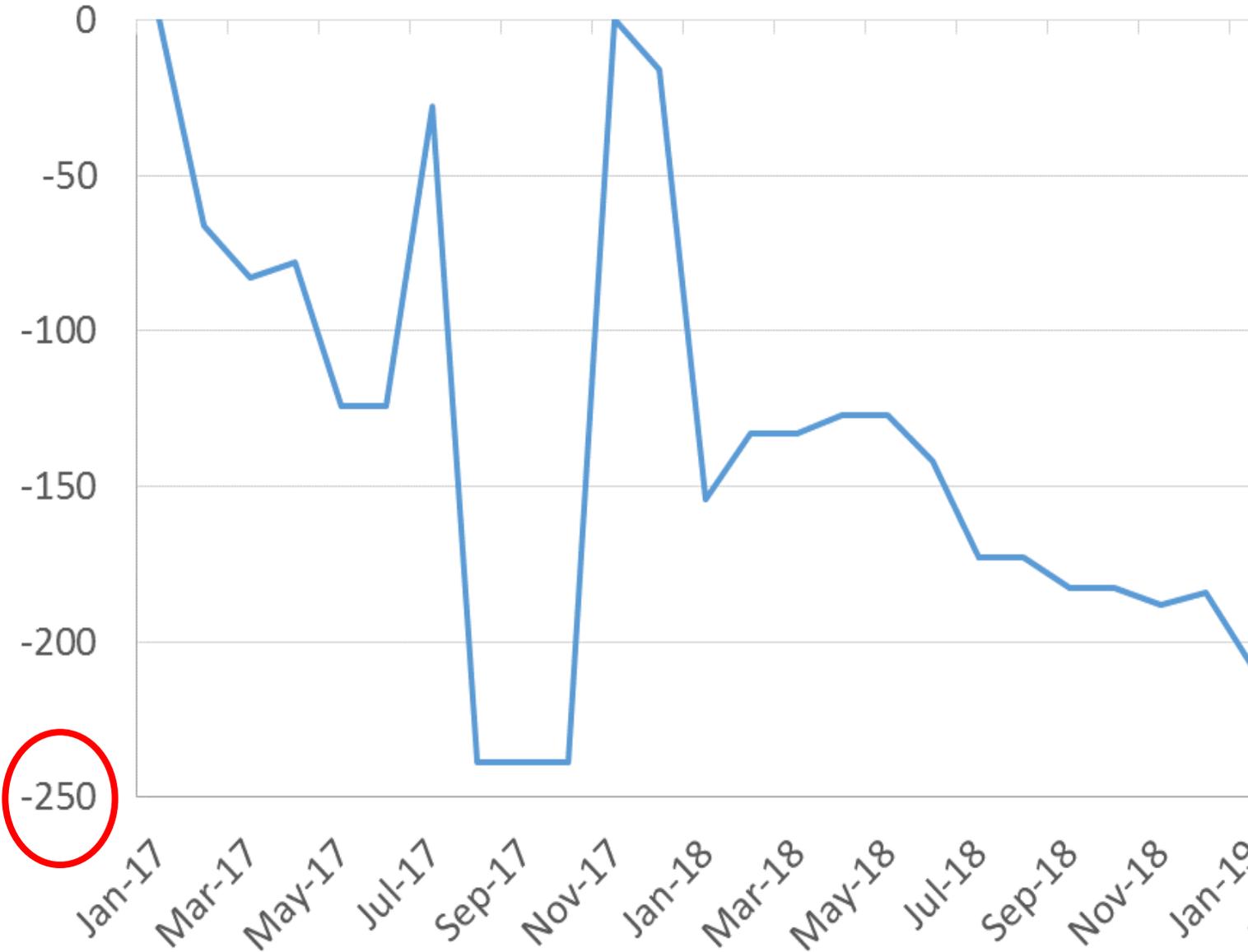
"The project is a little behind schedule."

Overall Project Status – Float

- Low Free Float indicates high probability that schedule will slip

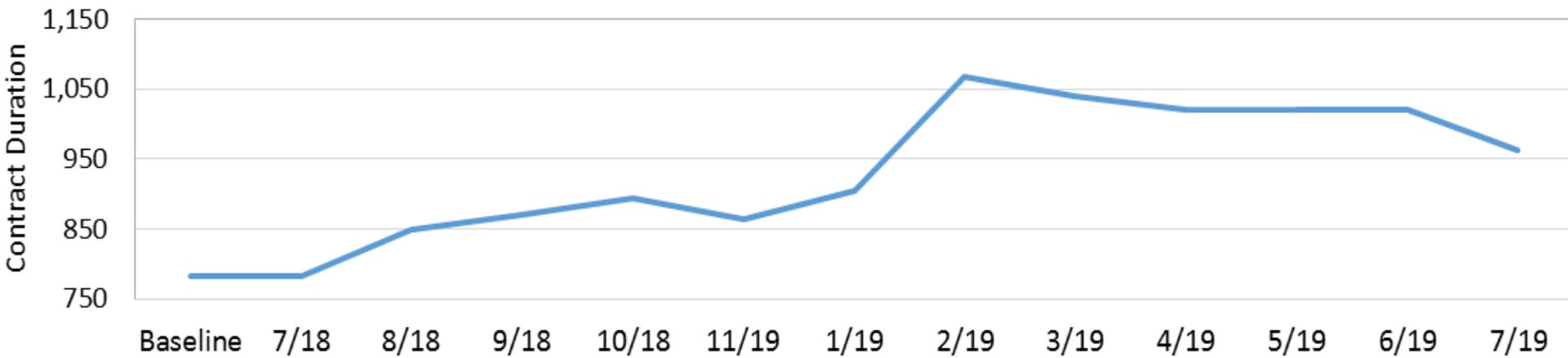|	Entire Project		Remaining Tasks			Float Status		
WBS Name	**All Normal Activities**	**% of Total**	**To Go Normal Activities**	**% of To Go Activities**	**% of Total**	**% Act with Less than 10 days Free Float**	**# Act With 10 Days or Less Of Free Float**	**Avg Total Float (Days)**
Total	**12,657**	**100%**	**5,551**	**100%**	**44%**	**73%**	4,074	**87**
Reporting Level	33	0.3%	-	0%	0.0%		-	-
Design	7,946	63%	2,149	39%	17%	**74%**	1,601	75
Procurement	1,049	8%	223	4%	2%	**97%**	217	34
Material	487	4%	136	2%	1%	**74%**	100	41
Fabrication	2,658	21%	2,564	46%	20%	**67%**	1,724	147
Commissioning	484	4%	479	9%	4%	**90%**	432	43

Provides actionable data
Procurement behind schedule, probably due to delayed design

Average Total Finish Float for Key Milestones

Simple Excel Table

Uses Conditional Formatting to identify trends

Rebaseline

Milestone	Baseline	7/18	8/18	9/18	10/18	11/19	1/19	2/19	3/19	4/19	5/19	6/19	7/19
K	45.3	46.0	49.3	61.2	67.7	66.0	58.2	95.0	74.2	49.5	48.7	27.2	26.8
J	26.7	26.0	34.0	33.0	32.8	30.7	31.7	78.5	88.5	40.3	39.8	27.5	35.2
H	20.2	19.5	28.0	24.2	28.3	27.2	27.8	77.2	60.2	42.3	41.5	36.8	38.5
G	20.2	19.5	29.3	24.2	28.2	23.2	24.7	72.2	53.3	44.0	42.0	44.8	44.8
F	13.8	12.5	14.8	20.5	26.0	21.0	22.0	71.5	56.3	46.0	43.8	50.0	35.7
E	12.8	11.8	17.0	18.5	19.8	16.0	18.5	70.2	50.8	43.5	41.2	39.8	28.8
D	7.7	5.7	12.5	13.3	19.3	13.2	14.8	63.3	46.8	39.5	36.3	43.7	22.3
C	7.3	5.3	13.2	13.8	16.8	11.3	12.7	66.8	47.2	42.8	39.7	36.8	13.3
B	4.7	3.3	8.8	8.5	13.8	7.0	9.5	60.8	44.7	37.5	34.0	41.3	17.2
A	3.2	2.0	7.0	7.8	10.3	4.7	7.3	64.8	45.5	40.8	37.8	34.8	6.5
Avg Float	16	15	21	23	26	22	23	72	57	43	40	38	27
Delta Days	0	1	66	88	112	81	123	286	257	239	239	239	181

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Many Tasks Taking Longer Than Planned
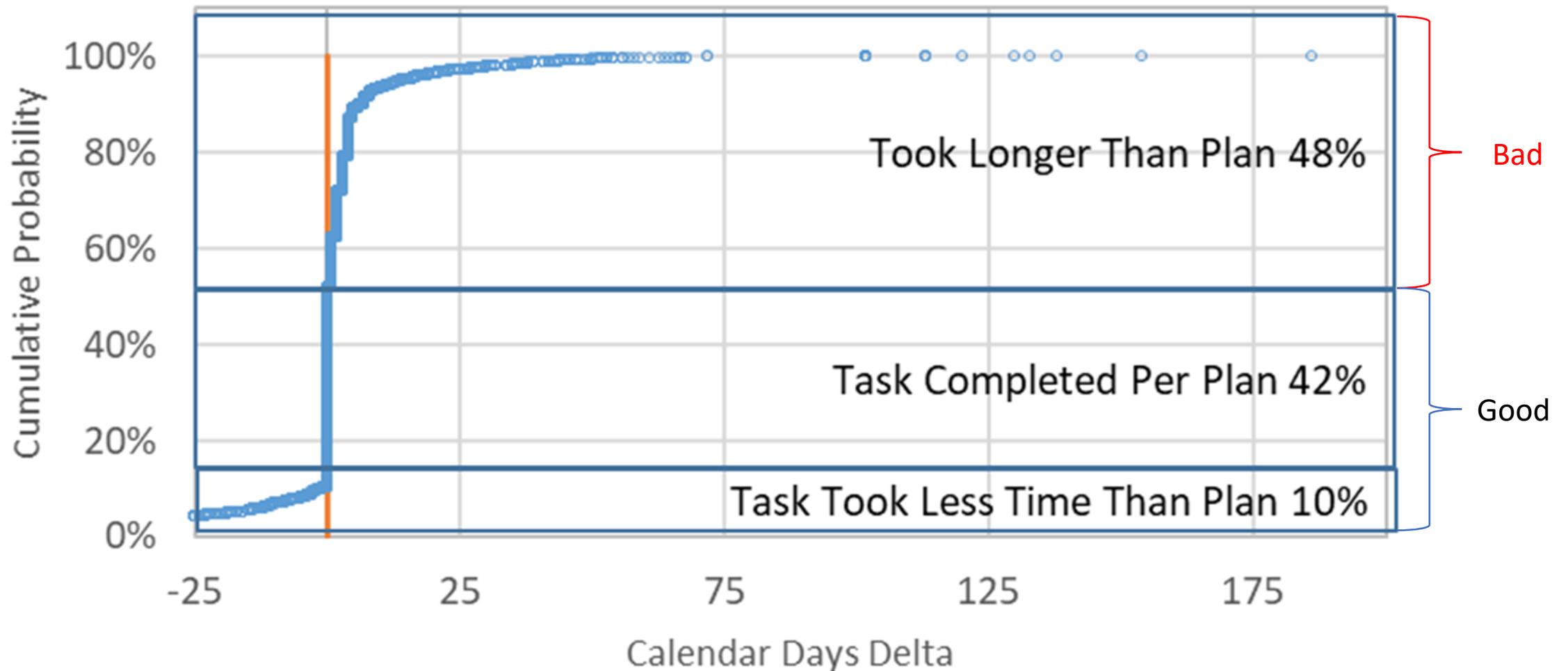
Most Activities Started Per Plan
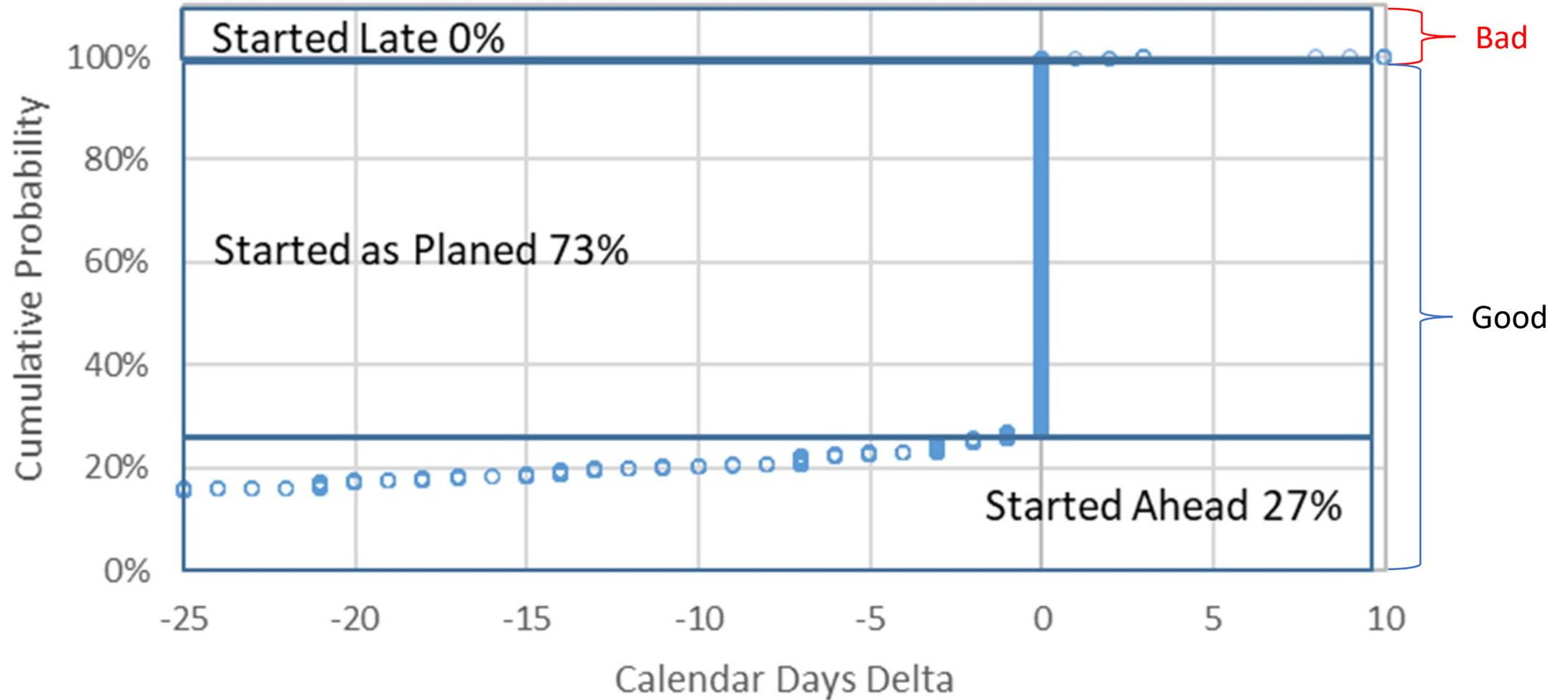
# At this rate project will never be completed!

- **Often when projects are in trouble**
  - Contractors call activity complete when not
    - Done so payment can be claimed for work complete
    - Contractors create new activities for remaining work
    - Makes metrics appear better
- **Actual project example -**
  - Since project start an average of
    - **237 activities <u>completed per month</u>**
    - **313 activities <u>added to schedule</u> per month**
    - **Delta 76 activities**
- Important to check schedules for this

> At this rate project will never be completed!

Never Ending Scope & Why it Matters

- Contractors often break up poorly planned tasks to keep performance metrics up especially on EVM projects

- Project added more work overall than it completed by breaking these tasks up

- Also, indicator of scope creep

Task Waterfall Chart
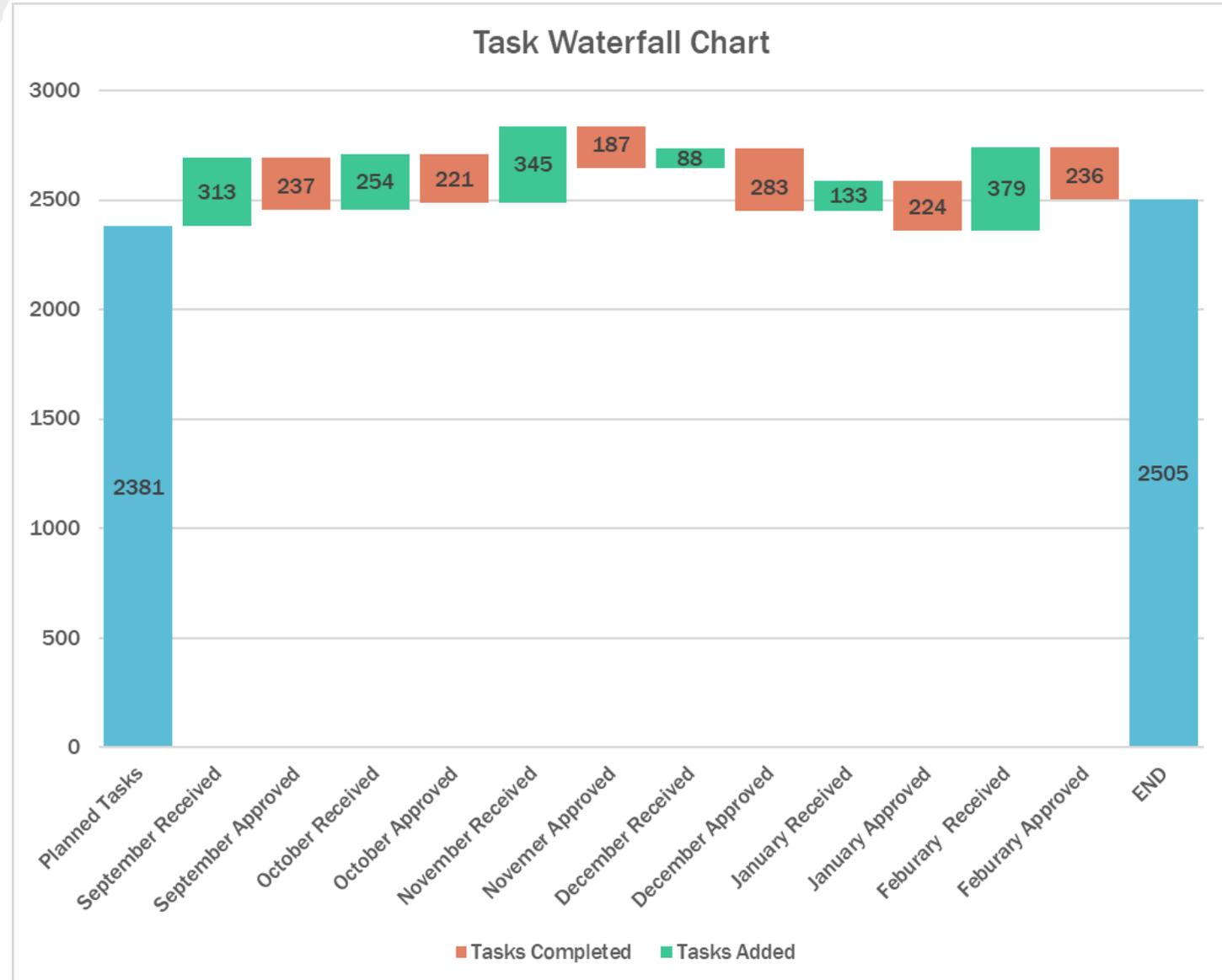
Conclusions

Detailed schedule analysis is very helpful however…

Management often doesn't understand

Analyst may not have time to do

Don't have to be an expert to develop actionable information

Maintain high level data reporting if "areas of interest" occur then deeper analysis can be done

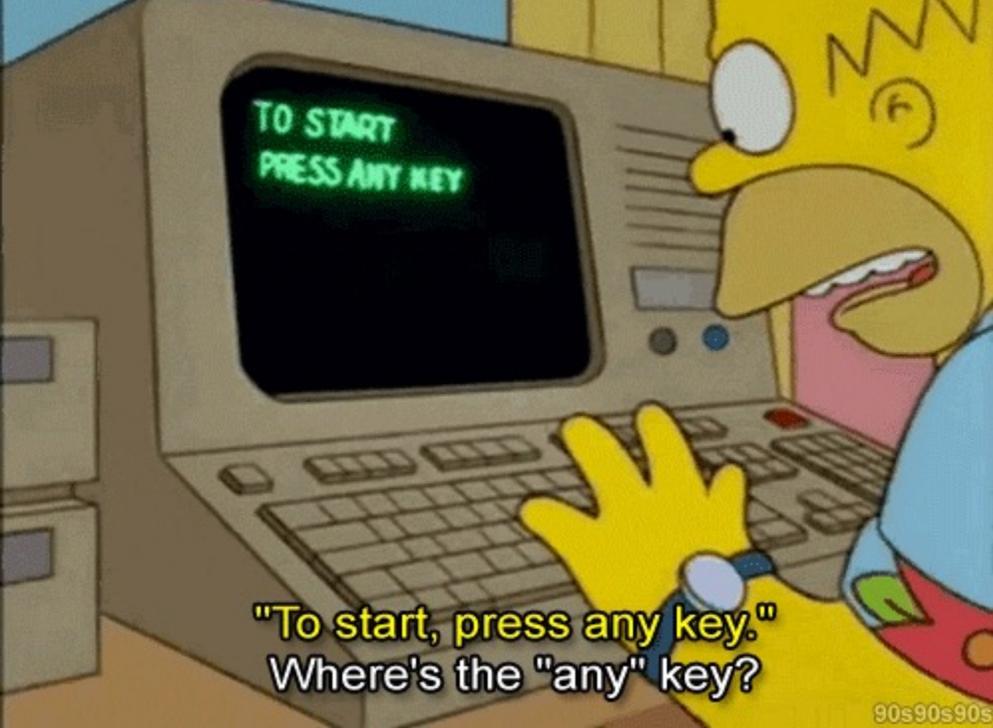**Typically, basic analysis is easier for management to understand**

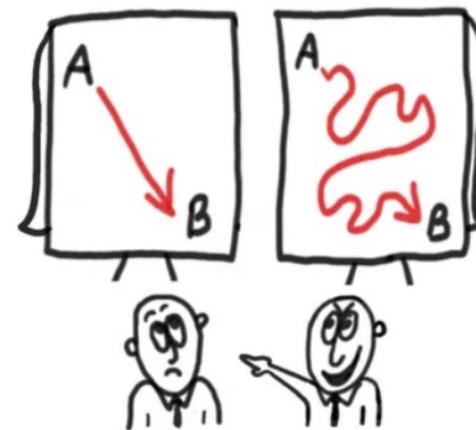Analysists can provide meaningful analysis with Excel, & typically faster

Remember! **K.I. S. S.**

Remember contractor is probably saying everything is fine

We <u>want</u> to believe them

Backup

Contact Information

- Glenn Butts KSC
  - 321-867-7198
  - Glenn.C.Butts@nasa.gov
- John Dotson KSC
  - 321-861-1876
  - John.C.Dotson@nasa.gov

"The spirits say you have all the data. Just do something."

Schedule Changes

Data Date	# of Activities	% Increase	Tasks Remaining
11/15/20	8,209		**3,064 (37%)**
3/4/19	7,776	**5.6%**	**5,362 (69%)**

17% of all remaining activities have constraints
0.7 Activities added per month

Project 1 Activity 206 shows "Launch (PRD) on 1/24/24

Data Date	# of Activities	% Increase	Tasks Remaining
11/9/20	9,371		**1,972 (21%)**
5/6/19	7,065	**32.6%**	**2,948 (42%)**
4/10/19	6,857	**36.7%**	**3,102 (45%)**

8% of all remaining activities have constraints
4.3 Activities added per month

Project 2 Activity 36333 shows "Deliver instrument to SC" on 9/21/22

RFI's not returned expediently

- Gives contractor excuse not to perform

OK to take 2 months to respond to RFI's?

RFI Turn Around Time Box-Whisker Plot Comparison
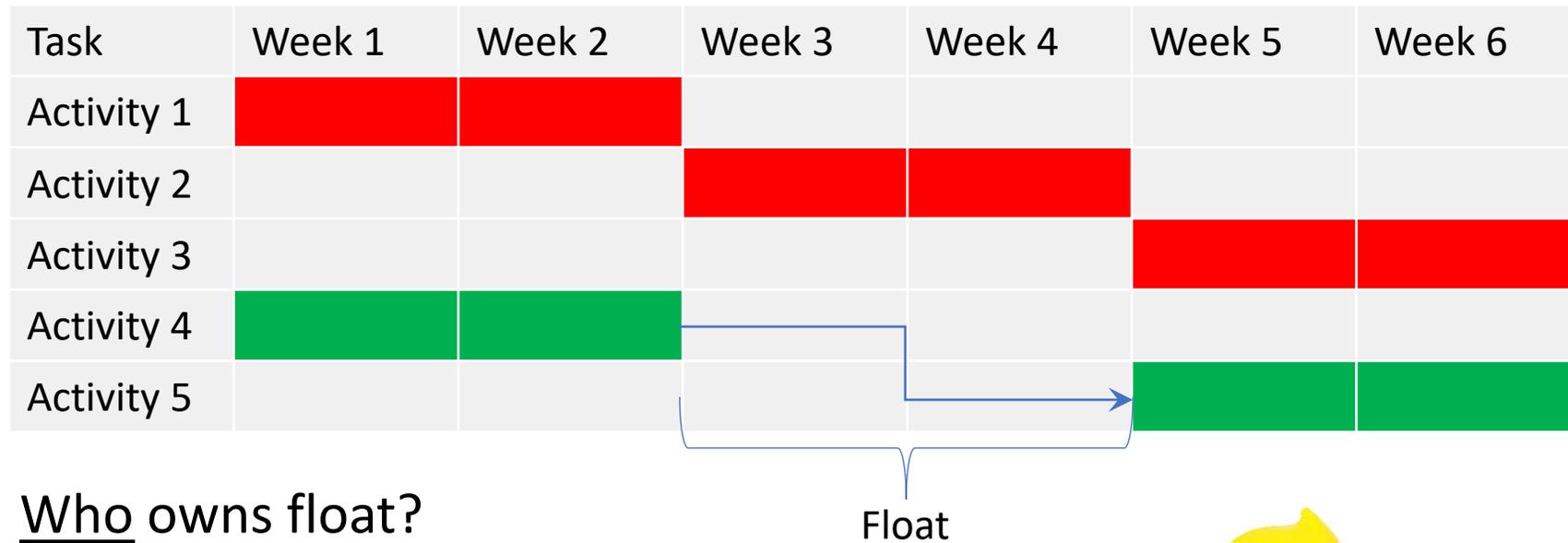
Actual # Days

Orginal # Days

Calendar Days

1st Quartile | Mean | 3rd Quartile | Extreme Outlier

Median | Mild Outlier

Interquartile Range (IQR)

Lower Whisker | Upper Whisker
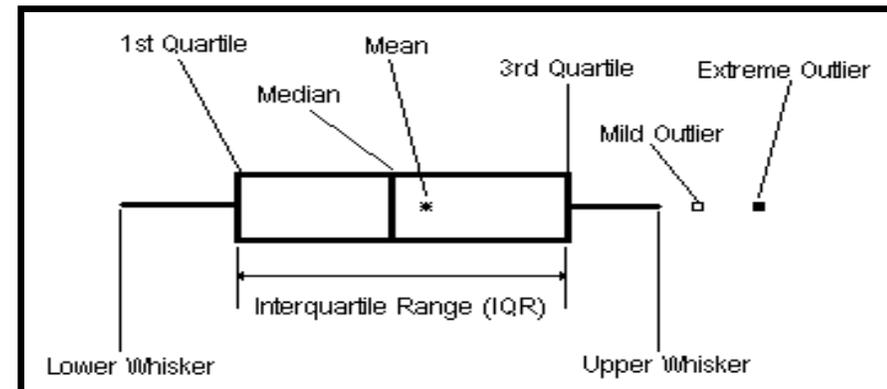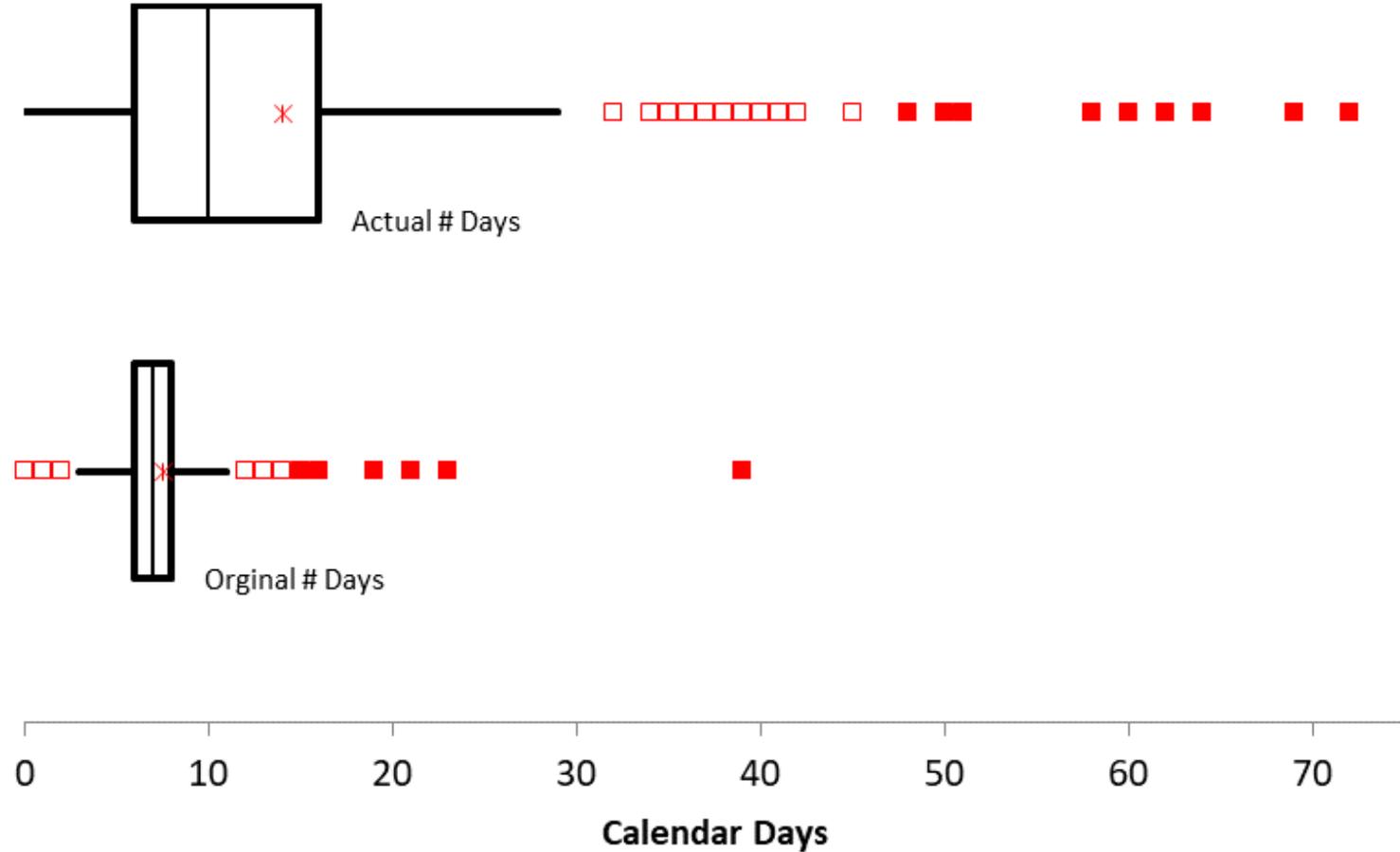
Overall Look – top down
IMS = 56% productivity
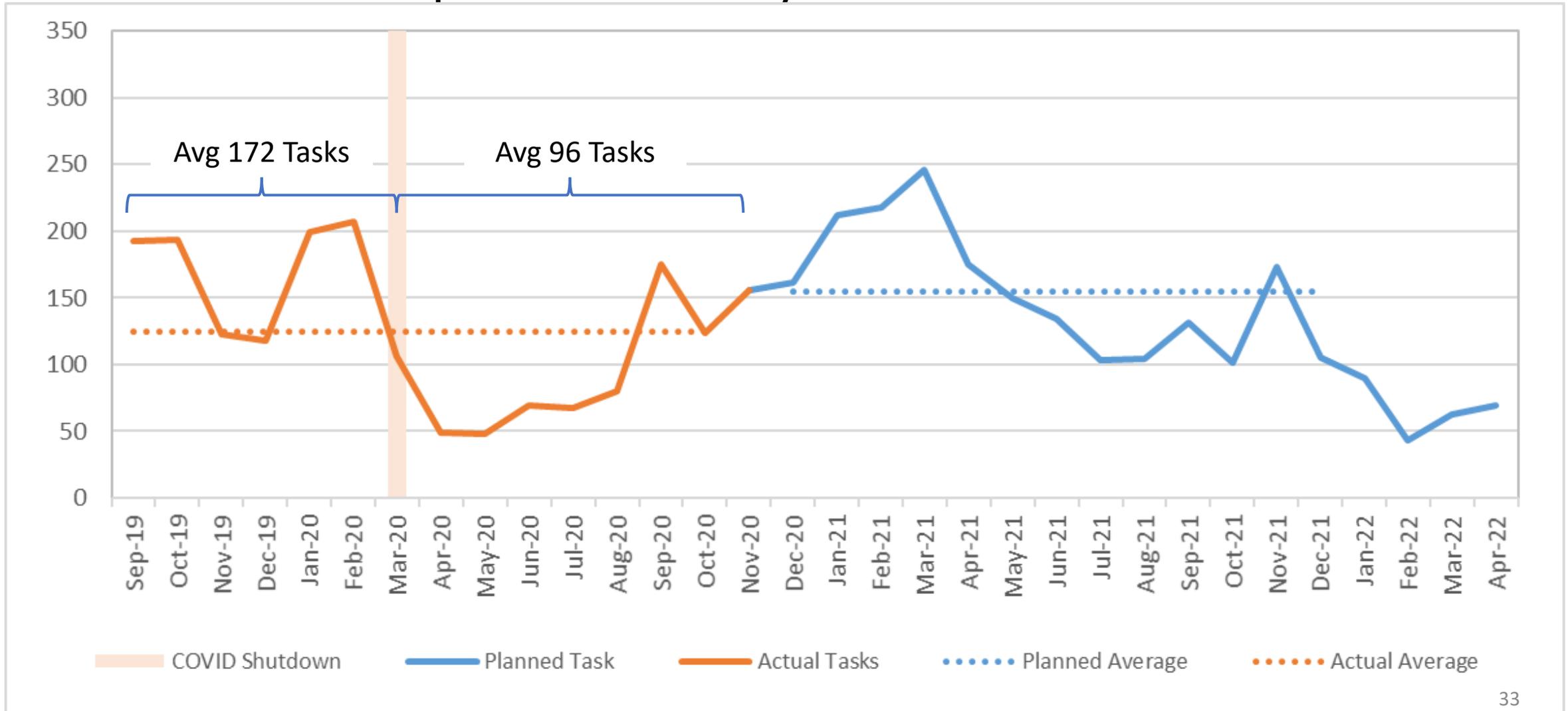
Float

- Schedule Float
  - Contingency or margin

Task	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Activity 1	🟥	🟥				
Activity 2			🟥	🟥		
Activity 3					🟥	🟥
Activity 4	🟩	🟩				
Activity 5					🟩	🟩

Float

- <u>Who</u> owns float?
  - Government
  - Contractor

Float owned by whoever uses it <u>first…</u>

Simplest Way to Make Chart