# *Schedule analytics tool*

pwc

*As capital project spend increases and aggressive deadlines are built into project schedules, the reliance on accurate, transparent and meaningful schedule practices is growing. Too often, major projects suffer from missed milestones, schedule slippage and delays with no way of determining recovery plans or realistic forecast completion dates.*

## Quantitative risk analysis

To help develop and maintain accurate, meaningful and timely schedules, engineering and construction (E&C) firms should consider combining quantitative schedule analysis with qualitative schedule review performed by experienced schedulers.

Quantitative schedule analysis provides our clients with additional insight into their schedules, including:

- Compliance with schedule provisions,
- Inclusion of all project scope,
- Monitoring of critical and near critical tasks,
- Modeling interface dates and milestones,
- Evaluating progress achieved, and
- Ability to re-sequence activities to mitigate delays and identify areas where acceleration will most efficiently benefit the project.

PwC's scheduling specialists have determined that most commercially available software is unable to perform complex, time-phased analysis on large schedules. Most have the ability to compare two schedules and provide only limited analytical functions to independently assist the E&C firm on complex projects.

## Schedule analytics tool

PwC has used industry-leading database techniques to develop a proprietary tool to extract, organize and analyze high volumes of data from a variety of scheduling tools.

Results of the analysis provide:

- An indication of the underlying schedule design and integrity;
- Identification of slippage that is occurring to an activity or sequence of activities;
- Identification of critical paths, sub-critical paths or concurrent critical paths;
- The changing nature of the project and supporting schedules; a comparison of any individual schedule against all others; and
- A comparison of the schedules and trends against a number of relevant industry standard metrics and benchmarks.

PwC's tool allows the user to develop custom analytics but also includes a number of standard time-phased reports, including:

- **Constraint analysis**—allows the PwC team to identify areas of potential schedule manipulation and constraints that may be preventing true critical paths from emerging and being managed by the project team.
- **Changing logic, open ends and logic integrity over time**—allows analysis of potential preferential logic, re-sequencing, excessive leads and lags.
- **Criticality over time**—provides visibility as to which areas of a project have float. Float is a relative, quantifiable value which can and should be treated as a resource.
- **Float degradation**—identifies areas of the schedule where float is reducing over time. The tool allows certain sections of the schedule to be flagged and evaluated.
- **Activity progress analysis**—shows activity progress in particular sections of a schedule and facilitates the projection of the current state to help determine estimated completion dates.
- **Float density analysis**—evaluates the difference between total float and remaining duration and provides insight into areas of the schedule that are compressing.
- **Activity duration analysis**—including analysis of the difference between original and actual durations over time and excessive activity durations. Altering activity durations or historic as-built start/finish dates is the simplest method of float sequestering. It is also the simplest to detect, but requires diligent adherence to schedule management and review procedures.

When combined with our qualitative analysis, our schedule analytics provide our clients with the transparency and information they need to determine if schedule information provided by project teams is accurate, reliable and credible for the purposes of critical decision making.

A quantitative analysis should not be considered in isolation and should form part of an overall schedule assessment that includes an evaluation of the general control environment, the nature of the schedules and the underlying processes and procedures.

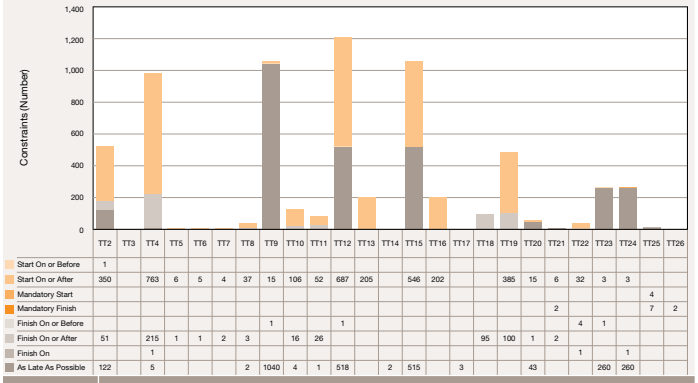
## *Schedule analytics tool: sample output*

*Each chart contains a Description, Observations and Recommendations heading to provide context to the analysis and suggested action to take in order to mitigate any risks associated with the observations.*

## *Constraint summary*

This chart summarizes all activity constraints included in all schedules. Includes zero free float, mandatory start, finish and early start and finish constraints.

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes all activity constraints included in all schedules. Includes Zero Free Float, Mandatory Start, Finish and Early Start and Finish Constraints. | A significant number of Zero Free Float constraints are used in procurement schedules. With the exception of completed activities, mandatory constraints are used exclusively in summary level schedules. | Ensure that mandatory constraints are not used in project schedules. |



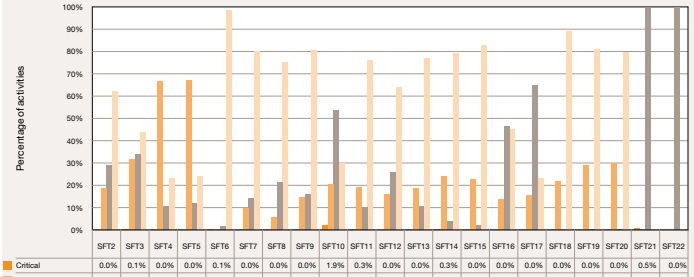

| | TT2 | TT3 | TT4 | TT5 | TT6 | TT7 | TT8 | TT9 | TT10 | TT11 | TT12 | TT13 | TT14 | TT15 | TT16 | TT17 | TT18 | TT19 | TT20 | TT21 | TT22 | TT23 | TT24 | TT25 | TT26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start On or Before | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Start On or After | 350 | | 763 | 6 | 5 | 4 | 37 | 15 | 106 | 52 | 687 | 205 | | 546 | 202 | | | 385 | 15 | 6 | 32 | 3 | 3 | | |
| Mandatory Start | | | | | | | | | | | | | | | | | | | | | | | | 4 | |
| Mandatory Finish | | | | | | | | | | | | | | | | | | | | 2 | | | | 7 | 2 |
| Finish On or Before | | | | | | | | 1 | | | 1 | | | | | | | | | | 4 | 1 | | | |
| Finish On or After | 51 | | 215 | 1 | 1 | 2 | 3 | | 16 | 26 | | | | | | | 95 | 100 | 1 | 2 | | | 260 | 260 | |
| Finish On | | | 1 | | | | | | | | | | | | | | | | | | 1 | | 1 | | |
| As Late As Possible | 122 | | 5 | | | | 2 | 1040 | 4 | 1 | 518 | | 2 | 515 | | 3 | | | 43 | | | | | | |

| Notes | This sample analysis is based on a single schedule but can also include a time phased analysis to show constraint changes over time. The tool also provides the facility to flag certain constraints and evaluate their impact over time. |
|---|---|

## *Criticality summary*

This chart summarizes the percentage of activities (in progress or not started) that are either critical, near critical or have excessive float.

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes the percentage of activities (in progress or not started) that are either critical, near critical or have excessive float. | Schedules show a significant percentage of near critical activities. Four schedules show a significant percentage of activities with excessive float. Note, some of the excessive float values are from summary schedules. | Review critical and near critical paths on active schedules. Reduce activities with excessive float. |



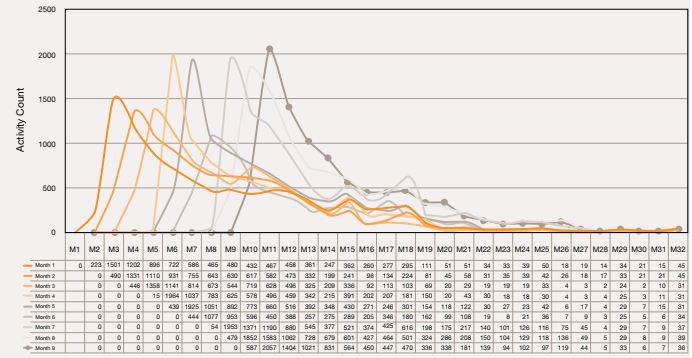

| | SFT2 | SFT3 | SFT4 | SFT5 | SFT6 | SFT7 | SFT8 | SFT9 | SFT10 | SFT11 | SFT12 | SFT13 | SFT14 | SFT15 | SFT16 | SFT17 | SFT18 | SFT19 | SFT20 | SFT21 | SFT22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Critical | 0.0% | 0.1% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% | 0.0% | 1.9% | 0.3% | 0.0% | 0.0% | 0.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.5% | 0.0% |
| Near Critical | 18.5% | 31.8% | 66.8% | 66.9% | 0.0% | 9.6% | 5.5% | 14.6% | 20.5% | 19.2% | 16.0% | 18.4% | 24.0% | 22.8% | 13.7% | 15.5% | 21.6% | 28.9% | 30.0% | 0.0% | 0.0% |
| Excessive | 29.0% | 33.7% | 10.7% | 11.8% | 1.6% | 14.1% | 21.4% | 16.1% | 53.6% | 10.3% | 26.0% | 10.4% | 3.8% | 1.9% | 46.5% | 64.8% | 0.0% | 0.2% | 0.2% | 99.5% | 100.0% |
| In Range | 61.9% | 43.7% | 23.2% | 24.1% | 98.3% | 80.0% | 75.2% | 80.5% | 29.6% | 76.1% | 64.1% | 76.7% | 79.1% | 82.7% | 44.9% | 22.9% | 89.1% | 80.8% | 79.7% | 0.0% | 0.0% |

| Notes | The analysis is performed on activities that are either in progress or not commenced. Completed activities are excluded. Zero total float activities are considered Critical; activities with Excessive Float have Total Float greater than 75% of the schedule duration (in this case approximately 1,000 days). Near Critical activities have a total float of between 1 and 120 days. |
|---|---|

## *Time phased early finishes*

This chart summarizes activities scheduled to finish each month (early dates).

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes activities scheduled to finish each month (Early Dates). | A bow wave of uncompleted activities is building over time. The plot of the current schedule (starting in M9) indicates an increasing peak and density of slipping activities. | Identify the nature and reason for the slipped activities. |



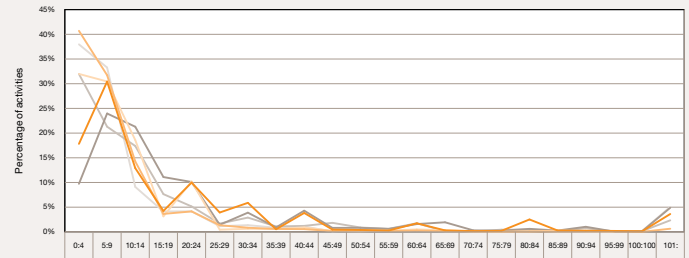

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 | M25 | M26 | M27 | M28 | M29 | M30 | M31 | M32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month 1 | 0 | 223 | 1501 | 1202 | 896 | 732 | 586 | 465 | 480 | 432 | 467 | 458 | 361 | 247 | 362 | 260 | 277 | 295 | 111 | 51 | 51 | 34 | 33 | 39 | 50 | 18 | 19 | 14 | 34 | 21 | 15 | 45 |
| Month 2 | | 0 | 490 | 1331 | 1110 | 931 | 755 | 643 | 630 | 617 | 582 | 473 | 332 | 199 | 241 | 96 | 134 | 224 | 81 | 45 | 58 | 31 | 35 | 39 | 42 | 26 | 18 | 17 | 33 | 21 | 21 | 45 |
| Month 3 | | | 0 | 0 | 446 | 1358 | 1141 | 814 | 673 | 544 | 719 | 628 | 496 | 325 | 209 | 336 | 92 | 113 | 103 | 69 | 20 | 29 | 19 | 19 | 19 | 33 | 4 | 3 | 2 | 24 | 2 | 10 | 31 |
| Month 4 | | | 0 | 0 | 0 | 15 | 1964 | 1037 | 783 | 625 | 578 | 496 | 459 | 342 | 215 | 391 | 202 | 207 | 181 | 150 | 20 | 43 | 30 | 18 | 18 | 30 | 4 | 3 | 4 | 25 | 3 | 11 | 31 |
| Month 5 | | | 0 | 0 | 0 | 0 | 439 | 1925 | 1051 | 892 | 773 | 660 | 516 | 392 | 348 | 430 | 271 | 248 | 301 | 154 | 118 | 122 | 30 | 27 | 23 | 42 | 6 | 17 | 4 | 29 | 7 | 15 | 31 |
| Month 6 | | | 0 | 0 | 0 | 0 | 0 | 444 | 1077 | 953 | 596 | 450 | 388 | 257 | 275 | 289 | 205 | 346 | 180 | 162 | 99 | 108 | 19 | 8 | 21 | 36 | 7 | 9 | 3 | 25 | 5 | 6 | 34 |
| Month 7 | | | 0 | 0 | 0 | 0 | 0 | 0 | 54 | 1953 | 1371 | 1190 | 880 | 545 | 377 | 521 | 374 | 425 | 616 | 198 | 175 | 217 | 140 | 101 | 126 | 116 | 75 | 45 | 4 | 29 | 7 | 9 | 37 |
| Month 8 | | | 0 | 0 | 0 | 0 | 0 | 0 | 479 | 1852 | 1583 | 1062 | 728 | 679 | 601 | 427 | 464 | 501 | 324 | 286 | 208 | 150 | 104 | 129 | 118 | 136 | 49 | 5 | 29 | 8 | 9 | 39 |
| Month 9 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 587 | 2057 | 1404 | 1021 | 831 | 564 | 450 | 447 | 470 | 336 | 338 | 181 | 139 | 94 | 102 | 97 | 119 | 44 | 5 | 33 | 6 | 7 | 36 |

| Notes | In progress or not started activities based on both Remaining Duration and Percent Complete. |
|---|---|

## *Activity duration analysis*

This chart summarizes the percentage of activities within certain duration ranges. Well designed schedules have few very long duration activities and a reasonable level of detail.

| Description | Observations | Recommendation |
|---|---|---|
| Summarizes the percentage of activities within certain duration ranges. Well designed schedules have few very long duration activities and a reasonable level of detail. | A significant number of activities include durations between 0 and 20 days. Two schedules include a large number of activities >100 days. | This level of detail in engineering schedules requires a significant level of effort to manage. Validate that summary level reports reflect these detailed schedules. |



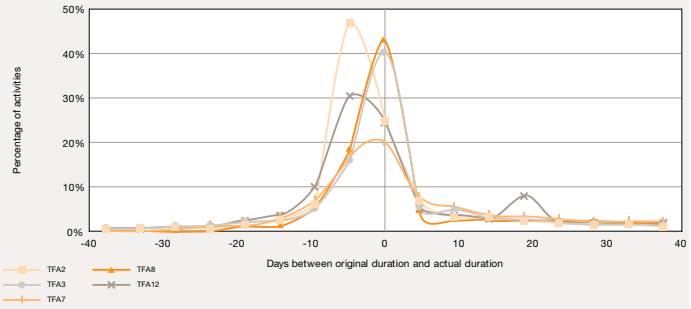

| | 0:4 | 5:9 | 10:14 | 15:19 | 20:24 | 25:29 | 30:34 | 35:39 | 40:44 | 45:49 | 50:54 | 55:59 | 60:64 | 65:69 | 70:74 | 75:79 | 80:84 | 85:89 | 90:94 | 95:99 | 100:100 | 101: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| rdr2 | 17.82% | 30.43% | 12.91% | 4.24% | 9.98% | 3.92% | 5.88% | 0.53% | 3.83% | 0.47% | 0.39% | 0.27% | 1.73% | 0.30% | 0.16% | 0.20% | 2.51% | 0.27% | 0.23% | 0.19% | 0.12% | 3.62% |
| rdr3 | 40.71% | 31.73% | 14.26% | 3.64% | 4.14% | 1.35% | 0.84% | 0.59% | 0.56% | 0.16% | 0.35% | 0.14% | 0.27% | 0.15% | 0.10% | 0.05% | 0.07% | 0.09% | 0.09% | 0.07% | 0.01% | 0.64% |
| rdr10 | 31.98% | 30.45% | 18.60% | 3.14% | 10.21% | 0.45% | 0.62% | 0.58% | 0.91% | 0.17% | 0.12% | 0.25% | 0.50% | 0.33% | 0.08% | 0% | 0.08% | 0.29% | 0.12% | 0.04% | 0% | 1.07% |
| rdr11 | 9.73% | 23.97% | 21.29% | 11.10% | 10.10% | 1.44% | 3.89% | 0.90% | 4.29% | 0.81% | 0.82% | 0.60% | 1.58% | 1.94% | 0.31% | 0.23% | 0.61% | 0.27% | 1.03% | 0.06% | 0.13% | 4.89% |
| rdr16 | 31.97% | 21.30% | 17.39% | 7.64% | 5.15% | 1.68% | 2.89% | 1.10% | 1.21% | 1.83% | 0.88% | 0.62% | 1.75% | 0.11% | 0.11% | 0.44% | 0.44% | 0.18% | 0.73% | 0.11% | 0.15% | 2.34% |
| rdr18 | 37.97% | 33.27% | 9.11% | 4.13% | 4.16% | 1.15% | 1.36% | 0.84% | 1.07% | 0.10% | 0.38% | 0.17% | 0.29% | 0.12% | 0.15% | 0.12% | 0.25% | 0.04% | 0.04% | 0.02% | 0.19% | 5.07% |

| Notes | |
|---|---|
| | This analysis is performed on activities (Task Dependent) only.<br><br>Task duration should be reviewed over time—OD's should not change. |

## *Activity duration variance*

This chart illustrates the difference between actual durations and original durations for a number of selected schedules.

| Description | Observations | Recommendation |
|---|---|---|
| This chart illustrates the difference between Actual Durations and Original Durations for a number of schedules. | The curves generally illustrate lower actual durations than planned. This is a good indication that schedules are not overly aggressive and may be achievable. However, it may also indicate embedded activity contingency. | Duration variances should be monitored. The TFA2 and TFA8 schedules show high variability in original and actual durations and should be further investigated. |

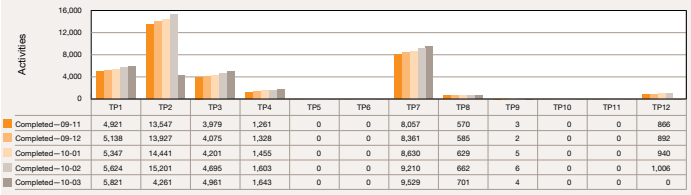



| Notes | |
|---|---|
| | This analysis is performed on activities (Task Dependent), with an Actual Duration greater than 0 and with a "Completed" activity status. |

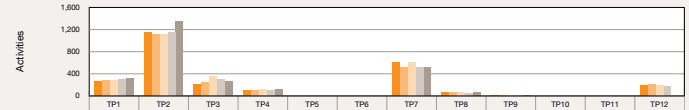
## *Activity progress summary*

This chart summarizes activities under way and complete (based on percent complete).

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes activities underway and complete (based on percent complete). | We understand completed activities in TP2 schedules are now moved to TP5 Archive schedule; however over 4,000 still exist in XYZ. | Monitor TP1, TP2, TP7 for progress updates. |




| | TP1 | TP2 | TP3 | TP4 | TP5 | TP6 | TP7 | TP8 | TP9 | TP10 | TP11 | TP12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Completed—09-11 | 4,921 | 13,547 | 3,979 | 1,261 | 0 | 0 | 8,057 | 570 | 3 | 0 | 0 | 866 |
| Completed—09-12 | 5,138 | 13,927 | 4,075 | 1,328 | 0 | 0 | 8,361 | 585 | 2 | 0 | 0 | 892 |
| Completed—10-01 | 5,347 | 14,441 | 4,201 | 1,455 | 0 | 0 | 8,630 | 629 | 5 | 0 | 0 | 940 |
| Completed—10-02 | 5,624 | 15,201 | 4,695 | 1,603 | 0 | 0 | 9,210 | 662 | 6 | 0 | 0 | 1,006 |
| Completed—10-03 | 5,821 | 4,261 | 4,961 | 1,643 | 0 | 0 | 9,529 | 701 | 4 | 0 | 0 | 0 |



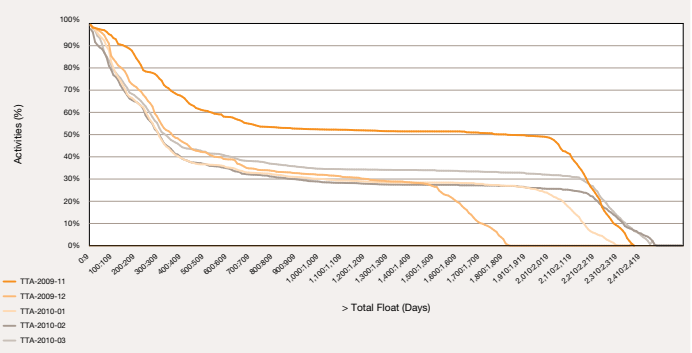

| | TP1 | TP2 | TP3 | TP4 | TP5 | TP6 | TP7 | TP8 | TP9 | TP10 | TP11 | TP12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In Progress—09-11 | 269 | 1,141 | 208 | 96 | 0 | 0 | 609 | 60 | 5 | 0 | 0 | 182 |
| In Progress—09-12 | 281 | 1,105 | 237 | 95 | 0 | 0 | 521 | 59 | 4 | 0 | 0 | 207 |
| In Progress—10-01 | 284 | 1,114 | 348 | 109 | 0 | 0 | 604 | 58 | 6 | 0 | 0 | 195 |
| In Progress—10-02 | 302 | 1,146 | 293 | 105 | 0 | 0 | 509 | 54 | 7 | 0 | 0 | 169 |
| In Progress—10-03 | 312 | 1,350 | 261 | 111 | 0 | 0 | 507 | 58 | 6 | 0 | 0 | 0 |

| Notes | |
|---|---|
| | Analysis is based on selected construction and engineering schedules issued. |

## *Criticality summary*

This chart summarizes a total float frequency analysis. Total float indicates activity criticality; zero float activities are critical.

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes a Total Float frequency analysis. Total float indicates activity criticality, zero float activities are critical. | This chart illustrates a significant number of activities with greater than 1,000 days float. The number of activities with excessive float decreased in December but is now increasing. | Further investigation of excessive float required. Float path analysis should be carried out. Identify reasons for increasing schedule float. |

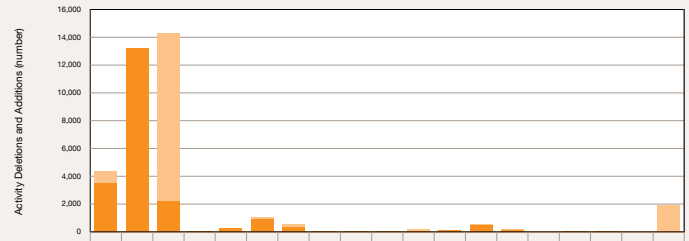



| Notes | |
|---|---|
| | The analysis is performed on activities that are either in progress or not commenced. Completed activities are excluded from the analysis. Progress is based on percent complete. Analysis is based on Total Float values.<br><br>Excessive float is considered >75% of schedule duration (in this case 1,856 days) |

## *Summary of activities added and deleted*

This chart summarizes the number of activities added and deleted.

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes the number of activities added and deleted between February 2010 and March 2010. | Almost 37,000 activities were added, deleted or moved between schedules this month. A significant number of activities are still moving into and out of schedules. The addition of the XYZ schedule to archive completed activities is a positive development. | Client should evaluate the reasons for activity deletions in LR25. |



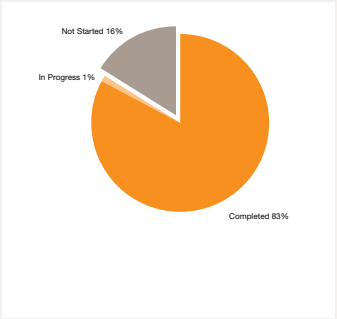

| | LR23 | LR24 | LR25 | LR28 | LR29 | LR30 | LR31 | LR32 | LR33 | LR35 | LR37 | LR38 | LR39 | LR40 | LR41 | LR44 | LR45 | LR46 | LR48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deleted | 853 | 0 | 12,093 | 0 | 3 | 163 | 168 | 0 | 0 | 1 | 152 | 43 | 135 | 46 | 12 | 1 | 0 | 1 | 1,878 |
| New | 3,513 | 13,211 | 2,176 | 23 | 274 | 888 | 348 | 12 | 8 | 12 | 2 | 112 | 441 | 127 | 0 | 1 | 1 | 0 | 0 |

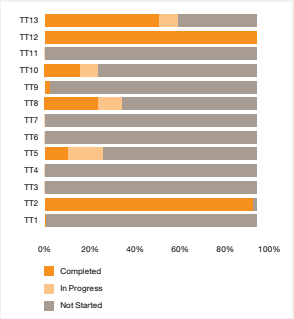
| Notes | This analysis is based on Activity ID. If an activity ID has changed it will appear as a deleted activity from one schedule and added to another. |
|---|---|

## *Detailed breakdown of activities deleted*

This chart details the number of activities added and deleted, their type and status.

| Description | Observations | Recommendation |
|---|---|---|
| This chart summarizes the number of activities added and deleted between two months. | The majority of activities deleted in the schedules reflect activity movement into archive schedules. | Identify the reason for removing or moving large numbers of activities in these schedules. |



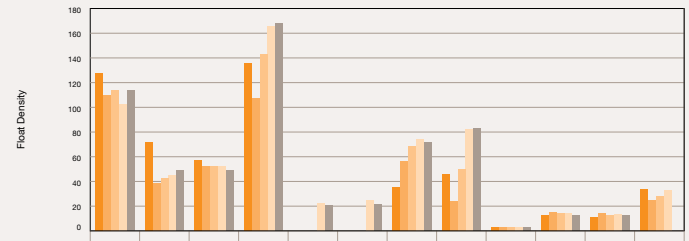




| Notes | This analysis is based on Activity ID. If an activity ID has changed it will appear as a deleted activity from one month and added to another.<br>This data is based on the older of the two compared schedules. |
|---|---|

## *Time phased float density*

Float density represents the relationship between total float and remaining duration. The metric provides an indication of schedule compression. A higher value is better if the schedule is properly designed.

| Description | Observations | Recommendation |
|---|---|---|
| Float density represents the relationship between total float and remaining duration. The metric provides an indication of schedule compression. A higher value is better if the schedule is properly designed. | Schedules show both increasing and decreasing levels of float density. Stabilization of the values is occurring as the number of major design changes reduce. | Continue to monitor schedules with decreasing or low float density. |



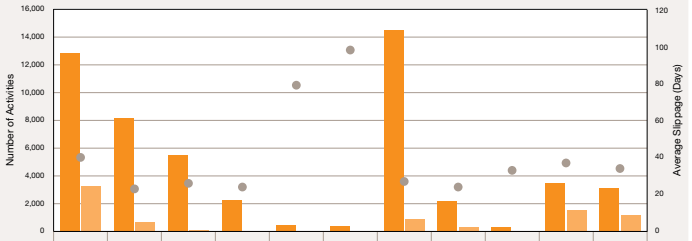

| | TFD1 | TFD2 | TFD3 | TFD4 | TFD5 | TFD6 | TFD7 | TFD8 | TFD9 | TFD10 | TFD11 | TFD12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009-11 | 127.50 | 71.36 | 56.77 | 135.76 | 0 | 0 | 35.13 | 45.39 | 2.44 | 12.21 | 10.74 | 33.69 |
| 2009-12 | 109.87 | 38.14 | 52.58 | 106.95 | 0 | 0 | 56.54 | 24.02 | 2.56 | 14.98 | 13.98 | 24.46 |
| 2010-01 | 113.81 | 42.54 | 52.62 | 142.64 | 0 | 0 | 68.04 | 49.40 | 3.16 | 13.83 | 12.85 | 27.73 |
| 2010-02 | 102.34 | 44.75 | 52.32 | 165.85 | 22.55 | 24.75 | 74.12 | 82.33 | 2.65 | 14.28 | 13.42 | 33.09 |
| 2010-03 | 113.53 | 48.99 | 48.60 | 167.60 | 20.41 | 21.62 | 71.88 | 82.94 | 2.50 | 12.94 | 12.19 | 0 |

| Notes | This analysis provides an indicative relationship between Total Float and Remaining Duration, no account is made for critical path activities or float paths. The analysis should be time phased to illustrate changes in updated schedules. The analysis can show schedule compression.<br>Analysis does not include summary schedules (milestone summaries etc), commissioning or procurement. Inclusion of additional scope can effect this analysis. |
|---|---|

## *Early finish date change summary*

Early finish dates reflect the earliest date an activity can finish based on schedule logic. This chart illustrates the movement of early finish dates for various schedules.

| Description | Observations | Recommendation |
|---|---|---|
| Early Finish Dates reflect the earliest date an activity can finish based on schedule logic. This chart illustrates the movement of Early Finish Dates for Engineering and Construction schedules. | A significant number of activities in the engineering and construction schedules appear to be slipping. | Establish reasons for EF date slippage. The average slippage rate is high and should be monitored. |




| | DTR1 | DTR2 | DTR3 | DTR4 | DTR5 | DTR6 | DTR7 | DTR8 | DTR9 | DTR10 | DTR11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SlippingEF | 12,838 | 8,135 | 5,491 | 2,244 | 463 | 365 | 14,536 | 2,189 | 290 | 3,509 | 3,109 |
| AdvancedEF | 3,261 | 709 | 121 | 14 | 30 | 18 | 919 | 321 | 45 | 1,544 | 1,196 |
| Average Slippage | 40 | 23 | 26 | 24 | 79 | 98 | 27 | 24 | 33 | 37 | 34 |

| Notes | This analysis compares the Early Finish Dates between matching Activity ID's across two or more months. Average slippage is calculated by comparing the days between the Early Finish dates of each slipped activity. |
|---|---|

## *Schedule analytics tool: examples of use*

### *Power plant construction project*

PwC used the schedule analytics tool to evaluate numerous schedules, including those with over 120,000 activities per month. Analysis was used to evaluate the quality of the schedules and assist with the development of a revised baseline. Many of the features of the schedule analytics tool were used on this engagement, primarily due to the limitation of the scheduling software's ability to support the rapid comparison of key schedule characteristics across multiple schedules. Analysis included the following:

- comparison of key schedule characteristics against industry standards over time;
- evaluation of the contractors' coding structures, the consistent use of activity code libraries, and the application of a WBS across all schedules;
- time phased analysis of changing original durations, total float, logic links, descriptions, activity status and other variables;
- evaluation of slipping activities and activities starting and finishing early and late.

### *Liquid natural gas (LNG) plant construction*

PwC's analytics tool was used to analyze numerous contractors' schedules developed to support the construction of LNG plants around the world. The tool was used to import schedule data from all projects into a single SQL server database and allowed comparison across projects. This provided our analysts with insight into key differences between the schedules on similar projects. By identifying scheduling factors associated with successful and unsuccessful elements of these LNG projects, our analysts were able to highlight potential risk areas and provide the contractor with alternative scenarios.

### *Refinery construction*

PwC's schedule analytics tool was used to evaluate the design of a refinery construction schedule. PwC analysts utilized system functions that allowed evaluation of key schedule characteristics against industry standards. The results were then used to establish likely areas of schedule risk and development of a plan to mitigate these risks. In addition, the tool was used to identify areas reflecting potential resource conflicts, logic inconsistencies and status problems.

### *Construction disputes*

PwC's schedule analysis tool has been used to support a number of schedule disputes and provide analytics detailing the quality of schedules for a variety of construction projects including railways, power plants, airports and hospitals. Our analysis has been used to assist with the development of expert witness testimony and provide graphical representations of key schedule characteristics for the purposes of developing positions in formal proceedings.

## *www.pwc.com/us/capitalprojects*

### *The PwC difference*

*We believe PwC is uniquely positioned to provide independent advisory services on, and the assessment of, large-scale and mega-projects. Our Engineering and Construction practice comprises nearly 5,300 professionals who serve more than 20,000 engineering & construction companies around the world. Our Capital Projects & Infrastructure specialists provide services related to the full value chain. This includes acquiring, financing, investing in, planning, designing, procuring, constructing, commissioning, operating, and maintaining complex programs or portfolios.*

### *PwC E&C contacts*


**H. Kent Goetjen**
*US E&C Industry Leader*
Hartford, CT
+1 (860) 241 7009
h.kent.goetjen@us.pwc.com

**John Doherty**
*US E&C Advisory Leader*
Chicago, IL
+1 (847) 430 9028
john.doherty@us.pwc.com

**Allen Pryor**
*US E&C Tax Leader*
Dallas, TX
+1 (214) 754 4570
allen.r.pryor@us.pwc.com

**Meta Wendt**
*US E&C Assurance Leader*
Los Angeles, CA
+1 (213) 356 6115
meta.wendt@us.pwc.com

**Diana Garsia**
*US E&C Marketing Manager*
Florham Park, NJ
+1 (973) 236 7264
diana.t.garsia@us.pwc.com


### *PwC CP&I contacts*


**Peter Raymond**
*US CP&I Leader*
McLean, VA
+1 (703) 918-1580
peter.d.raymond@us.pwc.com

**Steve Lechner**
*US CP&I Advisory Leader*
San Francisco, CA
+1 (415) 498-6596
stephen.p.lechner@us.pwc.com

**Daryl Walcroft**
*US CP&I Tax Leader*
San Francisco, CA
+1 (415) 498-6512
daryl.walcroft@us.pwc.com

**Anthony Caletka**
*US CP&I Assurance Leader*
New York, NY
+1 (646) 471-5405
anthony.caletka@us.pwc.com

**Vincent Manuele**
*US CP&I Director*
Philadelphia, PA
+1 (215) 805-0525
vincent.manuele@us.pwc.com