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Forensic Project Management Inc.

INTRODUCTION

This paper is based on an assumed understanding of CPM and AACE's recommended practice 29R-03.

Forensic Project Management (FPM) develops web-based, collaborative software that provides a new paradigm for project schedule management and forensic scheduling. The core innovation of FPM's software reconstructs Critical Path Method (CPM) project schedules into comprehensive, as-sequenced paths.

FPM's functionality is equally applicable for project schedule analysis, project risk management, and forensic schedule analysis (FSA). For initial development, FPM has chosen to focus on FSA, with the goal to simplify time-based project disputes for the engineering and construction industry.

What does this mean for owners, contractors, and consultants?

Schedule risk and time-based claims are evident throughout the construction industry. With FPM's simplified approach, the analysis process is extremely manageable, providing accurate, timely results. FPM and CPM software are complementary, creating a level of schedule intelligence and insight long anticipated by the industry, providing essential information that software previously could not offer.

$$f\left(\begin{array}{c} \text{Owners can manage claim risk, contractors can focus on building the work, and} \\ \text{consultants can apply expertise toward proactive measures, creating a win-win for all} \\ \text{parties.} \end{array} \right)$$

How does FPM save time and money, allowing valuable resources to be reallocated?

Traditional analysis methods take weeks and even months, depending on the scope, and that doesn't account for summarizing and communicating results to stakeholders. FPM's ability to quickly and accurately analyze concurrent delays and categorize schedule impacts is an integral part of reducing claim settlement costs.

$$f\left(\begin{array}{c} \text{Using FPM streamlines the analysis process, requiring approximately 10\% of traditional} \\ \text{efforts and decreasing the time investment by more than 85\%.} \end{array} \right)$$

Why is this important to the industry?

FPM's solution has been essential, but unrealized since the development of computer-based CPM. Analyst capabilities are elevated with the use of fully dynamic software that offers a comprehensive, automated, manageable approach.

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$f($ FPM has created momentum and changes the way business is conducted. $)$

OVERVIEW OF FORENSIC SCHEDULE ANALYSIS

FSA is the retrospective study of how events interact within CPM models to investigate series of deviations between project states. The full benefit of hindsight is required to provide a true retrospective analysis, which then provides the technical evidence needed for proving a delaying event caused an impact (causation), and quantifying the amount of delay time (quantum). This, combined with an entitlement that has been derived from comparing the contract to job events, provides both parties with the information necessary to reach an equitable agreement [1].

29R-03 offers specific implementations of four methods for factual analysis and quantification. Three of the these can be perceived as unsuitable due to their limitations:

- the *static, observational method* does not account for critical path changes;
- the *additive, modeled method* does not account for actual progress, critical path changes between periods, or schedule reductions. It is also selectively bias and the mismatch of plan and as-built data causes inaccuracies; and
- the *subtractive, modeled method* is based on true, documented data, but is difficult to explain, does not account for schedule reductions, and is selectively bias.

The remaining *dynamic logic, observational method* is the most untapped source for advancing forensic scheduling as a science. This method uses as-is project schedule updates to expose and quantify shifting critical paths between data dates. It is equally effective for measuring and communicating schedule risk and performance on active jobs, and investigating impacts due to progress and non-progress revisions between distinct update periods. This method also allows analysis of near-critical paths, which include risks that should not be overlooked during project execution, and concurrent deviations that should be forensically analyzed during delay disputes [2].

FORENSIC SCHEDULE ANALYSIS CHALLENGES

Too often, the limitations of FSA methods provide information that benefits the analyzing party. This can be a challenge because contractors and owners can disagree on which method should be used, and struggle with communicating the results, both of which can undermine settlement efforts.

FSA fosters complexity.

FSA has traditionally produced results that are based on a system in which complexities multiply as layers of methods, techniques, and data increase. Legal strategies and expert opinions are heavily relied upon because forensically relevant facts for objective analysis are limited.

FSA is debatable.

Debatability becomes evident as results are based on concurrency and bias. Assumptions are not backed by evidence and require further explanation. This may complicate negotiations, requiring analysts to defend against the appearance of cognitive bias.

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FSA requires a time commitment.

The time commitment required when using CPM software for analysis can make FSA difficult because it requires data to be organized, structured, and further processed into forensic information. Although information is provided in context of scope, activities, and resources, it does not provide information for logic sequence, nor does it offer a complete as-sequenced view. Since software like P6 cannot make analysts aware when concurrent paths exist, analysts must use hand-crafted techniques to identify and model co-longest and near-longest paths to each contractual milestone.

FORENSIC PROJECT MANAGEMENT SOFTWARE IS THE SOLUTION

29R-03 provides the industry a guideline for FSA that has been organized in a way that opened the door for automation and software development.

$$f\ (\quad \text{How analysis is conducted within the industry is changing, and FPM's fully dynamic software offers a complete, automated, manageable approach.} \quad)$$

All paths and deviations are revealed.

To effectively analyze a schedule, analysts need to see all paths and sequence-based deviations. Traditional software is capable of identifying a single longest path, but fails to identify all complete paths of project schedules. This results in extremely limited information for analysts. FPM has solved this problem with software that displays project schedules in their most natural context, revealing all paths and deviations to each milestone across all schedule updates.

Complexity is mitigated.

FPM software mitigates complexity by providing accurate, objective, and repeatable forensic analysis based on industry standard methods. Proprietary algorithms seamlessly process data from imported XERs or P6 web service queries to highlight key components throughout an entire project schedule. Changes to paths can easily be analyzed for all activities, making schedule analysis more accurate and giving context to all activities and relationships.

FSA is simplified as FPM software returns complete, ranked as-sequenced paths with pre-evaluated calculations, automatically organizing paths into analysis windows. Changes and variances include path and logic context, emphasizing the forensic value of the data date by displaying all of the driving starts of an evaluated milestone. These driving starts that are either in-progress or waiting to start are where concurrent delays, disruptions, and pacing exist. FPM software quantifies each of these events and displays preceding chained-events, such as activities that were both added and completed between data dates. The results are then compared to the as-planned snapshot, providing a clear picture of dynamic changes to critical paths during a specific window.

Traditional software provides disjointed analysis, where criticality is based on total float of individual activities, and activity deviations are provided in isolation with no context to upstream causes and downstream effects. This is where FPM creates a new frontier. Even though FPM software returns all paths, it ranks longest paths above critical paths because of their unique forensic value. FPM software defines longest paths as continuous chains between sets of related activities and defined milestones

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having the lowest relationship free float. It also establishes the overall duration of each of these chains, so that every deviation and resulting impact can be accurately associated.

The logic behind schedules is apparent.

CPM software is not able to make the logic behind schedules apparent for meaningful project decisions. Previously, the logic of schedules could not be properly audited because impacts could not be traced through entire paths; however, auditing of CPM schedules is now completely transparent and exhaustive. FPM and CPM software are complementary and there is no overlap in information.

With traditional software, context for analysis is not available without descriptive clarification to allow for tabulation and aggregation across milestones. In contrast, FPM software provides schedule information in its most natural context and the analyst is not required to add additional structuring criteria. It evaluates the effects of activities and relationships against their paths to individual, contractual milestones. This level of schedule intelligence and insight have been long anticipated by the industry, providing essential information that software previously could not offer.

Claim settlement costs can be reduced.

When considering delay claim preparation, traditional methods suffer from complexity and significant time commitment to allow for analyzing the schedule. Objective, repeatable methods are used to analyze schedules and facilitate amicable, impartial settlements. FPM provides defense against claimed impacts by revealing apportionment of concurrent events. The ability to quickly and accurately analyze concurrent delays and categorize schedule impacts is an integral part of reducing claim settlement costs.

Analysis preparation is simplified.

Overall, FPM software simplifies analysis preparation through automation, making it extremely manageable and providing accurate, timely results. FPM's dynamic software returns a complete longest path of each activity to all finish milestones for all project updates. It then ranks individual paths by critical impact against each milestone. Unprecedented scheduling context is provided as entire schedules are presented by individual, as-sequenced paths. Both as-built and to-go paths are combined for full context of progress through the entire duration of a specific analysis period.

Analysts navigate project updates via a web interface, which offers retrospective window analysis for forensically observing dynamic logic, path-specific Gantt charts, selection of milestones to analyze, and identifies variances and changes over time. Flexibility offers an opportunity to combine methods (additive and observational), allowing analysts to use different methods collaboratively instead of competitively. Analysis is completed within a fraction of the time, allowing negotiations to unfold effortlessly and resources to be allocated toward building the work.

USER EXPERIENCE

FPM, vertical Software as a Service (SaaS), is cloud-based and developer-hosted, offering an on-demand solution where updates are deployed instantly without impacting user teams. Collaborative efforts between users are heightened, potentially increasing productivity as multiple users can work on the same information simultaneously within a single environment.

The fully dynamic FPM software provides a single platform for the FSA process: users import XERs, the data is processed, and results are generated. The client interface is streamlined, making for easy navigation and timely analysis while providing an in-depth view of entire windows (forward and backward snapshots).

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After experiencing traditional CPM and FSA processes, analysts will appreciate:

- navigating project schedules with ease;
- having the flexibility to combine analysis methods; and
- allocating time savings toward building a proactive strategy with project teams.

$f ($ FPM has created an industry platform that allows analysts to transition from retrospective forensic analysis to contemporaneous, planned analysis. $)$

CONCLUSION

FPM's web-based, collaborative software provides a new paradigm for project schedule management and forensic scheduling. The core innovation of FPM's software reconstructs CPM project schedules into comprehensive, as-sequenced paths.

$f ($ FPM has impacted the FSA process by automating evaluations and allowing for in-depth analysis of key information in record time. $)$

Analysts can now get an inside look at specific events, discrete changes, and variances between constructed snapshots and across updates. Paths are easily stripped down to find any effect on a milestone for any update, streamlining navigation between snapshots based on context. Comparing concurrency, quickly understanding dynamic logic shifts, and efficiently tracking drivers to understand and assign cause are at the analysts fingertips. Results are viewable in real-time, allowing for continued and consistent analysis with controlled parameters.

$f ($ FPM dramatically scales the value of forensic output in both time and accuracy. $)$

Investigation and analysis are now natural and simple due to standardizing procedures and encouraging team collaboration. Streamlining the process allows for an elevated output where a combination of pre-processed information and user-inputs are ready for aggregation into business intelligence. FPM's cloud-based platform is easy to use, allowing customers to focus on their core business.

$f ($ FPM elevates the capabilities of analysts, providing software that creates momentum and innovates a path forward. $)$

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NO-REQUIREMENTS DEMO AVAILABLE

Experience our secure, no-obligation, free cloud-based demo at www.forensicpm.com or email info@forensicpm.com for more information.

REFERENCES

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