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Peer Review of a Schedule

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Peer Review of a Schedule

Introduction

In a recent report by the PMI recently (February 14, 2017) released, shows that Australia has a very poor track record, along with other parts of the world in managing large infrastructure projects. Cost blowouts and delays are common, especially in Government funded transport, hospital and communications projects. The NBN has had to recently obtain additional funding from the Federal Government. The new Royal Adelaide Hospital has overrun its budget by almost thirty percent and is will be over fifteen months late when it will be delivered.

A major area that the report focuses on is that billions of dollars in wastage on major projects continues to occur globally, but in recent years it has improved, however wastage in Australia still lags the improving global average.

Overseas the money wasted has fallen to $USD 97 million ($AUD 126 million) for every $USD1 billion invested in projects, it used to be an average of $USD122 million per $USD1 billion. The report indicates that currently Australian projects on average are wasting $USD108 million for every $USD1 billion spent. The report surveyed over 185 major projects in Australia.

The chief executive of the PMI, Mark Langley said that the latest survey in Australia identified a lack of talent for project management compared with the global average. Only 33 percent of organisations had a clearly defined career path for Project Management as opposed to 43 per cent globally.

To overcome wastage Lean Construction has been introduced in the past few years, ***LEAN*** is a manufacturing philosophy that removes non-value adding activity and changes all stakeholders in the value chain. ***LEAN Construction*** is the adaption of ***LEAN*** to project delivery. It is an excellent framework with which to deliver a transformation in ***construction*** productivity for major Australian large dollar value projects

Whilst it is true that many major projects do establish proper project management plans and schedules and follow the standard structured methodologies to ensure the project is viable, many do not. The most successful projects have invariably had “Peer” reviews of their project management proposals to ensure that a third party has validated those plans etc. and that they will truly deliver the project.

On investigating those which have failed, it was noted than many of them did not perform the necessary in depth project planning and scheduling as management did not see the value of spending the time and or the funding. No peer reviews or audits had taken place and as such any scheduling or cost shortcoming failed to be observed and so another project failure occurs. However it is well known that taking the time and properly funding the project management, planning and scheduling and perform independent peer reviews do deliver successful projects.

The ASC construction of the Collins class is a case in point when a full in depth project definition study was performed over a three year period which were heavily peer reviewed throughout that time ensured that before actually starting the construction phase it would be successful. These peer reviews (audits) meant all the likely problems that would occur on a $5.4 billion project (in 1991) were in the main resolved and that the project would achieve its goals which it did.

The use of Lean Construction techniques to prevent wastage and with a proper duration allowed to provide in depth planning and scheduling and cost controls with appropriate peer reviews and audits for all major projects will no doubt improve the rate of success in delivery.

Projects regardless of their type, industry and nature have failed for as long as humans have been trying to deliver projects on time. Until the current changes in Corporate Law, failure whilst not exactly tolerated did not cause too much concern at board level in past years. Now failures must be accounted for and the accounts need to show just what impact to either the bottom line or the shareholders' funds that such project failure causes. The shareholders of major corporate who fail to deliver a forecasted profit are on the warpath

Basically, failures are no longer easy to hide, and the legal profession will wax fat upon the litigation that surely and indeed is already occurring. However, it is not the board of directors who are issuing the writs, it is the shareholders, who are now starting to hold the board liable for the failure.

The statutory provision mandating continuous disclosure by listed companies was introduced on 5 September 1994 to support Australian Stock Exchange (ASX) listing rule 3.1. Statutory enforcement of this provision by the Australian Securities and Investments Commission (ASIC) remained dormant for many years with only limited application of the sanctions that followed the introduction of the Corporations Act 2001 (Cth) and further amended legislation in 2004. However, heightened activity by ASIC in 2006 was hoped as evidence that the regulator and the Courts would enforce the full range of penalties and remedies, from criminal proceedings to civil liability. Since then several cases were before the Courts because of legal action by the regulator and also by discontented company shareholders.

In New Zealand similar provisions exist under the control of the New Zealand Stock Exchange, so it is interesting to note the recent (February 2018) disclosure of failures to manage many construction projects on time and budget, by a major NZ construction company, may well have some legal consequences on the rapid demise of shareholder value. It is known that no peer reviews on projects were carried out, project after project were taken on without any recourse to the impact on corporate resources and cashflow and directors fiduciary duties to the shareholders.

With this increasing rate of project failures across the board, it is not just construction projects, it would be fascinating to learn how the boards of the banks and fund providers intend to deal with this problem, will they insist on proper Project Governance, Peer Reviews, Project Cost Controls, the current evidence would suggest that they will not.

A Peer Reviewer will note recent enforcement activity and the increasing litigation by shareholders against a listed company for a failure of relevant disclosure may provide an alternative to enforcement of continuous disclosure by ASIC and that the protection afforded to the Board and Directors is to have a proper understanding of Project Governance and Project Controls and that the project can be delivered successfully.

Peer Reviewing a Schedule

Establishing the peer review it has been assumed that the client is using Primavera P6, with versions running from V6.3 to 17.1. The peer review undertakes to examine the most common faults and deviations that occur in the Project Planning and Scheduling programs and plan as reviewed as the expectations as defined in the contract. Adherence by the contractor or client to "Best Practices Guides as annunciate by any of the Planning and Scheduling peak bodies such as the AACEi, PMI, APM, GAO, DCMA, AIPM are used as an industry wide basis for the review.
A major best practice reviewed are the Critical Design Elements which need to be specified to ensure the timely completion of the construction project.
Programs /Projects which do follow the best practices tend to demonstrate greater success in terms of outcomes and resource utilisation

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Establishing the review

Goals

- Examine and review the contract documents for both the contractor and sub-contractors to ensure that the program produced complies
- Examine and Confirm that the schedule is reasonable and attainable
- Determine that the Contractor's Means and Methods understandable
- Establish a good baseline for monitoring
- Verify and Validate durations
- Verify and validate logic and sequencing
- Identify claims positioning issues
- Identify risks in schedule and assumptions
- Ensure program delivers the contracted outcomes and expectations in terms of time and budget
- Document any variations, noncompliance and concerns found

Baseline Schedule Review (1)

- Review Scheduling Specification
- Confirm Submittal Completeness
- Develop familiarity with the Project (review the contract)
- Import Schedule & verify
- Review Schedule Architecture
- Review narrative of project description
- Review Sequencing
- Evaluate Metrics and Statistics using software products such as "XER Toolkit" or "Schedule Analyser Enterprise" to ensure data veracity
- Evaluate the project data against the US DCMA 14-point Criteria
- Perform Analysis
- Write Report

Baseline Schedule Review (2)

Review Scheduling Specification

- Section Numbers 101230 or 10.1.23.0
- Check Related Specifications Sections or special provisions
- Software Requirements

- Data Exchange requirements
- Master dictionaries / reports
    - Activity Codes requirements
    - ID coding requirements
- Preconstruction meeting
- Experience and qualifications of the scheduler
- Required submittal contents
- Client Contracted milestone dates and deliverables
- Determine Total Float ownership and document
- CPM network requirements
- Definition of Durations and Restrictions
- Initial Schedule Submission
- Fully detailed project schedule (baseline) submission
- Schedule updates
- Delay and extension of time
    - Notification requirements
- Early Completion schedules
- Final as-built submittal
- Resource and Cost loading
- Project Description requirements
- Prohibitions on manipulation

Baseline Schedule Review (3)

Gaining Familiarity with the project

- Review Plans and Specification
- Review project specific documents and manuals
- Visit project site
- Review construction methodology
- Bring in subject matter experts if necessary

Baseline Schedule Review (4)

Confirm Submittal Completeness

- Compare to contract schedule specification requirements
- Notify Contractor at once if not complete
- Do not start the review until submittal is complete
- Characteristic missing items
    - Schedule Methodology description
    - Electronic Files
    - Define explanation of Calendars, Lags, Activity Codes, Constraints, Resources, Costs

- Milestones and Definitions of Milestones
- If costs and / or resources are missing perform review in phases

Baseline Schedule Review (5)

Import Schedule & Verify

- Keep original submittal file, create copy to review
- Review in Original software if possible
- Recognize any issues with import in various software packages
- Create checklist to identify potential import issues
- Example – Microsoft MPX to Primavera 6 V8.4
  - Calendar Issues
  - Duration Issues
  - Blank Lines in MPX
  - Remove the Summary Task
  - Remove Summary Logic
  - Date Impositions
- Ensure and verify that imported schedule used to review and analyse is identical to the original submitted schedule
- Create Checklist for reviews

Baseline Schedule Review (6)

Review Schedule Architecture

- Validate Schedule Rules and settings
- F9 – Recalculate Schedule
- Review Organizational Tools

Review Schedule Construction

- Evaluate Activities – check against contractual requirements
- Review logic
  - Check for Missing Predecessors
  - Check for Missing Successors
  - Check for Open Ends
  - Check for superfluous logic
- Determine Validity of the Critical Path

Baseline Schedule Review (7)

Review Schedule Architecture

- Retained Logic vs Progress Override – Note Progress Override is not acceptable
    - Will not affect Baseline, but may cause optimistic predictions during status reporting
- Resource and Cost Rules
    - Estimate to Complete setting may allow Estimate at Completion to change
- Validate and understand influence of all settings and how they impact Earned Value Management and reports
- Evaluate how the Critical Path is calculated
    - Longest Path – Primavera
    - Total Float – zero value

Baseline Schedule Review (8)

Review Schedule Architecture

- Recalculate Schedule – ensure no changes to dates
- Validate all Completion Dates, validate against Contractual requirements
- Validate all intermediate milestones dates
    - Ensure Start Milestones are properly indicated
    - Ensure Finish Milestones are properly indicated
- Review Organizational Tools
    - Validate Activity Code Dictionaries
    - Validate Resource Code Dictionaries
    - Validate calendars – Global and User
    - Validate EPS
    - Validate WBS
    - Check for UDF's (P6)

Baseline Schedule Review (9)

Review Schedule Construction

- Evaluate Activities
    - Sort by Activity Description (Name in MS Project)
        - The AACEi Publication No 29R-02, is the guide used, as it is the recommended practice for Identification of Activities
        - Ensure all descriptions are consistent and unique and can stand alone
        - Ensure that all items in the project are visible as activities, procurement especially, contracted deliverables, design drawings and other admin work
        - Determine that the activity description does capture the full scope of work

- Compare descriptions for reasonable and comparable to the original duration
- Sort by original Duration
  - Review Contract for specification of maximum times
  - Ensure that the Original Durations are reasonable (no longer than "two status periods")

Baseline Schedule Review (10)

Review Schedule Construction

- Review Logic
  - Use of AACEi Publication No. 24R-03, the Recommended Practice for Developing Activity Logic for Guidelines
  - Check Open-ended relationships (Dangles)
    - There must only be two, the start and the end of the Critical Path Logic
    - Dangles caused inaccuracies in the critical path calculations and generates false Critical Paths
    - Beware of "dangling" activities resulting from SS or FF dependency lags
    - Negative durations on SS, FF or FS dependencies which will cause Predecessor open-ended after a status update
  - Evaluate Relationships (dependencies)
    - Check on all Lags
    - Filter by Trade, check same-trade relationships
    - Filter by Contractor, check those relationships

Baseline Schedule Review (11)

Review Schedule Construction

- Evaluate Critical Path
  - Is it reasonable and follow industry typical standards?
  - Does it start at the beginning of the project and run to completion?
  - Is there an appropriate level of detail?
  - Have there been any manipulations driving the critical path?
    - Sequestering Float where everything has been made critical
    - Manipulation where the Critical Path runs inappropriately through the client's responsibilities
    - The Critical Path is the only highly detailed string of activities in the project
    - Nothing is Critical due to heavy use of constraints
    - Numerous lags, maybe not identified, inserted in the Critical Path forcing it through specific activities

- Has there been any weather planning been included in Critical Path activities or will adverse weather cause slippage

Baseline Schedule Review (12)

Review Schedule Construction

- Evaluation of Near Critical Paths
  - Determine how much total float constitutes "near critical path"
  - What is the volume of work just off the Critical Path?
  - Review Longest Path and Lowest Total Float paths
    - Recommended review of Total Float is < ½ Reporting Period
  - Sort by Total Float
    - Validate reasonableness of high Float items
    - Is there a consistent range of TF?
    - Many activities with high Total float indicates under developed logic
    - All low Total float indicates inappropriate logic
  - Sort by Late Start
    - As expected this is the worst case scenario of work flow
    - Start at end of schedule and see if reasonable
    - Sort by Late Start, Order Week Ascending, check if the amount of work is possible
    - Review the Resources piling (view Histograms) can they fit into the spaces
  - Sort by Early Start
    - Sequence by Early Start, Order Week Ascending, once again review the amount of work planned each week is feasible and reasonable
    - How many resources are piling up?
  - Sequence by Early start, Sort by Late Start
    - Summarize to early Start, review the overlaps by each week
    - Focus the review on strong overlaps (indicates missing relationships)
    - Focus on small segments of project working concurrently
- Review Resources
    - Review for resource "soft" logic used to control flow of workers from area to area
    - Schedules without reasonable soft logic will be most likely to show a lot of high Total Float values (more than 5% is out of range as per DCMA)
    - Overuse of soft logic can sequester Total Float and forces Critical Path
    - Durations should be resource-based, that is it is calculated by Production Rate x Quantity, so resource planning is essential to project delivery success

Baseline Schedule Review (13)

Review Cost Estimates

- Examine the cost estimates for reliability, are they comprehensive, well-documented, accurate, and credible.
    - Comprehensive cost estimates completely define the program and reflect the current schedule and technical baseline. They are structured with sufficient detail to ensure that cost elements are neither omitted nor double-counted.
    - Well-documented cost estimates which can easily be repeated or updated which can be followed through to the original sources via an auditing process
    - Accurate cost estimates are developed by estimating each cost element using the best procedures from the data collected. Accurate estimates are based on appropriate inflation.
    - Credible cost estimates are discussed and will have documented any limitations of the analysis, including uncertainty or bias surrounding source data and assumptions. The assumptions are varied to determine how sensitive they are to changes. Best Practices Related to Developing and Maintaining a Reliable Cost Estimate will be used.

Combating Wastage

As previously stated combating wastage in major or indeed any project can be aided by the effective use of Lean Construction Techniques.

What are "LEAN" Construction Techniques?

It is "A way to design production systems to minimize waste of materials, time, and effort in order to generate the maximum possible amount of value." Koskela, L., Howell, G., Ballard, G., and Tommelein, I. (2002). "The Foundations of Lean Construction." Design and Construction: Building in Value, R. Best, and G. de Valence, eds., Butterworth-Heinemann, Elsevier, Oxford, UK.

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Peer Review Checklist

As per AACEi, PMI, APM,DCMA and GAO scheduling best practice guides

- All construction activities must have at least one predecessor and successor. Only "Start Project" and the "End Project" are open ended.
- Must have a proper EPS and an applicable WBS & Cost Coding Structure
- Must have applicable Procurement activities to material activities
- Must have detailing, spooling and prefabrication to support construction installation.
- The "As-Planned" CPM network is based on conditions known on bid-day.
- Must be able to indicate work flows (trade crew movement requirements) and work packages
- The total work scopes as defined by the WBS must have at least one work activity package.
- All necessary logic restraints are clearly established within the schedule.
- Can occur without interruption from other activities.
- Do not stop an activity so that other trades can work, then resume; multiple trades per activity should further detailed.
- Has a usable metric for measuring, e.g. (1000 mtrs. of pipework or 400 M^3 of Concrete, or 650 globes, etc...).
- Construction activity durations should be between 10-15 work days.
- Relationships are Finish-to-Start or Start-to-Start AND Finish to Finish. SF relationships are not used.
- No Negative lags (leads) used.
- Should be resource loaded with direct labour workhours to forecast labour requirements
- Should be cost loaded to forecast cash flow throughout the project.
- Procurement, Submittals, Reviews, and material deliveries are identified.
- Relationship Lags do not exceed the Predecessor Duration.
- Weather sensitive work is properly assigned to a Weather sensitive calendar.
- Normal weather is programmed into the CPM network calendar.
- All holidays and Union RDO's are present in the calendar
- Contract milestones are calculated using a Finish On or Before constraint so that backward pass calculations are properly determined.
- No hard constraints used i.e. "Must Start or Finish On"
- Must include QA/QC activities as well as Testing and Commissioning.
- Each activity is assigned to a responsible foreman.
- All UDF's have been specified and identified in a dictionary
- Obtain input and gain formal commitment (buy-in) from all project team members (foreman, superintendents', etc.).
- Signed off by the Stakeholders as being "Fair and acceptable"