Predicting Completion, a Governance Requirement

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Introduction

Governance has three basic functions:

1. Designing the organization's culture, ethics, and objectives to provide the best outcome for its stakeholders. This evolves into the organization's values and mission, which are implemented through its policies and strategy.
2. Building a management team that is capable of achieving the objectives, working within the desired cultural and ethical framework.
3. Requiring assurance and feedback from management that they are delivering the intended outcomes, or highlighting challenges and issues that need addressing.

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Introduction

Within this framework, organizations need to know when their projects are expected to finish!

Not knowing is not an option!

- The governing entity is responsible for requiring an effective controls framework
- Management is responsible for applying the framework effectively,
  - And, using the information appropriately,
  - And, reporting correctly

The governing entity requires assurance this is being done

Not knowing when a project will complete should be unacceptable

Introduction

Traditional 'hard' projects have been managed using CPM and/or EVM for decades

These controls can provide a reasonable prediction of completion

Provided the tools are applied appropriately

But there are a class of projects where CPM cannot provide a solution – there is no particular requirement to undertake the work in any sequence

These are defined as 'Class 3' Projects

- Distributed projects
- Soft projects

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Managing soft projects

Soft projects have largely abandoned CPM and gone 'agile'

There are many different forms of agile involving different tools and techniques
- Scrum, SAFe®, Disciplined Agile, Kanban, etc.

Across all of these different methodologies, the essence of agile remains:
- Intelligent flexibility; the people doing the work choose what to work on next
- Scope changes are welcome as long as the change increases the overall value
- Focus is on deliverables (early and often) and the project stakeholders

But there are only limited controls tools to measure progress
- Burndown charts, Kanban boards, etc

Virtually none to consistently predict the expected competition

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Managing distributed projects

An example: **Replace 200 Telstra pits in a suburb**

Work involved:
- Prerequisites:
  - Somewhere to dispose of the old pits (hazardous material)
  - New pits to install (procurement)
  - Trained people
  - Notice to home owners before work in street
- Repetitive element
  - Remove old fibro cement pits (asbestos hazard)
  - Replace with new 'plastic pits'
  - Tidy up the area
- Finalize the project

The repetitive work can be done in almost any sequence……..

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Managing distributed projects

The degree of constraint on the sequencing of work varies across a spectrum

Very few constraints → Highly constrained

Almost any sequence of work is acceptable	Considerable flexibility in some aspects of the work but not others	The sequence of work is largely predetermined
Agile approaches to management work well	Overall work flow needs deterministic planning but agility is required to optimize some aspects	Traditional deterministic (CPM) planning works well

Managing distributed projects

Concept of CPM classes developed in ***Scheduling Challenges in Agile & Distributed Projects***

1. **Physically constrained** – there is only one viable work sequence
2. **Practically constrained** – management has agreed the one best work sequence
   - A road can be built from either end – But, once management decide on the start point all of the work needs to follow the imposed flow in sequence
3. **Overarching constraints** – Soft and distributed projects, there is a required overall sequence of working, with varying degrees of flexibility in the way the detailed work is performed
4. **Arbitrary constraints** – there is no required sequence of working (as in Class 1 or 2), but management has decided to impose a detailed sequence of work as a matter of choice

CPM works well in Class 1 & 2 projects

CPM is suboptimal in Class 3 & 4 projects

- Class 4 projects are facing legal challenges – should be managed as Class 3 projects
- Class 3 projects need improved management tools – the focus of this presentation.

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Managing Class 3 projects

Distributed projects need a pragmatic strategy:

- An appropriate level of detail in an overall 'road map'
- There are always likely to be some mandatory sequences that must be followed – this must be planned
- Then let the people doing the work take over – focus on resource workflows and optimization

Agile and Lean focus on the team knowing what's best but their planning focus is short term

Balancing overall constraints with flexibility to optimize resource utilization and overcome issues means:

- There is no 'one-size' solution, controls need to be designed for the project
- Standard forms of contract need to recognize the challenge
- There is a lot of similarity between managing a distributed project and managing a soft project

These issues are discussed in more detail in: ***Scheduling Challenges in Agile & Distributed Projects***: https://mosaicprojects.com.au/PDF_Papers/P208_Scheduling_Challenges_in_Agile_+_Distributed_Projects.pdf

Challenges in the absence of CPM

The courts have identified the failings in CPM when applied to distributed projects (Class 3 & 4)

The industry has identified the failings in CPM when applied to agile projects (Class 3)

But without a CPM schedule there are major challenges in:

- Measuring how is the work progressing to identify issues and opportunities
- Predicting project completion in a consistent and defensible way
- Assessing the consequences of delay and disruption to calculate EOTs and delay costs

This problem affects:

- All distributed projects
- All agile projects where development is done in sprints or iterations (not just IT)
- Projects using 'lean construction' and 'last planner' techniques

An effective solution to these problems is also likely to work on Class 1 & 2 projects, allowing the CPM schedule to be used proactively rather than contractually

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Assessing progress without CPM

Assessing progress needs to be based on comparing:

- The amount of work actually achieved at a point in time with
- The amount of work planned to have been achieved at the same point in time

This needs an impartial measure to assess the quantum of work planned and achieved, options include:

- Monetary values ($)
- Function or story points
- Physical unit counts, or
- Any other metric that can be impartially assessed and is consistent across most of the project's work

Note: Hours of effort not appropriate:

- Planned hours can be impartially assessed, but
- Hours worked do not directly relate to the quantum of work actually achieved by the workers

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Predicting completion without CPM

Predicting project completion in a consistent, defensible and repeatable way is essential

Existing approaches that have been shown to be accurate include:

- Earned Schedule (an extension to Earned Value Management)
- Earned Duration

Both use a process that:

- Identifies the quantum of work achieved to a point in time
- The point in time when this amount of work was planned to be achieved
- Calculates the ratio between the time needed, and the time planned, to complete the quantum of work
- Applies the ratio to the overall project duration to calculate an expected project completion date

The results are more reliable than CPM updates, repeatable, and defensible

This concept can be applied to distributed and agile projects

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Applying EVM to Class 3 projects

A lot of work has been done on applying Earned Value Management (EVM) to Agile projects

The system works!

The same approach will work for applying EVM to all soft and distributed projects (Class 3)

The key elements of applying EVM to Class 3 Projects are:

- Work packages need to be focused on deliverables, not activity (sprints are an activity)
- All similar deliverables that will be produced by a single resource crew are best in the one work package:
  - The 'crew' may choose to work on any of its deliverables in any order
  - The key question is are they producing enough?
- Deliverables need to be countable and sizeable (eg, stories and story points with $ attached)

When EVM is applied effectively, Earned Schedule (ES) solves the rest of the issues:

- Determining current status ahead / behind
- Determining the predicted completion date

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Applying EVM to Class 3 projects

The only schedule input required is an assessment of when each work package can start and finish

- This sets the time element of the Performance Management Baseline

There is no need for a complex CPM schedule, simple heuristics will work most of the time

- A Bar Chart (Gantt Chart) is acceptable
- But there's no reason not to use a CPM schedule

Consider the schedule needed for the '***Telecom pit replacement***' project – 200 pits

- Contract period 13 weeks (3 months)
- Allow 2 weeks for initial procurement and training
- Allow 1 week for initial learning – 10 pits only
- Allow 1 week at the end for project finalization
- Therefore 9 weeks are left to install 190 pits = 21 per week (adjust week 1 to a target of 11 pits)
- **Note**: a contingency may be needed for inclement weather??

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Applying EVM to Class 3 projects

There may be 3 or 4 work packages – based on the schedule:

- Procurement – Weeks 0 to ? 5 or 6 (the end will depend on the situation)
- Training – Weeks 0 to 3 (includes initial installs of 11 pits)
- Installation – Week 4 to 12 (at 21 pits per week)
- Asbestos disposal – Weeks 4 to 13
- Close out – Week 13

Based on this data, a standard EVM PMB can be established and performance measured

Based on the EVM data, ES can calculate the current status and predicted completion date

EVM does not need to be complex:
https://mosaicprojects.com.au/Mag_Articles/AA015_Practical_EVM.pdf

But this presentation is focused on the projects that are not using EVM

Work Performance Management

Surveys show most projects do not use CPM or EVM for a variety of reasons

CPM has been found inappropriate for use on distributed projects

Agile methodologies have been designed not to use CPM

Work Performance Management (WPM) is designed as an alternative approach to project controls:

- Primarily for use in Class 3 (soft and distributed) projects, and is
- Also applicable to smaller / simpler Class 1 and 2 projects

The calculations can be run in a simple spreadsheet

The approach is based on Earned Schedule
(but without the need for either EVM or a detailed schedule)

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Work Performance Management

WPM compares the amount of work planned to be accomplished to the amount of work actually achieved in a period

WPM focuses on the core elements of the work, peripheral and support elements can be ignored

WPM can be used to give reasonably reliable information about the current status and predicted completion of a project

The measure of 'work' can be flexible: $, Story Points, Telecom pits, etc.

All that's required is consistency

Work Performance Management

The inevitable acronyms are:

- **WP** = Work Planned (measured in an appropriate unit – cumulative over time)
- **WA** = Work achieved (measured on the same basis as WP)
- **PC** = Planned completion (number of time units, days, weeks, months)
- **TN** = Time Now (number of PC time units to the date of assessment)
- **TE** = Time Earned (the number of PC time units to the point where WA = WP)
- **WPV** = Work Performed Variance (TE - TN negative values show schedule slip)
- **WPI** = Work Performed Index (TE/TN values less then 1.0 show schedule slip)
- **EC** = Expected completion (calculated by PC/WPI = EC)

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Work Performance Management

So how does this work? The following example is based on the '***Telecom Pit Project***'

1. Plot the measure of performance to create a project baseline:
   200 Telecom pits replaced
2. Using previously planned durations:
   - Contract period 13 weeks (3 months)
   - Allow 2 weeks for initial procurement and training
   - Allow 1 week for initial learning (11 pits only)
   - Allow 9 weeks to install 190 pits at 21 per week
   - Allow 1 week for project finalization

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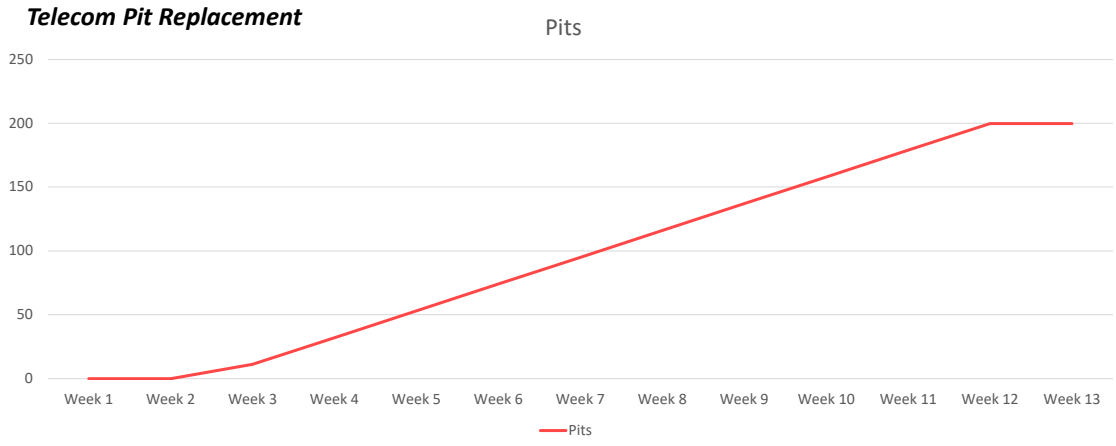
Work Performance Management



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Work Performance Management

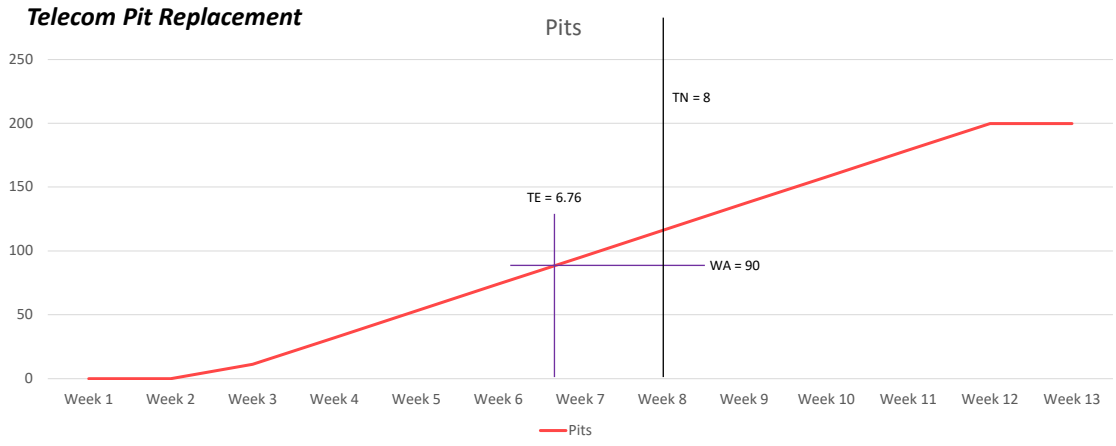
Measured progress at the end of Week 8:

Time Now = 8	**TN = 8**
The actual progress is measured at 90 pits complete	**WA = 90**
The planned progress at Week 8 was 116 pits complete	**WP = 116**
90 pits were planned to be achieved during week 7 74 at the end of week 6 + 16/21 = 0.76 of week 7	**TE = 6.76**

WPV = 6.76 - 8 = **-1.24** weeks behind schedule

WPI = 6.76/8.0 = **0.845**

Work Performance Management



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Work Performance Management

The predicted project completion is calculated as:

EC = PC/WPI 13/0.845 = 15.38 weeks

The project is expected to complete 2.38 week (or 2 weeks 2 days) late

WPM is a simple robust performance measurement system that provides an accurate assessment of the project's status from a time management perspective

The two requirements to implement WPM are:

- A consistent measure of work planned and accomplished (it is not necessary to include everything)
- A simple but robust assessment of when the work is planned to be done

Conclusions

WPM provides a robust, simple system to measure the performance of work and assess the likely project completion date

The metric used can be a core deliverable (eg, 2000 computers replaced in an organization) or a representation of work such as the $ value of the components to be delivered

Peripheral and support activities can be ignored, they rarely impact the project delivery independently – failures in the support areas typically manifest in the primary delivery metric

WPM **is not** an alternative to EVM and CPM on major complex projects

WPM can provide a cost efficient, simple, rigorous controls tool for the many projects that are either:

- Relatively small requiring a straightforward controls tool, or
- Large, but with a single primary deliverable that is easy to measure, or
- Fall into the Class 3 classification of agile or distributed projects (but choose not to apply EVM)

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Conclusions

The 'agile' approach is to assume the client, end user, and delivery team work together to proactively solve problems and create success – this is a good idea if it works….. **but**, WPM can provide the missing controls discipline

In many situations, traditional contracts are not fit for purpose – CPM does not work on agile and distributed projects*

Currently, the only management approach for dealing with continual change is to:

- Keep rigorous and detailed records of everything
- Provide all of the notices and determinations in the time required
- Try and sort the mess out afterwards by negotiation or mediation

* CPM can be forced to work on some Class 3 & 4 , but requires constant changes to the baseline schedule to accurately reflect the changing work sequences as they evolve over time.

Conclusions

There is a lot of work needed in this area:

- Contract improvements are required to allow the use of WPM
- Protocols need to be developed for dealing with the issues pragmatically within existing forms of contract
  - For the contractor
  - For the superintendent / client
- Governing bodies requiring to know when their projects are predicted to finish and the basis of that prediction
- *The use of a simple tool to implement WPM*

For more on WPM see:
https://mosaicprojects.com.au/PMKI-SCH-041.php#WPM

Updates will be posted to the PGCS Linked-In page at https://www.linkedin.com/groups/12819082/
Join to be kept up to date.

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Conclusions

Implementing WPM is straightforward – this example is from an Excel spreadsheet:

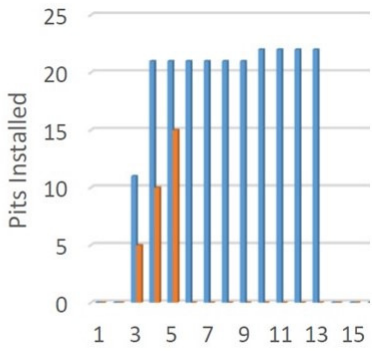
Telstra Pit Replacement

Time Now = 02-Jun-23

Planned Completion	14 Weeks	
Time Now	5 Weeks	
Time Earned	3.9048 Weeks	
Work Performance Variance	-1.0952 Weeks	(-5.5 Working Days
Work Performance Index	0.7810	
Expected Completion	17.9268 Weeks	
Variance At Completion	-3.9268 Weeks	(-27.5 Calendar Da
Expected Completion Date	**03-Sep-23**	

Note: This date is an approximation, WPM does not include a detailed calendar.

WPM Update Report



Work per Time Unit

Questions?

Contact the presenter at:

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