Baked In Optimism – Why so many projects fail

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Introduction

Most projects finish late

Most projects overrun budget

Many finish over time, over cost, and fail to deliver the intended scope!

The problem has been discussed for decades

There are many theories and 'solutions' (and consultants selling solutions)

But the problem has not gone away!

This presentation will not attempt to solve the problem

But it will identify two solvable issues to potentially help reduce the problem.

Introduction

Outline:

1. A brief review of the problem and some published solutions
2. The estimating challenge:
   - A simple definition of good estimating practice
   - The problem of the 'Long Tail'
3. The controls challenge:
   - A simple definition of good controls practice
   - The problem of predicting the completion cost
   - The problem of predicting the completion date
4. Some conclusions

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Reviewing the problem

This presentation is focused on project management failure – not meeting time and cost targets

Projects may still be valuable, even successful, despite overrunning time and cost

But when a project overruns time and cost someone has a problem

Good governance and good management:

- Need to know what they are committing to
- Need to understand if the commitments are being achieved
- If not, what is the expected outcome

Problems need identifying early
(**even if 'they' do not want to know**)

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Reviewing the problem

Things that don't work:

- Blaming the project manager
  - Most of the time, the traditional sacrifice really does not help – the new guy needs time to get up to speed
  - You have just spent a lot of money training the person in what not to do…..
- Blaming the estimators, schedulers and other support people
- Blaming the unique and unexpected 'one off' situation encountered 'this time'

Things that help reduce cost and time overruns:

- Adequate time and skills to produce a good plan (front end loading)
- Proper evaluation of risk and uncertainty (adequate contingencies)
- Effective support for the project delivery team (Sponsor / SRO)
- Using effective project controls processes (EVM, CPM, etc.)
- Developing an open and accountable culture

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Dealing with the problem

Governance options:

Design for success (break the problem into smaller units – phased development)

Gateway processes (where 'no go' is a real option)

Reference Class assessments:

- Add a contingency based on the average performance of past projects (Bent Flyvbjerg)
- But this approach reinforces failure (Mr Sirish Parekh, PGCS 2022)

Deal with the optimism bias, the "Hiding Hand", and other cultural issues (Bent Flyvbjerg)

It's a 'wicked problem' – any solution needs many subtle facets evolving over time

For more on ***Governance*** see: https://mosaicprojects.com.au/PMKI-ORG-005.php#Process3

For more on ***Reference Class Forecasting*** see: https://mosaicprojects.wordpress.com/2017/05/23/the-reference-case-for-management-reserves/

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Dealing with the problem

What can be done today?

1. The C-Suite needs to acknowledge there's a systemic problem and deal with the consequences
2. Estimators and project controls people need to step up and start improving processes to minimise under estimating/reporting
3. Recognise project time and cost overruns are largely caused by:
   - The project being underestimated
   - Management ignoring the estimate – they know best
   - The project being poorly managed
   - Any combination of the above
4. But, errors in predicting outcomes are almost always a project controls failure

Root causes of the problem

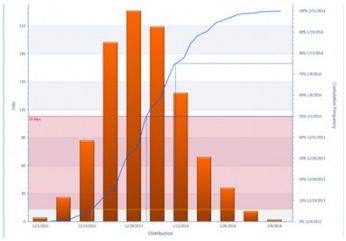
Some of the root causes of the estimating and controls issues are:

1. Inadequate consideration of risk and uncertainty (they don't go away if you ignore them)
2. Using traditional optimistic controls processes – the focus of this presentation
3. Skills and resource issues – good estimators and controls people are hard to find
4. Senior management who either don't understand, or don't want to understand projects are inherently risky

Under estimating – Cost & Time

Where good practice sits:

1. Detailed cost plans and schedules improve accuracy (within reason)
2. Point estimates are essential for control ($ or duration)
3. Range estimates are needed to assess likely outcomes (3-point is traditional)
4. Risks must be assessed and quantified (probability / impact / range)
5. Monte Carlo is the best tool for combining variability and risk to establish the probability of completing (date and time ranges)
6. Combining cost and schedule risk modelling is essential
7. Contingencies are set based on management's risk appetite

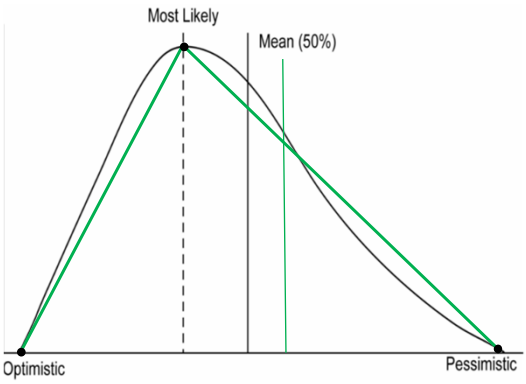


For more on ***Monte Carlo*** see: https://mosaicprojects.com.au/PMKI-PBK-046.php#Process2

The problem of the 'Long Tail'

Three Point Estimates are still optimistic!

What we use:



Optimistic and pessimistic estimates may be at 1% probability of not being exceeded, usually much higher (say 5%).

But – we don't really know.

The problem of the 'Long Tail'

Three Point Estimates are still optimistic!

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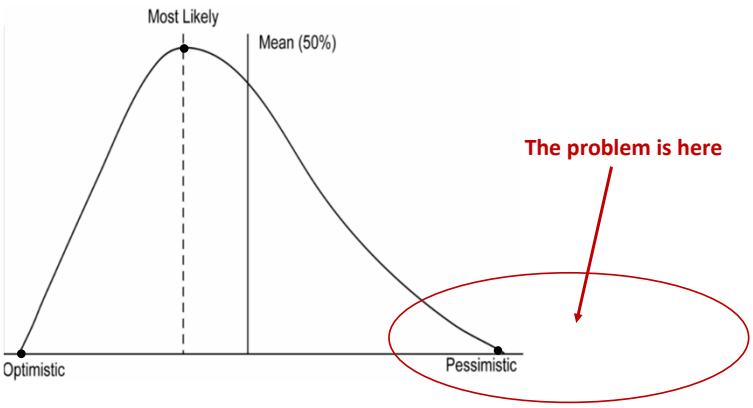

The problem of the 'Long Tail'

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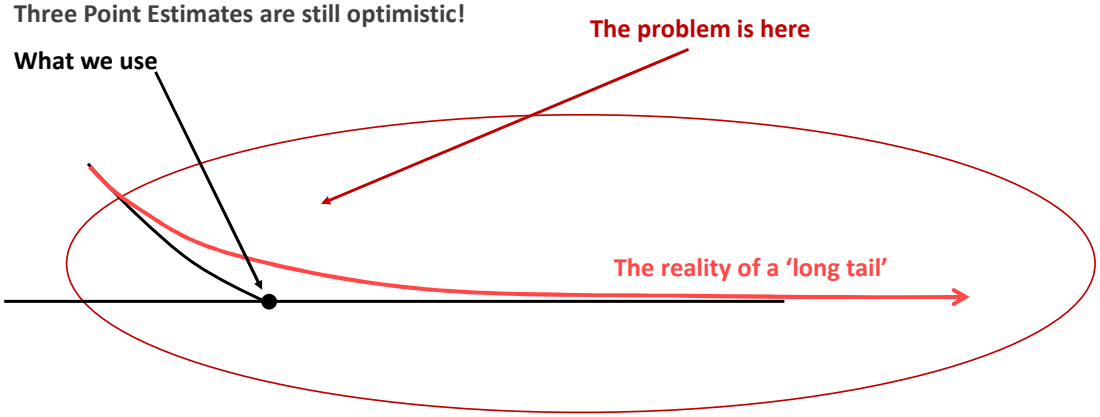

For more on ***A Long Tail*** see: https://mosaicprojects.wordpress.com/2009/07/21/a-long-tail/

The problem of the 'Long Tail'

Things to think about:

1. Costs and durations undershooting the optimistic estimate are constrained 'zero' is as low as you can go
2. Costs and durations overshooting the pessimistic estimate are unconstrained there is no upper limit
3. 'Long Tails' are not 'Black Swans', they are entirely foreseeable, low probability, high impact occurrences
4. If you have 2000 line items, and a 3% probability of the cost or duration not being exceeded you are predicting that the pessimistic estimate will be exceeded 60 times
   - 100% of these occurrences will add to the cost
   - Schedule depends on 'float' and other factors

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The problem of the 'Long Tail'

Things to think about:

5. I do not know how to model this effect – you need statisticians to sort this one out
6. But accepting a **P80** estimate after a 'three point' Monte Carlo analysis means:
   - The expected project failure rate will be predictably greater than 1 in every 5 projects failing
   - We do not know what the actual predicted failure rate is
   - The failures could be quite extreme (because of the long tails)
7. Most managers think P80 means a guarantee of success – "look at all of the contingency"
8. Only a minority of projects do Monte Carlo properly
9. Even fewer integrate time and cost in a structured risk assessment (FICSM / JCL analysis)

Houston, we have a problem!

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The problem of the 'Long Tail'

10. Most risk events are two dimensional (standard Monte Carlo only deals with one):
    - Low impact occurrences have a higher probability
    - High impact occurrences have a lower probability
    - Thinks of vehicle accidents:
      - Minor fender benders are relatively common
      - Total write offs are relatively rare
      - both of these and the continuum between are 'vehicle accidents'
11. Assuming the cost estimate or schedule is correct is dangerous (but done well they are as good as you can get)

Estimators & Schedulers

~~Houston~~ , we have a problem!

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Predicting Completion

Accepting there is always uncertainty in cost estimates and schedules makes predicting the expected projected project outcomes a vital governance process

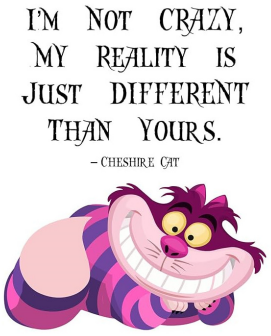
We cannot know the level of uncertainty

Contingencies create a buffer, but you cannot know if it is adequate

The future is not predetermined – it is created by management decisions

Knowing where we are (current status), and predicting the likely outcome underpins decision making

Which in turn creates the future for the project



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Predicting Completion

Accepting uncertainty and applying agility creates the best opportunity for success

Unlike Alice, a project manager needs to know:

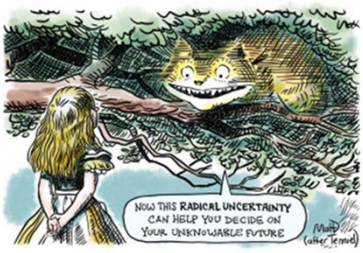
1. Where the project currently is, and
2. Where she would like it to finish up……

Controls people are responsible for assessing:

1. What the current reality is (status)
2. Where the project is currently heading (predictions)

And, understanding the options and uncertainties

For **Cost** and **Time**



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Predicting Completion - Cost

There is a disconnect between project controls and project accounting

Accounts people:

1. Use accrual accounting to assess the current expenditure per line item
2. Calculate the unexpended budget (Budget – Spent [per line item])
3. Make some adjustments (maybe) for over expenditure and 'other costs to complete'
4. Add it all up and create the forecast cost

Most managers have a background in finance and understand this

Modern accountancy has a 1400 year pedigree – they have the power

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Predicting Completion - Cost

Project controls people have Earned Value (EVM)

Earned Value Performance Management:

1. Measures the work actually performed
2. Based on the budget assesses the value of the work performed
3. Calculates the actual cost of performing the work
4. Compares the value achieved to the cost of the work to assess the cost performance index
5. **Scales** future expenditure based on the cost performance index to assess the money still to be spent
6. Adds the actual cost to date to the forecast costs needed to complete the project to obtain the total predicted cost of the project

Predicting Completion - Cost

Issues and challenges

Actual costs are (or should be) the same in both the project and the accounting system

The accounts approach assumes future costs are more likely to be aligned with the budget (very optimistic)

The EVM approach assumes future cost performance is more likely to be aligned with past performance (somewhere between pragmatic and pessimistic)

Both approaches have challenges dealing with contingencies

- In EVM applying contingencies can mask cost variances and make the CPI look better
- Accounting usually only adjusts contingencies when money is actually used

When the two systems diverge, senior management is likely to look to the accounts system in preference to the EVM predictions – EVM is not a financial reporting tool

Predicting Completion - Time

Predicting time outcomes is fully within the project controls domain

That's the good news! The bad news includes:

1. Most projects do not run an effective schedule management process – bar charts, burndown charts, kanban boards, or nothing are common (Excel is the most commonly used tool)
2. Where schedule management is applied, CPM is the default standard process
3. The technical quality of many CPM schedules if very poor
4. The CPM paradigm is not well adapted to managing resource allocations / requirements
5. Very few projects routinely status and update their CPM schedules
6. AND…… CPM is wildly optimistic!

See: https://mosaicprojects.com.au/PDF_Papers/P117_Why_Critical_Path_Scheduling_is_Wildly_Optimistic.pdf

Predicting Completion - Time

Most project managers do not use the schedule as a key input to decision making for the reasons outlined before plus the lack of skilled schedulers

But in the rare instances where there is a good quality, well maintained CPM schedule is it fit for purpose?

CPM is good for:

1. Laying out a logical plan for undertaking the work
2. Calculating the time needed to complete the project and the critical path
3. Telling resources what they are expected to do next (it is a good planning tool)
4. Recording progress based on statusing the schedule

For more on ***The Role of Scheduling*** see: https://mosaicprojects.com.au/PMKI-SCH-010.php#Process2

Predicting Completion - Time

CPM is not so good for:

1. Balancing and optimizing the use of resources
   (you need 'common sense for this)
2. Dealing with out of sequence working (retained logic and progress override only go so far)
3. Predicting completion (more in a minute)
4. Assessing delay and disruption (because of items 1, 2 & 3 above)

But to a large extent CPM is all we have at the moment…….. *Watch this space*.

Predicting completion based on a CPM schedule needs additional considerations

For more on ***Predicting Completion*** see: https://mosaicprojects.com.au/PDF_Papers/P217_Calculating_Completion.pdf

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Predicting Completion - Time

The fundamental problem with standard CPM is its assumption that all future works will be accomplished as planned

Activities in progress can be adjusted by using the estimated time to complete (rather than the % of the original duration achieved)

But there is no way of scaling future activity durations based on past performance – in most contracts this is prohibited!

The burning of float has no consequences until the float is used

Therefore, the predicted completion date will inevitably be optimistic

This optimism is not 'bad' – it can be used as a powerful motivator to lift future performance

But hope is not a strategy – management also need to know the likely completion date

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Predicting Completion - Time

Predicting the completion date using CPM is a challenge:

Which option is correct?

Predicting Completion

There are better alternatives:

1. Use the Earned Schedule extension to EVM
2. Use Work Performance Management (WPM)

In the example above, CPM shows the project to be 3 or 4 weeks (1 month) late (depending on how out of sequence progress is managed)

Earned Schedule and WPM predict the likely project completion will be **four months late**!

The different results are based on the embedded assumptions about future work
For a detailed discussion see:
https://mosaicprojects.com.au/PDF_Papers/P217_Calculating_Completion.pdf

Predicting Completion

But both of these alternatives require additional systems and are not based on the schedule…….
(they look at the quantum/value of work planned and performed**)**

A schedule based approach is to modify the concept in *Earned Duration* and WPM to assess the schedule performance

1. Count the number of *activity days* work planned per working day to set the baseline
   - Early and late date accumulations give a range
2. Count the number of *activity days* work achieved to date
3. Use the WPM formula (based on Earned Schedule) to calculate the likely completion (or just set up a simple spreadsheet for the two options)

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Predicting Completion

Modify the concept in Earned Duration and WPM to assess the schedule performance

Planned rate of progress = 20 activity days per month = 40 to date
Actual rate of progress = 20 days achieved (50% of planned)
Early and late curves are the same in this example

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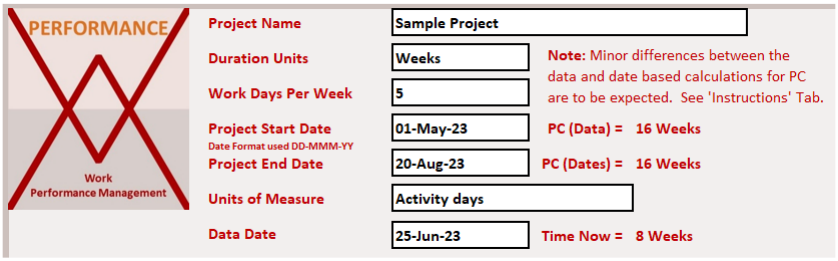
Predicting Completion

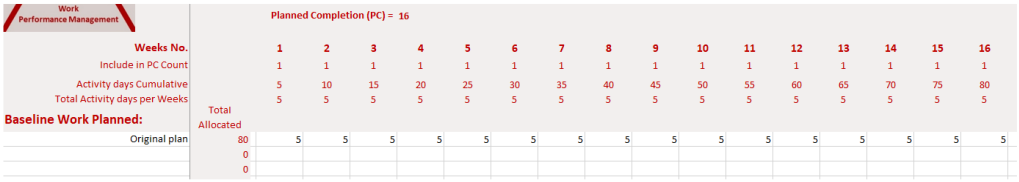
Calculated completion using WPM to assess the schedule performance – set up the project



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

Predicting Completion

Calculated completion using WPM to assess the schedule performance – set up the project



Predicting Completion

Calculated completion using WPM to assess the schedule performance – add progress

Work Performance Management

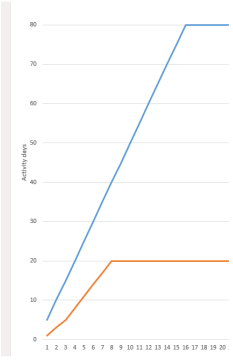
		Time Now (TN) =		8		Time Earned (TE) =	4.0000			
Weeks No.		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Include in TN Count		1	1	1	1	1	1	1	1	
Activity days Cumulative		1	3	5	8	11	14	17	20	
Total Activity days per Weeks		1	2	2	3	3	3	3	3	0
Baseline Work Accomplished:	Total Recorded									
Work accomplished	20	1	2	2	3	3	3	3	3	
	0									

Predicting Completion

Calculated completion using WPM to assess the schedule performance

Planned Completion	**16 Weeks**	
Time Now	**8 Weeks**	
Time Earned	**4 Weeks**	
Work Performance Variance	**-4 Weeks**	**(-20 Working Days)**
Work Performance Index	**0.5**	
Expected Completion	**32 Weeks**	
Variance At Completion	**-16 Weeks**	**(-112 Calendar Days)**
Expected Completion Date	**10-Dec-23**	

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



Predicted completion is based on average performance to date (not current performance), and
Assumes this will continue – change the performance, and the Outcome will change.

Conclusions

This presentation highlights many challenges –
most are in senior management space:

1. We need investment in estimating and project controls skills (beyond using tools)
2. We need to take a really close look at the tools and techniques used – they need improving
3. Management has to be trained to use the information we create and accept reality

Ultimately, this is a governance challenge and changes in the laws mean 'not knowing' is no longer an options for commercial Directors

Artificial Intelligence (AI) tools may be the catalyst for change (but the tools need training properly)

Integrated systems (BIM / Digital Twins) may also dive change when cost and schedule are embedded in the models. **But better tools are only part of the challenge**

Conclusions

There is a lot of work needed in this area:

- Contract improvements are required to allow the use of WPM or other advanced tools
- Protocols need to be developed for dealing with the issues pragmatically within existing forms of contract
  - For the contractor
  - For the superintendent / client

Watch this space, we are working to develop the concept of 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.

Questions?

Questions can be asked on-line now (typed Q&A), or

Contact the presenter at:

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