

Project Controls Expo, Australia – 26th November 2019

Melbourne Cricket Ground, Melbourne

Project Controls & Earned Value Management

Application on Mega Projects

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John Holland

**JOHN
HOLLAND**



**Project Controls
EXPO**
Melbourne, Australia

About the Speaker

Sangrah Bhatia – Project Controls Manager, John Holland

- Over twelve years of experience in the Engineering & Construction industry across Project Controls, Earned Value Management (EVM), Risk Management and Systems Implementation
- Experience on projects in the Infrastructure, Building, Defence, Rail, Oil & Gas, Mining and Utilities sectors ranging from \$1m to \$2bn
- Focus on implementation and execution of best practice Project Controls and Earned Value Management systems, processes and methodologies
- Member of Engineers Australia, Australian Cost Engineering Society (ACES) and Australian Institute of Project Management (AIPM)
- Holds a Bachelor of Engineering (with Honours), Graduate Certificate in Engineering Maintenance Management and an MBA

What is Earned Value?

An objective assessment of the value of work completed to date

$EV = \text{Budget} \times \% \text{ Complete}$



What is Earned Value?

What?

A way to capture a project's scope, expressing its progress as money (relating to the cost budget) and phasing it over time.



Compare Value and Cost

- Budgeted cost of work performed
- Actual cost to date

Compare Earned against Planned

- Budgeted cost of work performed
- Budgeted cost of work planned
- "Volume of Work" not Critical Path



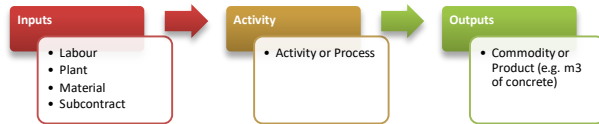
Why Earned Value?

- Provides early warning system for developing project issues
- Facilitates proactive management and project optimisation
- Drives achievement of progress “volume” month by month
- Integrates Scope, Cost and Time elements together and promotes objective measurement of work performed
- Time and cost assurance to stakeholders
- Provides an independent assessment of your forecast based on cost performance and progress to date
- Helps to eliminate project surprises



Approach

- **Establish WBS and CBS**
Establish an agreed Work Breakdown Structure and Cost Breakdown Structure for the project. Integrate with both Program and Cost Estimate
- **Leverage Existing Information**
Utilise existing project information such as the Baseline Cost Estimate and Baseline Program Schedule to create EVM model
- **Choose Objective Measures**
Choose objective progress and performance measures (Quantities) on project and establish appropriate “Rules of Credit” for capturing progress avoiding % Spent and % Complete where possible





Using the Data

Compare Earned Value (EV) with Cost

- Compare Earned Value (EV) against Actual Cost at multiple levels
- **Cost Performance Index (CPI)** = $\text{Earned Value} / \text{Actual Cost}$.
- Ratio of value of work performed compared to spend
- Use **Cost Variance (Earned – Actual)** as a guide in project forecasting. Look at % **Cost** compared to % **EV**

Compare Earned Value with Plan

- Compare Earned Value (EV) against Planned Value (PV)
- Gives an independent check of schedule on a “volume of works” basis
- **Schedule Performance Index (SPI)** = $\text{Earned Value} / \text{Planned Value}$
- Can we achieve the work to go? Is a step change required?

The Journey at John Holland

30

*Projects across
Infrastructure,
Building, Rail*

18

Months

>\$10B

*Value of Projects
where EVM
implemented*

20+

*Number of EVM
experts across
the organisation*

100%

*Leadership
Commitment*

SUCCESS

**JOHN
HOLLAND**



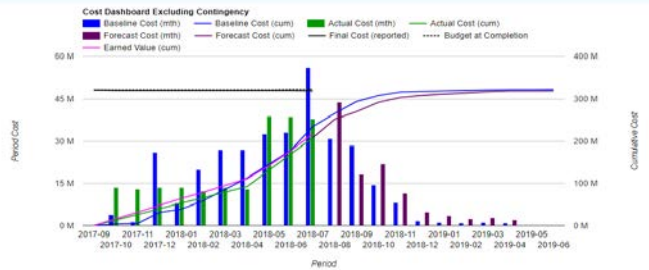
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Headline Data:	This Period (Cum.) JUN_2018	Last Period (Cum.) JUN_2018	Project Movement per Month	Performance
Excluding Contingency				
- Cost Budget (ex. cont.)	322,476,203	322,431,917	39,296	
- Actual Cost:	207,547,811	189,966,108	37,881,503	
- Final Cost (ex. cont.)	319,032,407	320,110,107	-1,077,610	
Contingency				
- Contingency Budget:	10,802,532	10,802,532	0	
- Contingency Remaining:	14,128,017	11,881,172	2,447,845	
Including Contingency				
- Total Cost Budget (incl. cont.)	333,280,735	333,234,449	39,296	
- Final Cost (incl. cont.)	333,161,614	331,791,276	1,370,338	
- Provisional Sums (not incl. above):	0.00	0.00	0.00	
Earned, Planned				
- Earned Value:	217,364,960	177,441,202	39,923,758	
- Planned Value:	234,822,674	178,370,315	86,152,859	

System Selection

- John Holland has selected ControlPro as the standard Project Controls and Earned Value Management system for all projects
- ControlPro is a cloud based online Project Controls and Earned Value Management system that is flexible, quick to implement and interfaces with existing John Holland systems
- ControlPro has been a trusted partner and has been instrumental in the successful implementation of Project Controls and Earned Value Management on all projects
- The platform has proven to be stable, robust allowing for generation of key Earned Value metrics and trends through multiple dashboards and reports

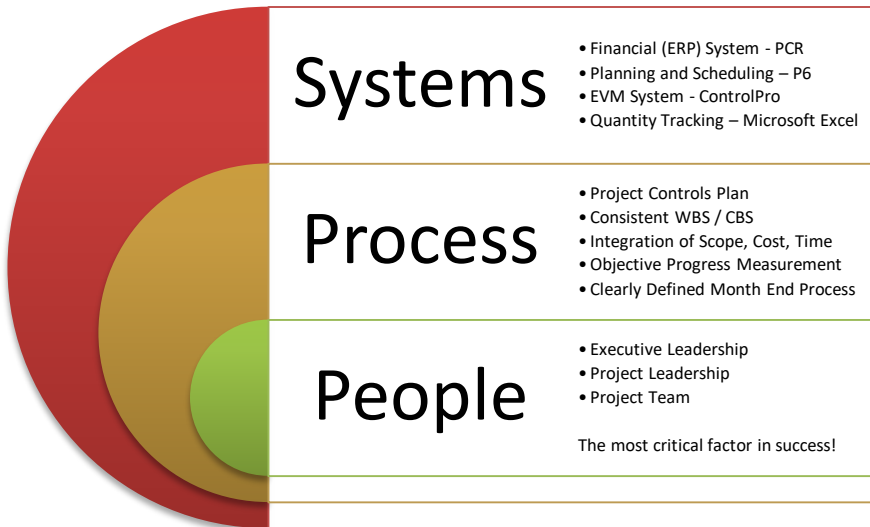




Mega Projects

- Mega projects defined as >\$1B and over three to five years in duration
- Providing objective data to challenge delivery teams is **critical**
- Understanding of what has been achieved to date and the project going forward
- Understanding the challenge ahead in terms of month by month spend and earned required
- Delivering a successful mega project is highly dependent on achieving Earned Value (progress) and spend targets month-in and month-out over a long period of time

Implementation on Mega Projects





Implementation on Mega Projects

- Early engagement of Project Controls
- Dedicated Project Controls team
- Senior and Project leadership must understand EVM, believe in the data and endorse it throughout the project
- Correct integration of Cost Code structure, Estimate and Program is essential to success



Implementation on Mega Projects

- Break down Mega Project into individual “Sub Projects”
- Each “Sub” project contains relevant cost codes, activities, budgets and objective progress measures (Quantities)
- Ensure clear link with the program Schedule to enable accurate Time Phasing and generation of Planned Values
- Utilise meta-data effectively to enable generation of different filters and reporting lenses



Importance of Design

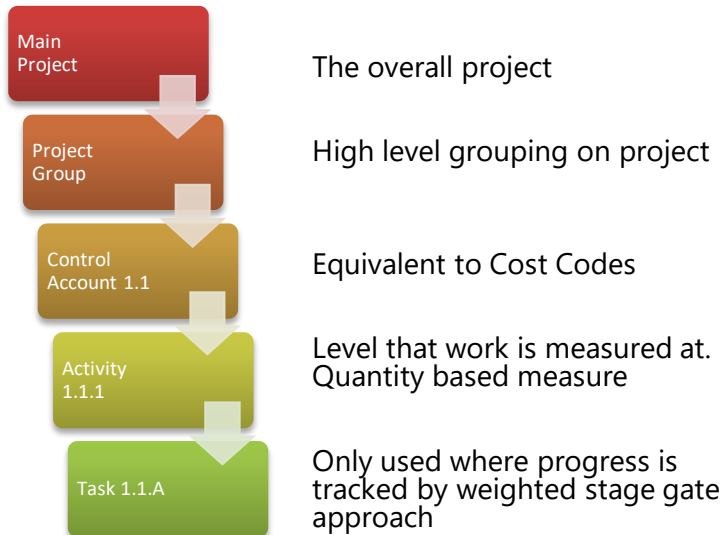
- Design phase can “make or break” your project
- Critical to accurately measure Design progress objectively
- Vital in gaining true understanding of Design cost and schedule performance from early stages of the project
- Adopt a weighted stage gate approach to objectively measure Design packages and deliverables

Structure

Level of Detail - Rules of Thumb

Per \$1B of project:

- ~1000 Cost Codes
- ~2000 Activities (ControlPro)
- ~15,000 – 20,000 Activities (Primavera P6)

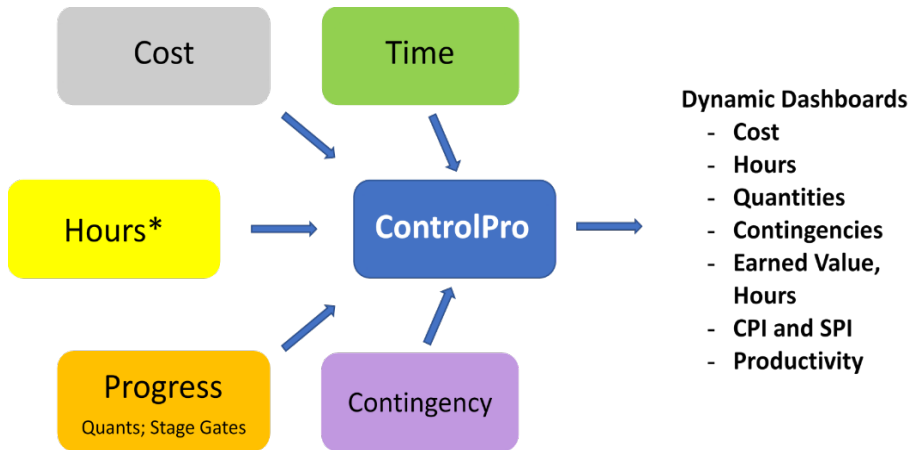




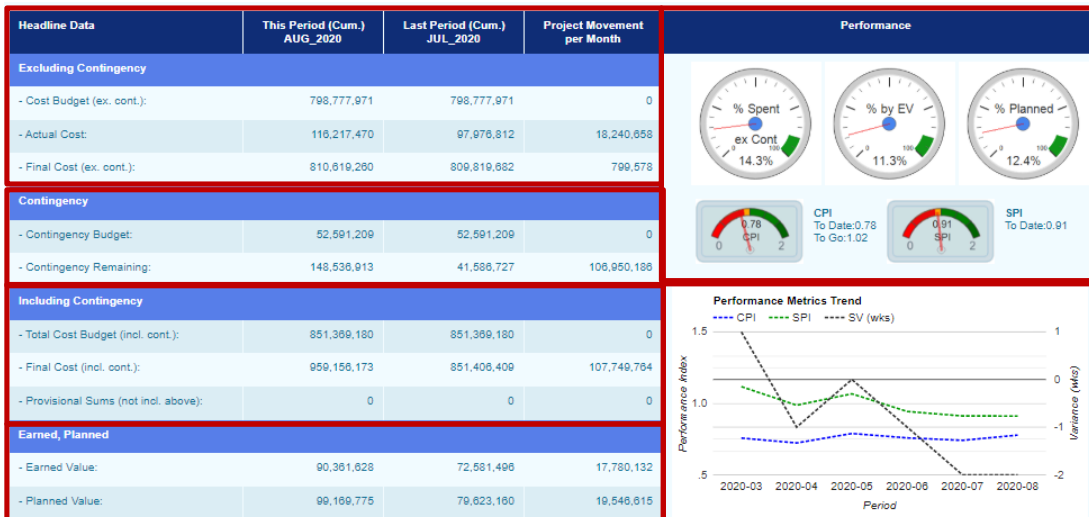
Using Meta Data

- Apply Meta Data to produce different lenses and views of reporting
- Filter out 'noise' to really understand month in and month out targets
- Select and generate Earned Value Histogram for:
 - Sub Project
 - Function / Discipline
 - Activity
- Responsible Person
 - Partner (for Alliance and JV) projects
 - Other criteria and filters

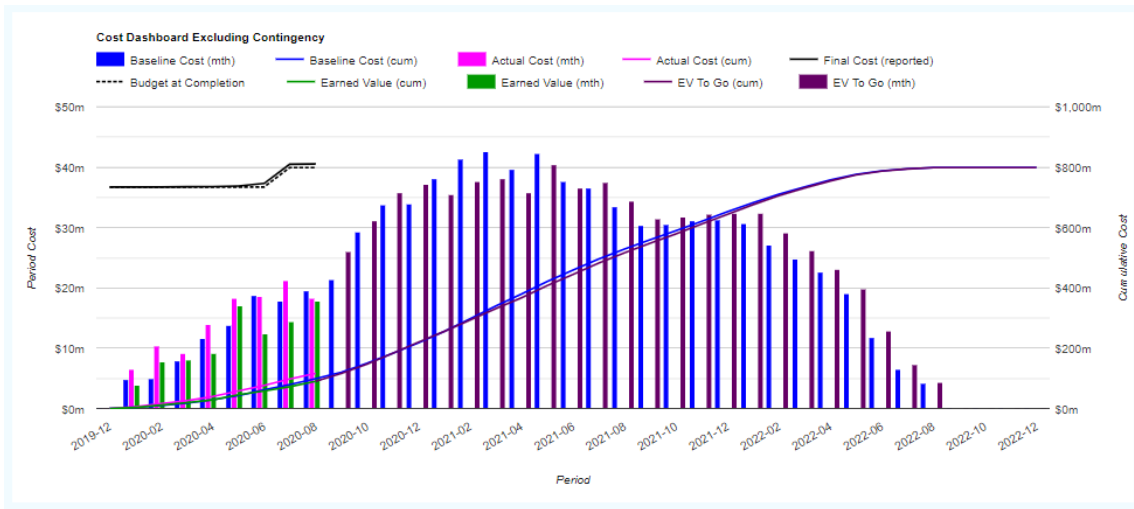
Updating EVM System



Example – Project Overview



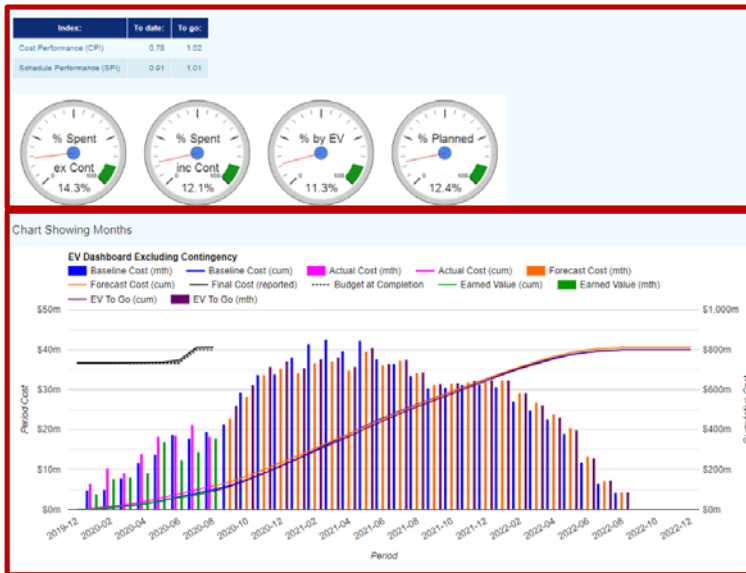
Example – Project Overview



Example – Project Overview

Project Group	Cost Budget	% by Cost	Actual Cost	Final Cost	Gain (Loss)	Earned Value	% by EV	Cost Variance	Cum CPI	CPI Status	Planned Value	Schedule Variance	Cum SPI	SPI Status
Directorate	130,452,892	27.2 %	36,808,639	135,466,972	(5,014,080)	31,182,883	23.9 %	-5,625,756	0.85		33,833,159	-2,650,276	0.92	
Rail Ops	89,794,815	25.8 %	23,420,981	90,910,176	(1,115,361)	17,120,180	19.1 %	-6,300,801	0.73		21,368,945	-4,248,765	0.80	
Design	63,406,572	37.0 %	24,749,042	66,906,864	(3,500,292)	13,535,468	21.3 %	-11,213,556	0.55		15,324,075	-1,788,590	0.88	
South	72,777,501	1.2 %	854,900	73,295,118	(517,617)	1,172,175	1.6 %	317,275	1.37		15,542	1,156,632	75.42	
Centre	94,122,653	1.8 %	1,700,588	94,088,849	33,804	1,610,852	1.7 %	-89,738	0.95		2,138,504	-527,652	0.75	
North	60,593,618	11.5 %	6,943,095	60,217,415	376,203	5,940,868	9.8 %	-1,002,227	0.86		8,921,750	-2,980,882	0.67	
Stations	115,781,993	0.8 %	869,975	115,781,970	23	879,382	0.8 %	9,387	1.01		1,336,991	-457,629	0.66	
Rail Systems	95,482,349	14.1 %	13,268,434	94,126,399	1,355,950	9,491,765	9.9 %	-3,776,669	0.72		10,616,501	-1,124,736	0.69	
Services	48,038,235	6.7 %	3,399,357	50,750,738	(2,712,503)	3,834,660	8.0 %	435,303	1.13		413,667	3,420,994	9.27	
Site Wide	28,327,343	14.5 %	4,202,459	29,074,759	(747,416)	5,593,397	19.7 %	1,390,938	1.33		5,200,641	392,756	1.08	
Contingencies	0	-	0	0	0	0	-	0			0	0		
Total	798,777,971	14.3 %	116,217,470	810,619,260	(11,841,269)	90,361,628	11.3 %	-25,855,842	0.78		99,169,775	-8,808,148	0.91	

Performance Summary Dashboard



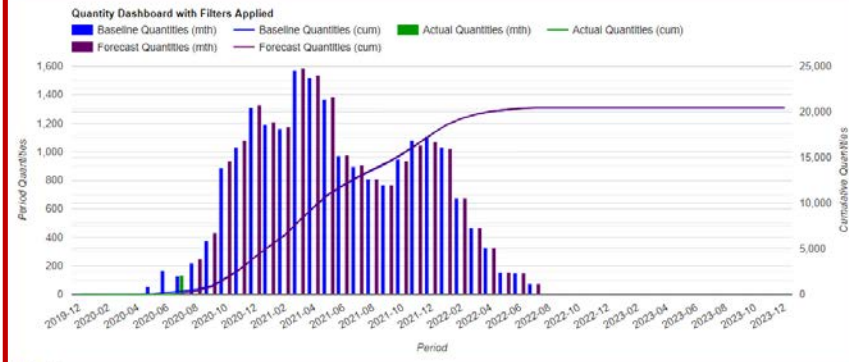
Track Quantities

Quantities Dashboard - Concrete (m3) (Data Date: 31/07/2020)

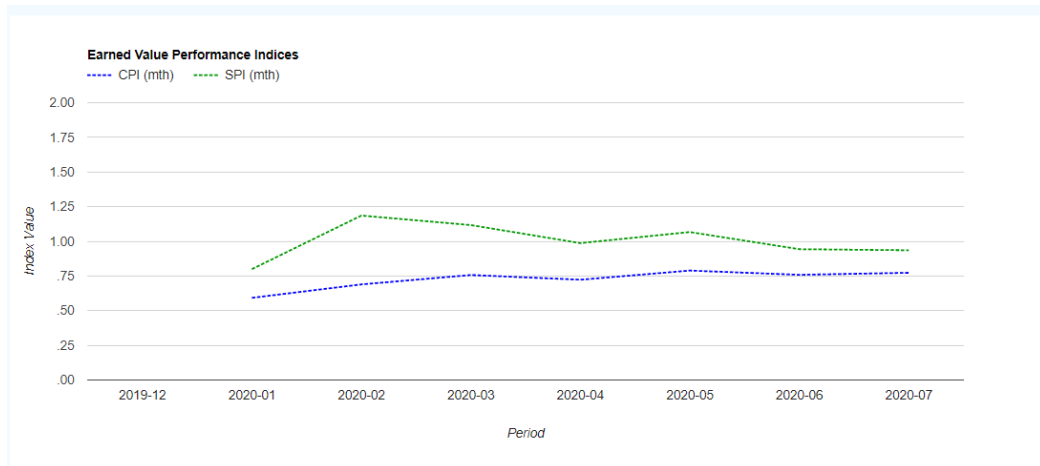
	Budget Quant: (total)	Actual Quantities: (to date)	Quant to Complete:	Final Quant: (total)	Earned Value: (to date)
Cumulative	20,425.00	139.00	20,285.00	20,424.00	932,012
Period Movement (month)	0.00	135.00		0.00	270,073



Chart Showing Months



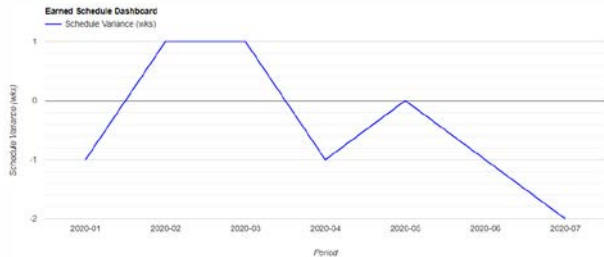
Track CPI and SPI Trends



Earned Schedule Analysis

Project Group	Cost Budget (M Cost)	Earned Value	% by EV	PV Date	Schedule Variance (mks)
Directorate	148,952,682	25,123,583	16.76 %	19/07/2020	-2
Rail Ops	110,808,691	17,928,469	15.37 %	11/07/2020	-3
Design	83,486,472	12,235,187	14.30 %	18/07/2020	-2
South	43,277,501	664,978	1.61 %	12/10/2020	11
Centre	70,722,653	1,485,962	2.10 %	20/09/2020	-6
North	50,593,616	5,370,336	8.66 %	11/07/2020	-3
Stations	53,781,893	373,233	0.59 %	18/07/2020	-2
Rail Systems	35,462,340	4,800,220	5.04 %	11/07/2020	-3
Services	48,038,235	1,775,297	3.70 %	09/10/2021	23
Site Work	76,327,343	3,827,316	13.51 %	29/07/2020	-1
Whole Project	734,391,847	75,722,791	10.31 %	18/07/2020	-2

Chart Showing Months



Leadership Feedback

"We are committed to making Earned Value Management a success in our organisation"

- General Manager

"Industry leading in terms of understanding project cost and schedule performance"

- Operations Manager

"We have never had this much visibility on our progress to date as we do now"

- Project Manager

"The filtering of data in reporting is extremely useful for our project"

- Project Manager

"I rely heavily on the Earned Value report and data to tell me the clear picture on my project"

- Construction Manager

"This is very accurate in terms of showing our true cost and schedule performance to date"

- Commercial Manager



Lessons Learned

- People engagement and buy in is the most important factor to success. Early engagement of Project Controls and close collaboration with Project team is critical
- Senior and Project leadership must endorse and understand EVM, believe in it and act upon it to be successful
- Accurate and robust link to both Estimate and Program is critical
- An “appropriate” level of detail in terms of tracking progress is vital to efficiency and success
- Using objective measures (Quantities) to track progress and weighted stage gate approach to track Design progress
- A clear understanding of month in and month out earned and spend targets will result in truly understanding progress to date and the work to go

Thank You

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