Project Controls Expo, Australia – 26th November 2019

Melbourne Cricket Ground, Melbourne

Unlocking the Power of Project Data Analysis for Megaprojects

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Project Controls EXPO Melbourne, Australia

Short Introduction and key past project

Framing my view and approaches

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About the Speaker

Darrin Kinney

- Construction runs in my blood

- **1st job**
- 269,000 (bpd) El Segundo refinery
- In 1994? 18 years old
- Construction progress lead as a summer intern?
- **COBOL?**

1999 Level 3 Local Loops

Level(3)® COMMUNICATIONS

Massive Multicity fiber rollout

- Challenge: implement a standard construction progress tool
- **Answer: NOT MS ACCESS! We failed miserably**

Only successful tool was a web based WBS CRUD list

Key lessons:

Lightweight, flexible, focused on 1 thing

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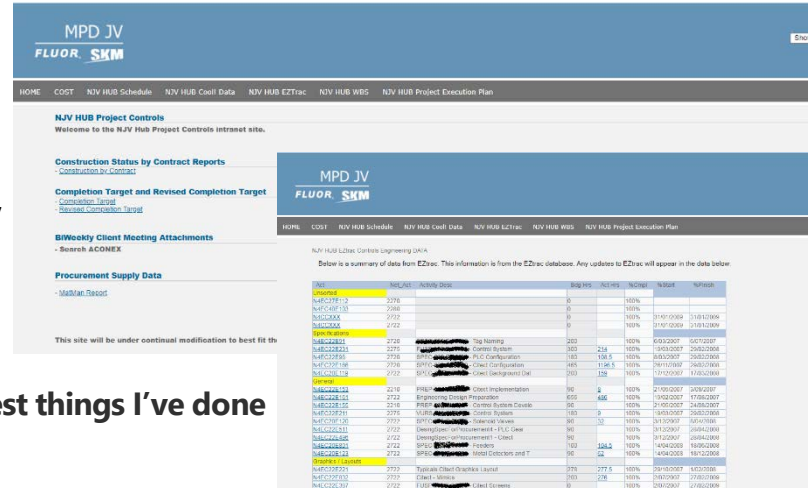
2006 RGP4

Distribute all project controls data via a website

- Challenge: Convince the technology team to give me access to the web server
- **Answer: YES (hell yeah!)**



This is still to this day one of the coolest things I've done and quite proud to show this off

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Key Strategic Points to Unlock the Power of Data Analytics

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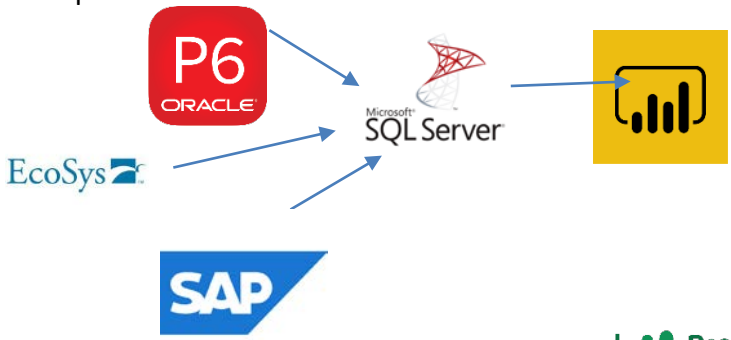
Strategy is Not Keywords

Unlock the power of your data - that is our objective – requires you to get dirty in the trenches. We've all seen it before, beautiful power point diagrams with all the sources of data with nice arrows going everywhere.
Reality is so much more complex



Strategy is Not Keywords
Strategy is to understand Excel Hell!

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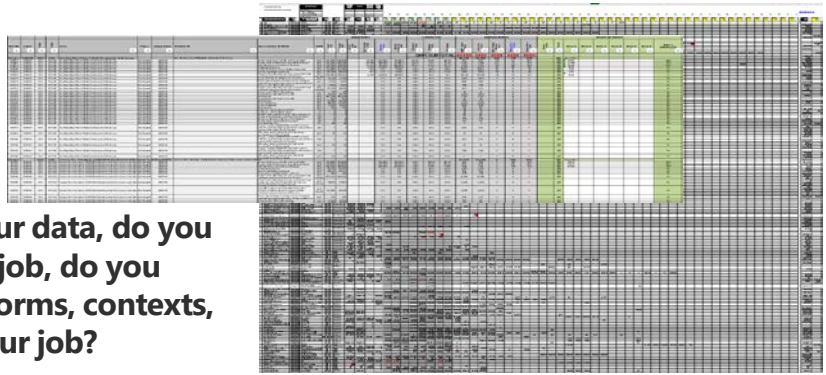
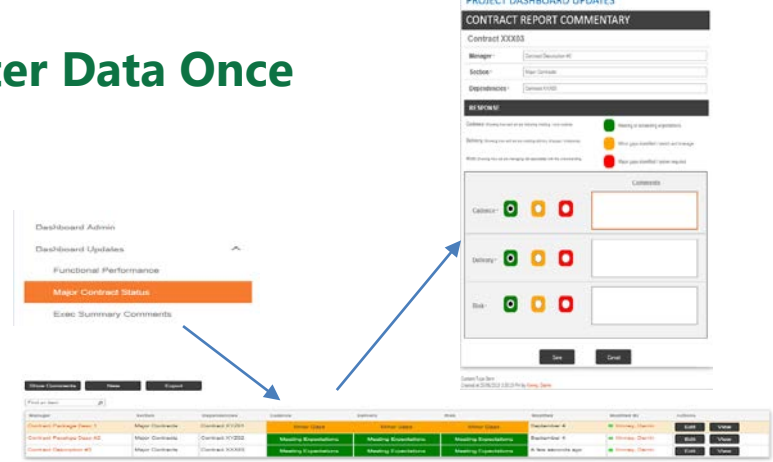


Do you know the basis of all your data, do you even know all the data on your job, do you understand that it will change forms, contexts, structures over the course of your job?

Enter Data Once

Allow users to CREATE / EDIT / UPDATE / DELETE!

- Sharepoint lists
- **JIRA (I'll talk about that later)**
- **Twitter / Yammer / Social**



Requires everyone working in the same files, or same lists, or same database

This is the "get systems talking together (if possible)"

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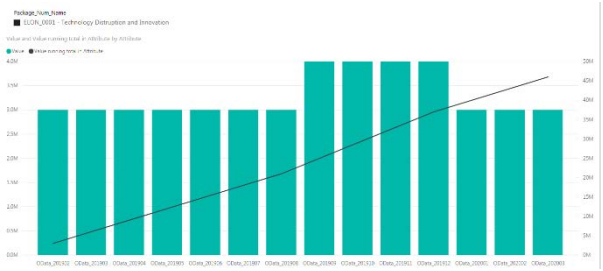
Enter Data Once



Allow users to CREATE / EDIT / UPDATE / DELETE!

- Cashflow Example

When data is initially entered into a structured data model (example cashflow per package), you can easily link to that and produce a myriad of graphs and analytics using that data

To often, we design our system to manage the data (or excel file), then design another excel file or Dashboard (with its own data model).

Enter Data Once is to look at the full work process from where someone keys data in, to where its consumed

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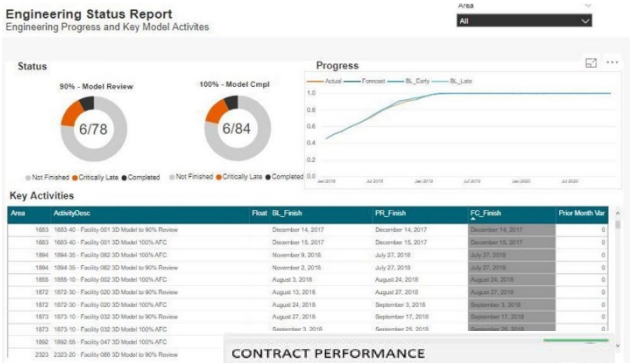
Be Visual – Dashboards!

Distribute project data via a Dashboard

- Be smart – don't duplicate your existing reports
- **Create metrics (# of activities that slipped?)**



Most data will not easily come out of source systems "automatically". The real tricks and balance are understanding what you can get from what system, and what you might need to produce a smart dashboard.

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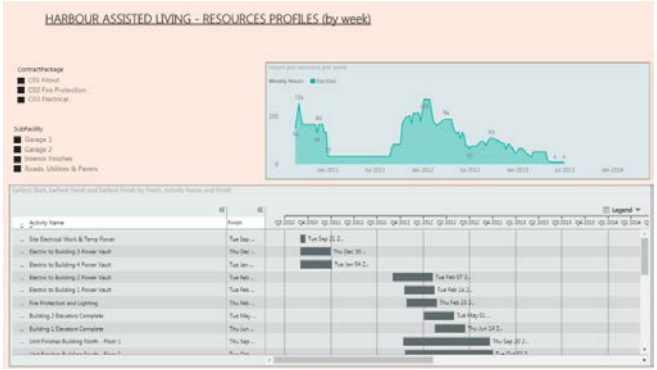
Be Visual – Dashboards!

Dashboards can display just about anything
Here is a resource analysis dashboard



This example pulls all its data from just 1 flat table export from P6

Understanding what you want to see and how it fits to a data model is critical
It is possible way over-engineer data SCHEMAS (be carefull)

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Your DATA!

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YOUR DATA – Do you have (or need) a model

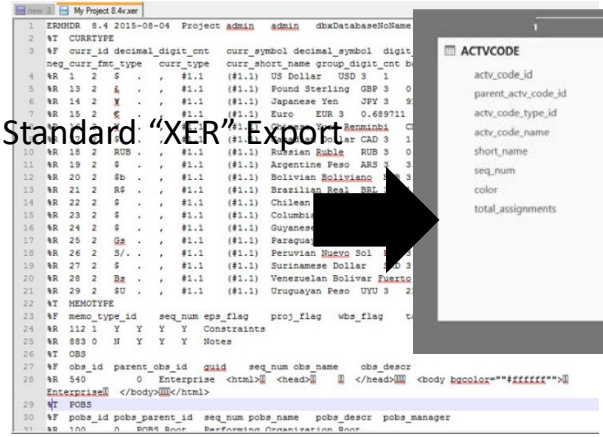
Where are you going to get your data

What are you planning on doing with it

HOW are you going to get and store your data

Relational Database Model? Normalized?

Standard “XER” Export



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YOUR DATA – Billions and Billions of Stars!

Here is a typical summary table of an EPCM Level 3 schedule and the companion engineers detailed Level 4 schedule.

Metric	Level 3	Level 4 Engineering
Number of Activities	7,000	6,000
Relationships	15,000	12,000
Activity Codes	1,000	500
Activity Assignments	100,000	40,000
WBS Elements	1,700	2,300
Resource Assignments	3,000	5,000

In our activity table, there exist about 30 different fields. In the database your consultant will build, each of these fields may be loaded a separate row (unpivot your date). Therefore, if you have a schedule with 10,000 activities and if you provide a database consultant that schedule, they might create a table with roughly 300,000 rows just for 1 schedule

Time phase resource data? 3000 resource assignments * 70-100 weeks = 300,000 (unpivoted normalized data rows)

BUT we also have multiple data-series: Actuals, Forecast, Plan, CTD and incremental (P6 has almost unmeasurable amounts of data)

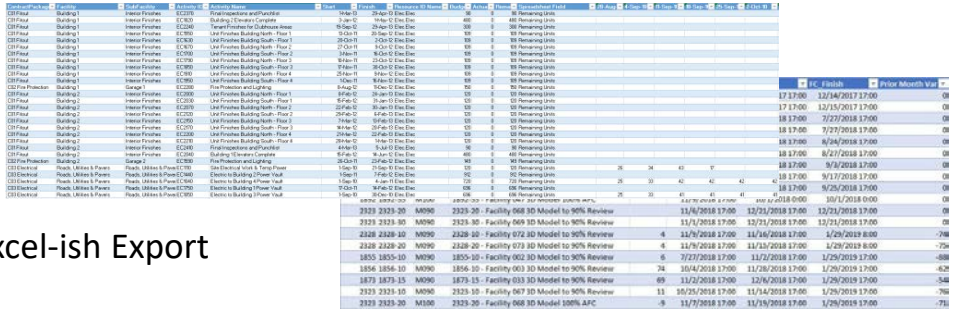
YOUR DATA

Where are you going to get your data

What are you planning on doing with it

HOW are you going to get and store your data

Flat Table Structures



Standard Excel-ish Export

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YOUR DATA

Do you need historical data?

- **You likely already have historical data managed in source sytsems (P6, Ecosys)**
- **My recommendation – in your import files, include the relevant comparison data (prior month, baseline, etc). This allows your data to remain effectively stand alone to avoid having to compare data ingested this month, with data ingested last month.**

Understand CADENCE

- **We want real time data, but before you can get there your data is likely weekly/monthly. Thus ensure your uploads are aligned with your cadence**

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YOUR DATA

No data structure is better than a bad data scheme

This is one of the initial hurdles you see in PowerBI
Resist the focus to build out complete data schemas for all your domains and instead setup what you know will be a flexible table structure that will change based on your import files.

After you come to grasps with your source data and the structure you are now comfortable using, then you can begin to build a more formal structure and defined pipelines to push your raw data into a data model.

Dashboards – Data Management Metrics

The hardest part of dashboards is DATA MANAGEMENT

Your digital team will likely shield you from the harsh reality

- **Problem: Nothing is easy**
- **Answer: Better understand what your digital team is doing**

Example – A simple radial gauge showing progress vs plan

If you feed a computer a data source, there is no innate way of knowing something as simple as "What is the current %". Therefore, we need to write some code

We need to know the data date?

Use the data date to then calculate the Actual %

…. Repeat for Plan %

```
M_Progress_Actual = CALCULATE (
SUM ( data1[Actual] ),
FILTER (
data1,
data1[DataDate] = MAX ( data1[DataDate] ) &&
data1[Date]=MAX(data1[DataDate]
)
))
```

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Dashboards – Data Management More Metrics

Example – A Simple Donut Chart

If you feed a computer a data source, there is no innate way of knowing something as simple as "How many activities have finished". Therefore, we need to write some code

We need something we can COUNT?
We need a unique value

```
Activity_Status_Num =
IF(ISBLANK(Schedule[Float]),1,IF(Schedule[Float]<1,2, 0))
```

```
IsFinished = IF(ISBLANK(Schedule[Float]),1,0)
DonutCounts = SUM(Schedule[IsFinished]) &"/"&
COUNT(Schedule[ActivityDesc])
```

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The End Game!

What do you really want to achieve?

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Use Agile Management

- Agile allows individuals, project, teams to focus on specific tasks that drive a project to completion
- A few key terms:
  - EPICS (your WBS high level - area)
  - Backlog (your scope)
  - Burndown Charts (your progress curves)
  - User Story (a subset of a WBS)
  - Kanban (visual representation of your tasks and status)
  - Product Owner (area managers, OBS)
  - Sprints / Sprint Planning (Feasibility studies)
  - Retrospective (lessons learned)

The Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

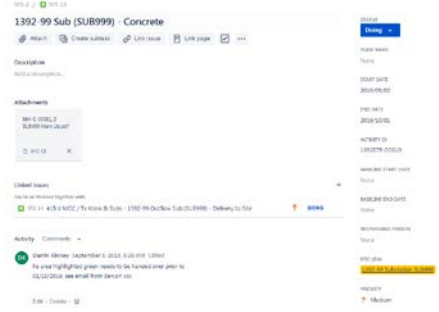
That is, while there is value in the items on the right, we value the items on the left more.

Use Agile Management

- USE JIRA

Example:
Substation Shipping, Manufacture, Site Concrete?

Visual Representation Of Activities



Data Integration

omments & Discussio About Activities

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Facilitate Live Real Time Data

Live Real Time Data Exists

- Challenge: Finding it and being able to pull it out and apply context
- **Answer: Can you build your progress base from documents and ITR records in your document control system?**

Too often finding actual status requires monthly reports, or perhaps massive quantity/manhour progress files (updating manually in excel). This information then needs to be uploaded into some system (Ecosys/COBRA). However, progress occurs in real time and is visible or discoverable!

aconex

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Be Hyper Reactive
Do you have the tools/data to question everything?

This is our end game!
We want to positively impact the decisions that need to be made,
We want to capture the decisions that are made in the first place to cause changes to projects
We want to get in front of decisions in the first place!

If the techniques discussed here are used to manage data are followed, you will begin to have a framework from which you can operate to have a hope to be hyper reactive.

For HPYER REACTIVITY, I have already touched on this during our substation example – IF everyone on the project records all their tasks, directions, decisions live in a system like JIRA the VISIBILITY of those decisions becomes open to everyone and can be QUESTIONED

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Conclusion

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