Systems Thinking in Planning for Project Success

A case for the Metro Tunnel Project and beyond

Edmund Chew

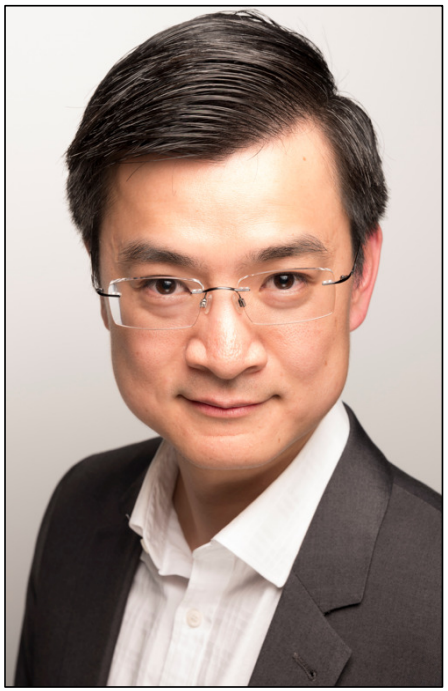
16 August 2022

I wish to acknowledge the traditional custodians of the land we are meeting on, the Ngunnawal people. I acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region

Introductions – Edmund Chew

A quick bio

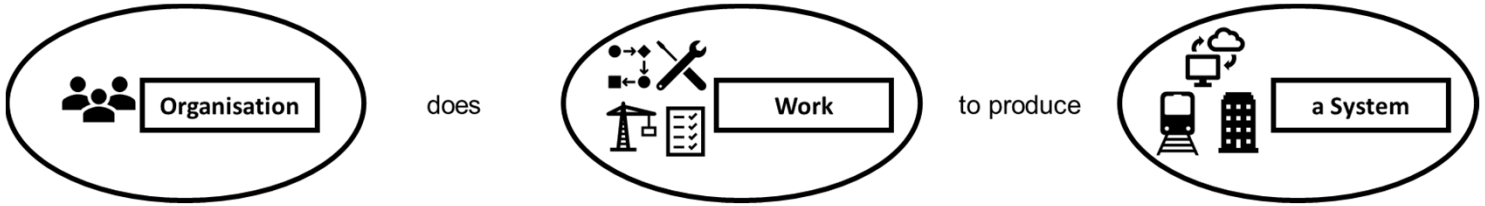
Qualifications	Bachelor of Engineering (Mechatronics) Bachelor of Business & Commerce (Marketing & Management) Masters of Business Administration Project Management Professional (Project Management Institute)
Exposure in Infrastructure Projects	Water, Roads, Education, Justice, Health and Rail
15+ years Experience	Worked on over 60 projects across all stages from development, delivery and through to handover. Experience working on contractor, consultant, client and operator roles
Diverse Roles	Planning, Cost Control, Project Management, Engineering and Operational Readiness



Menu for today's presentation

A thought for systems thinking and how it has helped the Metro Tunnel Project

WHAT



WHO/WHEN/WHERE

HOW

People
Process
Structure

C@B

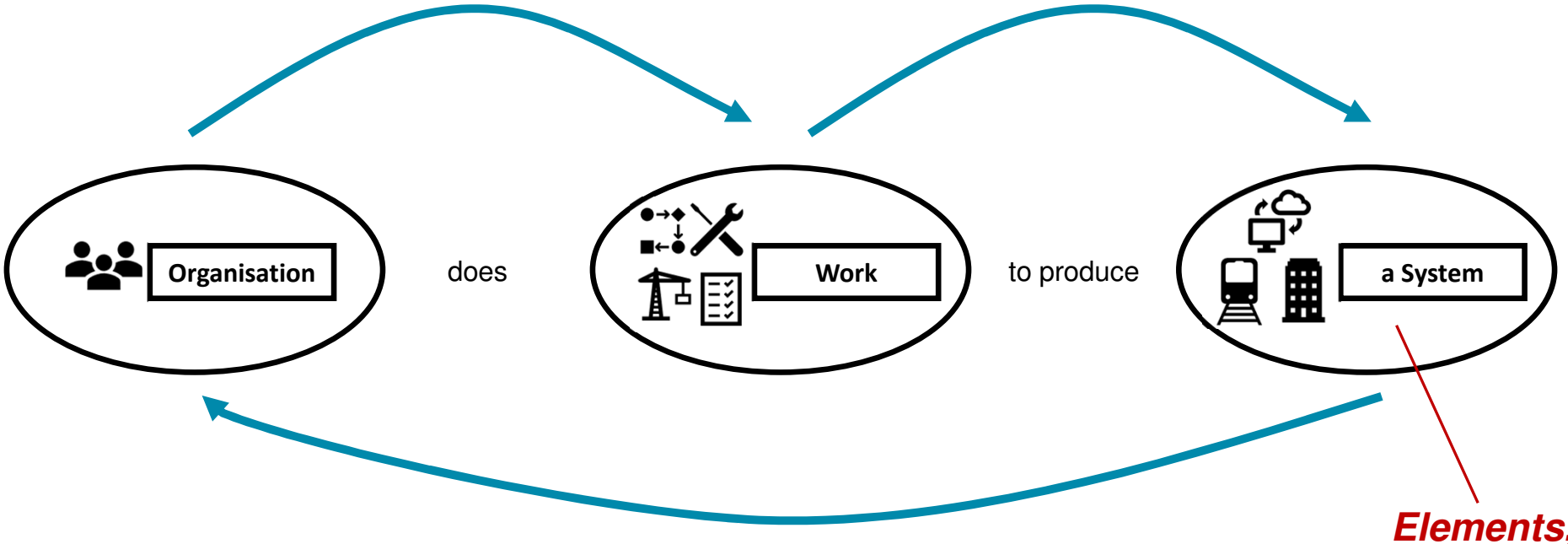
SO WHAT

So that success is no accident

Not a planning/scheduling presentation

A ‘simple’ concept for systems thinking

Planning and project management has been very much ‘linear’ thinking (cause & effect)



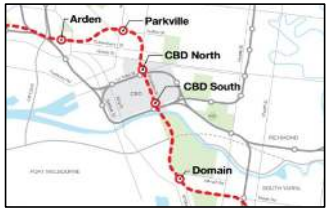
Which comes first?

Elements, interconnections, functions

Metro Tunnel Project – Trouble brewing in 2019

There was an impetus for change and so the Integrated Program Team formed

Project Background



New asset since the city loop
- 9km twin tunnel
- 5 new stations

New signalling solution
- Brownfield interface
- Platform Screen Doors

New High Capacity Trains
- 65x trains
- Delivered separately by department

Situation & Challenges

First new underground asset since the city loop to be introduced to the operator

Project packages and delivery of trains focusing on current issues in delivery

Similar projects in Australia and Internationally facing different levels of success

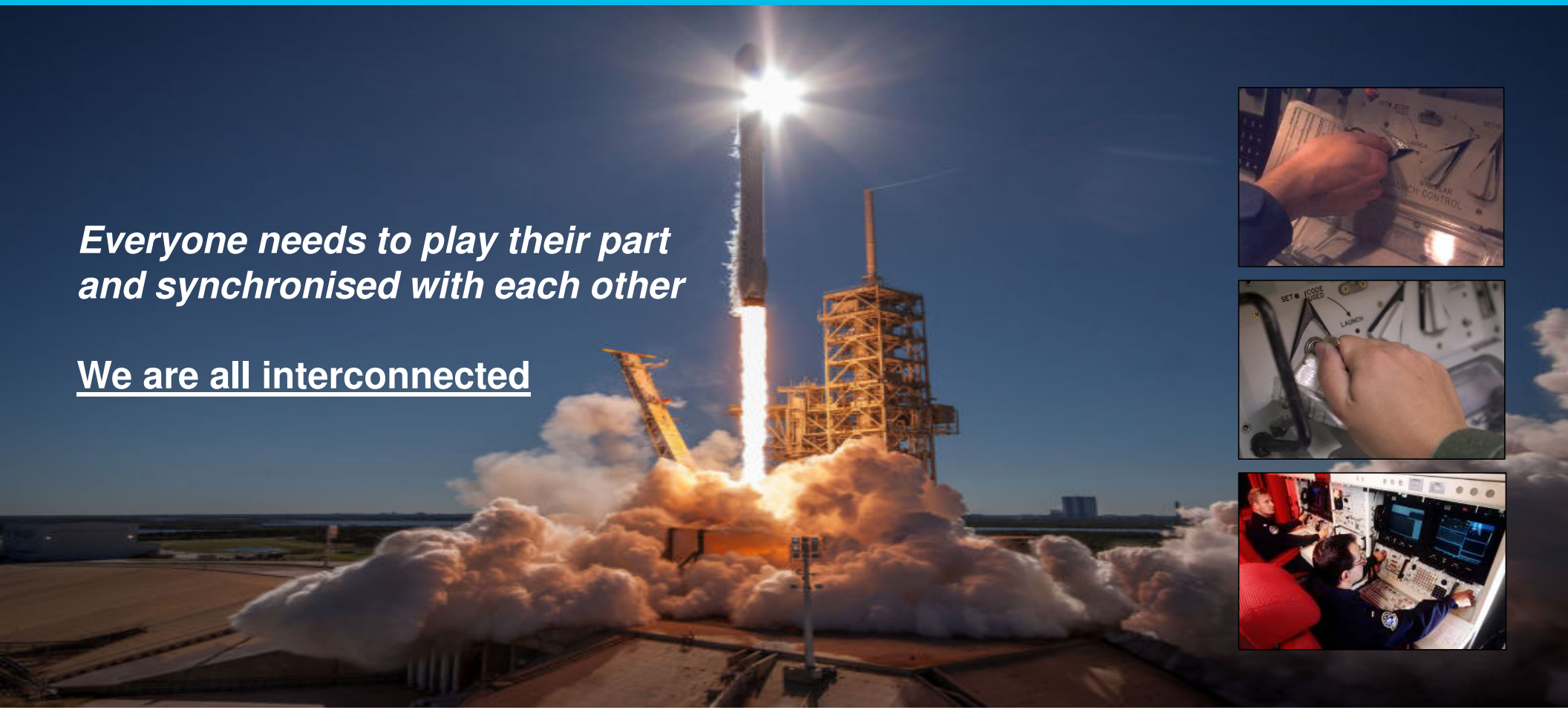
Rail Projects Victoria's leadership was committed to ensure timely delivery of the project

Systems Approach #1 – Integration of Purpose

Metaphor: Achieving Day-1 for the Metro Tunnel Project is like launching a missile

Everyone needs to play their part and synchronised with each other

We are all interconnected



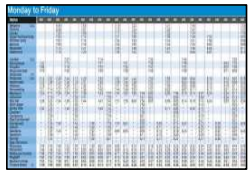
‘Who’ make up the Integrated Program

We realised that the project was made up of more than just the project packages

The 5 ‘Keys’

- Big ‘P’
- Operator
- Rolling Stock

- Paper Railway
- Timetable



The Players

- Design & Construction
- METROTUNNEL RAIL SYSTEMS ALLIANCE
- METROTUNNEL RAIL INFRA ALLIANCE
- RAIL PROJECTS VICTORIA
- METRO
- Maintenance
- VICTORIA State Government Department of Transport
- EVOLUTION RAIL
- METRO
- METROTUNNEL SYSTEMS INTEGRATON TEAM
- VICTORIA State Government Department of Transport NETWORK READINESS

One Outcome

METROTUNNEL

Day-1

XX-YYY-ZZ

The IP Team set out to clarify the parts and the interfaces between them using program

Drawing inspiration from Project Apollo

With so many parts, organisations and stakeholders

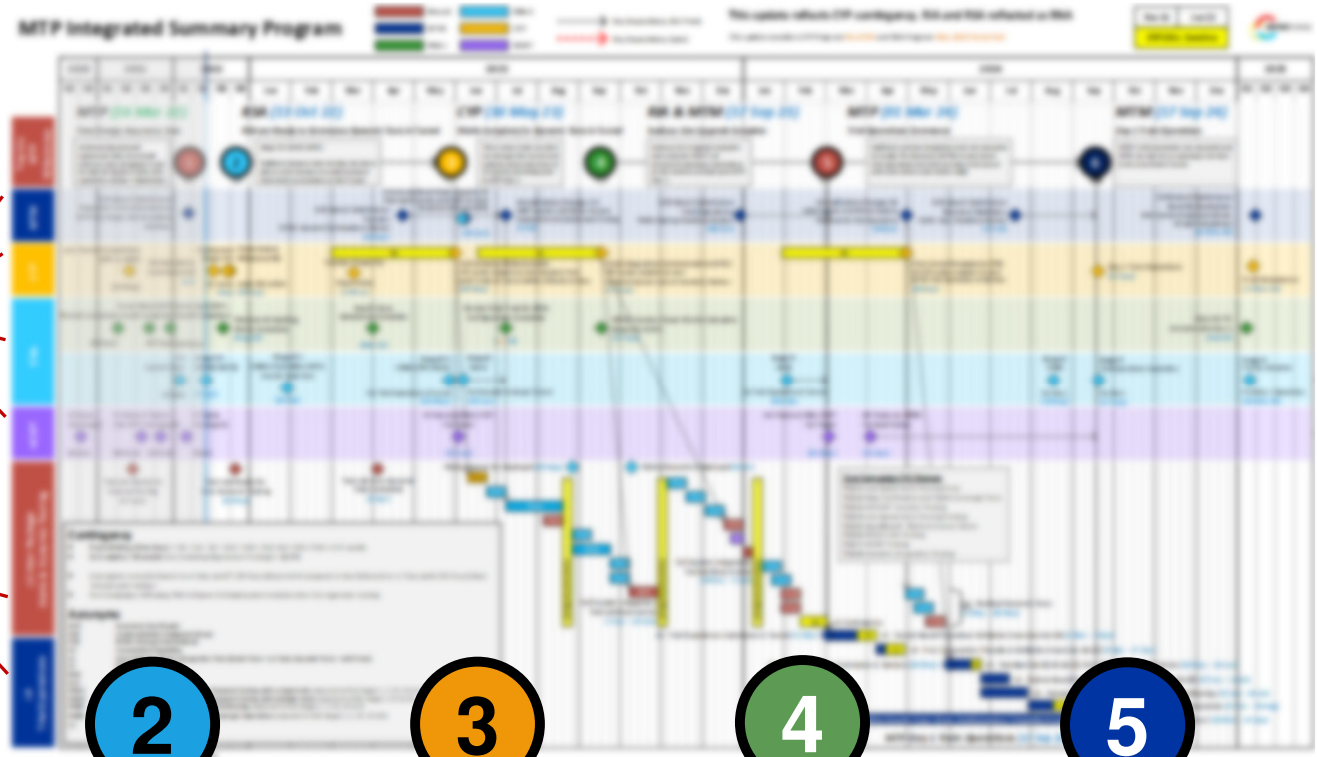
8 years

"We choose to go to the moon" **May 1961**

"One small step for man…" **August 1969**

Systems Approach #2 – Progressive validation

We now have a top-down view of our works with the Day-1 summary program



Project packages + operator

Dynamic Testing + Trial Operations
(all in the one same space)

1 *Final Design Assurance Case*

2 *Trains running with new signalling on the surface rail*

3 *Works Complete for Dynamic Tests*

4 *Sunbury Line Upgrade Complete*

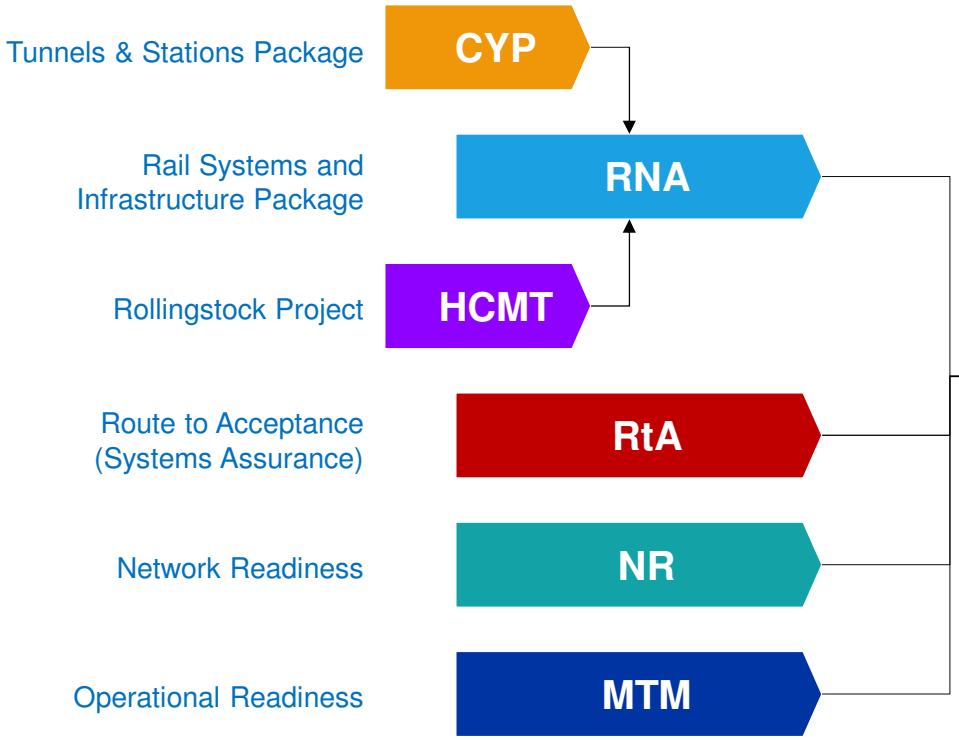
5 *Trials Operations Commence*

6 *Day 1 Train Operations*

Moving from development to tracking

Various programs are referenced to inform achievability of Day 1

Programs that input to the Integrated Program



Q: Will we achieve target Day 1?

All models are wrong but some are useful

– George E P Box

Systems Approach #3 – PEOPLE over process and structure

It is important that all parties involved use have a positive, transparent & collaborative approach

VAGO Report – Stage 2 (Main Works) Review

VAGO's comprehensive report was complementary of our collective work

2. Is the Metro Tunnel Project progressing as planned?

Conclusion

The tunnels and stations main works are currently progressing as planned and RPV and CYP's systems for monitoring and achieving project requirements are effective.

However, the overall project is facing time and cost pressures and RPV
RPV has also descoped some MTP signalling works and wider network
agreements with precinct stakeholders to implement EMI mitigations

RPV and CYP need to carefully manage all these risks to achieve RPV's
September 2024 and deliver the project's intended benefits.

RPV's monitoring of CYP's progress

RPV has an effective monitoring process in place to make sure CYP and other contractors are delivering the agreed scope of works.

The MTP reports on a similar basis to the other projects delivered by RPV and other MTIA teams.

This reporting is found in:

- monthly management and progress dashboards for users at RPV and MTIA
- project progress data embedded in monthly reports for the MTIA Director-General and the Major Transport Infrastructure Board (an MTIA advisory board)
- reporting to the DoT executive, central agencies and ministers' offices
- the quarterly Major Projects Performance Report, which the Office of Projects Victoria compiles and submits to a subcommittee of Cabinet.

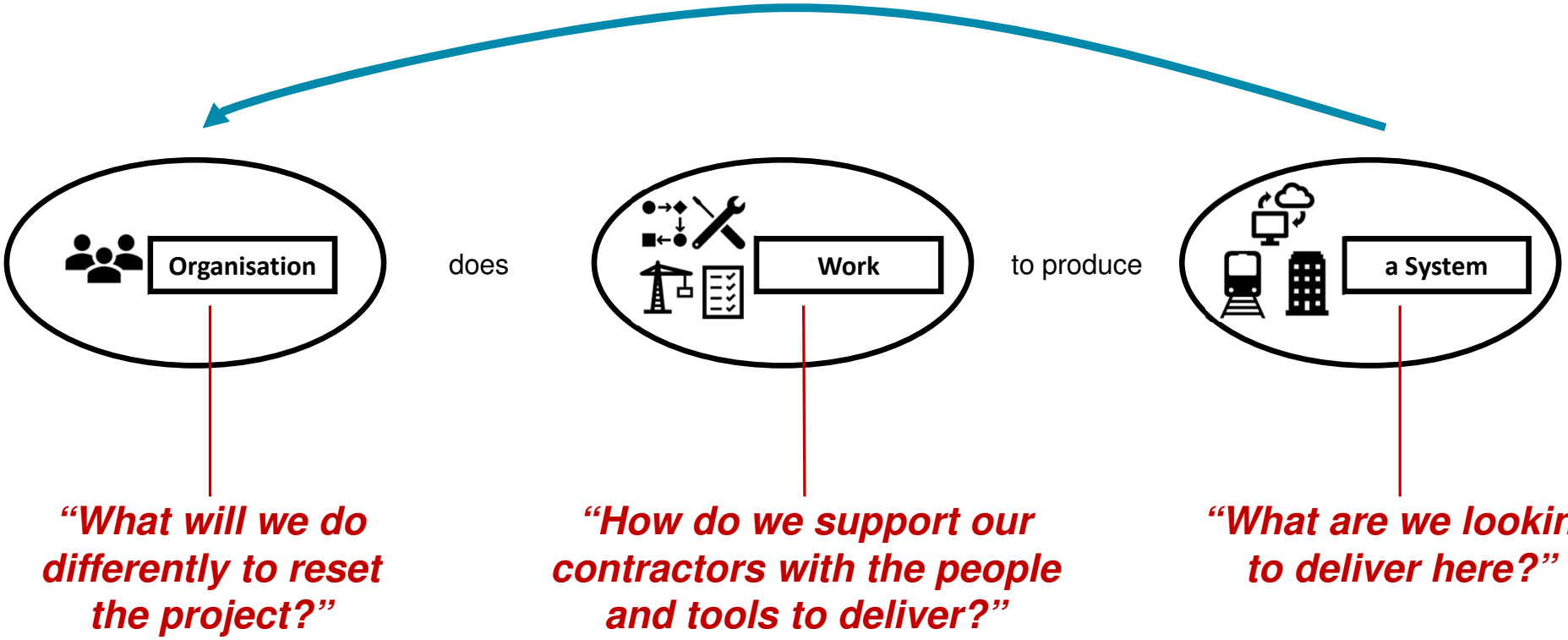
RPV also uses data from CYP's monthly progress report and monthly reports from the IR and FC. The IR and FC reports assess progress against the approved scope and calculate CYP's construction effort.

We examined recent examples of each of these levels of reporting, as well as source data. The description of the project's progress in the higher-level briefings we reviewed is accurate and aligns with the source material.

https://www.audit.vic.gov.au/report/melbourne-metro-tunnel-project-phase-2-main-works?section=

In Summary – Back to the concept

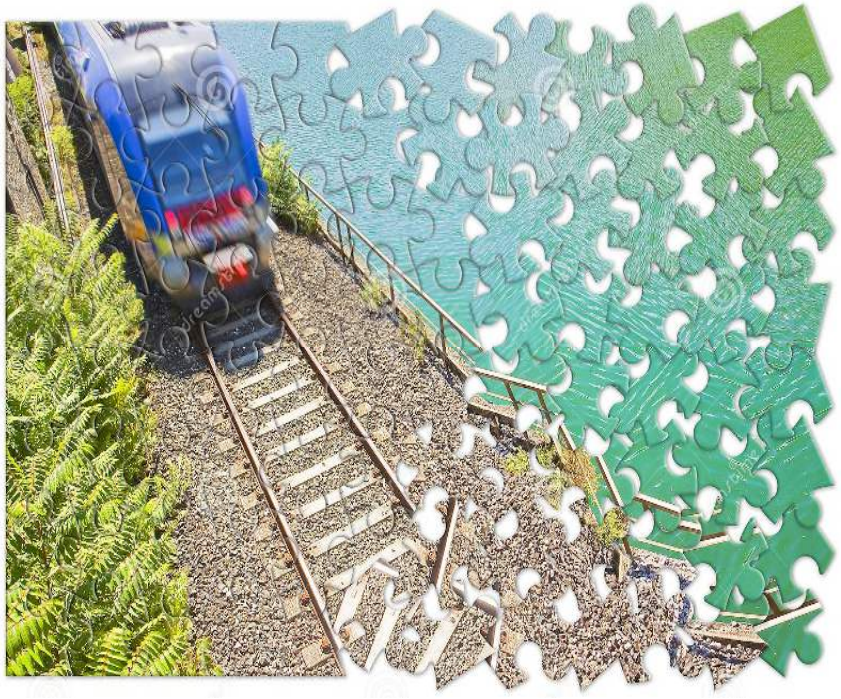
A change from commercial work packaging to properly understanding how to deliver



List of Takeaways

If the Metro Tunnel Project is delivered on time, *'its success is not an accident!'*

- Completion @ Beginning – start with the **'End in Mind'**
- Take the approach of an active and informed client
- Everything is **interlinked**, we cannot have silos
- Systems approach is a **iterative** and ongoing process, not a sequential process
- Consider **structure of the organisation** to reflect the works and the system



Systems Approach
beyond the Metro Tunnel Project

Systems Approach #4 – Lamb Curry

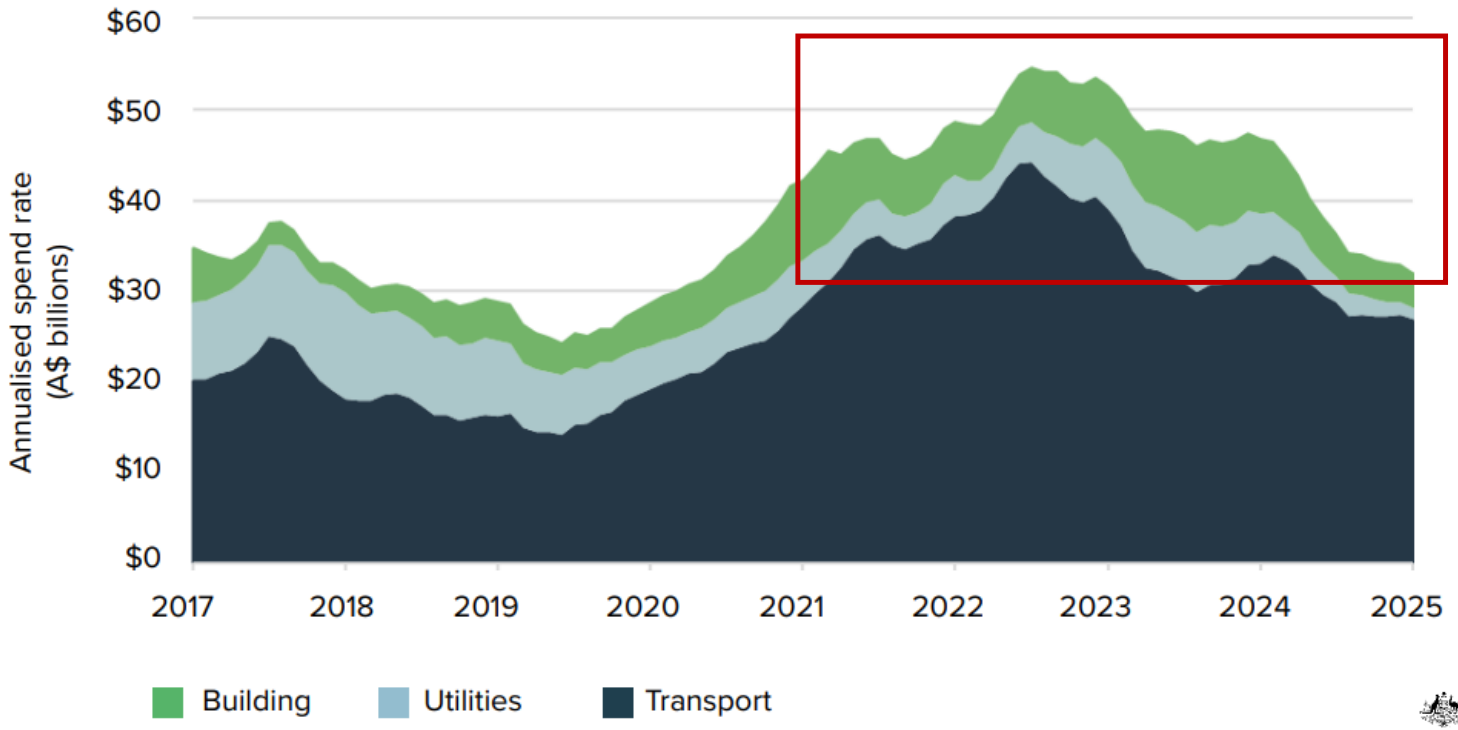
What are the elements (ingredients) that make this dish?

Ps: my presentation should have come before lunch!

Infrastructure Projects in Australia – Bigger and More

What are the elements (ingredients) that will help deliver these projects?

Figure 3: Major public infrastructure activity will approximately double over the next three years



How to address the 'over and above'?

Infrastructure Australia

Professionals Program – Tackling the Resource Issue

The program was set up to attract engineers from other industries into rail and planning

Rail Projects Victoria's Professionals Program offers a unique and rare opportunity for the rapid development of engineers as highly skilled practitioners in the field of planning and scheduling.

Professionals Program – Training for skill & philosophy

Engineers are trained ‘on-the-job’ and provided structured training

Module 1	Introduction to Planning and Programming
Module 2	Rail Familiarisation
Module 3	Primavera P6 Training
Module 4	Top Down and Bottom Up Planning
Module 5	Effective Communication
Module 6	Program Reviews
Module 7	Risk and Contingency
Module 8	Delay Claims Analysis

Professionals Program – Outcomes has been fantastic

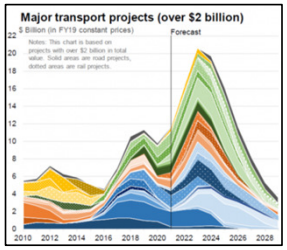
Planners are now working with the operators and contractors on our projects

"I am grateful to be working on an important infrastructure project with a brilliant team. I have the freedom to make my own judgements and at the same time I have the support and guidance from experienced planners."

"In the two year program I developed real 'on the job' project planning skills on real world projects of a truly global scale."

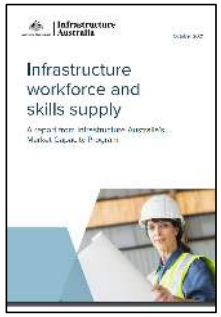
Looking Beyond – Diploma of Project Controls

The diploma aims to address various issues and shortfalls within the discipline



Increased number of projects

- Size of projects getting bigger
- Transport, energy and defence

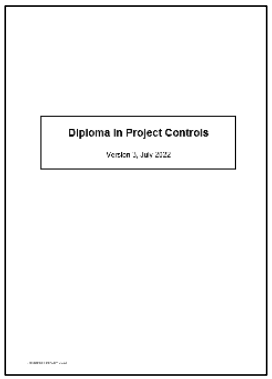


Workforce shortage

- Reports identify resource shortfall
- Organisations hiring same resource in supply chain

Hard to find skilled people

- No means to check for competency
- Years of experience does not always mean proficiency



Diploma of Project Controls

- Means to enter the project controls discipline
- Extra means to increase resource pool
- Provide means to assess competency

Project Controls Institute®

Graduates will be INDUSTRY READY

As an accredited VET course, the Diploma in Project Controls will help develop the skills and knowledge required to suit our projects and organisations needs

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Questions, thoughts, comments?