RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

FASTTRACK

THE NEWSLETTER OF THE HORIZONS PROGRAM l JULY 2021

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Platform Screen Doors

If you have visited Asian and European Metro systems, the chances are that you have seen the Platform Screen Doors (PSDs) or Platform Edge Doors (PEDs) in action. PSDs or PEDs are the sliding barrier doors installed at the edges of station platforms at several major metropolitan train stations. New South Wales is the first Australian state to introduce PSDs at the new Sydney Metro stations with Victoria right behind it as it plans to deliver PSDs at the new stations in the new Melbourne Metro Tunnel.

Figure 1: Platform Screen Doors at Castle Hill Station on the Sydney Metro
(Source: https://commons.wikimedia.org/wiki/File:CastleHillMetroStation.jpg)

PSDs have numerous benefits such as:

- help improve passenger safety by reducing number of passengers accidentally falling onto or purposely accessing the track,
- optimising station energy consumption,
- improving passenger comfort and experience by providing climate control at the platforms,
- maximising the use of platform area by potentially reducing the platform width,
- minimising transfer of noise, heat, dust etc from track to the platform,
- prevent or reduce wind felt by the passengers caused by the piston effect,
- improve safety by restricting access to tracks and tunnels and
- providing opportunities for additional advertising and hence revenue.

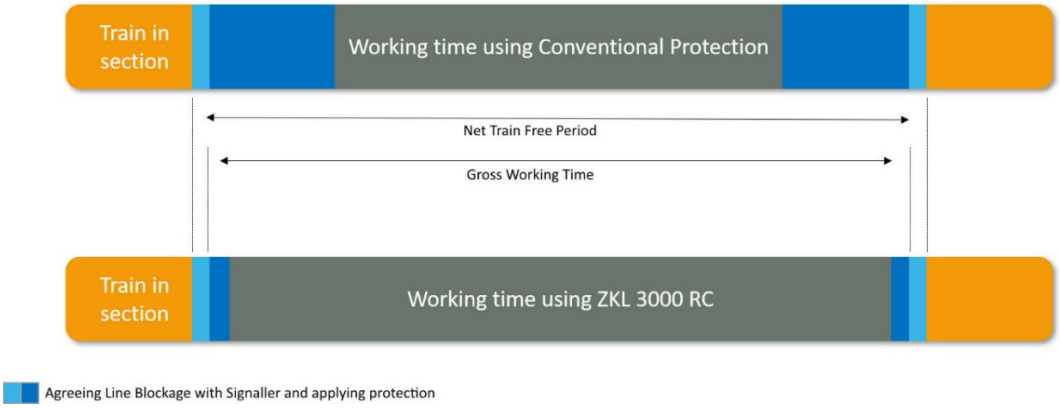
However, all these benefits come at a high cost. PSDs are expensive to implement and maintain. There are also additional issues which require further development work for each Rail Operator such as developing interface with the rollingstock and signalling system and developing solution to prevent passenger entrapment between PSDs and the train.

Remotely connected track circuit device

You know how a lot of time is lost with placing Track Circuit devices before track work can be executed in a safely matter. Strukton's partner Dual Inventive came up with a solution to reduce that time by developing a remote operated Track Circuit Device (ZKL 3000 RC), which can be preinstalled in track and is SIL-4 rated

The system can remain in track and be switched remotely in a matter of seconds, this allows for real-time monitoring and control of the device and removing the need to enter the track to place or remove protection once installed. It enables rail workers to perform work efficiently and safely. The ZKL 3000 RC is (de-)activated by an app on a smartphone or tablet, which means that track workers no longer have to spend time in the danger zone to install safety measures.

When switched, it simulates a train in the section, causing the track circuit to show 'occupied' thus placing the protecting signals at danger. The section is immediately blocked, enabling rail workers to perform work on the track efficiently and safely.



Working safely with more working time:

- The ZKL 3000 RC can be positioned at an earlier stage and not in hectic times during complex decommissioning. Chances of errors are thereby minimized, making the system safer
- The system is managed and monitored by one safety officer. Span of control is increased; one no longer has to wait for the observations of assistants
- A line blockage can be taken and handed back in less than 10 seconds, remotely and safely with an app
- More work can be carried out between trains and overall project times are decreased significantly

The system is applied across Europe and is currently being trailed at Sydney Trains. For more information, contact: struktonrailaustralia@strukton.com

Asset Management Shaping Success in Digital Technologies

Sydney Trains has had a proven track record in advancing asset management, demonstrated through being the first Australian public sector organisation to achieve ISO 55001 certification. The asset systems in place at Sydney Trains are conducive to innovation and the development of successful digital technologies through decreasing the barriers to innovation, reduced lifecycle costs and aligned project evaluation approaches. Furthermore, employing updated development methodologies that complement Asset Management Frameworks has assisted in realising many benefits. Several technologies have contributed to the success of augmenting established asset management systems and practices at Sydney Trains. These technologies range from database integration projects through mobile applications and augmented reality, with discussions on current Artificial Intelligence (AI) to be used within Sydney Trains for Track Access Planning.

Innovation from collective approach (Dropping the Barriers of Innovation):

Sydney Trains Asset Management utilise several systems and frameworks to operate and maintain Sydney Metropolitan rail network and fleet assets, as well as the being the maintainer for NSW TrainLink fleet and infrastructure assets. Delivering approximately $1.4 billion in annual works programs, innovative steps are required to ensure the delivery of a safe, reliable passenger fleet and metropolitan rail network, while encompassing the customer demands and keeping Sydney moving. Experimental learning has found that the success of Digital Technologies has correlated strongly to establishment, alignment and availability of crucial Asset Management systems and processes. Listed below are the key areas of innovation utilised within Sydney Trains Asset Management:

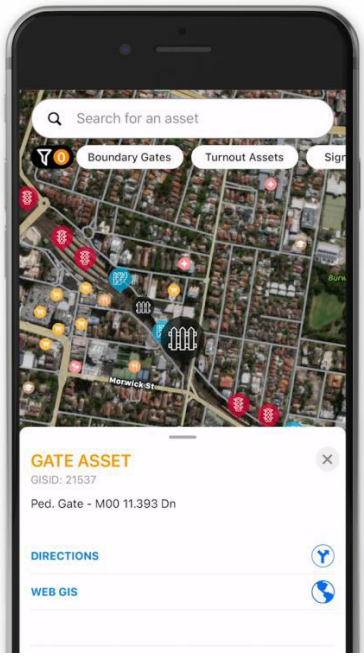
- **Robust Asset Management Framework**: Supporting key internal Asset Management Objectives as a 'single source of truth' of asset information systems and improving work planning efficiency through potential Maintenance task automation. With discussions held to bring AI used to be used for categories, correlate and assign planning data into trackwork possessions.
- **Multi-System 'single source of truth'**: System integration across the "Master Schedule Management Process", encompassing 6 databases all working harmoniously and without redundancy in information flow, has been successful in allowing for more efficient asset management processes to be developed. This also allows for more coherent and informative detailed being cascaded from high-level long term planning systems to medium-term views and eventually on-the-day coordination's.

***Reducing Inherent Risk*:**

Investment decision and software development alignment have been key areas for Asset Management and its approach to reducing inherent risk. Below are both areas and their subsequent affiliation with reducing our inherent risks:

- **Investment decision**: Supporting a consistent Life Cycle Costing across all assets is critical, while leveraging digital technologies to accomplish set approach. Decision making based on life cycle costs (ongoing maintenance & disposal) and hosting centralised & visible investment decisions, all flowing through a centralised Investment Forum.
- **Agile in Asset Management**: Consisting of short delivery cycles (sprints) coupled with open client engagement as the core focus. The two-week sprints have a focus on Minimum Viable Product (MVP), which reduces scope, deadline and cost variance risks; due to focus being on ensuring the asset is deployable and its version is workable.

The alignment of development methodologies to the Asset Management framework reduces issues and risks borne from ambiguous requirements, scope creep, business priority disconnection and missed deadlines. The application of Asset Management to digital technologies also introduces objective asset life cycle analysis to typically inconsistent estimates on cost benefits and option studies, reducing the risks of budget slippage as well as unexpectedly low returns on investment.



Digital Technology – Track Assets on Map view

Model Based Systems Engineering: an Answer to Increasing Complexity

The significant investment into the expansion of infrastructure across the nation has led to an ever-increasing complexity of transport systems and development programs. The advancement of modern technology and increase in customer demand has further increased the complexity of transportation systems. Howard Collins, former Sydney Trains chief executive, equated the challenge of implementing complex rail systems in an operational setting to "undertaking open heart surgery on the network without disrupting passenger services".

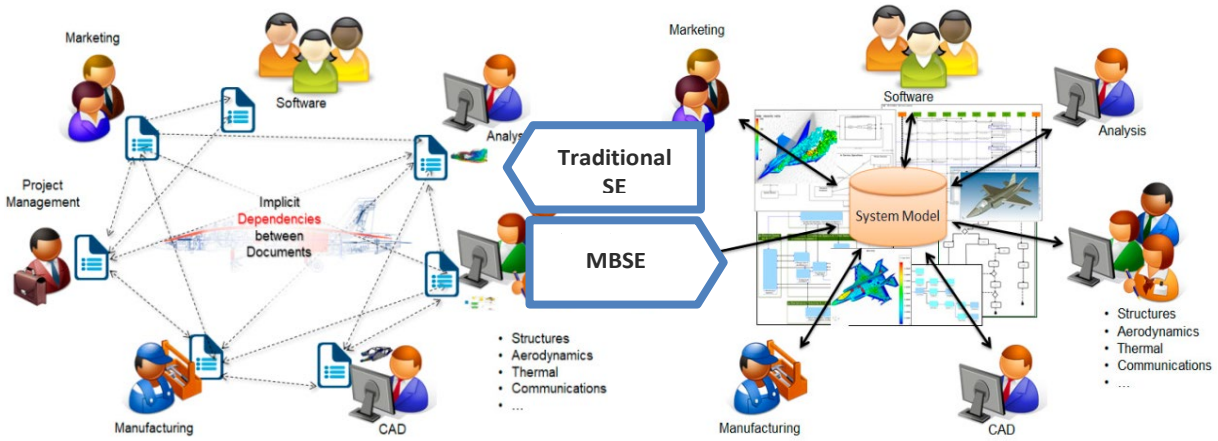
As the complexity of projects increases, so do the many interfacing stakeholders and parts, so does the sheer amount of engineering documentation (and version control!), and so does the chance to miss design issues.

How have other industries responded to the call to keep pace with the increasingly complex environment the transport industry now finds themselves? Several automotive, defence and space organisations (including NASA) have taken up the project delivery approach known as Model Based Systems Engineering (MBSE). Even areas of transport industry have begun introducing the MBSE approach (particularly, the Digital Systems Program delivered by Transport for NSW).

So, what is MBSE? The International Council of Systems Engineers (INCOSE) defines MBSE as:

> *"the application of modelling to support system requirements, design, analysis, verification and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases."*

Effectively, MBSE is a move away from traditional systems engineering approaches which rely on published documentation, and through the use of software tools, a move towards a single model accessible to all stakeholders in real time.



The MBSE approach has a number of advantages:

- Improved stakeholder involvement and communication. Breakdown of 'silo' mentality
- A shared understanding of the system across all stakeholders. Reduced risk of confusion due to version control.
- Earlier identification of issues and defects, particular between interfaces.
- Improved structuring, rigor, management and traceability of requirements and interfaces.
- Standard conformance and traceability
- Readily available impact assessment of scope changes – the single model traces the changed area to all linked areas.
- Better visualisation and understanding of the system from multiple perspectives

** Images and references are from (Madni and Purohit, 2019, Economic Analysis of Model-Based Systems Engineering)*

Thanks for reading

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