The Institution of Railway Operators

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Screen test

James Richardson looks at the way IT is used to integrate the train operations cycle

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Control centres can look chaotic because staff need instant access to so much data.

Nosing about train control and operations centres over the last two decades, the IT consultant is prone to ask: 'What are all these terminals then?' The response is usually: 'One for the signalling mimics, one for the customer information systems, one for the delay attribution system, one for emails,' and so on.

The erstwhile systems analyst cannot help prying further: 'And what are all these pages stuck on the wall?' These turn out to be special train notices, stabling plans and locomotive rosters.

Getting really personal, you may enquire as to whether the numbers written on the controller's left hand have any significance: 'The fleet bloke over there has just worked out a transposal in his system and phoned the details through to me. Now I'm going to update the automatic route setting, the customer information system, the delay attribution system, and so on.'

Such anecdotes are all too common and do not reflect a lack of investment or diligence in managing rail operations. There are good reasons why almost every site ends up as some variation of this organised chaos. There are no simple solutions and every case needs to be assessed and solved on its merits.

Highly integrated, single-vendor, super systems may suit some railways, but others will need to do what they can with a set of disparate legacy systems. I'd like to attempt to draw some general principles that may be helpful in streamlining operational systems.

Most railways are highly computerised. Database systems exist for the development and maintaining of master timetables. Similar systems are used to support the processes of daily timetable management. The modern train control centre is alive with technology.

There is a significant investment in dynamic station and customer-information systems. Most railways collect and store exhaustive statistics for train performance reporting and analysis.

These systems support an essentially simple business cycle. Trains are planned, run and then monitored. However, the reality can be more disjointed than the smooth cycle illustrated above. Large organisations tend, with the best of intentions, to create functional silos.

The IT systems that support these organisational silos are often referred to as 'islands of information'. This is a problem because information is the lifeblood of the post-industrial organisation. Poor circulation of information contributes to organisational ailments, including:

- Double handling of information that is costly and non productive;
- Error-prone manual processes and/or interfaces that compromise system integrity;
- A loss of transparency from one business area to another, often resulting in the same problems being solved repeatedly; and
- Bureaucratic business processes ill-suited to the dynamic business environment.

Effective IT solutions can break down silos and support the service delivery cycle as a whole, without compromising the integrity of the real-time safety-critical control systems. The key is a service-oriented IT architecture where functional modules are able to communicate via interfaces, as discussed below.

LONG- AND SHORT-TERM PLANNING

Long-term planners often require modelling and simulation tools that may be ill-suited to the needs of an operational master timetable management system. Often a third system is required for the needs of daily timetable management. It is imperative that these systems are able to exchange train schedules in a seamless manner.

Other critical integration requirements include:

- The ability to plan track closures and train traffic in the same system;
- The ability to plan with a whole-of-network view. Separate databases for different regions inevitably lead to difficulties, where traffic passes from one region to another;
- The ability to plan all traffic types in the same system. It is surprisingly common to see freight trains, for example, being managed in a different system from the passenger trains; and
- The ability to interface between timetabling and resource-management systems for fleet and crew planning.

SHORT-TERM PLANNING AND DAY OF OPERATIONS

The interface between the short-term planning and the train control centre is critical to the smooth flow of operations. Often, however, this interface is no more than a manual handover of running lists, train control diagrams, special train notices and daily circulars.

In this scenario, the waiting array of control centre systems must be manually fed with all the daily alterations contained in these reports.

This transcription can result in wasted time on operational shifts as well as potentially disruptive errors in ARS programming, incorrect customer information system displays and announcements, erroneous fleet

tracking data, and unreliable train performance reports.

The problem arises for two reasons: control centres are designed as closed systems with no concept of inbound or outbound interfaces, and timetabling systems are designed with no concept of integration with operational systems.

The solution appears to be an online timetable database-of-record that persists through the day-of-operations and beyond, as well as a set of interface protocols for the exchange of timetable, train path, fleet, crew, track possession and similar information between all modules throughout the service planning and delivery cycle.

PERFORMANCE MONITORING AND PLANNING

Today's service-oriented and regulated railways demand accurate performance monitoring and reporting systems. These systems involve the measurement of train delay against timetable and the recording of delay reasons for purposes of cost apportioning, management reporting and statistical analysis. This function is referred to as 'delay attribution'.

An effective delay attribution system needs to be interfaced with short term planning and day-of-operation alterations if it is to maintain a comprehensive database of actual train running times and codified delays.

In a highly trafficked environment it will be near-impossible to perform these alterations manually in separate systems. The result is often a compromise such as the monitoring of final arrival times only, or the monitoring of a small sample of total traffic. 'If you can't measure it, you can't manage it' is the truism that comes to mind.

A system that integrates short-term planning, day-of-operation alterations, real-time train arrivals/departures and delay attribution is required to solve this problem.

Such an effective solution can provide a comprehensive train running database that can in turn be used for detailed analysis, calibration of the master timetable, resolution of cost disputes and management reporting.

CONCLUSION

Information is the lifeblood of all modern organisations and effective interfaces are the arteries between parts of the body. Painful ailments that hinder productivity and increase costs are the result of poor circulation of information through the operational business cycle.

James Richardson is managing director of ViziRail, a software developer specialising in train planning and monitoring solutions. www.vizirail.com.au

DIARY OF EVENTS

SCOTTISH AND IRISH AREA

Tuesday 30 January: Visit to the Think Tank, Birmingham for the Winter Technical Conference morning and afternoon – 'Community Railways'.

Wednesday 14 February: Network Rail, Meeting Room 9, Lower Ground Floor, Buchanan House, Glasgow. Talk by Martin Batty: Montrose

Wednesday 14 March: Network Rail, Meeting Room 9, Buchanan House. The Work of the Railway Accident Investigation Branch – talk by Andy Savage, deputy chief inspector RAIB and PWI president.

Meeting times: All meetings start at 17:30, with tea/coffee and biscuits available from 17:15.

For information on all Scottish events and matters, please contact Jim Gillies on jim.gillies@networkrail.co.uk, or at Network Rail, Buchanan House, 58 Port Dundas Road, Glasgow G4 0HG.

MIDLANDS AREA

Monday 26 February: Masterclass event – Planning and Delivering the Timetable on the Derby to Birmingham Corridor. Event takes place in Derby at 17.45.

Monday 26 March: Customer Perspective from a Freight Operator. Talk takes place in Birmingham from 17:45.

To contact the Midlands Area, please contact Julia Stanyard on 0121 345 5030 or email: Julia.stanyard@networkrail.co.uk

NORTH EAST AREA

North East Area meetings normally take place at 17:30 for 18:00 in York. For further news on the IRO in the north east of England, email northeast@railwayoperators.org

NORTH WEST AREA

To contact the Midlands Area or get information about events please email Clive Evans at northwest@railwayoperatators.org

SOUTH EAST AREA

All South East Area meetings take place at the Union Jack Club, Sandell Street, near Waterloo Station. Doors open at 18:00 for an 18:30 start.

YOUNG PROFESSIONALS

Monday 19 February: Eurostar visit to North Pole Depot at 16.30. Meeting place to be announced.

Monday 12 March: Charles Horton, managing director of Southeastern Trains will be speaking on the future of the Southeastern franchise and the St Pancras High Speed domestic services at the Union Jack Club, Waterloo. The start time is 16:30 for 17:00.

Please register for all events at www.iroyoungprofessionals.org.uk/events

Informal networking

Thursday 1 February: Following the success of the first few informal networking occasions, informal networking will now be held at the fixed venue of the Euston Flyer between Kings Cross and Euston.

Please feel free to join from 17:30 onwards.

Thursday 1 March: Informal Networking at the Euston Flyer from 17.30 onwards.

We welcome any feedback or enquiries. Contact us at info@iroyoungprofessionals.org.uk or check our website at www.iroyoungprofessionals.org.uk

MEMBERS' NEWS

The following employers operate a corporate membership scheme, by paying a one-off annual fee that covers all their employees' affiliate or associate membership subscriptions:

Network Rail • Eurostar UK Ltd • First ScotRail • First Great Western • One • Railnews • Iarnród Éireann (Irish Rail) • EWS Railway • Northern Ireland Railways • Central Trains • Virgin West Coast • Virgin Cross Country • First Transpennine Express • Southern • Corus Rail Consultancy • London Underground Ltd • Docklands Light Railway • Transport for London • Stagecoach Rail • South West Trains • Sheffield Supertram • Arriva Trains Wales • Southeastern Railway • Island Line • London Lines • Silverlink Trains • c2c Rail • Gatwick Express • RWA Rail • Midland Mainline.

Those with full membership will continue to pay their subscription personally, irrespective of whether they can subsequently claim it back. Please note that, as the IRO's subscriptions are tax-deductible, a receipt will be issued for all payments – whether by cheque, standing order or internet payment.

If your company would like to explore the benefits of corporate membership of the institution, please contact us. We welcome applications from all industry companies, suppliers and associations – please contact Chris Daughton: on 01444 248931 or admin@railwayoperators.org.