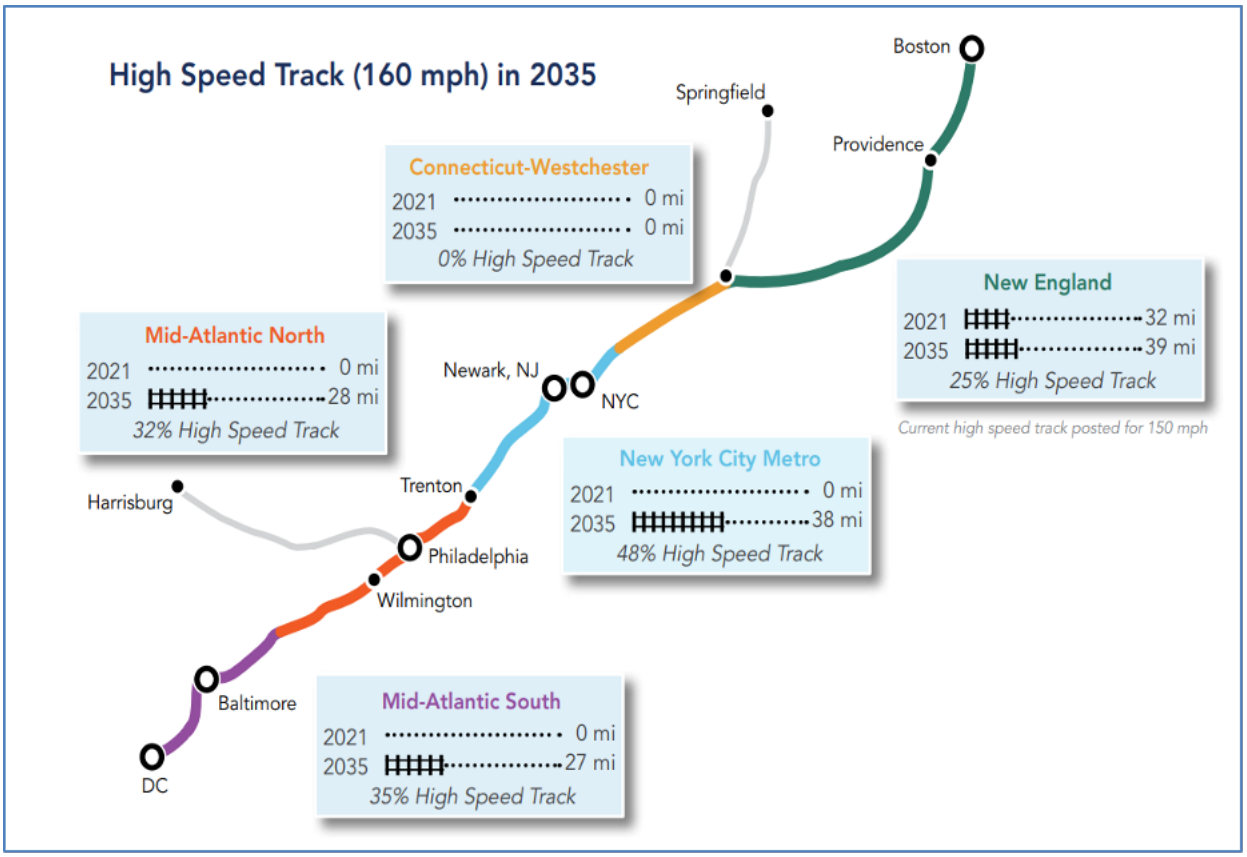
TEG TRANSPORT ECONOMISTS' GROUP

The Transport Economist

The Journal of the Transport Economists' Group



Editor Peter Gordon

Volume 51 Number 2
Summer 2024

The Transport Economist Volume 51, Number 2
Summer 2024

Contents **Pages**

Details of meetings are provided on our website at
http://www.transecongroup.org/meetings/

TEG TRANSPORT ECONOMISTS' GROUP

Appraising high-speed rail:
what they don't teach you at party conferences

Dick Dunmore

Online

24 April 2024

Introduction

Dick Dunmore began by explaining that his talk was based on publicly available information, plus discussions with many railwaymen and economists holding a wide range of views. His analysis was not quantitative, was not intended to reach any conclusions, and was not intended to be balanced. Instead, he would focus on points which had been discussed little or not at all. He apologised for any factual errors, pointing out that however much research and due diligence one undertook, it was still possible to get the wrong answer.

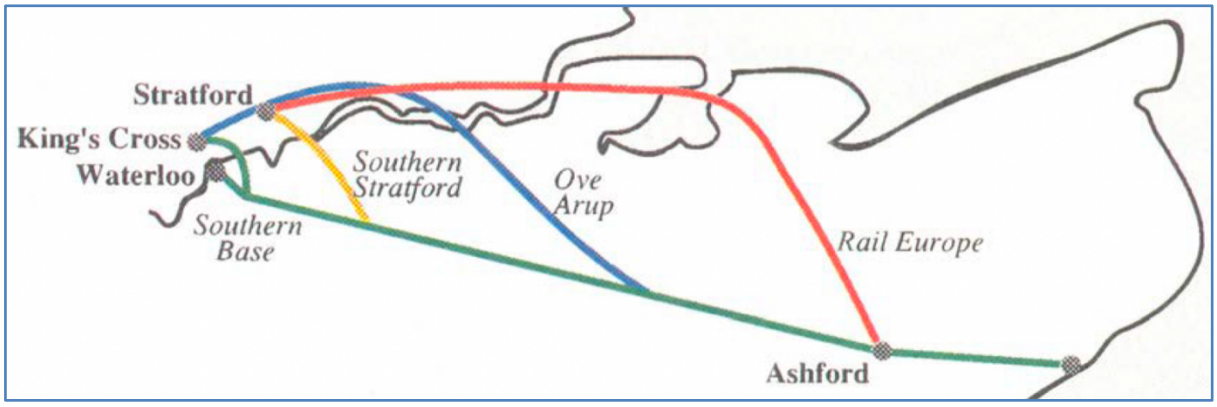
High-speed rail at party conferences

Major policy announcements on both of Great Britain's high-speed rail lines, HS1 and HS2, were made not through the normal mechanisms of a Government White Paper or a Spending Review decision in the House of Commons but as newsworthy items at Conservative Party conferences. Dick noted how, on these occasions, ministers were unlikely to be surrounded by critics and did not have to reveal much detail.

High Speed 1 in 1991

Eurostar services through the Channel Tunnel opened in 1994, using the existing rail network to a new 5-platform terminal at Waterloo. Nonetheless, the consensus, based on the then forecasts, was that a second terminus would be needed in the relatively near future. British Rail had developed a Southern Base route (GREEN) linking London with the Channel Tunnel and other bodies had proposed alternatives.

Figure 1: Routes for High Speed 1 proposed in 1991



The Southern Base route would continue to serve Waterloo on the surface but add a tunnel from Peckham to a 6-platform terminal at St Pancras with easier interchange for passengers from/to the north. Unsurprisingly, many in south London opposed the Southern Base.

Ove Arup proposed a route (BLUE) which ignored the existing terminal at Waterloo and went direct to St Pancras via Stratford, which was welcomed by the London Borough of Newham. The Southern Stratford (YELLOW) and Rail Europe (RED) routes would have terminated at Stratford, on the assumption that Crossrail would be built to the same timescale, so avoiding the expense of trying to reach central London.

At the 1991 Conservative Party Conference, the Secretary of State for Transport, Malcolm Rifkind, announced that the high-speed Channel Tunnel Rail Link (CTRL, now HS1) would go to "*Kings Cross-St. Pancras … via Stratford in East London*" [1].

In hindsight, much of the decision-making at the time was based on misapprehensions:

- Waterloo International cost £130 million and was only used for 13 years, from 1994 to 2007, when HS1 opened.
- Stratford International is not in the same location as the National Rail, Underground or DLR station.

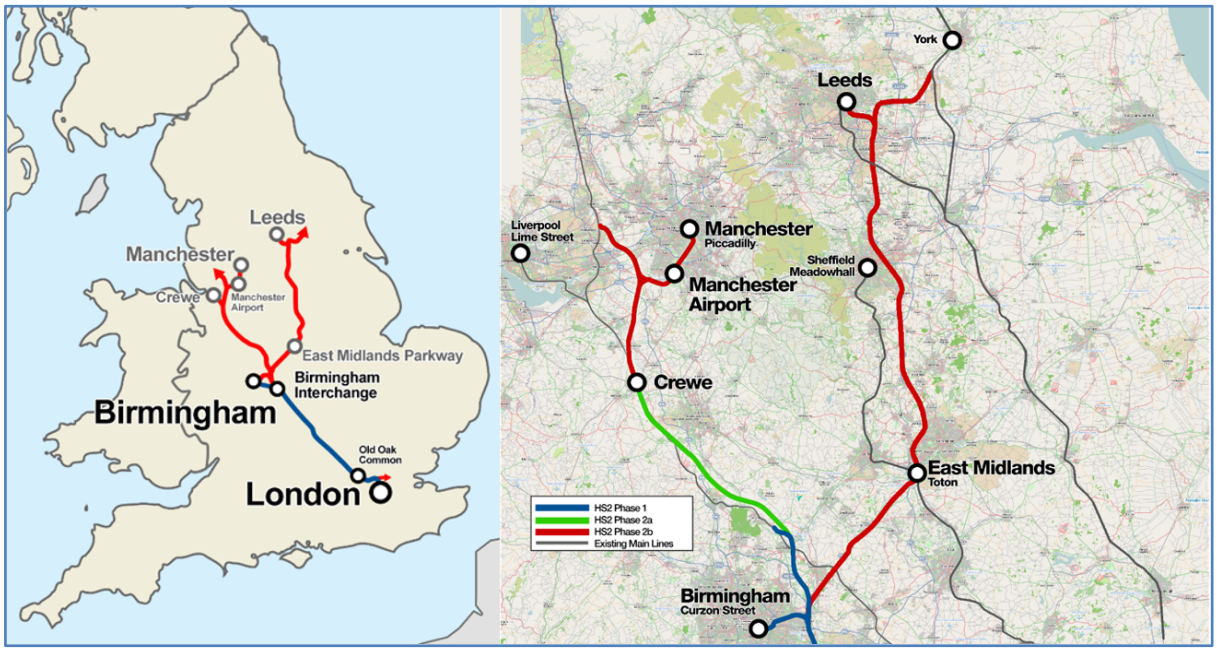
[1] When the decision was debated in the House of Commons, Shadow Transport Secretary John Prescott opened with "I want at the outset to register the strongest possible protest at the Secretary of State's contempt in choosing to make his statement to the Tory party conference six days before the House could meet to hear his statement."

- Crossrail (the Elizabeth line) opened 15 years after HS1, in May 2022, and does not serve Stratford International.

High Speed 2 in 2023

Thirty-two years on, at the 2023 Conservative Party Conference, Prime Minister, Rishi Sunak announced "*I am cancelling the rest of the HS2 project*". Figure 2 summarises the consequences.

Figure 2: The 2023 decision on High Speed 2



The RED parts of HS2 were cancelled, leaving HS2 as a route from Old Oak Common (OOC) in west London to Birmingham, with a short spur to the north to join the West Coast Main Line (WCML) at Handsacre. It is not yet known whether there will ever be a station in central London.

Dick's talk stemmed from thinking triggered by this announcement.

Are the base cases for high-speed lines credible?

Dick noted that appraisal needed to have a credible base case, but there was a risk that it made multiple implicit assumptions.

All existing infrastructure capacity is climate resilient and available forever. The last West Coast Main Line "modernisation" cost £9 billion and took over 9 years. Network Rail estimates that any further scheme would take 14 years and,

Dick surmised, is no doubt now trying to work out what, when, how, and at what cost.

All peak trains to all destinations are full in perpetuity, with passengers standing for up to 20 minutes, the current capacity criteria in Britain. Is it realistic to assume that passengers who can't board will quietly disappear?

All fares are "the same as now with RPI±X indexing". This massively oversimplifies complex yield-managed rail fares.

There is no interdependency with other schemes mooted or "promised". It is difficult to build a base case without assuming that other schemes will be built, whether as enablers of, or enabled by, the scheme being appraised.

This raised the question as to whether a fully credible base case can ever be defined when there are so many potential interventions, contingencies, and uncertainties.

Pricing

One of the major issues facing any appraisal is pricing, and specifically passenger fares. Others have suggested that we can manage demand to fit the capacity available by pricing it off.

For peak period long-distance travel, fares are unregulated under the current fares regime, so in principle, if there are too many customers for the trains from Birmingham, Manchester or elsewhere into London, one could just raise the fares.

For peak period commuting, which for the WCML broadly means those travelling into London from Milton Keynes southwards, things are more difficult. Here one could ration demand simply, by not letting people get on certain trains, or do the economically correct thing and raise the price of the currently regulated commuter fares. Either approach could prove politically difficult. Another approach would be to price off long-distance demand to leave more capacity for the commuters. If the government does not adopt any other policy this scenario would happen implicitly, because it seems logical to raise those fares over which one has flexibility. The result is more commuters on the line and fewer long-distance passengers. Dick said that this outcome had never been explicitly set out as a policy issue, but that it might be in the gift of ORR, given its powers about capacity allocation.

He did not know whether the modelling for HS2 and similar schemes realistically reflects what fares changes would happen as crowding got worse.

He welcomed how, with the southern end of HS2 going ahead, more capacity may be available for commuters, avoiding the need to ration it. If there are still too many passengers on the long-distance trains, one can still ration the capacity by price. However, it was not clear to him how a successful economic regulation of demand by price might be achieved in practice. Appraisals tend to assume that fares remain broadly the same as at present, subject to RPI±X indexing. In reality, fares are incredibly complex, with multiple fares between many places, many of which are yield managed. Logically, if capacity becomes constrained, one ought to start raising the yields to allocate the available capacity efficiently. Conversely, if and when capacity is expanded, average yields would fall to carry a greater number of lower paying passengers. The economics were clear, but were never explicitly modelled[2].

A further complication was that train operators in Britain are incentivised to maximise profits, rather than maximise benefits including positive externalities. They might find it easier to take more money from a smaller number of passengers rather than to carry larger numbers of extra people at lower fares.

The WCML also carries rail freight, and the government has aspirations to increase rail freight volumes as part of its net zero agenda. How would this demand for capacity be regulated?

Dick also wondered whether pricing demand to within capacity could be sustained beyond the medium term. We are 60 years from the Smeed report "Road Pricing: The economical and technical possibilities" which proposed road pricing as an alternative to "Predict and Provide". Even if road pricing could be designed to prioritise freight and long-distance traffic, could it all fit within the 1964 network? Raising prices to suppress demand might work for 5 or even 10 years, but could it be a credible approach in the longer term?

[2] The effect of prices varying with capacity utilisation is readily visible on a daily, weekly and annual cycle in rail, coach, air, and ferry businesses, among others.

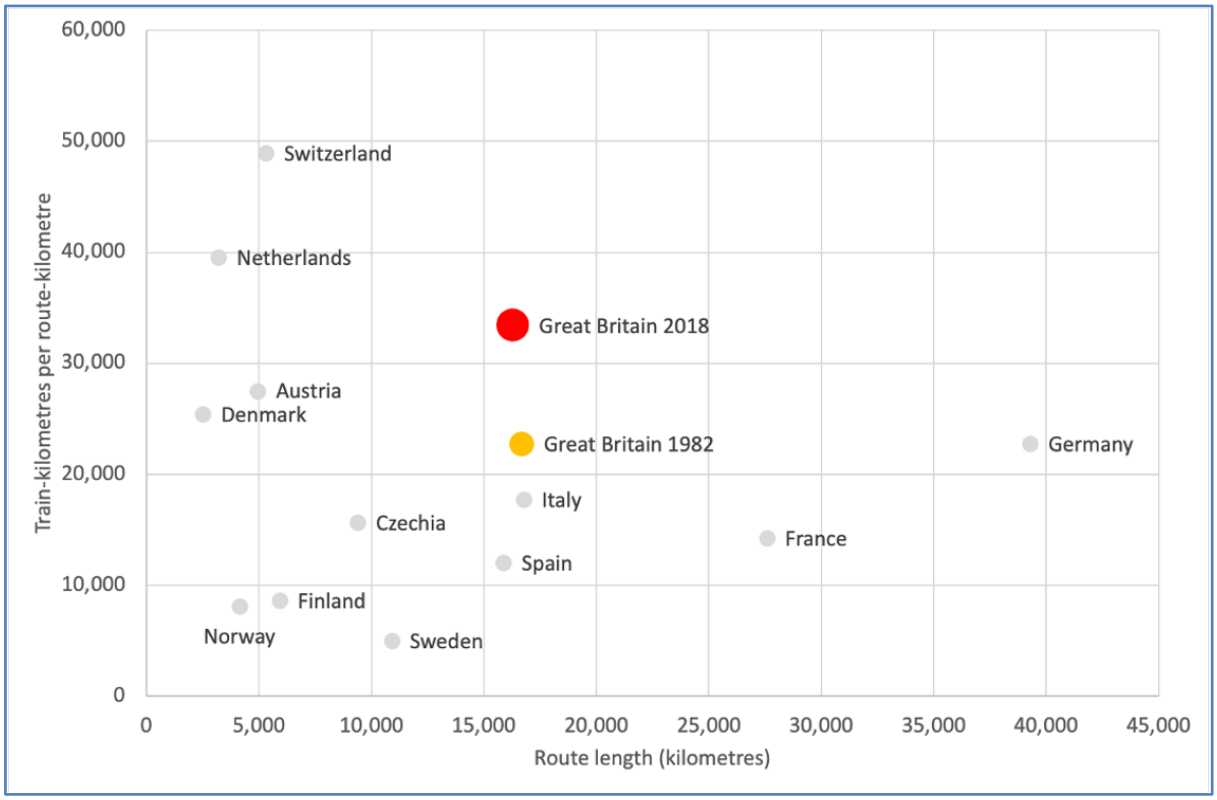
Speed is nice, but capacity is necessary

There has been much debate in the media about "why are they spending all this money only to go a bit faster?" Dick pointed out that the original rationale for HS2 was capacity.

One criticism of HS2 had been the design speed of 400km/h. In practice, high-speed rail infrastructure was first opened in France or Japan in the late 1950s at just over 200km/h, but by 2005 lines were opening with design speeds of 350km/h. The HS2 design speed is only 15% higher. Dick recalled that when the route was being planned, assurances were given that finding an alignment suitable for 400km/h did not add much cost. However, operating costs rise very rapidly with maximum speed, and while 400km/h might have been viable for initial route selection, that did not mean that it was cost-effective for detailed design or for railway operations.

Figure 3 shows that Great Britain has one of Europe's busiest rail networks, as measured by train-kilometres per route-kilometre.

Figure 3: Great Britain's rail network is used intensively



The national averages conceal wide variations, but only relatively small Switzerland and the Netherlands have more intensively used networks than Great Britain.

An additional factor is that London is in one corner of the country, unlike Madrid or even Paris. The greatest density of passenger train services is on the radial routes from London, particularly to the north. The four-track West Coast, Midland and East Coast Main Lines are all declared "congested" within the meaning of the European Union's Fourth Railway Package, but no major increments of capacity are available at low cost.

On these routes, passenger volumes, and train service density, tend to decline with distance from London. This affects the approach to investment policy, tending to concentrate attention at the London end, and influences BCRs: when capacity increments are lumpy, it is more difficult to justify expansion in thinner markets. Investing in the regions may win votes but may not be a good use of taxpayers' money. One example had been the expenditure on Eurostar trains for day and night services north of London, which were never used.

This pattern of rail congestion means that HS2 becomes a very complex project to appraise, because it will affect a large proportion of the overall network. In contrast:

- Spain's radial high-speed lines from Madrid each serve one direction, with only limited through running from the standard high-speed network onto the national broad gauge.
- France's radial lines from Paris each serve a single direction, although there is more through running.

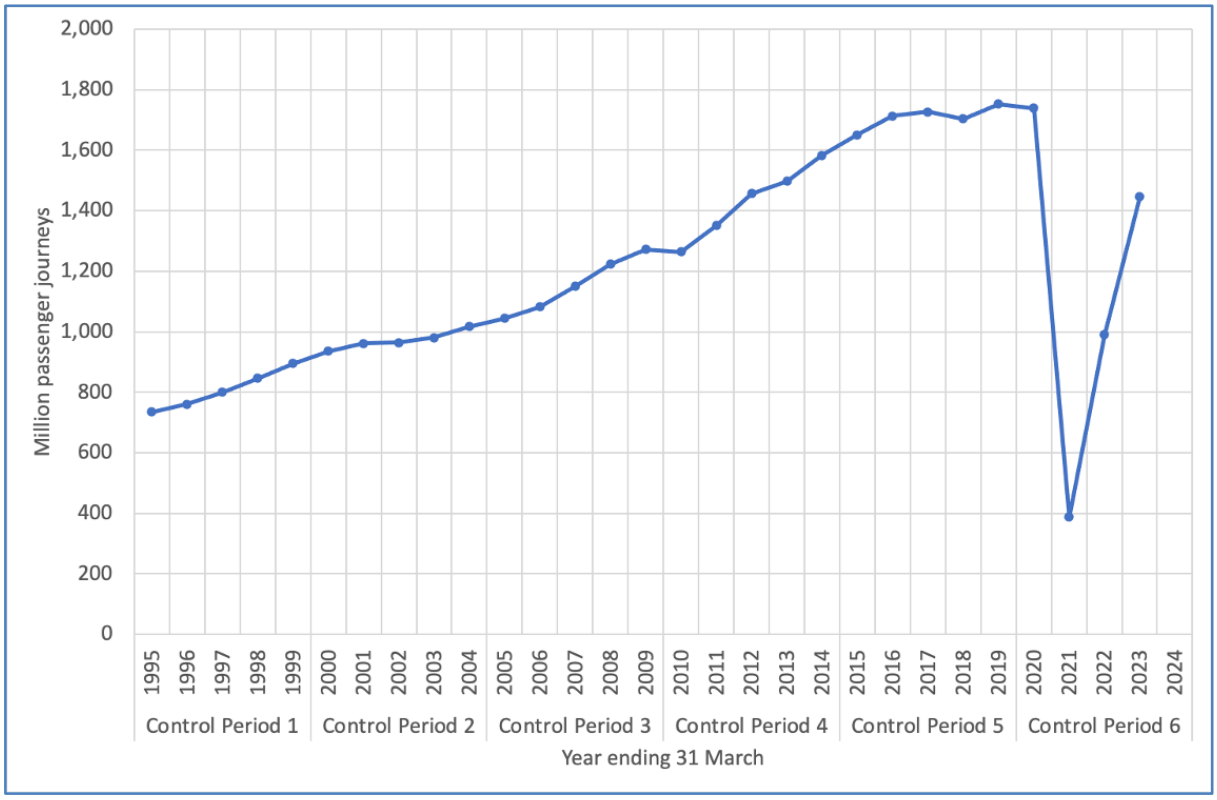
It is not realistic to "cap" demand growth

Dick also noted that, while future demand is uncertain, it is not realistic to cap it.

One early example from his own experience had been Network Rail's response to the first High Level Output Statement, introduced under the Railways Act 2005, for Control Period 4 from 2010-2014. Network Rail's response was to propose schemes which would provide just enough capacity to meet 2014 requirements. Steer and Arup advised ORR that more or bigger schemes might be needed to meet demand after 2014.

Figure 4 shows the unsurprising outcome that demand did not stop growing in 2014.

Figure 4: Growth does not stop at the end of arbitrary periods



However, the corollary is that, for the longer term, one may not know how much is going to be needed, when and/or what for.

Lumpy capacity increments cannot all be used shortly after opening, but in principle there is some value from spare capacity. Is it right, with large projects with remote completion dates, to place no value on capacity which may only be needed later? How could this be valued in appraisal?

Increasing train speed when building additional capacity may not be the original objective, but it is a benefit. One problem with HS1 ending at Stratford, or HS2 ending at Old Oak Common, is that neither adds capacity for travel into Central London.

"Just" upgrade the existing route

Before HS2 was given the go-ahead, there were studies of the alternatives of alternative "upgrades". Dick was unsure how well these had been investigated, given the potential complexities involved.

Here he made an analogy with road improvements. The M1 opened in 1959 between Watford (Junction 5) and Crick (Junction 18), paralleling the former Roman Watling Street (A5)

which runs through some 15 notable settlements of varying sizes. Would it have been sensible to upgrade the old Roman route through all those places, or to build local bypasses, or was it better to build a new and, as a consequence, higher-speed route? How could all the possible combinations of options be defined and appraised? As discussed above, if the M1 had not been built, how could long-distance traffic have been prioritised? How would one set road pricing in intermediate places, such as St Albans or Dunstable, so that local commuters were deterred to leave the route free for long-distance freight? How would traffic be distributed once it reached London, without complementary infrastructure, now the M25 and North Circular?

Similarly, a major London to Manchester "upgrade" of the WCML would involve works affecting many cities, towns and villages on route. Rail infrastructure typically connects cities, where people tend to vote for one party, through countryside, where people tend to vote for another party. This further complicates the politics of getting agreement to build major new infrastructure such as HS2. Dick noted a quote from Prime Minister Rishi Sunak "*Towns are the place most of us call home and where most of us go to work. But politicians have always taken towns for granted and focused on cities*."

Ashford in Kent had lobbied hard for HS1 to go through the town, rather than being bypassed. In Dick's view it ended up with a high-speed rollercoaster of cuttings and flyovers, with the town centre becoming one long strip of railway line, rail depots, car parks and so on. Adding twenty-first century elements to a nineteenth century railway risks delivering only nineteenth century technology, standards, and reliability. Instead, he suggested that it was often easier to build new infrastructure to a consistent modern standard, as had happened on HS1, rather than have a line which oscillates between different centuries as one moves along it. In addition, any on-route upgrade would probably require extra space and cause more disturbance to neighbours, but while adding capacity might not save time.

"Cheaper" routes often cost more

Dick pointed out that routes which appear cheaper from an early analysis can often turn out in practice to cost a lot more.

Taking the example of HS1, he noted that Arup proposed that the route to St Pancras used the North London Line corridor between Stratford and Caledonian Road. At first sight this seemed cheaper than tunnelling under south London but, within months of that route being chosen, further work showed that this proposal was going to be expensive and complicated. Arup had devised the route at their own initiative, and born the costs of doing so, but had not had access to the information, time and resources needed to work up the scheme in greater detail. In such circumstances there remain many unknowns.

On subsequent more detailed analysis, putting HS1 in tunnel from Stratford was found to be a cheaper, less disruptive and quicker solution. Also, with hindsight, the original surface proposal would probably have precluded the later development of this section of the London Overground network.

An analogous situation applies in the case of HS2. A decision was taken to build a station at Old Oak Common (OOC), notionally to provide an interchange to services to Heathrow Airport. Superficially it appeared possible to run from OOC along an existing railway line from Acton to Northolt but, after further studies and analysis, plus the objections from potential neighbours, it soon became apparent that the best solution was to put HS2 in the 13.5-kilometre Northolt Tunnel. With hindsight it might have been cheaper to tunnel directly to Euston from the chosen alignment outside London. Nowadays, any major new rail infrastructure may need to be in tunnel under urban areas.

Assumptions are poor, and circumstances change

Dick reflected on the limited quality of much of the data on which planners and analysts tend to base their judgements, and that circumstances change as the development progresses. Poor data requires the use of more questionable assumptions and the inclusion of greater contingencies.

As an example, the case for the now-cancelled section of HS2 from Birmingham to Manchester was made about 10-12 years ago with no detailed forecasts of any of the following.

Long-term government transport taxation and pricing policies: it is possible that we have a major restructuring of rail fares within the next few years, effect unknown.

Long-term base case infrastructure and service operating costs

Long-term OPERABLE timetables for HS2 and interacting routes: Dick noted that modelling of timetables for the Intercity Express Programme was relatively simplistic: it was not possible to investigate hundreds of timetables covering 20-30 years; and there was no check that the indicative timetables would actually work in 20-30 years.

Long-term timetables and pricing of competing modes and rail routes: Domestic air travel in Britain had halved while we were discussing whether to build or not HS2, but this steep decline did not continue, demonstrating how unknowable such factors are. HS2's modellers could only make simple assumptions about the effective pricing of air travel.

Detailed forecasts of freight demand for released capacity: Patterns of freight are changing structurally: short-distance coal traffic has almost disappeared, but long-distance intermodal traffic has grown substantially. More rail freight is envisaged to meet net zero objectives, but this was not foreseen when HS2 was appraised.

On multiple HS2 potential routes, knowledge of ground conditions and individual structural requirements and costs: it is possible to use simplistic estimates, but contingencies must be allowed for until the completion of further work to verify broad assumptions.

Many circumstances have changed since the HS2 scheme was initiated, some of which were not evident even four years ago.

The costs have been affected by factors such as that:

- ground conditions are often worse than assumed;
- extra costs of speed and tunnelling have materialised;
- inflation in general is higher; and
- engineering labour and materials costs have risen even more steeply.

The assessed benefits have been influenced by:

- the falling value of in-train time savings;

- declining business travel and commuting (although the latter has tended to increase more recently);
- lower and fewer weekly and daily demand peaks; and
- more low-fare leisure travel.

We must live with uncertainty, but also need to acknowledge that such eventualities do always tend to happen.

New railways are often not used as planned

Infrastructure is appraised on the basis of an assumed usage strategy and timetable. This is not difficult for a simple scheme connecting two points (for example, all trains that have used the Heathrow Express infrastructure have connected Heathrow and London Paddington) but is not always the case elsewhere, especially with larger projects. Dick gave three examples.

High Speed 1

The evolution in the expected use of HS1 since it was first conceived provides a classic example. When the Channel Tunnel first opened in 1994, Eurostar services ran from Waterloo via the existing network, and from 1996 some trains also served Ashford. When HS1 opened throughout in 2007, the route introduced additional stations with both "international" and "domestic" platforms at Pancras, Stratford (never served by Eurostar) and Ebbsfleet.

With hindsight, once domestic high-speed services were committed, what was the point of international platforms at Stratford or Ebbsfleet, when passengers could simply get a fast connection direct to either St Pancras or Ashford? Did anyone point this out at the time? Dick surmised either that international and domestic markets were seen as fundamentally different, or that no one had had the obvious idea.

David Rowlands, former Chairman of High Speed 2, later said "*It is just 68 miles from the Channel Tunnel to St Pancras and we have a terminal station there, a disused terminus at Waterloo, an unused station at Stratford, an underused station at Ebbsfleet and a dying station at Ashford*".

In 2024, Eurostar uses only one of the five stations: St Pancras.

Dick recalled that HS1 was built with a notional capacity of 20 paths per hour. Since stopping trains at intermediate stations reduces capacity, he suspected that no more than around 6 Eurostar (international) and 8 Javelin (domestic) trains per hour would be practicable, but he did not know whether anyone had ever investigated this issue. The peak service was now 3 Eurostar and 6 Javelin trains per hour, but the number of Eurostar trains that could be operated may fall with the long-planned introduction of fingerprinting of non-EU passengers entering the Schengen Area.

It is clear that 1990s assumptions about how HS1 would be used bear little relationship to how it is being used 30 years later.

London's Thameslink

The re-opening and electrification of the Snow Hill tunnel in 1988 linking local services from stations between Bedford and St Pancras with those south of the river was justified on savings in rolling stock costs. In 1996 the newly privatised Railtrack was allocated £600 million to provide a 24 trains per hour Thameslink 2000, and in doing so remove the peak hour bottleneck at London Bridge. Meanwhile, passenger demand increased across the network and additional trains were added to lines in the southeast. The upgraded Thameslink infrastructure eventually opened in May 2018 and included the world's first successful ATO under ETCS operation, but to date no more than 20 trains per hour have been operated through the core.

In Dick's view, some trains are running on lines "where they fit", rather than where the original planners thought there would be demand for them. As a resident of Greenwich, he benefits from two trains per hour not because it was thought that they should serve that corridor, but because it was found that it could accommodate them. Hence, on an increasingly systemically congested network, one may find that specific stretches of sophisticated new infrastructure cannot be fully utilised because all the timetable details had not been thought through.

Manchester's Castlefield Curve or Ordsall Chord

In the 1970s there was renewed interest in a mainline rail link to connect the networks north and south of Manchester. This

resulted in GMPTE developing the "Picc-Vic Tunnel" scheme which was subsequently denied funding by central government. When the first Metrolink tram service, between Bury and Altrincham, opened in 1992 it effectively fulfilled this objective.

In 2007, Dick helped draft a position paper on a new link to allow TransPennine trains to serve Manchester Victoria, Oxford Road, Piccadilly and Airport stations without blocking the "throat" outside Manchester Piccadilly station. The "Castlefield Curve", finally built as the Ordsall Chord, providing a mainline connection between Victoria and Oxford Road, was approved as part of the government's 2011 budget (not at a party conference).

Subsequently more trains were added to the network around Manchester and, when the Ordsall Chord was opened in May 2018 it was found that the existing rail infrastructure between Oxford Road and Piccadilly could not cope with the additional trains. There was effectively a complete meltdown of services in Manchester. The "just enough to work" was found to be "doesn't work at all". In 2019 the route through Oxford Road was declared "congested" and in 2024, 50 years after the Picc-Vic line was proposed, Manchester still has a binding rail constraint in the city centre. Until other infrastructure is enhanced, the Ordsall Chord may be barely used.

In contrast, Melbourne is building a completely new line, analogous to the Picc-Vic Line, linking its rail networks on either side of the city to overcome a similar problem. Time will tell how well that works.

Spare capacity for contingencies

Dick considered that, given the uncertainty about how well the infrastructure will perform and how much demand will emerge, Great Britain does seem overly keen to fill the infrastructure with all the trains it can without leaving any capacity for contingencies.

Politicians may make statements such as "*Hard-working taxpayers must have the best value for their hard-earned money*", and everyone is against gold-plating and for value engineering, but many relatively minor issues can affect whether something works reliably or not.

If a project's designs begin by providing 110% of what models say is needed, the designs are seen as being gold-plated. If the designs are then value-engineered to 101% of what appears to be needed, there is a risk that only 99% of what is needed is delivered, and it does not work.

Dickens expresses the idea perfectly in pre-decimal terms

Annual income twenty pounds, annual expenditure nineteen pounds nineteen and six, result happiness.

Annual income twenty pounds, annual expenditure twenty pounds nought and six, result misery.

Dick provided an example from the development of the London Overground. At a TEG meeting in 2009, just before it opened, Transport for London's (TfL's) Peter Field and Carol Smales said they were going to introduce new services, new trains and better staffing at stations, along with other improvements[3]. Members at the time were somewhat sceptical that it would succeed. They wished TfL luck, but the predictions did appear somewhat optimistic. Four years later, in 2013, Carol Smales again gave a presentation which included a chart showing actual usage[4]. At that meeting, Dick asked whether TfL had considered any forms of demand management if growth continued to put pressure on capacity.

Dick was now concerned that the new Elizabeth line, designed to support urban and suburban movement, might reach capacity. In 1991, two of the four proposed routes for HS1 had assumed that international passengers to/from central London would transfer to it at "Stratford". As of 2023, HS2 passengers to/from central London may have to transfer to it at Old Oak Common.

The Elizabeth line opened in May 2022 and cost £18.9 billion. By 2023, morning peak loadings between Stratford and Whitechapel, and between Acton Main Line and Paddington had reached 3 passengers/$m^{2,}$ and 4 passengers/m^2 is notionally "full". If this were reached, would there be any point in even stopping London-bound Elizabeth line trains at Old Oak

[3] https://transecongroup.org/wp-content/uploads/journal/Transport_Economist_36-3.pdf
[4] https://transecongroup.org/wp-content/uploads/journal/Transport_Economist_40-3.pdf

Common? Not surprisingly, TfL is already discussing buying more trains to increase capacity.

Dick also noted that 4 passengers/m^2 might have been a workable standard when most passengers were commuters, but might be a challenge as the expansion of step-free access mean that a growing proportion of passengers travel with wheelchairs, buggies, or one or even two "spinner" 4-wheel suitcases.

Imperfect is better than unknown

Dick noted that the most recent independent summary of HS2 was the Public Accounts Committee (PAC) review published in February 2024. It opened its conclusions with:

"*HS2 now offers very poor value for money to the taxpayer, and the Department and HS2 Ltd do not yet know what it expects the final benefits of the programme to be. The Department acknowledges that building just Phase 1 will not be value for money because total costs will significantly outweigh benefits. However, in October 2023 the Department's Accounting Officer did assess that, excluding the £23 billion that had been spent to date (in 2019 prices), it was value for money to continue and complete Phase 1. There are many uncertainties in this assessment and we were left with little assurance over the calculations. In particular, the Department needed to include as a benefit the £11 billion (in 2019 prices) of costs avoided from not cancelling the whole project, in order to justify continuing. Even with such assumptions the potential benefits are low, with between £1.10 and £1.80 of benefit for every £1 to be spent completing the project. The Department also has further work to do to before it fully knows what the potential benefits will be. The Department will now need to revise its business case for Phase 1, which it expects to complete during the first half of 2024.*"

Now what?

Dick's assessment was that the PAC had shown that government has made a massive change in an incredibly complicated scheme, and that the practicalities of planning and appraising rail services were not fully appreciated.

Planners and appraisers of road, airport, port, electricity, gas and water infrastructure can normally treat final demand as a statistical market.

Airport planners, for example, forecast how many flights there will be in a busy day or hour, but do not have to form a detailed view of where individual aircraft will be through the day.

Rail appraisal, in contrast, needs a detailed, workable operations plan for each option, including the base case. There is a need to identify policies on pricing and markets to be served, the timetables designed to serve them, and the movement, platforming, stabling and maintenance of the trains which operate these timetables. Only when all these pieces have been assembled can a reasonable appraisal be conducted.

Among those listening to the talk were experts in each of those subjects, but no one person was likely to understand fully all of them. Yet, if some of those points were missed, there was little prospect of an appraisal delivering the right answer.

The government's decision to cancel the rest of HS2 has profound impacts. As the PAC report makes clear, thinking is unclear, and in many cases needs to start again, on:

- the possible need to upgrade the Elizabeth line;
- increasing capacity on two of the other congested main lines north from London;
- whether or not there will be a HS2 terminal at Euston;
- the size of the high-speed fleet on order;
- running trains designed for HS2 north of Handsacre on the WCML.

Several other schemes may need to be rescoped, redesigned, re-costed and re-appraised, or may no longer be possible. One cannot build a scheme to connect to something which is no longer there.

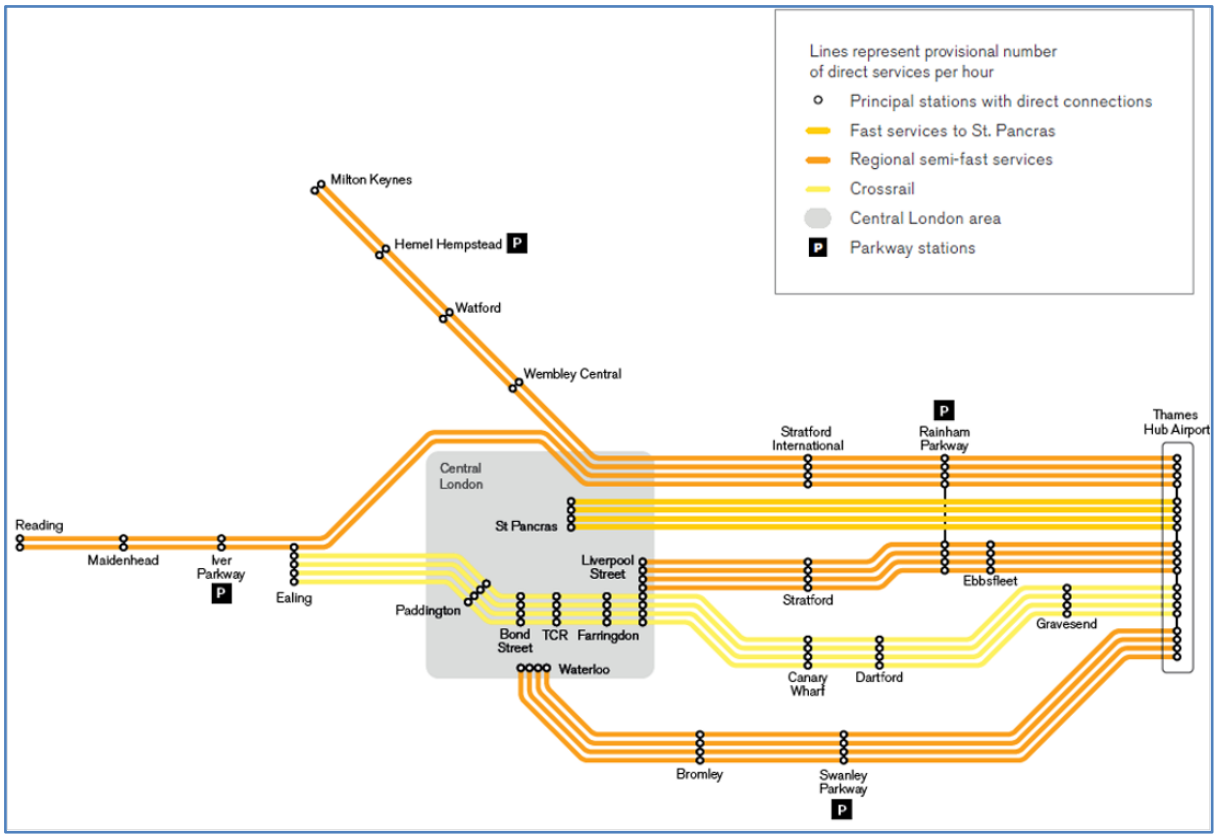
In essence, having ditched one plan, a new consistent plan is needed. What was planned may have had its flaws, but was reasonably coherent and well understood. What we are now trying to do is uncertain, and we don't know what it is, if it will work, how much it will cost, or what its benefit-cost ratio will be.

Yet, if one believes recent forecasts from Steer for the Railway Industry Association, demand is still growing.

A recent parallel?

Dick ended by presenting a chart from the 2013 proposal for a Thames Hub Airport, showing a "provisional" 20 trains per hour service, on six different rail corridors, some of which would have required new infrastructure and all of which involved working among existing services.

Figure 5: 2013 "provisional" services to a Thames Hub airport



This complex proposal seemed broadly analogous to saying, in 1996, "Get 24 trains per hour through central London on Thameslink" or, in 2023, "Devise a new long-term plan for services, timetables, and freight growth, on our three congested north-south long-distance lines, in the absence of HS2".

What would have happened if government had given the go ahead to the airport and then asked the rail industry to provide the proposed services? Could we have agreed in time:

- Could it work?
- What would it cost?

- When could it open?
- Would it (or the wider airport project) be value for money?

Dick concluded on that note and invited comments.

Discussion

William Barter (Director, William Barter Ltd.) said that it is never too soon to start writing a timetable for a project, and the more timetabling one does the better. Even if it is not the timetable which runs, time spent in reconnaissance is never wasted. The first shot at an HS2 timetable, in 2014, showed that Phase 1 on its own did not work very well, and that is partly why Phase 2a was invented. Cancelling Phase 2a means we are left with a railway that does not work very well. Although costs were not his speciality, William had recently seen an article from an HS2 engineer on an MBA project comparing the form of contract used in Britain and in France. This very firmly identified the British model of contracting as a source of many of the cost increases. British contractors had effectively been asked to provide warranties against everything forever, on a scheme that had not been designed in full detail, on a cost-plus contract. Inevitably, projected costs go up to reflect the risk. In France more time is spent in the planning phase so that it becomes realistic to expect a firm fixed price contract from the contractors.

John Segal (Independent transport consultant) agreed with 95% of Dick's presentation. He emphasised the relevance of the Base Case: the choice of alternatives was fundamental. He also noted that, in the context of HS2, any attempt to constrain long-distance travel on rail services, whether by capacity or price, means people will choose to go by road, but there is little spare capacity on the M1/M6/M40 road network. Does the Base Case also involve adding more lanes to the motorways? The government gave no guidance whatsoever on this issue. He also felt that the distinction between regulated and unregulated fares had become blurred, as in the UK the government now takes the revenue risk. This change has happened neither by design nor by government policy but by accident. Thus, the government could, if it knew what its transport objectives were, control fares to achieve its aims in terms of economic benefits. **Dick** said that

John had raised a very interesting point about fares policy, which was also considered at the time of the McNulty Study. The expectation is that franchisees will profit maximise, because UK policy is for them to hand money to the government. Alternatively, government could ask them to optimise on economic grounds such as efficient allocation of capacity or efficient use of surplus capacity at low price. Dick feared that, with greater government control, setting fares would become more a political than an economic judgement.

David van Rest considered that HS2 had been incredibly badly designed, gold-plated, and with stations in the wrong place, none of which were linked to existing local networks. The choice of the Misbourne Valley route had turned out to be a serious error. He suggested running HS2 trains into Paddington. He also believed that HS2 conflicts with Great British Railways' own development plans. **Dick** noted that he had investigated the issue of HS2 being expected to have a connection for access to Heathrow airport, and it appeared that no business case appraisal had been carried out. Rather, in some of the initial correspondence it was just asserted that Heathrow access was essential. In the end this was to be via Old Oak Common. He was not aware of an incremental cost-benefit analysis for having a station there, and suspected that the number of people who would double back to Heathrow would be very small.

Professor Peter Jones (UCL) understood that it was now accepted that Curzon Street station in Birmingham will not need the same number of platforms as planned, and there is no case for having platforms on the fast lines at OOC. The argument has been to carry on, because going back to square one would delay things too much because of the need for planning permission. His expectation was that hundreds of millions or even billions would be spent unnecessarily on these parts of the project. He thought that a lower speed top speed would have enabled the HS2 route to more-or-less mirror the M40, probably meaning that less of the route would have needed to be in tunnels, and that these could be of smaller internal dimensions. Also, he was not sure why the high-speed trains would slow down trains on the conventional network. Regarding the appraisal, he suggested that attracting people out of cars where they are using time completely unproductively to a train where time can be

used productively, one should be including the value of productive time created rather than just the value of the time savings. Similarly, given that the argument is primarily about capacity, presumably all the extra trips that are provided by that capacity would have been foregone. He was not sure how that was considered in the cost-benefit appraisal. **Dick** suggested that, in the scale of things, two extra platforms at OOC, which may be needed when the Relief Lines are closed, would be very cheap compared with the international facilities at Ebbsfleet and Stratford, which in hindsight were never needed at all. His recollection was that route planning software indicated that as one raised design speeds for London to Birmingham it did not cost much more for an alignment for 400km/h rather one for 300km/h. While that may have been true for the initial designs it may not have been the case after working up the scheme in more detail, or for the likely operating costs. He agreed entirely that, since people can work on trains but not in cars, the appraisal should value the increase in working time.

Graham James (Managing Consultant, Atkins) highlighted that some aspects of works on the ECML might fall under that same heading as the Ordsall Chord. The instinctive view is always that it is a waste of money and that one may have built something and not got the benefit from it. His pragmatic view was that inevitably over 20 or 30 years one usually, but always, found a use for new infrastructure. A shopping list for, say, £5 billion is never going to be delivered all at once, but must be bitten off bit by bit. The TransPennine Upgrade and Northern Powerhouse Rail were examples. As an appraisal professional he felt that economists and politicians should not focus on precise numbers in BCRs, for the reasons Dick had set out. The talk had shown the importance of understanding the uncertainties relating to major projects. This means planning for flexibility and making sure, as part of the project development process, that engineers design things to be flexible. It is pointless to build something that has exactly one use and fails if any one of the requirements behind it do not materialise. His message was to plan for the unexpected, whether one wants to or not.

David Metz (UCL) wondered whether it is now too difficult in Britain to create new rail routes because of a lack of public acceptability. Perhaps the rail network should be regarded as

mature, but with room for incremental changes. The focus should be on digital technologies to make best use of the infrastructure which exists. Would that be a conclusion that Dick would draw? **Dick** disagreed. There was a difference between being wrong and being uncertain. Going back to the Smeed example, the country might have wisely decided in the mid-1960s that it was not going to copy these silly continental Autobahns, Autoroutes and Autopistas. Instead, we were going to follow wise economic principles and price traffic to fit within our wonderful heritage Roman and medieval road network. He was not sure whether, 60 years later, anyone would conclude that this would have been the right decision to make. Of course, at the margin, people do make greater use of digital technology (the TEG meeting has not involved travel) but how far one could push that in the medium to long term he honestly did not know. It was certainly another approach, and at the margin things are moving in that direction, but it does not mean it can solve all transport problems.

Gregory Marchant took issue with Dick's comment that it does not cost much more to have a higher speed line. He pointed out that energy use increases as the square of the speed. Thus a 40% increase in speed requires a doubling of energy use, which was not necessarily desirable in a world concerned about climate change. **Dick** acknowledged the point, and hoped and assumed that someone somewhere had done calculations looking at speed and forecasting energy costs, if only to design the electrification. One would hope that those issues have been addressed, and that they were done by honest people who made judgements on the basis of evidence, in detailed technical fields in which we are not experts. Dick agreed that, as of now, the public is not collectively convinced that they got the right answer.

William Barter suggested that OOC was now intended to enable people to interchange with trains to the City and Docklands. **Dick** agreed that this was possible, even if the original rationale for OOC was to connect to Heathrow. There may be one rationale for a facility, which then produces benefits in other areas much greater than the original rationale. However, taking the emerging Elizabeth line loadings at face value, without some expansion of capacity, there may be no scope for people to join the Elizabeth line at OOC in the peak hour.

Michael Schabas (Independent consultant) expected more people may want to pay for First Class if this enables them to work better on a train. **Dick** considered this an interesting thought in relation to potential revenue yields.

Keyvan Rahmatabadi (Independent consultant) had worked on the Tours to Bordeaux high-speed rail project in 2007. This scheme for a 300-kilometre (187-mile) line, 50% longer than London to Birmingham, was costed at €8 billion. It was planned to be built 2012-15 and, as far as he knew, was delivered on time and within budget. He felt that things go wrong in Britain because of a tendency for people to keep changing their minds. Every time there is a change, there is extra cost. What was needed was to decide on the plan and get on with it. **Dick** recalled that when HS1 was being planned there were questions about why it was so much more expensive than the French line on the other side of the Channel. His recollection was the project team was asked to produce a detailed analysis of why things were different from France. This included examining bills of quantities and unit costs. He surmised that part of the explanation related to differences in population density: 438/km^2 in England, 123/km^2 in France, 93/km^2 in Spain. These averages are a massive oversimplification, but indicate that Britain has a very dense population and very expensive land. HS1 was built within the budget set at the time that the construction costs were defined.

Report by Gregory Marchant

Timetabling for HS2

What we did, why we did it, and what we learnt

William Barter

Online

22 May 2024

Introduction

The speaker began by giving a few details about himself. He is a British Rail ex-management trainee who went on to work in Operations Planning for major projects with the British Rail Southern Region and then Network SouthEast. He has been a consultant in the UK and overseas since 1993 and was the Chartered Institution of Railway Operators (CIRO) lead tutor for Operations Planning. He led timetabling for HS2 Ltd from 2012 to 2019, and is now a member of West Northamptonshire Council where he is the Assistant Cabinet Member for Rail.

This timetable thing – what's all the fuss about?

William began by quoting Gerald Fiennes: "*Who controls the timetable, controls the railway*". The timetable affects all of income, expenditure and assets.

It is the railway's offer to the public, which affects both the absolute level of demand, and hence total revenue to the railway, and its allocation between franchises. If people don't like the timetable, they won't travel.

It determines the fleet size required, and hence leasing costs, vehicle mileage, which determines fuel and maintenance costs, and staff numbers. Some costs are time-driven and others mileage-driven.

The railway has limited capacity, and a timetable must work within infrastructure constraints. However, a timetable we want to run but can't is what drives developments when the desired service can no longer be accommodated, and the only solution is additional infrastructure.

The existing infrastructure appeared unable to cope with the likely demand, hence the need for HS2. However, is it about speed or about capacity or can't a railway be about more than one thing?

William said the reason for building new infrastructure is capacity. The benefits are then greatest if the new infrastructure is high speed. However, if there were not a capacity problem, it wouldn't be happening, speed alone would not make a case. The released capacity which will allow better local, commuter, interurban, freight services on the WCML is the unsung reason. This has been neglected by the Department for Transport.

But what do we mean by capacity of a rail network? The CIRO defines it as "*the number of trains that can be incorporated into a timetable is that which results in one that is conflict-free, commercially attractive, compliant with regulatory requirements, and can be operated reasonably economically within the laid-down performance targets in the face of prevailing levels of Primary Delay*": many constraints!

The technical headway at full speed in open air is rarely if ever the binding constraint on capacity. Like any other railway, the constraints tend to be in low-speed areas such as stations and termini. For HS2, Old Oak Common station in West London is the place where utilisation is highest in UIC 406 terms at 75%, the UIC guideline maximum, with 18 trains per hour, the basis on which the speaker did his work. Capacity is akin to quantum mechanics – you don't know how much there is until you try and use it by trying to write a timetable - and then it is not where you thought it was when you do.

What goes into a timetable?

The two inputs to a timetable are:

- the demand side (business objectives) which includes commercial specification, origins and destinations flows, frequency, journey times and stopping patterns; and
- the supply side (infrastructure capability) which includes running times, planning rules, headways, junction margins and station working rules such as dwells and turnaround times.

All these are linked by the timetable.

HS2 has a great many engineers designing the infrastructure and many economists forecasting the demand, but who writes the timetable?

Is operational planning a “one man and a dog” task?

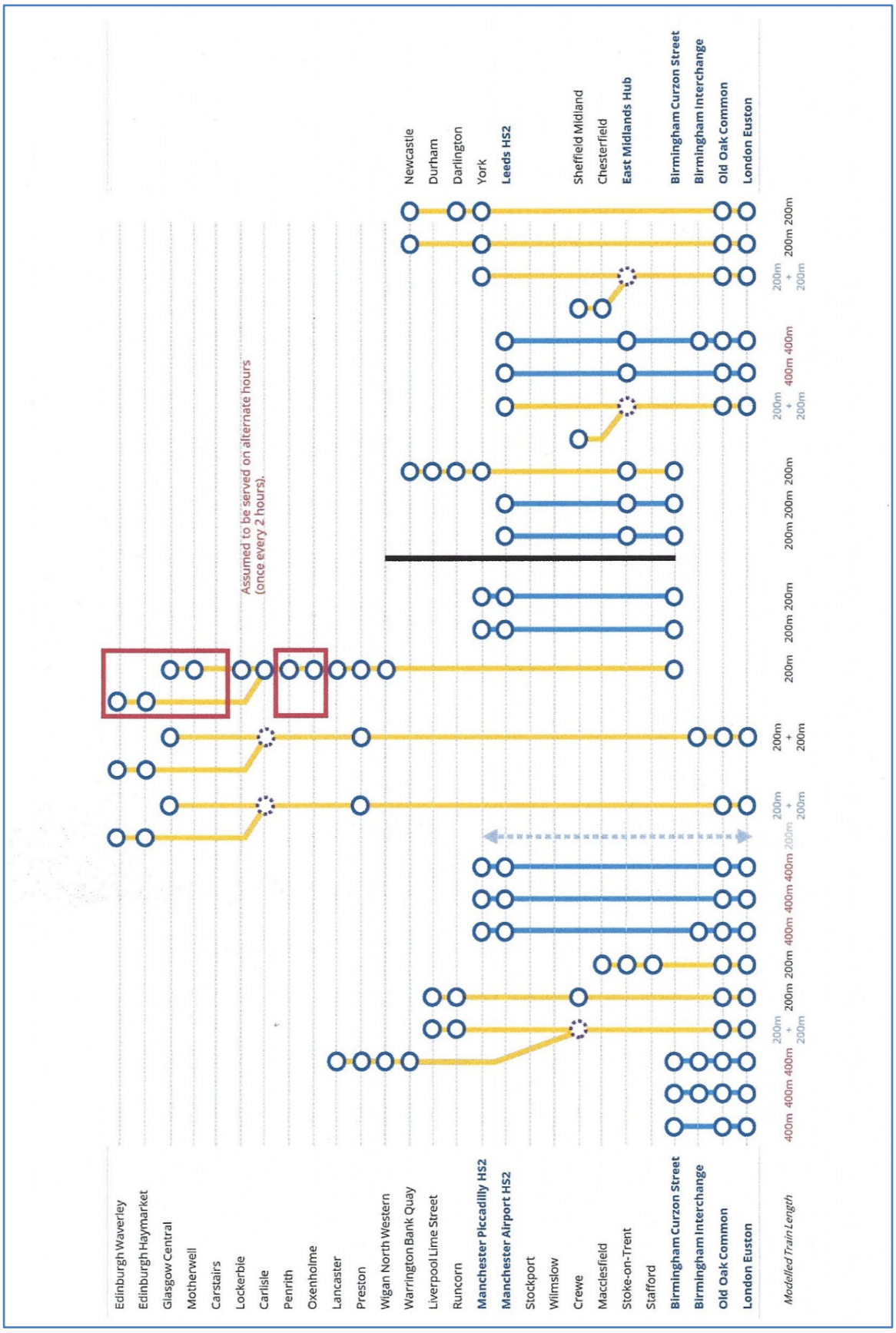
Figure 1: a train planner at work

The train planner’s role is to design a service which is technically valid (conflict-free), meets specifications and contractual commitments, exploits capacity efficiently, is operationally robust, attracts revenue and minimises operating costs. No one said it was easy!

If it is easy, we have over-provided. Compromise implies value for money and will be the start of an iterative process. Timetabling can expose opportunities as well as problems. Train Planners require luck! Some things will work neatly, some won’t. The skill is knowing the difference and working with luck, not against it. It was an observation that HS2 with Phase 1 alone did not work very neatly, but with Phase 2A it did.

Train Service Specification

Figure 2: the original (April 2020) 18 train per hour specification

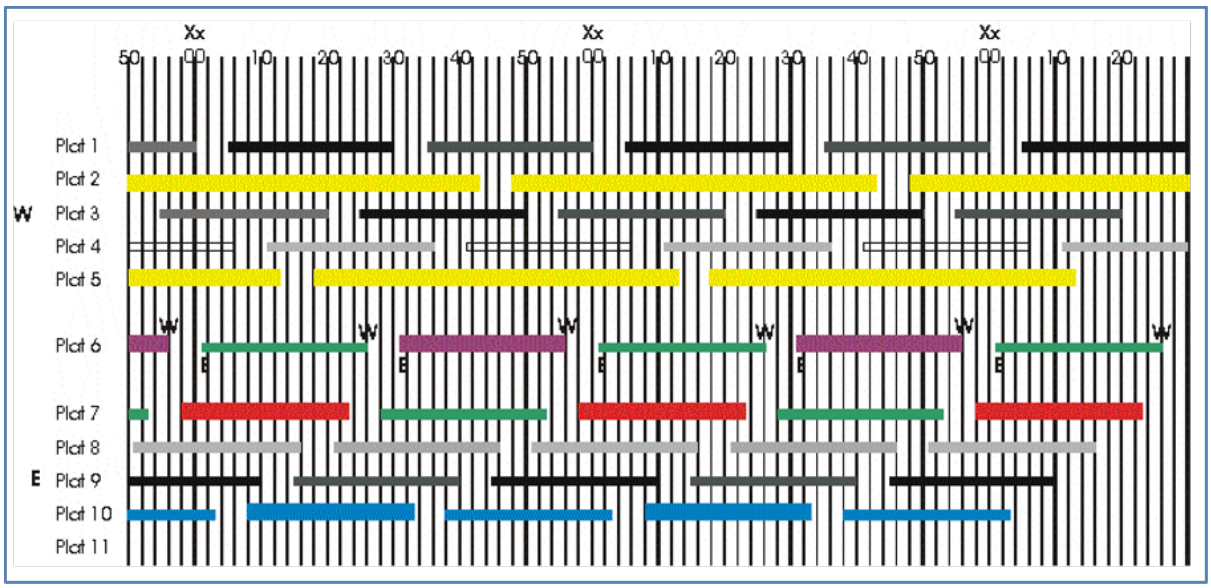


Helmuth von Moltke (1800 – 1861) said "*No plan of battle survives first contact with the enemy*". The speaker often says "*No train service specification survives first contact with the graph paper*". So, you start where the overriding objective meets the binding constraint. On HS2, the most constrained location is probably Euston, the terminus, in Phase 2b.

At Euston, the chart below shows train dwells in the ten platforms and the eleventh spare:

- Colours indicate routes.
- Thickness of lines indicates the length of train.

Figure 3: Euston concept Phase 2b



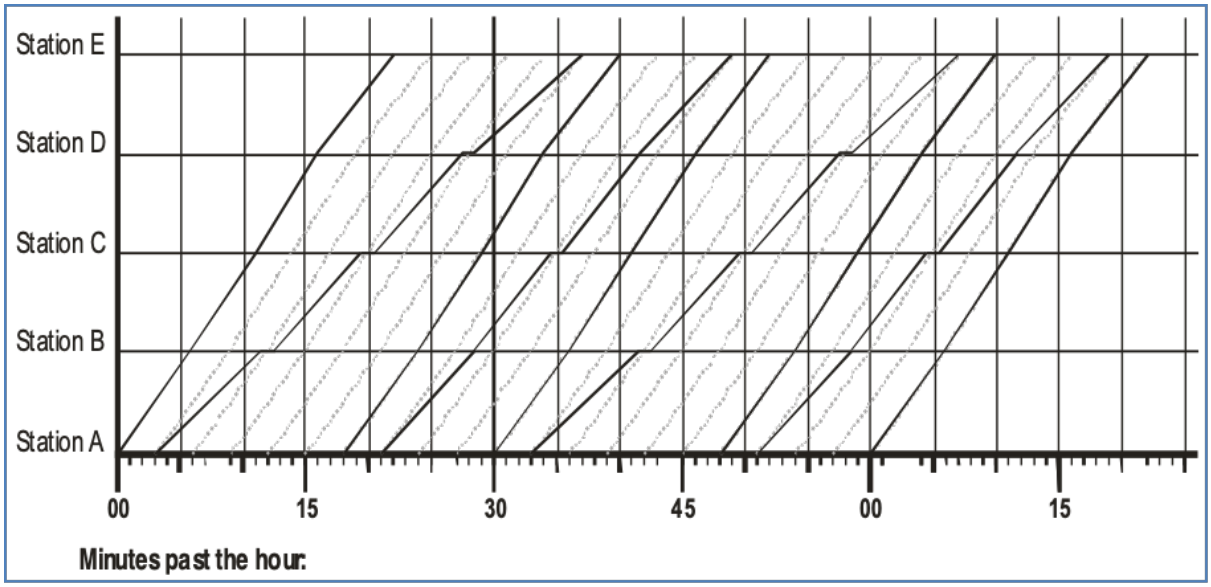
The chart achieves efficiency, when a clear pattern of occupations emerges, almost like a crystal structure.

Birmingham Curzon Street is the opposite, with relatively few trains taking up all the space, as they have varying occupation times to fit what the rest of the railway presents.

There are always compromises: for instance, you can flight trains, which maximises capacity but does not always optimise the timetable in terms of even intervals, as illustrated in the next two diagrams, both of which show a service of eight trains per hour.

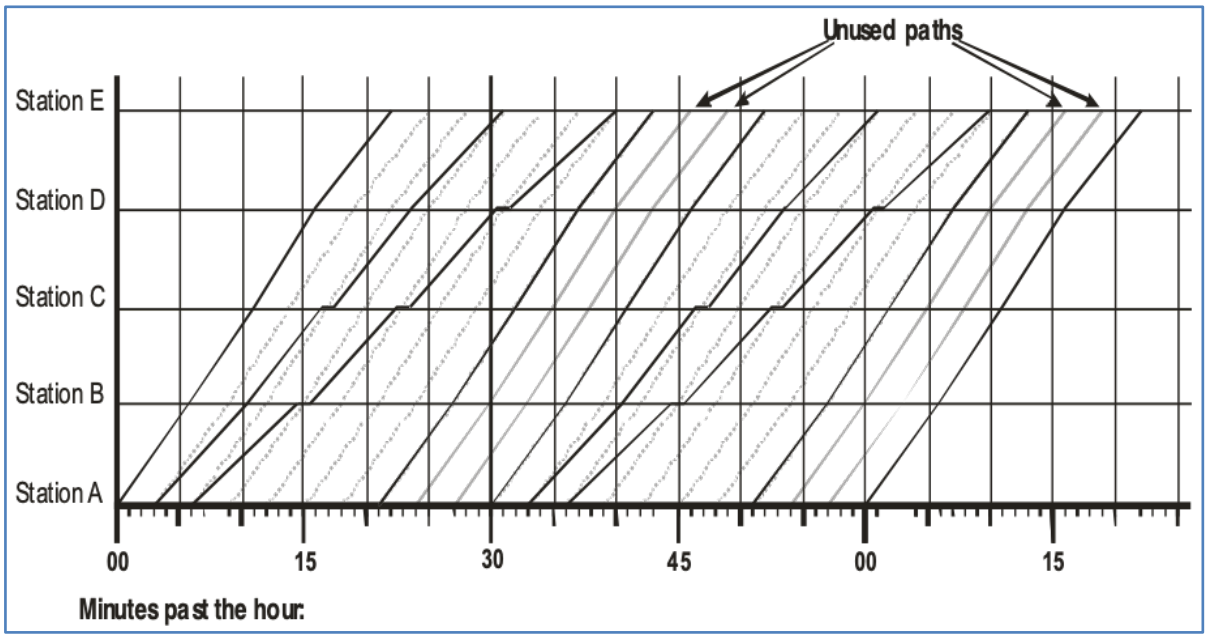
In Figure 4, blending schedules into a timetable may be commercial, in that station C gets a fairly evenly spaced service, but makes uneconomical use of capacity, with no spare paths.

Figure 4: Station C has good spacing but capacity use is poor



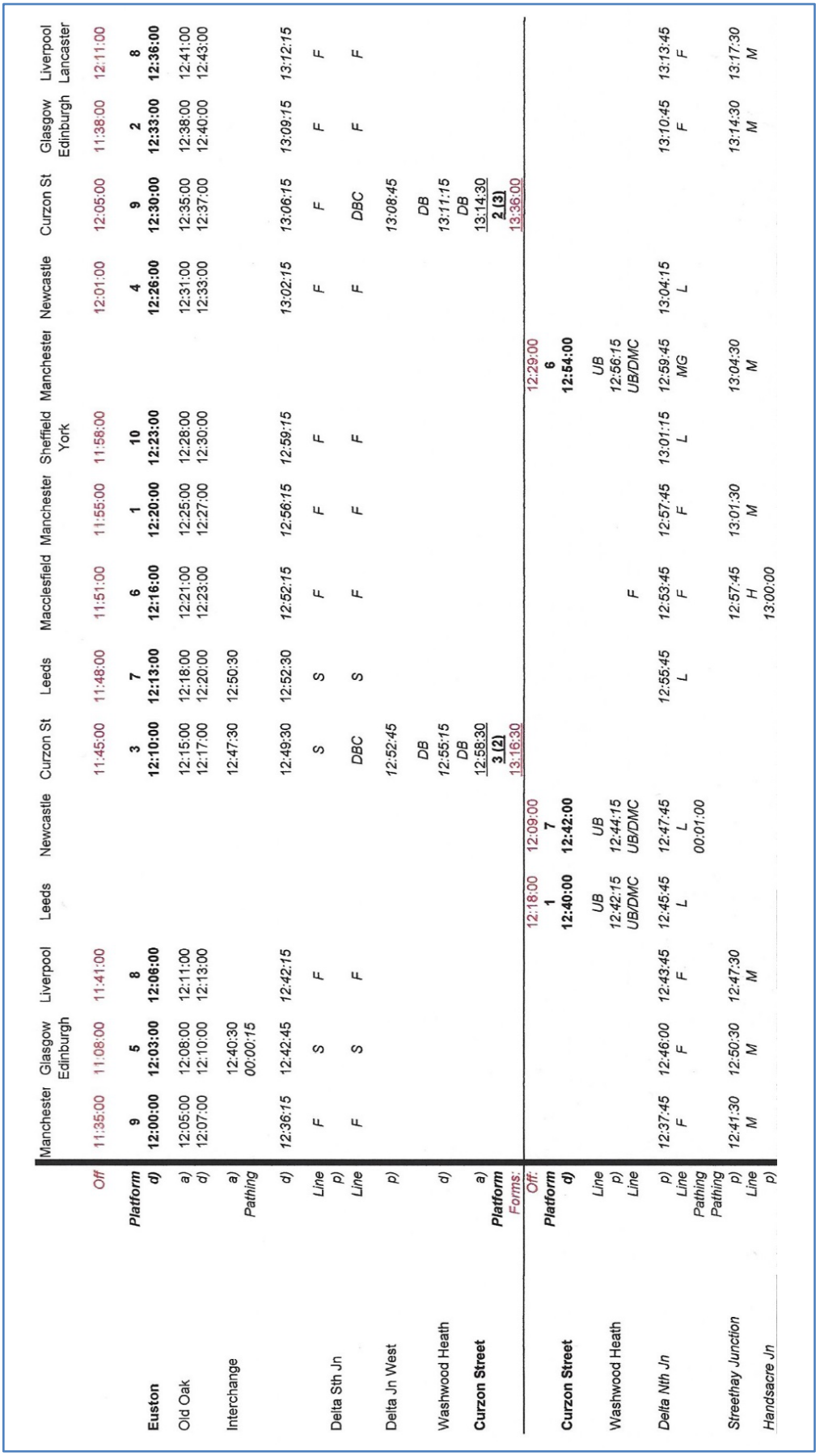
In Figure 5, conversely, the timetable is economical of capacity in that paths are freed for up to four more non-stop trains, but is uncommercial in that the service at station C is now uneven.

Figure 5: Capacity use is good but Station C has poor spacing



The speaker gave examples from HS2. The earliest specification had trains joining and dividing at Birmingham Interchange, but this caused several issues and was therefore dropped. The eventual compromises included that trains were not always fully "clock face" at Euston, as they had to fit constraints elsewhere.

Figure 6: an early proposed HS2 timetable



		Manchester	Glasgow Edinburgh	Liverpool	Leeds	Newcastle	Curzon St	Leeds	Macclesfield	Manchester	Sheffield York	Manchester	Newcastle	Curzon St	Glasgow Edinburgh	Liverpool Lancaster
	Off	11:35:00	11:08:00	11:41:00			11:45:00	11:48:00	11:51:00	11:55:00	11:58:00		12:01:00	12:05:00	11:38:00	12:11:00
	Platform	**9**	**5**	**8**			**3**	**7**	**6**	**1**	**10**		**4**	**9**	**2**	**8**
Euston	***d)***	**12:00:00**	**12:03:00**	**12:08:00**			**12:10:00**	**12:13:00**	**12:16:00**	**12:20:00**	**12:23:00**		**12:26:00**	**12:30:00**	**12:33:00**	**12:36:00**
	a)	12:05:00	12:08:00	12:11:00			12:15:00	12:18:00	12:21:00	12:25:00	12:28:00		12:31:00	12:35:00	12:38:00	12:41:00
Old Oak	*d)*	12:07:00	12:10:00	12:13:00			12:17:00	12:20:00	12:23:00	12:27:00	12:30:00		12:33:00	12:37:00	12:40:00	12:43:00
	a)		12:40:30				12:47:30	12:50:30								
Interchange	*Pathing*		*00:00:15*													
	d)	*12:36:15*	12:42:45	*12:42:15*			12:49:30	12:52:30	*12:52:15*	*12:56:15*	*12:59:15*		*13:02:15*	*13:06:15*	*13:09:15*	*13:12:15*
	Line	*F*	*S*	*F*			*S*	*S*	*F*	*F*	*F*		*F*	*F*	*F*	*F*
Delta Sth Jn	*p)*															
	Line	*F*	*S*	*F*			*DBC*	*S*	*F*	*F*	*F*		*F*	*DBC*	*F*	*F*
Delta Jn West	*p)*						*12:52:45*							*13:08:45*		
							DB							*DB*		
Washwood Heath	*d)*						*12:55:15*							*13:11:15*		
							DB							*DB*		
Curzon Street	*a)*						12:58:30							13:14:30		
	Platform						**3 (2)**							**2 (3)**		
	Forms:						13:16:30							13:36:00		
	Off:				12:18:00	12:09:00						12:29:00				
	Platform				**1**	**7**						**6**				
Curzon Street	***d)***				**12:40:00**	**12:42:00**						**12:54:00**				
	Line				*UB*	*UB*						*UB*				
	p)				*12:42:15*	*12:44:15*						*12:56:15*				
Washwood Heath	*Line*				*UB/DMC*	*UB/DMC*			*F*			*UB/DMC*				
	p)	*12:37:45*	*12:46:00*	*12:43:45*	*12:45:45*	*12:47:45*		*12:55:45*	*12:53:45*	*12:57:45*	*13:01:15*	*12:59:45*	*13:04:15*		*13:10:45*	*13:13:45*
Delta Nth Jn	*Line*	*F*	*F*	*F*	*L*	*L*		*L*	*F*	*F*	*L*	*MG*	*L*		*F*	*F*
	Pathing					*00:01:00*										
	Pathing															
Streethay Junction	*p)*	*12:41:30*	*12:50:30*	*12:47:30*					*12:57:45*	*13:01:30*		*13:04:30*			*13:14:30*	*13:17:30*
	Line	*M*	*M*	*M*					*H*	*M*		*M*			*M*	*M*
Handsacre Jn	*p)*								*13:00:00*							

As a result, the outcomes of timetabling include revised specifications, exposing not only problems but also opportunities. Extending the Preston service to Lancaster and the Stoke service to Macclesfield were fitted in, as shown in Figure 2.

Euston, Old Oak Common and Birmingham Curzon Street track layouts were developed quite informally with engineers, but work well. You could ask why, if Old Oak Common is a key constraint, timetable planning doesn't start there? This is because there is no timetable option other than 18 trains per hour, all stopping, but it was possible to optimise the turnout speeds to minimise headways.

Crewe, in comparison, was developed formally, but the speaker does not consider that the resulting scheme worked well (it had been superseded before Phase 2A was cancelled) as the appraisal format undervalued operability.

Manchester Airport's configuration with four platforms was both operationally ideal and the cheapest option.

An exercise to create an integrated timetable in 2014 showed that Phase 1 of HS2 on its own does not work very well on the classic network, which is in part why Phase 2A was invented.

General lessons

Beware of long tunnels. Ventilation shafts are a surprising constraint as their spacing may dictate block sections and thus headway. HS2 had a 3.2-kilometre distance between shafts owing to fire brigade considerations and a "one train between ventilation shafts" rule, extending headways especially where trains are slowing down on the approach to stations. Therefore, shafts should be spaced equally in time, rather than in distance, just as the Victorians knew to do with block posts.

Running time modelling alone provides journey times for the business case, but timetabling de-risks them, by identifying whether a given schedule is workable at all, and that it is not invalidated by allowances such as pathing time. The speaker wondered whether the demand modelling aligns with what a commercial operator would do:

- A model may say that hourly services to all destinations is best.
- An operator may prefer half-hourly services for major flows, with others requiring an interchange.

Beware of late changes to designs and specifications. Changes introduced late in the process, such as through petitioning, risk not being developed as carefully as the original specification. "Time spent in reconnaissance is never wasted!" For Northern Powerhouse Rail it was possible to sketch out an outline timetable at a very early stage and draw some useful conclusions such as on the fleet size.

High Speed: what's different?

In practice, little differs, and the timetabling process is much as for any railway. It is like other timetables, based on factors such as running times and junction margins. The key feature of HS2, however, is the intensity of operation, akin to a metro.

However, there are differences. Timing to the half-minute is not adequate to describe high speed networks: in steam days half a minute was half a mile, now it is two miles. Pathing time in short sections means that trains brake remotely from the section, which may create other conflicts. It may be necessary to be more generous with infrastructure, to avoid the need for pathing time at all, but if it is needed it should be put in it in long sections or station dwells.

Crew costs, which are time-driven, become cheaper relative to mileage-driven costs when trains run a lot of miles per hour. It is therefore worth spending more on crew, for example to avoid empty running or to improve reliability. There is a need to understand the dynamics of diverging and merging moves in detail, and iteration with the signal engineer becomes crucial.

HS2: where now?

The speaker said that HS2 must be designed to be extended: capacity is not released by relieving half a route.

HS2 must go to Crewe, as the capacity constraints between Colwich Junction and Stafford are not realistically soluble otherwise.

HS2 must go to Euston, as Old Oak Common is fine for destinations on an East-West axis, but Euston is necessary for locations on the North-South axis which are reckoned to be about two-thirds of all passengers. There is a "zone of indifference" around Tottenham Court Road, and possibly the initial stage without Euston will form habits that differ from earlier modelling assumptions. Euston is where HS2 substitutes for current West Coast Main Line services and, as these shift to HS2, space occupied by existing platforms will become available for expansion of the HS2 station after Phase 1. This is not true of other suggested station locations in which all the space that HS2 needs would require new land.

In Manchester, HS2 and Northern Powerhouse Rail must share infrastructure to justify serious infrastructure expenditure on either project, but is sharing a station sub-optimal for both?

Classic services with Phase 1 alone need urgent discussion, but does not seem to have been a factor in the October 2023 cancellation decisions. How much capacity is released without Euston depends on whether a high-speed service to Old Oak Common is any more attractive than a classic service to Euston.

"Who controls the timetable?" is the final question, given that "Who controls the timetable, controls the railway". Is it the Department for Transport, HS2 Ltd, Network Rail, or an operator? If there is no clear answer that may explain some of the problems.

Discussion

Peter Gordon (Editor, the Transport Economist) asked if it would be possible to run freight on HS2 at night. **William** said that it would not be, other than perhaps high-speed parcels services, such as now being trialled on the conventional network by Varamis. Most freight is not city centre to city centre, and the gradient coming out of the Chiltern tunnel might not make it possible. The place for freight is the West Coast Main Line, in released capacity. Thinking back to HS1, four consortia bid for it, of which two were happy with freight but two thought that a lot of construction costs could be saved by making it passenger-only.

Weifeng Jiang (Atkins) asked about the spacing of ventilation of tunnels running into Toton in the East Midlands. **William** said that yes, we got this right, as distances between shafts reduce as we run into the station. **Weifeng** also asked if freight paths were considered between Crewe and Wilmslow and north of Preston towards Scotland. **William** replied that there was not much freight on the former, but that they had indeed been considered between Preston and Scotland. He said that the Railfreight Group were wrong to say that HS2 services would cause freight trains to be only 1,000 tonnes: this is not the case, and was simply the start of an analysis to expose the trade-off between freight train speed and load. The freight specification examined had been more demanding than the present service, to reflect future growth.

It was asked if turnaround times could be reduced to reduce the number of trains required. **William** said that this would be very high risk for the timetable. The shorter the standard turnaround, the more trains would need to take double turnarounds to ensure resilience, as the Glasgow trains do in Figure 3 above, with a total dwell of 55 minutes comprising 25 minutes turnaround plus a 30-minute interval.

Graham Jones said that the Gerry Fiennes quote "*Who controls the timetable, controls the railway*" related to the Western Region, where the Divisions did their own timetabling: he said that it had to be done centrally to optimise things. **William** said that he agreed that operators will tend to produce a realistic timetable, while commercial people will produce an ambitious one. Chris Green would say don't timetable a train unless you can run it reliably, whereas John Prideaux would say put it in as it will work most of the time and being in the timetable is what draws demand. William said that he veers towards the latter camp.

Tim Elliott wondered if we need termini: if we can through services, as used to happen on the Circle line, we can reduce dwell time. It would also reduce the need for platforms. **William** replied that there was a risk of under-scoping through stations because they looked easier. In a city centre, dwell times would not be the 2 minutes planned for at Old Oak Common, where only a minority of passengers, and probably the more agile and

lightly-loaded, would be changing trains, so there would be a requirement for multiple platforms, while short wide sites are easier to find than long narrow ones.

Tim Yates (independent economist) asked how for long will manual timetable production continue. **William** said that he didn't know. When timetabling software was introduced, it was primarily as a data repository and a system for data exchange in support of access bids. Much knowledge is still in the heads of timetablers, although software overtook the need to do graphing with pencil and paper. **Peter Gordon** said that the consultancy where he used to work was developing automated systems for Network Rail and London Underground Limited, but in practice it would be used for short-term timetable changes and to produce recovery timetables after disruption. **William** agreed that most timetabling resources were employed for short-term alterations such as for weekend engineering work, and this and recovery disruption might be automated, especially as a sub-optimal solution might be better than a late solution and could be tolerated occasionally. This was less the case with the main timetable which had to be right both for reliability and ongoing cost. Never rely only on an automated system for traincrew planning: look at what happened to Thameslink in 2018, where limited time made it necessary to rely on initial outputs rather than iterating and optimising them. **John Preston** (University of Southampton) noted that there had been an automated system since 2010, but agreed that the key thing is to be able to concentrate on the best timetable. **William** said that when he started the rules were on a single sheet of paper, but these grew into today's detailed Planning Rules, as the bidding process for paths developed. Only a human can decide where do you start a timetable.

Tim Elliott asked about turnarounds at Euston: will each route be out and back, or could trains interwork as they do on the West Coast Main Line? **William** replied that there was no ideological reason trains should not interwork, but there had had never been a problem to which interworking was the solution. This, he thought, was because HS2's junctions were all grade-separated, whereas for instance there was no choice but to interwork on a railway such as the South Eastern, where the need to make parallel moves at flat junctions meant trains might have to go

anywhere. On HS2 there were to have been six types of train (200 metre and 400 metre formations of both "Classic Compatible" and "Captive", with possible reverse formations) which reduces the scope for interworking. It also adds complexity and reduces resilience.

Gregory Marchant (SRA, retired) was intrigued about comments about HS2 being a metro service. What we have is a twenty-first century version of the Great Central, with many places feeding into London. Should we start our thinking at the country end? **William** said that he had thought about that, but the biggest constraint is at the London end, and we therefore need to start there, otherwise if the Northern sections were built without the London end it would be very difficult to run a meaningful service on them. It had been said in Parliament that with an integrated rail system we might be better able to pursue timetable or rolling stock solutions to capacity issues, but we had been doing that for the last thirty years. The need on the West Coast corridor now was a new pair of tracks, and the only question was what sort of tracks.

Report by Peter Gordon

North American high-speed rail trends

Michael Colella, Director, Steer

Steer

26 June 2024

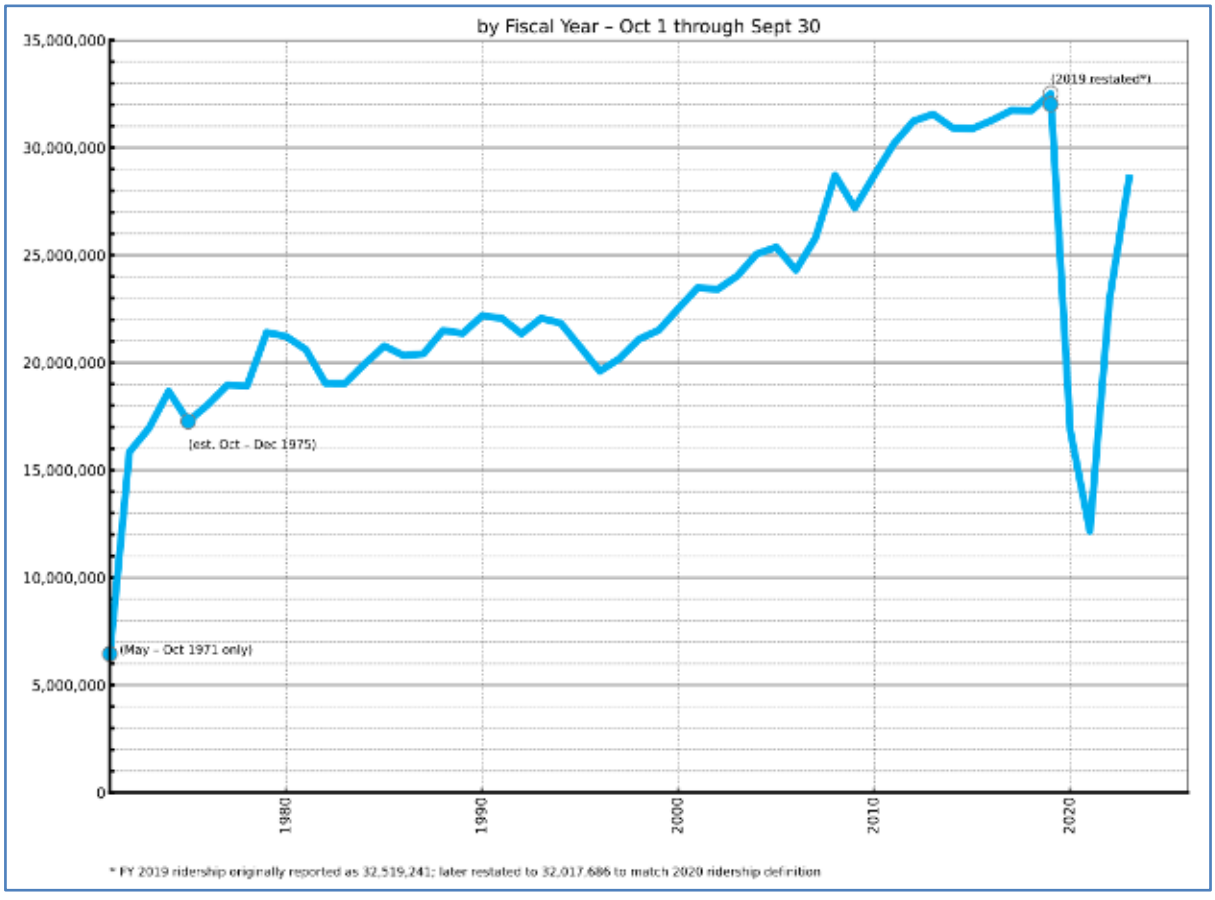
Introduction

Road dominates travel in Canada and the USA, although urban transit is better developed in major Canadian cities, with only a few US cities having significant networks.

While intercity rail in the USA and Canada has seen growth in recent years, it is a very small market compared to European comparators, and is almost non-existent outside:

- in the USA, the North East Corridor between Boston, New York, Philadelphia and Washington (NEC); and
- in Canada, between Montreal and Toronto.

Figure 1: Amtrak passenger numbers



In the USA, Amtrak may hit an all-time record in 2024 of over 33 million passenger journeys and, with an average trip length of around 300 kilometres, 9.6 billion passenger-kilometres. Nearly 50% of all trips are made in the NEC although there is also growth on state supported services, particularly in California, the Pacific Northwest and North Carolina.

In Canada, VIA Rail is even smaller, with around 5 million passenger journeys and 1 billion passenger-kilometres per year, of which over 95% is in the Ontario – Quebec corridor.

As comparison, the UK's West Coast Main Line franchise alone had 33 million passengers in 2023/24, and nearly 40 million passengers and 8 billion passenger-kilometre in 2018/9.

Table 1: Modal split for long-distance trips in the US, 2011

Mode	**Million long-distance trips (over 50 miles)**	**Mode share**
Car	2,336	89.5%
Air	193	7.4%
Bus/Coach	55	2.1%
Rail	21	0.8%

Source: US Bureau of Transportation Statistics 2013

The USA is a very traditional country and Amtrak operates much like British Rail in the 1970s, with many single function jobs. The key factors that drive the more limited rail network in North America are:

- Geography: despite a population of 340 million in the USA and 40 million in Canada, there are long distances between most major cities and a much lower density than Europe. The USA has 37 people per square kilometre compared with 279 people per square kilometre for the UK.
- Competition: car is the dominant mode for trips over 80 kilometres, with air taking over 50% of trips over 1,000 kilometres.
- Investment: federal funding for highways alone exceeded $US 52 billion in 2023. Adding spending by States would roughly double this. Federal funding for aviation was $US 24 billion in 2023, much of it from ticket taxes.

Amtrak received around $US 1 billion per annum in funding until 2021, with a significant increase to over $US 6 billion in 2023. Rail is non-existent for most people outside the North East Corridor and a few other city pairs.

However, it is not just exogenous factors that drive North America rail, transit and transport. Industry is driven by the importance of historical trends, while Government policy is driven by like-for-like renewals, particularly in the US the "Tyranny of State of Good Repair", all based on asset registers and replacement dates rather than asset condition or commercial criteria. Safety is driven more by the ability to survive accidents than by prevention.

Another factor is a production-led basis, focusing on the importance of getting from A to B, rather than on customer needs of reliability, comfort, convenience and value for money. It is also driven by inputs: outcomes are not the focus of initiatives and projects, particularly for wider criteria such as economic development and equity.

There is a technical focus. Leadership is engineering- (or legal-) dominated and, unlike in Europe, there are few transport planning degrees. Commercially, funding is subsidy-led, with few commercial targets. This is also the approach that applies to some extent to the privately owned freight operators. From the speaker's personal perspective, if it is to deliver real change, rail needs to consider changes in its culture and cost base and not just additional funding. Generally, ownership is fully public or private, with nothing in the middle.

Emerging trends

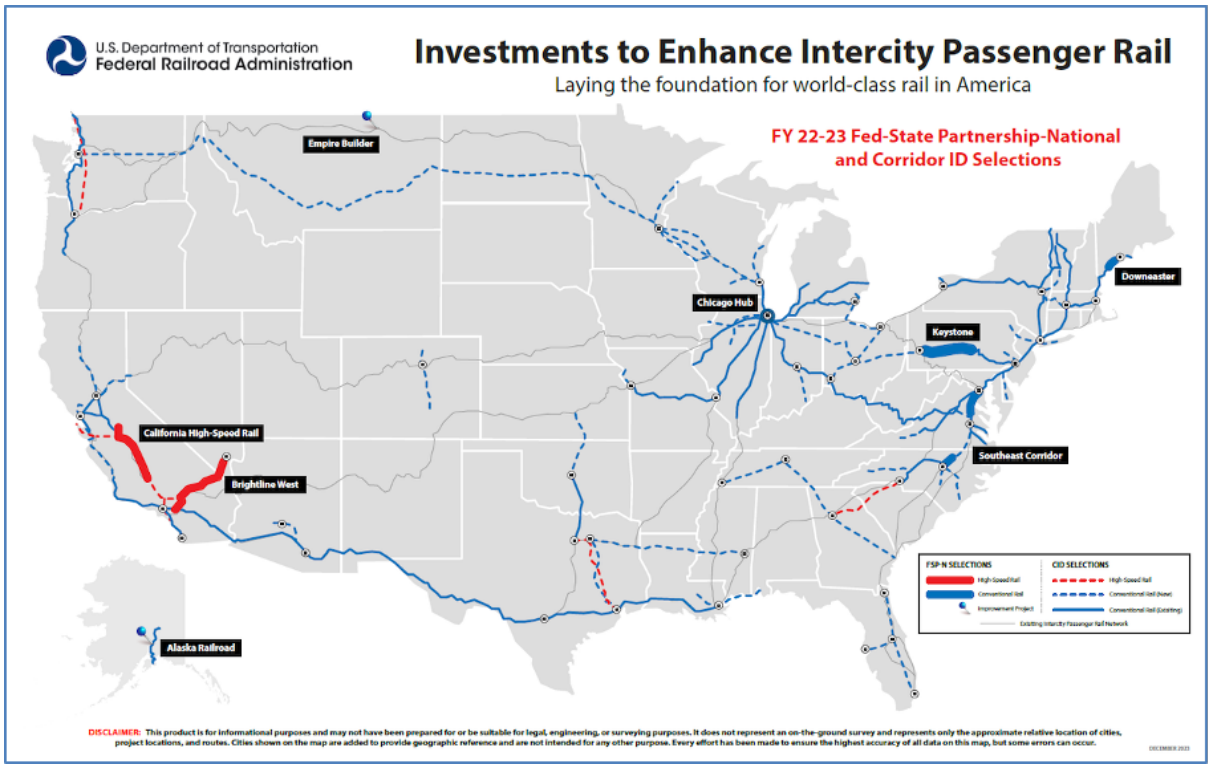
There are some emerging signs of strategic planning with a more system led approach focusing on outputs. CAD $60 billion is being invested in Toronto Metrolinx suburban services over the next few years, and private companies are becoming interested.

There is growing private interest, with Brightline Florida/West in the USA and Canada's HFR P3 (High-Frequency Rail Public-Private Partnership) alliancing model.

The US: the Bipartisan Infrastructure Bill (BIL)

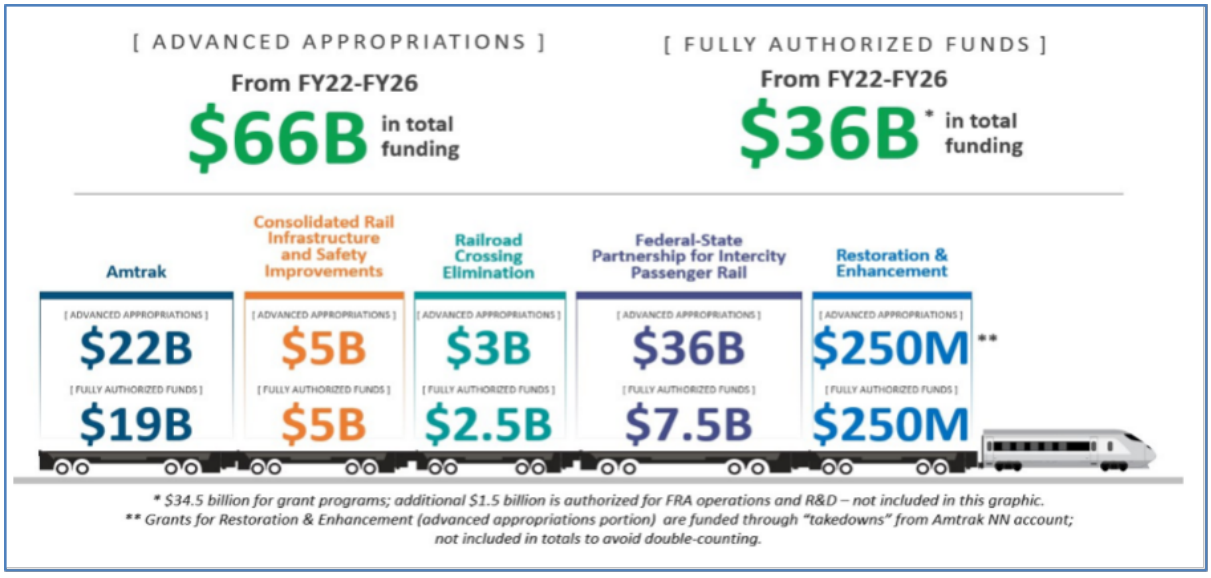
The thick lines in the map below are corridors to which the Federal Government has agreed. This has already released $US 12 billion in its own right.

Figure 3: Corridors agreed by the federal government



Source: FY22 Corridor Identification and Development Program Selections, Federal Railroad Administration (FRA)

Figure 2: The US Bipartisan Infrastructure Bill (BIL)



The scale of opportunity in rail and transit in North America is unprecedented. The BIL, combined with the Inflation Reduction Act (IRA) could result in spending of over US $1 trillion over eight years, including $US 66 billion for rail and $US 39 billion in new transit projects. States must bid for projects.

The BIL funding is *"the largest investment of its kind since Amtrak was founded in 1971"* Stephen Gardner, Amtrak CEO.

"The BIL provides historic appropriations for railroad transportation grant programs administered by the Federal Railroad Administration" FRA Corridor Identification and Development Program brief.

Canada

In Canada rail, transit and related investments total CAD$6bn through 2025 and CAD$3bn annually beyond 2025.

Case studies

While there are numerous high-speed rail (HSR) projects being proposed, the speaker highlighted six.

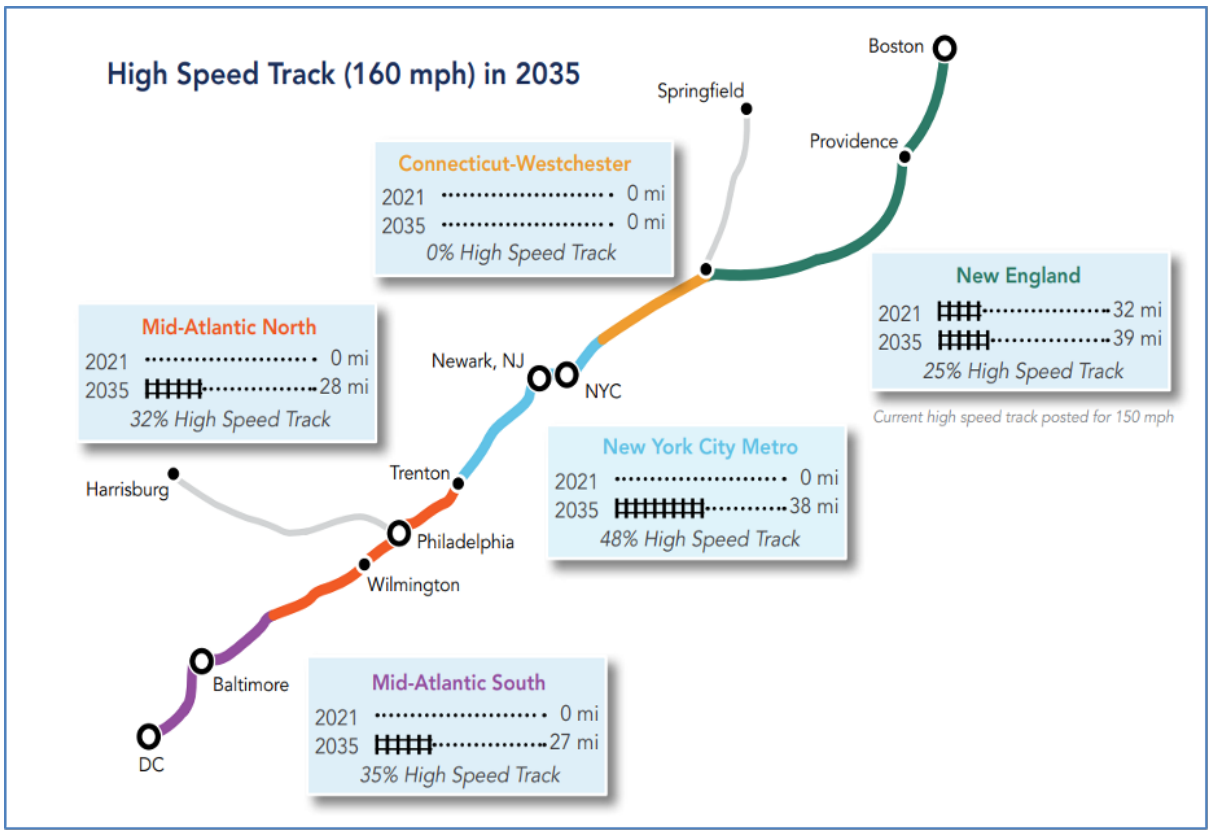
Case Study 1: The Amtrak Northeast Corridor Upgrade

Amtrak is getting the lion's share of the BIL funding. Connect NEC 2035 is a once-in-a-generation opportunity to replace ageing bridges and tunnels, acquire new trains and add capacity to improve performance and enhance the customer experience with over 150 projects totalling over $US 100 billion (part-funded) which will double frequencies and capacity and significantly reduce journey times. Three bridges will be replaced. New tunnels between Newark and New York will double capacity. If the tunnels aren't built, it will be necessary to close the NEC or reduce to a single track for five years by the early 2030's.

It will improve connectivity across the USA's largest megaregion stretching from Boston to Washington with over 55 million people, unlocking over $US 90 billion in additional activity. It is forecast to generate over 60 million additional rail trips per annum, split between modal shift and new travel.

It is led by Amtrak, with support from eight States and transit agencies. It is design-build with the first projects underway and new trains under construction.

Figure 4: The Amtrak Northeast Corridor Upgrade



Source: [Northeast Corridor Commission (nec-commission.com)]

Case Study 2: California High Speed Rail

This will be a new electric HSR railway linking San Francisco with the Central Valley and Los Angeles/Anaheim, with proposed extensions to Sacramento and San Diego. This will cost over $US 100 billion, and is partially funded and under construction. The first phase of 171 miles plus links to the Bay Area is planned to open in 2030. It will also benefit commuter rail. Right now, passenger traffic must use freight lines whose operators resist handling passenger traffic. There is no open access or Rail Regulator as the UK and across the EU. Union Station in Los Angeles will separately be rebuilt as a though station at a cost of over $US 10 billion.

Figure 5: California High Speed Rail

Source: [California High Speed Rail]

California passed a referendum allowing the Authority to borrow money. Construction began in 2014 and most of the project should have been completed by now, but there are still at least three years to go for the first phase to open through the California Central Valley from "nowhere to nowhere".

It links the largest state in the US, which would be the world's fifth largest economy, and two megaregions, unlocking economic development away from crowded cities to improve the

environment, create jobs, and preserve agricultural and protected lands. It is forecast to generate over 30 million annual trips upon completion in 2040.

The California High Speed Rail Authority is a State Public Authority with the project being delivered through series of Design/Build contracts. It has experienced significant delays due to a mix of environmental and design approvals, land acquisition issues and a lack of clear leadership.

Case Study 3: Brightline West

This is a new electric HSR railway linking Las Vegas with Southern California and Los Angeles suburbs, with a potential extension to Los Angeles Union Station.

Figure 6: Brightline West

Source: [Go car-free, care-free | Brightline West]

This is one of the largest travel corridors in the world, with over 45 million one-way trips annually split between road (85%) and

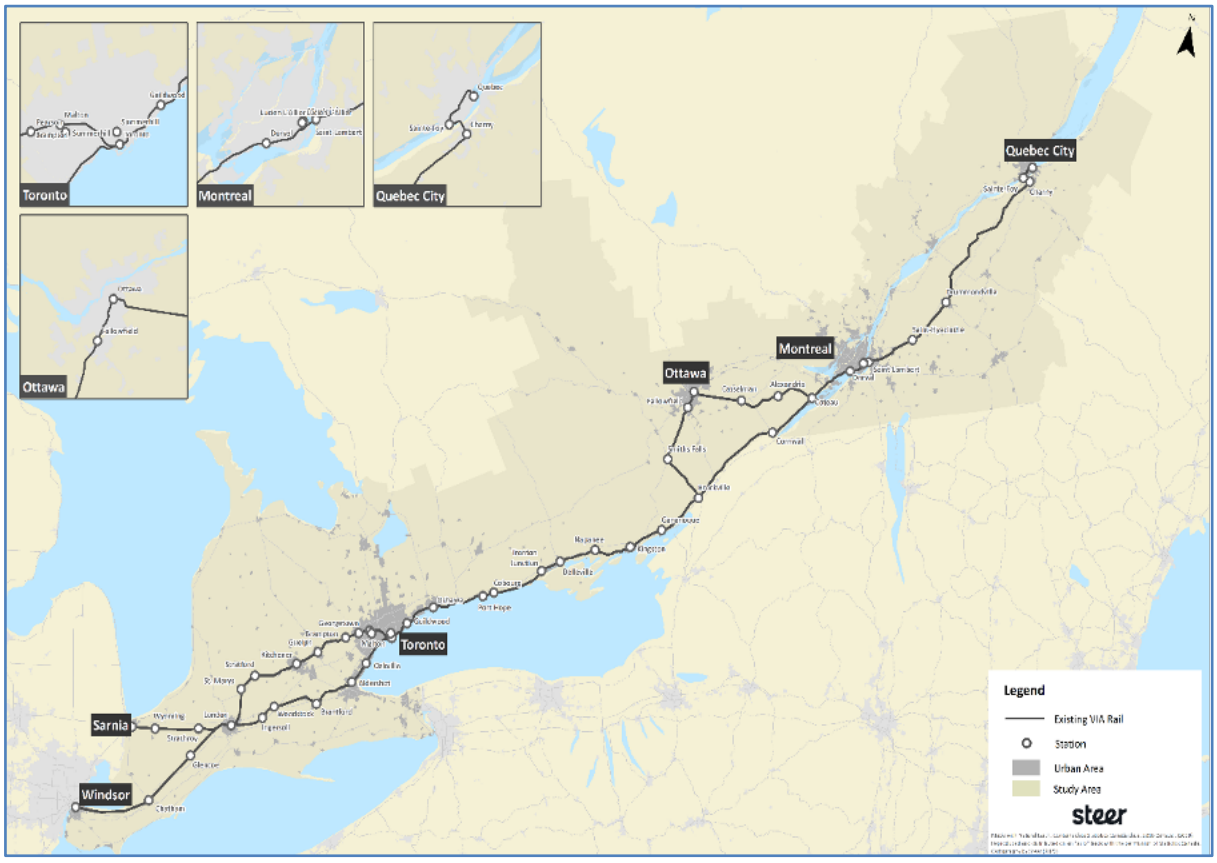
air (15%). The project is designed to unlock regional economies, but with less reliance on road in North America's second largest megaregion. Financial close is expected later this year, with groundbreaking in May 2024 and a 2028 soft opening planned in time for the 2028 Los Angeles Olympics.

It is privately owned, constructed and operated with a mix of private and public funding.

Driving on Interstate 15 is horrendous and trips to Las Vegas can take between five and ten hours, compared to less than two hours by HSR. The scheme will be financed by giving the railroad land packages. About a third of funding is public. The main works will start at the end of the year and the 2028 opening is tough but could be achieved. It will change opinions of new HSR schemes.

Case Study 4: High Frequency Rail: Quebec City – Windsor corridor

Figure 7: High Frequency Rail: Quebec City – Windsor corridor



This is the largest rail transportation infrastructure project undertaken in Canada in decades, with a mix of new and

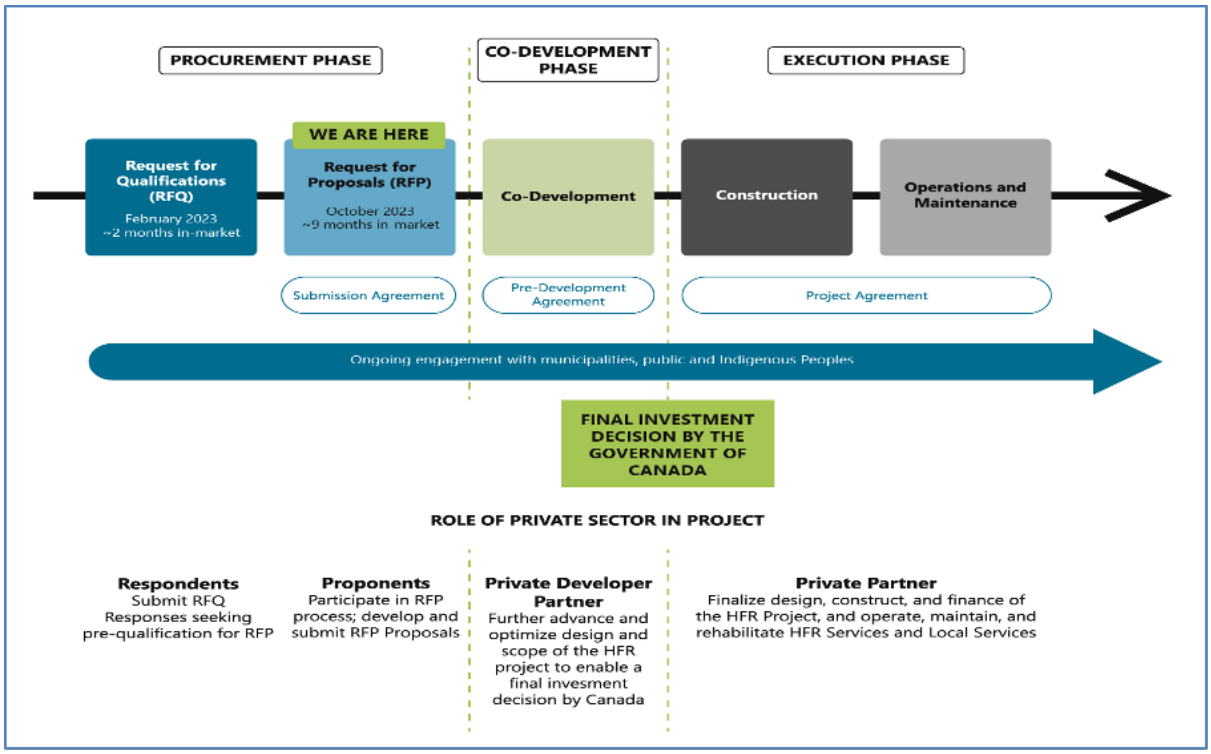
upgraded rights-of-way to provide a more frequent, faster, and more reliable intercity passenger railway in Canada's busiest travel corridor.

It will support Canada's Net Zero commitment by electrifying the corridor and fleet, will connect new communities and produce a significant modal shift, and will support the long-term regional and economic growth of the country's most densely populated region.

Canadian National and Pacific Railroads were undertaking studies in the 1960s. New lines will integrate with commuter rail. It should open in late 2030s. Planning is less politically blinkered and more dynamic in Canada than in the USA, and can draw on best international practice. The project sponsor is Transport Canada with input from the Canadian Infrastructure Bank and VIA Rail. It is a PPP/P3 model in which the private partner will be co-developer, operator and maintainer with revenue risk.

The project will be delivered through a 30–50-year PPP/P3 Design, Build, Finance, Maintain and Operate (DBFMO) concession.

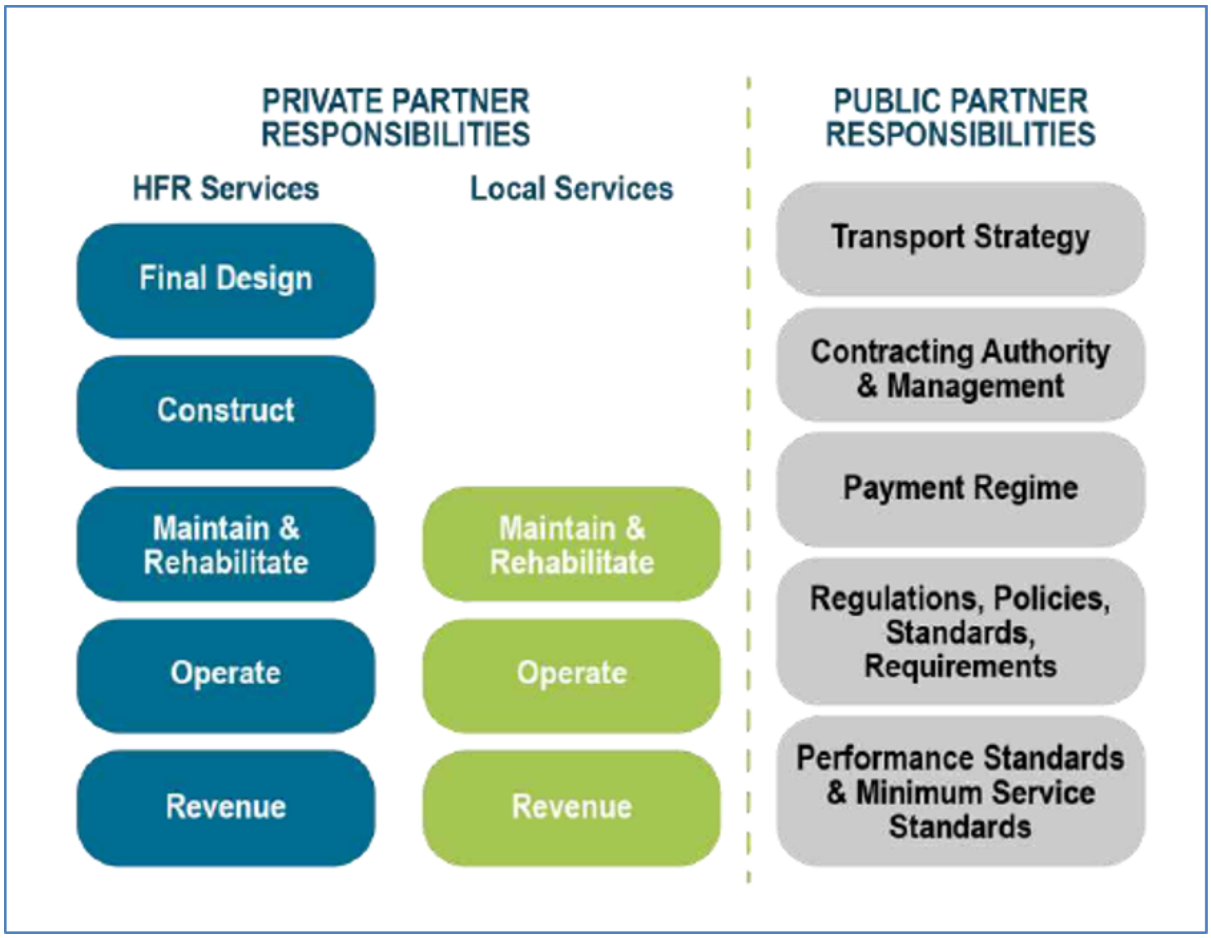
Figure 8: High Frequency Rail timeline



CIB and Canada will also provide financing. The private partner assumes revenue risk after ramp-up of new High Frequency Rail

services. The procurement approach proposed is a first in the world, though drawing on progressive alliancing contracts such as Transport for Wales 2018 rail delivery partner and Australia's Sydney Metro procurements. The private sector could propose High-Speed Rail or other innovative solutions including changes in route, station locations.

Figure 8: High Frequency Rail allocation of responsibilities

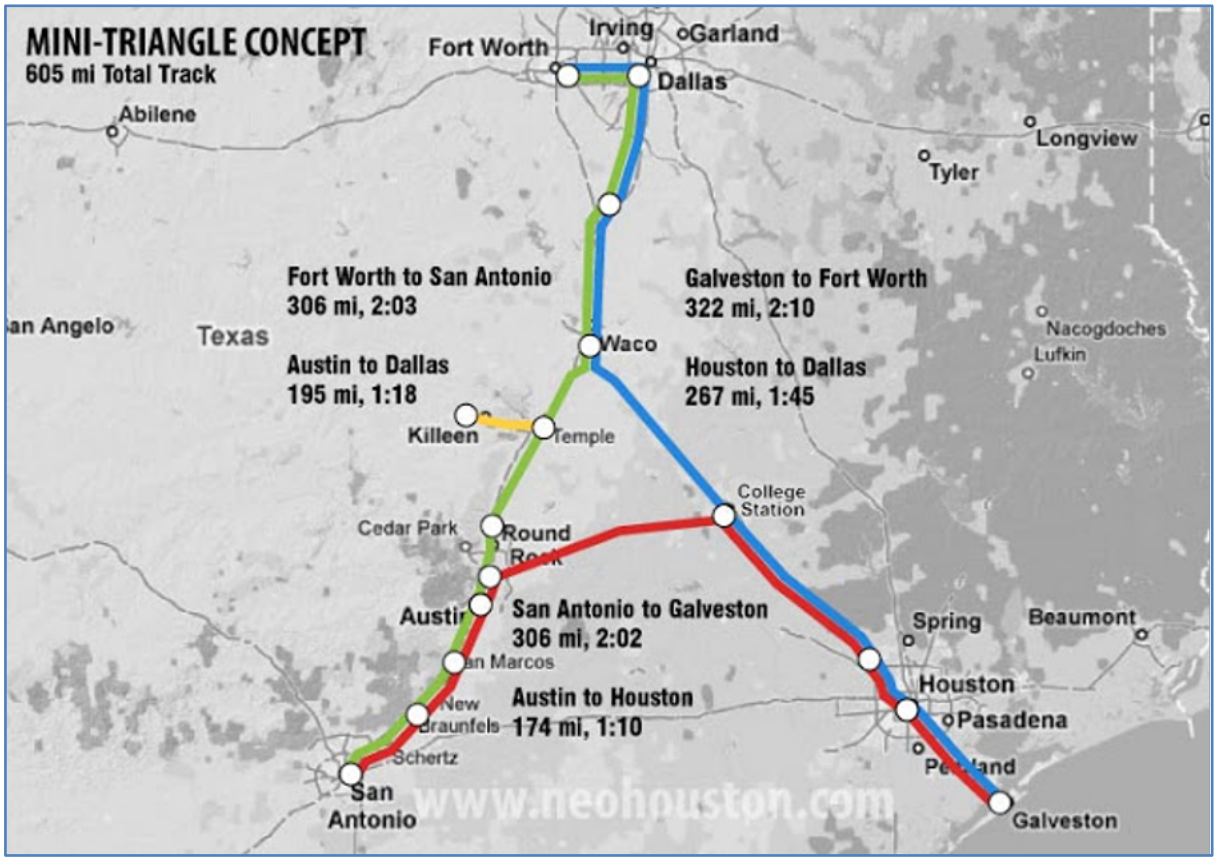


Source: [HFR - High Frequency Rail (hfr-tgf.ca)]

Case Study 5: Dallas – Houston Shinkansen

This is a new electric HSR linking Dallas and Fort Worth with Houston, with potential extensions to Austin and San Antonio. Texas has a love-hate relationship with rail, which has been considered for decades, but has faced considerable challenge from some large land owners and Republican legislators, though the Texas State Supreme Court has given the go-ahead. It is the fastest growing megaregion and is constrained by existing road and air links. It is forecast to generate over 13 million trips per annum by 2050.

Figure 9: Dallas – Houston Shinkansen



Source: [Texas Central Home - Texas Central]

Texas Central is privately owned but recently teamed up with Amtrak to promote and potentially fund the project.

The scheme may or may not happen: it is one to watch. It would be a public private partnership.

Case Study 6: Cascadia UHSGT

Cascadia is a new electric HSR railway linking Portland, Seattle and Vancouver BC in under 3 hours. There is potential for the new line also to be used by commuter rail. It would give a step change in travel times and unlock development sites along the corridor, which is one of North America's fastest growing megaregions, but where little activity occurs between cities. A PPP/P3 model being considered, currently led by the Washington State Department of Transportation, with support from Oregon Department of Transportation and the Province of British Columbia.

Figure 10: Cascadia UHSGT

Source: [Ultra-high speed rail study | WSDOT (wa.gov)]

All three cities are affluent areas, but the megaregion is not well connected. It is more likely to happen than the Dallas – Houston Shinkansen, despite involving two countries and three States and Provinces.

Conclusions

The speaker ended with some thoughts to consider:

- **Strategy**: funding alone will not change outcomes: cultural change is needed to unlock delivery, with a move away from being production-led to a focus on what people and businesses want rather than what they may "need". It is important to build a coalition of support. Tapping into alternative funding streams can accelerate progress.

- **Planning**: trends can easily change … and then change back again. Integrating investment with land use can unlock wider economic growth and sustainability and make megaregions better, not just bigger. There is a need to develop better project prioritisation tools and to apply regular and rigorous benefits realisation assessment to test if project is still worthwhile.
- **Delivery**: there are options for procurement to secure high-quality outcomes. Splitting the owner from delivery is key to value for money changes. Resources, both money and people, may limit what can be done robustly.

Discussion

Gregory Marchant asked about dealing with different geographies. There is more space to deal with developments in the US. Are there any lessons for European Countries? **Michael** replied that there were possibly two. HS2 was about capacity, the concept was what was needed (you need to think ambitiously) but the execution has been poor. The idea of totally renationalising the network isn't the answer: the private sector also needs to play a role.

Peter Gordon asked about surface access to stations: if there is poor access by public transit, will people stay in their cars for the whole journey? **Michael** replied that city region transit networks are generally not good, with a few exceptions like New York City, Toronto and Montreal. This is one reason for low ridership forecasts for most of the HSR proposals. **Peter** also noted the very high cost of building new infrastructure in the USA. **Michael** said that New York in particular is very expensive to build in, although there is also cost escalation in the UK. What drives it? Firstly standards. The Second Avenue subway line station is over-specified, with three levels throughout. A single station cost twice as much as a larger one on Crossrail which also included underground interchange with the Underground and Thameslink. Secondly, the process is production-led, and the public private element may be driving costs up. Design-build is prohibited under New York State law.

Tim Elliott asked about the commercial exploitation of air rights. **Michael** replied that in New York the Metropolitan

Transportation Authority (MTA) must pay developers to access their land. California HSR will have minimal developments at stations.

Gregory Marchant noted that the population density in cities outside New York is low, resulting in long travel distance and times to stations. **Michael** said that the economy in the Chicago area was not growing, limiting growth opportunities. Outside Chicago, mid-western cities are shrinking, which is one reason why fewer schemes are in the Midwest. There are developments in the Los Angeles area. In Toronto 10 out of 15 suburban rail and light rail lines are currently running all day, often at hourly or better frequencies, but in two years there should be frequent off-peak services across all lines.

Report by Peter Gordon

Review

The views expressed are those of the reviewers and should not be attributed to the Transport Economists' Group

---

Airport Enterprises: An Economic Analysis

David Starkie

Published by Regulatory Policy Institute

ISBN 978-1-7394918-0-02 (paperback edition)

ISBN 978-1-7394918-1-9 (e-book edition)

David Starkie sets out the origins of his latest book in a course given at the International Business School in Bremen, expanded to draw on a range of other sources.

Chapter 1 opens with the main theme, that an airport is a "business platform", not only providing or contracting its own services, but often hosting a wide range of businesses not limited either to airlines or even to those which directly support them.

His analysis focuses on airports in the UK, for which relatively good operational data is available, although financial data is limited, and it is difficult to define, quantify and establish the value of the market segments within each airport ecosystem.

Chapter 2 examines the extent of contracting out activities, and concludes that this is less common in public sector airports, possibly as a result of inertia, or possibly because cost-minimisation need not be a public sector objective, although Manchester Airport is a notable exception.

Chapters 3 and 4 explore the issues arising from how airports are "two-sided markets" offering both runway-based services to airlines and terminal-based services to passengers. One consequence is that it can be optimal to charge airlines below marginal cost to increase the number of passengers from whom the airport can profit, directly or indirectly, from car parking, catering and retail activities. It is more difficult for airlines to tap these revenue streams, except perhaps by "bundling" services such as passenger lounges, and chauffeur services, within their

passenger product. Charging airlines below marginal cost can lead to, but also compensate airlines for, airside congestion.

Chapter 5 examines production functions, noting that almost all airports may benefit from economies of scope as well as of scale, particularly with lumpy assets. The author also notes that short runways can be built and later expanded in relatively small increments. Even Heathrow's runway capacity was increased in increments from 370,000 movements in 1990 to 480,000 in 2009. Terminals are generally much more scalable, but tend to become harder to navigate with each round of expansion, as exemplified by Gatwick's 1988 North Terminal. Approaches vary: Manchester's capacity was expanded to 24 million passengers per annum (mppa) through many small additions across three terminals, but when Heathrow's Central Terminal Area was full it added first Terminal 4 (initially 8 mppa) and then Terminal 5 (initially 30 mppa).

Chapter 7 examines whether airport charges can or should be based on menu pricing or bespoke contracts. Charges can still be related to different measures, such as aircraft size, or passenger numbers, and low-cost carriers may request and receive more basic facilities which enable them to lower their fares, and may negotiate charges which incentivise volume growth. One consequence not mentioned is that airlines cannot meaningfully provide their passengers with an itemised list of the airport charges that they add to their fare.

Chapter 8 deals with price signals and incentives, and particularly the absence of congestion-related pricing. Unsurprisingly, airlines who are operationally constrained to arrivals or departures peak times, or hold lucrative but scarce peak slots, are reluctant to pay more than competitors who have more scheduling flexibility or hold slots with less attractive timings[5].

Chapter 9 examines the elasticity of demand to airport prices, and concludes that higher charges may reduce passenger demand not only because of higher fares but also because of lower frequencies or the withdrawal of services. The latter effect

[5] See also the report of the author's talk "Pricing Runway Use in the Peak and Off-peak" in The Transport Economist, Volume 30 Number 3, Autumn 2003.

appears to be particularly strong for low-cost carriers (LCCs), who often have the option to transfer aircraft and crew to another base at which they can make similar returns, but may be less so for a hub carrier focusing on connections at a single airport. The CAA has withdrawn regulation at Stansted, which it concluded did not have significant market power over the LCCs, but retained it at Heathrow, by far BA's most important base.

This impact of airport charges on airline frequency and service levels may, in my view, be more important than any effect on fares. Airlines' decisions of what capacity to offer are made at different times, by different people, with different tools, from their decisions on fares, which are highly tactical and may be automated. It would be interesting to see any documented examples of changes in airport charges leading directly to higher fares, and the mechanism by which this took place.

Chapter 11 explores the debate over higher fares at congested hub airports such as Heathrow, and to what extent these reflect higher costs, higher service quality, or efficient rationing of scarce capacity. The author presents a chart showing that load factors (the proportion of seats occupied) are lower at Heathrow than at Gatwick, but notes that it is not obvious why a "business" focus at the former should result in lower load factors than a "leisure" focus at the latter. Intrigued by this difference, the reviewer found that average load factors are lowest for the long-haul operators common at Heathrow (and who may inter alia have to use a large aircraft to obtain the necessary range) and highest for the low-cost carriers and tour operators common at Gatwick. This suggests that the difference between the airports may be due to the different mix of airlines using them. The author suggests that increasing the charges per aircraft, rather than the charges per passenger, would strengthen the incentive to fill the aircraft.

One emerging theme is that the industry evolves, and this changes not only the role of airports but also how they are best managed and, in some cases, regulated. Long haul, national carriers operating weekly have given way to alliances, or airline groupings, operating almost all services daily. Short haul international flights, once a cosy arrangement between the two national carriers, may have two or more airlines competing

point-to-point and others offering connections via their hubs. Domestic flights increasingly face the challenges of lack of slots at national hubs, competition from high-speed rail, and preference or pressure to use other modes on environmental grounds. Every airport faces a changing mix of airlines, their requirements and preferences, and their willingness to pay for them and, in many cases, what other commercial activity can profitably be fitted around them.

Chapter 13 explores the tortuous process of expanding Heathrow, the merits and consequences of which have long been debated. Appraising proposals raises many issues. Should benefits to non-UK passengers be valued[6]? Is it cheapest or "best", and why, for passengers to or from the UK regions to fly direct, connect elsewhere, or connect through an even larger and more complex Heathrow? Would an expanded Heathrow rapidly be filled and, if so, what would have been gained?

I last reviewed a book on the economics of airports for TEG over 20 years ago, in 2003[7]. The author's insights on the field remain highly relevant and a very interesting read.

Review by Dick Dunmore

[6] Despite Treasury guidance that foreign residents should be excluded from public sector appraisals, this is not always done.

[7] Book review "A Market in Airport Slots by Keith Boyfield, David Starkie, Tom Bass & Barry Humphreys" in The Transport Economist, Volume 30 Number 1, Spring 2003

Opinion

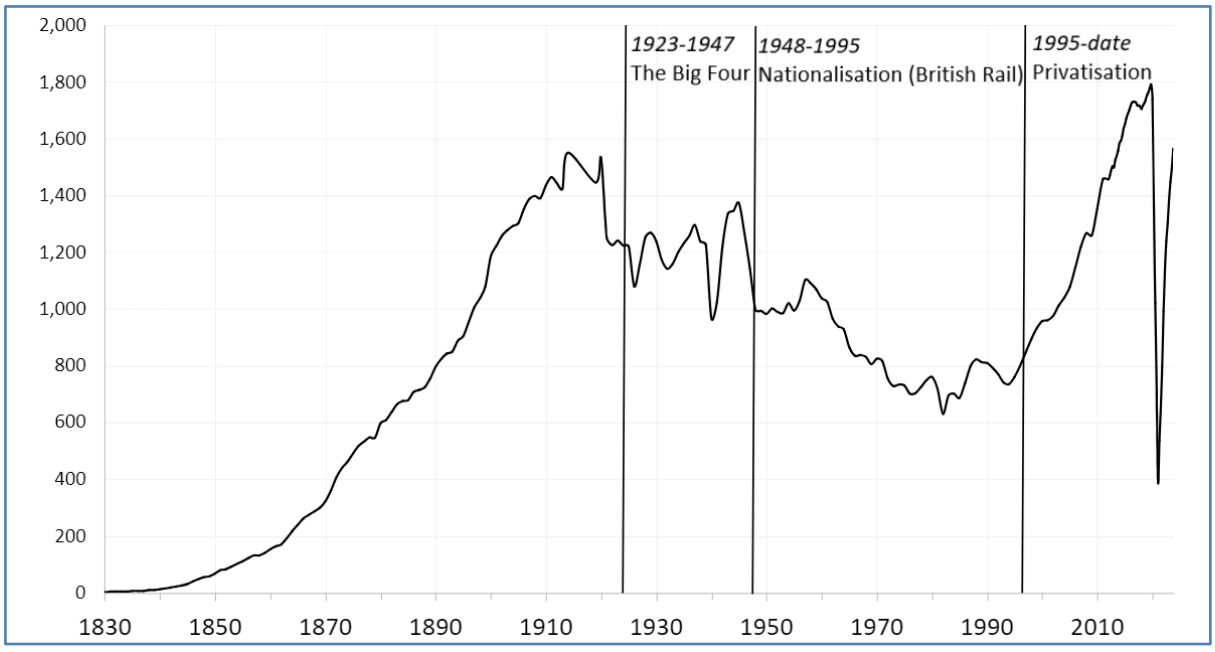
The views expressed are those of the contributors and should not be attributed to the Transport Economists' Group

How will we manage a crowded railway?

Author's note. This opinion, drafted before the 22 May 2024 announcement of a general election, focuses on the history of the railway up to the relatively detailed policy documents of the last government and opposition parties. It does not consider the subsequent and brief references to rail in the party manifestos. It was submitted on 5 July 2024, once the outcome of the election was known, and cannot reflect subsequent events.

Introduction

Figure 1: Rail passengers per year in Great Britain, 1830-2023



Source: Wikipedia (GBR rail passengers by year 1830-2023.png)

Great Britain's railway presents many challenges to the new government: public frustration with a byzantine fare structure; commitment for the network to be reliable, resilient and to carry more traffic; the affordability, acceptability and deliverability of more capacity; and both greater integration under a "directing" mind and greater devolution to national and regional bodies.

The railways after 200 years

How did we get to this point, and what lessons can be learnt?

The chart above helpfully divides the history of the railways into four successive periods, broadly:

- expansion in the private sector;
- contraction under government guidance;
- contraction under government subsidy and ownership; and
- expansion under government subsidy and guidance.

Expansion in the private sector

In 1818, in Trier in German, Henriette Pressburg gave birth to boy who later developed influential theories on whether the means of production should be privately or collectively owned. His first name was Karl. His father's surname was Marx. There are probably some in the new government who admire him.

In 1825, a great stride was taken in Great Britain's industrialisation. Untroubled by Karl's future thoughts on such matters, the Stockton and Darlington Railway (motto "At private risk for public service"[8]) funded, built and opened a railway line, open for a fee to anyone with suitable wagons, enabling them to combine the low energy consumption of rolling a wheel along a rail with the power and potential speed of the new steam engines. It was successful, but it soon encountered the operational and safety complications of mixing fast steam and slow horse-drawn trains on the same line. It ruled that steam trains would have priority and horse-drawn trains would be operated in groups, as "flights" of trains with similar speeds.

More railways were built through the remainder of the nineteenth century, culminating in the (relatively) high-speed Grand Central Railway from Manchester to London (1899). Eventually over 100 companies built over 35,000 route-kilometres of railway. However, as the twentieth century dawned, the growth of the network eventually ran out of steam.

[8] "Periculum privatum utilitas publica"

Contraction under government guidance

1921 diagnosis: too much competition

After the First World War, the emergence of the private car and ex-military lorries had contributed to a rapid growth in road transport at the expense of rail, which a result carried less traffic on the same infrastructure. The Railways Act 1921 grouped most of the existing network into the "Big Four" of Great Western Railway (GWR), London, Midland and Scottish Railway (LMS), London and North Eastern Railway (LNER) and Southern Railway (SR). It was hoped that, once merged, duplicate operators would not waste resources competing for the same business, but the decline continued.

Contraction under government subsidy and ownership

1947 diagnosis: too little investment

After the Second Word War, the railways were run down and needed renewal. The Transport Act 1947 nationalised the "Big Four" and some smaller railways to create British Railways, and was followed by the 1955 Modernisation Plan which, among other things, replaced the remaining steam locomotives. Nonetheless, competition from road transport continued to grow, and the railways continued to decline, and increased investment did not eliminate, or make acceptable, their need for subsidy.

1963 diagnosis: too much network

Beeching noted that much of the network carried little traffic and was already life-expired. He proposed the removal of around 8,000 route-kilometres and nearly 2,400 stations, although not all the proposed cuts were carried out.

1982 diagnosis: any acceptable railway needs subsidy

Serpell's notorious estimate that only a railway reduced to around 2,500 route-kilometres could operate without subsidy forced government to realise that a commercially viable railway would never be politically acceptable.

1982 diagnosis: not market-led

Serpell's team also found that, nearly 40 years after the Big Four were notionally merged, the railways remained largely regionally managed and engineering-led. Civil, Mechanical and Electrical

(M&E), and Signalling and Telecommunications (S&T) engineering Departments maintained and prepared the infrastructure and rolling stock assets which were then used by the Operations Department to provide train services.

Fortunately, the railway had already begun the process of Sectorisation. Market-facing businesses (for passengers, eventually InterCity, Regional Railways, and Network SouthEast) would set fares and specify service for which the Engineering Departments would become suppliers. Sectorisation went well, cutting costs and growing services and demand. This led to Organising for Quality (OfQ) in which engineering functions were absorbed into sector businesses which ran their own trains but traded with each other for services such as track and station capacity, and on-station staff including ticket offices.

1993 diagnosis: not enough competition

By 1991, however, the Conservative government, not great fans of Karl Marx, were keen to continue to expand the role of the private sector and, where possible, introduce competition. The Railways Act 1993, triggered by European Council Directive 91/440/EEC requiring at least accounting separation of infrastructure management and transport operations, introduced the template of monopoly infrastructure used by competing service providers. Passenger operations were divided into franchises based on existing service groups within the three sectors.

People must use water, gas and electricity, which had already been privatised, but most have a choice of whether to use the railways. At the prices that passengers were willing to pay, the railways could not cover their costs, except on some long-distance journeys, and so, unlike previous privatisations, the railway would still require subsidy. The chosen solution had four main components.

First, the infrastructure, Railtrack, would be funded wholly by charges paid by the operators.

Second, the private sector would bid to operate passenger services as "franchises" to a Department for Transport specification, demanding subsidy for those which lost money and paying a premium for any which could be profitable.

Third, and given that the infrastructure had not yet been ”shrink-wrapped” around the existing or expected services, franchisees were encouraged not only to cut costs but also to grow revenue through improved and expanded services and a wider variety of fares.

Fourth, open access by other operators was also permitted where capacity allowed, subject to agreements that franchisees would be protected from excessive poaching of their business.

Expansion under government subsidy and guidance

1996 brought the privatisation of the infrastructure manager, Railtrack, and the letting of the first franchises, whose investments in infrastructure, trains and other improvements no longer counted as public sector borrowing. Passenger demand was soon clearly on an upward path.

1997 diagnosis: no strategic direction

1997’s Labour government did not reverse the process, but its Transport Act 2000 established a Strategic Rail Authority with duties (inter alia) to consult before formulating a strategy. Marx might have approved, but the SRA only lasted until 2006. What the Act could not do was specify how a strategy agreed by the SRA as planner and the government as payer would, over time, inform the detailed planning of the timetables and the millions of fares available, or how operational decisions would be made in real time.

2018 diagnosis: no mind guiding a private sector railway

In 2018, the May timetable proved to be undeliverable with the expensive infrastructure built and opened to provide it. The Conservative government commissioned the independent Williams Rail Review, from which, in May 2021, emerged a white paper, the Williams-Shapps Plan for Rail. It concluded that “miscalculations by both Network Rail and operators in preparing timetable changes, and a failure of accountability and oversight throughout the process, led to a collapse in the national timetable”. The chosen solution was not fewer services, or more infrastructure, but greater integration of the railway under a “guiding mind”.

2024 diagnosis: no mind directing a public sector railway

After almost 200 years of the involvement of private companies, national government, independent authorities and devolved administrations, with internal divisions by geography, or by engineering function, or by market. The organisation of the railways continues to evolve.

The legacy service groups of 1996 have been restructured beyond recognition to create operators including Transpennine Express, Wales & Borders, West Midlands, East Midlands, the London Overground and Elizabeth line, and the giant Thameslink, Southern and Great Northern operating on three main lines north of London and multiple branches south of London. The infrastructure manager, now Network Rail, has repeatedly changed its internal structure, in part to improve its mapping to these customers.

In April 2024, the Conservatives' 118-page white paper was joined by Labour's 28-page Getting Britain Moving. Instead of a "guiding mind" there would be a "directing mind" but Labour drew on some of the same anecdotes ("75 different types of train") to characterise the problem. Given the similarity of much of the documents, it is difficult to identify exactly where they differ, even with a line-by-line analysis, as neither does more than scratch the surface of the more detailed arrangements.

On fares, possibly of most immediate interest to passengers, and where noticeable change could in principle be made quickly:

- The Conservatives headlined that "fares will be simplified" by Great British Railways[9].
- Labour seemed more cautious "Great British Railways will simplify the ticketing system" before clarifying that this will begin with a review to begin reforms "in due course"[10].

[9] "Great British Railways will use its leadership role to simplify the current mass of complicated fares and tickets, ending the uncertainty and confusion about whether passengers are using the right train company. It will set most fares under a clear framework agreed with Ministers."

[10] "The overcomplicated fares system will be reviewed, to begin the process of simplifying it and introducing digital innovations. Drawing on the functions of the Rail Delivery Group, which will transfer to Great British Railways in due course, reforms to the underlying fares regulations will be implemented as soon as possible, while making sure to avoid unintended consequences."

Labour's apparent relative caution may reflect how recent pilot schemes on fares have angered anyone whose journey costs more, or may be to avoid promising anything that it cannot commit its future Chancellor of the Exchequer to endorse.

On organisational structure, the Conservatives made seven references to "guiding mind" and Labour made eight references to "directing mind", although the exact distinction is not clear. There is a clearer dividing line on the future of franchises:

- The Conservatives would have continued to involve the private sector, but "Franchising will be replaced by new Passenger Service Contracts"[11].
- Labour will, in contrast, be "Transferring expiring train operator contracts directly to the new statutory body."

The difference is long-expected and consistent with their differences in ideological outlook.

The Conservatives see the public sector as bureaucratic and unresponsive, and the private sector as a source of capital and innovation, but made slow progress on how best to harness it. This may reflect in part the difficulties of working out exactly where and how Passenger Service Contracts will mean "greater commercial freedom", or when revenue sharing arrangements are "appropriate" [12]. It is easy to deplore "micro-management", but hard to decide when and where to let go.

Labour, like Marx, sees the private sector as prioritising profit over public service, and the public sector as a benign force under a "passenger-in-chief" Secretary of State. It seems confident that integration of much of the railway will solve many problems, but the NHS is a reminder of how merely putting an activity in the public sector does not create an efficient management structure. Labour also glosses over how the integrated passenger business will share the infrastructure with private

---

[11] "Passenger Service Contracts will be different across the network and will not take a one-size-fits-all approach, including on contract length. Operators will have greater commercial freedom on some parts of the network, with revenue sharing arrangements where appropriate. New open access services will also be explored where spare capacity exists."

[12] The General Election was announced on 22 May. The Public Accounts Committee's "Rail reform: The rail transformation programme", published the next day, is a timely stock take on Conservative progress.

sector freight and remaining passenger operators, all of whom will still need contracts setting out their access rights and performance and compensation regimes.

Both parties meant well, but neither's proposals include the operational level detail explaining how they will address the many interlocking issues of running a railway.

The new government faces the growing challenge, shown on the opening chart, that passenger numbers on the railway have reached an all-time high, and are expected to continue to grow. Large parts of the railway are systemically congested including, for example, the entire corridor from Brighton through Thameslink to Edinburgh. On many routes, changes cannot be made to one service without also agreeing changes to all other passenger and freight services. Congestion can be eased if sufficient additional capacity is provided, but the Conservatives cancelled High Speed 2 north of the West Midlands, which would eventually have provided at least some relief to all three major north-south lines.

Labour mentions (once) that the timetable will be "resource-led", but do not explain how this will differ from "resource-constrained", or how passenger and freight services will be contained within the constraints.

The Conservatives referred to growth in passenger numbers and rail freight, and electrification, and "upgrades", and even to reopening old lines[13]. The wording hinted that the old would be restored, and the existing would get better, but even minor "upgrades" are likely to mean disruption and nuisance while the work is done, and taking land temporarily for work sites and permanently for additional platforms, sidings, tracks, flyovers and viaducts, none of which is likely to be popular with the immediate neighbours.

The alternatives are more crowding, higher fares, and missed Net Zero targets.

[13] "Restoring lost rail links and accelerating the delivery of critical upgrades to the network will help level up places across the country, spark new economic growth and improve public transport connectivity and prosperity across our nations and regions."

The challenge

Does Labour have a clear view on whether and how it expects:

- to simplify fares without reducing revenue and increasing subsidy;
- to run a full railway, on which more of one type of service will mean fewer of another;
- to limit freight growth, and raise passenger fares, to manage demand;
- to grow services through expensive growth in the network, including new lines; or
- to agree with multiple stakeholders the details of any or all of these?

Conclusion

For almost a century, until after the First World War, the private sector introduced and expanded Britain's rail network and services. Over the next sixty years, government stepped in as demand and services declined: first encouraging consolidation to reduce fixed costs; then funding capital renewal and modernisation; then drastically reducing the network; and finally accepting the need for continued subsidy. Now, passenger demand has been growing again, but this time the Government must pay, because expansion's incremental costs exceed its incremental revenues.

The failure to deliver the May 2018 timetable triggered the latest search for how to run the railway.

Both major parties put forward plans whose only clear differences reflected their ideological predispositions. Both mentioned growth of passenger and freight and of reopening old lines and "upgrades".

Neither referred to growth and expansion requiring land, and potentially new corridors, outside the boundary of the current railway. It is not clear whether either has the appetite to fund major new projects, without which we may be committed to operating and managing a full railway, and by implication constraining demand to fit.

The simplistic “privatisation or nationalisation” public debate ignores how we have already tried many ways to run a railway, are undecided on how to deal with systemic constraints, and are committed to involve not only central government but also national and regional transport bodies.

We may find that the railway is run, not by a “directing” mind, but by committees with few policy levers to pull until more money is made available and more infrastructure is built.

Dick Dunmore

TEG Committee 2024-2025	
Chair	
Tali Diamant	AtkinsRéalis
+44 (0)7976 931192	
Tali.Diamant@atkinsrealis.com	
Treasurer and Membership Secretary	
Gregory Marchant	4 Seymour Square Brighton BN2 1DP
+44 (0)1273 621522	
gregorymarchant.teg@outlook.com	
Secretary, Webmaster and Programme Coordinator	
Dick Dunmore	15 Imperial Mansions 13 Victoria Parade London SE10 9FR
+44 (0)7715 771321	
dick_dunmore@hotmail.com	
Journal Editor	
Peter Gordon	39 Haslam Close Uxbridge Middlesex UB10 8TJ
+44 (0)1895 678803	
petersgordon@blueyonder.co.uk	
Committee members without portfolio	
John Collins	Arup
John-R.Collins@Arup.com	
Adriana Moreno Pelayo	Arup
+44 (0)20 7755 6261	
Adriana.MorenoPelayo@arup.com	
Iven Stead	Department for Transport
Iven.Stead@dft.gov.uk	

The Transport Economists' Group, formed in 1973, provides a forum for people involved in transport economics to meet regularly and discuss matters of mutual interest. Membership is open to economists working in transport and others whose work is connected with transport economics.

The aim of the Group is to improve the quality of transport management, planning and decision-making by promoting lectures, discussions and publications related to the economics of transport and of the environment within which the industry functions.

Meetings, online or at Arup's Central London HQ, from September to June (except December), consist of short papers presented by speakers, drawn from both within the Group's membership and elsewhere, followed by discussion.

The Group's Journal, "The Transport Economist", is published three times a year reporting on meetings and other activities of the Group. It reviews recent publications of interest and contains papers or short articles from members. The Editor welcomes contributions for inclusion in the journal, and can be contacted at petersgordon@blueyonder.co.uk.

The current membership of over 150 covers a wide range of transport modes and types of organisation. Members are drawn from transport operators, consultants, universities, local and central government and manufacturing industry. All members are provided with a full membership list, updated annually, which serves as a useful source of contacts within the profession. Applications from people in all sectors are welcome.

Applications for membership should be made on a form which can be downloaded from the Group's website at www.transecongroup.org.

The Transport Economist | Volume 51, Number 2
Summer 2024

Contents **Pages**

Details of meetings are provided on our website at

http://www.transecongroup.org/meetings/

TEG TRANSPORT ECONOMISTS' GROUP