

Network Rail's introduction of the Integrated Train Planning System: Evidence report following ORR's investigation

Executive summary

Timetabling is a vital service that Network Rail is required to carry out under its network licence on behalf of the rail industry, following processes set out in the contractual framework. There is a large network of inter-related IT systems that help it do this and help the industry manage their businesses.

Network Rail recently introduced a new Integrated Train Planning System (ITPS) to replace the current collection of legacy train planning software with a single modern and more powerful system. In principle it is an initiative we welcome; the continued dependence on obsolete and poorly integrated systems in many areas is a barrier to efficiency across the industry. It has general support among Network Rail's customers.

However implementation of the new system for the May 2010 timetable change did not go smoothly with, in particular, many problems becoming manifest when the short term planning process was cut-over. These included:

- Errors in data extracted for the national rail timetable leading to a delay of around 4 weeks in its publication and to knock-on delays in Train Operating Company (TOC) publication of pocket timetables (in breach of their franchise obligations);
- An inability to produce standard reports used by TOCs for their planning;
- Poor data integrity in downstream systems such as the revenue sharing system, passenger information systems and TOC reservations systems;
- Changes to timetables arising from engineering work being advised to TOCs later than normal T-12 timescales;
- Very late confirmation of services for freight and charter operators; and
- Poor system performance including an inability of the system to cope with normal volumes of electronically imported bids in normal working hours;

These problems badly affected operators in terms of their own planning and resourcing, and to some extent revenue and reputation. Since the beginning of March 2010 Network Rail has done a lot of work to mitigate their impact in the short term, including having teams working to correct errors manually in parallel with others implementing new software releases to provide permanent solutions. Train operators have similarly put in huge efforts 'behind the scenes' to check timetables and to identify and work around the errors found.

The hard work of Network Rail and operators' staff over the last 6 months has helped minimise the impact on passengers and freight customers. The trains ran when they were intended to. Nevertheless, the industry has given out wrong or confusing information to passengers about some services – particularly weekend services where

there were variations to the normal timetable, and some passengers will have acted on that information.

We have investigated Network Rail's management of the development and implementation of the new system, through the independent reporter Arup. This revealed that Network Rail had made a number of decisions at the start of the project that influenced its risk profile, how it engaged with its stakeholders and its approach to risk management (in particular, reducing its ability to carry out a full systems test before launch). We questioned whether Network Rail had adequately assessed and managed the consequences of those decisions, and therefore whether it was fulfilling its licence obligations to run an efficient, effective timetabling process reflecting best practice and to make information about changes to the timetable available for passengers in good time.

Network Rail has admitted that it is failing to make relevant timetabling information available to passengers in good time. But it believes that it has not failed to run an efficient, effective process in managing implementation of the system.

We agree that introduction of ITPS was, in principle, the right thing to do to make timetable planning more efficient and to enable better analysis and modelling tools that will underpin the efficient use of network capacity. We also accept that Network Rail made reasonable strategic choices when deciding to adopt a commercial off the shelf system (COTS) and to set up the project as a Network Rail centric one using the industry common interface file (CIF) as a boundary to the project.

However, having made those decisions it remained essential that the development and launch of the system in such a business-critical area was done properly.

It should have been clear from the start that the changes had the potential to impact systems critical to the whole industry and ultimately to end customers. The decision to ring-fence the development of ITPS as an internal project was, in principle, reasonable, but in our view Network Rail went too far in the early stages in thinking it could be done in isolation. This impacted on the early risk assessments for the project. The independent reporter noted these focused on low level details rather than on the service obligations to train operators.

Network Rail's promise to stakeholders that the approach meant ITPS would not affect them constrained its ability to test the system more fully. And it would not be reasonable to expect exhaustive testing of all the possible failure modes for such a system. Nevertheless, taking all factors into account we consider that the extensive testing that was done still did not go far enough given the big bang approach to implementation and the number of stakeholders and systems reliant on ITPS. For example, problems with electronic data interchange (EDI) uploads that worked normally before ITPS went live should not have come as a surprise. These could have been tackled pre launch had testing identified them.

This means that we are not satisfied the 'go live' decision taken by Network Rail in January 2010 was the right one in all the circumstances. In particular, at the time of the "go" decision on 22 January the number of critical or high impact defects was increasing and stood at around 120. The project steering group had a reasonable expectation that the critical defects would be addressed in good time but we are concerned that it does not appear to have addressed the risks around the high impact defects adequately.

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Introduction

Background

1. The Integrated Train Planning System (ITPS) is a project by Network Rail to replace a collection of legacy train planning software products with a single modern and more powerful system. In principle it is an initiative we welcome; the continued dependence on obsolete and poorly integrated systems in many areas is a barrier to efficiency across the industry. It has general support among Network Rail's customers.
2. After a protracted development period, in January 2010 Network Rail decided to implement the first phases of ITPS to handle work on the 23 May timetable change - some years later than the timescales originally planned. Long term planning for the base timetable went well but problems began to emerge when Network Rail began overlaying short term planning changes (e.g. for engineering works). Network Rail first notified us of "teething problems" on 4 March 2010 and we began to get complaints from First Group, Arriva Group and National Express East Anglia (NXEA) at about the same time. Problems included late publication of the timetable and serious impacts on downstream systems including those providing passenger information and reservations.
3. This led to some inaccurate information being given to passengers and freight customers and a significantly increased workload and potential revenue loss for train operators. Charter operators were particularly badly affected. The main impact has been on services affected by short term planning changes, generally associated with weekend engineering work.

Terms of reference for the investigation

4. In May 2010 we told Network Rail that we would investigate its management of the introduction of ITPS and its impact on operators and their customers. We held back the start of the investigation until 20 May to avoid distracting key Network Rail project staff at a critical point in the May timetable change. The scope for this investigation was to:
 - A** investigate the circumstances leading up to the recent timetable problems, including the planning, testing, risk assessment and "go-live" decisions Network Rail took around ITPS;
 - B** establish the direct impact of the introduction of ITPS on train operators and their passenger and freight customers; and
 - C** review Network Rail's plans for meeting its obligations in the short term *and* for ensuring these problems are not repeated in the long term (including at the December timetable change).

Conduct of the investigation

5. We mandated the independent reporter, Arup, to assess Network Rail's handling of the introduction of ITPS and to review plans for meeting obligations in the short and long term, according to elements A and C of the scope of the investigation. Arup produced a draft report on 22 June. We met with Arup and Network Rail to discuss this on 24 June and a number of amendments were suggested. Arup produced its final report on 7 July.

6. We asked for feedback from train operators on the impact of ITPS on their businesses and their customers. We received comments and supporting evidence from fifteen operators. We also received comments from Passenger Focus and London TravelWatch who supported our investigation. In June, we met with National Express East Anglia (NXEA) and DB Schenker (DBS) to hear their feedback directly.

7. We also received and reviewed minutes of twice weekly teleconference meetings that Network Rail ran with operators from 26 March to 25 May. These conferences continued on a weekly basis following the timetable change but we have not reviewed the minutes of those later calls.

Context (licence conditions)

8. We wrote to Network Rail on 12 July stating that, based on the information we had gathered in our investigation, we considered that it may have failed, or be failing, to meet one or more of its network licence obligations.

9. The relevant licence provisions are conditions 1 and 2. Under condition 1.23 Network Rail must:

- (a) run an efficient and effective process, reflecting best practice, for establishing a timetable and any changes to it; and
- (b) where necessary and appropriate, initiate changes to relevant industry processes,

so as to enable persons providing railway services and other relevant persons to plan their businesses with a reasonable degree of assurance and to meet their obligations to railway users.

10. Compliance with this condition forms part of the general duty set out in condition 1.2 of the network licence.

11. Condition 2 (timetabling) contains a general duty which obliges Network Rail to provide access to appropriate, accurate and timely information on services to allow passengers to plan their journeys. In particular condition 2.4 states that, in order to comply with the general duty in condition 2.1, Network Rail should:

provide holders of passenger licences with access to information about relevant changes not less than 12 weeks before the date on which such changes are to have effect

unless to do so would conflict with its obligations under condition 1.2.

Network Rail's response

12. Network Rail responded on 26 July 2010 acknowledging that it is currently in breach of condition 2 as it is not meeting its T-12 obligations, but that it did not believe that a breach of condition 1 had occurred. On 2 August we met with Network Rail and Arup to clarify points raised in this letter.

Consideration of issues

13. As Network Rail has acknowledged a breach of condition 2, this report does not discuss this area in great detail. It concentrates on the issues surrounding the development of the system under condition 1. We consider that these issues include:

- the risk management in the development of ITPS, the degree of testing of the system and the go live decision;
- the impact on train operators (including the issues surrounding the informed traveller timescales); and
- Network Rail's plans for resolving the deficiencies in the system so the problems are fully resolved before the December timetable change.

14. This report sets out the findings of our investigation into the three issues as outlined above. It sets out both matters of fact that we have established and our views, and those of the independent reporter, Arup, based on those facts.

15. Arup has made recommendations about steps Network Rail should consider taking in order to improve its introduction of new IT systems.

The introduction of ITPS and the impact on operators and rail users

Reasons for ITPS development

16. Network Rail developed the ITPS with the aim to provide a single, efficient process for timely and accurate planning of a high quality, easily published timetable that meets the needs of all stakeholders¹. It replaces the train planning tool Trainplan as well as addressing other key train planning systems, integrating them into one, more efficient tool which would better serve the future requirements of the industry. This was therefore more than a standard system upgrade; it was a major modernisation of the whole Network Rail timetable planning architecture. In its "Operational Planning Centralisation" briefing document Network Rail commented that "the system will make planning more accurate, easier, more enjoyable and of course more efficient."²

17. The previous system was expensive and cumbersome to operate and required highly specialised skills to manage it. It did not directly interface with other systems, such as possessions planning, and could not form the basis for further developments such as capacity planning or modelling tools. It relied on multiple databases, one of which (the train service database TSDB) was becoming increasingly difficult to maintain and was an ongoing constraint on future planning developments. The system provided very limited opportunities to automate system interfaces and improve effective

¹ Network Rail IMTS-017, Outline Solution Design, ITPS, 1.2, September 2006. Quoted in the Arup report, 7 July 2010.

² Quote from First Great Western, by email, 5 June 2010.

collaboration in the industry. East Coast Trains commented that the legacy systems were probably a decade or so behind what should be achievable with technology available today.

18. Network Rail notes in its letter of 26 July 2010 that “from its outset ITPS was designed to be a major and necessary modernisation of the whole train planning architecture for railway industry. Thus it is inevitable that the roll-out and implementation of ITPS might be expected to have an industry wide impact.”

19. Most of the operators have said that they fully support the introduction of ITPS and believe that the system will bring great benefits to the industry by helping to create a more efficient process and a more effective timetable. We agree.

Development timescales

20. The programme was planned to be delivered in 4 phases, starting with long term planning, followed by short term planning, upgraded simulation capability and enterprise alignment which allows analysis of actual vs. planned train movements. Phase one was due in July 2007 with phase 4 due for completion in December 2008. However, the project was delayed so that phase 1 was implemented in September 2009 and phase 2 in January 2010. Phases 3 and 4 have been put on hold until the current problems are resolved.

21. Network Rail took the decision to replace the existing train planning system with ITPS for phase 1 in September 2009. It began development of the May 2010 timetable using the new system, populating it with the base timetable based on long term planning (LTP). This phase went well with no reported problems. The go live decision for phase 2 was taken on 22 January 2010. This was the last day when Network Rail could have reverted to the old TrainPlan system without incurring material additional cost.

22. Network Rail sent out its formal offer for the May 2010 timetable in December 2009. We have had no complaints about this offer from any passenger operator and NXEA, when asked, confirmed that it was broadly content with the offer. However, DBS and Freightliner noted that their offers were much worse than in previous years, with a significant number of schedules missing from the offer. DBS noted that its response to the offer was some 50% longer than the previous year.

23. Network Rail began phase 2 covering the short term planning (STP) for weekly changes to the base timetable (e.g. for engineering works) in May 2010. It became apparent early on that there were a number of problems with data integrity in downstream systems, with a small number of missing trains, wrong codes and problems with the number of people using the system at any one time. Network Rail began to implement some mitigation measures and planned a fix for 3 April. In early March Network Rail told ORR orally that there were some “teething problems” with the new system. On 9 March First Great Western told us it was likely to miss its normal publication dates for pocket timetables, due to the introduction of ITPS.

24. By 26 March Network Rail had identified a number of problems. These are discussed individually below.

National rail timetable (NRT)

25. Network Rail normally provides timetable information to TOCs and independent publishers of the national rail timetable (NRT) about 8 weeks before the start of a new

timetable (at the end of March for the May change), to allow operators to publish their own pocket timetables no later than 4 weeks prior to the start of services in accordance with franchise commitments. There are no set timescales in Network Rail's licence or the contractual process for publishing the NRT but it needs to be done in a timely manner.

26. Problems emerged in March with several TOCs noticing that STP schedules were permanently replacing the LTP schedules in the system and some trains were missing. There were also problems with showing connections between services, splitting and attaching trains and showing links with shipping and buses. The tables were finally uploaded to Network Rail's website in early May but needed to be republished on 17 May. Network Rail wrote to the Department for Transport (DfT) to explain why franchisees might not meet their franchise commitments, but these problems added to the workload of both TOC and Network Rail planners, and had the potential to confuse passengers. Most TOCs published their timetables by T-2 but East Coast, for example, was delayed to T-1, some needed reprints and others incurred some costs from abortive work setting up a print run.

Production of standard reports

27. There were problems with the quality of standard schedule reports that TOCs rely on internally for their operational planning. These include comparison reports between bid and offer or between LTP and STP, allowing TOCs to spot changes quickly, as well as other reports which help TOCs with operational planning. Network Rail introduced interim fixes using Excel macros but these were of limited use. Some reports were in production by early May but others have taken much longer to sort out and bid vs offer reports are still not available. This made checking the output from ITPS much harder as planners had to check manually thousands of individual schedules weekly to spot errors, creating many hours of additional workload continuing into August.

EDI electronic bid import

28. Operators were unable to import electronic bids into ITPS, resulting in time-consuming and labour-intensive processes being put in place. A fix was put in over the Easter weekend (2-5 April) but problems continued, particularly with the high volume bids from some southern based TOCs. Only one TOC could access the system at a time and even then they had to follow much more onerous processes for the system to accept bids, further adding to their workload. Network Rail increased the bandwidth for EDI and upgraded the computers at the train planning centres at the beginning of July to speed up the process.

Publication of data for downstream systems

29. There were a number of problems with publishing timetable information to downstream systems. This was mainly a problem for STP although there was a potential impact on LTP schedules with regards to the ORCATS revenue sharing system. Systems affected included passenger information systems and reservation and booking systems. Operators have reported that significant numbers of trains were dropping out of the system so although they were running they were not being advertised. This meant that operators had to check all their weekend services, in some cases up to 3000 schedules, manually each week to identify errors, as well as trying to keep up with the normal informed traveller process for later weeks. Often the errors were only rectified on the day before the service was due to run. There were knock-on

effects on the TOC's operational planning as train and driver rosters could not be planned in the usual timescales. This problem was particularly bad in the first few weeks of the new timetable but TOCs have reported problems with services in August. This has obviously had an impact on TOC resources and revenue as well as on passengers' ability to plan and book their journeys.

Informed traveller timescales

30. In line with the industry planning process, Network Rail normally provides offers on STP 14 weeks before the services are due to run. As a result of these problems, Network Rail has been missing these timescales. On 25 May it produced a recovery plan showing that most TOCs would be back to T-14 by 11 June. However, on 11 June it revised this to 30 July. Thameslink, Chiltern and freight operators would be later. In its letter of 26 July, Network Rail's plan showed that C2C and LOROL had slipped to 7 August, South Eastern and NXEA to 27 August, with freight remaining at 15 October and Thameslink at 5 November. On 1 August Network Rail reported that the T-14 offer and T-12 upload had been achieved on 30 July for all operators apart from NXEA, Southeastern and Grand Central. There was no plan for Chiltern, which is currently affected by delays to its possession planning for the Evergreen 3 improvements.

31. In addition to this, spot bids were subject to delays and the process continues to be very slow, so amendments are often not uploaded to downstream systems until T-1. These bids are normal late changes caused by late amendments to or cancellation of possessions, changes to special trains for, say, sporting events or minor changes to services or empty stock movements.

Freight and Charter operators

32. These operators had particular problems because they follow different timescales for timetable planning. Planning of short notice freight began on 17 May and much of the planning had to be done as very short term planning (VSTP). FOCs reported a number of issues including rolling spot bids not being uploaded correctly and trains either missing or duplicated in the schedules which required resources to check and correct. Some trains were rejected because ITPS did not hold the relevant geographical data about some of the remoter parts of the route. There was an operational impact on their ability to plan vehicle and crew rosters because of the lack of validated timings. FOC receipt of the May 2010 timetable offer in December 2009 was poor in quality and incomplete. Some FOCs were also unable to access timetable data reliably in ITPS from their sites until the 'patch release' over the weekend 15-16 May 2010. This had a significant impact on FOCs' ability to plan their businesses properly.

33. Charter operators reported receiving timings for their services only days before the service was due to run, making it difficult for them to send out their tickets, souvenir brochures and other information in time. Network Rail has written to these operators apologising for the situation but claims that part of the problem is due to a lack of discipline in the timetabling process on the part of both itself and the operators. Under normal circumstances, the system is able to cope with this but ITPS problems have exposed this weakness. We have also had complaints from the chartering companies who commission the charter operators, who also report revenue losses as customers cancel their journeys and increased costs associated with the delays to the information. DBS stated that the situation has been disastrous for the charter industry.

Impact on passengers

34. We have investigated the impact of this on passengers. We believe that apart from charter services, the potential impact on passengers and freight customers has been significantly reduced by the efforts of both Network Rail and the operators to correct the errors. Some passengers will have been unable to obtain the summer 2010 timetables until later than usual. But the main impact has been on people using services affected by short-term changes, generally associated with weekend engineering work, particularly in June and July. Some of these passengers will have been affected when booking. With inaccurate online information, booking options were reduced (which may have led to overcrowding on those services which were shown as running). Some passengers may have booked tickets on trains which did not in fact run, or were replaced by buses. Some passengers may have received confusing or inaccurate information while travelling, as information systems were fed with some erroneous data. We have had two complaints made to us directly and Passenger Focus has written to Network Rail stating that the situation is unacceptable from a passenger perspective. It has also provided us with examples of bus replacement services that were still shown inaccurately in August. London Travelwatch has received two appeals against Chiltern and NXEA as a consequence of ITPS problems, but neither has given us an indication that the number of complaints has increased in recent months.

35. There has been a much greater impact on charter passengers as they may not have been sent tickets or details of timings or calling patterns until a few days before travel. This meant they were unable to book cheaper connecting travel or hotels and has caused a degree of anxiety for many as these services can be quite costly. Many customers cancelled their journeys altogether.

The situation in mid August

36. We spoke to a selection of operators and Passenger Focus on 10 and 11 August for further feedback. The general feeling was that things were much better, with most operators now receiving their offers from Network Rail within the normal informed traveller timescales (T-14), but that there was still a way to go. There were still a few incidents with some services dropping out of the system, for example relating to trains splitting or attaching and Passenger Focus highlighted a particular problem with bus replacement services not showing in the passenger facing systems. However, these are not consistent problems so it is not clear whether these problems were due to the system or due to human error. Arriva noted that currently there was relatively little engineering work requiring STP changes, but commented that there may be more problems in September when engineering work is due to increase.

37. Some TOCs now have access to ITPS itself, making checking much easier, but others do not. ITPS is still not able to produce bid vs. offer comparison reports, again making checking more time consuming.

38. The operators' main concerns were about the spot bidding process after the T-14 offers. These are normal amendments to services, usually due to changes to or cancellations of blocks or possessions, or due to minor amendments that the operators need to make for operational purposes. This process is now very slow and the changes are often not uploaded until the week before the service is due to run. Operators feel that Network Rail has prioritised the 'informed traveller' work so that it can meet its regulatory obligations at the expense of this other vital work and they suggested that

Network Rail could have spread the workload a bit more evenly between the two processes.

Project planning and the go live decision.

Background

39. We mandated the independent reporter, Arup, to review the project planning and development of ITPS and Network Rail's decision to introduce it for the May 2010 timetable. Arup's team included an experienced train planning and performance specialist and an experienced and well qualified practitioner in the implementation of IT systems. Arup's report sets out the history of the project and how the project was managed. It considers Network Rail's actions to mitigate the problems for both short term informed traveller timescales and for ensuring the situation is not repeated at the December timetable change.

40. We also asked operators about the amount of involvement or oversight of the project they had during its development.

41. Arup identified a number of key risks with the project that go back to decisions taken at the outset. It highlights Network Rail's decision to keep the project in-house, using a commercial, off-the-shelf-system (COTS) and relying on a common interface file (CIF) as the boundary. Arup suggests that the implications of these decisions, and the way they were then followed through, lay behind most of the problems which subsequently emerged.

Use of a COTS

42. Arup considered that use of a COTS is a reasonable approach to avoid the difficulties and potential cost increases inherent in developing a bespoke system. However, it noted that the system chosen had been proven on a network that was much simpler than Network Rail's. It suggests that "the difficulties and risks inherent in applying a COTS package which was proven in only a relatively simple, small-scale environment to the quite different UK rail environment were not fully appreciated by the project team³" and Network Rail therefore took insufficient measures to mitigate the risk.

43. In its letter to us on 25 May, Network Rail said that, following encouraging visits to other railway organisations, it had believed a 'vanilla' COTS could be introduced into the GB rail environment without extensive development work but it acknowledged that this had not been the case. It acknowledged that the mix of traffic types, size of network volume of traffic and multiple time horizons for timetable planning have each generated a demand for additional, bespoke development that contributed to the delay to the project.

44. However, in its letter of 26 July, Network Rail disagreed with Arup's criticism of the use of the COTS system and that the risks of using it were not fully appreciated by the project team. It argues that it was appropriate to start with a tried and tested package, albeit one used only in a simpler environment, and was much less risky than bespoke development. The system had been shown to be capable of delivering the required

³ All quotations are taken from Arup's Final report of 7 July 2010 unless otherwise stated.

outputs, which increased Network Rail's confidence that it would be successful. Network Rail realised that some bespoke development would be needed and the programme team developed and implemented a plan to achieve this.

45. We recognise that there are benefits to using a COTS system and we do not question the decision to do so here. Network Rail has explained in detail how it came to choose the system and the reasons for its confidence in its ability to be 'up-scaled'. However, there was clearly a significant amount of bespoke development required which had an impact on the timing of the project and, in light of the problems that occurred, we question whether Network Rail fully appreciated the complexity of delivering the downstream system users' requirements at the start.

Timing of the project and use of the Corporate Network Model (CNM) to populate ITPS

46. Arup suggested that the initial timescale for developing ITPS was unrealistically ambitious for a project of such complexity and stakeholder diversity. It noted that Network Rail had not planned any time in the deployment plan to allow for consolidation, following introduction to service, before starting further development.

47. In particular it noted the project's reliance on development of the corporate network model (CNM). ITPS needs high-grade data which Network Rail had planned would be provided by the CNM. However, this was ultimately not possible so development of ITPS was delayed by a year as data was derived from another source. Arup commented that "no evidence could be found to show that this risk had been recognised, and that adequate mitigation had been planned, at project inception."

48. Network Rail disagrees with Arup's assessment, stating that timescales had been ambitious but deliverable. An internal audit in 2007 gave the project team confidence that the programme was well constructed, although it was about 12 weeks behind schedule. It accepts that reliance on the CNM was a reason for delay and that it should have allowed greater contingency to cover the risk.

49. However, we consider that the timescales for the development of the project were an internal matter for Network Rail and in this investigation we are not directly concerned about the delay to the project itself.

Network Rail's decision to keep the project in-house and to use the CIF as a natural boundary

50. Network Rail took a decision at the start to contain the initial impact of the project to its own organisation to avoid the significant additional complexity that would have been involved in progressing this as a cross-industry project. It decided to use the CIF as the boundary with the many related systems and processes used elsewhere in the industry. It gave an undertaking to users that they would not be required to make any changes to their systems or processes when the new system entered service. Several operators told us that they were assured on several occasions they would see no differences. Arup notes that this meant that Network Rail did not give itself the mandate to require users to adopt more rigorous standardised information exchanges for inputting, outputting and reporting purposes.

51. Network Rail did discuss requirements with operators in the early stages of the project but DBS noted that the regular meetings had stopped in 2008 and it was not sure if any of its suggestions had been incorporated. Others said they had had little or no involvement apart from presentations at the annual timetable conferences. Network

Rail said in its letter of 25 May that it “had to make some major assumptions about the processes our customers use, the consistency between them and their willingness to change”. Network Rail did update train operators with presentations at the annual Timetabling Conference but some operators said that they saw this more as an update than consultation.

52. The basis for Network Rail’s decision to keep the project in-house was that the CIF created a natural boundary between the system and the downstream users. The CIF is a standard format file that was used to transfer data electronically from the old TSDB to other computer systems. ITPS uses the CIF in the same way and inputs data directly into it in the same format. However, in our meeting with Network Rail and Arup on 24 June, Network Rail said that many of the problems arose because many downstream systems interpreted the data in different ways so were unable to read the output from ITPS. It acknowledged that this was a common problem in IT, recognised across the world.

53. Arup comments that “the original premise on which ITPS planning (and therefore testing and release to operations) was based was that the system could achieve a successful initial outcome (including phases 1-4) wholly independently of its interaction with the rail industry outside of Network Rail. This presupposed the adequacy of the existing interface standards (such as CIF) to provide a clearly specified boundary between operators’ and track providers’ information systems, given the extent of their interaction. Nevertheless, the documentary record shows that the original Network Rail planning teams believed that ITPS could be successfully delivered in isolation, with only “*longer term integration and collaboration of UK rail industry planning teams*”.

54. Arup points out that Network Rail was fully aware of the interface with external stakeholders. It quotes various project documentation which recognized the existence and interface with external stakeholders. One explicitly included in scope “...*the processes and data interaction where there is currently an interface with Operational Planning processes:... Other Network Rail systems or functions, including the Corporate Network Model (CNM) [and] The Train & Freight Operating Companies including Charter Trains...*”. The exclusions from scope included: “...*The operations of the Train & Freight Operating Companies, except where there are system or process interfaces with Operational Planning*”. The ITPS project ought, therefore, to have taken fully into account its effect on the external environment, particularly including the train and freight operating companies.”

55. Network Rail argues in its letter of 26 July that Arup’s report fails to adequately recognise the difficulties in engaging the wider industry when implementing long-term strategic developments. It is confident that its decision to keep it in-house was the right thing to do and that it had engaged with stakeholders about this at every timetable conference from 2006 onwards. It had also engaged with stakeholders to identify all their requirements and had mapped these to the project by mid 2007. However, it also acknowledges in its 26 July letter that “it was inevitable that the roll-out and implementation of ITPS might be expected to have an industry wide impact”.

56. Network Rail also disagrees with Arup’s comments on the use of the CIF, stating that the decision to use the CIF as a boundary was the right thing to do to prevent all the downstream system owners having to make changes to their systems. This would have taken years to do. It disputes Arup’s comments that the interpretation of the CIF and its use by systems owners was subject to significant variation, as, apart from a couple of issues with data extraction, in the main the CIF has been effective in

transferring information between Network Rail and the downstream systems. It clarified this on 2 August, saying that the main issue was the quality of the data presented in the CIF, rather than the format itself. The problems with downstream systems arose because the data put into the CIF was different from that put in by the old system, although it was in the right format.

57. We accept that trying to run this project as a cross-industry project would have been unwieldy and would have added to the time and cost of the project, so Network Rail's decision to keep it in-house was, in principle, reasonable. However, we are concerned that this led to Network Rail believing that the project could be run in isolation, with little or no input from or interaction with users. This appears to have had a serious impact on Network Rail's risk management and on its ability to persuade users to become involved in testing the system. It also exposed Network Rail to having to tailor ITPS to ensure that it was capable of handling a variety of different reports used by different operators.

58. We also accept that using the CIF as a natural boundary for the project was a reasonable thing to do. However, Network Rail itself noted that interpretation of such files was generally known to be a risk in IT systems development and the rollout of the system was likely to have an industry wide impact. We therefore consider that Network Rail should have recognised this risk and done more to mitigate it. However, the evidence provided to Arup points to risk assessment that concentrated on internal risks to Network Rail's business without addressing the wider risk to the industry as a whole. We consider that this cannot be considered to be best practice, particularly given the importance of the systems to both operators and their customers.

System testing

59. Arup also criticises the absence of a plan for comprehensive whole-system testing prior to go-live. It reports that "Network Rail staff interviewed agreed that the project risk, and the difficulties experienced during go-live, could have been significantly reduced had the project been planned and implemented in such a way as to ensure the feasibility of exhaustive testing. However, because of Network Rail's commitment to require no changes in downstream (e.g. TOC and FOC) practices, processes or systems, coupled with the treatment of the project as an essentially Network Rail concern, the need for sufficiently exhaustive whole-system testing prior to go-live was not recognized at the outset. Such testing would have required a very high degree of voluntary cooperation from TOCs, FOCs and other systems owners. The decisions taken at the outset precluded the level of testing that would have been necessary to avoid the problems encountered at the go-live stage".

60. Network Rail did recognise the need for systems testing and extensive testing was carried out within the boundaries of the project. Network Rail asked downstream users to become involved. Initially only 3 out of 188 downstream users volunteered although Network Rail was able to increase this to 60. It is not clear when testing was carried out. At the 8 January fitness for launch meeting, the Steering Group was told that CIF production had not been tested end to end in the Network Rail environment. Testing for Delta Rail began in March 2009 but testing for other recipients did not begin until December 2009. Network Rail began testing ORCATS, the revenue sharing system, in January 2010 (about the time of the go-live decision).

61. Arup notes that guidance set out in Network Rail's Information Management Service Development Lifecycle – Best Practice Reference Manual states that "implementation

should always commence with a pilot implementation within the live environment prior to a full implementation...". However, the way the project had been set up and how the release was planned meant that Network Rail could not follow this advice. Although a pilot test had been carried out in 2008, this was too early in the project to produce representative results.

62. Arup is clear that the testing was not comprehensive, saying that it was not conducted at the scale and concurrency that could be anticipated at 'go-live'. It argues that comprehensive testing could not realistically be achieved because the project structure meant that there was no mandate to do so which would have made getting agreement at that stage more difficult and potentially costly. It further comments that "because Network Rail did not create a comprehensive, representative test environment as a part of project development, many sources of error and inadequate system performance were not identified during development, but only emerged (or were reported by operators) when the system was required to interact with live operators' systems to support the May 2010 timetable."

63. Network Rail agrees that more testing would have significantly mitigated the risks but does not agree that its project set up was the reason for the lack of testing. In our meeting on 24 June, and again on 2 August, it argued that whole-system testing would not have been feasible or cost-effective because of the workload on train planning staff. It pointed to the lack of volunteers coming forward to assist with the testing but does not believe this is due to anything it had said to operators previously. On 2 August, Arup agreed that it may not have been reasonable to test every one of the 188 downstream systems fully and a comprehensive test of the system would have required about 300 planners. But Arup noted that this would not have been necessary; tests could have been run under simulated normal working conditions to see, for example, how multiple attempts to access the same parts of the system in real time would work and to anticipate system performance. It could have taken a sample of historical bids from each TOC for testing systems outside the project.

64. All of the operators who commented on this area said that they had had no involvement in the development of ITPS apart from demonstrations in 2006 and 2008 and the annual updates at the timetable conference. Some mentioned that they had been consulted on the functionality that they would like to see but all recalled being told that there would be no adverse impact on their business and that they would not need to make any changes to their own systems. No one mentioned having been asked to take part in any testing of the system. East Coast said of the 2006 demonstration that it was not sure if many people there could fully appreciate how ambitious it was going to be to develop all the 'added value' modules.

65. There is clearly some disagreement between Arup and Network Rail on this issue. Arup considers the reason full systems testing was unfeasible was because these early decisions to isolate the project precluded a 'mandate for standardisation' that would have assisted with more representative testing. Network Rail argues that a full system test would have been unfeasible and costly in any case. We appreciate that testing against 188 downstream systems and the full range of operator input practices would have been an enormous undertaking and it may not have been necessary to test every single one, but in the event ITPS was tested against only a third of its downstream systems. A number of systems that are vital to the TOCs operations, revenue and booking processes were affected. It is not clear how many of these were tested prior to launch against a LTP and STP timetable.

66. Evidence from the TOCs shows that they were not engaged with the process and had been assured that they would not need to do anything. It could be argued that the operators had opportunities to question the impact of Network Rail's proposals. However, the presentations were made to operational planning staff who, whilst being experts in using the systems, may not be IT system implementation experts so could reasonably be expected to take these assurances at face value.

67. We therefore consider that Network Rail should have done more to involve the TOCs at the relevant level from an earlier stage to ensure that more of the key interfaces were fully tested prior to launch. Indeed, Network Rail itself acknowledges this in its 26 July letter, stating that it recognises "that for future systems project that have the potential to have an industry impact, we need to do more to make sure that our customers (at a senior as well as more operational level) fully understand the significance and importance of such projects" and that it must do more to facilitate customers' and stakeholders' engagement on projects which have extended life-cycles.

Risk management

68. Arup is critical of Network Rail's management of the risks inherent in changing a key system feeding over a hundred other downstream operational and customer information systems. Its main criticisms are that risk assessment and testing were inadequate for such a complex and potentially high impact change, and did not fully reflect the implications of the original ring-fencing decision. It states that risk assessment concentrated on lower level risks - by focusing on Network Rail systems and assuming that the interface with external systems would not change, it did not address the bigger risks of failure outside Network Rail. In particular the lack of full-system testing in a comprehensive test environment created a serious risk that was not effectively recognised or managed. There was also no evidence presented to show that the risk of problems with the CIF were recognised and treated during the project planning.

69. Arup notes that Network Rail followed the standard methodology in the Guide to Railway Investments Programme (GRIP) and other standard Network Rail guidance but considered that these are limited as the model they use for software development presupposes that the project requirements are fully defined at the outset. It considers that this was not the case with ITPS as the demands of the external environment were not adequately defined. Although the correct documents were produced, Arup considered that the nature of the real risks to which the project was exposed were neither recognised nor mitigated effectively, particularly at the outset. One document refers to only 3 identified delivery risks relating to cost, timescales and a "risk and opportunity" relating to interaction with the Track Access Billing project. Although the guidance recommends a business impact assessment, Arup notes that "no evidence was presented to indicate that any impact on the business of the TOCs and FOCs was assessed at this stage of the ITPS project. Therefore there was a comprehensive failure to develop a robust approach to risk identification and management, with the real risks to the project not being identified at the outset. The absence of a whole industry approach to the project compounded this problem."

70. Network Rail agrees that the project risk and difficulties experienced during go-live could have been significantly mitigated had exhaustive testing been feasible. It also comments that internal audits of the development and implementation of ITPS in 2007 found that the project was well constructed. A further audit in 2009 also contradicts

Arup's view that early strategic choices and assumptions complicated the implementation of ITPS. However, it acknowledges in its 26 July letter "it is clear, that through better planning Network Rail should have been able to do more to mitigate the effects of the roll-out and implementation of ITPS on our customers and end-users, particularly in terms of compliance with Informed Traveller timescales".

71. Network Rail further comments that "it is perhaps inevitable that many issues might be expected to arise in the transition from the old way to the new way of timetabling". We agree with this statement and consider that the risks should have been fully recognised and adequate mitigation put in place to try to minimise the impact of such issues. Arup's report highlights such actions as extensive exploration of the potential issues of data and process compatibility, system scalability and adequate provisions for fully representative testing prior to the commitment to go live, which it notes in sections 3.1.1 and 4.1 of its report, were not done.

Go live decision

72. Network Rail placed a great deal of emphasis on the need for the project Steering Group to understand the risks involved with launching ITPS in May 2010. Several presentations were made prior to the launch of both phases. Arup considered that the tone of the presentations was optimistic but that this was not backed up by the quantitative data presented. The already high number of outstanding defects with the system was still rising when the go-live decision was taken. At Network Rail's fitness for launch meeting on 8 January 2010 296 defects were reported, of which 94 were classed as critical or high impact. This number had risen to 330, of which 120 were critical or high impact, by the fall-back decision meeting on 22 January 2010 (the last day when Network Rail could revert to the old TrainPlan system without incurring financial penalties). Network Rail has argued that the criteria for go-live was "zero critical defects" but Arup disagrees that this is an adequate criterion and argues that high impact defects should have been considered as well.

73. At the fall-back decision meeting on 22 January 2010 the recommendation was made to continue with ITPS despite the number of outstanding defects. The project team expressed confidence in their ability to resolve or mitigate the high impact defects although Arup is sceptical about the basis for this confidence. It cites a number of CIF publication risks and numerous medium likelihood/high impact risks that did not have convincing mitigation actions, but were essentially 'watch and react' measures. For example, the mitigation for the risk that the business as usual data process might not be able to cope with the expected volume of data requirements for STP was to have rapid response teams in place to deal with issues as they arose. In the event, this was a particular problem once STP started and led to a protracted period where Network Rail planners had to work overnight and at weekends and there was a significantly increased workload for TOC planners.

74. Network Rail states in its 26 July letter that it is still confident that the decision to go live for the May 2010 timetable was the right thing to do because of the inefficiency of the old system. In a meeting on 2 August it expanded on this by reference to the extensive, though necessarily incomplete, testing that had been undertaken. In further correspondence following this meeting it clarified the reasons why the Steering Group had been confident that the defects would be resolved in time. Between 8 January and 22 January, 72 new defects were opened, of which 16 were critical, 28 were high and the remaining 28 were medium to low. The project team explained to the Steering

Group that the critical defects would be closed by maintenance releases on 8 February and 8 March. It was this that gave the Steering Group the confidence to agree to go-live and, indeed, all but one of the critical defects were closed by 8 February. In all, 50 of the 72 new defects were closed out before the timetable change. However, there was still one outstanding high impact defect open as late as August. Network Rail acknowledges that the Steering Group concentrated on the critical defects and the project team set no expectations about when the high defects would be cleared, although the decision was also informed by business representatives on the programme who reviewed all the issues where work-arounds were required; they provided their professional views to the project team who assured the Steering Group that the combined impact was understood and was acceptable and sustainable to the business.

75. In light of this additional information, Arup has acknowledged that the Steering Group had reasonable grounds for confidence that the critical defects would be addressed in time but had to rely on the project teams assurances that the remaining high impact deficiencies would also be dealt with. It does not appear that it had firm evidence to support these assurances or that it actually discussed the risks. Arup notes that the Steering Group appeared to have accepted the professional opinion of its specialist advisors that all would be well but does not appear to have seen solid evidence that this would be the case.

76. We agree that the go-live decision appears overly optimistic. There was a high, and rising, number of defects. A number of these were considered to be high impact and there is no evidence that the Steering Group considered these in any detail, relying on the assurances of the project team. Mitigation actions for many of these relied on a reactive approach which, with hindsight, proved to be inadequate.

Co-ordination of the launch of ITPS and moving all timetable planning from 3 centres to one at Milton Keynes.

77. Delays to the introduction of ITPS meant that it was launched at the same time as the relocation of Network Rail planning staff to Milton Keynes and the restructuring of Operational Planning. Arup could find no evidence that this has caused any adverse effect on the ITPS project. In fact, Network Rail considers that it was helpful in that training the new staff directly on ITPS actually helped with the launch of ITPS. It noted that the new staff were able to contribute very quickly, showing the quality of the staff and the simplicity of using ITPS compared to the earlier systems. However, NXEA commented that the new staff did not have local knowledge which has made finding and fixing the problems much harder, putting even more onus on the TOCs to check the schedules.

Actions taken to resolve the problems in the short and longer term

78. Network Rail has worked hard to mitigate and resolve the problems that have emerged since March and continues to do so. It set up teams of planners to deal with the immediate problems working overnight and at weekends to get round the problems with the EDI imports, to check the output and to manually input data directly into downstream systems. Coinciding with this was the work they had to do to deal with the planned RMT strike before Easter which was then cancelled.

79. The project team acted quickly to identify and put in fixes. The first fix over the Easter weekend resolved some of the immediate problems and a further fix in mid July stabilised the EDI import problems. It is planning a further update in Mid August.

Network Rail has managed these fixes well, building in testing periods before installation. Arup has confirmed that Network Rail's plans for recovery appear credible and well resourced; so far they are mainly progressing according to schedule.

80. Network Rail is still working to recover its short term planning timescales, and most TOCs are now receiving their offers within informed traveller timescales, although there are still some problems with very short term planning. Freight will return to normal by 15 October and Thameslink by 5 November. There is currently no plan for Chiltern, which is affected by delays to its possession planning for the Evergreen 3 improvements.

81. Network Rail has set up regular communications with its customers, including twice-weekly teleconferences and close liaison between TOC and Network Rail planning teams. All the TOCs have been very positive about the effort that Network Rail has put in at all levels to resolve the problems and at the National Task Force the owner groups have indicated that they are content with the actions Network Rail is taking.

82. Some TOCs are concerned now about the plans for the December timetable and we are monitoring the situation. The offers for December have been made and so far we have had comments from DBS and Freightliner that the quality is poor, but no other complaints. We accept Arup's report that the measures Network Rail is taking to resolve the problems with the system itself look adequate but will continue to monitor progress carefully.

Conclusions

83. We agree in principle that introduction of ITPS was the right thing to do to make timetable planning more efficient and to enable better analysis and modelling. We also accept that Network Rail made reasonable choices when deciding to adopt a COTS system and to manage the project internally, using the CIF file interface as a boundary to the project.

84. However, we consider it essential that the development and launch of a new system in such a business-critical field is done properly. It should have been clear from the start that the change had the potential to impact on such a significant part of the operation of the rail industry as a whole, with knock-on effects on passengers and freight customers. The decision to ring-fence the development of ITPS as an internal project was, in principle, reasonable, but Network Rail went too far in the early stages in thinking it could be done in isolation. This impacted on the risk assessment and management and on Network Rail's communications with its stakeholders. This in turn affected Network Rail's ability to test the system fully prior to launch.

85. In particular, at the time of the "go" decision on 22 January the number of critical or high impact defects was increasing and stood at around 120 (though all critical defects had been cleared by 8 February). The Steering Group had a reasonable expectation that the critical defects would be addressed in good time but we are concerned that it does not appear to have addressed the risks around the high impact defects adequately. We agree with Arup that, for a change of this magnitude and potential impact, these defects should have been considered more carefully.

Glossary

LTP	long term planning for the base timetable
STP	short term planning for weekly engineering works
VSTP	very short term planning for last minute changes and freight movements
TSDB	train service database - the old system
ITPS	integrated train planning system - the new system
EDI	the electronic bidding process
CNM	corporate network model - Network Rail's geo-spatial information system
CIF	common interface file, which is the boundary between ITPS and the downstream systems.