Case Study: Progressive Assurance in Requirements Management

THAMESLINK PROGRAMME
LEARNING LEGACY

London Bridge Station Redevelopment

Capturing, verifying and validating requirements is a challenging exercise for large and complex projects because the construction of some stages often overlaps with the design of others. As a result, the final design is sometimes not complete until relatively late in the schedule. Leaving the assurance late means that key staff may have moved onto other projects and the compliance evidence is more difficult to collate. It also makes it much harder to spot and correct any issues without them affecting the overall delivery.

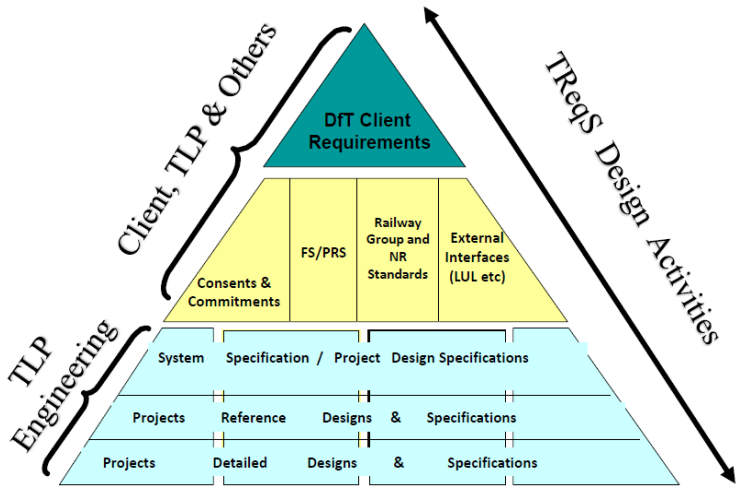
For the London Bridge Station Redevelopment (LBSR) project, verifying that delivery contractors had met all their obligations, that the project had met its obligations to stakeholders and, in the case of Thameslink Programme (TLP), to the Department for Transport (DfT) would have been difficult without a robust requirements management process. The project's and TLP's chosen support tool for managing requirements, *T-Reqs*, a DOORS-based system of configuration management, provided a database to record and provide visibility of the project requirements with traceability to their origin and compliance evidence at each stage of the Governance for Railway Investment Projects (GRIP) methodology.

In addition to *T-Reqs*, the project devised a process whereby design assurance evidence was gathered progressively at the finalisation and review of each major design phase. This meant that production of the final overall station assurance report was much easier to produce and to a high standard. It demonstrated to the DfT, the route organisations and the train operating companies (TOCs) that all requirements had been satisfied through the final design of the station. This is a good example of collaboration between the project team, the various development managers in place over that time and the requirements management team within TLP Central Engineering.

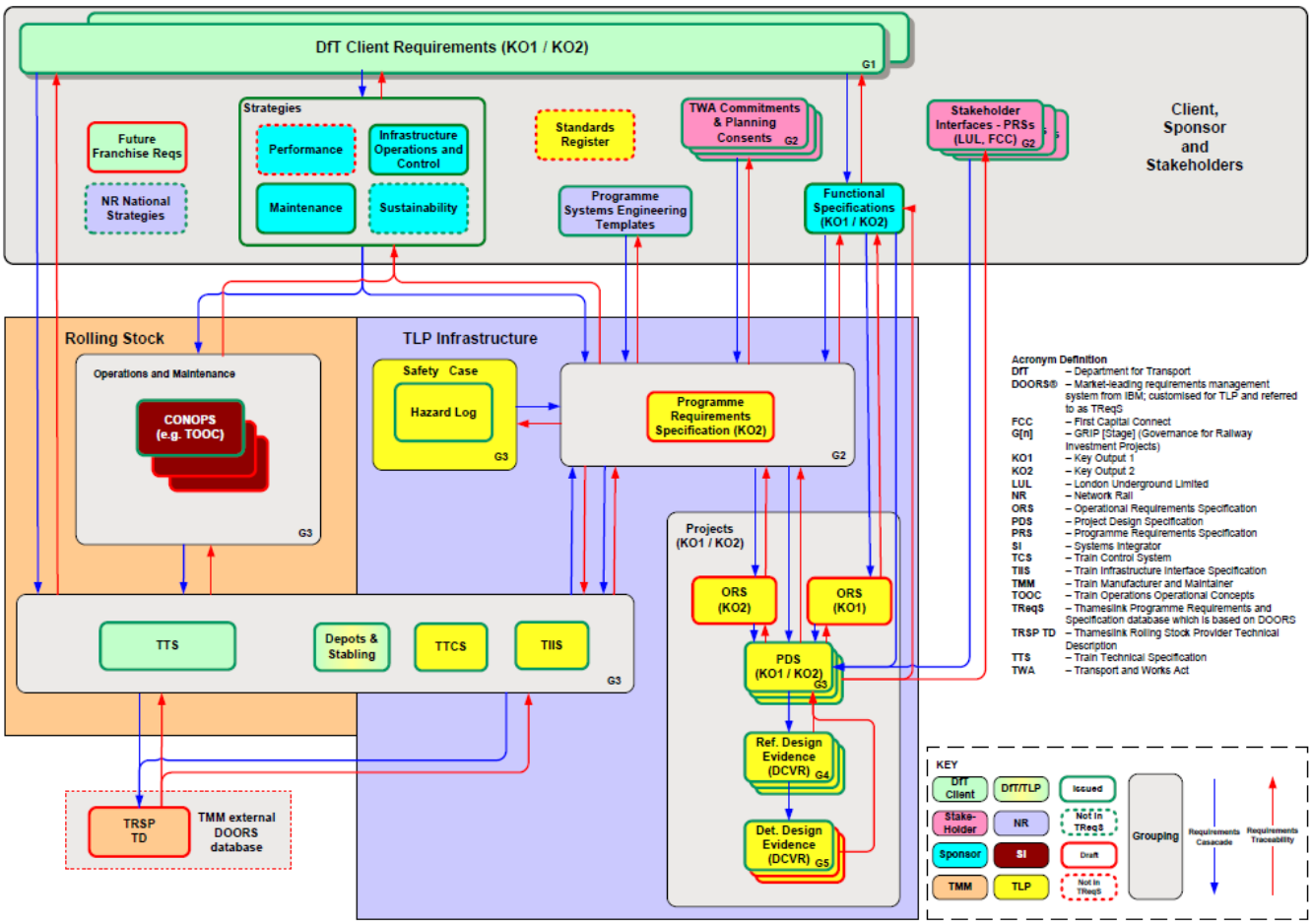
This case study looks at scope hierarchy and assurance reporting during the LBSR project. It also shares requirements management best practice, lessons learned and key recommendations for future infrastructure projects.

1. Scope Hierarchy

To understand the hierarchy of the project scope, the scope pyramid and chart below depict how the Project Design Specification (PDS) resulted from other pre-existing documents. These included the Client Remit from the DfT, the Functional Specification by the Sponsor in addition to Network Rail Standards, Engineering Requirements and Health & Safety Regulations.



TLP Requirements Document Hierarchy



2. Design Compliance Verification Reports (DCVR) and Engineering Validation Reports (EVR)

The LBSR project teams produced Design Compliance Verification Reports (DCVRs) to assure their work by progressively capturing PDS compliance through the design stages. Evidence was built up through each construction stage-works to contribute towards the final overall DCVR which provided a good basis for the Design Review Panel (DRP) to make an informed decision for the GRIP 5 Stage Gate Review.

Central Engineering's Principal Programme Engineer, Derek Price, agreed that DCVR (N420-NRT-REP-PD-000024) was a good example: *"Within 30 minutes the reader gets a clear statement of the degree of compliance of the entire London Bridge station design with the PDS and can quickly find compliance evidence against key requirements of interest. There has been a consistent, precise approach to dealing with partial compliance which gives a lot of confidence. Record keeping of compliance evidence appears excellent and gives a really strong foundation."*

In the same way, the stage Engineering Validation Review (EVR) reports issued after Engineering Validation Review Panel (EVRP) meetings show how the construction and installation meet all the stakeholder requirements and allow for independent technical peer review to be undertaken by Central Engineering. This offers the sponsor a high level of confidence at the sponsor reviews and GRIP Stage Gate Review Panels. This principle is recognised by the wider company and is being adopted as part of the national roll-out of the Integrated Engineering Life Cycle (IELC).

3. Best Practice

- Use of the *T-Reqs* Thameslink Requirements System – a DOORS based system of configuration management for capturing various elements of the scope of works (process, assumptions and core requirements). *T-Reqs* was useful in managing change control, baselining and removing, modifying or replacing requirements. Use of DOORs provided information on impact assessment, history and traceability to inform change panel decisions.

- DCVR usually linked to GRIP stages 3-5 for the validation of design outputs and assumptions prior to stage gate review (SGR). EVR process and EVRP meetings linked to GRIP stages 6-8 but expanded during GRIP 6 to capture interim construction phases.

- Delegated authority from the route to TLP Central Engineering for the assurance and approval of deliverables. The capability and maturity of resources (steady personnel) within the requirements team of central engineering provided consistent support to the project teams. Also, a well-resourced development team within LBSR were committed to the process and provided a lot of confidence to the sponsor.

- Included in the contract document (Technical Work-scope) was a clause specifying that the contractor provide traceability between the design and PDS (although note there was no similar specific obligation for providing traceability between the constructed works and PDS).

- Periodic reviews like sponsor reviews, interim EVR and configuration stages proved very helpful as they were used to assure the project based on geographic location, disciplines, stages of work etc.

- The value of having DRP and EVRP prior to the SGR helped to validate the sponsor's business case. For instance, where PDS was not complied with, those involved had a buy-in to either change the requirement or accept the alternative solution/non-compliance.

4. Lessons learned

- The PDS was too specific with certain requirements and it became too difficult to achieve or evidence some of them. Two examples from the LBSR project included:

    - Advantrix charging points: The PDS could have specified that the project supported the required ticket technology instead of specifying a technology that was out of date by the time of implementation.

    - Number of lockers: No need to specify exact numbers – just specify that the locker provision should satisfy TOC, NR, BTP etc requirements (with a 'circa' figure if known). The project had to report partial compliances against exact locker quantities stated in the PDS even though the provision is acceptable to the end users.

- Conversely some requirements were too vague to be useful. An example was confusion around separate metering arrangements for electrical supplies and TOC accommodations blocks.

- Lack of confidence in the downstream process meant that some of the Network Rail standard requirements were repeated in the PDS, making evidencing time consuming for various construction phases as there was no clear-cut requirements aligning to specific delivery phase.

- Progressive assurance was good, but it would have been better to tie the construction strategy to some subset of the requirements to provide more transparency – requirements specific to each stage could have been identified, so that it was immediately clear how each construction stage complied with the PDS.

- If progressive assurance was built in upfront most of the assurance challenges at the latter end may have been avoided. There were some challenges in locating compliance evidence from the start of the works, before the rigour required for progressive assurance became more fully understood.

- Being delivery focused at the earlier stages without the end in mind (with assurance processes that accompany it) poses a threat to evidencing and final handback at later stages.

5. Key recommendations for future projects

1. Start the requirement capturing on a clean sheet and integrate the inputs from diverse stakeholders - the scope may not be sufficiently developed at the project initiation.

2. Refer to the client remit, functional specification (FS) and programme requirement specification (PRS) as source documents to collate project level scope of works into the PDS or equivalent document.

3. Freeze the requirements or scope document at single option stage. The London Bridge Station PDS went through many revisions until it was finally frozen at GRIP stages 3 – 4. Thereafter it was subject to formal change control as appropriate eg to capture significant changes to the retail scope in the station.

4. The LBSR team came to view the scope as defined by the PDS requirements, even though the PDS did not cover everything required to be delivered by the project.

5. Make substantial investment in solid information management systems and document control because they are very useful in managing requirements process.

6. Changes in scope through value engineering should incorporate operational sign off not just limited to cost and engineering/design considerations.

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Further information

For more information on this Learning Legacy case study please email **contact@thameslinkprogramme.co.uk**