



Traceability for London Underground Ltd Track Standards

In March 2001 the LUL (London Underground Limited) Board directed the Policy Review Group (PRG) to develop a coherent suite of policies consistent with the LUL document hierarchy. This work was considered necessary in that much of what could be defined as LUL Policy was not stated, presented within Standards, or sitting within Board papers as historical decisions. By making LUL's policies explicit and clearly stated at the top of LUL's document hierarchy, they create an auditable trail down through the document hierarchy through Standards and procedures into the implementation environment.

The work of the PRG is part of the overall review of the document hierarchy entitled Phase 3 Project. All LUL's Standards were reviewed to ensure they fitted with the PPP Contract, eradicated inconsistency, error and avoided duplication. The involvement of rcm² limited in this process (Dec 2002 – Date) was to provide DOORS[®] expertise for the Infrastructure Systems Team (IST) dealing with 210 Track Standards.

Our consultants were responsible for aiding the formation and compilation of the new Track Standards using Dynamic Object Orientated Requirements System (DOORS[®], a registered trademark of Telelogic AB). A key strength of DOORS[®] is its ability to create, import, export and publish sets of requirements as documents. Furthermore it allows the processing of individual statements in those documents as valuable items of data for the purposes of change management, version control and traceability making it the tool of choice for this project.

Our consultants' primary roles were as DOORS[®] Engineers. They were tasked with administering and supporting the DOORS[®] database for the Track Engineers. They developed tools to improve its ease of use and functionality, extracting information and presenting data as required.

The existing Track Standards were in PDF and Microsoft Word formats. These had to be converted to Word and formatted according to a specification to ensure they were correctly represented as DOORS[®] modules when they were imported. Our consultants managed this and were also responsible for configuring the modules (imported documents) intended for analysis by the Track Engineers. To ease this analysis the DOORS[®] Engineers developed a graphical tool (Figure 1). This allowed the Track Engineers to analyse the documents and set attributes without having to know the inner workings of DOORS[®] or its development language, DXL (DOORS[®] eXtensible Language) in preparation for disaggregation.



The screenshot shows a software window titled "Analysis Tool for Existing Standards - DOORS". It contains several sections:

- Object ID:** 1
- Object Heading:** [Empty field]
- Object Text:** Adjustment and expansion switch maintenance
- Existing Category:** Reset to default
- Existing Rationale:** [Empty field]
- Existing Justification:** [Empty field]
- Table:** A table with columns 'Type', 'Reference', and 'Details'. It is currently empty.
- Competency:** [Unchecked checkbox]
- Concession / Inclusion / Query:** [Unchecked checkboxes for Concession, Inclusion, Query]
- Destination Category:** Reset to default
- Risk Priority:** Reset to default
- Life Cycle:** [Empty field]
- Destination:** [Empty field]
- Approved Items Register:** Reset to def
- Procedure:** Reset to default
- Technical Specification:** Reset to default
- Required Interfaces:** [Empty field]
- Other Required Interfaces:** [Empty field]
- Justification for Change:** [Empty field]

 Navigation buttons at the bottom include Previous, Next, Same as Previous, OK, Close, and Apply.

Figure 1: DOORS-based ‘Analyse Existing Standard’ form

In DOORS® it is possible to represent all the information or a selection of the information in many different ways using Views. These Views were created automatically using DXL. Multiple views were created for the client to assist in the elicitation of information and structure when preparing the Case for Standards. Track Engineers and Project Managers were trained in how to use the tools that had been developed. They were also given some training with DOORS® in order for them to be in a position where they can maintain the new Track Standards in DOORS® themselves. rcm² provided suitable documentation, in terms of user manuals and maintenance manuals for both its consultants and the client’s employees.

In summary, rcm² consultants have analysed our client’s requirements and produced results according to their needs. All deliverables have been met, including:

- 210 Track Standards, procedures, specifications and handbooks imported into DOORS®
- 39 new Track Standards resident in DOORS®
- Track Engineers trained in using DOORS® and tools provided by rcm²
- Documentation for Track Engineers (for using DOORS® and tools)
- Ongoing support to Track Engineers and Project Management

rcm² limited helped to deliver the IST part of the project on time and within budget. Their expertise, combined with the tools they developed enabled the Track Engineers to utilise the DOORS® database without prior knowledge and little training and accomplish the creation of the new Track Standards. The final solution is a coherent suite formed of 39 new consistent standards that are maintainable and updateable through DOORS® and the tools developed by rcm² consultants.