



IBM Software

# UK Innovate 2010

The Rational Software Conference

Smarter software for a smarter planet.



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**UK Innovate2010**

The Rational Software Conference

# DOORS & DWA Influencing Railway Enhancements

Neal Marriott

**NetworkRail**



Smarter software for a smarter planet.



# Neal Marriott

22 yrs service – RN Submarine Service

Sizewell B Power Station

Rolls Royce/ BAE Systems - Astute Class Submarine Programme

Network Rail – WCRM/Enhancement Engineering



# Integrated Delivery



# Discussion

The Early Days:

History

Mid Term:

Current Approach and Application Development

Into the Ether:

Future Implementation, Web Benefits & Advantages of DWA



# The Early Days



# History

DOORS first introduced into Network Rail (nee Railtrack) during the West Coast Route Modernisation (WCRM) programme.

Initial purchase consisted of approx 22 concurrent licences.

Employed to demonstrate satisfaction of the Functional Specification.

Conscientious decision to formalise requirements management within the area of railway enhancements.



# History

Identified the need to further develop Requirements Management.

Intent to develop the User Base resulted in an Enterprise Agreement being entered in to giving concurrent access to a defined set of Telelogic Applications:

DOORS  
Doc Express  
(RPE)  
DOORS Net  
DOORS Analyst

Synergy/CM  
Synergy/Change  
SA  
Focal Point\*  
Tau\*





# History

The engineering function has learnt the need for:

Remit Development

Requirements Management

Managed Change Control

Proof of Compliance



# Restrictions of Contract

Inability to permit 3<sup>rd</sup> Party Contractors to the corporate data community thereby having a major impact with respect to Requirements challenge  
Proving compliance.



# Mid Term



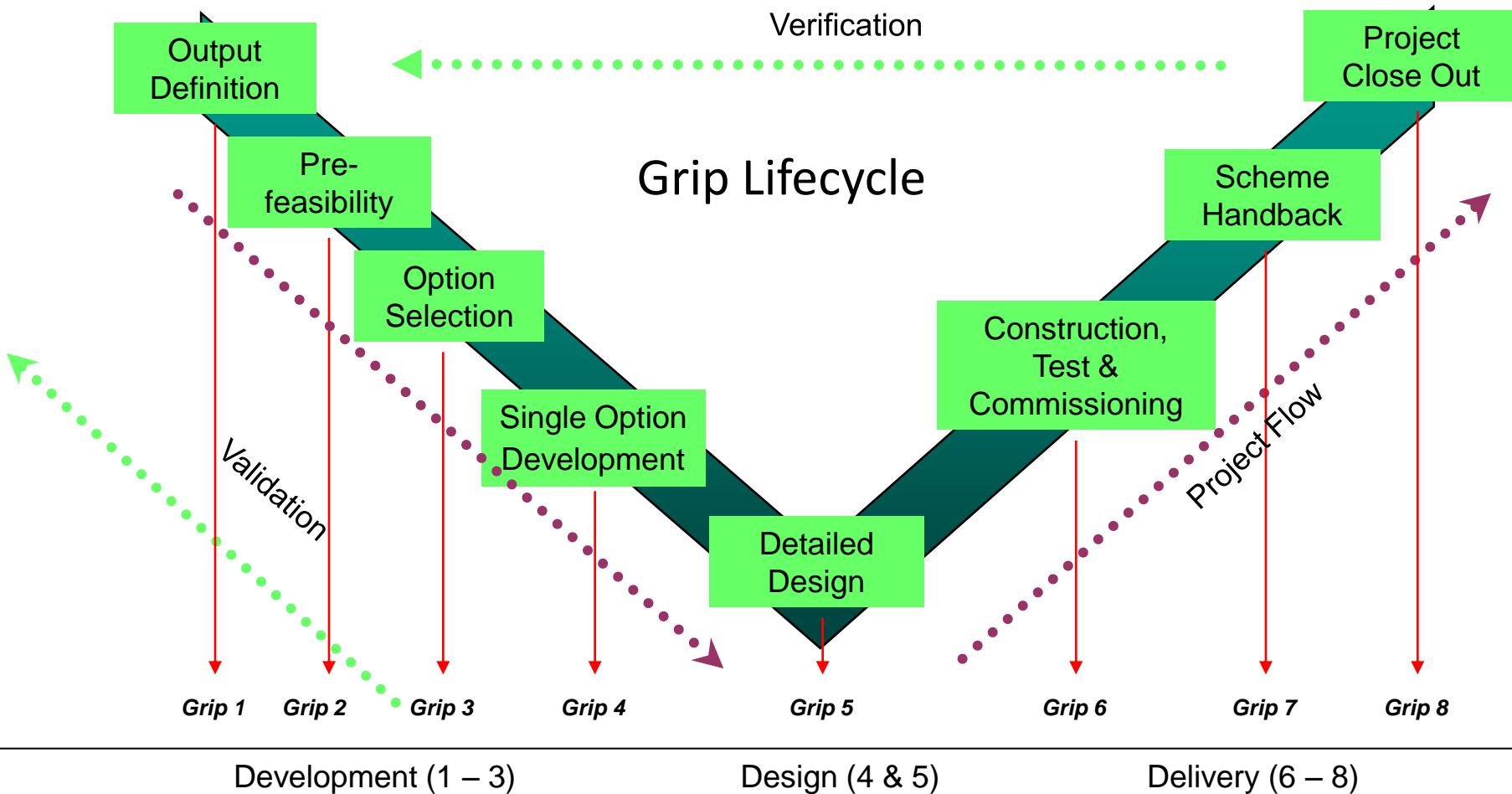
# Intent

To develop a company wide approach to Requirements Management that supports the programme/project environment.

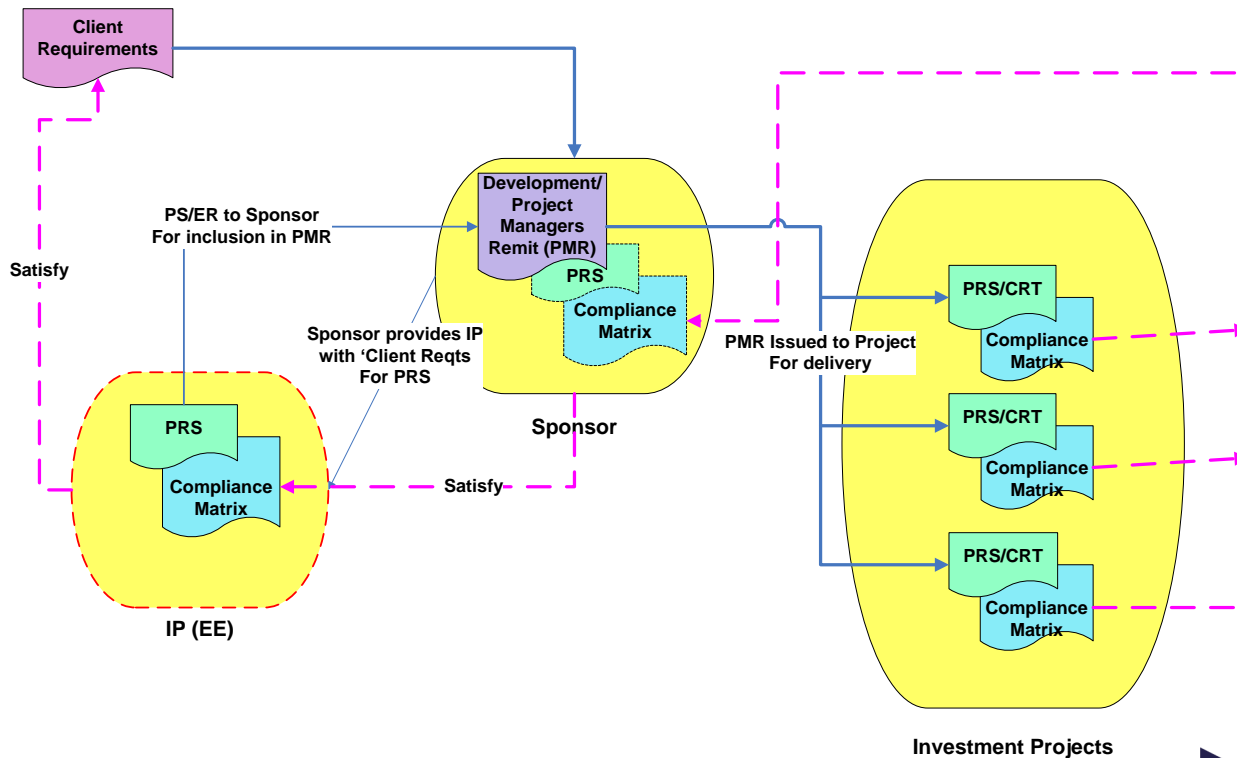
Use RPE to develop a standard format of remit documentation

Introduce Work Breakdown Structure methodology whilst being supportive of the Network Rail's Guide for Railway Investment Programmes (GRIP) process.





# What is Anticipated (Larger Programmes)



# DOORS & DWA

How the DOORS application has evolved within Network Rail?

DOORS Web Access concept & how to assist programme/project teams deliver compliant solutions?



# Requirements Management

## Concept:

Utilise a generic set of templates and requirements to deliver Requirement Specifications on an iterative basis throughout the lifecycle.

Challenge and manage change to requirements accordingly.

Implementation and development of standard processes.

Application of major & minor baselines.

Progressive capture & management of engineering company standards within the DOORS environment.





# Projects Using DOORS

Thameslink

Crossrail

Edinburgh Glasgow Improvement Programme (EGIP)

Aberdeen to Inverness

Southern Power Upgrade

GN/GE (Great Northern/Great Eastern)

Intercity Express Programme (IEP)

NLRIP

Reading Station

Waterloo Re-Development

Northern Hub

Modular S & C

SCADA



# Training Material

Uniquely developed to support the engineering community needs and addresses:

- Basic DOORS User Training
- Engineering Process
- Requirements Management Training
- Remit Training for Engineers



## In the Near Term

Continue the growth of DOORS usage within the engineering community.

Develop single format document templates with which to export requirements to.

Upgrade to the current version of DOORS and System Architect.

Conduct a study to understand benefits of moving from Citrix to Net environment.

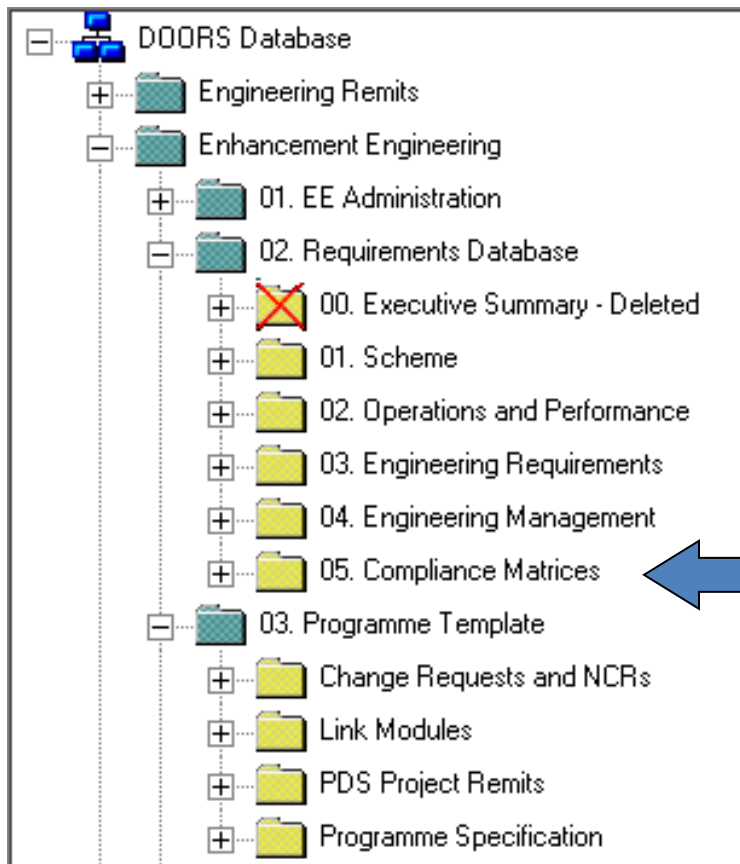
Deliver DOORS functionality via DWA and migrate users to this environment.



# Right First Time



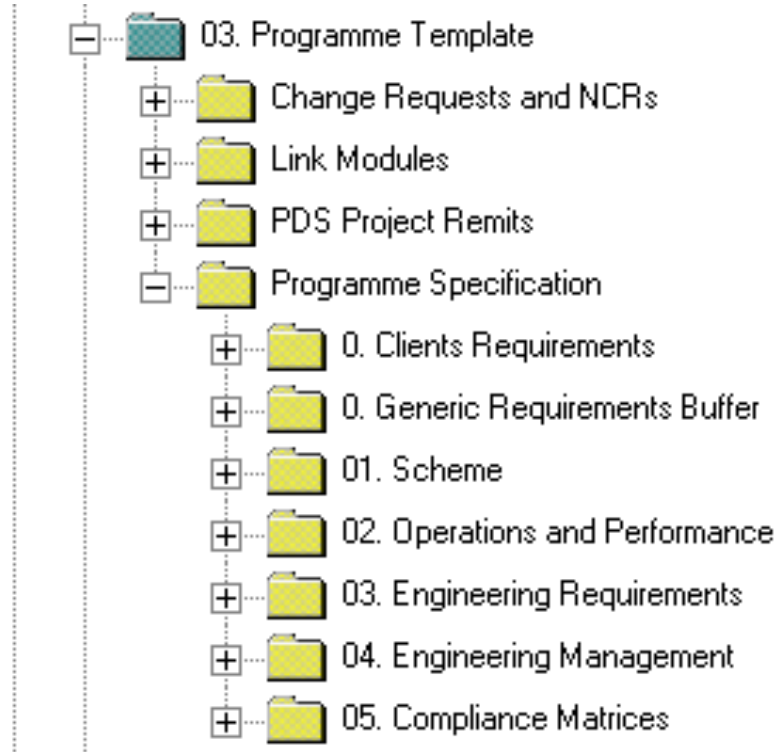
# Structures



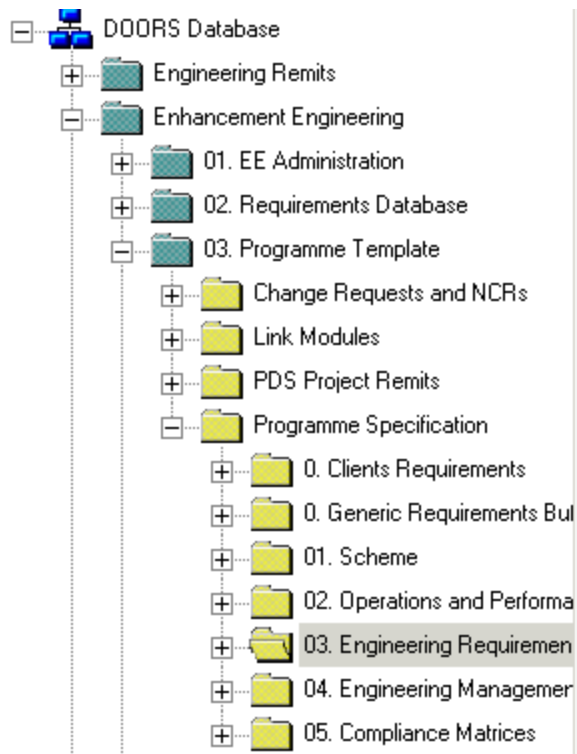
Currently either:  
Exported in MS Excel and linked back to parent.  
Completed direct into the system



# Structures



# Structures



Name	Type	Description
02. Trains	Folder	Train Infrastructure Interface Specific...
03. Cross Discipline Engineering R...	Folder	Cross Discipline Engineering Require...
01. System Engineering Requirem...	Formal	System Engineering Requirements
04. Electromagnetic Compatibility	Formal	Electromagnetic Compatibility Require...
05. Electrification	Formal	Electrification Requirements
06. Plant	Formal	Plant Requirements
07. Signalling and Control	Formal	Signalling and Control Requirements
08. Telecoms	Formal	Telecoms Requirements
09. Track	Formal	Track Requirements
10. Civil and Structural Engineering	Formal	Civil and Structural Engineering Requi...
11. Stations and Buildings	Formal	Stations and Buildings Requirements
12. Level Crossings	Formal	Level Crossing Requirements
13. Ergonomics	Formal	Ergonomic Requirements
14. Environment	Formal	Environment Requirements
15. Depots - EMPTY	Formal	Depot Requirements



# Structures

Formal module '06. 106982 - EGIP/Programme Specification/03. Engineering Requirements/08. Telecoms' current 1.0 - DOORS

File Edit View Insert Link Analysis Table Tools User DocExpress Network Rail WEXP West Coast Kitchen Help

Edit All levels

Ref	3.8 Telecoms	Text Type	GRIP Stage	Applicable Project
106982TEL-30	<b>2 Telecoms Bearer Network</b>	Heading	All	<ul style="list-style-type: none"> <li>0. - Programme Wide</li> <li>1.1 - Queen Street</li> <li>1.3 - Croy</li> <li>1.4 - Greenhill</li> <li>1.6 - Winchburgh Junction</li> <li>1.7 - Winchburgh to Dalmeny</li> <li>1.8 - Dalmeny Chord</li> <li>1.9 - Haymarket to Inverkeithing</li> <li>1.10 - Waverley</li> <li>1.13 - Haymarket Improvements</li> <li>2.1 - Greenhill to Dunblane</li> <li>2.2 - Stirling Stabling</li> <li>2.4 - Dunblane</li> <li>3.1 - Finnieston Turnback</li> <li>3.2 - Bellgrove</li> <li>3.3 - Garmgad</li> <li>4.2 - Rutherglen to Newton</li> <li>4.5 - Level Crossings</li> <li>4.6 - Motherwell</li> <li>5.1 - Gogar</li> <li>5.2 - E &amp; G Electrification</li> <li>6.1 - Signalling Control</li> </ul>
106982TEL-31	The bearer network comprises cable route, optical fibre and copper cables, and transmission systems.	Informative	All	



# Data Structure

IBM Rational DOORS Web Access User: Mark Best, Current language: English (United States), Package: Ed

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08. Telecoms Grip 2 Search...

Ref	3.8 Telecoms	Text Type	Applicable Project	History / CR Number	GRIP Stage	Generic Source Version	Clarification Required	Cl
106982TEL-29	FTN/GSM-R group. Co-locating systems reduces landtake and the need to provide separate services.	Informative			All	A01	False	
106982TEL-30	<b>2 Telecoms Bearer Network</b>	Heading	<ul style="list-style-type: none"> <li>0. - Programme Wide</li> <li>1.1 - Queen Street</li> <li>1.3 - Croy</li> <li>1.4 - Greenhill</li> <li>1.6 - Winchburgh Junction</li> <li>1.7 - Winchburgh to Dalmeny</li> <li>1.8 - Dalmeny Chord</li> <li>1.9 - Haymarket to Inverkeithing</li> <li>1.10 - Waverley</li> <li>1.13 - Haymarket Improvements</li> <li>2.1 - Greenhill to Dunblane</li> <li>2.2 - Stirling Stabling</li> <li>2.4 - Dunblane</li> <li>3.1 - Finnieston Turnback</li> <li>3.2 - Bellgrove</li> <li>3.3 - Garngad</li> <li>4.2 - Rutherglen to Newton</li> <li>4.5 - Level Crossings</li> <li>4.6 - Motherwell</li> <li>5.1 - Gogar</li> <li>5.2 - E &amp; G Electrification</li> <li>6.1 - Signalling Control</li> </ul>		All	A01	False	
106982TEL-31	The bearer network comprises cable route, optical fibre and copper cables, and transmission systems.	Informative			All	A01	False	

Attributes Discussio

Links

-User

Object Heading Telecoms E Network

Object Text

Object Short Text

0. - Progra Wide

1.1 - Quee

1.3 - Croy

1.4 - Greer

1.6 - Wind Junction

1.7 - Wind Dalmeny

1.8 - Dalm Chord

1.9 - Hayrr Inverkeithi

1.10 - Wav

1.13 - Hayr Improveme

2.1 - Greer Dunblane

2.2 - Stirlin Stabling

2.4 - Dunb

3.1 - Finnie Turnback

3.2 - Bellgr

3.3 - Garnd

4.2 - Ruth Newton

4.5 - Level

Applicable Project

# Compliance Extract

Formal module '06. 106982 - EGIP/Programme Specification/05. Compliance Matrices/Issue A01 Compliance Matrices/1.4 Greenhill Junction Compliance Matrices/3.10 Civil and St

File Edit View Insert Link Analysis Table Tools User DocExpress Network Rail WEXP West Coast Kitchen Help

export All levels

Ref	Head No.	Requirement	GRIP Stage	Compliance Statement	V and V Method	V and V Status	Evidence Ref
106982STR-26	2	<b>2 Bridge Design</b>	All	To be supplied by Project Team			
106982STR-28	2.1	<b>2.1 Bridge Design Standards</b>	All	To be supplied by Project Team			
106982STR-29		Bridge designs shall be in accordance with BS5400 Steel, Concrete and Composite Bridges. [2+]	2 3 4 5 6 7 8	To be supplied by Project Team			
106982STR-30		Loadings, design procedures and materials specifications given in BS5400 shall be interpreted and supplemented by recommendations for the design of bridges given in Approved Code of Practice GC/RC 5510. [2+]	2 3 4 5 6 7 8	To be supplied by Project Team			
106982STR-31		GC/RC 5510 references design standards and guidance contained in civil engineering industry publications that shall be used in the preparation of designs including: <ul style="list-style-type: none"> <li>relevant parts of the Design Manual for Roads and Bridges (DMRB) published by the Highways Agency</li> <li>publications of the International Union of Railways (UIC). [2+]</li> </ul>	2 3 4 5 6 7 8	To be supplied by Project Team			
106982STR-32		The technical specification for concrete bridges shall be based on Section 80 of NR/GN/CIV/008. [5+]	5 6 7 8	To be supplied by Project Team			
106982STR-33		The technical specification for steel bridgea shall be based on Section 90 of NR/GN/CIV/008. [5+]	5 6 7 8	To be supplied by Project Team			



# Compliance Extract

IBM Rational DOORS Web Access User: Mark Best, Current language: English (United States), Package: Ed

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3.10 Civil and Structural Engineering V and V

export Search...

Absolute Number	Ref	Head No.	Requirement	GRIP Stage	Compliance Statement	V and V Method	V and V Status	Evidence Ref	Issues	Owner
10	106982STR-26	2	<b>2 Bridge Design</b>	All	To be supplied by Project Team					
11	106982STR-28	2.1	<b>2.1 Bridge Design Standards</b>	All	To be supplied by Project Team					
12	106982STR-29		Bridge designs shall be in accordance with BS5400 Steel, Concrete and Composite Bridges. [2+]	2 3 4 5 6 7 8	To be supplied by Project Team					
13	106982STR-30		Loadings, design procedures and materials specifications given in BS5400 shall be interpreted and supplemented by recommendations for the design of bridges given in Approved Code of Practice GC/RC 5510. [2+]	2 3 4 5 6 7 8	To be supplied by Project Team					
14	106982STR-31		GC/RC 5510 references design standards and guidance contained in civil engineering industry publications that shall be used in the preparation of designs including: · relevant parts of the Design Manual for Roads and Bridges (DMRB) published by the Highways Agency · publications of the International Union of Railways (UIC). [2+]	2 3 4 5 6 7 8	To be supplied by Project Team					
15	106982STR-32		The technical specification for concrete bridges shall be based on Section 80 of NR/GN/CIV/008. [5+]	5 6 7 8	To be supplied by Project Team					
16	106982STR-33		The technical specification for steel bridgea shall be based on Section 90 of NR/GN/CIV/008. [5+]	5 6 7 8	To be supplied by Project Team					

Attributes Discusio

Links

-User

Object Heading Genera

Object Text

Object Short Text

Compliance Statement To be : by Proj Team

Discipline

Evidence Ref

GRIP Stage All

Issues

Owner

Statement last updated

V and V Method

V and V Status

V and V Type

-System

Absolute Number 6

Last Modified By Diane

Last Modified On Octob

Created By Diane

Created On Octob

# Training Documentation (Self Generated)

‘Super User’ via IBM training courses

Local:

Project User

Engineering Requirements Management System users

Scheme Design Specialists



# Into the Ether!!!



# Looking Ahead

Implement DWA into the corporate and Contractor communities.

Develop demonstrable compliance and therefore progressive assurance.

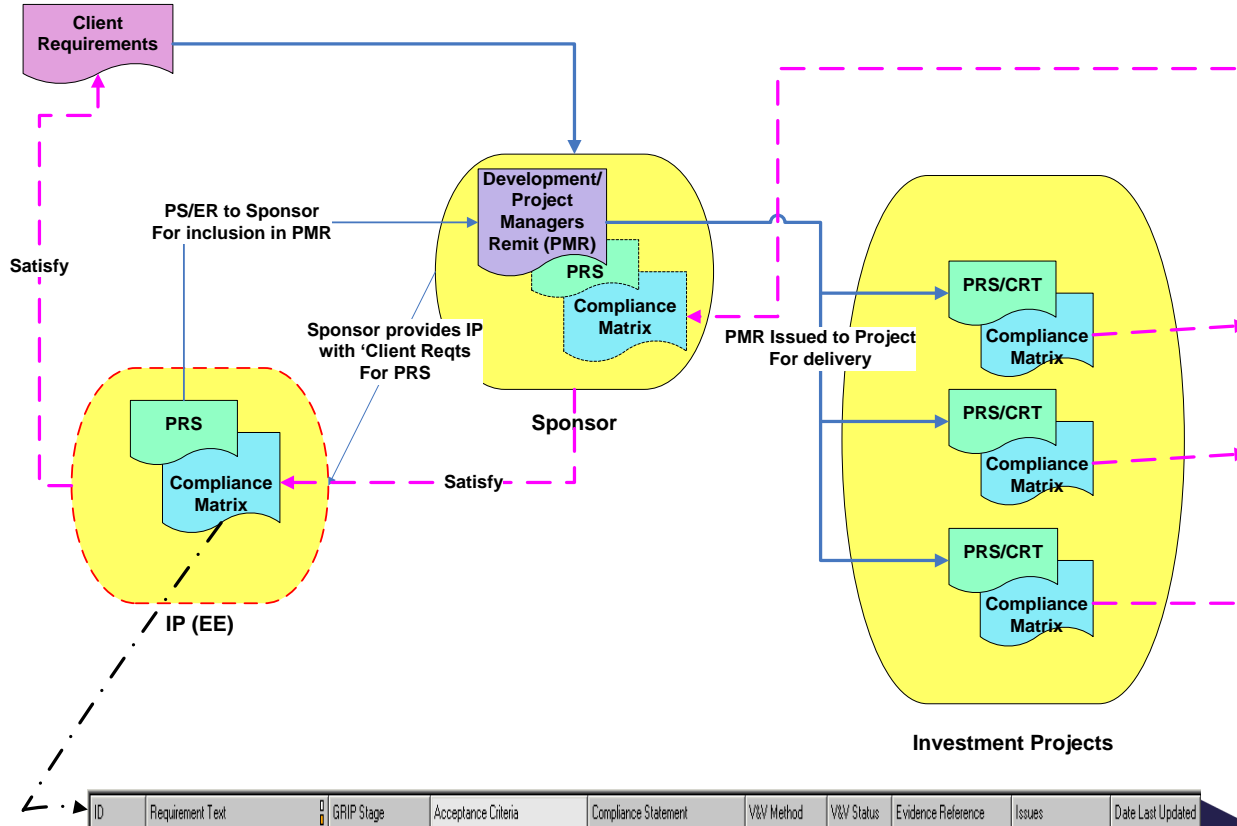
Introduce 'linking' as standard practice by engineers.

Deliver standard outputs from RPE.

Complete the capture of engineering standards.



# Compliance Expectations



# Web Benefits

## Consider – 2.5/3.5k Requirements/remit

The Outline Project Specification shall include the engineering requirements from this document.	Final Project Specification includes the engineering requirements	Document	Future Compliance	B0440500-04/SG.02a/0002 - V.1
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With no contractor access:

Export and re-capture in MS Excel?

Provide an accessible web based solution





# Advantages of Using Web Access

Contractors legally permitted to access NR DOORS environment  
Collaboration environment (Requirements challenge)



# Challenges for Deployment DWA

MS IE 8

DOORS 9.2+

IM Support

Citrix Benefits



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