D-4.3.3 End-to-End Testing Plan

Delivery Workstream

Ofgem Switching Programme

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Document Control

Revision History

Revision Date	Summary of Changes	Changes Marked	Version Number
n/a	For internal programme development. Not published.	n/a	V1.0
12/02/2018	Publication for DB3.	No	V2.0
25/07/2018	Minor change agreed in Change Request CR009 to update Figures 1 and 2.	No	V3.0
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Reviewer

Name	Title / Responsibility	Release Date	Version Number

Approvals

Name	Signature	Title / Responsibility	Release Date	Version Number
		TDA Chair	20/07/2018	V3.0

References

This document is associated with the following other documents:

Ref	Title	Source	Release Date	Version Number
[1]	"Delivering Faster and More Reliable Switching: Outline Business Case	Ofgem	tba	-
[2]	Switching Programme Testing Strategy	Ofgem	09/09/2017	-
[3]	D-4.3.3 E2E Testing Plan Product Description	Ofgem	-	0.5
[4]	Switching Design Repository (D-4.1.2 E2E Detailed Design Models)	Ofgem	-	Switching baseline Wave4 v1

Ref	Title	Source	Release Date	Version Number
[5]	D-4.1 E2E Switching Arrangements Design (comprising several sub-products)	Ofgem	tba	tba
[6]	D-4.2 CSS Design (comprising several sub-products)	SI Delivery Manager	tba	tba
[7]	D-4.1.10 E2E Security Design	Ofgem	tba	tba
[8]	D-5 Design Proving	SI Delivery Manager	tba	tba
[9]	CSS Interface Specification	SI Delivery Manager	tba	tba
[10]	Programme Plan	Ofgem	tba	tba
[11]	UEPT Scenarios	SI	tba	tba
[12]	D-4.3.4 E2E Transition Plan	Ofgem	tba	tba
[13]	D-4.3.6 E2E Data Migration Plan	Ofgem	tba	tba
[14]	D-4.1.9 E2E Switching Arrangements Service Management Strategy	Ofgem	tba	tba
[15]	Environment Plan	SI	tba	tba
[16]	D-4.3.2 E2E Integration Plan	Ofgem	tba	tba
[17]	D-8.2 Governance and Assurance Plan for DBT	Ofgem	tba	tba
[18]	Defect Management Plan	SI	tba	tba
[19]	SIT Plan	SI	tba	tba
[20]	UIT Plan	SI	tba	tba
[21]	D-4.1.4 E2E Switching Arrangements NFR	Ofgem	tba	tba

Table of Contents

1   Executive Summary

This document describes the approach to end-to-end testing for the Ofgem Switching Programme, which will deliver next-day switching as a new industry standard and improve reliability of the switching process through better management and oversight of industry data.

The document describes the major Phases of testing leading up to Go-Live:

- Pre-Integration Testing, where each component system (eg UK Link, supplier's system, shipper's system) is tested in isolation by its responsible Service Provider (SP) or Licenced Party;

- Systems Integration Testing, where first the components of CSS are tested together and then CSS is integrated and tested with the other Central Data Services (UK Link, MPRS, Smart Metering, DES/ECOES/MIS). CSS integration is carried out by the CSS Systems and Services Integrator (CSS SI) and integration of all the Central Data Services by the Core Systems and Services Integrator (Core SI) supported by the SPs, without the involvement of Licenced Party systems;

- User Integration Testing, where the Central Data Services are provided by the SI as a testing service (supported by the SPs), to which Licenced Parties may connect to conduct their own testing, including E2E switches between suppliers;

- Data Migration and Transition Testing, where the approach and tools for data migration and transition to live are tested by the SI, supported by the SPs;

- Operational Testing, where operational functions and processes are tested by the SI; and

- Live Proving, involving all parties including Licenced Parties and allows Ofgem to assess the readiness for live operation.

As a principle, Pre-Integration Testing for each CSS component must complete before CSS integration commences, CSS integration and Pre-Integration Testing for each Central Data Service component must complete before Systems Integration Testing commences and Systems Integration Testing must complete before User Integration Testing commences, unless otherwise agreed by the Programme Gating process. Data Migration and Transition Testing, Operational Testing and Live Proving may run concurrently with each other and with User Integration Testing.

A separate Plan will be produced for each of these Phases before the Phase commences by the party responsible for that Phase of testing, which will include details of the testing to be conducted and the entry and exit criteria. In the case of Pre-Integration Testing, a separate Plan will be produced for each of the Central Data Services (and a separate one for each component of CSS, if applicable) under the co-ordination of the SI function.

A CSS Simulator test tool(s) will be provided as a testing aid for Licenced Parties to install on their own systems, together with pre-defined test data and scripts which execute business scenarios. A Licenced Party wishing to conduct testing of its own against the Central Data Services or to connect to the Production environment will first be required to

demonstrate its system's capability by successfully completing a User Entry Process Test(s).

Providers of Central Data Services will be required to provide test environments, define tests and participate in testing and defect resolution for all of the above Phases.

A risk-based approach to testing will be adopted, with the depth and breadth of testing determined by the risk. The test coverage of each Phase will be demonstrated by the use of Requirement Traceability Matrices, where the controlling requirements for a Phase are listed and a mapping given to the relevant test cases.

2 Introduction

2.1 Context

This document sets out the manner in which all parties involved in the Ofgem Switching Programme will conduct testing during the Design, Build and Test (DBT) phase of the programme.

This E2E Testing Plan is based upon and supersedes the following document produced during the Blueprint programme phase:

- Switching Programme Testing Strategy [2].

This E2E Testing Plan is also informed by the following:

- D-4.3.3 E2E Testing Plan Product Description [3]; compliance of this Plan with the Product Description is shown above the Table of Contents;

- "Delivering Faster and More Reliable Switching: proposed new switching arrangements" Design Baseline 2 consultation document [1];

- Switching Design Repository (the end-to-end business model, held in the case tool ABACUS) [4]; and

- D-4.1 E2E Switching Arrangements Design [5].

This Testing Plan has taken account of the approaches to testing used in both Nexus and the Smart Metering Implementation Project (SMIP). The Testing Strategy and Product Description envisaged categorising testing as "formal" and "informal", as in SMIP. This distinction has not been made in this document.

The testing described in this document will be elaborated in further Test Plan documents. The testing will be divided according to its purpose into a number of Phases; one or more Plans will be produced for each Phase by the party or provider responsible for the Phase of testing (or for PIT, responsible for the system or service under test). Co-ordination and management of all CSS and CDS testing will be undertaken CSS and Core System Integrator (SI) and co-ordination and management of all Licensed Party testing will be undertaken by the E2E Systems Co-ordinator role.

2.2 Reviews and Approvals

This document was reviewed internally within the Programme. It was also circulated to industry parties for comment, via the Switching Programme Delivery User Forum. Comments were amalgamated, the document updated where relevant, and a response given in a Comment-Response Matrix.

This version of the document has been approved by the TDA and further changes will be made under change control.

2.3 Change Forecast

This document will be reviewed and, where applicable, updated when the following documents/information are available:

- Final version of the Outline Business Case document [1];

- Approved version of Switching Design Repository [4];

- Approved version of D-4.2 CSS DesignD-4.1 E2E Switching Arrangements Design [5].

- Final definition of the CSS solution architecture and technology (as part of CSS procurement); and

- Final definition of the Core Systems and Services Integration Approach and Plan (as part of the SI procurement).

Ofgem will own this document and keep it up to date. Each new version supersedes the previous version in its entirety.

Updates to this document will follow the review and approval process outlined above.

2.4 Assumptions and Terminology

A number of factors relating to testing are yet to be finalised within the Switching Programme. Assumptions have been made in this document, which may be revised in later versions. They are as follows:

- The Centralised Switching Service (CSS) will consist of more than one component. The number of components will depend on the solution procured and since this is not yet known, the assumption has been made that there will be a separate component for each of: the network, the premises address database, the central system which manages the switching, the customer enquiry service and the service management function. It is assumed that a different Service Provider (SP) will be engaged for each one and that integration of these components will be done by the Systems Integrator. CSS will be procured by the CSS Procurer and Manager (referred to as SI Delivery Manager). When the approach has been confirmed, this document will be updated to reflect it.

- The Programme will have a CSS and Core Systems Integration (SI) function, procured and managed by the SI Procurer and Manager. There are two roles associated with this function: the first covers integration of the constituent

components of CSS and the second the integration of the CSS components with the existing Central Data Services. This document generally refers to them collectively as the "SI". Where necessary, a distinction is made between the "CSS SI" and the "Core Systems SI". The SI will be responsible for Data Migration (but will not cover data cleansing and transformation carried out by Licenced Parties).

- There will be a Quality Assurance (QA) function, encompassing two different aspects of assurance - design assurance and test assurance. The QA function will be provided by more than one organisation. This document refers to:

    o For design assurance, the "Switching Design Assurance Team" which will be part of E2E Systems Co-Ordination and Programme Assurance (E2E Co-Ordinator); and

    o For test assurance:

        - the "Core Systems Test Assurance Team" which will be the responsibility of the SI Delivery Manager; and

        - the "Licenced Party Assurance Team" which will be the responsibility of Ofgem.

- There will be a function which manages the day-to-day running of the E2E Switching Solution, once it is in live operation, together with operating and managing the CSS. This document refers to such a function as the "Switching Operations Team".

- There will be a Programme gating process, including identification of the gates and the governance around a gate, which will be established and managed by the Ofgem E2E Co-Ordinator.

- Licenced Parties will be required to conduct a User Entry Process Test to demonstrate their systems' ability to interact correctly with CSS and the other Central Data Systems and Services.

- There will be enquiry services for Licenced Parties to access market data; this document refers to these services as ECOES and DES. However, the services may be provided by a single, amalgamated Market Intelligence System (MIS) if this is developed in future.

This document uses the term "E2E Switching Solution" to describe the systems and services which provide the new E2E Switching Arrangements. A Licenced Party is an industry party (supplier, shipper or network operator) who is not an Agent or a MAP. Central Data Services are those systems/services which provide the central infrastructure underpinning the E2E Switching Solution: CSS, ECOES, DES, UK Link, MPRS and Smart Metering (DSP). The party responsible for provision of each of these is termed a Service Provider (SP).

2.5 Summary of Changes

The changes made since the previous version are summarised below:

- Comments raised by the TDA at their review meeting on 29 January 2018.

3   Objectives

The objectives of this Plan are to:

- define the testing and assurance activities necessary to demonstrate that the end-to-end Switching Solution meets the requirements set out in the consultation document, the Design Repository and the Solution Architecture;

- mitigate the risks of poor quality components and systems being introduced into live operation;

- ensure that the level of testing assurance meets the requirements of key stakeholders (including Licenced Parties);

- establish the governance arrangements for the testing assurance activities;

- identify the responsibilities and obligations of those involved in testing; and

- act as the primary point of reference for all testing and testing assurance questions, with further details being provided in the individual Test Plan documents relating to each Test Phase.

4   Scope

4.1   Introduction

The Ofgem Switching Programme will deliver next-day switching as a new industry standard and improve reliability of the switching process through better management and oversight of industry data. It will introduce a new, flexible, CSS for gas and electricity switches.

The following diagram shows the systems which comprise the end-to-end Switching Solution. With the exception of CSS, all the systems identified exist currently. The systems which provide Central Data Services are coloured blue and will undergo significant change as part of the Switching Programme. Licenced Party systems which will be subject to significant change are shown in yellow and Agent and MAP systems (which will be subject to limited change) in green. Those systems shown in white are indirectly linked to the Switching Programme and will not change. The Electricity Central Online Enquiry Service (ECOES) and Data Enquiry Service (DES) are shown individually, as they currently exist, although it is possible these will be merged into a single MIS.
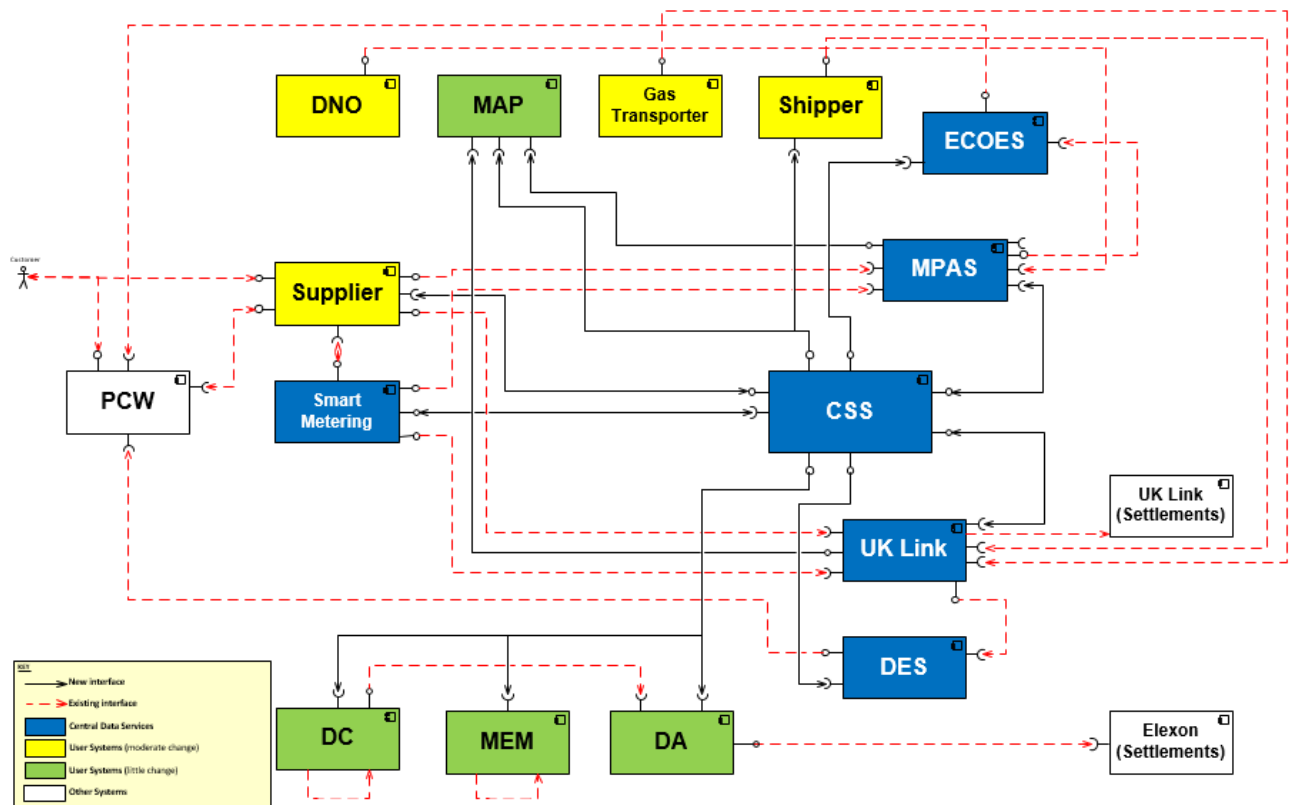
Figure 1 - Switching Programme Constituent Systems, both new and existing

The scope of testing described in this document covers all testing up to the point of go-live. Facilities for enduring testing post-go-live will be covered elsewhere.

Principles underpinning the way in which testing will be conducted are:

- Changes to a system will first be tested on that system in isolation by the responsible provider;

- A CSS Systems Integration Function (CSS SI) will conduct the integration and testing of the components of CSS;

- A Core Systems Integration Function (Core SI)[1] will conduct the integration and testing of existing systems with the CSS by:

  o Testing the integration of the Central Data Services (using test stubs to replace Licenced Party and Agent/MAP interactions);

  o Testing the data migration and transition strategy on Central Data Services; and

  o Providing a testing service for Licenced Parties, where Licenced Parties may connect and test against Central Data Services. An obligation will be

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[1] Note that the Core and CSS SI may be provided by the same party.

placed on each Licenced Party to provide evidence of its organisation's and system's readiness to connect to the testing service.

- The SI and the Switching Operations Team will together conduct operational testing of the system prior to go-live; this will include at least one full end-to-end rehearsal, involving all Central Data Services and as many Licenced Parties as possible.

This document describes how these principles will be applied. The level of detail is consistent with that of the Joint Test Strategy used successfully in the SMIP and is intended to contain enough information for the subsequent Test Plans for the individual Test Phases to be constructed.

4.2 Test Phases and Stages

The testing has been divided into a number of Test Phases to support the above principles. Each Phase may have more than one constituent Test Stage(s).

The proposed minimum set of Test Phases and Stages is:

- **Pre-Integration Testing** (PIT), conducted by the provider responsible for the relevant system (the Service Provider) or the Licenced Party and comprising:

  - **System Testing**, where each new or changed system in the E2E Switching Solution is tested individually for compliance with its functional, non-functional and technical/design requirements; and

  - **Interface Testing**, where each system is tested against a CSS Simulator test tool provided within the Switching programme, to verify the system's interface to CSS.

- **Systems Integration Testing** (SIT), which comprises:

  - **CSS Integration**, where all components of the CSS solution are integrated and tested for compliance with the overall CSS functional, non-functional and technical/design requirements by the CSS SI; and

  - **Central Data Services Integration**, where CSS, MPRS, UK Link, ECOES, DES and Smart Metering are integrated. Together, the systems and their interfaces are tested for compliance with E2E functional and non-functional requirements, using pre-defined E2E business scenarios. The testing is managed by the SI and executed jointly by the SI and all Service Providers responsible for Central Data Services.

- **User Integration Testing** (UIT), where testing is conducted by Licenced Parties against the Central Data Services provided as a testing service by the SI, and comprises:

  - **User Entry Process Testing** (UEPT) to verify the Licenced Party's fitness to connect to CSS, as well as that of its MAPs and Agents; and

- **End-to-End Testing**, where the End to End service interactions are tested and Licenced Party conducts any other testing it wishes, to verify its own system.

- **Data Migration and Transition Testing** (DMT), which verifies the approach to data take-on and the planned transition into live operation and is conducted by the SI;

- **Operational Testing** (OT), where operational functions and processes are tested, and is conducted by the Switching Operations Team, supported by the SI;

- **Live Proving**, which verifies the set-up of the Live system and allows Ofgem to assess the readiness for go-live of the Central Data Services/processes and Licenced Party systems and processes. This is conducted by the SI with the support of the SPs and Licensed Parties and comprises:

  - **Production Acceptance** (to check basic system configuration and function and data population);

  - **Pre-Live Stability Testing** (to do a final check of the stability of the system by conducting a full regression test);

  - **Business Continuity/Disaster Recovery** (BCDR) (to verify continued E2E Switching Arrangements function in the event of a disaster/recovery and involves the Switching Operations Team);and

  - **Live Rehearsal** (to assess readiness for go-live and includes Licenced Parties).

Each Phase is described in detail in the following sections.

4.3 Testing within a Phase

Each Phase will comprise a number of different types of testing:

- Functional;

- Non-functional, comprising:

  - Performance;

  - Load;

  - Resilience; and

  - Security.

- Regression; and

- Acceptance.

Some aspects of security testing, such as penetration testing of the environments, will be scoped and managed by the Switching Security Team. Other aspects, where the security

requirements impact the functional or non-functional characteristics of any of the Central Data Services, such as the need for Threshold Anomaly Detection in CSS, will be tested in the relevant Phase by the SP responsible for the Phase, according to this Plan. The definition of those tests which will be conducted by the Switching Security Team and will be contained in the Test Plan for the Phase.

Regression testing would be expected to be automated as far as is reasonable.

The way in which these types map to the Phases is shown in the table below.

Test Type \ Test Phase	PIT	SIT	UIT	OT	DMT	Live Proving
Functional	✓	✓	✓	✓	✓	✗
Non-Functional	✓	✓	✗ [1]	✗	✓	✗ [1]
Regression	✓	✓	✓	✓	✓	✓
Acceptance	✓	✓	✓ [2]	✓	✓	✓

Table 1 - Types of testing in each Test Phase

[1] There is no non-functional testing in these Phases, but security testing (such as penetration testing) *of the environment* will take place.

[2] Acceptance in UIT is UEPT

5   Pre-Integration Testing

5.1   Introduction

The purpose of PIT is to validate each new or changed system in the E2E Switching Solution individually for compliance with its functional and technical requirements, including its interfaces to other E2E Switching Solution systems.

PIT will be carried out on each system in isolation, on a system-by-system basis. The relevant Licenced Party or Service Provider will be responsible for its own PIT.

Each Licenced Party will be expected to carry out PIT on its own system in keeping with good industry practice and according to the CSS Interface Specification [9]. The Licenced Party will produce a PIT Plan and Test Completion Report and Acceptance Test Completion Report, which can be assured by the Licenced Party Assurance Team. The CSS Simulator tool supplied by the SI will be made available to Licenced Parties as a testing aid.

Each SP of a Central Data Service will conduct PIT in accordance with this Plan, including supporting the test assurance process, as described in section 14 - Test Assurance. In

the case of CSS, its constituent sub-systems will each be tested individually in PIT and integrated to form CSS as the early part of SIT. The currently assumed constituent components are:

- Registration service;

- Address service;

- Communications network;

- Customer Enquiry Service; and

- Service management service.

Each SP will conduct testing of its own system ("System Testing"), for which it will provide any test tools necessary. System Testing will include:

- Functional Testing;

- Non-Functional Testing:

    o Performance;

    o Load;

    o Resilience; and

    o Security.

- Development and execution of a Regression Test Pack; and

- An Acceptance Test.

The Service Provider will then conduct Interface Testing, using the CSS Simulator, a test tool provided by the Switching Programme. The CSS Simulator will be installed on the Service Provider's own test environment and will simulate the actions of CSS with respect to that particular system. For example, for MPRS testing, the CSS Simulator will send out a notification of a secured switch and will correctly respond to provision of updated agent details. The CSS Simulator will have a pre-defined set of scripts (including pre-set test data), which the Service Provider will run. The CSS Simulator will also be provided to Licenced Parties, if requested, to facilitate their PIT testing. The CSS Simulator will be able to be used by suppliers as well as agents. The diagram below illustrates the use of the CSS Simulator in the context of a supplier's testing.
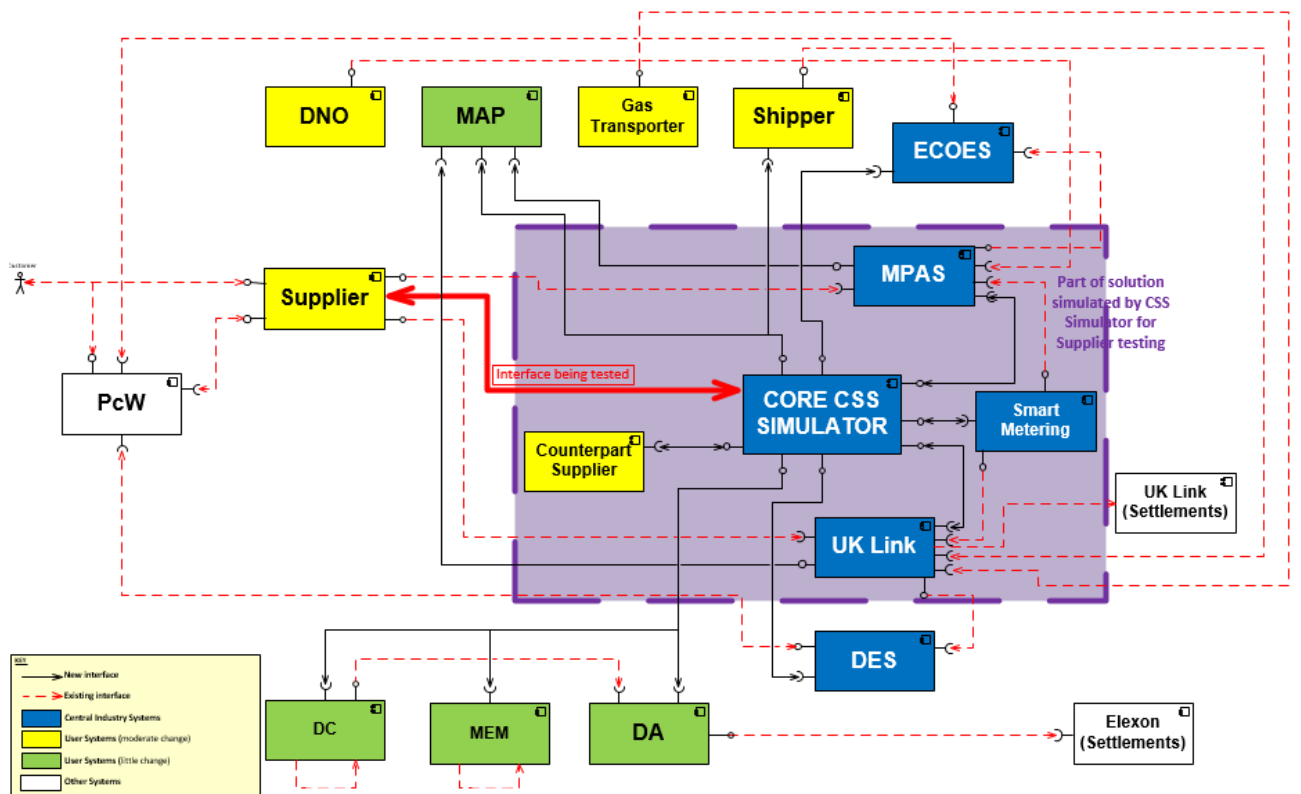
Figure 2 - CSS Simulator use in supplier testing

5.2 System Testing

5.2.1 Scope

A single System within an existing or new provider organisation may have many constituent sub-systems. Each sub-system will each undergo some form of Unit and Link Testing, before integration to form a coherent System ready for System Testing.

The approach used will be determined by the relevant SP, will follow relevant industry standards, and will be described in the PIT Plan. It will also:

- Show how Unit and Link Testing demonstrate compliance with the Technical Specification, including testing of negative and edge cases.

- Show how System Testing demonstrates compliance with the CSS Interface Specification [9] and with the relevant Functional Specification and relevant non-functional requirements.

- Define the testing to be carried out, including

    o Functional (including functional security controls)

    o Non-Functional to a level appropriate to the capability of the solution, and the features of the test environment being used:

        ▪ Performance;

- Load

- Resilience; and

- Security.

  o Development and execution of a Regression Test Pack; and

  o An Acceptance Test

- Describe the goods-in testing to be carried out where a sub-system is supplied by a third party. This testing process also applies to Test Stubs, test environments and Devices.

- Follow the process laid out for Quality Gates Reviews; and

- Comply with the overall testing timescales.

5.2.2 Inputs and Outputs

The inputs are the requirements on which System Testing is based and will be described in the PIT Plan. They will include the following, which does not include responsibility or accountability for assurance. The column for Ofgem includes any agents or advisors appointed by Ofgem:

Input	Service Provider	SI	Ofgem	Licenced Party
CSS Interface Specification[9] SEE NOTE 1	C	I	C	C
Functional Specification for System (for all Central Data Services)	R, A	I	C	-
Functional Specification for System (for Licenced Party systems)	-	-	C	R, A
D-4.2 CSS Design[6] SEE NOTE 1	C	I	C	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
System Test Report (for all Central Data Services other than CSS)	R, A	C	I	-
System Test Report (for Licenced Party systems)	-	-	I	R, A
System Test Report (for CSS)	R, A (CSS Service Provider)	-	I	-
PIT Plan (for all Central Data Services other than CSS)	R, A	C	I	-
PIT Plan (for Licenced Party systems)	-	C	I	R, A
PIT Plan (for CSS)	R, A (CSS Service Provider)	C	I	-

Table 2 - System Testing RACI (Inputs)

KEY TO RACI:

R   Responsible

A   Accountable

C   Consulted

I   Informed

NOTE 1: This product will be the responsibility of the SI Delivery Manager, who will also be accountable for it. The SI Delivery Manager has few inputs to the Phase and does not merit a separate column in the RACI.

NOTE also that PIT for a Licenced Party system will be based on the Functional Specification for that system, as produced by the Licenced Party. PIT for a Central Data Service other than CSS will be based on the Functional Specification for that system, as produced by the relevant Service Provider. Components of the CSS will take the D-4.2 CSS Design as input and PIT.

The outputs delivered during this Stage are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Test Scenarios and Scripts	R, A	-	I	-
Acceptance Test Specification	R, A	-	I	-
Test Infrastructure/ Environments and Data	R, A	-	I	-
Test Tools (including for performance/ other non-functional testing)	R, A	-	I	-
Executed System Tests	R, A	-	I	-
Executed Acceptance Tests	R, A	-	I	-
Regression Test Pack created or updated	R, A	-	I	-
Test Completion Report: • Functional Testing • Non-Functional Testing • Regression Testing	R,A	-	I	R, A
Acceptance Test Completion Report	R, A		I	R, A

Table 3- System Testing RACI (Outputs)

For a Central Data Service, Central Test Assurance Team approval of the Unit- and Link-Test Report and the Goods-In Test Report is required before System Test execution begins.

5.3   Interface Testing

Following System Testing, a System will undergo Interface Testing, which demonstrates the correct interaction of the System with the CSS Simulator test tool provided by the SI. The Simulator will be designed to be installed on the Service Provider's own test

environment and enable the Service Provider to run a standard set of business scenarios, and record the results. The CSS Simulator will be easily configurable, to change the base data and the tests executed.

The Licenced Party Assurance Team will review and approve the results of the tests.

5.3.1 Inputs and Outputs

The inputs will be described in the PIT Plan. They will include the following, which does not include responsibility or accountability for assurance. Licenced Party involvement in this Stage is optional, so their Responsible and Accountable items are relevant only if they participate:

Input	Service Provider	SI	Ofgem	Licenced Party
Design, Build and Test Programme Plan [10]	I	I	R. A	I
CSS Simulator	I	R, A	C	I
Test environment for CSS Simulator	R, A	-	C	R, A
CSS Simulator User Guide	I	R, A	C	I

Table 4 - Interface Testing RACI (Inputs)

The outputs delivered during this Stage are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Executed Tests with recorded results	R, A	I	I	R, A
Test Completion Report: • Functional Testing • Non-Functional Testing • Regression Testing	R, A	I	I	R, A

Table 5 - Interface Testing RACI (Outputs)

6 Systems Integration Testing

The purpose of SIT is to verify that all Central Data Services, when integrated, comply with the E2E functional and non-functional requirements. The first Stage of SIT will be to integrate the components of CSS and verify that they operate together to form a cohesive system, complying with the stated requirements. In principle, SIT will commence after all PIT testing has been successfully completed, however it is possible that components may enter SIT on a component-by-component basis.

The SI will manage Systems Integration Testing, supported by the Service Providers of the Central Data Services. The SI will provide assistance to the Service Providers in their assigned test preparation, test execution and defect resolution activities, ensuring that they have the requisite information.

SIT will verify that the Central Data Services operate correctly together and meet the requirements defined in:

- Switching Design Repository (the end-to-end business model, held in the case tool ABACUS) [4];

- D-4.1.4 E2E Switching Arrangements Non-Functional Requirements [21];

- D-4.1.10 E2E Security Design [7;] and

- CSS Interface Specification [9].

All system and service components of the Central Data Services will have been fully tested in PIT for all stand-alone functional and non-functional requirements, and there is no need to repeat all such testing in SIT. Instead, the primary focus will be on the dynamic interactions between solution elements that span system boundaries and on end-to-end business scenarios, to a level appropriate to:

- the capability of the integrated solution, and

- the features of the test environments being used.

The Systems will be introduced into SIT on an incremental basis, with a simulator being used in place of each System until the System itself is integrated. The simulator(s) will be delivered as part of the design baseline (D-5 Design Proving[8]). Functional testing (including the functional Acceptance Test) will be conducted on the SIT environment and non-functional testing (including the non-functional Acceptance Test) on the Pre-Production environment. A standard set of regression tests will be created and will be run as appropriate to verify changes have not introduced regression into the system.

6.1.1 Inputs and Outputs

The inputs are the requirements on which SIT is based will be described in the SIT Plan. They will include the following, which does not include responsibility or accountability for assurance:

Input	Service Provider	SI	Ofgem	Licenced Party
D-4.1 E2E Switching Arrangements Design [5]	C	I	R, A	C
D-4.2 CSS Design[6] (for CSS integration)	C	I	R, A	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
SIT Plan (plan for this Phase)	C	R, A	C	I

Table 6 - SIT RACI (Inputs)

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Scenarios and Scripts	C	R, A	C	-
Acceptance Test Specification	C	R, A	C	-
Test Infrastructure/ Environments and Data (including Data Tools for data population)	R	R, A	I	-
SIT Simulator test tool (for functional testing)	C	R,A	I	-
Switching Performance Testing Tool (for non-functional testing)	C	R, A	I	-
New Registrations Performance Testing Tool SEE NOTE 1	R, A	C	I	-
Executed Tests with recorded results	C	R, A	I	-
Executed Acceptance Tests with recorded results	C	R, A	I	-
Regression Test Pack created or updated	C	R, A	I	-
Test Completion Report: • Functional Testing • Non-Functional Testing • Regression Testing	C	R,A	I	-
Acceptance Test Completion Report	C	R, A	C	I

Table 7 - SIT RACI (Outputs)

NOTE 1 – this applies to MPRS and UK Link only.

7   User Integration Testing

The purpose of UIT is to demonstrate that Licenced Party systems (including interfaces to CSS and other E2E Switching Solution systems) and processes operate according to the functional requirements. In principle, it will commence following the successful completion of SIT, although overlapping these Phases is not excluded.

UIT consists of two Stages:

• User Entry Process Testing (UEPT); and

• End-to-End Testing (E2ET).

In UEPT, parties have to demonstrate their eligibility to act as Users by preparing and using their back-office systems to undertake a series of tests (UEPT), based on the UEPT Scenarios document [11], where the party executes tests against dummy data provided by the SI. Large suppliers must be ready to commence UEPT as soon as the UIT testing service is available. Suppliers are responsible for ensuring that the Agents and MAPs with which they interact undertake the equivalent of UEPT where the Agents and MAPs demonstrate their ability to interact correctly with CSS.

Having completed UEPT, a Licenced Party may conduct its own tests (E2ET), either with a dummy participant or with another Licenced Party and by involving its MAPs and Agents

should it wish to do so. There will also be a required and defined minimum set of E2E scenarios and tests that need to be conducted in the E2ET Phase, with a representative set of Licensed Parties and their agents who have passed UEPT, to satisfy Ofgem that the E2E system and service interactions function as intended. In both UEPT and E2ET, the SI will allocate each Licenced Party a set of test data it may use (and which no-one else will use), in order to allow the Licenced Parties to test independently of one another. The SI will provide a process, which may be automated, whereby it acts as the counterpart in a change of supplier (where a Licenced Party is testing gaining a consumer, the SI acts as losing supplier and vice versa).   The E2E Co-ordinator will also act as a co-ordinator for those Licenced Parties wishing to lose/gain consumers between themselves.

The SI will provide authorised Licenced Parties with the requisite facilities (e.g. environment comprising all Central Data Services, support) to undertake UEPT and E2E Testing. The facilities will be available at any time except when the system is unavailable for pre-notified, scheduled maintenance.

The SI will publish guidance in the form of the "Guide for Users" document, describing:

- which Licenced Parties are eligible for which services and on what basis (including any applicable charges); and

- responsibilities for provision of the network connection to the UIT environment.

This document will be made publicly available at a suitable point before UIT commences.

Where practical, the SI will allow Licenced Parties to test concurrently; otherwise the SI will determine in a non-discriminatory manner the order in which Licenced Parties will be allowed to undertake such tests. Where any Licenced Party disagrees with the manner in which they have been scheduled, they may refer the matter to the Programme Sponsor or its agents.

Licenced Parties undertaking tests will comply with:

- Good Industry Practice

- SI and Ofgem procedures and instructions.

The SMIP had a Stage which consisted of a small number of Licenced Parties successfully passing through UEPT, but this has not been replicated here.

7.1 User Entry Process Testing

The inputs and outputs will include the following, which does not include responsibility or accountability for assurance:

7.1.1 Inputs and Outputs

Input	Service Provider	SI	Ofgem	Licenced Party
D-4.1 E2E Switching Arrangements Design [5]	C	I	R, A	C
D-4.2 CSS Design[6]	C	I	R, A	-

Input	Service Provider	SI	Ofgem	Licenced Party
CSS Interface Specification [9]	I	I	R, A	I
Design, Build and Test Programme Plan [10]	I	I	R. A	I
UIT Plan (plan for this Phase)	C	R, A	C	C

Table 8 - UEPT RACI (Inputs)

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
UEPT Scenarios	C	R, A	C	C
UEPT Scripts and Test Schedule	I	C	C	R, A
Test Infrastructure/ Environments (Central Data Services) incl network provision	R	R, A	C	C
Test Infrastructure/ Environments (Licenced Party) incl network connection	I	C	I	R, A
Test Tools (for testing environment upgrades) including maintenance	I	R, A	C	-
UIT Counterparty Simulator test tool	I	R, A	C	C
Test Data Plan	C	R, A	C	C
Test Data population	R	R, A	C	I
Support/upgrades for Infrastructure/ Environments (Central Data Services) incl network	R	R, A	I	I
Support for defect triage and fixing	R	R	A	C
Executed Tests with recorded results	I	I	I	R, A
Test Completion Report	I	I	I	R, A

Table 9 - UEPT RACI (Outputs)

The SI has overall responsibility for provision of the testing service, including managing the infrastructure and environments. Each Service Provider has responsibility for providing its system, together with support and defect triage and fixing.

7.2   End-to-End Testing

E2E Testing takes place on the UIT environment, already provided by the SI for UEPT. The SI has an additional obligation to provide test data for the Licenced Parties' use in E2ET. The SI also has responsibility to develop a set of minimum test scenarios for this phase that must provide adequate coverage to demonstrate that the E2E system and service interactions (with real systems not stubs) together with the intended business processes meet the E2E Design requirements and specifications. This will require a representative number of Licensed Parties, and potentially their agents, to have passed UEPT to take part in this minimum set of test scenarios.

The E2E Test Phase will also enable Licensed Parties to conduct any other tests they may require to verify aspects of their design outside the minimum E2E test scenarios mentioned above.   There are no obligations on Licenced Parties in respect of these individual tests: this is a voluntary service. Nevertheless, Licenced Parties are expected to recognise the importance of this testing and undertake robust and comprehensive tests of their systems and their interactions with CSS and other Central Data Services.

8   Data Migration and Transition Testing

The purpose of DMT is to test the planned approach to Data Migration (transformation and transfer – see D-4.3.6 E2E Data Migration Plan[13]) and the planned approach for the multi-stage transition into live operation (see the D-4.3.4 E2E Transition Plan[12]). It also tests the approach for the final cutover into Live operation. It commences following the successful completion of SIT.

The SI has overall responsibility for DMT, which takes place on the Pre-Production environment, provided by the SI and involves Central Data Services but not Licenced Parties' systems. The SI is responsible for developing the tools required for the Data Migration and Transition, including provision of data integrity/verification tools.

8.1.1   Inputs and Outputs

The inputs and outputs will include the following, which does not include responsibility or accountability for assurance:

Input	Service Provider	SI	Ofgem	Licenced Party
D-4.3.4 E2E Transition Plan [12]	I	C	R, A	C
D-4.3.6 E2E Data Migration Plan [13]	I	C	R, A	C
D-4.2 CSS Design[6] (for CSS integration)	C	I	R, A	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
CSS Data Migration Plan	I	C	R, A	I
Data Migration and Transition Tools	C	R, A	C	I
DMT Plan (plan for this Phase)	C	R, A	C	I

Table 10 - DMT RACI (Inputs)

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Test Scenarios	C	R, A	C	-
Test Scripts	C	R, A	C	-
Test Infrastructure/ Environments (Central Data Services) incl network provision	R	R, A	C	-
Support/upgrades for Infrastructure/ Environments (Central Data Services) incl network	R	R, A	C	-
Support for defect triage and fixing	R	R, A	C	-

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Executed Tests with recorded results	I	R, A	C	-
Test Completion Report	I	R, A	C	I

Table 11 - DMT RACI (Outputs)

9 Operational Testing

The purpose of OT is to verify that the Central Data Services can be installed and operated under the live configuration, can be operated by the Service Management function under normal and exceptional conditions, meets its Service Level Agreements and meets its security requirements. OT may commence following the successful completion of SIT.

The testing will be conducted by the Switching Operations team, supported by the SI and will include:

- functional testing of Service Management tools and business processes;

- verifying that Service Desk staff have been adequately trained;

- service monitoring and reporting;

- Business Continuity and Disaster Recovery (BCDR) testing;

- backup and restore testing;

- E2E security testing, including penetration testing and the Security Operation Centres; and

- audit logging and alerting.

The objective of OT is to provide Ofgem with a sufficient level of information as to the readiness of the resources, processes and procedures needed to support Ofgem to make an informed decision as to the readiness of the E2E Switching Solution to Go-live. Further details of the way OT, DMT and the beginning of actual transition to Live will interact will be provided in the respective Plans.

9.1.1 Inputs and Outputs

The inputs and outputs will include will include the following, which does not include responsibility or accountability for assurance:

Input	Service Provider	SI	Ofgem	Licenced Party
D-4.1.9 E2E Switching Arrangements Service Management Strategy [14]	I	I	R, A	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
Service Design	I	I	R, A	-

Input	Service Provider	SI	Ofgem	Licenced Party
OT Plan (plan for this Phase)	C	R, A	C	I

Table 12 - Operational Testing RACI (Inputs)

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Test Scenarios	C	R, A	C	-
Test Scripts	C	R, A	C	-
Test Infrastructure/ Environments (Central Data Services) incl network provision	R	R, A	C	-
Support/upgrades for Infrastructure/ Environments (Central Data Services) incl network	R	R, A	C	-
Support for defect triage and fixing	R	R, A	C	-
Executed Tests with recorded results	-	R, A	C	-
Test Completion Report	I	R, A	C	I

Table 13 - Operational Testing RACI (Outputs)

10 Live Proving

The purpose of Live Proving is to verify the set-up of the Production system, demonstrating it is fit for purpose and to assess the readiness for go-live of the E2E Switching Solution as a whole (including Licenced Party systems). It will commence following the successful completion of OT and DMT.

Live Proving is organised by the SI and comprises:

- Production Acceptance (to check basic system configuration and function and correctness of initial data), conducted by Ofgem without Licenced Party involvement;

- Pre-Live stability testing;

- Business Continuity and Disaster Recovery (BCDR) testing; and

- Live Rehearsal (to assess readiness for go-live), organised and co-ordinated by Ofgem, with the participation of Licenced Parties.

10.1 Production Acceptance

10.1.1 Inputs and Outputs

The inputs and outputs will include the following, which does not include responsibility or accountability for assurance:

Input	Service Provider	SI	Ofgem	Licenced Party
Production environment design	R, A	C	C	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
Production Acceptance section in Live Proving Plan (plan for this Phase)	C	R	A	-

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Test Scenarios	C	R	A	-
Test Scripts	C	R, A	C	-
Support for defect triage and fixing	R	R, A	C	-
Executed Tests with recorded results	-	R	A	-
Test Completion Report	-	R	C	-

10.2 Pre-Live Stability Testing

The Pre-Live Stability testing will be carried out on the final version of the software, in parallel with the other Stages of Live Proving and will consist of a full set of end-to-end regression tests developed as part of SIT by the SI. It will take place on the UIT environment so that it can run without interfering with other go-live preparations.

10.3 BCDR Testing

The BCDR test will be a full end-to-end business continuity/disaster recovery scenario, conducted on the Production environment. It will be designed by the SI, working closely with the Switching Operations Team. The SI will provide co-ordination and all Service Providers, including the Switching Operations Team will be required to participate, along with as many Licenced Parties as possible. At a minimum, it will consist of a failover[2] of CSS followed by a failback[3], demonstrating continuity of service throughout (allowing reasonable time for recovery after failover).

10.4 Live Rehearsal

The Live Rehearsal will consist of one or more co-ordinated end-to-end tests of some of the major switching processes. It will involve all SPs and as many Licenced Parties as possible and take place outside normal business hours on the Production environment, once Production Acceptance has been successfully completed.

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[2] a procedure by which a system automatically transfers control to a duplicate system when it detects a fault or failure
[3] the process of restoring operations to a primary machine or facility after they have been shifted to a secondary machine or facility during failover

The Live Rehearsal may include a BCDR test of the Central Data Services, while Licenced Parties are conducting tests.

10.4.1 Inputs and Outputs

The inputs and outputs will include the following, which does not include responsibility or accountability for assurance:

Input	Service Provider	SI	Ofgem	Licenced Party
Switching Design Repository [4]	-	-	R,A	-
Design, Build and Test Programme Plan [10]	I	I	R. A	I
Live Rehearsal section in Live Proving Plan (plan for this Phase)	C	R	A	-

Table 16 - Live Rehearsal RACI (Inputs)

The outputs delivered during this Phase are:

Output/Deliverable	Service Provider	SI	Ofgem	Licenced Party
Test Scenarios	C	R, A	C	C
Test Scripts	C	R, A	C	C
Executed Tests with recorded results	R	R, A	C	R
Test Completion Report	R	R, A	C	R

Table 17 - Live Rehearsal RACI (Outputs)

11   Test Process

11.1 Test Coverage

The test scripts in each formal Test Stage will be mapped back to the corresponding design document and the requirements document by means of a Requirements Traceability Matrix, so that the breadth of test coverage can be measured and verified. This will be done by the party responsible for producing the test scripts.

The depth of test coverage (i.e. how "thoroughly" each solution element is tested) will be determined by a risk assessment of:

- the importance to the market of the various solution elements; and

- the technical probability of test issues being present in each solution element.

This approach applies to:

- all types of testing (e.g. functionality, security, performance);

- initial testing of solution elements during the PIT, SIT, OT and UIT Phases;

- testing of fixes and enhancements to these elements during the Pre-Integration, Systems Integration, Operational Testing and User Integration Test Phases; and

- Regression Testing of these elements.

The risk assessment will be included in the relevant Test Plan for each Test Phase.

11.2   Test Prioritisation

The risk assessment will also be used to prioritise test preparation and test execution activities. Each test will be prioritised by the relevant stakeholders in terms of its market impact (i.e. if the solution element covered by the test failed in live use, what would be the impact on the solution) and technical probability (i.e. how likely is it that test issues will be present in the solution element). This prioritisation will use a High, Medium, Low scale in order to group tests into three categories:

1 – tests which cover solution elements that a) are very likely to contain test issues and/or b) would cause major market impact if they failed

2 – tests which cover solution elements that a) are likely to contain test issues and/or b) would cause significant market impact if they failed

3 – tests which cover solution elements that a) are unlikely to contain test issues and/or b) would cause only minor market impact if they failed.

Category 1 tests will be written ahead of Category 2 tests, which will be written ahead of Category 3 tests.

Category 1 tests will be executed ahead of Category 2 tests, which will be executed ahead of Category 3 tests.

11.3   Test Pass and Fail

A test will pass if the actual result matches the expected result. Where this is not the case, a defect will be raised and the test will be set to "fail". If the subsequent triage process determines that the defect has been raised in error (e.g. due to a misunderstanding), then the test result will be reset from "fail" to "pass".

11.4   Test Activities and Responsibilities

The following activities will be performed for the Programme:

- Preparation and maintenance of the E2E Testing Plan (by Ofgem);

- Support of preparation and maintenance of the E2E Testing Plan (by SI Delivery Manager and SI);

- Preparation and maintenance of an Environment Plan (by SI).

The following activities will be performed per Test Phase:

- Preparation and maintenance of Test Phase Plan (as captured in RACI charts above for input to each Phase);

- Support Test Plan preparation and maintenance (by SI);

- Design of testing infrastructure (e.g. Environments) (by SI for cross-party Test Phases, by responsible party for PIT);

- Implementation of testing infrastructure (as for Design above);

- Test Phase planning (by parties and/or providers for that Test Phase); and

- Support Test Phase planning (parties involved in Test Phase).

The following activities will be performed per Test Stage (by party or provider responsible in line with Testing Plan for that Phase):

- Identify Test Scenarios

- Support Test Scenario identification.

- Design of Test Scripts, and production of Test Specification document and Requirements Traceability Matrix

- Support of Test Script Design

- Design and preparation of Test Data

- Support of Test Data design and preparation[6]

- Preparation of Test Execution Schedule

- Support of Test Execution Schedule preparation

- Perform Quality Gate Reviews

- Support Quality Gate Reviews

- Execution of testing

- Defect Management

- Support of Defect Management

- Defect resolution

- Support of Defect resolution

- Release Management

- Support of Release Management

- Configuration Management

- Support of Configuration Management

- Test Progress Reporting

- Support of Test Progress Reporting

- Test Assurance.

12 Test Environments, Data and Tools

12.1 Test Environments

A test environment is a replica of the planned Live system (but with a few differences and possibly on a smaller scale), consisting of the hardware, third-party software, application software and communications between parts of the system. A difference could be that not all parties to the Live system will be connected to a given test environment (for example, in SIT, there will be no suppliers connected); instead, their actions will be simulated. The simulation of actions by a supplier (or any other party) is effected by the use of a Test Tool which simulates this party's system, for example the CSS Simulator, which simulates the presence of CSS by initiating messages and responding to those sent by the supplier's system.

SI will be responsible for producing an Environment Plan [15], which will describe the deliverables, responsibilities etc. In principle, each Service Provider will be responsible for furnishing an environment consisting of its component, linked to the other components in a way that mimics as far as possible their links as they will be in the Live system.

Environ-ment	Relevant Test Phases	Components Involved	Notes
PIT	PIT: • System Testing • Interface Testing	All (individually)	Prior to Go-Live, the minimum requirement will be for a single PIT environment per System. Following Go-Live, an additional PIT environment will be needed for all Central Data Services, at the same version as Production, to allow for testing Production patches.
SIT	SIT (functional): • CSS components integration • Central Data Services integration	Central Data Services + simulators	There will be a single SIT environment, consisting of all the Central Data Services, together with test tools to simulate Supplier/other interactions. This will be designed, and managed by the SI and will be used for the functional SIT testing; it will not be a Production-like environment. Each SP supports this by providing its part of the Solution in its own environment and the SI oversees the connection of all the environments. The CSS SP will additionally supply an environment on which to run the CSS Simulator. Note that this assumes overlapping of releases will not take place.

Environ-ment	Relevant Test Phases	Components Involved	Notes
			The Smart Metering environment associated with this will be one of its SIT environments, where testing can be conducted with both meter emulators and real smart meters located in the DCC's test labs.
UIT	UIT: UEPT E2ET	All	The UIT environment will be provided as a testing service by the SI (supported by the SPs, each of which provides its own system on its infrastructure, all connected together). Licenced Parties will be able to connect to UIT to conduct their own testing. It is anticipated that the Smart Metering environment associated with this will be its UIT environment, to which real smart meters are connected in both the DCC's test lab and Licenced Parties' own remote test labs.
Pre-Production	SIT (non-functional) OT DMT	Central Data Services + simulators	The Pre-Production environment will comprise the Central Data Services, in the same configuration as Production (including full DR facilities). Test tools will simulate Supplier/other interactions; the CSS SP will provide an environment on which to run the Switching Performance Testing Tool and MPRS and UK Link will provide environments on which to run the New Registration Performance Testing Tools. It will be designed, set up and managed by the SI and used for performance, load and resilience SIT tests, Operational Testing and Data Migration and Transition Testing. Post Go-Live, it will be used for testing Production patches.
Production	Live Proving BCDR Live Rehearsal	All	The full Production environment will be subject to a Proving exercise before Go-Live. It will also be used for a series of rehearsals involving all parties, where the systems and processes can be tested prior to go-live.

12.2 Test Data

For PIT, establishment and management of the test data used will be the responsibility of the organisation conducting PIT.

The SIT and Pre-Production environments will use a common set of data (although SIT may use a sub-set of that data since it is smaller in size). The SI will establish and maintain the test data, supported by the Central Data Services Providers. Each party conducting testing will be allocated a portion of the data for its own use; this will be particularly important for UIT, where each Licenced Party must use only its data. In principle, old live data will be used and in order not to divulge the Supplier-to-MPxN relationship, the SI will anonymise it by changing the relationships between:

- MPxN and address; and

- MPxN and Supplier.

Full details of the test data to be used will be specified in the Test Data section of the as part of the SIT Plan[19]. This will cover the process and tool used to manage the data and for each item of data needed for system set-up:

- Party responsible for providing/maintaining;

- How it relates to other data in the Switching Arrangements;

- Source and content of the data; and

- Quantity of data required.

The test data will be designed with the test scenarios in mind. For example, it will be necessary to ensure that adequate data is present to reflect different types of metering arrangement: DCC-enrolled, traditional (and for traditional, different settlement attributes such as Half-Hourly and Non-Half-Hourly).

The UIT environment will use the same set of test data as Pre-Production. A particular set of data will be allocated to each Licenced Party and there will be one or more dummy Suppliers controlled by the SI which will be available for customer gain and loss, enabling each Licenced Party to test independently. The UIT Plan[20] will contain a section on Test Data, developed in a collaborative manner with the Licenced Parties, which will cover:

- How data is allocated to each Licenced Party;

- How data allocation is communicated; and

- How co-ordination will ensure no overlap/conflict between Licenced Parties when testing.

The principles stated in the UIT Plan will include the following:

- Data provided will be adequate to support the planned number of participating Licenced Parties;

- Data provision and maintenance will be co-ordinated and managed by the SI, who may instruct an SP or Licenced Party to carry out an update or correction to the data for which they are responsible;

- A single test data cut will be taken therefore there should not be an undue or ongoing burden on the providing Service Provider;

- Customer names will not be included in the data provided;

- Each Licenced Party will be allocated data with which to test;

- The data one Licenced Party is using for testing will not be revealed to another Licenced Party; that Licenced Party will have exclusive use of the allocated data on UIT;

- Data will be reviewed before testing starts;

- Storage and use of data will comply with the UK Data Protection Act and GDPR; and

- Data will be able to be restored (if needed because of a serious failure) at some point during the testing.

12.3 Test Tools

The test tools required are described in each section describing the Phases of testing (sections 5 to 0). They are summarised below. The list does not include "tools" which will be produced in order to support the agreed transition/data migration approach. These tools are considered programme deliverables (not tools to support testing) and are outside the scope of this Testing Plan.

Tool	Relevant Test Phases	Tool Developed By	Tool Used By
Any tools necessary for PIT (System Testing)	PIT (System Testing)	Relevant Licenced Party or Service Provider for its own PIT	Relevant Licenced Party or Service Provider
CSS Simulator	PIT (Interface Testing)	SI	Licenced Parties Service Providers
Data Tool	SIT UIT OT DMT	SI for CSS Each Central Data Service Provider for other Central Data Services	SI Service Providers
SIT Simulator	SIT (functional testing)	SI	SI

Tool	Relevant Test Phases	Tool Developed By	Tool Used By
Switch Performance Testing Tool	SIT (non-functional testing)	SI	SI
New Registration Performance Testing Tool	SIT (non-functional testing)	MPRS UK Link	MPRS UK Link
UIT Counterparty Simulator	UIT	SI	SI in its provision of the UIT test service and indirectly by the Licenced Parties who use that service

Table 18 - Summary of Test Tools

For the System Testing stage of PIT, it is the responsibility of the organisation conducting PIT to develop any tools necessary for comprehensive testing. For example, for a gas supplier, this may include a simulation of interactions with a shipper.

For the Interface Testing stage of PIT, the SI will make available a CSS Simulator, which will simulate the actions of CSS by responding to a message sent into it and sending out messages in the way that CSS will do, for principal business scenarios (without being a fully-functional prototype). It will be expected to be installed on the infrastructure of the organisation conducting PIT. See the description in sections 5.1 Introduction and 5.3 Interface Testing for further details.

The Data Tool will be used in several Phases to create test data for the Central Data Services. Each Service Provider will need to develop a tool which allows data provided in an agreed format, such as csv file, to be loaded into its system, in order to ensure the integrity of the test data across the Switching Solution.

The SIT Simulator will support the system-by-system integration of the Central Data Services in SIT. It will be capable of holding data and simulating the action of each Central Data Service, the gaining and losing supplier in terms of sending messages to CSS and responding to messages received from CSS and act as a recipient for notifications to all other Licenced Parties. Its action will be configurable, so that for example, certain switch requests will result in an objection being raised. It will support the automation of tests by running allowing sets of tests to be specified in the form of a set of input data (multiple switch requests) which can then be executed automatically. It will include automatic analysis and reporting of the results (test success/failure).

The Switch Performance Testing Tool will be used to simulate a supplier's behaviour by sending switch requests to CSS, responding to invitations to object and cancelling a switch by annulment or withdrawal. It will be capable of generating switch requests from 150 suppliers at configurable rates, by interrogating either the CSS database or the ECOES/DES systems to determine valid gaining and losing suppliers and formulating switch requests accordingly. It will be capable of generating the switch requests in the volumes identified in [21][21]. Its behaviour will be configurable so that the major business scenarios can be exercised, for example the percentage of switches for which an objection is raised and the speed of supplier response to an invitation to object will be

configurable. The profile of switch request volume across suppliers will also be configurable.

The New Registration Performance Testing Tools will be used to simulate input into MPRS and UK Link which will cause these services to send a new registration request to CSS. Its behaviour must be configurable, in terms of the rate at which it generates new registrations, must be capable of generating registrations for all suppliers and must support the volumes identified in [21].

The UIT Counterparty Simulator is likely to be based upon the SIT Simulator. Its function is to act as the losing or gaining supplier in a switch, to allow each Licenced Party to test independently. It will simulate the action up to 100 suppliers in acting as the gaining supplier to allow a Licenced Party to act as losing supplier and as the losing supplier to allow a Licenced Party to act as gaining supplier. The Licenced Parties against which it is operating will be configurable, as will parameters allowing different business scenarios to be simulated, for example for each gaining Licenced Party, the percentage of switch requests where an objection is raised. The SI will put in place a process whereby each Licenced Party is able to request testing against the Counterparty Simulator.

13 Test Organisation and Management

13.1 Test Phase Management

13.1.1 Pre-Integration Testing

As defined in section 5 above, each affected Licenced Party or Service Provider will be responsible for planning, managing and executing its PIT testing. Each Licenced Party or Service Provider will use and manage its own processes, staff, test environments, test data, test tools and test labs for PIT, noting the need to report progress and escalate defects upstream to the SI.

Each Licenced Party or Service Provider undertaking PIT will provide the following (to Licenced Party Assurance Team and the Central Systems Test Assurance Team respectively):

- Test Plan documents (including the Test Approach) ahead of test execution;

- Regular progress reports in the run-up to and during test execution for each PIT Test Stage; and

- A Test Completion Report at the end of each stage of test execution.

The Licenced Party Assurance Team and the Central Systems Test Assurance Team will assure PIT, as detailed in section 14. Both assurance teams will report progress to the E2E Co-Ordinator. Quality Gate Reviews will operate as detailed in section 14.3.

13.1.2 Cross-Party and Provider Testing

In line with sections 6 to 10 above, the SI will be responsible for planning, managing and executing SIT, UIT, DMT, OT and Live Proving Test Phases.

These Test Phases will require test environments, test data, test tools and test labs to be shared across the various parties and providers involved under a common set of processes (defined by the SI) using staff from all Licenced Parties and Service Providers. To ensure that that these Test Phases are planned and controlled efficiently, the SI will consult with the various Licenced Parties and Service Providers involved to devise a high level approach for each Test Phase, which will be documented in the Test Plan for each of these phases, focussing on:

- Roles and responsibilities;

- Definition of Test Success criteria;

- Entry and Exit Criteria;

- Set-up and operation of the Test Management tool;

- Tracking and reporting of test progress;

- Identification and design of the test scenarios to be covered;

- Design and sourcing of the supporting test data;

- Re-use of test scripts and test data from Pre-Integration Testing;

- Participation in test script preparation and execution;

- Co-ordination of joint test preparation and execution activities;

- Staffing levels required for test preparation, test execution and issue resolution;

- Plans for establishing connectivity between SP test environments;

- Procedures and privilege rights for the cross-SP access to test environments/labs;

- Scheduling the usage of test environments and test labs; and

- The Test Stubs to be used;

The SI will provide the SI Delivery Manager and the Ofgem E2E Co-Ordinator with:

- The Test Plan (including Test Approach) document ahead of test execution;

- Regular progress reports in the run-up to and during test execution; and

- Test Completion Reports at the end of each stage of test execution.

Ofgem and the SI Delivery Manager will:

- Assure the Test Phases, as detailed in section 14; and

- Review the activities that are undertaken and provide confirmation that all Exit Criteria have been met (possibly supported by review by an independent organisation).

13.2 Test Reporting

The progress of each Test Stage will be reported by the party or provider responsible for managing the associated Test Phase as defined in section 13.2 above. Test progress reporting shall cover:

- Pre-testing progress, via weekly Test Readiness Reports;

- Test execution, via weekly Test Execution Reports; and

- Post-testing wrap-up, via the Test Stage Completion Report.

13.2.1 Test Readiness Reporting

Commencing twenty working days prior to the start of test execution for each Test Stage, the responsible party or provider will provide a weekly report showing:

- Actual number of test scripts written, in progress and not started;

- Requirements Traceability Matrix coverage achieved with the test scripts written to date;

- State of readiness for:
  - Test Data;
  - Test Environment;
  - Test Stubs; and
  - Test Team.

- Progress against Test Stage Entry Criteria defined in associated Test Plan;

- Mitigation/management progress against key Risks, Dependencies and Assumptions identified in the Test Plan; and

- Overall RAG status.

13.2.2 Test Execution Reporting

Once test execution for each Test Stage has started, the responsible party or provider will provide regular progress reports as defined in the agreed Test Plan. The report will show:

- Actual number of test scripts executed vs. planned, cumulative trend;

- Actual number of test scripts passed vs. planned, cumulative trend;

- Actual number of open and closed test defects vs. planned, cumulative trend;

- Actual number of test defects outstanding, split by Severity;

- Progress against Test Exit Criteria defined in Test Stage Plan;

- Progress against any Work Off Plan from previous Test Stage;

- Risk, Dependency and Assumption status; and

- Overall RAG status.

13.2.3 Test Completion Reporting

Once test execution for each Test Stage has completed, the responsible party or provider will produce a final Test Completion Report showing:

- Overview of testing undertaken;

- Actual number of tests run, passed, failed, not run;

- Explanation for any tests not run;

- Test defect IDs for failed tests;

- Number of test defects outstanding (if any), split by Severity;

- Work off Plan for outstanding test defects (if any);

- Number and severity of test defects raised;

- Specification of test environment used; and

- Recommendations for tests to be included in the next Test Stage.

A draft of the Test Completion Report will be issued 10 working days before the planned end of test execution.

13.2.4 Roles and Responsibilities

The roles and responsibilities for each Test Phase are covered in section 5 to 10 above, including associated inputs and outputs (deliverables). Generic activities and responsibilities for each Test Phase and Test Stage are included in section 11.4. Overall roles and responsibilities for Test Management and Governance are included in this section, and for Test Assurance in section 14.

Together, the definition of roles and responsibilities defined in this Testing Plan should be sufficiently clear for all parties and providers involved in Testing to plan, manage and execute their testing accordingly.

14 Test Assurance

14.1 Introduction

Each formal Test Stage and Phase will be considered complete when all relevant Exit Criteria have been achieved. On completion of the Test Stage/Phase, The relevant assurance function will issue a Certificate of Test Stage/Phase Completion.

If a Certificate of Test Stage/Phase Completion has been issued subject to completion of a Work-Off Plan and the Work-Off Plan has not been completed within the applicable time period, then the Certificate of Test Stage/Phase Completion will be revoked unless the failure relates solely to Severity 4 test issues.

14.2 Test Assurance

Test assurance operates at multiple levels across the E2E Switching Solution.

Licenced Parties are expected to define and follow procedures to assure their own Pre-Integration Testing, in line with good industry practice.

Each Service Provider will establish procedures to assure its own Pre-Integration Testing and confirm compliance with the E2E Testing Plan (this document) and the individual Pre-Integration Test Plan. This assurance will include reviewing the testing undertaken by third parties supplying components of their service solutions, and performing acceptance testing (Goods-In Testing) of such components.

The Central Systems Test Assurance Team will assure the SPs' PIT using the following methods:

- review of SP Pre-Integration Test Plan;

- review of SP Requirements Traceability Matrix;

- review of SP Test Scenarios and data;

- review of SP Test Completion Reports and Work-Off Plans;

- review of SP Test Completion Report for Pre-Integration Testing; and

- attendance at SP Quality Gate Review for Integration Readiness.

The Central Systems Test Assurance Team will assure SP testing using the following methods at agreed points in the lifecycle:

- Quality Gate Reviews;

- Test Witnessing;

- Test Quality Audits;

- Product Inspections; and

- Document Review.

14.3 Quality Gate and Assurance Reviews

A series of Quality Gate Reviews will be held between Test Stages to confirm that the Exit Criteria of the preceding Test Stage and the Entry Criteria of the upcoming Test Stage have been met (see section 14.4 for details of the Exit and Entry Criteria). These will be conducted by the Service Provider, with the participation of the Central Systems Test Assurance Team or the Ofgem Licenced Party Assurance Team as appropriate.

At the end of a Test Phase, a review will be held to confirm that the Exit Criteria of the Phase have been met. These reviews will be conducted by the relevant programme governance function, supported by the Central Systems Test Assurance Team or the Ofgem Licenced Party Assurance Team as appropriate, with the participation of the relevant Service Providers. A successful review will result in a Certificate of Test Stage/Phase Completion being issued.

Note also that the D-4.3.2 E2E Integration Plan[16] defines key quality gates from an overall integration perspective at the end of PIT (Integration Readiness) and at the end of SIT/UIT/OT/DMT (Operational Readiness). This specifies additional criteria over and above the testing criteria specified in this E2E Testing Plan that must also be met.

14.4 Entry and Exit Criteria

Formal testing will be gated by a set of generic and specific Entry and Exit Criteria operating at the Test Phase and Test Stage levels.

14.4.1 Generic Entry and Exit Criteria for all Test Phases

The following generic Entry Criteria will gate the entry of all Test Phases:

- Test Plan for Test Phase signed-off;

- Certificate of Test Phase Completion for preceding Test Phase issued, unless the plan is to overlap Test Phases ; and

- Certificate of Approval to Proceed Certificate issued.

The following generic Exit Criteria will gate the exit of all Test Phases:

- Acceptance Test has been successfully concluded;

- production of agreed Work-Off Plans for any outstanding Defects that occurred in the Test Phase;

- compliance with requirements as described in the Requirements Traceability Matrix; and

- Certificate of Completion of Test Stage issued for all Test Stages in the Test Phase.

14.4.2 Generic Entry and Exit Criteria for all Test Stages

The following generic Entry Criteria will gate the entry of all Test Stages:

- Test Scenarios signed off;

- Test Scripts prepared, including traceability to Requirements/Design documents;

- Test Tools, Test Environments, Test Data ready;

- Certificate of Test Stage Completion for preceding Test Stage issued, unless the plan is to overlap Test Stages; and

- all relevant parties have confirmed they have resources with the requisite skills and accesses available to support the Test Stage.

The following generic Exit Criteria will gate the exit of all Test Stages:

- all tests run to completion, or any exceptions documented and agreed;

- all Test Success Criteria (e.g. test pass rate) achieved, or any exceptions documented and agreed;

- the number and severity of any outstanding Test Issues relating to Central Data Services is at or below the target thresholds, or any exceptions documented and agreed;

- Work-Off Plan for any outstanding Defects has been produced;

- test results documented and evidence captured;

- set of Defect logs has been produced;

- regression testing successfully completed;

- Regression Test Pack has been prepared or updated.

14.4.3 Specific Entry and Exit Criteria for Test Phases/Stages

Specific Entry and Exit Criteria for each Test Phase will be listed in the relevant Test Plan document.

Specific Entry and Exit Criteria for each Test Stage will be listed in the relevant Test Plan document.

15 Issue and Defect Management

Testing will reveal defects in the systems being tested. These defects will be in the form of non-conformances with the system specifications. Unexpected results from testing may also be due to issues with the test environment, test data, test scripts, etc used for testing. In any event, these issues and defects need to be logged, investigated and resolved. For the purposes of this section, issues and defects will be collectively referred to as 'defects'.

Defect Management tracks and manages the discovery, resolution, and retest of system defects identified during test execution. The Defect Management process involves recording, reviewing, and prioritising defects; assigning defects to responsible parties for resolution and re-testing as required. The objective of Defect Management is to ensure

that all defects are recorded, resolved, and retested consistently, effectively, and quickly. It also allows key stakeholders to accurately monitor the number, priority, and status of defects. Tracking of defects will be a key input into quality metrics captured by the SI during systems integration and testing for DBT.

It is expected that the SI will define the overall capability required for Defect Management and Defect Tracking during the DBT Phase across all parties and providers, and the SI will be required to develop a comprehensive Defect Management Plan[18] for DBT.

The SI will also be expected to define a process for escalating and resolving design issues that are raised during the DBT Phase, as part of an issue resolution process.

15.1 Defect Management Approach

The overall Defect Management Plan to be developed and provided by the SI should define the required approach for Defect Management during DBT and all parties and providers involved in Testing will be expected to comply with this Defect Management Plan. This will cover:

- What constitutes a valid defect;

- The scope of a defect;

- When to raise a defect;

- What is considered complete information for a defect; and

- Who is responsible for raising and resolving defects.

Any variations to this standard approach must be described in the relevant Test Plan document and fully justified.

All Test Phases will have the following defect management features in common:

- Defects will be logged in a suitable repository/tool by the body responsible for running the test;

- Full details of each defect will be recorded in the repository/tool, to enable speedy resolution and, where relevant, traceability back to requirements, design, build and test artefacts;

- Defects will be triaged by the Triage Team and reviewed by the Triage Panel on a regular basis, in order to:

  o classify them;

  o ensure sufficient information has been collected;

  o set their Severity and Priority; and

  o assign them to the relevant Resolver group/domain.

- A Test Defect Manager in each domain (party/provider) will regularly review outstanding test defects to ensure that they are resolved at the requisite speed, and will report progress to the SI Overall Defect Manager and other stakeholders.
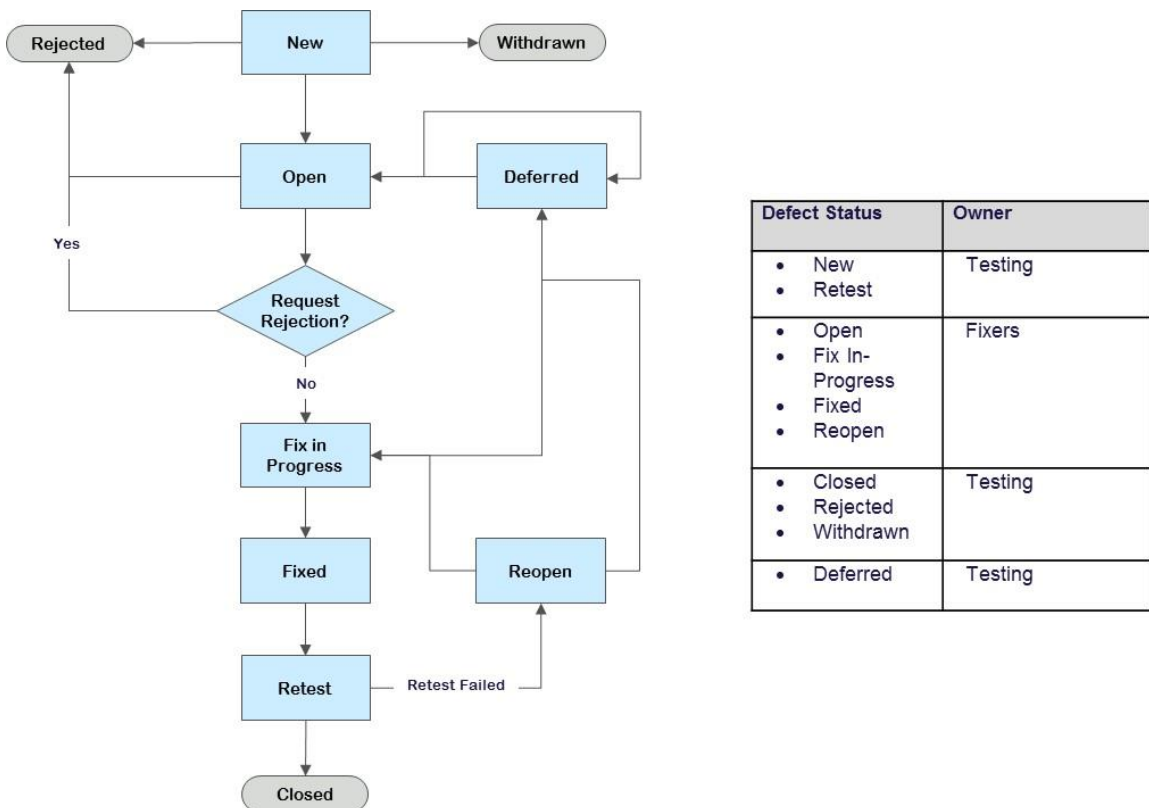
15.2 Defect Management Model and Process

The Defect Management Plan provided by the SI should also provide detailed information describing the model and the process to support Defect Management. This will cover:

- Defect Lifecycle;

- Defect Assignment and Process Workflow;

- Defect Status Definition & Transition;

- Defect Types, Classifications & Definitions; and

- Defect Management – Roles & Responsibilities (all parties).

15.2.1 Defect Process Workflow and Lifecycle

The following diagram is an illustrative example of a simple Defect Management Process Workflow that describes a generic Defect Lifecycle. The SI will provide detailed information describing the Defect Lifecycle and Workflow in the Defect Management Plan[18].

Defect Status	Owner
• New • Retest	Testing
• Open • Fix In-Progress • Fixed • Reopen	Fixers
• Closed • Rejected • Withdrawn	Testing
• Deferred	Testing

15.2.2 Defect Types, Classifications and Definitions

The Defect Management Plan will include detailed information describing the various Defect Types, Classifications and Definitions to be used during DBT and any Testing defects will need to comply with these.

For Testing, it is expected that the Defect Types will include (but not be limited to) the following:

- A static testing defect related to requirements.

- A static testing defect related to design.

- A test issue:

    o that prevents execution of a test;

    o that causes an unexplained or unexpected outcome or response to a test;

- Not a test issue/defect (e.g. a misunderstanding);

- A duplicate;

- A change request related defect that requires Change Management (i.e. Change Control Management) rather than a defect fix;

- An issue that needs more information.

Defects also need to be defined in terms of their severity, so they can be prioritised appropriately for resolution within agreed service levels. This will be defined within the Defect Management Plan produced by the Systems Integrator following contract signature (i.e. response times for developing and implementing a fix). The following table is a representative example of Defect Classifications and Definitions. The final classifications and definitions, and service levels with different organisations will be fully defined within the System Integrator Defect Management Plan, which will be subject to Ofgem approval.

Defect Severity & Priority	Definition
D1 Critical	- Testing process is severely limited or stopped by the existence of the problem. - A key market function is at a standstill and no work around exists. - Fix must be implemented as soon as possible and takes precedence over all non-emergency work in progress.

Defect Severity & Priority	Definition
	• The error affects a large volume of test scripts to be executed. • Significant testing Impact - more than 50 % of the scripts planned for the day are blocked
D2 **High**	• A very complex problem that is not impending progress but requires attention if the test script is to pass the testing stage. • A key market function is operational, however a severe error exists in its processing and the workaround is complex and time consuming • Considerable Testing Impact – more than 25% of the test scripts planned for that day are blocked.
D3 **Medium**	• A problem that is not impending progress, but requires attention if the test script is to pass the testing stage. • A workaround exists. • The occurrence of the problem is low or does not impact key accounts. • Moderate Testing Impact – less than 25% of the test scripts planned for the day are blocked.
D4 **Low**	• A problem that do not need addressing prior to moving the next testing phase. • The occurrence of the problem is low or does not impact testing progress. • The changes may be of cosmetic nature. • Minimal impact to testing effort.

15.2.3 Defect Management Roles and Responsibilities

The following diagram is a representative example of Defect Management Structure which is likely to be updated and finalised by the SI in the Defect Management Plan.
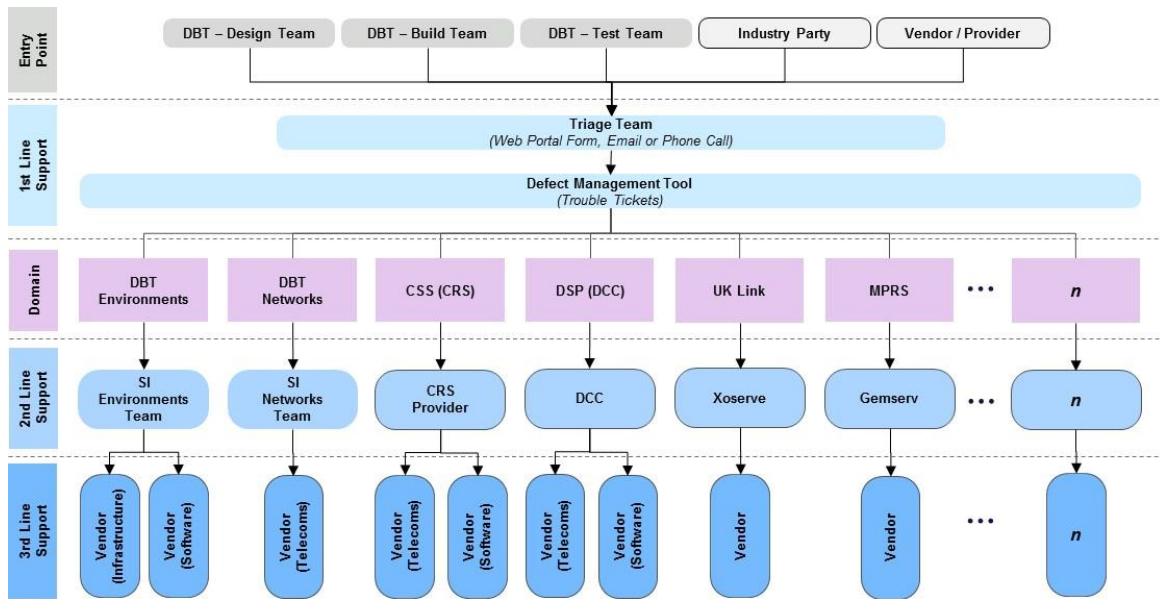
Key Roles and Responsibilities for Defect Management are captured in the table below. These will be updated to reflect the final Defect Management Plan.

Role	Responsibilities
Overall Defect Manager **(SI)**	• Leadership & communication of defect management process • Point of Escalation • Daily Defect Status Reports • Running Defect Triage Panel and managing audience • Analysis of defects to assist in project decision making activities • Liaising upstream with senior stakeholders and downstream with Test Defect Managers
Test Defect Manager **(per Domain inc SI)**	• Reviewing & managing the quality of the submitted defect • Rejecting any invalid submitted defects with comment • Splitting defects which are complex to solve and are impacting the test schedule • Linking defects that have a fix dependency on one another before the retest can commence • Escalating to Overall Defect Manager where deferral is required

Role	Responsibilities
	• Point of contact for the Overall Defect Manager and Test Execution Team • Driving Retest of defects that have been delivered into the test environment • Accepting and closing defects that have been successfully retested in the test environment
Environment Lead	• Ensuring environment stability during Test window • Managing & Tracking change in general across all environments • Ensuring that all required systems are connected & working as expected in the test environment prior to test execution
Release Manager	• Checking Release Notes when patch is delivered to determine which defects can be set to retest • Coordinating with the defect & environment managers when required
Tester **(SI – for cross-party Test Phases** **Participant/Provider responsible for PIT)**	• Submitting new defects • Retesting any deployed Hotfixes relating to D1 and D2 Defects (defect remains open until official patch release) • Retesting defects raised as per the release notes / info in trouble ticketing system (i.e. Defect Management Tool)
Resolver **(per Domain inc SI)**	• Recreate the issue/defect • Liaise with Tester and Test Defect Manager when required, e.g. additional information/clarity around the topic in question • Fix the issue/defect • Update the defect resolution fields, root cause, fix time and functional area of the defect • Validate the defect category
	Domain – Each domain represents each main party and provider involved in the testing activities in DBT (e.g. SI, CSS Service Provider(s), DCC, Gemserv, Xoserve, etc.)

15.3 Defect Management Tools

The SI will recommend, provide and implement an appropriate Defect Management Tool in support of the Defect Management Plan, as well as to support the Defect Management Model and Process amongst the various parties and providers involved in testing for DBT. The individual parties and providers may already have a standard set of Defect Management Tools in use in their respective organisations, therefore the tools recommended, provided and implemented by the SI must be able to integrate and cross-communicate with each other to support an efficient and effective Defect Management process.

15.4 Defect Management Reporting

The various Test Reports defined in section 13.2 above will capture and report information on defects and their status relevant to each Test Stage. The SI is required to provide, produce and make available Defect Management Reports to all Test Managers and Leads, as well as others directly impacted by defects arising from testing for DBT and the E2E Co-Ordinator.

The SI will consolidate defect information to produce the detailed Defect Management Reports to be made available on a daily basis, serving as input into daily Status and Escalation Meetings within the Defect Management Plan.

These Defect Management Reports will contain (but not be limited to) the following information:

- Number of defects found;

- Number of defects accepted;

- Number of defects rejected;

- Number of defects deferred;

- Number of open defects by Priority;

- Number of open defects by Severity;

- Number of open defects by Domain (and by responsible parties);

- Time to resolve defects by Priority;

- Time to resolve defects by Severity;

- Time to resolve defects by Domain (and by responsible parties).

Additionally, the SI is expected to produce on a weekly basis Defect Management Reports that are statistical metrics (including Service Levels) in nature for reporting to the E2E Co-Ordinator.

15.5 Defect Management Governance

The Defect Management Governance model should be aligned to governance for Integration and Testing. The SI will define the detailed governance in the Defect Management Plan, which will cover:

- Daily Defect Status Meetings/Calls;

- Daily Triage Meetings/Calls;

- Defect Breakout Meetings/Calls;

- Defect Escalation Process and Escalation Meetings/Calls;

- Defect – Operational Meetings/Calls.

It is important that this clearly captured the Defect Escalation Process and that it includes the appropriate roles and responsibilities for all parties and providers involved in testing.

16 Risks, Assumptions and Dependencies

The following tables define the Risks, Assumptions and Dependencies for testing generally and, where relevant, applicable to each Test Phase. These tables are not exhaustive, and the responsible party or provider for each Test Phase should ensure a comprehensive set of Risks, Assumptions and Dependencies are identified for that phase and documented in the Test Plan(s), together with mitigation and management actions required and the responsibilities for these actions.

Risks, Assumptions and Dependencies should then be proactively managed by the Licenced Party or Service Provider responsible for each Test Phase, and escalated as defined in the D-4.3.2 E2E Integration Plan[16] if they pass agreed thresholds.

Risk	Applicability	Mitigation
Different interpretations of interface specifications by individual parties/providers in Design & Build leads to many issues and defects in SIT	Design & Build PIT	Use Test Tool provided by SI to de-risk interfaces (SI) Incentivise use of Test Tool Sharing and transparency of party and provider designs during Design & Build (SI facilitated)
Lack of availability of representative Test Data of representative quality leads to reduced confidence in testing results	SIT and beyond	Test Data required identified early and sourced in time for testing (SI) Any confidentiality issues (commercial or personal) understood and managed (Ofgem)

Risk	Applicability	Mitigation
Impacts on wider Switching and Market ecosystems not picked up in Testing	PIT UIT/E2E	Risk based analysis of potential impacts on 'unchanged' parts of wider ecosystem (SI) Appropriate regression testing in PIT and E2E Test Phases (parties and providers and SI) Effective Live Rehearsal (SI and Ofgem)
Individual party and provider testing (PIT) does not progress to meet required timescales and/or quality of testing is not sufficient to provide confidence in individual designs prior to SIT	PIT	Clear Entry criteria set and agreed for SIT (SI and Ofgem) Consider regulatory incentives to encourage required progress (Ofgem) Consider commercial incentives on DCC SPs wrt Smart Metering (DCC) Progress monitored and reported regularly (SI) Assurance and assistance provided by SI based on risk (SI)
Test Environment capacity not sufficient to support multiple parties and providers requirements simultaneously	SIT phase and beyond	Analysis of Test Environment requirements early on (SI) Effective planning and management of party and provider use of Environments (SI)
Defect resolution by relevant party or provider does not meet required levels resulting in increasing backlog of defects delaying closure of Test Phases	All phases	All parties and providers to be resourced to deal with expected Defects; as per Defect Management Plan Regular review of Defect Management performance with remedial actions agreed for parties and providers not achieving required performance Escalation to Ofgem governance if a party or provider fails to remedy poor performance

Risk	Applicability	Mitigation
Test timescales get compressed to meet planned Go Live date resulting in reduced test coverage	All phases	Accurate 'left to right' planning for Testing to be performed by all parties and providers (including SI) Test timescales to be defended through Programme governance Test coverage and defects to be prioritised to focus on most critical areas if time is capped

Assumption	Applicability	Management
All parties and providers will provide adequate resources, test environments, test data, test tools, etc for PIT and in support of other Test Phases	All	Via assurance of Test Plans (PIT) by SI and/or Ofgem
The Design Proving Project will have validated the E2E Design functional requirements and all findings will be made available to all parties and providers	All	Ofgem
A SI will be appointed and will be responsible for overall management and coordination of Testing (including Defect Management, Environments, etc) as defined in the E2E Integration Plan (see 13.1 above)	All	Keep E2E Testing Plan aligned with D-4.3.2 E2E Integration Plan[16] through to DB4 (Ofgem) SI role and scope to be confirmed by Ofgem as part of D-8.2 Governance and Assurance Plan for DBT[17]
SI will be responsible for CSS integration SI will be responsible for integration between CSS and other central systems (UK Link, MPRS, DES, ECOES, DSP);	All	To be validated when overall Governance & Assurance roles are finalised by Ofgem
A Test Tool will be provided by the SI to support PIT	PIT	Ensure SI Requirements product includes this and it meets needs

Assumption	Applicability	Management
		for Testing (Ofgem and SI Delivery Manager)
There will be a function which manages the day-to-day running of the E2E Switching Solution, once it is in live operation, together with operating and managing CSS.	Operational Testing Dress rehearsal	Review and validate that Testing Plan aligns with final E2E and CSS Service Management Designs
The CSS will consist of more than one component. The number of components will depend on the solution procured and since this is not yet known, the assumption has been made that there will be a separate components for each of: the network, the Address Service, the central registration system, the customer enquiry service and the service management function. It is assumed that a different Service Provider (SP) will be engaged for each one and that integration of these components will be done by the SI function.	All	To be revalidated once Procurement process determines components and SPs (SI Delivery Manager and Ofgem). SI role and scope to be confirmed by Ofgem as part of D-8.2 Governance and Assurance Plan for DBT[17]
There will be an Assurance function, encompassing design, build, integration and test assurance, which will be provided by Ofgem and the SI Delivery Manager.	All	To be validated to reflect final D-8.2 Governance and Assurance Plan for DBT agreed by Ofgem Testing and Integration Plans to be updated and aligned in light of this

Dependency	Applicability	Management
Each Test Phase/Stage will be dependent on satisfactory completion of previous Test Phases/Stages, and agreed work-off plans	All Phases	SI to monitor and co-ordinate progress, and to escalate if sufficient progress not being made
Testing will be dependent on the output from DPP	Mainly PIT	Ofgem to make DPP output available to all parties and providers (including SI)

Dependency	Applicability	Management
Testing will be dependent on provision of representative Industry Test Data being made available to SI	SIT and beyond	SI to define Test Data requirements and Ofgem to seek this, addressing any legal or regulatory issues
Testing will be dependent on Design and Build activity having completed on time	PIT start	All parties and providers
Testing will be dependent on final designs for: Systems; Data; Interfaces; Data Migration approach and Service Management	All phases	Final design details to be made available to Testing asap so that final Test designs (Scenarios, Test Cases, Test Scripts, Test Data, Test Environments, etc) can be developed in time
Testing will be dependent on final Integration Plan, SI scope and detailed approached developed by SI	All phases	Update Testing Plan to reflect final Integration Plan and SI scope and approach developed once known (Ofgem/SI Delivery Manager)
Testing will be dependent on full co-operation of all parties and providers	All phases	Ensure incentives and regulation drive required behaviours (Ofgem)
Testing will be dependent on Test Environment design and co-ordination	SIT and beyond	SI to be contracted to design and manage the provision of suitable Test Environments and publish to all parties and providers
Testing will be dependent on availability of Test Harness/Test Tool	PIT	SI to be contracted to provide Test Tool prior to start of PIT

Appendix A – Glossary

A glossary of terms used in the Switching Programme can be found in the list of Defined Terms. Those terms used in this document which are not part of the Defined Terms are listed below.

ABACUS	Enterprise Architecture tool, used to hold the data model, business process descriptions, and other artefacts.
API	Application Program Interface
BLPU	Basic Land and Property Unit
BCDR	Business Continuity and Disaster Recovery
CNF	Confirmation File
CRO	Customer Requested Objection
DCC-enrolled meter	A meter included in the Smart Meter programme
DMT	Data Migration and Transition testing
DPP	Design Proving Project. This is an initiative being conducted by Ofgem to validate thE2E design work before enactment starts.
DTN	Data Transfer Network, operated by Electralink.
DUIS	DCC User Interface Specification
Dual fuel	Gas and Electricity being supplied to/exported from the same location
E2E	End-to-End
E2E Switching Solution	The systems and services which provide the new E2E Switching Arrangements.
FAT	Factory Acceptance Test
IXN, IX Network	Network over which gas data flows are transmitted between suppliers, shippers, agents and UK Link.
MIS	Market Intelligence Service
MPAS	Meter Point Administration Service
MPRS	Meter Point Registration Service
MPxN	Generic term to include MPANs and MPRNs indicating any generic meter reference number
MRA	Meter Reading Agent

One-fail-all-fail	A dependency between a group of switch requests which causes the entire group to fail if one of the group fails
OT	Operational Test
PIT	Pre-Integration Test
Pre-pay	A mode of payment collection where the consumer pays in advance for a set amount of energy
S1SP	SMETS1 Service Provider
SIT	System Integration Testing
SMETS1	Smart Metering Equipment Technical Specification - First generation smart meters
SMETS2	Smart Metering Equipment Technical Specification - Second generation smart meters
SR	Service Request
SSD	Supply Start Date
SMP	Supply Meter Point
UEPT	User Entry Process Test
UIT	User Integration Test