SIT Component Integration Test Approach & Plan

Document owner	Document number	Version
Dominic Mooney	**MHHS-DEL1258**	**1.0**
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Contents

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1.1 Change Record

Date	Author(s)	Version	Change Detail
24/03/2023	Dominic Mooney	0.1	Initial Draft
08/06/2023	Dominic Mooney	0.2	Minor updates following SRO review.
28/06/2023	Dominic Mooney	0.3	See section 3.4 'Summary of Changes'
07/072023	Dominic Mooney	0.4	Final changes following Industry Assurance review – see section 3.4 'Summary of Changes'
19/07/2023	Dominic Mooney	1.0	Baselined at v1.0 following July TMAG approval

1.2 Reviewers

Reviewer	Role
Lee Cox	SI Test Manager
Kevin Davis	SI Test Architect
Cesar Lopez	SI Data Architect
Simon Berry	SI Environments and Release Manager
Ian Smith	SRO Design Lead
Smitha Pichrikat	SRO Function Client Delivery Manager

1.3 References

Ref No.	Document/Link	Publisher	Published	Additional Information
REF-01	MHHS-DEL315 - E2E Testing & Integration Strategy	SI Testing	29th April 2022	
REF-02	MHHS-DEL852 - Pre-Integration Test Guidance	SI Testing	3rd April 2023	
REF-03	MHHS-DEL618 - Environment Approach & Plan	SI Testing	28th February 2023	
REF-04	MHHS-DEL1089 - Release and Configuration Management Approach & Plan	SI Testing	17th May 2023	
REF-05	MHHS-DEL813 - Overarching Test Data Approach and Plan	SI Testing	5th May 2023	
REF-06	MHHS-DEL1064 - Placing Reliance Policy	SI Testing	27th April 2023	
REF-07	MHHS-DEL466 - Defect Management Plan	SI Testing	23rd May 2023	
REF-08	MHHS-DEL1166 - SIT CIT Test Scenarios	SI Testing	17th April 2023	
REF-09	MHHS-DEL030 - Programme Governance Framework	PMO	08th Mar 2023	
REF-10	MHHS-DEL1140 - Milestone Register	PMO	26th May 2023	
REF-11	MHHS-DEL1332 - Test Management Tool User Guide	SI Testing	16th June 2023	
REF-12	MHHSP-DES138-Interface Catalogue	Design Team	Version 5.1.2	
REF-13	MHHS-DEL1309 - CIT Test Data Approach & Plan	SI Testing	19th July 2023	

1.4 Terminology

Term	Description
Various	For terminology, see Programme Glossary on the MHHS portal: Programme Glossary (SharePoint.com)

2   Executive Summary

The Market-wide Half Hourly Settlement programme (MHHS) when completed will contribute to a more cost-effective electricity system, encouraging more flexible use of energy and helping consumers lower their bills.

[REF-01] MHHS-DEL315 - E2E Testing & Integration Strategy describes the overall, end-to-end (E2E) approach to testing - the manner in which all parties involved in the MHHS programme will conduct testing. It spans initial testing of individual systems through to complete E2E tests ahead of the start of the Migration Period (where the new systems are progressively introduced and old systems progressively retired). The document describes the major phases of testing:

- **Pre-Integration Testing (PIT)**
- **Systems Integration Testing (SIT)**
- **User Integration Testing (UIT)**

The purpose of Systems Integration Testing (SIT) phase is to prove that the component Services are implemented in a way consistent with the MHHS E2E Design and interact in a coherent and consistent manner, in other words to "prove" the MHHS E2E Design. The SIT phase comprises of 5 sub–Test Stages:

- **Component Integration Test (CIT)**, where all components of the MHHS E2E solution are integrated and tested for compliance with the interface specifications and codes of connection. This includes step-by-step integration of the DIP (including PKI), central systems, MPRS, EES, Smart and Advanced Data Services, Metering Services, Suppliers, Network Operations, UMSO services and UMSDS.

- **Functional Test**, where together, the systems and their interfaces are tested E2E for compliance with the E2E MHHS Design, using pre-defined E2E business scenarios.

- **Migration Test**, where the migration process specified in the E2E MHHS Design is tested, starting with the "as is" systems and moving through the migration steps to arrive in the final "to be" state. Both central (market infrastructure) and supplier/service provider systems will be needed for Migration SIT.

- **Non-Functional Test**, where the non-functional characteristics (including performance and security requirements) specified in the E2E MHHS Design are tested.

- **Operational Test**, where the central systems' operational functions and processes are tested (including their service management solutions and Business Continuity/Disaster Recovery). Supplier and service provider systems may be needed to support testing but will not themselves be under test.

The Programme has a defined set of documentation which will be produced to support the preparation and conduct of each SIT stage. This Approach and Plan document specifically relates to the Component Integration Test (CIT) stage, describing the associated objectives, scope, approach, schedule, management, governance and assurance of the test stage. This is a child document of [REF-01] MHHS-DEL315 - E2E Testing & Integration Strategy and therefore it is recommended that for context both documents are read in conjunction.

3 Introduction

3.1 Document Purpose

The Component Integration Test Approach and Plan (this document) sits within a two tier MHHS Test documentation hierarchy. Please note this document references tier 1 parent documents throughout and doesn't seek to repeat content contained within them, readers will be sign posted to these documents for further detail where relevant. This document also refers to tier 2 child documents that will be produced later.
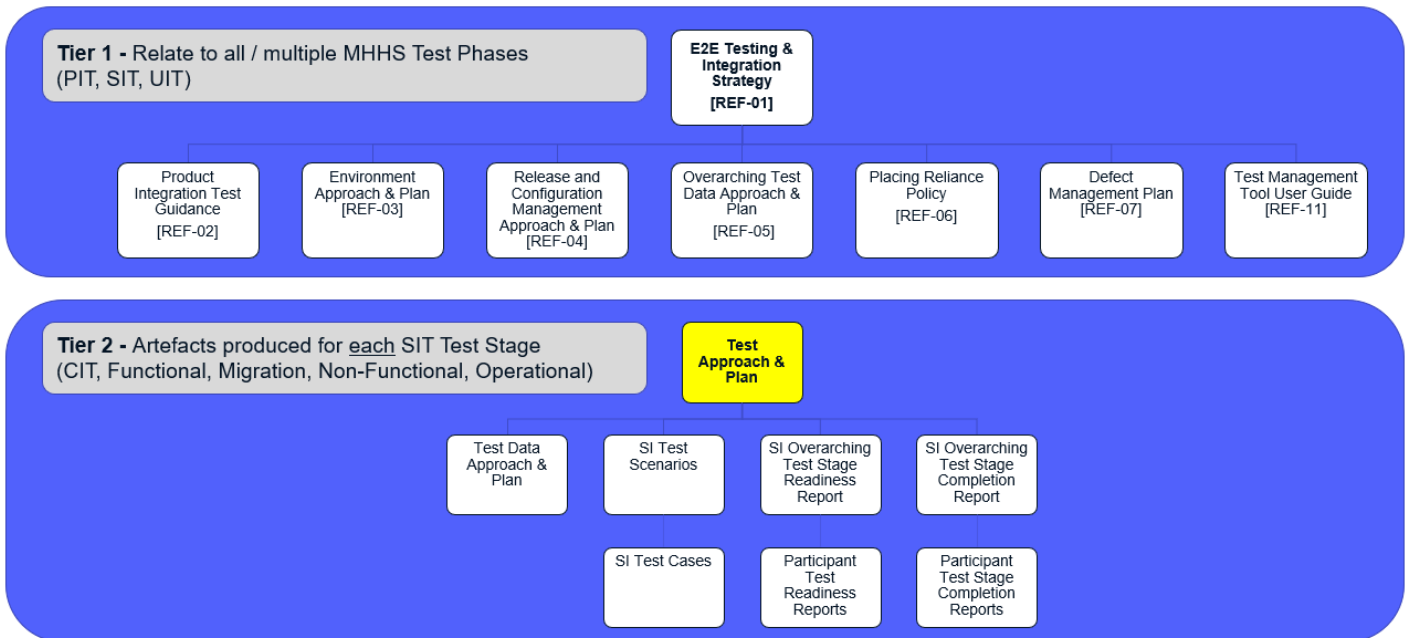
Figure 1 - MHHS two tier test documentation hierarchy

The Component Integration Test Approach and Plan covers:

- Test Stage Objectives
- Scope
- Architecture and Coverage
- Approach (Preparation & Execution), covering:
  - Test Scenarios and Cases
  - Test Data
  - Stubs and Harnesses
  - Test Management Tool
  - Evidence Capture
  - Defects Management
  - Environments & Releases
  - Readiness and Completion Reports
  - Entry and Exit Criteria
- Schedules
- Management & Organisation
- Governance & Reporting
- Assurance.

This document is intended to be read by the following groups:

- SRO Function (SRO)
- Lead Delivery Partner (LDP)
- Testing and Migration Advisory Group (TMAG)
- All Programme party teams and resources involved in SIT execution or support.
- DCC UEPT Team
- BSC and REC Code Body Qualification teams
- Independent Programme Assurance (IPA).

3.2   Reviews and Approvals

The Component Integration Test Approach and Plan will go through initial LDP review by the following team members:

- Lee Cox, SI Test Manager
- Kevin Davis, SI Test Architect
- Cesar Lopes, SI Data Architect
- Simon Berry, SI Environments and Release Manager

Upon completion of LDP review, any comments and feedback would be incorporated before going to the SRO team formal review by:

- Ian Smith, SRO Design Lead
- Smitha Pichrikat, SRO Function Client Delivery Manager

Upon completion of the SRO review it will then be distributed to the SITWG for review where comments will be incorporated leading to a recommendation of approval by the group.

When comments and feedback have been incorporated, approval will be requested from:

- Testing and Migration Advisory Group (TMAG).

The document will be made available for information via the programme portal.

3.3   Change Forecast

The SI team will own this document and keep it up to date, with review and approval by MHHS programme governance as appropriate. Each new version supersedes the previous version in its entirety.

Updates to this document will follow the review and approval process outlined in section 3.2.

3.4   Summary of Changes

Minor changes in version 0.4:

- A red box has been added to the diagram in section 6.1 'MHHS Architecture and Coverage' to depict the DIP interfaces in scope for CIT more clearly.
- References to Settlement Operations have been removed from CIT scope.
- In section 7.2.1.1 the reference to PPs' ability to 'take on ISD' has been amended to 'download ISD' to be consistent with the rest of the document.

- In section 7.2.2 the reference to 'MPANs records' has been changed to 'MPAN records'.

- Two references to test 'scripts' in Section: 7.2.4 and 7.2.6 have been changed to 'cases' for consistency with the rest of the document.

- In section 7.2.8 the statement '...will be required to provide an individual Test Completion Report within 5 days of completing their tests...' has been amended to 5 working days for clarification.

- MHHS-DEL1309 CIT Test Data Approach & Plan has been added to the references table and within the document.

3.5 Assumptions and Caveats

3.5.1 Assumptions

- It is assumed the Elexon (Helix) ISD solution will be developed in time for parties to access as part of their CIT testing.

- Although at the time of writing the programme plan and PIT Guidance does not yet reflect the recent programme decision to permit Programme party PIT phasing in line with each SIT Stage, the document assumes some PP's may choose to meet their PIT requirement in this way.

3.5.2 Caveats

N/A

4 Objectives

4.1 Objectives

The objective of the Component Integration Test (CIT) stage is to demonstrate that each Market role in scope, which directly integrates with the DIP, can bi-laterally interface with the DIP successfully and the DIP can then route interface messages to the correct recipients based on IF message sender and payload conditions. The purpose of this testing is to build confidence for, and de-risk, the subsequent SIT Functional Test stage where full E2E business process tests involving all roles will be executed.

The objective will be to execute and pass all test scenarios / cases in scope of the Test Stage without exception.

5 Scope
5.1 In Scope

The scope of SIT Component Integration is as follows:

1. For all Roles interfacing with the DIP:
    I. **Verify ability to download Industry Standing Data** for each Participant within MHHS Architecture:
        a. Download ISD dataset relevant to the Service.
    II. **Verify ability to send/receive IF/PUB** for each individual Participant within MHHS Architecture:
        a. Send each type of IF message (one example of each IF message type valid for the Participant's Role).
        b. Receive each type of PUB message (one example of each PUB message type valid for the Participant's Role).
2. For the DIP:
    I. **Verify DIP routing:**
        a. Route each type of IF message according to Always, Primary and Secondary. Send and receive each IF and PUB between all Participants, as progressively more components are added to the

integrated environment. Note that the routing exercised will depend not only on the IF message but also on its Event Code and where appropriate on data within the message.

In (1-ii), the testing will be done by using mocked-up messages where necessary. By careful design of the tests, a single set of tests will cover both (1-ii) and (2-i). However, given the DIP routing depends on Event Codes coupled with data in the message body, of which there are many variations, additional tests will be necessary to fully prove the routing. In this case, the Participants will be required to send/receive additional messages once they have successfully completed (1-i) and (1-ii) to assist with other parties' testing.

Please refer to [REF-08] MHHS-DEL1166 - SIT CIT Test Scenarios for further detail of the CIT coverage.

The Market roles in scope for the CIT stage are:

- Data Integration Platform (DIP)
- BSC Central Service (LSS, MDS)
- Registration Service (MPRS)
- Smart Data Service (SDS)
- Advanced Data Service (ADS)
- Metering Service Smart (MSS)
- Metering Service Advanced (MSA)
- Electricity Suppliers
- Network Operations
- Electricity Enquiry Service (EES)
- Unmetered Supplies Operator (UMSO)
- Unmetered Supplies Data Service (UMSDS).

Please note that this document is agnostic of specific industry SIT volunteer organisations.

5.2   Out of Scope

- Only direct interfaces with the DIP will be tested in CIT, the non-DIP direct interfacing roles i.e. DCC (DSP, CSS), VAS, National Grid ESO and DTN, will be introduced within a connectivity proving stage prior to SIT Functional Test stage.
- DCC UEPT – Participants adopting the SDS MDR role are to engage with the DCC and follow and complete the associated User Entry Process Test procedures as a pre-requisite to entering SIT Functional Test (Note this does not apply to suppliers fulfilling the MDR role using IS and ES IDs).
- The details and mechanics of how test data will be allocated and used during CIT will be the subject of the separate [REF-12] MHHS-DEL1309 - CIT Test Data Approach & Plan document, this will be issued for consultation in conjunction with this document.
- Pre-Integration Test (PIT), which takes place on the Programme participant's own standalone test environment and is a pre-requisite for entry into SIT or Qualification Testing. Guidance for this test phase can be found in [REF-02] MHHS-DEL852 - Pre-Integration Test Guidance.
- All the other SIT Stages – these will be the subject of separate Test Approach and Plan documents:
    - o   Functional Test
    - o   Migration Test
    - o   Non-Functional Test
    - o   Operational Test
- Minimum Viable Cohort – this will be formed during SIT Functional Test
- UIT Test Stages:
    - o   Qualification Test

6 Test Architecture & Coverage

6.1 MHHS Architecture and Coverage

Component systems/services will be integrated one at a time or in small groups over six intervals within the CIT test window (Please section 8 'Test Schedule' for dates and timelines). Testing will focus on each role/service that directly integrates with Data Integration Platform (DIP) see figure 2 below. Test scenarios and cases have been designed to be conducted on a bi-lateral basis between each role/service and the DIP only, i.e. there will be no dependency on the involvement of other roles/services within in the architecture in order to complete the tests in scope for this stage.

This will be achieved by establishing a test environment where all Central Systems, the Registration Service and at least two Services for each Role are connected via to the Data Integration Platform (DIP). Tests will then be conducted based on the IF/PUB messages relevant to each role in scope. The environment where CIT has been conducted will then be used for the subsequent SIT Functional Test stage.
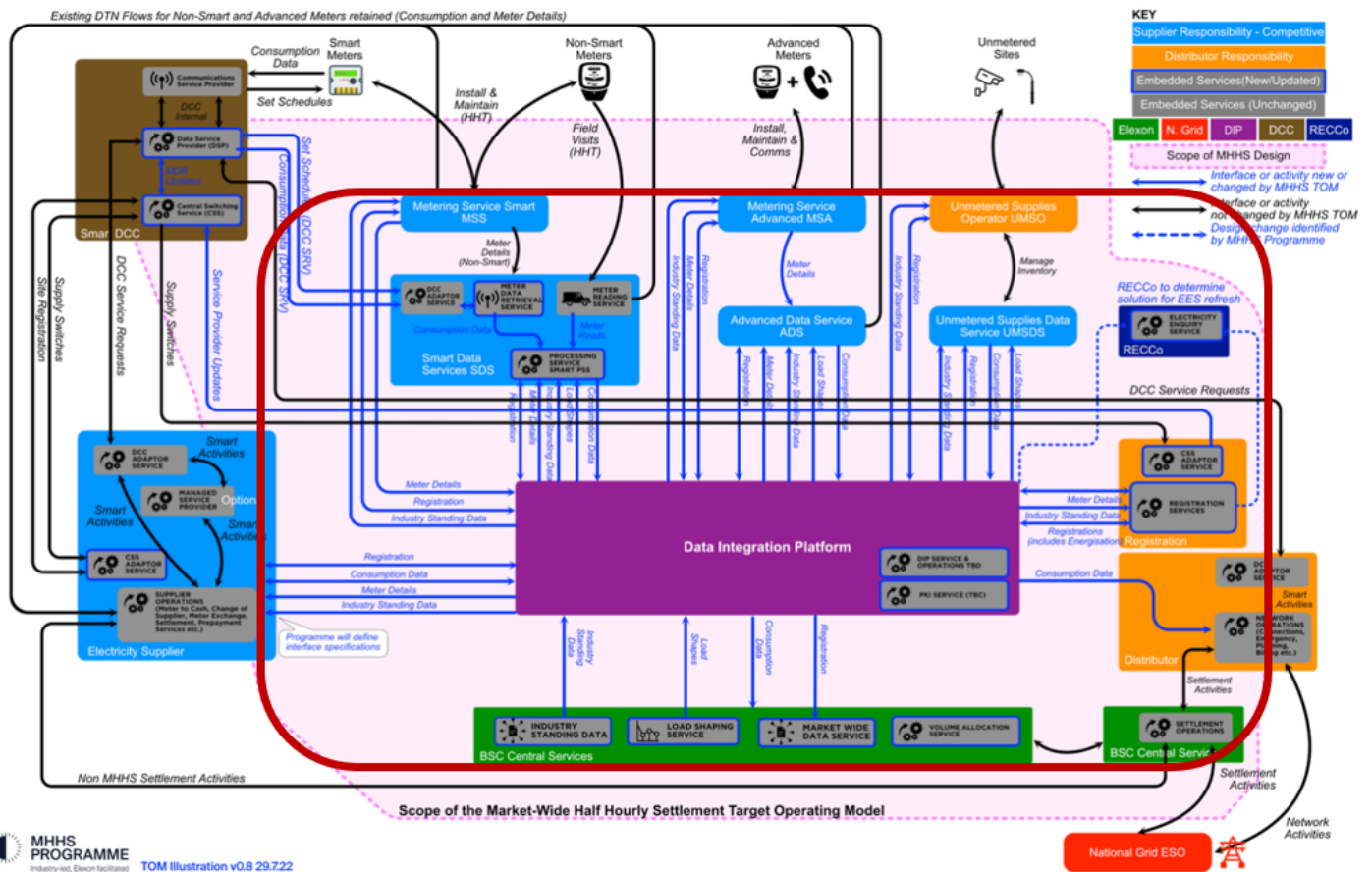
Figure 2 - TOM illustration (Note CIT DIP interface scope within red box)

CIT will be conducted between the SI Test Team and the organisation responsible for each component being integrated, with messages being exchanged between special end-points set up by the SI Test Team and the service being integrated. Each role/service will be expected to send and receive -IF/PUB messages relevant to it in order for that service to pass SIT CIT. This means that where the test is that a service receives a PUB message, the SI Test Team will initiate that test by sending in the relevant message from a specially created end-point.

For service message receipt, the service is expected to pass the test when it has successfully received the in-scope PUB messages for their role (as specified in [REF-08] MHHS-DEL1166 - SIT CIT Test Scenarios), and it can be evidenced that the message has landed at the nearest point in your back office beyond the adaptor layer.

Where the test involves a service generating an IF then it is up to that service to generate a message appropriately, triggering it from the same point in their service as would be the case in the E2E business process (i.e. not just from their adaptor layer), this is important as it will build confidence prior to the E2E business process testing in the subsequent SIT Functional Test stage, note that as full E2E testing won't be possible at the CIT stage it is expected that the participant will use the same method/mechanism to generate the IF message in isolation that was used within their PIT testing.

A Sender will also be required to send messages that will involve generating several different variations of a particular IF in order to verify the DIP routing.

The following combination of data items makes each scenario unique:

- Interface (IF number)
- Event Code
- Data Conditions
- Sender.

Data Conditions means any specific conditions called out in the [REF-12] MHHSP-DES138-Interface Catalogue which are used to determine the routing. For example, routing for an IF-006 can depend on the Supply Start Date.

During CIT, tests will also be required to show the DIP routing of, and participants systems' ability to download Industry Standing Data (ISD).

For details of the scenario coverage please refer to [REF-08] MHHS-DEL1166 - SIT CIT Test Scenarios.

6.1.1 MHHS Environment Requirements

CIT stage testing will be undertaken within the MHHS SIT-A environment. SIT CIT participants will be required to connect their test environments to the SIT-A DIP instance as a pre-requisite to CIT in accordance with the requirements set out in [REF-03] MHHS-DEL618 - Environment Approach & Plan, please refer to this document for the details on:

- Management and tracking environment builds, and associated reference data.
- Planning and allocation in the use of environments for relevant participants, including user access permissions and control.
- Environment Connectivity Proving.
- Maintenance, availability, and monitoring of environments, including the specification of back-ups, exports, refreshes, or roll backs.
- Controlling deployments into environments, including data configuration, version control and release notes.
- Tracking and coordination in resolving environment issues using the defect management workflow.
- Environment requirements for the various stages within PIT, SIT and UIT phases.

7 Test Approach

7.1 Test Preparation

7.1.1 SI Test Scenarios & Test Cases

The SI Test Team has used the MHHS Design repositories to inform MHHS test scenario and test case design. At the top level the design is structured into 3 key themes:

- MPAN Ownership
- Metering Changes

- Meter to Bank.

The themes in turn link to business requirements, business process descriptions, interface specifications, logical data model, method statements and the End to End Solution Architecture-. These documents help trace the business journey for each MHHS industry role across the process flow, the underlying systems, the associated message exchanges and validation rules.

Each participant role can be mapped to its' flows, in relation to each service, as well as interactions with other roles and participants (process handoffs). This is a critical for analysing SIT end to end testing requirements.

[REF-12] MHHSP-DES138-Interface Catalogue has been one of the primary inputs for defining the Component Integration Test Scenarios and Cases.

CIT Scenarios have been developed by the SI Test Team and undergo the following review, consultation and approval process:

1. LDP Peer Review
2. SRO and Design Team Review
3. SITWG Review / Consultation
4. TMAG Approval.

At the time of writing the CIT Scenarios are at stage 3 of the process, for details please refer to [REF-08] MHHS-DEL1166 - SIT CIT Test Scenarios. Test Cases are currently under development.

7.1.2   Test Data

The [REF-05] MHHS-DEL813 - Overarching Test Data Approach and Plan describes how an aligned set of data for Systems Integration Testing (SIT) will be delivered. Please refer to this document for the details of the overall approach to data cuts, data management, allocation, cleansing, storage, archiving and maintenance.

Prior to CIT commencement the SI will identify sets of suitable data that participants can use for each of their SIT test cases in scope, details on process and mechanisms for this are documented in the [REF-12] MHHS-DEL1309 - CIT Test Data Approach & Plan which will be published in conjunction with this document.

7.1.3   Test Stubs and Harnesses

Pseudo organisations and roles will be set up in the DIP, along with pseudo end points that will allow the SIT Test Team to generate IF and PUB messages where required in the scenarios, as per the approach described in section 6.1. This approach will also require pseudo-organisations and MPIDs to be included in ISD in order that DIP onboarding can occur.

7.1.4   Test Management Tool

All CIT Test execution and defects will be managed within the MHHS Azure DevOps (ADO) Test Management Tool.

In preparation for CIT all test cases applicable to a participants' role in the test stage will be loaded into their individual ADO test project ready for execution.

7.1.4.1   Test Management Tool Onboarding

The SI will set up all nominated test resources for each CIT participant within ADO and provide the necessary access and user guidance tutorial material.

Details of ADO set up, onboarding and usage will be published within [REF-11] <u>MHHS-DEL1332 - Test Management Tool User Guide</u>.

7.1.5 Participant Preparation

In preparation for the CIT stage, participants will be required to plan, execute and complete the following activities:

- Pre-Integration Testing relevant to the CIT stage – please refer to the [REF-02] <u>MHHS-DEL852 - Pre-Integration Test Guidance</u>.

- Environment Connectivity proving - please refer to the [REF-03] <u>MHHS-DEL618 - Environment Approach & Plan</u>'.

- Test Data allocation has been loaded and verified – please refer to the [REF-05] <u>MHHS-DEL813 - Overarching Test Data Approach and Plan</u> and [REF-12] <u>MHHS-DEL1309 - CIT Test Data Approach & Plan</u> which will be published in conjunction with this document.

- Participant users have been onboarded to the MHHS Test Management Tool – please note details on this process will be published within [REF-11] <u>MHHS-DEL1332 - Test Management Tool User Guide</u>.

- Participants have confirmed they have resources with the requisite skills and system access to support the test stage execution and defect management process – note this will be subject to assurance.

7.1.5.1 Participant's adopting the Placing Reliance Policy

[REF-06] <u>MHHS-DEL1064 - Placing Reliance Policy</u> can be adopted where Qualifying SIT participants either:

a) Intend to delegate some testing to a 3rd Party Software / IT provider, or;

b) Intend to enter SIT as a group and delegate or place reliance within that group.

In either case it is the Qualifying SIT participants that are ultimately accountable for how their MHHS industry testing requirements have been met, but exactly how they choose to delegate day-to-day task management within test preparation and execution to their delegated 3rd party testing providers, or within the SIT Group, may differ between participants. During test preparation the SI will provide a RACI template for participants to complete with their delegated 3rd Party test providers, which will confirm arrangements in relation to (but not limited to) the following areas:

- Test Meeting Attendance

- Defect Decisions

- Releases

- Governance representation.

7.1.5.2 Participant SIT Test Readiness Report

Prior to CIT commencement each participant will be required to provide a Participant SIT Test Readiness Report as a self-declaration of their completion status in relation to preparation activities outlined in section 7.1.5, this will need to include any exceptions and work off plans that have been agreed and must be signed by senior stakeholders within the participants' organisation. Please note the SI will provide a report pro-forma for participants to complete.

The SI will be engaged in Test Assurance engagement and monitoring throughout these preparation activities; however the report serves as a formal position at the point of CIT entry governance.

Participant SIT Test Readiness Reports will be required at a defined date ahead of your CIT commencement, please see section 8.2 for the schedule and dates by which this will be required for your role / service.

7.1.6 Test Entry Criteria

The following deliverables have been produced by the SI, reviewed, assured and approved as appropriate for the test stage:

- Test Approach and Plan.
- Test Data Approach and Plan.
- Test Scenarios.
- Test Cases.
- Requirements Traceability Matrix.
- Test execution schedule (SIT participants will be consulted).

The following have been set up by the SI and confirmed as ready for test commencement:

- Test data has been allocated to participants.
- Test stubs & Harnesses.
- Test Management Tool
  - Tests have been loaded.
  - Tests have been loaded and assigned to relevant participants.
- Defect Management process.
- Environment Management process.
- Release Management process.
- Test governance.
- Test meetings.
- Test Reporting.

For Participants entering SIT:

- Evidence of successful PIT Completion for the CIT stage has been submitted, assured by the SI and any work off plans agreed and tracked - please refer to [REF-02] MHHS-DEL852 - Pre-Integration Test Guidance for full details of the PIT exit criteria.
- Environment Connectivity proving has been successfully completed and evidence assured by the SI.
- Test Data allocation has been loaded, verified, and assured by the SI.
- Participant users have been onboarded to the MHHS Test Management Tool.
- Participants have confirmed they have resources with the requisite skills and system access to support the test stage execution and defect management process.

7.1.6.1   SI Test Readiness Report

Prior to CIT entry the SI will compile an overarching CIT Readiness report on the status of these entry criteria, which will note any exceptions or work off plans that have been agreed and include the SI recommendation to proceed or pause. This report will form the basis on which governance approval to commence CIT execution will be sought via the MHHS Governance Framework – please see section 10.1.

7.2   Test Execution

The approach to CIT will be to progressively onboard participants based on role / service in a controlled sequence, thus allowing confidence to be increased as each system / service joins and completes testing.

SIT Participants should plan to complete their test preparation and execution actvities for their market role(s) in line with the associated interval below (please see section 8 for dates and timelines).

The DIP provider will be involved in testing from the outset and throughout the entire CIT stage execution window.

During test execution the SI Test Team will coordinate in scope test activities between the DIP provider and each participant. In addition to coordinating the defect, data, enviroments and release management.

SIT CIT Entry Interval	Systems / Services
1	DIP, LSS, MDS
2	MPRS (Drop 1)
3	Smart Data Services, Advanced Data Services
4	Metering Services
5	Suppliers, Network Operations, UMSO
6	MPRS (Drop 2), EES, UMSDS

SIT CIT Progressive Integration

- Participants progressively onboarded by system / role
- PIT and SIT readiness aligned to CIT entry point

Figure 3 – CIT Intervals

7.2.1 ADO

ADO will be used for:

- Managing test case execution and evidence capture.
- Tracking and reporting test execution progress.
- Raising and managing defects (including Environment issues).
- Tracking and reporting defect status and progress.
- Release Management.
- Maintaining requirements to test traceability.
- Tracking and reporting test coverage status.

SIT participants will be expected to keep ADO updated in real time as execution is carried out.

Details of the ADO set up will be published subsequently within [REF-11] MHHS-DEL1332 - Test Management Tool User Guide.

7.2.1.1 Test Evidence Capture

Programme participants conducting SIT CIT will need to provide test evidence for the test steps in ADO where it has been indicated as required. This evidence will be used during test assurance to validate actual vs. expected result of the test. In addition test evidence will be critical for triaging defects and this may require both the evidence of the failure event, and upstream test step evidence to assist in analysing the failure.

Examples of where evidence will be required in testing:

- Evidence of successful ability to download ISD for each relevant Participant.
- Evidence of successful ability to send/receive IF and PUB messages for each role:
  - For **IF messages sent outward** from the application to the DIP showing the contents of each message sent to the DIP, and the DIP to provide content of message of that the DIP has received.
  - For **PUB messages sent inwards** to the applications from the DIP showing a file of messages (relevant Always, Primary and Secondary) and record of their successful receipt in the recipient system.

- Evidence of successful DIP routing for each type of IF message in scope of testing according to Always, Primary and Secondary.

Screenshots of the test system, messages and or electronic logs of messages must be provided as appropriate and should be annotated with the Test Case reference and test step that they apply to. The evidence requested is standard for any test assurance process and should be similar to that required by the Programme participants' own quality gate and internal audit.

7.2.2 Test Data Usage

Each CIT participant will be allocated a set of suitable test data for each test case in scope for their role. All MPANs records used in testing will be allocated unique reference ID that will be used in all communications including test result and defect logging in ADO.

Full details of how test data will be managed during test execution are to be documented in [REF-12] MHHS-DEL1309 - CIT Test Data Approach & Plan which will be published in conjunction with this document.

7.2.3 Placing Reliance

Where applicable, day-to-day test execution will be managed and coordinated in accordance with the Placing Reliance RACI that has been agreed during preparation with those participants that have chosen to adopt the policy to meet their test requirement.

7.2.4 Defect Management

The MHHS programme defines a defect, in respect of any tests, as:

a) Anything that is preventing the execution of the tests; or

b) Once commenced or executed, the test has an unexpected or unexplained outcome or response.

A defect is raised in respect of any of the following:

- Failure in the way systems (or system components) operate (both functionally and non-functionally).
- Failure in the way systems have been integrated and/or communications between these systems.
- Failure in the performance of test emulators, simulators or data generators.
- Failure in relation to different Test environments.
- Failure in relation to the Test specifications, cases, data or expected results.
- Documentation Issue.

All defects will be raised and managed within MHHS Test Management Tool (ADO) and will follow the process depicted below.
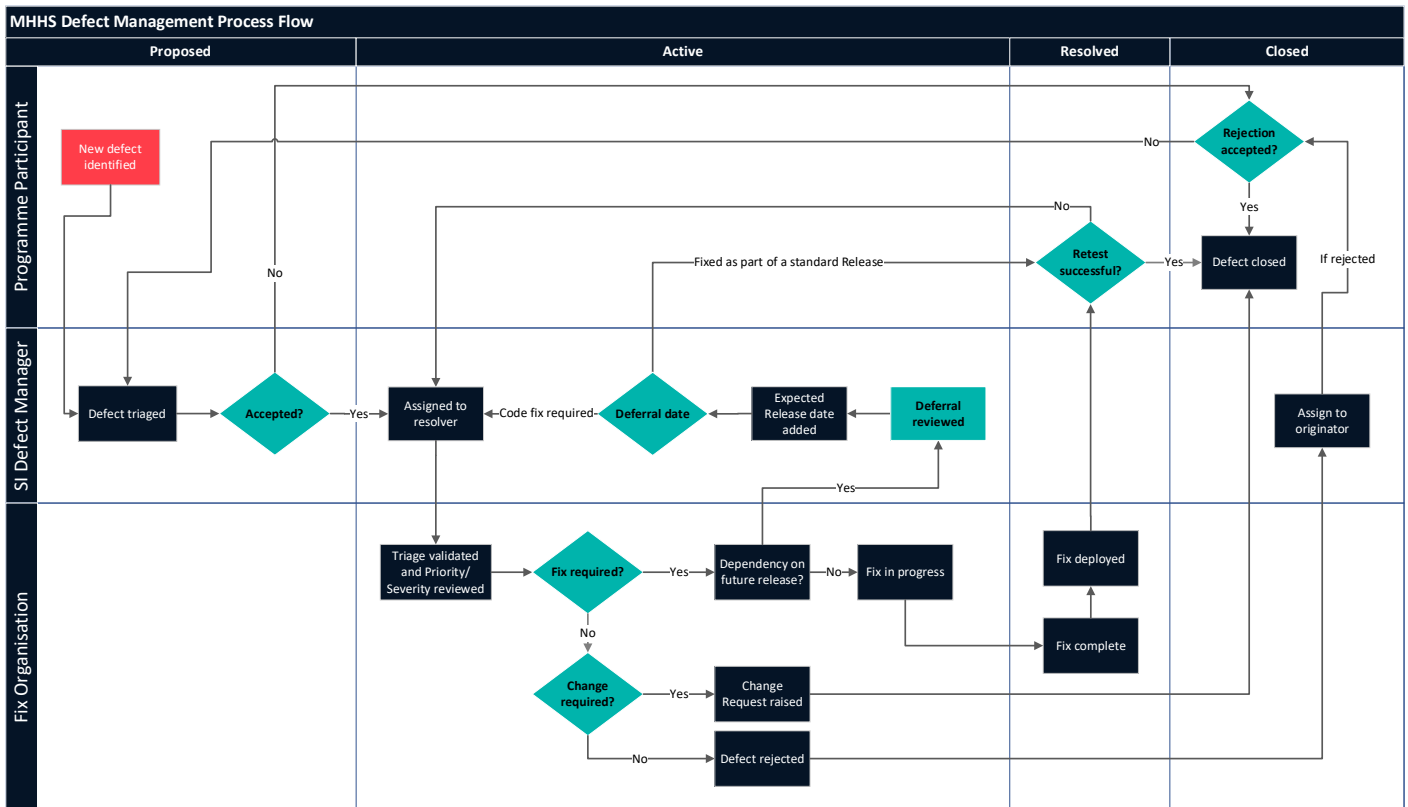
Figure 4 - ADO Defect Process Flow

Defects arising within the CIT stage will be managed in accordance with the [REF-07] MHHS-DEL466 - Defect Management Plan.

7.2.5 Release & Configuration Management

When defects arise that require a code fix, code releases will be managed in accordance with the [REF-04] MHHS-DEL1089 - Release and Configuration Management Approach & Plan.

7.2.6 Test Suspension and Resumption Criteria

During SIT, any PP has the right to suspend testing where it considers necessary, by agreement with the SI team. Testing will only recommence when agreed between the PP and SI team. Where the SI team believes there are reasonable grounds to suspend all testing, this can be done by agreement with the SRO. In the case of any suspension the IPA and OFGEM would also be informed.

Reasonable grounds for suspending testing may include any of the following:

- Application components are not available as scheduled.

- A testing issue prevents further useful testing from proceeding.

- A large percentage of planned test cases for a given day fail and significant root cause analysis needs to be undertaken to establish the cause. The outcome of any root cause analysis activity may result in testing being suspended.

- Test cases to be executed are in a "blocked" status due to an identified testing issue.

Where testing has been suspended, either the SI team or the PP (as appropriate) will produce a test suspension report reflecting the cause of the suspension and the actions to be taken by whom and when in order for testing to resume – the test resumption criteria. Testing will only resume once the PP has demonstrated to the SI team or the SI team to the SRO that the test resumption criteria have been met.

7.2.7   Regression Testing

Due to the nature of testing within the CIT stage there is no planned regression phase built into the test schedule, instead any regression requirements will be assessed on a case-by-case basis in relation to any defects that have been fixed with a code release, and assessment of the impact this release may have on testing that had been previously executed within the test stage.

7.2.8   Participant Test Completion Reports

As each CIT participant concludes their testing within the CIT stage, they will be required to provide an individual Test Completion Report within 5 working days of completing their tests, this will need to include any exceptions and work off plans that have been agreed.

Where a SIT participant is performing CIT testing in multiple roles / intervals the programme will accept a single completion report covering all testing that has been executed.

Please note the SI will provide the test completion report format for all participants to complete.

The SI will be engaged in Test Assurance engagement and monitoring throughout the execution activities; however the report serves as a formal position at the point of CIT exit governance.

7.2.9   Test Exit Criteria

- All tests have been run to completion or any exceptions are documented and agreed;
- All tests have passed (please note that due to the nature of the CIT test stage there is no prioritisation of tests and intention is for all tests in scope to have been executed and passed, any exceptions will need to be documented and agreed).
- There are no outstanding Severity 1 or 2 defects, or any exceptions are documented and agreed.
- Any outstanding severity 3-5 defects on each system and the total number of severity 3-5 defects across all systems has been documented and agreed.
- Work-off plan for any outstanding defects has been produced and agreed.
- Test results and evidence has been captured in the test management tool.
- Defects have been captured in the defect management tool.
- Any required regression testing has been successfully completed.

7.2.9.1   SI Test Completion Report

At the end of the SIT Component Integration Test stage the SI will produce an overarching test stage completion report which will cover:

- Test Execution Results (Anonymised as appropriate i.e. identified by market role rather than organisation).
- Summary of Test Status (Planned vs. Actual).
- Passed with Workarounds (If applicable).
- Failed Tests (If applicable).
- Descoped or Deferred Tests (If applicable).
- Status of work off plan from previous phase / stage (If applicable).
- Defects Summary (Anonymised as appropriate i.e. identified by market role rather than organisation).
- Raised and closed (Inc closure reason analysis).
- Outstanding Defects with their status and work off plan.

- Outstanding Defects (By Priority and Severity).

- Outstanding Defects (By Test Participant i.e. identified by market role rather than organisation).

- Defects Analysis (Anonymised as appropriate i.e. identified by market role rather than organisation)

  - By Category.

  - By Closure Reason.

- Defect Lessons Learned and Improvement Plans for the next phase / stage.

- Test Exit

  - Exit Criteria Status.

  - Work Off Plan.

- Overall Test Execution Observations, Lessons Learned and Improvement Plans for the next phase / stage (If applicable).

- Conclusion and Recommendation.

This report will form the basis on which governance approval of the completion of the CIT stage will be sought via the MHHS Governance Framework – please see section 10.1.

8 Test Schedule

8.1 SIT Component Integration Test

CIT is the 1st stage within the System Integration Test schedule.
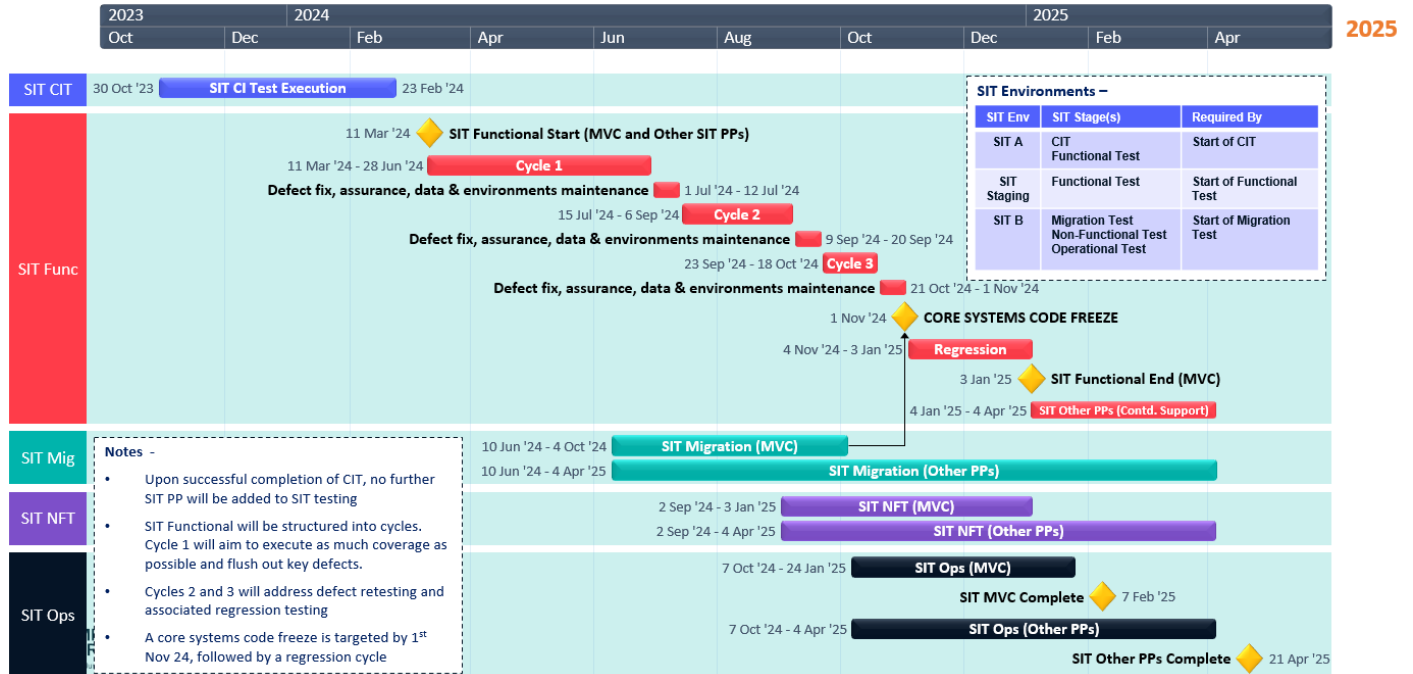
Figure 5 - SIT Stages Plan on a Page

SIT Participants will be progressively onboarded by role / service within the CIT window. CIT Interval start dates for each role / service below.

SIT CIT Entry Interval	SIT CIT Entry Date	Systems / Services
1	30 Oct 23	DIP, LSS, MDS
2	13 Nov 23	MPRS (Drop 1)
3	27 Nov 23	Smart Data Services, Advanced Data Services
4	11 Dec 23	Metering Services
5	15 Jan 24	Suppliers, Network Operations, UMSO
6	29 Jan 24	MPRS (Drop 2), EES, UMSDS

Figure 6 - SIT CIT Interval Start Dates

8.2 CIT Test Preparation Schedule

8.2.1 CIT Participant Preparation Schedule

SIT CIT readiness dates that PP's within each CIT interval will be required to meet ahead of test execution commencement. Please note that this also includes the schedule for test assurance and goverance activities.

For details of activities, deliverables and assurance associated to PIT please refer to [REF-02] MHHS-DEL852 - Pre-Integration Test Guidance.

PIT Completion / SIT Readiness in ref to PP SIT CIT Start

		DIP, LSS, MDS	MPRS (Drop 1)	Smart Data Services, Advanced Data Services	Metering Services	Suppliers, Network Operations, UMSO	MPRS (Drop 2), EES, UMSDS
Activity / Milestone	**Notes**	**CIT Interval 1**	**CIT Interval 2**	**CIT Interval 3**	**CIT Interval 4**	**CIT Interval 5**	**CIT Interval 6**
SIT CIT Start	CIT Interval 1 Start = PSG Milestone (M9)	30th Oct 23	13th Nov 23	27th Nov 23	11th Dec 23	15th Jan 24*	29th Jan 24
SIT CIT Ready to Start (TMAG Milestone)	TMAG Milestone - 1 week prior to CIT Start for each CIT Interval	23rd Oct 23	6th Nov 23	20th Nov 23	4th Dec 23	8th Jan 24	22nd Jan 24
SI Overarching CIT Test Readiness Report reviewed by SITWG / IPA	• 5 working days for review	13th Oct 23	3rd Nov 23	17th Nov 23	1st Dec	5th Jan 24	19th Jan 24
SI Issues Overarching CIT Test Readiness Report	• SI releases report 2 weeks prior to 'SIT CIT Ready to Start' milestone for CIT Interval 1, allowing for review and mop up ahead of PSG (M9) • SI releases iterated report 1 week prior to 'SIT CIT Ready to Start' milestone for CIT Intervals 2-6	6th Oct 23	27th Oct 23	10th Nov 23	27th Nov 23	18th Dec 23	15th Jan 24
PP CIT Test Readiness Reports Assured by SI	5 working days for review	6th Oct 23	27th Oct 23	10th Nov 23	24th Nov 23	15th Dec 23	12th Jan 24
PPs Issue CIT Test Readiness Reports		29th Sep 23	20th Oct 23	3rd Nov 23	17th Nov 23	8th Dec 23	5th Jan 24
Test Data Load and Verification Complete	Period of 4 weeks prior to PP CIT Test Readiness Report	29th Sep 23	20th Oct 23	3rd Nov 23	17th Nov 23	8th Dec 23	5th Jan 24
MHHS code deployed to SIT PPs' envs	Period of 2 weeks prior to PP CIT Test Readiness Report	29th Sep 23	20th Oct 23	3rd Nov 23	17th Nov 23	8th Dec 23	5th Jan 24
Environment Connectivity Proving Complete		29th Sep 23	20th Oct 23	3rd Nov 23	17th Nov 23	8th Dec 23	5th Jan 24
SIT PPs' envs ready to start connectivity proving (incl certs)		1st Sep 23	22nd Sep 23	6th Oct 23	20th Oct 23	10th Nov 23	24th Nov 23
PP Final PIT Completion Reports assured by SI	5 working days for review	6th Oct 23	27th Oct 23	10th Nov 23	24th Nov 23	15th Dec 23	12th Jan 24
PPs Issue Final PIT Completion Report	Final report allowing for any test completion delta	29th Sep 23 (No later than**)	20th Oct 23 (No later than**)	3rd Nov 23 (No later than**)	17th Nov 23 (No later than**)	8th Dec 23 (No later than**)	5th Jan 24 (No later than**)
Draft PIT Completion Reports assured by SI		29th Sep 23	20th Oct 23	3rd Nov 23	17th Nov 23	8th Dec 23	5th Jan 24
PPs Issue Draft PIT** Completion Report	A draft of the PIT test completion report to be submitted no later than 15 working days before the planned end of test execution	8th Sep 23 (No later than**)	29th Sep 23 (No later than**)	13th Oct 23 (No later than**)	27th Oct 23 (No later than**)	17th Nov 23 (No later than**)	1st Dec 23 (No later than**)

Note 1* – There is an extended period between CIT Intervals 4 and 5 allowing for the Xmas and New Year period. Some readiness dates have also been adjusted accordingly for CIT Intervals 5 and 6.

Note 2** – SI Test Team will agree timelines for prior PIT deliverables with individual SIT PPs in line with their delivery plans, allowing for test assurance activities in the lead up to SIT

MHHS PROGRAMME
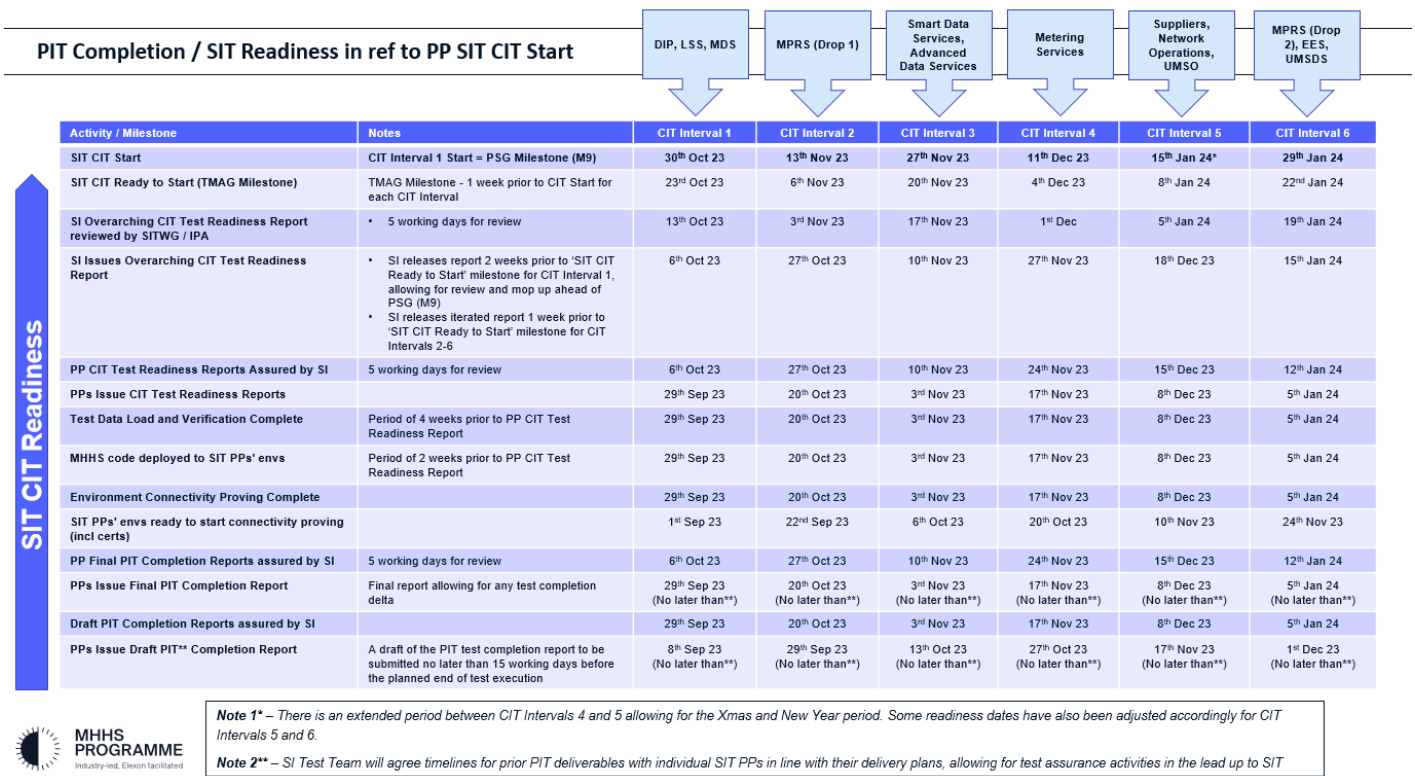Industry-led, Elexon facilitated

Figure 7 – SIT CIT Interval Readiness Schedule

8.3 Test Execution Schedule

SIT Participants should plan to complete their test execution within their interval window (see below), however should defects arise that cannot be resolved within these windows, participants will need to ensure test resource is available to support retesting and/or any related regression testing as required.

Note the DIP provider will be involved in all testing throughout the entire CIT stage execution window.
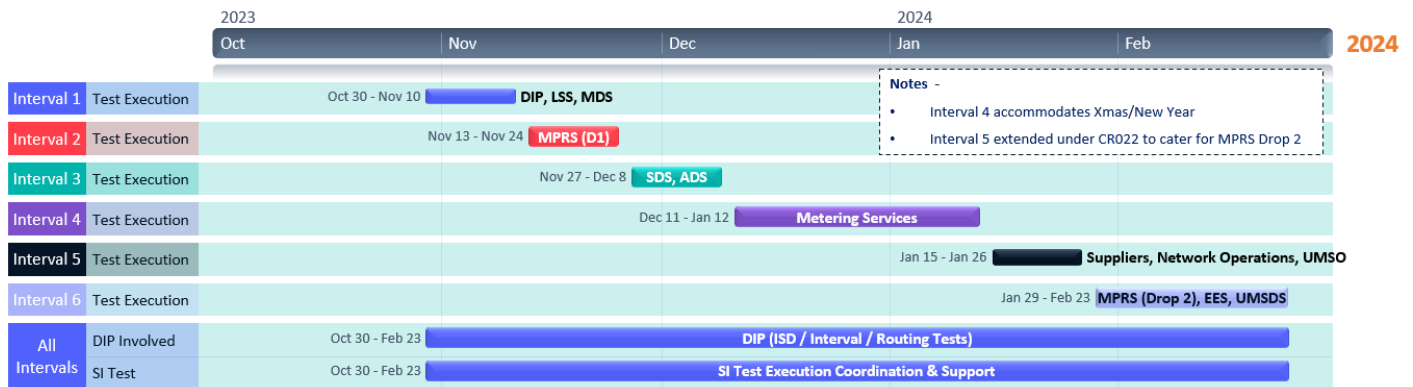

Figure 8 – SIT CIT Interval Execution

9 Test Management & Organisation

The following resources will be required to prepare and execute the CIT stage. The resources below is a guideline to the types of resource required by organisations participating in the day-to-day activities of CIT. It is the responsibility of each Participant to provide sufficient and appropriate resources to support the Test Stage.

Organisation	Role/Resource Type
CIT Participants	• Test Manager • Test Analyst • Defect Manager / Analyst • Programme Management • Infrastructure, application and network support • Release and configuration management support • Environment Management support
SI Team	• Test Manager • Test Lead / Analyst(s) • Test Data Lead / Analyst(s) • Defect Manager / Analyst(s) • Programme Management • Environment Manager • Release Manager • Test Architect / Assurance Manager • Test Assurance Lead / Analyst(s) • Test Management Tool Lead / Analyst(s)

Table 1 - Test Teams & Roles

9.1   Test Meetings

Daily Test Meetings

On each day where Test Execution is planned, the SI will hold daily stand-up meetings with each individial test Participant (and / or their delegated 3rd Party testing provider) to:

- Review the status of testing for the previous day.

- Review planned testing for the day.

- Review any changes required to scheduled testing e.g. for blocking Defects.

Where appropriate both the Participant and DIP representivies who are engaged in testing together at the time may be invited into joint stand-ups where there is requirement to discuss and coordinate on cross party activities or blockers.

The SI may also invite SME's to discuss specific topics concerning defects, environmental or data issues or releases.

Weekly Test Execution Progress Meetings

The SI will conduct weekly Test Progress meetings with all test participants engaged in CIT testing at that point in the schedule, to:

- Collaborate with all Test Participants on matters relating to Test Execution.

- Review testing progress for the week to date.

- Review planned testing for the following week.

- Review any changes required to scheduled testing e.g. for blocking Defects.

This meeting will also involve representatvies from the Environments, Data, Defect Resolution and Release Management.

Note that the default period for reporting will be from Friday to Thursday to allow for collation and distribution of reports. The meeting will be conducted using Microsoft Teams.

Defect Management Meetings

Please refer to the [REF-07] MHHS-DEL466 - Defect Management Plan.

Environments and Release Management Meetings

Please refer to:

- [REF-03] MHHS-DEL618 - Environment Approach & Plan.

- [REF-04] MHHS-DEL1089 - Release and Configuration Management Approach & Plan.

Fast Track Implementation Group

The SI will provide status updates witin the FTIG forum and escalate any blocking issues which may need collaboration at this forum in order to resolve.

9.2   Test Roles & Responsibilities

9.2.1   CIT RACI

Activity	Participant	SI	SI Test Assurance	SITWG	TMAG
CIT Scenarios	I	R,A	C	C	I
CIT Scenarios Approval	I	C	C	C	R,A
CIT Test Cases	I	R,A	C	C	I
CIT Test Cases Approval	I	C	C	C	R,A
CIT Approach and Plan	I	R,A	C	C	I
CIT Approach and Plan Approval	I	C	C	C	R,A
Set up and operation of CIT Test Stubs and Harnesses	I	R,A	C	I	I
Set up and administration of Test Management Tool (ADO)	I	R,A	C	I	I
Set up of Participant users within (ADO)	I	R,A	C	I	I
Test Data Allocation	C	R,A	C	C	I
Loading and assigning of Test Cases in ADO	I	R,A	I	I	I
PIT Preparation, Execution and Completion	R,A	C	I	I	I
Coordination of Environment Connectivity Proving	C	R,A	I	I	I
Environment Connectivity Proving	R,A	C	I	I	I
Test Data Load and Verification	R,A	C	I	I	I
Participant mobilisation of appropriate Test and Support Resources	R,A	C	I	I	I
Participant CIT Readiness Report	R,A	C	I	I	I
SI CIT Test Readiness Report	C	R,A	C	I	I
SI CIT Test Readiness Report Approval	I	C	C	C	R,A
Decision to commence SIT CIT Interval Test Execution (*Note PSG responsible for decision to commence Interval 1 / M9 based on TMAG recommendation*)	I	C	C	C	R,A
Completion of assigned CIT Test Case Execution within ADO (inc. evidence capture)	R,A	C	I	I	I
CIT Test Case Execution Coordination and Support	C	R,A	I	I	I
Defect Management Coordination	C	R,A	I	I	I
Fixing assigned Defects (inc. Environment Defects)	R,A	C	I	I	I
Coordinating Releases & Code Deployments	C	R,A	I	I	I
Deployment of Releases	R,A	C	I	I	I
Chairing Test Meetings	C	R,A	I	I	I
Participant Test Meeting Attendance	R,A	C	I	I	I
Reporting on Overall Test Execution and Completion Progress and RAG status	C	R,A	C	I	I
Participant CIT Completion Report	R,A	C	I	I	I
SI Participant Test Completion Assurance	C,A	C	R	I	I

SI CIT Test Completion Report	C	R,A	C	I	I
SI CIT Test Completion Report Approval	I	C	C	C	R,A

Table 2 - CIT RACI

10 Test Governance & Reporting

10.1 Governance

CIT Testing will operate in accordance with the [REF-09] <u>MHHS-DEL030 - Programme Governance Framework</u> adhering to the decision making and escalation principles set out within.

The table below is an extract from the [REF-10] <u>MHHS-DEL1140 - Milestone Register</u> identifying CIT milestones and the decision-making authority (governance group). The SI will be responsible for reporting status and RAG for all Tier 2 and 3 TMAG milestones and the CPT will be responsible for reporting status and RAG for Tier 1 PSG milestones.

Milestone Tier	Level 1 Milestone	Milestone ID	Milestone Title	Decision-making authority (governance group)
T3		T3-TE-0014	SIT Component Integration Test scenarios approved	TMAG
T3		T3-TE-0069	SIT Component Integration Test Cases approved	TMAG
T3		T3-TE-0012	SIT Component Integration Test Approach & Plan approved	TMAG
T3		T3-TE-0019	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 1	TMAG
T3		T3-TE-0020	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 2	TMAG
T3		T3-TE-0021	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 3	TMAG
T3		T3-TE-0022	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 4	TMAG
T2		T2-TE-0250	SIT Component Integration Test 1 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG
T1	Yes	T1-TE-1000	System Integration Testing Start (M9)	PSG
T3		T3-TE-0060	Component Integration Test Interval 1 Start	TMAG
T2		T2-TE-0300	SIT Component Integration Test 2 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG

T3		T3-TE-0023	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 5	TMAG
T3		T3-TE-0061	Component Integration Test Interval 2 Start	TMAG
T2		T2-TE-0350	SIT Component Integration Test 3 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG
T3		T3-TE-0024	SIT Participants' SIT A environments ready to start connectivity proving (incl certificates and security compliance) CIT Interval 6	TMAG
T3		T3-TE-0062	Component Integration Test Interval 3 Start	TMAG
T2		T2-TE-0400	SIT Component Integration Test 4 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG
T3		T3-TE-0063	Component Integration Test Interval 4 Start	TMAG
T2		T2-TE-0450	SIT Component Integration Test 5 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG
T3		T3-TE-0064	Component Integration Test Interval 5 Start	TMAG
T2		T2-TE-0500	SIT Component Integration Test 6 Preparation Complete (incl. approval of SI SIT Component Integration Test Readiness Report)	TMAG
T3		T3-TE-0065	Component Integration Test Interval 6 Start	TMAG

T3		T3-TE-0032	SIT Component Integration Test End (incl. confirmation that PPs have submitted their Test Completion Reports to Programme for assurance)	TMAG
T2		T2-TE-0600	SIT Component Integration Test Completion Report Approved	TMAG

Table 3 - CIT Milestones

10.2 Reporting

Once test execution for the test stage has started, the responsible party will ensure that test execution progress is kept up to date in ADO and tracked within configurable ADO dashboards (See below for an ADO dashboard example). The SI team will then produce regular aggregate progress reports based on this information. The reports will be collated by the SI team for use within Test progress, Defect Management and Release Meetings and for upward reporting to the SRO, FTIG, SITWG and TMAG. Reports and configurable but will generally show:

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

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

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

- Actual number of test defects outstanding, split by severity / priority.

- Test and requirement coverage by priority.

- Progress against test exit criteria.

- Progress against any work-off plan from previous test stage.

- Risk, dependency and assumption status.
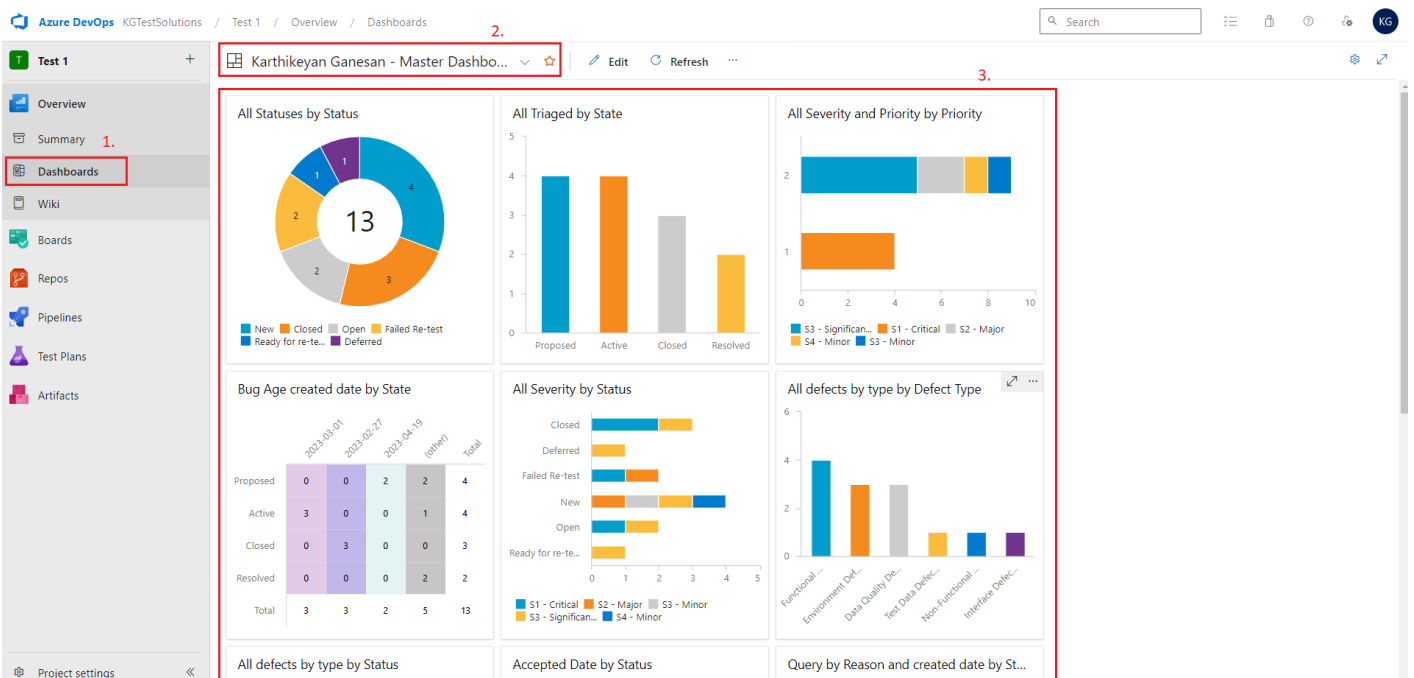
- Overall RAG status.

Figure 9 - ADO Dashboards

11 Test Assurance

11.1 Approach

SI Team will carry out monitoring and outcome assurance throughout PIT, details of this approach can be found within the [REF-02] MHHS-DEL852 - Pre-Integration Test Guidance.

In addition to this SI will engage in assurance of Programme participant SIT readiness activities i.e.

- Environments
- Test Data
- Test and Support Resource mobilisation
- Test Resource readiness for execution.

During and following CIT execution the SI will undertake assurance of test execution results with a specific focus on:

- Validating evidence of actual vs. expected results of tests
- The quality of supporting information and evidence within defects
- Evidence of local defect retesting prior to fix release deployment to the SIT-A environment
- Test Stage Exit Criteria and Completion Status.

12 Appendix

N/A