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Testing Approach For The Horizon System

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Abstract: This document provides a description of the process, roles and responsibilities applicable to Post Office Limited and Fujitsu Services Testing.

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0.0 Document Control

0.1 Document History

Version No.	Date	Reason for Issue
0.1	20/06/03	First issue
0.2	2/6/03	Merge of initial Fujitsu Services and Post Office Ltd documents for internal review by the working group prior to a wider distribution
0.3	04/07/03	Updated following a joint PO Ltd and Fujitsu Services workshop
0.4	10/07/03	Updated to reflect PO LTD testing.
0.5	11/07/03	Updated to reflect joint view of version 0.4
1.0	15/08/03	Updated to reflect commercial input to version 0.5

0.2 Review Details

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0.3 Associated Documents

	Doc Reference	Vers	Date	Title	Source
1	CA023570007_18	1.0	31/12/02	Schedule 20 Development Services	Amended Contract
2	BP/DES/???	0.7	7/6/03	Joint Working ISL	PVCS
3	Working Document: VI/STR/062	1.0	23/06/03	Fujitsu Services Test Strategy for the Horizon System	PVCS

Unless a specific version is referred to above, reference should be made to the current approved versions of the documents.

0.4 Abbreviations/Definitions

Abbreviation	Definition
The Agreement	Contract signed by the Post Office and Fujitsu Services on 31 Dec 2002
CCD	Contract Controlled Document
CD	Conceptual Design
CTs	Commercial Terms
DIT	Direct Interface Test
DP	Design Proposal
DU	Development Unit
End-to-end Integration	Overall integration of systems from different suppliers
FS	Fujitsu Services
HLTP	High Level Test Plan
ISL	IS Landscape
ITU	Integration and Testing Unit
JWISL	Joint Working ISL
LLTS	Low Level Test Script
RASD	Requirements, Analysis and System Design

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RV	Release Validation
SI	System Integration
SVI	System Validation and Integration
System Integration	Integration of systems within the Fujitsu Services domain

0.5 Changes in this Version

Version	Changes
0.3	Internal Fujitsu Services review
0.4	Updated from PO LTD review
0.5	Updated from joint commercial review

0.6 Table of Contents

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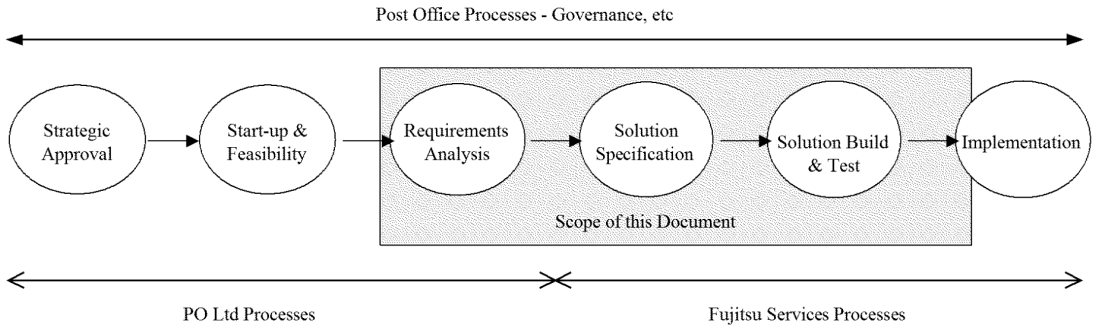
1 Introduction

1.1 Scope

This CCD covers testing of the Horizon System within the lifecycle processes of the Joint Working IS Landscape [2].

The scope of the document within the Development Services lifecycle is shown below:



1.2 Document Map

This document belongs to a family of documents describing testing of the Horizon system. This document deals with generic, non-release specific issues and addresses issues related to the joint testing. Its relation to other documents is shown in below:

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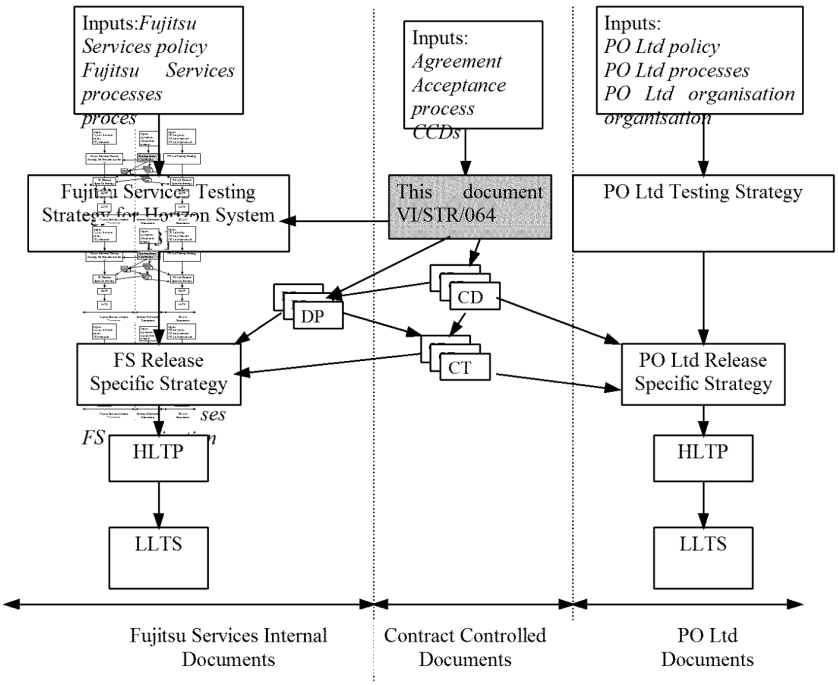

2 The Underlying Principles

2.1 Testing Principles

There are a number of important testing principles, which are critical in achieving a more efficient and effective approach to the testing of the Horizon systems, and so to significantly reduce overall time-to-market. These include:

- Build in Testability at the Outset
  - Objective and testable requirements
  - No ambiguity – try to reduce/eliminate ambiguity in requirements, design, etc.
  - Early involvement of testing
  - Exploit Automation
- Fail fast – identify and fix defects as early as possible in the development lifecycle.
  - Risk based approach – prioritise testing based on an assessment of likelihood and impact of failure.
  - Stabilise Products and Configuration Early
  - Objective Driven Testing
- Promote a collaborative approach – not just between PO Ltd and Fujitsu Services, but also with other 3rd suppliers.
  - Eliminate Duplication of Effort

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- Where appropriate use testing professionals/specialists – recognising the need for skilled and experienced testing professionals for certain aspects.
- Learn from failures – improve by learning from mistakes
- Stabilise Products and Configuration Early

The above principles have also been taken into account in the recent Fujitsu Services review of testing efficiency, which has resulted in a complete revision of the Fujitsu Services Testing & Integration Strategy for the Horizon systems [3], which is aimed at improving time-to-market, and reducing testing costs, whilst maintaining service quality.

3 Testing Involvement in ISL

3.1.1 Requirement Analysis Stage

During this stage the Conceptual Design is produced. The Conceptual Design reviews should include :

- Ensuring that all requirements are objective and, where applicable, that acceptance criteria are testable
- Ensuring that there are no implicit functional or non-functional requirements
- Reviewing the method of acceptance for every requirement
- Ensuring that testing obligations on suppliers are explicitly defined
- Identification of PO Ltd's testing requirements

A high level test strategy section for the Conceptual Design should be also produced during this stage.

3.1.2 Solution Specification Stage

During this stage for every opportunity the Fujitsu Services Test Team will be responsible for production of the test approach section in the Design Proposal that will define the approach for that business opportunity.

3.1.3 Solution Build & Tests Stage

This stage is described in section 4.

4 Testing Approach

4.1 Introduction

Using The PO Ltd Revised Testing Approach as developed for the S50 release as the basis. The following should be the PO Ltd generic approach which should flex to reflect the release under test.

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The aim will be to move towards a more collaborative approach through the various test phases, making more use of identifying and exploiting areas of synergy where practical and appropriate. Also aim to adopt more proactive approaches to reviewing test materials using workshops and other techniques / methods where practical and appropriate.

In developing a revised approach with the aims of reduced testing costs and testing timeframe the following changes / assumptions have been made.

- Fujitsu Services are responsible for and capable of carrying out internal testing to the point of delivery of a completed internal system to the PO Ltd led E2E testing phases albeit PO Ltd will wish to be involved with internal testing via reviewing supplier plans, scripts, results and fault logs. In particular this will be the method used to achieve the completion of PO Ltd non functional testing.

Where appropriate for the release contents :-

- Fujitsu Services will lead and carry out Direct Interface Testing with suppliers who connect directly to them. PO Ltd will provide support to coordinate where required and carry out passive witnessing.
- PO Ltd will lead Direct Interface Testing with suppliers who do not connect directly with Fujitsu Services e.g. IBM – LINK. This may require the provision and support of a Fujitsu Services test environment to PO Ltd to effectively carry out these tests.
- PO Ltd will lead the Certification or Accreditation phases supported by the appropriate suppliers.
- PO Ltd will lead the E2E Integration of systems supported by the suppliers
- PO Ltd will lead the E2E Functional testing phase supported by the suppliers

4.2 Overview of Testing Lifecycle

The testing of the Horizon systems is performed in the following main areas:

- **Development Testing** – thorough basic testing and initial integration, stabilises the deliverables, verifying them against the designs, and setting the configuration. Also exposes external interfaces, validating them against the agreed interface specifications.
- **ITU Testing** – integrates the systems together as an overall solution, validating their combined behaviour against the requirements, and proving the migration and implementation path.
- **Post Office Testing** – This cover the stages as detailed in section 4.4 where Post Office testing covers the integration of the various supplier solutions.

The stages are shown in the diagram below (dashed boxes denote optional stages):

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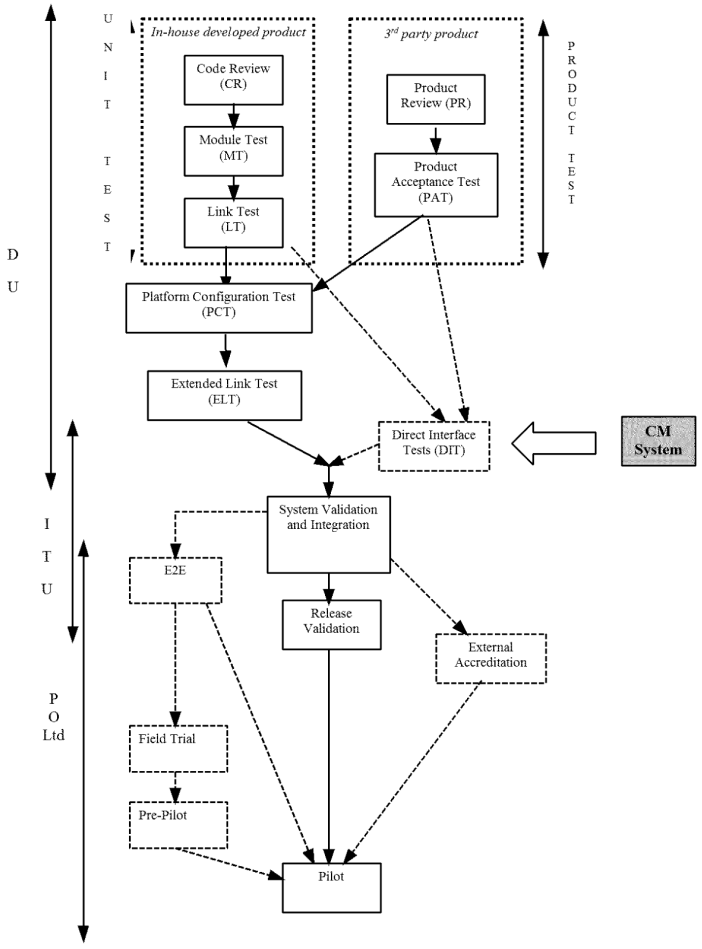

4.3 Fujitsu Services Testing Process

Details of this Fujitsu Services process are provided in [3]. The following sections contain a high level overview.

4.3.1 Overview of Fujitsu Services Test Design and Analysis Phases

This is the stage in the development process where the shape of the Fujitsu Services testing of the release is defined. The analysis is performed on a "per release" basis, i.e., all changes comprising the release are analysed together.

The following principles are to be applied here:

- All the test should be mapped to the requirements
- All PO Ltd requirements will be included in the Conceptual Design.

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- High level test analysis to be standardised and centralised
- Areas of synergy to be identified
- Prioritisation of tests objectives and identification of areas of criticality
- Efficient use of environments
- Full exploration of automation
- Creation of re-usable and repeatable suites of tests (regression tests)

The table below summarise the stages of test design and analysis and identifies the outputs.

Stage of testing	ISL stage	Output
Requirements analysis	Requirements Analysis	Review of Conceptual Design
Test Approach for Opportunity	Solution Specification	Test Approach section of Design Proposal
Release Test Strategy	Solution Specification Solution Build and Test	Release Test Strategy document
Test Analysis	Solution Build and Test	Test Conditions
High Level Test Planning	Solution Build and Test	High Level test Plan(s)
Low Level Test Scripting	Solution Build and Test	Low Level test Scripts Automated Tests

4.3.2 Development Testing

The Fujitsu Services 'Development' area performs three main types of testing, each comprising a number of individual stages. These are described below. In general, these stages of testing are performed prior to the deliverables, and their configuration, being locked-down, formally baselined in the CM system, and handed over for wider use. As such they tend to be planned as small, discrete tests, quick to execute, and run in an iterative fashion to cater for defect detection, with the minimum of administrative overheads.

4.3.2.1 Unit Test

Unit Test is performed, by Fujitsu Services alone, for all in-house developments. Its purpose is to verify each component deliverable in detail against the design. It will comprise an appropriate combination of:

- **Code Review** – review of source code against the low-level design to trap obvious defects and to confirm standards
- **Module Test** – detailed verification of runtime code against the low-level design to confirm correct operation of all logic paths.

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- **Link Test** – verification of internal interfaces against the low-level design to confirm correct interaction and parameter handling.

4.3.2.2 Product Test

Product Test is performed, by Fujitsu Services alone, for all third-party deliverables procured by Fujitsu Services other than COTS (Commercial off-the-shelf products, widely used in the industry, and not heavily tailored for use in the Horizon systems). It will comprise an appropriate combination of:

- **Product Review** – review of the product(s) at the time of delivery, against the high-level design.
- **Product Acceptance Test** – validation of the product(s) against a checklist of required attributes. Also, where applicable, confirmation that acceptance criteria, agreed with the third-party supplier, have been met.

4.3.2.3 Fujitsu Services Integration Test

Fujitsu Services Integration Test is performed principally by Fujitsu Services alone, except for DIT which is performed as a Joint Testing exercise. Its purpose is to set the configuration for each software system and hardware platform, and to integrate application and infrastructure software together, thus verifying the configuration, and completing the validation of all Fujitsu Services' deliverables against their designs. It will comprise an appropriate combination of:

- **Platform Configuration Test** – trial building and verification of each hardware platform type against the corresponding platform specification, and the trial loading of both application and infrastructure software deliverables on those platforms, against the corresponding system and software configuration designs.

- **Extended Link Test** – exercises each application system, running together with its supporting infrastructure software, on a representative platform, validating it against the high-level design, and confirming the stability of the system, software, and platform configuration and build.

4.3.3 Direct Interface Test (DIT)

This is a Joint Testing exercise to validate each external interface, on a bi-lateral basis, against the agreed interface specifications. This testing, depending on its scope, can be either owned by Development Unit or ITU. Fujitsu Services will own and carry out Direct Interface Testing with suppliers who connect directly to them. PO Ltd will provide support to coordinate where required through:

- Review of Interface scripts between the two supplier domains
- Support set – up of test environments
- Support or coordinate the provision of Required Ref Data
- Support where appropriate the tests
- Review the test results including any faults

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4.3.4 ITU Testing

The Fujitsu Services ITU area performs two main types of testing. These are described below. In general, all ITU testing is performed on locked-down deliverables, which have been comprehensively verified and validated against the designs, and formally baselined in the CM system. It is expected that the systems have become stable and are already functionally sound. As such the test planned here tend to be larger and less discrete than those used in Development Testing. With a much lower level of product volatility, the tests are planned in combination, run in cycles. The emphasis here is on validating that the overall solution has not regressed, satisfies any new requirements, operates correctly, and can be implemented successfully as planned.

4.3.4.1 Systems Validation & Integration

System Validation & Integration is performed both by Fujitsu Services alone, and when required as part of the PO Ltd testing stages as a Joint Testing Exercise. Its purpose is both to integrate all the various systems together to form the overall Horizon solution, and to validate that this solution satisfies the requirements. An important aspect of this validation is regression testing, to confirm that the solution has not regressed as a result of introducing the changes. Appropriate suites of pre-existing tests are selected for this purpose, whilst for the changes new tests are developed. Both encompass a number of different facets of testing, including:

- Business Integration , Cross-System Data Integrity
- Performance, Capacity, Throughput, Response Time
- Resilience, Availability, Backup, Recovery
- Operations, System Management, Scheduling
- Security
- Usability

Typically, large releases will initially undergo validation on representative (cut-down) environment, integrating the systems together to form a stable overall solution. Then it will move into a full integration environment modelled on Live. Smaller releases and individual component deliveries will be validated directly on the full integration environment. Performance characteristics for the data centre systems will be tested as required within a separate test environment because of the demands imposed by the specific requirements for data size and distribution, and transaction volumes and profiles. Performance characteristics for the Counter systems, however, will typically be tested on the full integration environment.

It is in the Systems Validation & Integration stage that any components developed under competitive ISL, and needing to be integrated within the Horizon solution, will be intercepted. Fujitsu Services will include the necessary coverage to confirm correct integration (but not to validate the component(s) per se) as an integral part of their SV&I testing cycles, based on the interface specifications agreed for them.

4.3.4.2 Release Validation

The primary purpose of this stage of testing is to ensure the integrity of releases prior to their Live implementation. Significant releases typically have a complex migration plan that needs

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to be validated at each stage to prove both integrity of the product set and Live continuity during the implementation stage. A number of cycles of this migration testing is run to allow the resolution of issues, prior to being finally validated on the Live Support rigs. Minor releases may go direct from SV&I onto the Live Support rigs.

A significant factor in proving the migration process, and in confirming the integrity of the release, includes checking that the resulting system state (or configuration) for each platform has achieved the expected configuration (i.e. each platform ends up having the correct components installed as a result of going through the migration/implementation process).

4.4 Post Office Testing

4.4.1 High Level Approach

- A small dedicated PO Ltd core team
- Additional team members added dependent upon the release content

4.4.2 Initial Task

An appropriate High Level Test Strategy developed to reflect the release contents.

4.4.3 Significant Release

A release which includes changes which impact on a wider scope than Fujitsu Services and therefore needs various phases to achieve E2E Integration e.g. NB, S30, S50. Or a significant level of change within the Fujitsu Services solution.

In a significant release PO Ltd testing would, generally, include the following stages:-

4.4.3.1 Internal Functional Testing

Joint working with Fujitsu Services internal functional testing via the following:-

- Review Fujitsu Services internal test plans/ scripts for completeness
- Review Fujitsu Services internal test results / progress reports
- Review Fujitsu Services internal testing fault logs for impact

4.4.3.2 Non Functional Testing

Joint working with Fujitsu Services internal non functional testing via the following:-

- Fujitsu Services document reviews
- Review Fujitsu Services test plans for completeness
- Involvement with testing specific key tests during a Fujitsu Services testing cycle

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- Review Fujitsu Services test results
- Review Fujitsu Services test fault logs for impact

4.4.3.3 Direct Interface Testing

Support Fujitsu Services through the execution of Direct Interface testing between two suppliers e.g. Horizon to NBE,

- Review Interface scripts between the two supplier domains
- Support set – up of test environments
- Support or coordinate the provision of required Ref Data
- Support where appropriate the tests
- Review the test results including any faults

4.4.3.4 Certification or Accreditation Testing

PO Ltd will coordinate supported by Fujitsu Services the preparation and execution of scripts to achieve certification or accreditation e.g. LINK certification, EPay Accreditation.

- Review and agree Certification / Accreditation scripts
- Support or coordinate set – up of test environments
- Support or coordinate the provision of required Ref Data
- Support or execute where appropriate the tests
- Provide required evidence e.g. counter receipts
- Review the test results including any faults

4.4.3.5 E2E Integration Testing

This phase is where PO Ltd would lead, supported by Fujitsu Services, in demonstrating the successful connection of all the appropriate systems (test versions) in the releases E2E solution including carrying out some E2E test transactions to confirm the readiness to enter the PO Ltd E2E functional testing cycles.

4.4.3.6 E2E Functional Testing

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This phase is where PO Ltd would lead, supported by Fujitsu Services, in demonstrating through short "days in the life of the PO Ltd business" cycles that the revised systems interact correctly in an E2E manner and with the revised business process and procedures.

This is also to assure PO Ltd that the changes to current systems and the introduction of new systems has not impacted upon the businesses operation including E2E financial aspects (accounting, reconciliation, settlement, remuneration) have been and can maintained during live operation. E2E Management Information is maintained or new information reflects the requirements and business needs.

Successful completion of this phase would lead to the introduction into the Live environment via one or more of the following PO Ltd selected options:-

- a pre-pilot (transactions carried out in a passive Post Office)
- pilot (small number of outlets)
- go-live.(rolled out to the full estate)

4.4.3.7 Pre-Pilot

This final testing phase is whereby a "live" passive Post Office is used to test that the connectivity of the live E2E systems has been achieved and that a small number of transactions representing the changes can be carried out and report correctly in accounting and management information terms.

Completion of this final phase should be the point of handover to the Implementation team / phase.

4.4.3.8 Field Trial

A field trial in a small number of outlets may be appropriate for certain products / changes . This would be defined in the High Level Testing Strategy and agreed by PO Ltd and Fujitsu Services.

4.4.4 Minor Release

A release which generally has changes which are contained with the one supplier domain and does not require E2E integration. e.g. S40.

In a minor release PO Ltd testing would, generally, include the following stages:-

4.4.4.1 Internal Functional Testing

Joint working with Fujitsu Services internal functional testing via the following:-

- Review Fujitsu Services internal test plans for completeness
- Review Fujitsu Services internal test results / progress reports
- Review Fujitsu Services internal testing fault logs for impact
- Involvement with testing some key tests around change aspects

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4.4.4.2 Non Functional Testing

Joint working with Fujitsu Services internal non functional testing via the following:-

- Fujitsu Services document reviews
- Review Fujitsu Services test plans for completeness
- Involvement with testing specific key tests during a Fujitsu Services testing cycle
- Review Fujitsu Services test results
- Review Fujitsu Services test fault logs for impact

4.4.4.3 Direct Interface Testing

The scope of a minor release is unlikely to require the execution of a Direct Interface Test. If it did it would be as defined for a significant release.

4.4.4.4 Certification or Accreditation Testing

The scope of a minor release is unlikely to require the execution of a certification or accreditation phase. If it did then this could be achieved as a separate phase or during other phases where practical e.g. Internal testing functional or non functional phases. DIT.

4.4.4.5 E2E Integration Testing

The scope of a minor release is unlikely to require the execution of a E2E Integration phase if it did it would be carried out as defined for a significant release.

4.4.4.6 E2E Functional Testing

The scope of a minor release is unlikely to require the execution of a E2E Functional phase if it did it would be carried out as defined for a significant release.

4.4.4.7 Pre-Pilot

This final testing phase is whereby a “live” passive Post Office is used to test that the connectivity of the live E2E systems has been achieved and that a small number of transactions representing the changes can be carried out and report correctly in accounting and management information terms.

Completion of this final phase should be the point of handover to the Implementation team / phase.

4.4.4.8 Field Trial

A field trial in a small number of outlets may be appropriate for certain products / changes . This would be defined in the High Level Testing Strategy and agreed by PO Ltd and Fujitsu Services.

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4.4.5 Acceptance

Testing is one part of PO Ltd giving Acceptance to a release Significant or Minor. Testing will be able to confirm the acceptance criteria for some requirements have been met during the various test phases. The criteria and the targeted test phase should be identified during the requirements analysis phase. The testability of the acceptance criteria should be assessed by the testing team during the Requirements reviews.