

Smart Meter Testing & Trialling Discussion Paper

ERA – SRSM Group

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Introduction

Recognising the criticality of a successful test and trial phase within the Smart Meter programme the ERA members have brought together a group of senior system and test managers from their membership to assist in suggestions for planning and to increase awareness within member companies of the up-coming challenges. This discussion paper summarises their thoughts and is intended to assist the DECC team in planning the test and trials for the DCC go live and enduring market solution.

It presents a review of the test phases set out in the staircase in the DECC Test Strategy document, provides a RAID analysis related to this aspect (cross referenced to the program RAID) and some additional key conclusions.

The scope of the paper does not cover trialling, pilots or the mechanics of any controlled market start-up (CMSU). It covers the scope of testing from within the Testing Strategy document of the DECC programme. There is a section to discuss Smart Metering Equipment (SME) assurance. For the other phases of testing identified in the paper, it is assumed that any SME used has passed any accreditation regime. The exclusion of any phase from this discussion document, which is in test related DECC documentation, does not indicate a statement about the necessity or otherwise of such.

The rationale and points of view raised in this paper are largely on the basis of experience and gut-feel for testing phases, given the limited level of information available at this stage. The alternative approach highlighted in this paper needs further definition and analysis to inform testing scope and timing.

It should be considered a discussion paper only. There are different views on testing from different suppliers, which is to be expected at this stage.

Key Conclusions and Next Steps

The initial estimates from DECC indicated to us that the expected timescale of the post SMEs testing is considerably in excess of the period allowed for in the draft programme plan.

We have sought, by bringing together specialists from within member companies, to review the test strategy approaches which might shorten the overall timescale based upon DECC's original test strategy paper (0.8). The key driver for this has been the overall objective to deliver DCC Go-Live at the earliest opportunity with appropriate levels of quality. The discussions, in this paper, resulted in constructive ideas though without detail being available there remains considerable uncertainty over the elapsed time required.

Critically, however, DECC need to urgently review the 7 month period for DCC testing set out in the draft programme plan as we are concerned that this key element, which is almost certain to form part of the critical path, is not long enough to deliver an appropriate level of assurance and therefore quality in DCC to enable the mass rollout. Further discussion and analysis is required of the testing strategy and this is before we even consider trialling, pilot schemes and CMSU.

In addition the programme the programme V model needs to be refined referencing deliverable/products to related tests. We would welcome an opportunity to work on this with DECC as there are some queries with the strategy document (e.g. we were unsure of the meaning of E2E SME test and the role of suppliers and other stakeholders).

The proposed approach modifies the staircase approach by building assurance on services and systems incrementally. We have taken the approach of building up the scope of services being tested to provide assurance through the testing process. This would normally be providing assurance against incremental levels of baselined documentation (in this case maybe incrementally functional requirements, business processes definitions, contracted services and SLAs and SEC – we need to analyse the intended baseline documentation set).

We also wish to discuss the number of participants to be involved and the cohort reaching entry/exit gates for progress to be made in a robust fashion.

We recognise governance is a critical driver of success and particularly the DECC/DCC interaction and handover and would urge further immediate focus on this aspect by DECC programme teams.

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Objectives

We have identified a number of key objectives from our discussions that the test and trial program should seek to deliver over and above an acceptable and resilient timescale and requisite quality.

These have been used as challenges against the work presented in this document:

- Participants did not want to be limited to work at the speed of the slowest party whilst ensuring adequate progress for all.
- Should allow all market participants to move through testing at pace.
- Must ensure the robust operation of the market is not compromised.
- The test program should ensure DCC goes live as early as is practical (but needs to be equitable for the market, e.g. if different communications geographies are available at different times).
- Strong baseline management is essential.
- Parallel work and early stage testing (e.g. from DCC service providers) should be utilised wherever possible.
- Fast and fully empowered decision making is essential with a formal Design Authority in place.
- The process must demonstrate testing of negative test cases and exceptions.
- There must be consistency of operation across multiple service providers.
- Detailed dependency impact analysis is essential. For example, no-one will be able to progress if there are problems with DCC / registration systems. Critical supplier processes must be working e.g. CoS / CoT

There needs to be a policy decision to address those who fail tests to a level where they are not ready for next steps of testing or entry into any trial/pilot/CMSU phase.

Scope

DECC have identified a number of types of testing and trialling and the latest view presented to ODAG (15/11) is shown below. As mentioned in the Introduction this document refers to the testing set out for Equipment and the DECC Testing Strategy (v0.8), shown as Equip and DCC rows respectively in the diagram below. There is more work required on the other rows of the DECC diagram (e.g. trialling, Foundation, transition/migration/implementation).

We did capture some thoughts on other phases of testing for further consideration, e.g.:

- The ideal would be for DCC to own the trial process once it is in place but this is reliant on a robust handover plan from DECC and is likely to require some on-going involvement from DECC and industry. DCC will have to ensure adequate test capacity above the business as usual capacity if they are to execute trials. [RAID reference TTAGR3]
- Whether all suppliers need to be ready for CMSU (whereas other market service providers must be)? [RAID reference TTAGR1]

- Must ensure that we are testing to deliver a positive customer experience, as defined in “Cons” row in the diagram above. Tests need to be defined with this aspect in mind.
- Need availability of test environments to be defined and supplied by DCC. There is a big assumption through this discussion paper that there is no constraint on the number of test environments and that all environments are prepared and ready for the start of each phase of testing. This assumption will need a practical challenge in terms of readiness and cost.
- DECC must ensure that these test environments are retained through the duration of the programme, and beyond, for use in entry testing and on-going assurance.

Smart Meter Equipment (SME); MID and Type testing

The EU Measurement Instruments Directive (MID) refers to all equipment used at Point of Sale (POS) and is intended to protect consumers in respect of accuracy and safety and manufacturers in terms of easing trade barrier issues. To that end the MID certification houses are to be provided with specifications on Metrology, Processing and Memory, Firmware, Data Storage and Power Sources.

DECC are currently assessing what assurance/accreditation regime may be required for Smart Metering and there are a range of options:

- The HAN, WAN, IHD and security devices could be a manufacturer responsibility to test against technical specifications, so become a matter of supply chain management and protection against procurement of equipment that is, or becomes, non-compliant. There could be no additional assurance regime defined over and above minimum requirements of MID.
- There could be a new, additional set of accreditation tests defined for the GB Smart Metering Equipment over and above MID to provide additional assurance on:
 - Interfaces
 - Interoperability
 - Interchangeability
 - Functionality
 - Security

There is currently some uncertainty amongst members as to the depth of EU notification and where any test, accreditation and procurement processes leave the level of risk and financial liability. However, due to the difference of views in this area, we do not intend to do any further work on this within the SRSM project.

DCC Testing and Testing Strategy

Consideration was given to the components incorporated into each phase and the additional validation each brought to the process. This has allowed the formulation of possible staging for the programme which builds on the previous DECC staircase and uses the phases of testing identified in

that illustration, but shows where additional assurance is gained at each phase by additional systems/functionality/parties being added.

Each phase of testing identified below adds a new set of functions/services; therefore entry, exit and issue resolution needs to be subject to robust decision-making.

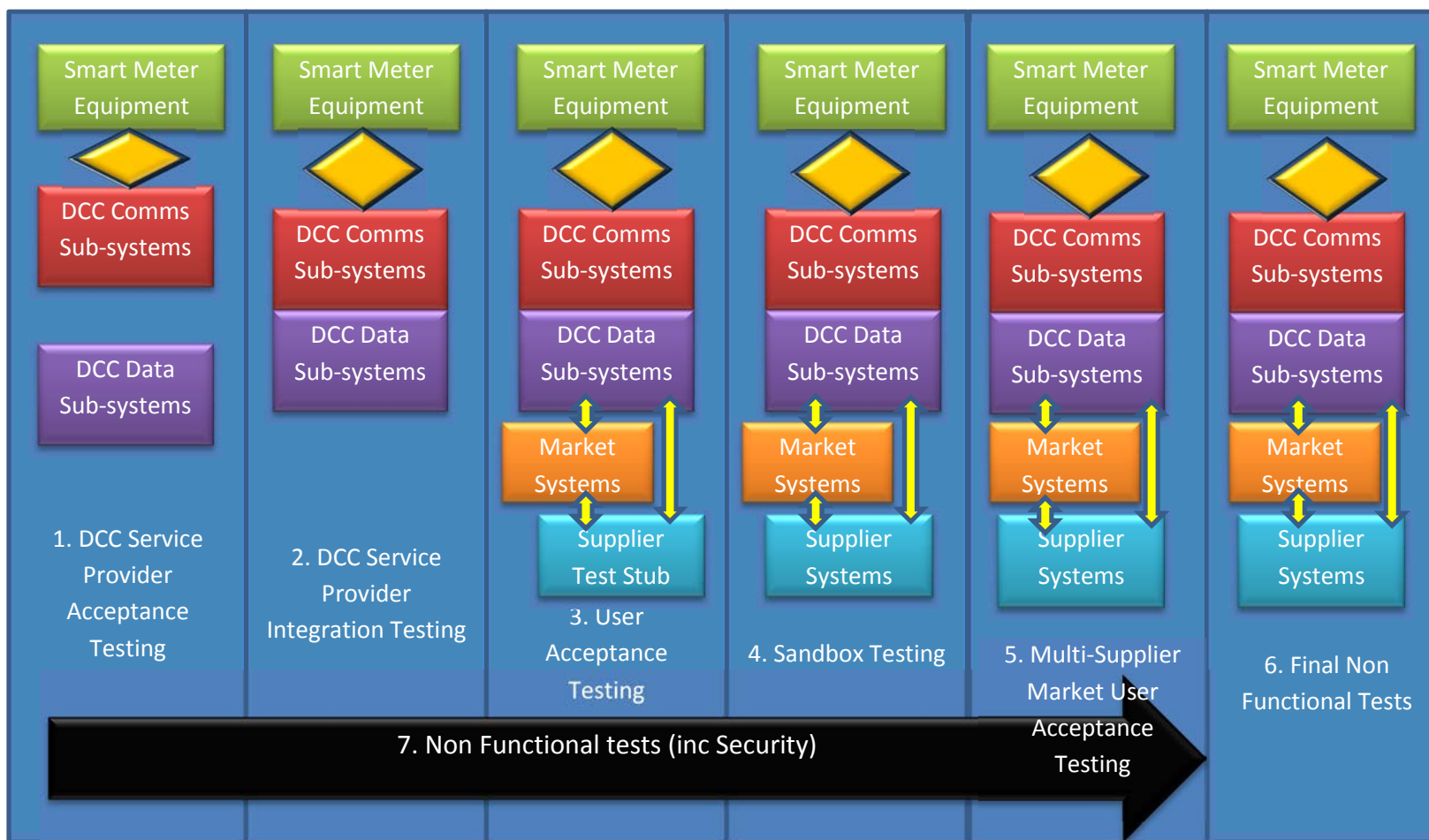
This is illustrated below (**Page 9 Potential test programme diagrammatic**) and provides a picture of the components and integration being built into each phase.

1. DCC Service Provider Acceptance Testing (what was FAT and SAT Part 1) are combined and use the same test data inputs and outputs. The group noted that it would be preferable to see this include real SME and WAN technology as far as is possible. We assume multi-stream parallel running by providers in order to minimise elapsed time. It also relies on quality input from participants and suitable incentives to ensure the minimisation of over run. FAT/SAT P1 Tests should use the same test data so that input/outputs can be compared between the different service providers in advance of the following integration tests.
2. DCC Service Provider Integration Testing (what was SAT Part 2) follows with the integration of the 3 communications Service Providers and the Data service provider (possibly operating over several centres) – this integration process marks the progression of testing into this stage.
3. User Acceptance Testing is seen as an essential but cut-down process. Critically, it brings in both supplier systems emulation and test systems provided by market support operators (Xoserve, MPAS etc.) These latter systems need to be in place for sandbox testing and need early planning for delivery. We may be able to shorten UAT to deliver stable and connected systems to test stubs or emulators at suppliers and then execute more extensive, robust testing in the next phase.
4. Sand box Testing is seen as important, (although this was not a unanimous position amongst all of the ERA suppliers) with test environments built and remaining open for some time, possibly becoming part of new supplier entry process. It is assumed that there will be enough environments available for all parties on an equitable basis (to meet objectives above), that suppliers may wish to use their own systems interfacing with the sandbox duplicated to test CoS process and that suppliers can then partner to further test CoS processes. Both scripted and unscripted phases should be accommodated. We believe that this should be split into the following phases:
 - a. Phase 1 Scripted Single supplier(Core E2E testing)
 - b. Phase 2 Unscripted Single Supplier testing
5. Multi-Supplier Market User Acceptance Test, as defined as Market User Acceptance Testing Part document, but importantly using sand box environments, not live systems. We reviewed the 3 parts of Market User Acceptance Testing defined in the DECC staircase and considered part 1 with stubs as being a retrograde step, part 2 as being the key tests to execute and part 3 as being part of trialling and therefore out of scope.
6. Final Non-Functional Testing on Volume, Security, DR and Recovery. Note that testing of certain of these should be undertaken at sub-system level at each stage.

7. In addition to the tests above, we expect non-functional testing (including security) to be running all the way through it in parallel. Retests of the non-functional testing should be conducted where there are major changes/drops to systems, services or interfaces. Running non-functional testing throughout has a significant impact on cost, as test environments will need to be available for it, but it is the only way to keep down the time for the final run of non-functional tests and this is crucial as it is on the critical path.

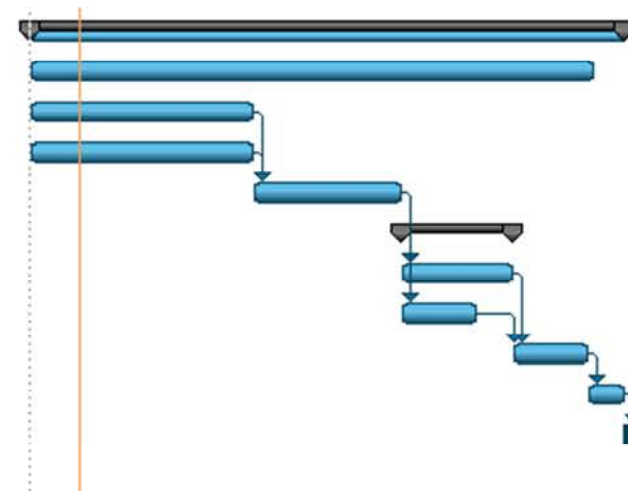
Key overarching principles through the test programme are:

- We felt that it was important that DCC Comms Service Providers and Data Service Providers are allowed to execute some informal interface testing before SAT Part 2 to have an early test of connectivity and to ensure that integration test phases go as smoothly as possible. This could be made an obligatory entry criterion for tests.
- Volume and Soak tests on each sub-system **should** be made at the earliest stages possible to identify weak components and alleviate some fault finding should the integrated system prove to have volumetric issues.
- Well prepared scripts and robust test data are available ahead of each stage
- The drafting and maintenance of test cases are critical and need industry expertise via a collaborative effort although DECC/DCC should oversee the process. This is not felt to be a part time role nor, crucially can it be delivered from any committee structure.
- There must be adequate allowance for re test, regression testing and contingency.
- The governance and process allows retest and regression test to pass through quickly
- Decision-making process must be quick and robust.
- Entry criteria met with good quality services/systems.
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Potential test programme diagrammatic

<ul style="list-style-type: none"> ▣ Enduring System Tests On going Non Functional tests 1. DCC Service Provider Acceptance Testing 2. DCC Service Provider Integration Testing 3. DCC User Acceptance Tests
<ul style="list-style-type: none"> ▣ Sandbox testing 4a. Phase 1 Scripted Single supplier(Core e2e) 4b. Phase 2 Unscripted 5. Multi-Supplier Market User Acceptance Testing 6. Final Non Functional Tests
DCC GO LIVE



ERA proposed test programme structure (timeline is not representative of scale)



FAT/SAT P1 Service provider testing inc agents such as Xoserve, MPAS etc.	SAT P2 Integration of Service providers DCC/Comms etc.	UAT	Sandbox testing P1 Single Supplier Core E2E Scripted Entry (Allowing Suppliers to connect to Sandbox Environments)	Sandbox testing P2 Unscripted play for suppliers e.g. single supplier tests COS process by making their systems work as winners and losing supplier	Sandbox Testing P3 Multi supplier market testing e.g. 'buddy up' with another supplier to test COS	Final non functional testing
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Assumes all Security test requirements defined and embedded in testing from day 1

Assumes we have a SMETS compliant test set available from day 1

Potential test programme diagrammatic 2

TTAG RAID Information

Risks

Reference	Area	Cause	Effect	Owner	ODAG RAID cross reference
TTAGR1	Governance	There is no real sign of strong baseline management through the test cycle	Multiple parties will be designing against uncertain baselines incurring cost and slippage as well as programme credibility	DECC	
TTAGR2	Governance	Decision making is a perceived weakness and this is reflected in the little time allowed in current plans	Hiatus in what is already a time stressed plan will have severe effects on programme timeline	DECC	
TTAGR3	Governance	DECC DCC handover process is key and is currently too open	There is a potential discontinuity in the program and DCC are inadequately prepared or resourced to take the program forward in a reasonable timescale.	DECC	

Assumptions

TTAG1	Governance	Not all suppliers need to be ready for CMSU though other market service providers must be so.	Test with DECC	
TTAG2	Program Strategy	Suppliers can move individually through test phases	Test with DECC	
TTAG3	Program Strategy	A dependency model will be produced to understand exactly what is expected of participants in the testing phases (e.g. in terms of systems readiness, what phases of testing already completed, environments, connectivity, functionality etc.)	Test with DECC	
TTAG4	Governance	ODAG test Sub Group will form	Test with DECC	
TTAG5	Technical	SMETS and design work will deliver interoperable SMEs	Test with DECC	
TTAG6	Technical	HAN requirements (e.g. propagation, co-existence) will be tested and met by the proposed HAN selection and not be part of the test regime	Test with DECC	
TTAG7	Program Strategy	Entry tests on WAN technology providers are shielded from suppliers. Wan providers will have a sand box environment set up.	Test with DECC	
TTAG8	Governance	DCC will be responsible for integration of different service providers.	Test with DECC	

TTAG9	Governance	Contractual arrangements will be written in for providers reflecting the approval/decision-making for entry/exit of testing phase.	Test with DECC	
TTAG10	Technical	The process will have access to test SME (e.g. golden test SME) through all testing phases (i.e. not real customer installation). How this is practically deployed will need to be resolved. We expect that connectivity to real, test SME will be provided by the comms service provider.	Test with DECC	
TTAG11	Program Strategy	Quality gate exists for what service providers are providing into testing phases.	Test with DECC	
TTAG12	Technical	Expect that data service provider will have run comms to SMEs as part of their proof of concepts.	Test with DECC	
TTAG13	Technical	DCC Comms Service Providers and Data Service Providers are allowed to execute some informal interface testing before formal test phases to prove connectivity.	Test with DECC	
TTAG14	Program Strategy	There are sufficient sand-boxes provided in a timely manner for all participants to work at a preferred pace within overall timescales	Test with DECC	
TTAG15	Program Strategy	All environments prepared and ready to start at the beginning of test phases	Test with DECC	
TTAG16	Program Strategy	Tests are well prepared – scripts and test data robust; decision-making quick and robust; entry criteria met	Test with DECC	

		with good quality services/systems; retest and regression test passed through quickly.		
TTAG17	Governance	DCC will make decision on allowing access to network for Smart Metering Equipment (e.g. by maintaining data meta-list for approved equipment). This will be governed through SEC for enduring operation	Test with DECC	

Issues

Reference	Issue	Action	ODAG Cross reference
There needs to be sight of revised entry tests. This should protect the integrity of the existing market but also ensure the continuation of competition			
Where do integration services sit? If DCC is a thin procurement/contract manager – can you add in SI/testing/accreditation services? Can be thin with an integration function for different service providers. There will be differences in interpretation – needs to be clear decision-making taking into account impact.			

Is there a market entry process for new entrants where we re-use some of the defined tests/trials to protect integrity of the enduring market?			
CERG Monitoring and reporting will need to be tied into test/trial reporting.			

Dependencies

Need to be considered through the planning process.