248/06 - LESSONS LEARNED FOLLOWING FAILURE OF MODIFICATION P269

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Summary	This paper provides an overview of why the implementation of P269 failed to have the correct impact. The result was due to undocumented functionality that our investigation concluded was introduced during the original NETA Programme. While little could have been done to anticipate such an event, measures have either already been put in place or are under consideration to mitigate a similar future occurrence. The Panel is invited to comment on the findings and actions arising.

1. Background to P269 and its Failed Implementation

1.1 The aim of Modification Proposal P269 'Prevention of Base Trading Unit BMUs' Account Status Flipping from Consumption to Production (the "Flipping" mod)' was to ensure that BM Units in a Base Trading Unit are always associated with a Party's Consumption Account, rather than 'flipping' between Consumption and Production as a result of a change to the Trading Unit's Relevant Capacity. On 1 June 2015, the conditions for such a change were encountered for the first time since the implementation of P269, in the North Scotland GSP Group. This date marked the start of the Summer 2015 BSC Season and the re-declaration of Generation Capacity (GC) and Demand Capacity (DC), which in turn triggered the use of the P269 rules. However, the result in this case was that BM Units in the Base Trading Unit were incorrectly associated with a Party's Production Account.

The Impact of the Failure

1.2 This flipping effect resulted in erroneous Interim Information Run (II) data. ELEXON spotted and fixed the error using a workaround before the Initial Settlement (SF) Run. Consequently there was no impact on Parties' Trading Charges. The error impacted credit calculations which used the erroneous II data.

Current Status

1.3 The temporary workaround remains in place: we have increased a specific BSC Party's DC value (with its agreement) to a sufficient level to flip the Trading Unit status back to Consumption.

2. P269 Lessons Learned Exercise

2.1 The July 2015 Panel endorsed ELEXON undertaking a lessons learned exercise into the reasons why P269 was not implemented correctly.

2.2 This is believed to be a unique event, where a Modification (P269) failed to have the required impact when first called upon three years after what had been considered a successful implementation.

2.3 This paper reports the findings of the lessons learned exercise and identifies other areas requiring improvement/consideration that, although not directly related to the cause of the P269 issue, should also be considered. The costs, timescales and consequences of the enduring solution are also highlighted.

2.4 The scope of this lessons learned exercise encompassed the following workstreams. It involved colleagues from across ELEXON and investigated the key processes of the modification and implementation process :

- **Work Stream 1:** Review of the Impact Assessment Process (Appendix 1)
- **Work Stream 2:** A review of the Business Requirements Development Process (Appendix 2)
- **Work Stream 3:** A review of the System Testing process (Appendix 3)
- **Work Stream 4:** Consideration of the CRA/SAA Design and Interface (Appendix 4)
- **Work Stream 5:** Enduring Solution (Appendix 5)

2.5 The assumed central issue for all workstreams was that the BM Units in the North Scotland Base Trading Unit moved over to the Production Account in contravention of the rules established by P269.

2.6 In addition, while investigating the underlying cause of the P269 issue, a number of other issues came to light that, although not the cause of the P269 event, were noted and are detailed in the summary of findings table (Section 3).

3. Findings and Recommendations

Primary Cause of P269 Failure

3.1 The error occurred because the Settlement Administration Agent (SAA) system was performing its own duplicated calculation of Production/Consumption status, separately from those already performed by the Central Registration Agent (CRA) system. This SAA activity is undocumented functionality, which appears to have been a consequence of design decisions made during the original NETA Programme in the run-up to Go-Live in 2001. As such, it was not identified in any Impact Assessments (from ELEXON, industry or Service Providers) at the time P269 was being assessed. All available BSC Systems documentation indicated that CRA systems were the single, definitive source of P/C Status, and there was nothing in any SAA documents to contradict this view.

Consequently, the SAA systems were not amended to deliver the Modification, and changes were only made to the CRA systems.

3.2 With regard to identifying the underlying factors that caused the issue with P269 and other lessons learned, the consequential recommendations are as follows:

3.2.1 Main Recommendations (directly related to the underlying cause of P269)

Subject (Workstream)	Recommendation
Consideration of the CRA/SAA Design and Interface – Functional System Design (source Workstream 4)	The underlying **cause** of the failed implementation was divergence of the SAA systems documentation from the actual functionality contained within the SAA system. This can be corrected for this instance as the failure to implement P269 has exposed a specific issue. The proposed enduring solution corrects this failure.
Testing (source Workstream 3)	The lack of end to end testing incorporating the SAA was a **contributory factor** in the failure of P269. In future: a) Ensure test scenarios are based on the different possible business scenarios that could occur – now in place. b) Ensure the subject-matter expert agrees scenarios before use – now in place. c) Give greater consideration to performing end-to-end testing, especially when making changes that have a direct potential to affect parties' imbalance positions – now in place. d) Always check the end SAA Settlement report output where a change potentially impacts Trading Charges, even if it is believed that the changes are limited to another BSC System and that system has already been tested (particularly important for CRA and CDCA, as these share a single database with SAA and so there are no physical defined data flows to test between these and SAA) – in progress

3.2.2 Additional Recommendations (issues not related to P269 but of wider benefit)

Subject (Workstream)	Recommendation
Governance when issues arise	When/if a similar issue were to occur in the future, the responsibility to resolve said issue will be clear and unambiguous.
Service Provider Impact Assessments	ELEXON should improve the quality of the service provider IA's – being addressed as part of the transfer to new service providers of the AM Dev service.
Impact Assessment Process (source Workstream 1)	At the start of the impact assessment process when system changes are likely to be required, a meeting should be held with ELEXON's Lead Analyst, Design Authority, the ELEXON subject-matter expert (if different) present along with the relevant service provider(s) to walk through the impact assessment responses and confirm a shared understanding of the requirements.

4. Next Steps

Enduring Solution

4.1 ELEXON is currently working to implement a permanent fix to address the defect. Full details are contained in Appendix 5.

4.2 Implementation of this fix is planned for 12th April 2016.

4.3 Key activities regarding the implementation include:

- Progression of a Change Proposal in early 2016 to update the SAA User Requirement Specification (URS) and the SAA Service Description.
- Revision to ELEXON's working practices to ensure that no non-Base Trading Units, and only Base Trading Units, should have names beginning with 'DEFAULT_. The CRA systems already contain existing, documented, functionality to ensure this. However, as Trading Unit applications come through ELEXON for validation before going to the CRA we will capture this in our LWIs too.

4.4 The total costs of the enduring solution are £68k.

Other Improvements

4.5 Note the recommendations already implemented.

4.6 Note the other recommendations to complete in 2016 as we transition to a new Service Provider.

5. Recommendations

5.1 We invite you to:

a) **NOTE** the findings of the work streams established to investigate the matters arising following the failure of P269.

b) **NOTE** the actions that are already in place and the suggested follow-on actions.

c) **NOTE** the enduring solution that is currently being implemented.

Appendices

Appendix 1 – **Work Stream 1:** Review of the Impact Assessment Process

Appendix 2 – **Work Stream 2:** A review of the Business Requirements Development Process

Appendix 3 – **Work Stream 3:** A review of the System Testing process

Appendix 4 – **Work Stream 4:** Consideration of the CRA/SAA Design and Interface

Appendix 5 – **Work Stream 5:** Enduring Solution

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APPENDIX 1

Workstream 1- Review of the Impact Assessment Process

Aim

This workstream considered why the Impact Assessment (IA) process did not identify that the P269 solution would not have the intended impact, whether anything could reasonably have been done differently in the P269 IA process to identify the issue and whether any changes should be made to the IA process going forward as a result of P269.

Findings

1. Level of detail

As is normal, the business requirements were established early in the process and remained largely unchanged throughout, and this was not a factor in the issue.

To facilitate the IA, a 'Draft Solution to Identify Impacts' document was supplied, and meetings and ad hoc discussions with the service providers took place to ensure the solution and IA request were fully understood.

During the assessment of the failure of P269, no issue with the level of detail contained within the Application Management and Development (AM DEV) IAs was identified. However, subsequently, in considering an enduring solution to the issue, it has been clear that the detail in the original (and especially more recent enduring solution) IAs needs to be improved in terms of accuracy, clarity and demonstrating understanding of the issues under consideration.

2. Was the solution too specific?

Prior to the system requirements being developed it appears the AM DEV Service Provider focussed on the CRA because this was stipulated by ELEXON in the IA request. This raises questions around whether this is good practice for IAs, whether it made a material difference in the case of P269 (contributing to the P269 issue not being identified) and whether it has a commercial impact:

- ***Best practice***
  It is considered best practice to specify business requirements to service providers, not specific solution requirements. This avoids imposing constraints on service providers and allows them to use their expertise to develop the optimal technical solution to deliver the business requirements, which they then impact-assess. However, ELEXON also considers it helpful to indicate to service providers where we believe impacts do, or do not, exist. The service providers must notify us if we are wrong.

  In the case of P269 the Draft Solution to Identify Impacts stated that "We do not believe that P269 impacts any BSC Agent roles other than the CRA. We ask you to confirm this as part of this impact assessment". There seems to have been a reasonable balance between providing business requirements and indicating our understanding of the likely impacts without constraining the IA.

- ***Impacts arising from P269***
  The business requirements, together with the way in which the CRA and SAA systems were documented and understood to work, led to the systems solution developed for P269. There is no reason to think that if ELEXON had not indicated the likely impact on the CRA that an alternative and more complete solution would have been developed.

As noted elsewhere, the circumstances that caused impacts to be missed, i.e. undocumented duplication of functions in CRA and SAA systems, were unusual. Only detailed examination of the SAA system would have revealed that it could have caused potential issues. There is no reason to believe that such examination would have taken place if ELEXON had not provided a steer that the impact of P269 was likely to be on the CRA.

- ***Commercial impact***
  As noted above, initial pre-IA conversations between ELEXON, the AM Dev Service Provider and the BPO/Host Service Provider during the Modification Process all focused on the impact of P269 being confined to the CRA, as this was what the available BSC Systems documentation indicated. ELEXON then produced a draft requirements document that also focused on the CRA, but which asked the service providers to confirm through the formal IA process whether there were any other BSC Agent impacts. Both service providers returned impact assessments listing CRA-only impacts. For the reasons described above, it is not apparent that the outcome would have been different without ELEXON's initial focus on the CRA. However, this focus reduced ELEXON's ability to challenge the service providers subsequently on the failure of P269 to achieve its intention.

3. System documentation

The IA can only be conducted using the documentation available and this was completed in the normal manner (although it was later discovered that undocumented functionality was to be the underlying cause of the failure of P269 – see Appendix 4).

4. Timescales

Both BPO and AM DEV IAs were issued on Friday 1 April 2011 with a deadline of Monday 18 April 2011, i.e. 11 Working Days. This was in line with contracted timescales for IAs (standards are 5 working days for AM DEV and 10 working days for Business Process Operations (BPO)). In the case of P269 the IA responses were submitted by the deadline and there is no indication that any extension was sought by either AM DEV or BPO.

There were, however, subsequent revisions/refinements to the results of the P269 IA, continuing into early May, and ongoing discussion between ELEXON AM DEV/BPO. The next Workgroup meeting after the IAs was at the start of May, and the final meeting was in mid-June. It therefore appears that there was time for further Service Provider IAs if this was considered necessary, so the timescales available for IA were a **not a factor** in the P269 issue.

5. Contract provisions

The Service Provider contracts underpin the arrangements for the production of IAs, such as defining the minimum time that service providers will have to complete their IAs. The impact of, and on, contract provisions would need to be considered in any wider review of the IA process, but the contract provisions in place were **not a factor** regarding the quality of the IAs or otherwise contributed to the P269 issue.

6. Coordination between ELEXON and BSC Service Providers and final sign-off of Impact Assessments

The IA requests were submitted in line with the agreed processes and, as noted above, there were ongoing discussions between ELEXON and the service providers in the form of meetings and ad hoc discussions. ELEXON notified the service providers of areas where revisions were required due to errors or misunderstandings around the solution. ELEXON was still in contact with the service providers, particularly BPO, following the IA deadline. It therefore appears that for P269 the interactions between ELEXON and the service providers were reasonably effective and that feedback from ELEXON led to the improvement of the IAs.

Therefore, this aspect was **not a factor** in causing the P269 issue but issues surrounding service provider IAs were encountered whilst the enduring solution was developed. Recommendations to resolve have been put in place.

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APPENDIX 2

Workstream 2. A review of the Business Requirements Development Process

AIM

This workstream considered whether business requirements were developed in a robust fashion and whether processes were in place to address any impacts or issues that are identified during the detailed development of business requirements

Findings

When managing change, ELEXON aims to establish a set of key business requirements that can be agreed with BSC Parties and used to form the basis of a more detailed solution. ELEXON recognises that a given business requirement can give rise to a number of different system solutions, each with their own advantages and disadvantages.

ELEXON is responsible for the initial requirements specified in an IA, and for updating the User Requirements Specifications (URSs) for the affected BSC systems. The URS describes the processing that the system is expected to perform, but the details of how the system fulfils those requirements are covered in the System Specification and Design Specification. These Specifications are updated by ELEXON's AM DEV service provider, and reviewed by Design Authority to ensure that the design meets the business requirements.

In the case of P269, ELEXON was able to establish the overall business requirements sufficiently early in the process, and these remained largely unchanged throughout, culminating in the agreed BSC Legal Text. On this basis and for the purposes of this lesson learned review it is believed that the development of the business requirements for P269 followed expected procedure for a Modification Proposal and was **not a factor** in this issue.

As some of the existing rules around P/C status were unclear to Parties, and P269 was creating further complexity, ELEXON took the extra step of defining the necessary system logic to ensure that the solution aligned with the changes to the Code. ELEXON recognises that this extra activity strayed into an area of detailed system design, and could have influenced the outcome by forcing Service Providers to deliver a particular (or incomplete) software solution. However, by this time, the results of the impact assessment had already led both ELEXON and its Service Providers to focus the scope of P269 around the CRA system, and so the development of detailed system requirements was **not a factor** in this issue.

APPENDIX 3

Workstream 3. A review of the System Testing process

AIM

This workstream considered whether the development and implementation of testing approaches were robust, and if there were any gaps and whether plans contained appropriate checks and balances to ensure scenarios were not missed.

Findings

ELEXON identifies requirements for testing in the first instance through the impact assessment process:

- For changes impacting ELEXON systems, the AM DEV is always required to carry out a Factory Acceptance Test (FAT). This comprises change-specific tests focused around the new or revised functional requirements, and regression tests that ensure the changes applied to the system do not have an adverse or unexpected impact on existing functionality.

- On completion of FAT, the AM DEV delivers the revised software to the BPO for Operational Acceptance Testing (OAT). This testing ensures that the BPO can operate the business processes following delivery of the new software and that these general business processes, along with specific changes which have been made meet our performance requirements.

- Where a change has a direct impact on participants, ELEXON may also recommend participant testing so as to test the interfaces between the BSC Systems and Parties/Party Agents before implementation.

Once ELEXON has scheduled a collection of Modifications and Change Proposal into a Release, ELEXON formalises the various testing requirements into a Test Strategy agreed with the AM DEV and BPO. This Strategy sets the scope of the testing phase of the Release implementation.

ELEXON applies a risk-based approach for testing, which usually means ELEXON only applies FAT and OAT to those systems that have been modified directly by a change. As a result, ELEXON does not perform routine end-to-end testing for every change as the lack of test automation with the BSC Systems makes this a lengthy and resource-intensive activity, and the benefits do not usually outweigh the associated costs.

In the case of P269, ELEXON completed FAT and OAT successfully. The FAT undertaken on the CRA system revealed no issues as the CRA system was (and is) performing as per the original requirements. Similarly, the OAT focused on operation of the CRA system and so also revealed no major errors in design.

In hindsight, had ELEXON performed an end-to-end test involving the SAA system, a problem with the solution should have been identified and therefore steps taken to resolve it as part of the implementation process. The lack of end-to-end testing, incorporating SAA, was a **contributory factor**.

Recommendations

- Give greater consideration to performing end-to-end testing, especially when making changes that have a direct potential to affect parties' imbalance positions.
- Always check the end SAA Settlement report (SAA I -014) output where a change potentially impacts Trading Charges, even if it is believed that the changes are limited to another BSC System and that system has already been tested (particularly important for CRA and CDCA, as these share a single database with SAA and so there are no physical defined data flows to test between these and SAA).
- Ensure test scenarios are based on the different possible business scenarios that could occur.
- Ensure the subject-matter expert signs-off the test scenarios in advance of testing.

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APPENDIX 4

Workstream 4. Consideration of the CRA/SAA Design and Interface

Scope of review

This workstream considered whether the CRA and SAA system documentation provided a clear and accurate view of the interfaces between the systems.

Findings

Functional System Design

This issue revealed an apparent duplication of functions between the CRA and SAA systems, namely the derivation of a BM Unit's P/C Status based on Relevant Capacity.

Analysis suggests that this duplication is a legacy of design changes made during the NETA Programme in the run-up to Go-Live in 2001. The records indicate that at one point, the calculation of P/C Status, based on Relevant Capacity (and therefore BM Unit GC/DC values), was indeed an SAA function. It appears that in July 2000, the Programme took steps to transfer this function over to the CRA. However, despite this the SAA system has continued to carry out its own derivation of Relevant Capacity and P/C Status, using this data to assign Credited Energy Volumes to Parties' relevant Energy Accounts.

The investigation concludes that this duplication of function was the **cause** of the issue, and led to a change of P/C Status in contravention of Modification P269, for Supplier BM Units in a Base Trading Unit.

Function duplication in general (P269 specifics are detailed in Appendix 5)

ELEXON recognises that duplication of system functions is not ideal. ELEXON's Enterprise Architecture Principles, established in 2013, highlight the benefits of best practice in design, following patterns such as separation of concern and solution reusability. In the case of new system developments, ELEXON has been able to apply many of these principles, by making use of service-oriented architecture. However, in the case of the BSC Systems, despite continued development and maintenance, the fundamental architecture is over 15 years old and so almost inevitably falls short against the latest design principles.

As a result, when considering demand-led changes to aged systems, it's not necessarily appropriate to attempt to bring the systems into line with the latest principles when a simpler, more immediate solution will suffice. The cost and effort involved in reworking legacy system architecture can be considerable, and usually cannot be justified unless as part of a holistic strategy.

The BSC Systems Approach project, established by ELEXON in April 2015, investigated such a strategy. Specifically, the programme has delivered:

- An agreed list of **priorities** for areas of **improvement** and the potential **solutions/vendors** to deliver those improvements;
- **Business Cases** for any work considered to be immediately necessary; and
- an **Implementation Schedule** (including an investment plan) for any proposed changes over the next few years.

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The BSC Systems Approach has applied the Enterprise Architecture Principles to ensure that considerations on future solutions are aligned as far as possible with best practice. A Roadmap was delivered to the Board in September 2015.

System Documentation – Accuracy

The SAA documentation (specifically the Service Description, URS, System Specification and Design Specification) showed no indication of the function duplication between CRA and SAA in relation to P/C status. Instead it appears to reflect the intended design change made in 2000, to the extent that there is no reference to the SAA accessing or otherwise making use of GC/DC values provided by the CRA. Given that this documentation helped shape the solution design for P269, this was a **contributory factor.**

The enduring solution will ensure that the SAA and CRA functions around P/C Status are documented accurately.

System Documentation – Review processes

The set of BSC System documentation managed by ELEXON comprises both logical and physical designs. As part of the Release implementation process, ELEXON is responsible for establishing the logical design, represented by the User Requirement Specifications (URS) and Interface Definition and Design (IDD). The physical design is delivered by Service Providers, based on the IDD and URS, and is documented in System Specifications and Design Specifications. ELEXON reviews and authorises these physical design documents to ensure that they adhere to agreed solution design and meet the business requirements established by the Modification or Change Proposals.

In the case of P269, ELEXON carried out the review of the physical design according to normal procedures. The investigation has found that ELEXON had the necessary time and expertise to review the documents properly, and were able to raise appropriate comments that the Service Provider was able to resolve.

Since the SAA documentation did not reflect the actual system implementation, the document review would not have picked up such an error. The review of the software documentation modified for P269 was **not a factor** in causing the failure under consideration.

Data Architecture

The CRA and SAA systems, although considered as delivering separate services, are implemented as part of a joint CRA/SAA/CDCA software application, supported by a single shared database. This arrangement was developed by the original NETA Programme to ensure that the three services could exchange data at the volumes and frequencies necessary to support settlement.

A consequence of this approach is that the exact physical implementation of the data interfaces between these systems can differ considerably from the logical design provided in the system requirements documents. For example, while the URSs and IDD describe the logical data items transferred between CRA/SAA/CDCA, the system design specifications realise these requirements in terms of accessing fields in particular data tables. When considering changes to these interfaces, this disparity can make it more difficult to verify or interpret how particular items are being or transferred. We believe this to be a **factor** and emphasises the need to take care in testing changes to these systems (see other findings).

APPENDIX 5

Workstream 5. Enduring Solution

Our starting point for an enduring solution was the desire to remove altogether the undocumented, duplicated SAA calculation of P/C Status – leaving CRA as the single, definitive source of P/C Status that the existing suite of BSC documents has always implied it is. P/C Status forms part of the BM Unit Registration Data that CRA holds and reports to Parties. This CRA BM Unit Registration Data also includes the following other registration data used in the P/C Status calculation:

- Each BM Unit's P/C Flag (Exempt Export BM Units choose their P/C Status by setting this flag to P or C; all other BM Units have a Null P/C Flag)
- Identification of whether each BM Unit is in a Base Trading Unit or not
- Each BM Unit's GC and DC values (used to calculate the sum of BM Unit Relevant Capacities for each Trading Unit)

The BSC's P/C Status rules, as amended by P269, are that:

- Where a BM Unit has a fixed (not Null) P/C Flag, its P/C Status matches that flag
- Where a BM Unit has a Null P/C Flag and is not part of a Base Trading Unit, its P/C Status is dynamically determined for each Settlement Day depending on the sum of all the BM Unit Relevant Capacities in its Trading Unit – Production if positive, Consumption if negative or zero
- Where a BM Unit has a Null P/C Flag and is part of a Base Trading Unit, its P/C Status is always Consumption (this is the P269 scenario – P269 fixed this to Consumption to avoid the BM Units in a Base Trading Unit 'flipping' to Production if the sum of its BM Unit Relevant Capacities became positive)

The CRA's P/C Status calculation is already correct, as the P269 implementation amended and documented this functionality. It is the undocumented SAA functionality which is continuing to duplicate the pre-P269 (and now incorrect) Relevant Capacity-based calculation for Base Trading Units. Because CRA and SAA systems share a database, the immediate obvious answer appeared to be to get SAA systems to simply 'pick up' and use the correct P/C Status value calculated by CRA systems.

During investigation with our service providers, we established that removing this duplication altogether was not a simple task because:

- CRA systems calculate and report P/C Status, but do not store these values (something which is not obvious from the existing BSC Systems documentation, so we will make sure this is documented)
- While CRA could potentially be made to store P/C Status for future Settlement Days, SAA systems would also need access to historic P/C Status data for the purposes of the 14-month Reconciliation Run process (and further back for any potential Dispute Runs) – we would therefore potentially need to recreate and store this historic data in CRA[1]
- While it is not impossible to overcome these issues, doing so would considerably broaden the scope of (and therefore risk associated with) the changes – impacting both CRA and SAA (and all BM Units) and lengthening the implementation timescales for the immediate fix to the issue

In our agreed enduring solution, we have therefore tried to strike an appropriate balance between removing the SAA duplication as far as possible while minimising the scope, risk and implementation lead time.

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[1] This is not a problem currently because SAA systems store the product of their duplicated P/C Status calculation.

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The solution involves amending SAA systems so that they use existing data from another, interim, stage in the CRA's existing P/C Status calculation. This allows us to simplify the remaining duplicated SAA logic compared with the full end-to-end duplicated calculation it is currently performing. We will document the amended SAA functionality so that any future changes to the P/C Status rules take account of the need to amend both CRA and SAA systems.

The table below shows the how CRA and SAA currently calculate P/C Status, and how SAA will do so under the enduring fix. The changes are shown in red highlight/italics, and affect SAA systems only with no CRA system changes required. The solution utilises an existing interim data item in the CRA's P/C Status calculation, the 'Trading Unit P/C Flag', which P269 already modified to always be Consumption for Base Trading Units. The CRA system documents do not currently detail this data item, so we will amend them to do so as part of the enduring solution. CRA systems store the Trading Unit P/C Flag at a Settlement Day level, making it feasible to use in the SAA's Settlement calculations.

CRA systems					**SAA systems**	
Hypothetical BMU scenario	**BM Unit P/C Flag**	**In a Base Trading Unit?**	**Trading Unit P/C Flag**	**Reported (and correct) P/C Status**	**P/C Status currently used in Settlement**	**P/C Status in Settlement under enduring fix**
BMU-1	C	Y	C	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA
BMU-2	P	Y	C	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA
BMU-3 (P269 scenario)	Null	Y	C	Trading Unit P/C Flag value from CRA	*P or C depending on sum of BM Unit Relevant Capacities in the Trading Unit*	*Trading Unit P/C Flag value from CRA*
BMU-4	C	N	P or C depending on the sum of BM Unit Relevant Capacities in the Trading Unit	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA
BMU-5	P	N		BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA	BM Unit P/C Flag value from CRA
BMU-6	Null	N		Trading Unit P/C Flag value from CRA	*P or C depending on sum of BM Unit Relevant Capacities in the Trading Unit*	*Trading Unit P/C Flag value from CRA*

BMU-3 is the P269 scenario for which CRA is correctly calculating P/C Status, but SAA is not. We therefore could have amended this but left the existing duplication for BMU-6. This appeared undesirable, so we decided to try to incorporate this into the enduring solution too. There are two potential variations on BMU-6: one where the BM Unit is in a Trading Unit with other BM Units and one where it is in a Trading Unit on its own (what the BSC calls a Sole Trading Unit). Unfortunately, BM Units in Sole Trading Units have no Trading Unit association in the BSC Systems,

and thus no CRA Trading Unit P/C Flag that we can use to set P/C Status in SAA where their BM Unit P/C Flag is Null. Resolving this would require changes to CRA systems, increasing the scope, risk and implementation lead time for what is otherwise an SAA-only change. On balance, we therefore believe it is appropriate to leave the existing duplicated, Relevant Capacity-based SAA calculation intact for this variation of BMU-6, such that we only remove it for BM Units in Trading Units with other BM Units. We believe the risk associated with this is minimal, because the duplicated calculation only needs to use that BM Unit's own Relevant Capacity rather than performing the broader, Trading Unit-based calculation.

The total service provider implementation cost of this enduring solution is approximately £68K. P/C Status is most likely to change at the start of each BSC Season when all Parties re-declare their BM Units' GCs and DCs. The necessary system development timescales rule out implementing on the date of the February 2016 Release, in time for the start of the BSC Spring Season on 1 March 2016. We will therefore implement the fix as a standalone change in April, in time for the start of the BSC Summer Season on 1 June 2016.

The enduring solution requires changes to the following documents (the changes to CRA documents are just to ensure all existing CRA functionality is documented; the system changes are to SAA only):

- CRA Design Specification
- CRA System Specification
- SAA Design Specification
- SAA System Specification
- SAA User Requirements Specification (URS)
- SAA Service Description

Of the above, only the SAA URS and SAA Service Description are formal Configurable Items. We will raise a Change Proposal for these in January 2016, for implementation at the same time as the systems solution. We will update all the other documents as part of the systems implementation exercise.

With our service providers, we will conduct detailed scenario-based and end-to-end testing to ensure that SAA systems will correctly calculate P/C Status for all BM Units, regardless of the type of BM Unit or Trading Unit. This will include both testing the P/C Status values calculated in the SAA systems and checking the subsequent allocation of Credited Energy Volumes to Energy Accounts in the SAA-I014 Settlement Report.

During our work on the enduring solution, we investigated two further areas related to the BSC Systems' calculation of P/C Status. We determined that both required no further action, but we record them here for completeness:

- The mathematical calculation that the CRA and SAA systems both use to calculate Relevant Capacity differs to that specified in the BSC but delivers an identical mathematical outcome. The lower-level systems documents already describe this calculation in sufficient detail. As the systems have performed this calculation without issue since NETA Go-Live we do not propose to amend it.
- The way that the CRA systems identify BM Units in a Base Trading Unit for the purposes of P269 differs to that specified in the original P269 impact assessments, as it looks for a Trading Unit name beginning with 'DEFAULT_' rather than using the Base Trading Unit Flag setting for each BM Unit. In practice, this achieves an identical outcome as all Base Trading Units use this naming convention and no other Trading Units have similar names. The lower-level systems documents already describe this identification method in sufficient detail, and it does not conflict with the P269 rules specified in the BSC and Configurable Items. In addition, the CRA systems contain automated validation to ensure that no non-Base Trading Units, and only Base Trading Units, have names beginning with 'DEFAULT_' – and the current CRA systems documentation describes this validation. On this basis, we do not propose to

amend this existing element of the P269 CRA systems solution. However, as Trading Unit applications come to ELEXON before going to the CRA, we will also amend our Trading Unit Registration LWIs to include the same validation. This will avoid any delays to Parties' Trading Unit Registrations in the (unlikely) event that they try to register a non-Base Trading Unit with a name beginning 'DEFAULT_'.