

Investment Decision Pack
NGET_A14.11_Ellipse
December 2019

As a part of the NGET Business Plan Submission

Engineering Justification Paper Ellipse			
Asset Family	<i>IT System – Asset Management</i>		
Primary Investment Driver	<i>Asset Health</i>		
Reference	A14.11 - Ellipse		
Output Asset Types	IT System		
Cost	[REDACTED]		
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Reporting Table	D4.3A		
Outputs included in RIIO T1 Business Plan	NA		
Spend Apportionment	T1	T2	T3
	-	[REDACTED]	-

Contents

Executive Summary 3

Introduction..... 4

Background Information 5

Optioneering..... 7

Detailed Analysis & CBA 9

 Cost 9

 Timeline 9

 CBA 9

Key Assumptions, Risk and Contingency..... 10

 Assumptions 10

 Risks 10

Conclusion..... 11

Outputs included in RIIO T1 Plans 12

Executive Summary

In the RIIO T2 period the support for the Enterprise Asset Management System Ellipse is due to come to an end. The system in its current version will also be nearing its end of life¹. Our options analysis shows that after this point, without either a significant upgrade or replacement of Ellipse and a review of existing support, development and maintenance arrangements, it is likely that Electricity Transmission (ET) will see an increase in the Run the Business costs (RTB²) and challenges with ongoing operation and support.

This confluence of events presents an opportunity to reassess the market and to address IT and Business priorities.

For IT we can take advantage of industry trends of new solution deployment models, development techniques and modular architecture, and to continue the transformation of our architecture. It also enables National Grid to optimally align our suppliers with our IT operating model.

For business, any new solution and architecture must be able to accommodate changes to requirements including the adoption of risk-based maintenance, increased digitalisation of business processes, the extension of condition monitoring and the increasing reliance on Asset Investment Planning tooling to optimise work management. Equally, it must be a good functional fit with broader National Grid systems in HR, Procurement and Finance. Additionally, it should have a robust product roadmap to enable us to maintain an industry leading work and asset management capability.

A range of options for the provision of asset registry and work and asset management capabilities have been identified, and detailed analysis, including Cost Benefit Analysis (CBA) undertaken. The preferred solution is to replace Ellipse with a market leading work and asset management solution that meets the requirements for ET outlined above. The solution will be shared between ET and Gas Transmission (GT) as this provides the most economic and efficient solution for the two businesses, with the ET share of the cost being █████. This investment is required to ensure that ET can continue to provide a safe and reliable electricity transmission system for our customers and stakeholders.

¹ We define a refresh as the replacement of hardware with comparable, supportable hardware and / or an upgrade to a current (supported) version of system software and application software. Upgrading to a current version of software ensures the availability of maintenance and security patches, it may also bring increased system capability, but that will be a by-product of the upgrade and not its primary purpose.

A full replacement differs from a refresh, in that the usual trigger for a full replacement of an IT system with a new system will be to develop new or changed business capabilities. The business requirements will have changed to an extent that it is not considered possible or cost effective to accommodate the new and changed requirements through changes to the existing system and the procurement of an entirely new system is considered the best option in terms of the business benefits delivered versus the cost. The business requirements that drive such a replacement may be functional (e.g. a new process has to be supported) or non-functional (e.g. a substantial increase in user numbers, resilience required or transaction throughput).

² 2013 options analysis identified an increase in ongoing Opex of █████ per year for similar option.

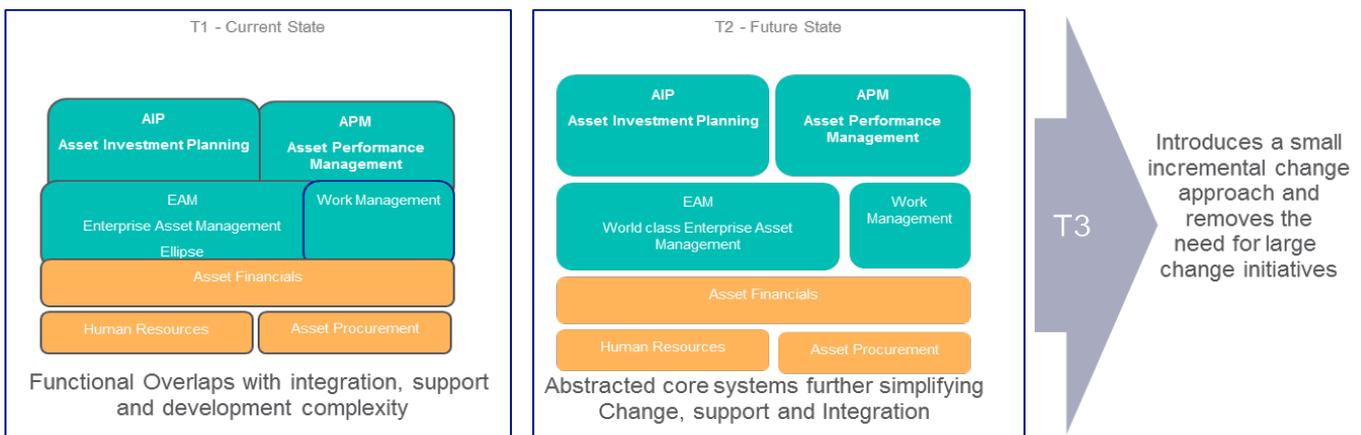
Introduction

Ellipse is a business-critical Enterprise Asset Management application, provided by ABB, across both Electricity Transmission and Gas Transmission. It manages the;

- a) Registry of the transmission assets
- b) Maintenance and other work associated with those assets
- c) Inventory relationship for MRO (Maintenance, Repair and Operations)
- d) Some elements of work scheduling
- e) Some elements of faults and defect management
- f) Some elements of asset condition and performance data
- g) Cost and time information across capital and maintenance work
- h) Wayleave information
- i) Field worker’s timesheets and feeds into the SAP payroll system

It was most recently technically upgraded from version 6 to 8 in 2015-17 as part of the TISMP/TCRM programme (see ‘background information’ for details). This mitigated significant asset health risks with version 6 and rationalised parts of the surrounding application and integration landscape. Contingent with our IT asset health policy we have previously adopted the assumption that Ellipse would need a refresh in 2022-24.

Instead, an updated solution coupled with a transformed architecture will enable systems to meet the changing demands of the energy market whilst removing the need for major upgrades in future regulatory periods, thus reducing the overall cost of future change and ongoing maintenance. The diagram below shows the evolution of the architecture and system landscape across regulatory periods.



Work has started in the RIIO-T1 period to simplify the architecture, integration and system landscape through updates and abstraction of work management and simplification of core asset management integration during system upgrades. To complete the transition, additional investment is required.

To meet stakeholder’s expectations of a safe, efficient and reliable network, we will therefore look to move to a fully supported, integrated, market leading asset management solution that supports ET with monetised risk and delivering maintenance programmes to support the health of transmission assets. Given the new architectural and deployment options from asset management systems we would also like to explore the possibility and potential benefit of remaining on a common platform and vendor across Gas and Electricity Transmission but separating instances. This would likely benefit IT from a commercial and operational perspective and present opportunities and efficiencies to both transmission businesses. This option had been discounted from previous assessments due to those limited architecture and deployment options.

Below are three most likely options available to ET and the ones we have explored. This investment report advocates option ‘C – Replace with other market leading Asset Management System’.

- a) Deferral of a larger upgrade of Ellipse until RIIO-T3 (Would require some investment throughout T2) (Do Nothing)
- b) Upgrade current solution in RIIO-T2 (Ellipse)
- c) Replace with other market leading Asset Management System (e.g. Maximo, SAP) and reassess the benefit and viability of separate Electricity and Gas asset management systems

Background Information

In 2013-14 an options analysis, carried out under the Transmission Technology Change Roadmap Programme (TCRM), recommended a technical upgrade of Ellipse from version 6 to 8 across both ET and GT. Other options explored but discounted included a replacement of Ellipse with either Maximo or SAP, deferral of investment altogether and separation of the ET and GT instances of Ellipse. Each of these options were rejected because at that time they either increased the total cost of ownership, were deemed too risky or did not fit with the business’s requirements (key assessment criteria for any option). At that time asset management system vendors typically sold tightly integrated product suites that delivered elements of investment planning and performance management.

The upgrade took place in 2015-2017 under the Transmission IS Major Projects Programme (TIMSP). Ellipse was upgraded from version 6 to version 8 for both ET and GT. The main driver was to address the health of version 6 but to also improve integration with other systems, reduce overall cost to run the system and reduce dependency on AMT-Sybex to develop functionality and interfaces in the future.

Final project costs for the upgrade were as below.

Year	FY15	FY16	FY17	FY18	Total
Ellipse Upgrade (ET share) (£)	████	████	████	████	████

Since this upgrade, we have introduced a new technology and vendor into the current architecture for asset investment planning (Copperleaf C55) which has been integrated into the existing environment. Our system landscape and architecture has also continued to develop in asset performance management but we are yet to define any clear product or vendor strategy in this area due to most vendors still having not defined clear direction and roadmap.

Additionally, the ongoing reconciliation of asset data (Ellipse) and financial data (SAP) has continued to drive inefficiencies and difficulties in the reconciliation of the cost of asset work, generation of key business and stakeholder metrics and cost visibility in the operations. Specifically;

- Granularity of asset breakdown is different between Ellipse and SAP;
 - This can lead to difficulties in providing our auditors with sufficient evidence of an asset’s existence, and often leading to requirements for time-consuming manual work to pull together additional supporting evidence.
 - Capitalisation and asset write-offs where replacement/disposal takes place at a lower level of granularity than where the assets are recorded in SAP can be difficult to correlate and therefore drives extensive manual work to manage allocations.
- The link between assets in the two systems is not system enforced.
 - This involves several manual or semi-manual steps at each end with the exchange of spreadsheets by ECM workflow and email in between. This opens opportunities for significant time delays to occur.
 - The reliance on manual/semi manual steps increases the risk of discrepancies between systems and drives lengthy reconciliation activities.
- Ellipse’s strictly parent-child hierarchy constrains our ability to capture the relationship of certain asset types such as those that are not maintained or inspected themselves (e.g. cable tunnels). This drives manually intensive workarounds to detail supporting evidence for an asset’s existence. The

ability to maintain such multi-dimensional relationships between assets would reduce manual workarounds and potentially improve modelling capability for asset-to-asset risk.

Optioneering

Below are the three options considered against our key criteria of:

- Total cost of ownership – capital investment and associated operating costs borne by consumers
- Capacity to deliver - the level of risk associated with the ability of NG and our supply chain to deliver the option
- Business/strategic fit - the alignment of this option to our overall business direction and other planned investments
- Addressing the problem – how well the option resolves the identified issue
- Risk – the overall risk to the business associated with this option

The output of this is designed to produce the most cost effective solution that delivers the maximum benefit to ET’s stakeholders. Each option has undergone a cost benefit analysis (attached).

- Deferral of large scale investment in current platform till RIIO-T3
- Upgrade current solution (Ellipse)
- Replace with other market leading Asset Management System (e.g. Maximo, SAP)

We are discounting option a) and b) for the reason detailed below.

Option	* Total Cost of Ownership	Capacity to Deliver	Business / Strategic Fit	Addressing the Problem	Risk	Overall
A) Deferral of large scale investment in current platform till RIIO-T3 (Do Nothing)	<p>RED</p> <ul style="list-style-type: none"> • Likely increase in ongoing Opex costs for support.³ • Likely increase in year on year remediation investment.⁴ • Likely increase in parallel IT costs such as integration. 	N/A	<p>RED</p> <ul style="list-style-type: none"> • Would place core business processes at risk as system ages. • Would expect cyber risk to increase year on year.⁵ • Would not support future ET requirements 	<p>RED</p> <ul style="list-style-type: none"> • System health issues would increase and would become a serious risk to the business. • Ellipse is fundamental to the safe and efficient delivery of the capital plan and maintenance programmes. 	<p>HIGH</p> <ul style="list-style-type: none"> • All software components will exceed end of life. Product will reach end of life and ABB will withdraw support for all components. 	REJECTED

³ 2013 options analysis identified an increase in ongoing Opex of █████ per year for similar option.

⁴ Typically spend between █████ per year on such activities in stable environment – would expect this to increase substantially.

⁵ To satisfy Digital Cyber Risk & Security requirements, regular updates of the Ellipse application must be applied to ensure that the Ellipse Appliance OS is up to date in terms of ABB recommendations for the specific version in place

<p>B) Upgrade current solution (Ellipse)</p>	<p>AMBER</p> <ul style="list-style-type: none"> • Capex project costs £18m to £22m⁶ • Ongoing Opex costs projected to remain similar to today 	<p>GREEN</p> <ul style="list-style-type: none"> • Standard migration approach with history in NG • Likely most cost-effective Capex approach minimising IT complexity and re-work. • Processes remain largely unchanged and users require familiarisation training only. 	<p>RED</p> <ul style="list-style-type: none"> • Would not address concern about ABB's product roadmap for Ellipse and wider capability set • Unlikely to meet future ET requirements • Would not align with NG IT Enterprise Architecture policies⁷ 	<p>AMBER</p> <ul style="list-style-type: none"> • Would not address inefficiencies identified in cost management between Ellipse and SAP. • Would address all projected system health issues. • Would not address business feedback of difficulty to use and expense and inflexibility in making changes to the system 	<p>MEDIUM</p> <ul style="list-style-type: none"> • May increase risk of vendor lock in • May not meet ET's future business requirements 	<p>REJECTED</p>
<p>C) Replace with other market leading Asset Management System (e.g. Maximo, SAP)</p>	<p>AMBER</p> <ul style="list-style-type: none"> • Capex project costs likely higher, at £30m, than an upgrade⁸ • Expect reduction in ongoing Opex incurred from licensing and support rationalisation 	<p>AMBER</p> <ul style="list-style-type: none"> • Migration away from Ellipse would more complex than upgrade • Still activity that is done regularly across industry 	<p>GREEN</p> <ul style="list-style-type: none"> • Simplified NG wide architecture and lower platform cost. • Reduced NG customisations. • Enabler for future ET requirements 	<p>GREEN</p> <ul style="list-style-type: none"> • Would address all projected system health issues. • Improved integration, reduced cost with other NG systems such as SAP • Reduced reliance on AMT Sybex 	<p>MEDIUM</p> <ul style="list-style-type: none"> • Need to proactively manage delivery as expected to be more complex 	<p>RECCOMENDED</p>

⁶ Based on cost of v6 to v8 upgrade at [REDACTED]

⁷ Leverage and reuse applications and technology where NG has made a significant investment (HR and Finance – SAP, Asset Management – Maximo)

⁸ Benchmarked by Gartner April 2019

Detailed Analysis & CBA

Cost

The cost projections are based on;

- Programme cost analysis from previous projects of a similar size. The key input was the 2015-17 upgrade of Ellipse and supporting collateral. Other project inputs included similar projects in wider National Grid.
- Relevant investment sanction and closure papers
- Current cost and commercial arrangements with application development and maintenance partners.
- Stakeholder interviews and wider IT knowledge.

Our costs were market tested with Gartner in the lead up to our submission. Gartner benchmarked both option B and C and their recommended range for option C is between [REDACTED] which we are within.

Below shows a summary of the output from the CBA covering both ET and GT. The baseline “do nothing” option has the lowest forecast expenditure but incurs additional cost through the risks that it creates for the business.

Option B and C both have higher levels of investment but additional costs are not faced, leading to a lower NPV. Our recommended option’s Total NPV is [REDACTED], which is lower than the option to replace and significantly lower than deferring investment until RIIO-T3.



Timeline

Our plan and deliverability is based on previous assessments conducted in RIIO-T1 during TISMP, along with experience of delivering major system replacement programmes in the TO portfolio.

Key milestones:

- Detailed assessment of the current estate and options analysis will be conducted at the start of the project, planned for FY23.
- The project to replace Ellipse will run from FY23 until its completion in FY24
- The project will conclude with the implementation of a fully supported, integrated, market leading asset management solution that supports ET with monetised risk and delivering maintenance programmes to support health of transmission assets.



CBA

Please refer to file NGET_A14.11 _Ellipse_CBA01.xlsx (This CBA covers costs for both ET and GT)

Key Assumptions, Risk and Contingency

Assumptions

We regularly meet with existing and potential vendors to assess the Enterprise Asset Management market, based on these conversations and research with industry analysts we have based our recommendation on the following assumptions:

- There are alternative vendors in the market that have been assessed and scored higher in their vision for asset management and their ability to deliver a world class solution.
- Solution vendors are rearchitecting their solutions and platforms to modern architecture patterns.
- Solution vendors are adopting modern development practices to enable smaller incremental function updates and release
- Asset management solution vendors are offering commercial terms where customers can purchase discrete functional elements of their platforms to avoid overlap and duplication.
- Most solution vendors offer several deployment models to suit customer needs
- Key business capability requirements will remain generally unaltered
- ET and GT will continue to share a common solution in RIIO-T2

Risks

We have also identified several risks in the table below and are actively mitigating these to prepare for the successful delivery our recommendation and commitments in the T2 regulatory period.

Risk	Actions Taken
Gas Transmission and Electricity Transmission may choose different EAM solutions/timelines.	Actively working with GT business, regulation and IT teams to ensure that the best outcome is met for both businesses and for IT to run, manage and maintain the resulting system landscape
Increased complexity of migrating away from Ellipse may significantly increase costs and timelines of implementation	Benchmarking by Gartner of plan has shown a premium of 20%-30% in implementation costs which we have included in overall cost.
Continuation of longer technology health cycles leading to large upgrades with increased complexity and cost throughout RIIO-T2/T3	Ensure we rationalise platforms and implement shorter technology health cycles to reduce complexity, cost and risk
Increased risk of cyber and security breaches in early RIIO-T2	Ensure all systems are maintained to latest vendor released versions in a timely manner (proposed). Maintain a strong cyber capability within National Grid which regularly assesses the IT landscape for vulnerabilities
Limited internal or external talent - lack of enablement	Ensure a program of continual improvement is implemented to help retain talent and knowledge within National grid and ensure that National Grid IT retains the most appropriate application development and maintenance partners.
Business imperatives may necessitate a change in the implementation timeframes	We will continue partnering closely with the ET and GT business, ensuring all initiatives are aligned, and we will manage any business need to, for example, bring forward the implementation of the new solution.

Dependencies

- Reliance upon the business change transformation agenda to align changes in business process, culture and behaviours, to support in leveraging the new technology
- Reliance upon data enhancement strategy in parallel with new system and processes

- Reliance upon vendor product development delivering against roadmaps

Conclusion

National Grid's strategy is to continue to mature our IT architecture to support rapid change as cost effectively as possible. We started our transformation journey in RIIO T1 performing major upgrades to our core asset management system, bringing in new solutions for investment planning and performance management and simplifying the surrounding systems, integration and support model. We now need to continue this transformation to take advantage of developments in the IT market and to optimise changes in our IT operating model, but also align with, and support of, business needs and priorities.

This paper and its recommendation underpins ET's responsibility to provide a safe, reliable and cost effective network for its customers and stakeholders that can quickly adapt to the changing needs of the UK energy market. When implemented, it will drive the following benefits:

- Reduction in ongoing Opex incurred from licensing and support rationalisation
- Simplified NG wide architecture and lower platform cost.
- Removed need for large, costly future change programmes.
- Reduced NG customisations.
- Increased ability to rapidly and cost effectively change the IT landscape to support future ET requirements – e.g. digitalisation, monetised risk
- Address all projected system health issues.
- Improved integration, reduced cost with other NG systems such as SAP
- Reduced reliance on AMT Sybex

The solution will deliver asset and work management capabilities for both ET and GT, at a cost of [REDACTED] for ET in 2024.

Outputs included in RIIO T1 Plans

RIIO-T1 Allowance	Forecasted RIIO-T1 spend RRP19	Key Outputs
<p> [REDACTED] This was made up of two significant investment phases in 2013-16 and 2018-22. Note that the submission included aspects of other capabilities such as GIS and therefore it makes it difficult to make a direct comparison. </p> <p> <i>1. "Investment in 2013-2016 for the asset upgrade or replacement of the Ellipse Enterprise Asset Management System. This will take consideration of the overall portfolio, including integration with components such as mobile solutions, GIS, outage management and planning tools."</i> </p> <p> <i>2. "Investment in 2018-2021 for the tactical application refresh of the Enterprise Asset Management System. This investment follows the earlier upgrade/replacement of Ellipse which will have completed in 2015-2016. This will provide the latest software capabilities in this area for the TFO chosen application."</i> </p>	<p> [REDACTED] </p> <ul style="list-style-type: none"> • Upgrade of Ellipse from version 6 to 8 • 2015-17 [REDACTED] • Potential upgrade of Ellipse from version 8 to 9 to mitigate some asset health and security issues. • 2019-20 • Forecast [REDACTED] 	<p> We did envisage two large projects to upgrade or replace Ellipse, our asset registry, in the RIIO-T1 period. Through extending the support in 2015-2017 we have been able to only deliver one upgrade (Ellipse version six to eight) in this period. We will see the next upgrade or replacement in 2022-2023. This has delivered efficiency of approximately £10m against our submission. </p>