NEED/OPPORTUNITY STATEMENT (NOS)

Corporate Data Network Refresh 2018-2023

NOS- 000000001542 revision 1.0

Ellipse project no.: P0008894
TRIM file: TBA

Project reason: Support the business IT
Project category: Support - IT

Approvals

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Approved	Stuart Barber	A/Chief Information Officer
Date submitted for approval	9 August 2016	

1. Background

The Corporate Data Network provides the switching, routing and load balancing services to enable endpoint devices to connect to enterprise applications and intra server data transfer.

The CDN comprises Cisco switches and routers and F5 load balancers. The CDN is monitored and managed using the SolarWinds network management software. The current Asset life for physical network devices is 5 years.

Data communications also enables Unified Communications services including Video Conferencing, Instant Messaging, desktop sharing and electronic mail. Physical screens, voice gateways together with Call Manager, Jabber, Webex and Microsoft Exchange software enable these services. These assets have a life of 5 years.

2. Need/opportunity

All of these physical devices and associated software will progressively reach end of life during the upcoming regulatory period.

IT Hardware	Hardware Description	End of Life
Cisco Switches	Provides the ability to connect devices together on a network. A switch will receive, process and forward data to the destination device.	2022
Cisco Routers	Provides the ability to connect multiple networks and forward small units of data destined for either its own network or other networks.	2022
F5 load balancers	A load balancer is a device that is used to distribute network or application traffic across a number of servers. Load balancers are used to increase capacity and the reliability of applications.	2022

Without a replacement program there is an increased risk the hardware will progressively fail leading to interruption to service availability for the IT Service portfolio. The operational risk impacts have been quantified at $3.18m per annum commencing in 2021/22. This figure is derived from calculating costs associated with the failure of an IT 24x7 service affecting 1000 users for 72 hours.

Three underlying causes are included within the risk model: hardware failure within the physical switching environment, data transfer failure and software failure of infrastructure software required to run the unified communications applications. Hardware replacement and repair labour have been included in the risk costs, along with the cost of service interruption mentioned above.

3. Related needs/opportunities

The information infrastructure refresh and enterprise applications refresh are related and will be considered as part of the scoping and requirements definition for the information infrastructure replacement program.

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

TransGrid

Attachment 1   Risk costs summary

Current Option Assessment - Risk Summary

Project Name: Corporate Data Network Refresh 2018-2023

Option Name: 1542 CDN Refresh - Base case

Option Assessment Name: 1542 CDN Refresh Base case - Assessment

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
Network	1	Distribution	Service Failure (Network)	$2.12	Hardware Failure	$2.12	50.00%	$1.06	$0.00		$1.06			$0.00
Network	1	Distribution	Service Failure (Network)	$2.12	Software Failure	$2.12	50.00%	$1.06	$0.00		$1.06			$0.00
Network	1	Distribution	Service Failure (Network)	$2.12	Data Transfer	$2.12	50.00%	$1.06	$0.00		$1.06			$0.00
				$6.36		$6.36		$3.18	$0.00		$3.18			$0.00

Total VCR Risk: Total ENS Risk:

Ellipse project no.: P0008952
TRIM file: TBA

Project reason: Support the business IT
Project category: Support - IT

Approvals

Author	Michael Milne	Planning and Architecture Manager
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Approved	Stuart Barber	A/Chief Information Officer
Date submitted for approval	9 August 2016	

1. Background

TransGrid operates two data centres from which IT services are delivered. The data centres provide power, cooling, monitoring and security for the IT equipment. Within the data centres are physical servers, storage arrays and associated software which runs the portfolio of enterprise applications. In addition a fleet of managed endpoint devices comprising workstations, desktops, laptops, tablets and smart phones are used by employees to access enterprise applications.

Enterprise Applications and services are delivered from virtual web, application, file and database servers running the Microsoft Windows server or Oracle Enterprise Linux operating systems.

The virtual servers run within the VMWare VSphere hypervisor environment which in turn executes on IBM ESX and Nutanix physical servers.

The physical servers are located in TransGrid data centres at Sydney West and Sydney South substations and have an asset life of 4 years.

Storage is shared across the server environment using Storage Attached Network (SAN) and Network Attached Storage (NAS) technologies. The storage for the virtual desktop environment is built in to the Nutanix servers in what is known as hyper converged infrastructure. The asset life for storage infrastructure is 5 years.

Storage for all other services is separated into four tiers comprising:

- Tier 1 – Nimble SAN supporting all production enterprise applications

- Tier 2 – IBM XIV Gen 3 SAN supporting all non-production environments

- Tier 3 – IBM V7000 SAN which contains all data loss protection back up data

- Tier 4 – NetApp NAS which hosts file servers and large static data sets including LIDAR post processed data and high resolution photography.

Remote access to services and virtual desktops are provided by the Citrix software suite which comprises XenApp and XenDesktop. Structured data management services are provided to enterprise applications using Microsoft SQL and Oracle database management system software. Data loss prevention is provided by the IBM Tivoli Storage Manager (TSM) suite. The asset life for this infrastructure software including the operating systems mentioned above is 4 years.

Endpoint approximate device numbers and asset lives are as follows:

- Smart Phones 600 (3 years)

- Tablets 300 (3 years)

- Laptops 900 (3 years)

- Desktops 200 (4 years)

- High performance workstations 50 (4 years)

2. Need/opportunity

All of these physical devices and associated software will progressively reach end of life during the upcoming regulatory period.

Without a replacement program there is an increased risk the hardware will progressively fail leading to interruption to service availability for the IT Service portfolio. The operational risk cost increase is calculated at $4.5m per

annum commencing in 2019-2020. This figure is derived from calculating risk costs associated with the failure of an IT business hours service affecting 1000 users for 120 hours. Three underlying causes are included within the risk model: component failure within the physical server environment, hardware failure of a shared storage platform and software failure of infrastructure software required to run enterprise applications.

3.   Related needs/opportunities

The data communications refresh and enterprise applications refresh are related and will be considered as part of the scoping and requirements definition for the information infrastructure replacement program.

4.   Recommendation

It is recommended that options be considered to address the identified need/opportunity.

TransGrid

Attachment 1   Risk costs summary

Current Option Assessment - Risk Summary

TransGrid

Project Name: Information Infrastructure Refresh 2018

Option Name: 1547 Information Infrastructure Refesh - Base case

Option Assessment Name: 1547 Base case - Assessment

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Service Failure (TG IT service)	$3.00	Software Failure	$3.00	50.00%	$1.50	$0.00		$1.50			$0.00
TG IT service	1	Compute	Service Failure (TG IT service)	$3.00	Component Failure	$3.00	50.00%	$1.50	$0.00		$1.50			$0.00
TG IT service	1	Storage	Service Failure (TG IT service)	$3.00	Hardware Failure	$3.00	50.00%	$1.50	$0.00		$1.50			$0.00
				$9.00		$9.00		$4.50	$0.00		$4.50			$0.00

Total VCR Risk: **Total ENS Risk:**

TransGrid

Ellipse project no(s):
TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition
Project category: Support - IT

Approvals

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	Azil Khan	Investment Analysis Manager
Approved	Stuart Barber	Acting Chief Information Officer
Date submitted for approval	31 October 2016	

Change history

Revision	Date	Amendment
V0.1	18/10/2016	Received Initial draft from Litmus
V0.2	24/10/2016	Added Benefits Quantification
V0.3	16/11/2016	Updated risk drivers and application descriptions

1.   Background

TransGrid's Field Service Workforce plays a crucial role in the maintenance, replacement, defect remediation and inspection of the high voltage network. To assist with their core operations, a number of mobile applications have been designed and distributed for use to this work group. These mobile applications allow for the field workforce to be more efficient, have access to real-time asset information, log and action health, safety and environment risks in real time and be generally more mobile.

The current suite of mobile applications was custom developed and is integrated through the TransGrid Application Framework to the Enterprise Resource Planning system (Ellipse). Regular enhancements and updates to the applications are released periodically to enhance the functionality, speed, reliability and overall performance of each application.

As technology advances, there is the opportunity to improve mobile applications through the implementation of augmented reality and voice input to increase the productivity, effectiveness and safety of field operations.

2.   Need/opportunity

Need

There is a need to replace and/or upgrade the identified custom built applications before they reach the end of the life period. The increased operational risk that would be incurred unless these applications are replaced or upgraded is estimated to be $7.92m. The risk cost drivers are based on a hazardous event of service failure either in security, software or data quality. The key inputs into the risk cost are:

> Probability of failure estimated at 20% is based on the rate of change of the external software environment;

> Major consequence from these failures is the potential service interruption for 72 hours and across 500 users is based on the replacement of the mobile application suite for example TransGrid's Resource Allocation Calendar recovery timeframe;

> Likelihood of the consequence moderated by "N-0.5" which applies 55% likelihood on the consequence is based on the usual failure modes as full redundancy is not in place for all systems.

The risk report is included at attachment one. The following field based mobile applications will reach end of life in the period 2018-2023.

IT Service	Application	Application Description	End of Life
Works Risk Assessment	Work and Safety Package (WASP)	An automated system for generating Safe Work Method Statements, associated mandatory forms and checklists which are required to safely perform specific work activities.	2020
Skills Certification	Authorisation to Work (ATW)	The system ensures that TransGrid staff has the correct authorisation based on their training and qualifications to complete work. The system allows for the easy management of authorised individuals to complete work across the organisation.	2021
HV Switching	Portable Switching (PS)	The mobile application component of THEOS, which is a system used to plan and manage High Voltage outages across the network. The mobile application allows for switching instructions to be sent to Field users.	2021
Scheduling and Dispatch	TransGrid Resource Allocation Calendar (TRAC)	TRAC is an online calendar based planning tool for the allocation/planning of resources with interfaces to THEOS and Ellipse to source related work orders and outages. Human & Non-Human resources, Mobile plant, test equipment or any resource for that matter can be managed in TRAC. This system also contains a mobile application component.	2021
Asset Inspection	Asset Inspection Manager (AIM)	AIM is a tool for Field Services and Asset Management teams to create and perform scripts for asset maintenance and inspections. The application allows Asset Management to create a script of questions for Field workers to complete when they perform maintenance inspections.	2022
Vegetation Management	Vegetation Management System (VMS)	This application is utilised by Field Services staff to perform vegetation assessments and record easement maintenance requirements.	2022
Outage Management	The Outage System (THEOS)	THEOS is a custom developed application for the planning, resource scheduling, coordination and statistical tracking of outages of High Voltage equipment and their associated Requests for Access.	2022

Opportunity

There is an opportunity to improve data quality and decision making leading to optimise maintenance costs and improve network reliability. This will be done through prudent investment in a number of new technologies including:

> Augmented reality solutions (live direct/indirect view of the real world where elements are supplemented by computer generated input) to improve process efficiency and workforce safety. Field Services workforce can be provided with intuitive augmented instructions on the job so they can understand processes and have access to information quickly, spend less time on each step, and make fewer errors. This solution would also allow for staff to get remote assistance from experts and collaborate with other teams. These solutions can be applied to many areas of the business including the management of TransGrid's vehicle fleet.

> Dynamic scheduling and dispatching solution to improve efficiency in the Field Services workforce as jobs will be dispatched automatically on mobile devices. Jobs can also be started, paused and closed directly from the field.

> Track and trace inventory for mobile devices – with the significant number of mobile devices across the network this will become critical for delivering an efficient process and accurate information for the configuration of these devices.

Preliminary Benefits Assessment

Benefit	$m p.a.
Reduction in effort to configure and manage the fleet of sensor and monitoring devices associated with the HV network because Field Services will have augmented reality solutions to improve the management of TransGrid's HV vehicles. (Based on 400 fleet vehicles x average SP 18 $44.27/hr x 40 minutes savings for each vehicle/wk x 48wks/yr = $566,656/yr)	0.57
Improved efficiency on field work as instructions and asset information are easier to access through augmented reality solutions and/or remote expert support. This can include improvements to WASP and VMS processes. (Based on 524 Field Services staff x average SP 18 $44.27/hr x 30 minutes savings/wk x 48wks/yr = $556,739/yr)	0.56

* Please note benefit calculations will be refined when each of the projects are scoped in detail.

3.   Related needs/opportunities

Intelligent Operations Centre – real time data and defect information for assets will be pushed to the Digital Field Force.

4.   Recommendation

It is recommended that options be considered to address the identified need/opportunity.

TransGrid

Attachment One Risk costs summary

Current Option Assessment - Risk Summary

TransGrid

Project Name: Digital Field Force

Option Name: RP2IT-DFF - Option 1

Option Assessment Name: RP2IT-DFF - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Service Failure (TG IT service)	$13.21	Security Vulnerability	$13.21	20.00%	$2.64	$0.00		$1.98			$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$13.21	Software Failure	$13.21	20.00%	$2.64	$0.00		$1.98			$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$13.21	Data Quality	$13.21	20.00%	$2.64	$0.00		$1.98			$0.66
				$39.62		$39.62		$7.92	$0.00		$5.94			$1.98

Total VCR Risk: **Total ENS Risk:**

TransGrid

NEED/OPPORTUNITY STATEMENT (NOS)

Analytics Platform Refresh

NOS- 000000001690 revision 0.0

Ellipse project no(s): P0010088
TRIM file: TBA

Project reason: Support the business IT
Project category: Support - IT

Approvals

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Approved	Stuart Barber	Acting Chief Information Officer
Date submitted for approval	31 October 2016	

Change history

Revision	Date	Amendment
V0.1	18/10/2016	Received Initial draft from Litmus
V0.2	24/10/2016	Added Benefits Quantification
V0.3	1/12/2016	Updated the document

1. Background

Data analytics is used by organisations to make better business decisions. Traditionally, data analytics focused on two main fields:

> Diagnostic – why did it happen; and
> Descriptive – what is happening.

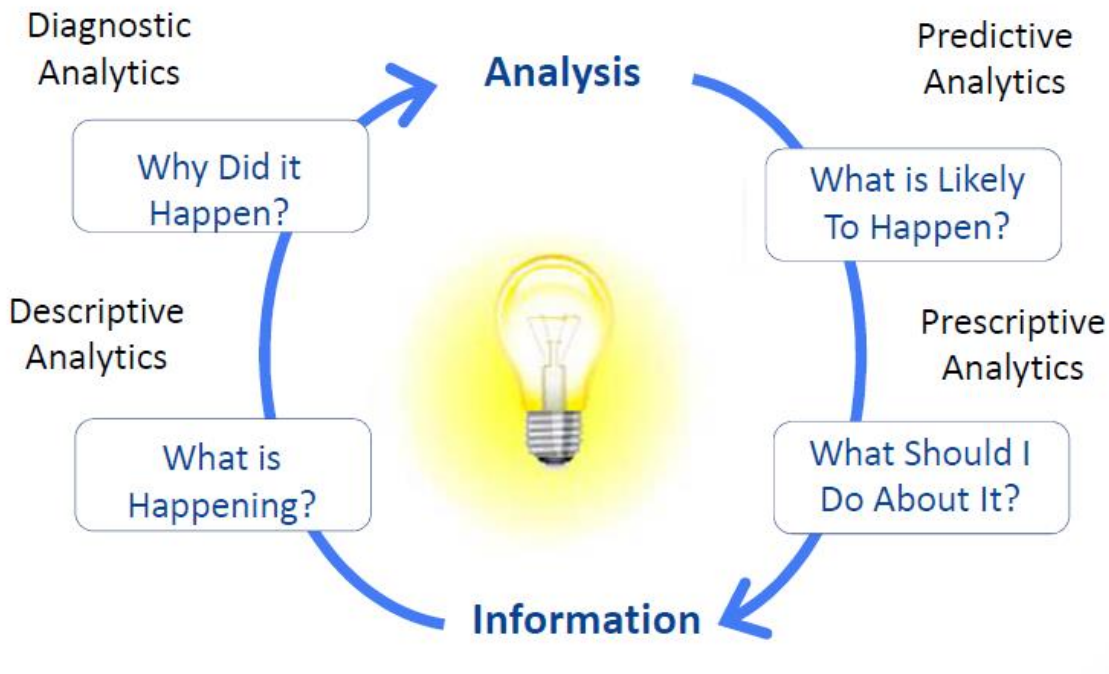The field of data analytics is rapidly evolving and has recently seen the addition of two fields:

> Predictive – asks what is likely to happen in order to predict outcomes; and
> Prescriptive – asks what I should do about it in order to prescribe actions.

TransGrid's current reporting landscape focuses predominantly on descriptive analytics, but with the recent introduction of tools such as Analysis Services cubes and Tableau, use of available data for diagnostic and prescriptive analytics is being widely adopted.

To make sound operational decisions, importance of predictive analytics and need to provide appropriate tolls and access to data will become critical in the next few years.

Currently there is software available in the market which can provide analytical capabilities to asset managers giving them an insight into optimised asset decision making which will lower asset maintenance costs and improve reliability. These new capabilities complement and extend the descriptive and diagnostic capabilities already implemented through data warehouse and visualisation tools.

The following graphic illustrates the analysis journey from data to insight.

2.   Need/opportunity

There is a need for TransGrid to refresh its current descriptive and diagnostic platforms (Microsoft SQL Server Reporting Services, Microsoft SQL Server Analysis Services, WhereScape Red and Tableau) which will reach end of life in the period 2018-2023. The IT services reaching asset end of life are summarised in the following table. These applications will be upgraded or replaced based on the business requirements and the suitable products available in the market.

Table 1 – IT services reaching asset end of life.

IT Service	Application(s)	Application Description	End of Life
Business Reporting	Microsoft SQL Server Reporting Services, Microsoft SQL Server Analysis Services and WhereScape Red	Microsoft SQL Server Reporting Services provide a set of canned reports to users. These reports can be executed on demand. Microsoft SQL Server Analysis Services delivers online analytical processing and data mining functionality for business intelligence applications. WhereScape Red is a tool that provides a framework for the development and ongoing support of an enterprise data warehouse.	2022
Data Visualisation	Tableau	Tableau is a tool that allows a user to analyse data and display the data in a graphical or dashboard format.	2022

The increased operational risk that would be incurred unless these systems are replaced or upgraded is calculated at $3.24m from the financial year of 2022/23. The driver of this risk cost is based on the hazardous events relating to out of support either in security, software failure and data quality. Key inputs into the risk cost are:

> Probability of failure estimated at 20% is based on the rate of change of the external software environment specified by vendors this includes software version updates and hardware replacements to enable compatibility across the network;

> Major consequence from these failures is the potential service interruption for 1,000 users for 72 hours and a data confidentiality breach for up to 50 thousand records;

> Likelihood of the consequence is moderated by "N-1" which applies 5% likelihood of the consequence. This is based on the failure mode of full redundancy which is in place for all the systems.

The risk report is included at attachment 1.

There is an opportunity for TransGrid to achieve the following outcomes through investment in master data management and predictive/prescriptive analytics capabilities:

> More efficient regulatory reporting, in particular the completion of the annual Regulatory Information Notice (RIN);

> Financial reporting better tailored to meet security holder and other external stakeholder requirements;

> Predictive analytics will reduce asset failures reducing associated costs;

> Prescriptive analytics will optimise maintenance decisions leading to lower asset maintenance costs; and

> Improved asset and financial data quality.

Preliminary Benefits Assessment

Benefit	$m p.a.
Improved reporting capability across the business which results in better decision making and a reduction in the time required to generate the reports. An estimated non- cashable cost saving of $0.830m per annum which is based on Operational Reporting and Analytics – Stage 3 reports to be delivered in 2017.	$0.83
Reduced asset failures will result in a reduction in associated costs. The cashable costs savings is $4m based on 4,000 fixed assets (November 2016 fixed assets report) and $1,000 saving per asset.	$4.0
Benefit total:	$4.83m

* Please note benefit calculations will be refined when each of the projects are scoped in detail.

3.   Related needs/opportunities

> Pervasive Security – as information and insights will need to be secured; and
> Intelligent Operations Centre – as the integration platform will support the seamless flow of data between the different systems.

4.   Recommendation

It is recommended that options be considered to address the identified need/opportunity.

TransGrid

Current Option Assessment - Risk Summary

TransGrid

Project Name: Enterprise Analytics Platform

Option Name: RP2IT Analytics - Option 1

Option Assessment Name: RP2IT Analytics - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Out of Support (TG IT service	$5.39	Security Vulnerability	$5.39	20.00%	$1.08	$0.00		$0.29	$0.00	$0.00	$0.79
TG IT service	1	Application	Out of Support (TG IT service	$5.39	Software Failure	$5.39	20.00%	$1.08	$0.00		$0.29	$0.00	$0.00	$0.79
TG IT service	1	Application	Out of Support (TG IT service	$5.39	Data Quality	$5.39	20.00%	$1.08	$0.00		$0.29	$0.00	$0.00	$0.79
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Security Vulnerability	$0.00	20.00%	$0.00	$0.00		$0.00	$0.00	$0.00	$0.00
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Software Failure	$0.00	20.00%	$0.00	$0.00		$0.00	$0.00	$0.00	$0.00
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Data Quality	$0.00	20.00%	$0.00	$0.00		$0.00	$0.00	$0.00	$0.00
				$16.18		$16.18		$3.24	$0.00		$0.87	$0.00	$0.00	$2.37

NEED/OPPORTUNITY STATEMENT (NOS)

Pervasive Security

NOS- 000000001691 revision 0.0

Ellipse project no(s): P0010090
TRIM file: TBA

Project reason: Compliance - Security
Project category: Support - IT

Approvals

Author	Guillaume Leroux	Litmus Group
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Approved	Stuart Barber	Acting Chief Information Officer
Date submitted for approval	31 October 2016	

Change history

Revision	Date	Amendment
V0.1	18/10/2016	Received Initial draft from Litmus
V0.2	24/10/2016	Added Benefits Quantification
V0.3	29/11/2016	Updated documents according to feedback

1.   Background

New technologies embedded in the High Voltage (HV) network improve productivity and network reliability through enhanced connectivity but also bring new challenges in terms of security. The increased connectivity of previously isolated operational technology networks has increased the vulnerability to cyber-attack. Coupled with an expanding threat landscape the risk posed to network reliability from a cyber-security attack is rising.

A recent report from Australian Cyber Security Centre in 2015 listed the Energy industry as having the highest cyber security incidents reported rate at 29%[1]. If a cyber-security threat was realised the impact to the power transmission network would be significant and possibly result in a blackout as happened in Ukraine in December 2015.

TransGrid already made investments to secure its corporate data network and detect incidents in the SCADA network but recognises the need to continue investment.

The following gaps have been identified during the development of the technology strategy:

> Current security controls need to be refreshed;

> The flow of information from substations equipped with smart sensors is constrained from a business value perspective due to concerns around security and authorisation; and

> Secure interactions are required with a broader range of suppliers and partners as TransGrid increasingly takes on the prime contractor role in major projects.

This program will ensure the risks posed by cyber-attack are mitigated to an acceptable level and TransGrid meets compliance obligations associated with information security.

2.   Need/opportunity

2.1   Need

There is a need to replace and/or upgrade the following existing security applications and controls, which will reach their end of life over the period 2018-2023.

IT Service	Application	Application Description	End of Life
Physical Access Management	Insight	Provides the ability to monitor and manage security access across TransGrid sites and depots.	2020
Incident Detection	Splunk	Monitors both internal or external threats and any unauthorised change attempts in the IT network including the corporate data network and selected devices.	2021

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1.   [1] *https://www.acsc.gov.au/publications/ACSC_**Threat_Report_2015**.pdf*

IT Service	Application	Application Description	End of Life
Email and Web Filtering	Mimecast	Provides enhanced email filtering to help protect TransGrid from the latest email borne cyber threats.	2021
Advanced Malware Protection	Content Keeper	Provides online defence and barrier against web threats such as malware attacks and malicious websites affecting TransGrid's IT system.	2022
Application Whitelisting	McAfee Application Control	Prevent the execution and spread of malicious code and is used to prevent the installation or use of unauthorised applications.	2022

The increased operational risk that would be incurred unless these applications are replaced or upgraded is $7.28m. The driver of this risk cost is based on a hazardous events of out of support and software failure either in security, software failure and data quality. The key inputs into the risk cost are:

> Probability of failure estimated at 10% is based on the rate of change of the external software environment;

> Major consequence from these failures is the potential service interruption for 1,000 users for 72 hours and a data confidentiality breach for more than 50 thousand records;

> Likelihood of the consequence is moderated by "N-1" which applies 5% likelihood of the consequence which is based on the failure mode of full redundancy which is in place for all systems.

 The risk report is included at attachment 1.

2.2 Opportunity

There is an opportunity for TransGrid to further strengthen cyber-security defence through prudent investment in artificial intelligence based identity management systems to assist with authentication.

The program proposes exploring this area with an initial proof of concept before proceeding with a full investment case. Accordingly the associated benefits have not been identified and or estimated in this document.

3. Related needs/opportunities

> All Programs of Work rely on having foundational security systems in place as outlined in the Pervasive Security Program.

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

Current Option Assessment - Risk Summary

Project Name: Pervasive Security

Option Name: RP2IT-Security - Base Case

Option Assessment Name: RP2IT-Security - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Service Failure (TG IT service)	$10.40	Security Vulnerability	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Application	Service Failure (TG IT service)	$10.40	Software Failure	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Application	Service Failure (TG IT service)	$10.40	Data Quality	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Compute	Service Failure (TG IT service)	$10.40	Data Transfer	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Core Network	Service Failure (TG IT service)	$10.40	Data Transfer	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Storage	Service Failure (TG IT service)	$10.40	Software Failure	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
TG IT service	1	Storage	Service Failure (TG IT service)	$10.40	Data Quality	$10.40	10.00%	$1.04	$0.00		$0.11	$0.00	$0.00	$0.93
				$72.79		$72.79		$7.28	$0.00		$0.76	$0.00	$0.00	$6.52

Total VCR Risk: Total ENS Risk:

Ellipse project no(s): P0010197
TRIM file: [TRIM No]

Project reason: Support the business IT
Project category: Support - IT

Approvals

Author	Guillaume Leroux	Litmus Group
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Approved	Stuart Barber	Acting Chief Information Officer
Date submitted for approval	28 October 2016	

Change history

Revision	Date	Amendment
V0.1	18/10/2016	Received Initial draft from Litmus
V0.2	24/10/2016	Added Benefits Quantification
V0.3	28/10/2016	Updated NOS with needs table and modified the opportunities
V0.4	24/11/2016	Updated risk percentages.

1.   Background

Utility companies are challenged to improve efficiency and operations as they update their aging network assets and implement more complex intelligent networks. Asset design plays a key role in improving the reliability, performance and cost efficiency of the network by managing technical opportunities and risks, asset total cost of ownership, compliance requirements and commercial opportunities and constraints.

In 2017 and 2018, TransGrid will be rolling out 3D CAD and replace its current asset design tool with the objective of improving the asset design capability and associated efficiencies. Asset designers will have the ability to reuse templates when designing new assets and be able to remotely review proposed designs from the field engineers, saving time and improving accuracy of designs.

2.   Need/opportunity

2.1   Need

There is need to replace asset design applications as they will reach their end of life in the period 2018-2023. The increased operational risk that would be incurred, unless these applications are replaced or upgraded, is $4.41m for the financial year of 2023/24. The driver of this risk cost is based on the hazardous events relating to out of support and software failure either in security, software failure and data quality. Key inputs into the risk cost are:

> Probability of failure estimated at 20% is based on the rate of change of the external software environment starting from 2023/24. It is expected that the support cost risk will increase to 30% in 2024/25 and 50% in 2025/26 as the vendor will not support obsolete technology, which is aligned with their support agreements;

> Major consequence from these failures is the potential service interruption for 300 users for 7 hours and a data confidentiality breach for up to 50 thousand records;

> Likelihood of the consequence is moderated by "N-0.5" which applies 55% likelihood of the consequence. This is based on the failure mode for half redundancy, as full redundancy is not in place for all systems.

The risk cost summary is included at attachment 1.

IT Service	Application Description	End of Life
HV design	3D modelling provides the ability to create 3D computer graphics of an object.	2022
Manage HV design documents	Electronic Document Management System (EDMS) is used by Capital Program Delivery and Network Performance and Development to securely manage and store relevant documents and drawings of the NSW HV Transmission System.	2021

These two applications are critical to the design, management and storage of TransGrid's library of documents and drawings for the transmission network and assets.

2.2 Opportunity

There is an opportunity to improve the asset design capability by providing enhanced 3D modelling capability within the organisation using applications such as the Light Detection and Ranging (Lidar) and point cloud technology. Lidar is a surveying method that measures the distance to a target by illuminating that target with a laser light and point cloud technology is a platform used for big data analytics. These tools will be leveraged by TransGrid to ensure 3D models become the centralised reference document for all primary and secondary designs. This capability will give context to substation-based design, construction and operations decisions.

TransGrid will improve their asset design capability by addressing the following opportunities:

> Optimise new substation design by improving the quality of the current substation design/configuration information;

> Embed engineering standards and compliance by further consolidating asset design capability;

> Improve the change and configuration processes by integrating asset design with project delivery; and

> Integrate spatial information into the asset design process to model the actual geographical setting and incorporate any spatial constraints when designing the asset to improve network performance.

2.2.1 Preliminary Benefits Assessment

As a preliminary assessment, benefits identified are:

No.	Non-cashable benefits	Savings (Per Annum)
1.	Reducing asset design effort by removing some manual work. (Based on 300 users x average SP 18 $44.27/hr x 24 minutes savings for each user/wk x 48wks/yr = $254,995/yr)	$255,000
2.	Improving the completeness and quality of asset design, hence reducing the amount of rework required to complete a design. (Based on 300 users x average SP 18 $44.27/hr x 47 minutes savings for each user/wk x 48wks/yr = $499,366/yr)	$499,000
3.	Reducing the time spent in designing assets that comply with network performance and reliability requirements, as quality information becomes available. (Based on 300 users x average SP 18 $44.27/hr x 46 minutes savings for each user/wk x 48wks/yr = $488,741yr)	$489,000
4.	Improving the efficiency of downstream processes by integrating asset design with maintenance plans. (Based on 300 users x average SP 18 $44.27/hr x 24 minutes savings for each user/wk x 48wks/yr = $254,995/yr)	$255,000
5.	Improving compliance by integrating engineering and regulatory standards with asset design, resulting in reduced time spent on meeting compliance obligations. (Based on 300 users x average SP 18 $44.27/hr x 24 minutes savings for each user/wk x 48wks/yr = $254,995/yr)	$255,000
	Non-cashable benefits total:	$1,753,000

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No.	Cost avoidance	Savings (Per Annum)
6	Additional software support in the first year (increases by 20% from the normal operating cost of $0.2m per annum). *Note: This will increase by 30% in the second year and 50% in subsequent years.*	$40,000

* Please note benefit calculations will be refined when each of the projects are scoped in detail.

3.   Related needs/opportunities

> Pervasive Security – the future asset design solutions will need to comply with TransGrid's security requirements, specifically when enabling collaboration with external parties.

> Intelligent Operations Centre – implementing the integration technology to leverage data sets from other systems and external sources.

4.   Recommendation

It is recommended that options be considered to address the identified need/opportunity.

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Attachment 1 Risk costs summary

Current Option Assessment - Risk Summary

Project Name: Intelligent Asset Design

Option Name: RP2IT-IAD - Option 1

Option Assessment Name: RP2IT-IAD - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Componen	No.	Minor Component	Sel. Hazardous Even	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Out of Support (TG IT service)	$3.44	Security Vulnerability	$3.44	20.00%	$0.69	$0.00		$0.03			$0.66
TG IT service	1	Application	Out of Support (TG IT service)	$3.44	Software Failure	$3.44	20.00%	$0.69	$0.00		$0.03			$0.66
TG IT service	1	Application	Out of Support (TG IT service)	$3.44	Data Quality	$3.44	20.00%	$0.69	$0.00		$0.03			$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$3.90	Security Vulnerability	$3.90	20.00%	$0.78	$0.00		$0.12			$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$3.90	Software Failure	$3.90	20.00%	$0.78	$0.00		$0.12			$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$3.90	Data Quality	$3.90	20.00%	$0.78	$0.00		$0.12			$0.66
				$22.03		$22.03		$4.41	$0.01		$0.43			$3.96

Total VCR Risk: **Total ENS Risk:**

NEED/OPPORTUNITY STATEMENT (NOS)

Digital Enterprise

NOS- 000000001727 revision 0.0

Ellipse project no.: P0010324
TRIM file: TBA

Project reason: Support the business IT
Project category: Support - IT

Approvals

Author	Michael Milne	Planning and Architecture Manager
Endorsed	Azil Khan	Investment Analysis Manager
	Michael Milne	Planning and Architecture Manager
Approved	Stuart Barber	A/Chief Information Officer
Date submitted for approval	21 November 2016	

1. Background

In April 2013, TransGrid implemented an Enterprise Resource Planning (ERP) system version 8.3 to provide functionality for accounts payable, purchasing, inventory and warehousing, cataloguing, human resources, payroll, health and safety, and maintenance. The ERP supports high level business processes including:

> Asset Management;
> Financial Management including Financial Budgeting and Analytics;
> Governance, Risk and Compliance (GRC);
> Sourcing and Procurement;
> Portfolio, Program and Project Management;
> Demand Forecasting and Power Systems Analysis;
> High Voltage (HV) Condition Analysis;
> Workflow Management;
> Productivity Applications;
> Integration and Security within the Enterprise Systems; and
> Data cleansing.

ABB Enterprise Software provides the Ellipse software and is contracted for maintenance and support. This contract provides the right for TransGrid to upgrade the version of Ellipse without incurring additional software licensing costs and support to remediate issues with the application.

ABB offer various types of support periods for the versions of Ellipse, they are:

> Active;
> Classic;
> Limited; and
> Custom limited.

Active support provides software updates and fixes for priority 1, 2, 3 and 4 defects as well as changes to functionality required to meet changing taxation, legal or regulatory requirements. However Active support will cease for Ellipse 8.3 on 31 March 2017, after that Ellipse will be under classic support. Please refer to the Attachment 2 for the priority defect definitions.

Classic support is only provided for priority 1 defect resolution. Other support services can be procured at additional cost and are offered solely at the discretion of ABB. Classic support will cease on 31 March 2019.

Under standard support arrangements for all four types, the support provided is across all modules within the Ellipse suite.

2. Need/opportunity

TransGrid needs to provide reliable and fit-for-purpose administrative and asset management capabilities by improving the current processes and aligning them with industry and/or technology directions. Table 1 summarises key areas that have been identified for improvement.

Table 1 – Areas for improvement and associated applications

Areas for improvement	Applications
Back-office and financial management capabilities	Ellipse, Enterprise Portfolio and Project Management System (EPPMS) Project Server, Success, Resource Utilisation Tool, TM1-Financial Budgeting, Finance Journal and Reconciliation and Finance Estimating Tool.
Source-to-Pay processes in particular category spend analysis, invoice data capture and requisition	Ellipse, TM1-Financial Budgeting, Finance Journal and Reconciliation and Finance Estimating Tool.
Project and risk management capabilities	Ellipse, Investment Risk Management Tool, Wynyard Risk Management, Legal Compliance Tool and Matter Register.
Ensure asset information is available across enterprise systems and organisational functions	Ellipse, Legal Compliance Tool and Matter Register, EPPMS Project Server, Success, Resource Utilisation Tool, Fleet-Vehicle and Mobile Plant, Equipment Register Manager and Asset Information System and Stakeholder Engagement Tool.
Decision making and unlock value of data by maintaining a single source of truth for all asset information	Ellipse, Legal Compliance Tool and Matter Register, EPPMS Project Server, Success, Resource Utilisation Tool, Fleet-Vehicle and Mobile Plant, Equipment Register Manager and Asset Information System, Waste Management System, Electronic Stock Taking Tool, Savve -Online Learning, Stakeholder Engagement Tool, Tender Management System and Supplier Performance Manager Tool.
The overall usability of applications to increase productivity and minimise support costs	Ellipse, EPPMS Project Server, Success, Resource Utilisation Tool, Waste Management System, Electronic Stock Taking Tool, Tender Management System and Supplier Performance Manager Tool.

The financial and reputational risks associated with not investing in the upgrade or replacement of Ellipse has been estimated at $25.5m starting from the financial year of 2018/19. The driver of this risk cost is based on a hazardous event of out of support either in security, software failure and data quality. Key inputs into the risk cost are:

> Probability of failure estimated at 50% is based on the rate of change of the external software environment and the replacement of the underlying software platforms. The probability of failure is higher than normally estimated for an enterprise application due to the number of interfaces to the Ellipse application and the high number of ancillary software components required for running the application. It is expected to increase to 25% in 2019/20, and 100% thereafter based on vendor support agreements.

> Major consequence from these failures is the potential service interruption as well as service degradation for 40 hours and across 1,000 users is based on Ellipse's recovery timeframe; and

> Likelihood of the consequence is moderated by "No Backup (N)" which applies 100% likelihood on the consequence which is based on the failure mode of no redundancy is in place for Ellipse.

The risk cost summary is included at attachment 1.

TransGrid

3.   Related needs/opportunities

The data communications refresh and information infrastructure refresh are related and parts of those programs will be executed to ensure there are fit for purpose underlying services to operate the refreshed ERP application.

4.   Recommendation

It is recommended that options be considered to upgrade or replace TransGrid's current Enterprise Resource Planning (ERP) application and associated systems.

Attachment 1   Risk costs summary

Current Option Assessment - Risk Summary

Project Name: ERP Refresh

Option Name: RP2IT-001 - Option 1

Option Assessment Name: RP2IT-001 - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Out of Support (TG IT service)	$17.00	Security Vulnerability	$17.00	50.00%	$8.50	$0.00		$8.00		$0.00	$0.50
TG IT service	1	Application	Out of Support (TG IT service)	$17.00	Software Failure	$17.00	50.00%	$8.50	$0.00		$8.00		$0.00	$0.50
TG IT service	1	Application	Out of Support (TG IT service)	$17.00	Data Quality	$17.00	50.00%	$8.50	$0.00		$8.00		$0.00	$0.50
				$51.00		$51.00		$25.50	$0.00		$24.00		$0.00	$1.50

Total VCR Risk: **Total ENS Risk:**

Attachment 2 Priority Defect Definitions

Priority Defect	Definition
Priority 1 – Critical (P1)	Defects are classified as high priority and high severity when an error has occurred in the basic functionality of an application and it does not allow a user to use the system. Priority 1 defects can be known as "Show Stoppers".
Priority 2 – High (P2)	Defects are classified as high priority and medium severity when a feature is not usable as it's supposed to be which is usually due to how the new code has been written or sometimes how the IT environment has been set up.
Priority 3 – Medium (P3)	Defects are classified as medium priority and medium severity when the issue needs to be fixed but the user can deal with the functionality which is not as per expectation.
Priority 4 – Low (P4)	Defects are classified as low priority and low severity when there are cosmetic issues such as spelling mistakes in a paragraph.

TransGrid

NEED/OPPORTUNITY STATEMENT (NOS)

Intelligent Operations Centre

NOS- 000000001732 revision 0.0

Ellipse project no(s): P10010339
TRIM file: TBA

Project reason: Support the business IT
Project category: Support - IT

Approvals

Author	Guillaume Leroux	Litmus Group
Endorsed	Michael Milne	Planning and Architecture Manager
	Azil Khan	Investment Analysis Manager
Approved	Stuart Barber	Acting Chief Information Officer
Date submitted for approval	18 November 2016	

Change history

Revision	Date	Amendment
V0.1	18/10/2016	Received Initial draft from Litmus
V0.2	24/10/2016	Added Benefits Quantification

1.   Background

As an asset intensive business, TransGrid makes decisions which directly impact maintenance costs, reliability and performance of the transmission network. With the development of distributed generation, the network becomes more complex as new types of assets need to be monitored and controlled to efficiently operate the network.

In response to these challenges, transmission networks including TransGrid have been equipped with an increasing number of devices which includes sensors, monitoring, controlling and measuring systems to control energy flow and manage network performance, reliability and safety.

Collectively the data collection and control devices are referred to as Operational Technology (OT). OT data was originally restricted to isolated networks and locked in proprietary formats, primarily for reactive usage. Furthermore, Information Technology (IT) is focused on reducing cost, increasing productivity, compliance and improving efficiency.

There are several trends influencing the need to connect this historical separation:

> An increasing requirement to consolidate the network and asset information into business-oriented systems, where smart analytics can mine data and provide information to operate the network more reliably and efficiently;

> An increasing convergence of the underlying platforms with OT systems starting to leverage more open operating systems and data transport protocols as opposed to proprietary platforms;

> Systems that are unique to OT are less and less common. An Internet Protocol (IP) addressable Windows/Unix/Linux machine is now common to both IT and OT, as are Intel chips and IP routers.

Throughout the industry and within TransGrid, existing IT and OT technologies have been built separately and are hosted on different platforms.

New technologies now allow for data capture and integration from diverse sources, analysis of that data and potentially automate some of the asset maintenance decisions. Within TransGrid the Asset Management Centre is responsible for the process of collection and analysis of this data to drive better asset decisions.

2.   Need/opportunity

2.1   Need

There is a need to upgrade or replace the following IT Services utilised by the Asset Monitoring Centre as they will no longer be supported and the underlying applications will reach end of life in the upcoming regulatory period.

Service	System/Application	System/Application Description	Need Date
Enterprise Integration Service	Enterprise Service Bus/ Axway	The Enterprise Integration Service is technology used for sending messages from one system to another via a Bus.	2019
Asset Monitoring	Online Condition Monitoring	Online Condition Monitoring provides condition information about High Voltage plant and equipment. The information is used	2020

Service	System/Application	System/Application Description	Need Date
		provide advanced warning of unusual equipment conditions and provide the defect response.	
TransGrid Spatial Server	GE Smallworld	GE Smallworld is a geospatial information system that stores the details about TransGrid's assets.	2021

The financial and reputational risks associated with not investing in the upgrade or replacement of these services has been estimated at $7.38m. The driver of this risk cost is based on a hazardous event of out of support either in security, software, component failure, data transfer or quality. The key inputs into the risk cost are:

> Probability of failure estimated at 20% is based on the rate of change of the external software environment; and

> Major consequence from these failures is the potential service interruption for 72 hours and across 250 users is based on the replacement of the asset applications suite for example TransGrid's Spatial Server recovery timeframe.

The risk cost summary is included at attachment 1.

2.2   Opportunity

There is an opportunity to improve the efficiency and effectiveness of asset decision making through the automation of utilising prescriptive analytics built on the current and planned analytics repositories. There is also an opportunity to reduce costs associated with the maintenance of the monitoring and control devices by implementing centralised automated deployment capability for configuration management of this application suite.

2.3   Preliminary Benefits Assessment

Benefit	$m p.a.
Reduction in effort to maintain the transmission network through better asset decision making due to the automation of utilising prescriptive analytics. (Based on 250 staff x average SP 18 $44.27/hr x 2hrs/wk x48 wks/yr = $1,062,480/yr)	$1.06

* Please note benefit calculations will be refined when each of the projects are scoped in detail.

3.   Related needs/opportunities

The Enterprise Analytics platform is a pre-requisite for the implementation of prescriptive analytics.

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

Current Option Assessment - Risk Summary

TransGrid

Project Name: Intelligent Operations Centre

Option Name: RP2IT-IOC - Option 1

Option Assessment Name: RP2IT-IOC - Option 1 - Assessment 1

Rev Reset Period: Next (2018-23)

Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF ($M)	Failure Mechanism	NoxLoC xCoF ($M)	PoF (Yr 1)	Total Risk ($M)	Risk ($M) (Rel)	Risk ($M) (Op)	Risk ($M) (Fin)	Risk ($M) (Peo)	Risk ($M) (Env)	Risk ($M) (Rep)
TG IT service	1	Application	Out of Support (TG IT service	$12.30	Security Vulnerability	$12.30	20.00%	$2.46	$0.00		$1.80	$0.00		$0.66
TG IT service	1	Application	Out of Support (TG IT service	$12.30	Software Failure	$12.30	20.00%	$2.46	$0.00		$1.80	$0.00		$0.66
TG IT service	1	Application	Out of Support (TG IT service	$12.30	Data Quality	$12.30	20.00%	$2.46	$0.00		$1.80	$0.00		$0.66
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Security Vulnerability	$0.00								
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Software Failure	$0.00								
TG IT service	1	Application	Service Failure (TG IT service)	$0.00	Data Quality	$0.00								
TG IT service	1	Core Network	Out of Support (TG IT service	$12.30	Data Transfer	$12.30								
TG IT service	1	Core Network	Out of Support (TG IT service	$12.30	Component Failure	$12.30								
TG IT service	1	Core Network	Planned Change (TG IT service)	$0.00	Data Transfer	$0.00								
TG IT service	1	Core Network	Planned Change (TG IT service)	$0.00	Component Failure	$0.00								
TG IT service	1	Core Network	Service Failure (TG IT service)	$0.00	Data Transfer	$0.00								
TG IT service	1	Core Network	Service Failure (TG IT service)	$0.00	Component Failure	$0.00								
TG IT service	1	Core Network	Unapproved Change (TG IT service)	$0.00	Data Transfer	$0.00								
TG IT service	1	Core Network	Unapproved Change (TG IT service)	$0.00	Component Failure	$0.00								
				$61.50		$61.50		$7.38	$0.00		$5.40	$0.00		$1.98

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