Transport Asset Standards Authority
NSW GOVERNMENT

Technical Note – TN 001: 2019

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Subject:　　Update to security requirements in T MU AM 06010 GU *Business Requirements Specification*, v2.0

This technical note is issued by the Asset Standards Authority (ASA) as an update to
T MU AM 06010 GU *Business Requirements Specification*, version 2.0.

This technical note emphasises the importance of considering security of people, property and
industrial automation and control systems (IACS) in T MU AM 06010 GU.

An early engagement with the security division is essential so that threats are identified through
risk assessment and mitigations considered and applied early in the design process.

1.　Section 10 Business requirements

Add the following after the last dot point, RAMS:

- Security

  The business requirements specification should address both the reality and perception of
  security in the Transport environment. It should comply with relevant regulatory obligations
  and Transport standards governing the provision of security, particularly applicable to the rail
  environment. It should ensure that processes for risk assessment of security are addressed
  during the design phase of major asset acquisitions and projects by continuously engaging
  with the security division.

  T HR SY 10000 GU *Overview of Rail Security Standards and Interpretation Guide* provides
  an overview of the suite of legacy RailCorp security standards (RSSs) and guidance on how
  to interpret references in those standards in the current TfNSW organisational context.

o   People and property

ESB 002 *Design Principles* recommends the application of Crime Prevention Through Environmental Design (CPTED) to maximize the protection of our customers, employees, contractors, visitors and assets from security threats. It also provides protection against associated risks by the adoption of reasonable preventative security measures for trains, stations and other transport property through good design and effective use of the physical environment. The principles stated in this standard are transferable, and therefore should be applied to all Transport assets.

o   Cyber Security

T MU SY 10010 ST *Cybersecurity for IACS – Overview* and T MU SY 10012 ST *Cybersecurity for IACS - Baseline Technical Cybersecurity System Requirements and Countermeasures* should be consulted for the protection of industrial automation and control systems (IACS) such as signalling systems, train control systems, supervisory control and data acquisition (SCADA) systems, intelligent transport systems and operational management systems.

Authorisation:

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Guide

Business Requirements Specification

Version 2.0

Issued date: 20 December 2016

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Standard governance

Owner: Manager Systems Engineering Process, Asset Standards Authority

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Document history

Version	Summary of changes
1.0	First issue, December 2015
2.0	Second issue.

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Preface

The Asset Standards Authority (ASA) is a key strategic branch of Transport for NSW (TfNSW). As the network design and standards authority for NSW Transport Assets, as specified in the *ASA Charter*, the ASA identifies, selects, develops, publishes, maintains and controls a suite of requirements documents on behalf of TfNSW, the asset owner.

The ASA deploys TfNSW requirements for asset and safety assurance by creating and managing TfNSW's governance models, documents and processes. To achieve this, the ASA focuses on four primary tasks:

- publishing and managing TfNSW's process and requirements documents including TfNSW plans, standards, manuals and guides

- deploying TfNSW's Authorised Engineering Organisation (AEO) framework

- continuously improving TfNSW's Asset Management Framework

- collaborating with the Transport cluster and industry through open engagement

The AEO framework authorises engineering organisations to supply and provide asset related products and services to TfNSW. It works to assure the safety, quality and fitness for purpose of those products and services over the asset's whole of life. AEOs are expected to demonstrate how they have applied the requirements of ASA documents, including TfNSW plans, standards and guides, when delivering assets and related services for TfNSW.

Compliance with ASA requirements by itself is not sufficient to ensure satisfactory outcomes for NSW Transport Assets. The ASA expects that professional judgement be used by competent personnel when using ASA requirements to produce those outcomes.

About this document

The information in this guide has been drawn from some principles in ISO/IEC/IEEE 15288 *Systems and software engineering – System life cycle processes;* however, this document has been tailored specifically for the requirements of the transport industry.

This *Business Requirements Specification* guide forms part of a suite of TfNSW systems engineering documents of which T MU AM 06006 ST *Systems Engineering Standard* is the parent document. T MU AM 06007 GU *Guide to Requirements Definition and Analysis* also forms part of the systems engineering suite of documents and briefly covers business requirements specification.

This guide has been developed by the ASA in consultation with stakeholders across TfNSW and is aligned with the TfNSW Asset Management Framework.

This guide is a second issue.

Table of contents

1.   Introduction

Transport for NSW (TfNSW), transport agencies and Authorised Engineering Organisations (AEOs) engaged as technical advisors are responsible for developing a business requirements specification (BRS) for projects after an investment brief is approved. A BRS is a document in which the business opportunity or problem space is defined. A BRS documents the business goals, business needs, and business capabilities and also references the customer requirements that should be achieved by the project or program. The BRS precedes the development of the system requirements specification (SRS) and is a subset of the total requirements needed to characterise the solution.

A BRS is prepared before a final business case, which outlines why the project is being developed or changed. The business case also aligns with the operations and maintenance concept definition documents. T MU AM 06008 ST *Operations Concept Definition* contains requirements for operations concept definition. The business requirements stated in the BRS should provide the capabilities and associated metrics that would aid in achieving high-level enterprise goals.

2.   Purpose

The purpose of this document is to provide the following:

- information to assist in writing a BRS that contributes to the development of successful investment projects

- a BRS writing process that can be applied to most applications through scaling and tailoring

- an indication of the level of detail that a BRS requires so that it is usable and reviewable

- information to assist in achieving a specific, measurable, attainable, realisable and traceable (SMART) BRS that is consistent in order, structure and level of detail

2.1.   Scope

The scope of this guide is to define the normative content and key considerations when preparing a BRS. While this guide provides the order and sectioning of a BRS, it does not state a standard for the structure of a BRS. The structure and layout can vary according to the type and scope of a project. A BRS should be tailored to suit particular project needs. Therefore, some of the suggested sections of a BRS included in this document may not be relevant to a specific project.

This document is limited in scope to business requirements and does not cover system requirements.

2.2. Application

This guide is intended for use by TfNSW, heavy rail, rapid transit and light rail transport agencies and any AEOs that are responsible for developing a BRS. This guide can also be used by the wider transport industry as a resource to understand the process that TfNSW undertakes in developing a BRS.

This document can be applied when writing either a strategic BRS, or a program or project BRS. This document has been written with the intent that the user is capable of eliciting requirements and inputting these into a form of a requirements specification.

3. Reference documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

International standards

ISO/IEC/IEEE 15288: 2015 Systems and software engineering – System life cycle processes

ISO/IEC/IEEE 29148: 2011 Systems and software engineering – Life cycle processes – Requirements Engineering

Transport for NSW standards

T MU AM 06004 ST Requirements Schema

T MU AM 06006 ST Systems Engineering

T MU AM 06007 GU Guide to Requirements Definition and Analysis

T MU AM 06008 ST Operations Concept Definition

Other references

Transport for NSW 2015, Asset Management Framework Overview (available on request from ASA via email to standards@transport.nsw.gov.au)

Transport for NSW 2012, NSW Long Term Transport Master Plan

Transport for NSW 2012, Sydney's Rail Future - Modernising Sydney's Trains

4. Terms and definitions

The following terms and definitions apply in this document:

AEO Authorised Engineering Organisation

availability the measure of the percentage of time that an item or system is available to perform its designated function

BRS business requirements specification

business case a justification or reasoning for initiating a project

business requirements (as defined in Business Analysis Body of Knowledge - BABOK) higher level business rationale that, when addressed, will permit the organisation to increase revenue, avoid costs, improve service, or meet regulatory requirements

business requirements specification the document in which the business goals and stakeholders requirements are documented

FAT factory acceptance test

IFAT integrated factory acceptance test

LTTMP Long Term Transport Master Plan

maintainability (as defined in IEC 60050-191) the probability that a given active maintenance action, for an item under given conditions of use can be carried out within a stated time interval when the maintenance is performed under stated conditions and using stated procedures and resources

MCD maintenance concept definition

NA not available, not applicable

NSW New South Wales

OCD operations concept definition

RAMS reliability, availability, maintainability and safety

reliability the probability that a specified item will perform a specified function, within a defined environment, for a specified length of time

requirement statement which translates or expresses a need and its associated constraints and conditions (ISO 29148)

SAT site acceptance test

SIT system integration test

system requirements all of the requirements at the system level that describe the functions which the system as a whole should fulfil to satisfy the stakeholder needs and requirements, and is expressed in an appropriate combination of textual statements, views and non-functional requirements; the latter expressing the levels of safety, security and reliability that will be necessary

SRS system requirements specification

TfNSW Transport for New South Wales

validation confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled

verification confirmation, through the provision of objective evidence, that specified requirements have been fulfilled

5. BRS development process

A BRS is a living document that can change throughout the life of a program or project. However, the later the change is made into the life cycle, the greater the impact. Changes to a BRS should be managed through a change control process.

Before developing a BRS, an investment brief is prepared. The investment brief includes the investment information, scope, objectives, risks, dependencies, project costs and benefits of the proposed program or project. After this investment brief is approved, a strategic BRS and strategic business case is prepared. The draft business requirements for the program or project are then defined to produce a draft project or program BRS. After this program or project BRS is approved, a final business case is written and approved. The approved BRS and business case are formally handed over to the project delivery team to prepare a systems requirements specification (SRS), concept and reference design and works brief. This process as shown in Figure 1 is aligned to TfNSW's strategic planning process from its Asset Management Framework Overview.

Section 5.1 provides further information on the program or project BRS as well as strategic BRS.
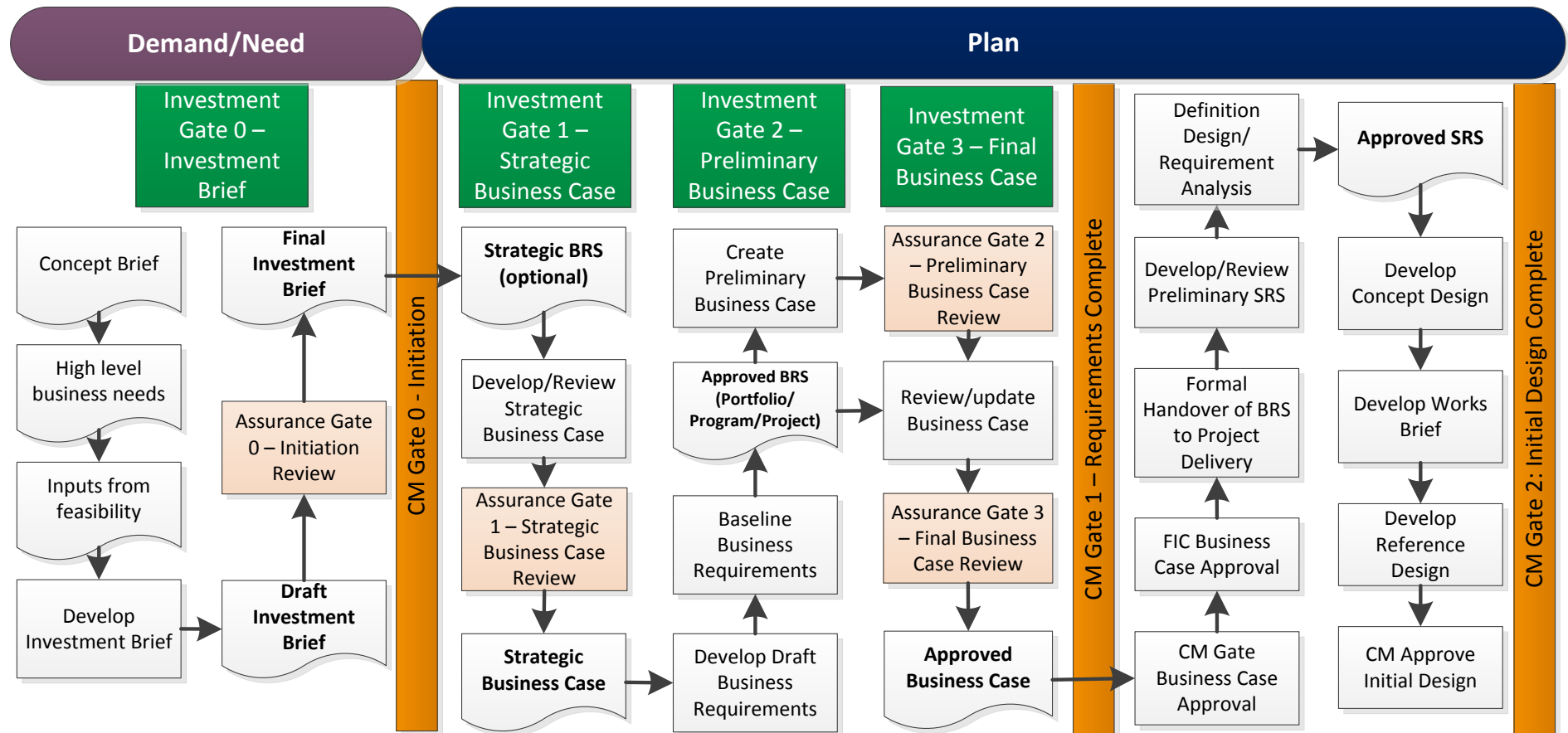
Figure 1 - BRS development within life cycle process

5.1. Program or project BRS

A program or project BRS is developed after the strategic business case is approved and draft business requirements are defined. This type of BRS would contribute to the evaluation criteria to support the development and selection of options to resolve any issues.

Requirements for the baseline business requirements are usually obtained from consultation with key stakeholders, operations specialists, and other sources as determined by the type of program or project. While developing the BRS, the conditions, constraints, conflicting requirements, organisational issues (including safety and security factors) should be identified and assessed in order to reach a conclusion after considering all factors.

Before developing this program or project BRS, a strategic BRS can be written before the strategic business case. A strategic BRS is a separate document developed at the strategic stage of the project after the investment brief is signed off. This BRS assists in the development of a preliminary program or project BRS. A strategic BRS should cover the project context, project objectives, operational requirements, future proofing options and reliability, availability, maintainability and safety (RAMS) requirements.

A strategic BRS also contributes to the development and selection of options, which is similar to a program or project BRS, to solve a problem. However, the strategic BRS is much simpler than a program or project BRS and less effort is required to produce it.

Refer to T MU AM 06007 GU *Guide to Requirements Definition and Analysis* for further information about a BRS.

6. Structure and layout of a BRS

The following list provides a high-level structure of a business requirement specification document:

- configuration items
- introduction (includes document purpose, project context and objectives, project constraints, geographical boundaries, interfaces with other modes or projects and stakeholders)
- document framework (includes interfaces with other documents, terms and definitions and reference documents)
- customer requirements
- business requirements

Appendix A provides a sample table of contents with possible sections that can be included in a BRS document.

Appendix B provides a worked example of a project BRS.

Note: Appendix A and Appendix B are only examples. The structure and layout of a BRS can vary according to the scope of the project. For some projects, not all sections provided would be relevant.

7. BRS configuration items

The configuration items of a BRS include the cover page and the following preliminary BRS information:

- document and program or project title

- document information

- document approval information

- document version control log

The configuration items of the BRS should not extend beyond two pages.

7.1. Document and project title

The cover page should display the title of the document and the title of the project for which the BRS is written.

7.2. Document information

The following information about the document should be provided as part of the document information:

- version number of the document

- release date of the document

- owner of the document (the name of the author or group)

- print date of the document

- status of the document (for example, draft, withdrawn, superseded or released)

- location of the master document stored

- document confidentiality information

7.3. Document approval information

The document approval information section should contain the list of names of the approvers along with their position title. This section should provide a column space for the date and signatures of the approvers.

7.4. Document version control

The document version control section displays the version control log and the different versions of the document along with the date, reviewer, organisation and summary of changes related to that particular version. The organisation information should include the section or department of the organisation.

8. BRS introduction

The introduction section of the BRS document should provide the background and context of a particular BRS. This includes information such as agreed funds by NSW Government (if available), when it was agreed, business and commercial arrangements and the high-level expected deliverables of the project. This information should reference the business case. It should also state that it is based on an operations concept definition (OCD) or maintenance concept definition (MCD) that supports the service demand and need.

8.1. Document purpose

The document purpose should state the objective and intended outcomes of the document. This section should also describe for whom and why the document is required if it is not already covered in the introduction.

8.2. Project context and objective

The project context should describe the background of the project by closely examining the problem statement. This involves asking questions such as who is going to benefit from this project, why this project is necessary and how the project will integrate with existing systems.

The project objective on the other hand is achieving the project outcome or intended goal. Clear project objectives are crucial because the success of the project is determined by how closely these objectives are met.

8.3. Project constraints

The project constraints should list the limitations in delivering the project within the agreed cost, schedule and available resources. Vague and ambiguous constraints should be avoided. However, these constraints are not requirements but can be used as a rationale for the defined business requirements.

When developing constraints, it is worthwhile to consult with stakeholders (for example, the project delivery team and the relevant TfNSW divisions responsible for planning and customer experience). A review of relevant materials such as TfNSW's *NSW Long Term Transport Master Plan* (LTTMP), asset management policies, feasibility studies and any document that contains a

record of key decisions made about the project such as meeting minutes should also take place. Once the limitation or constraint is identified, the rationale and source should be noted.

8.4. Geographical boundaries

The geographical location of the project should be specified. This geographical location can include latitude and longitude coordinates or kilometric distance measurements from a specific reference point. Some programs or projects can be network wide and therefore it should be noted that the geographical boundary is network wide.

8.5. Interfaces with other transport modes

The interfaces that this project has with other transport modes should be listed. If the project does not interface with other modes, it should be mentioned as not applicable in this section.

8.6. Relationship to other projects

Any existing project, network system (that is, telecommunication systems, emergency protocols, and control systems) or other concurrent projects that has an impact should be listed. The reason for defining critically independent projects is to understand the impact that this project has with others; whether it be existing or concurrent.

8.7. Stakeholders

This section of the BRS should list the stakeholders of the project and how they influence the organisation or relate to the development and operation of the project. Stakeholders include not only the users but also the customers.

9. Document framework

Section 9.1 through to Section 9.3 provides additional elements that can be included in the BRS.

9.1. Interface with other documents

The BRS can impact other documents that are developed subsequently for the project. Therefore, the impact on other documents should be considered while developing the BRS. As shown in Figure 1, a strategic BRS can impact the strategic business case and the program or project BRS. Subsequently, the program or project BRS can impact the final business case and the SRS.

The BRS should also reference the OCD and the MCD. The OCD is a strategic informing document that defines at a conceptual level early in the system life cycle how the proposed new or altered system will operate to support the desired service over its operational lifetime.

The MCD is also a strategic informing document that defines at a conceptual level how the proposed new or altered system will be maintained to support the proposed operational concept and desired service levels. The MCD may be a separate document or combined with the OCD, and addresses topics including maintenance access, maintenance staffing and resource levels, degrees of automation and condition monitoring, maintenance timing windows, logistic support, obsolescence management, disposal, and general whole of life maintainability concepts.

Other inputs to the development of the BRS may include, but are not necessarily limited to the following:

- land use and urban design objective

- project industry briefing

- project objectives

- benefits realisation strategy

- sustainability objectives

- strategic business case

- TfNSW stakeholder requirements

- NSW government announcement

- TfNSW customer and product strategy

- all other documents shown in Figure 2

These inputs collectively help identify the problem space and are referred to during the iterative development of the BRS. The SRS is then derived from the BRS through a requirements analysis process as shown in Figure 2. Refer to T MU AM 06007 GU *Guide to Requirements Definition and Analysis* for more information about requirements analysis.
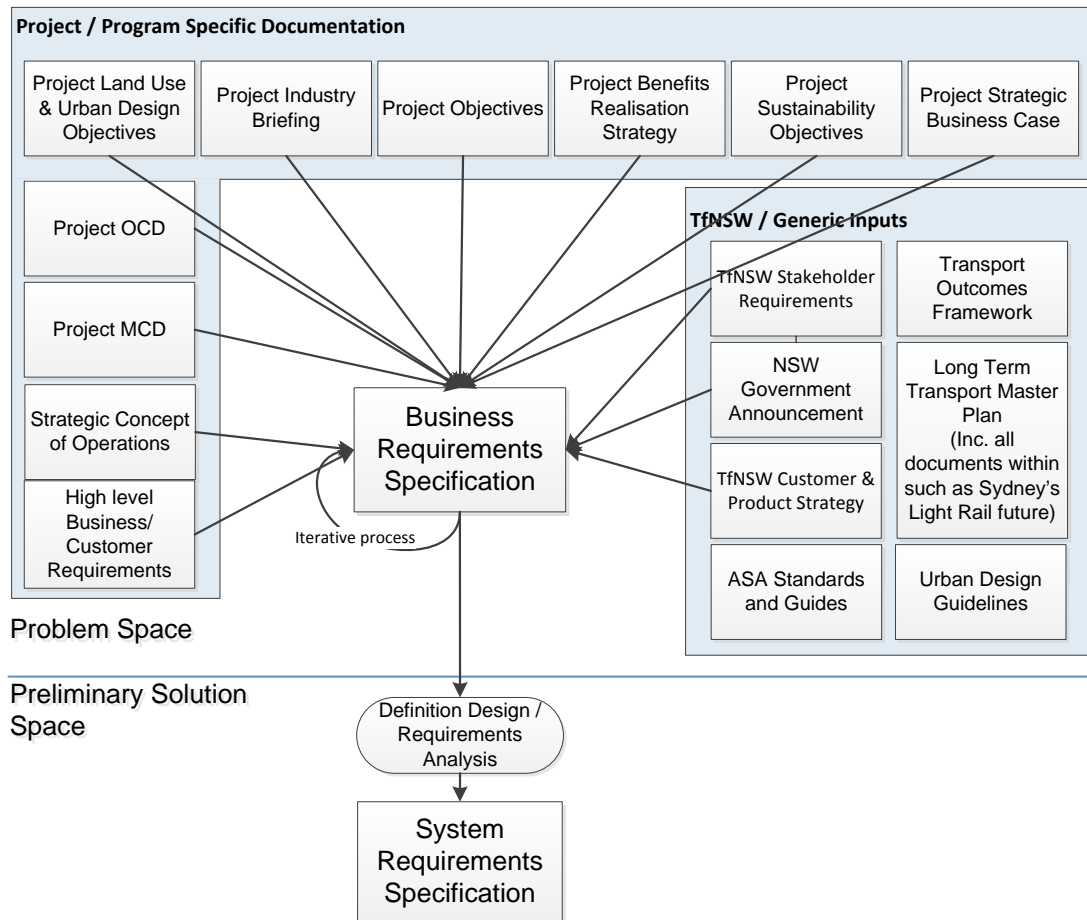
Figure 2 – Document map for business requirements specification

9.2. Terms and definitions

The terms and definitions used in the BRS should be listed in the alphabetical order in this section.

Where a term is normally abbreviated, the abbreviation should be placed after the term in parentheses the first time it is used, after which the abbreviation may be used. Abbreviations and acronyms should be listed in this section if they are used more than once in the document.

9.3. Reference documents

The reference documents that are used in the BRS should be listed in this section. Examples of reference documents can include OCD and MCD documents, the business case, standards, Transport Outcome Framework and any government planning documents such as TfNSW's LTTMP and *Sydney's Rail Future- Modernising Sydney's Trains*.

10. Business requirements

Business requirements are the critical activities that are performed to satisfy organisational objectives while remaining solution independent. Business requirements define what is to be

delivered to provide value, as opposed to system requirements which define how it is to be delivered. The following categories provide guidance on areas to consider when writing and documenting business requirements:

- Customer requirements

  Customer requirements for a new or altered system express the high-level customer demand or needs in a defined environment. It depicts the customers' perspective on the new or altered service, which will be supported by the new or altered system. Customers will not necessarily have easily quantifiable, measurable performance levels to be defined in the customer requirements, and therefore these will often be expressed in qualitative terms. The customer requirements can be sourced from useful data such as customer surveys and complaints.

  TfNSW is responsible for undertaking a number of key programs which include measures and targets, customer value propositions (CVP), customer experience improvement initiatives and customer requirements. The CVP is divided into nine customer experience drivers which describe how the customer would benefit from a service. These nine drivers are as follows:

  o Timeliness – frequent and reliable services that keep to schedule, arrive on time, and offer a reasonable journey time given the distance travelled (that is, how punctual and frequent the service is?)

  o Convenience – conveniently located station, stop or wharf, ease of interchange and connection between modes, plus ease of parking and drop-off (that is, what level of difficulties the customers face to utilise the service?)

  o Safety and security – feeling safe and secure on all parts of the system as a result of physical design features, the way the service is operated and the behaviour of other people (that is, how safe the service is and how secure does the customer feel?)

  o Comfort – comfort throughout the journey including adequate personal space, availability and comfort of seats, a smooth journey, appropriate temperature, and other amenities where needed (that is, how comfortable was the customer's end-to-end journey?)

  o Accessibility – ease and convenience of physical access and navigation through the system (that is, is the service accessible by everyone, including but not limited to, those who experience disabilities?)

  o Information – clear, effective, relevant communication of service information and timetables, including real-time updates on service changes and clear, easy-to-understand announcement (that is, does the information exist, is it readily accessible, coherent and easily understood?)

- o Ticketing – ease and convenience of getting and using tickets without having to queue, and confidence that the right price has been charged (that is, how does the consumer pay for the service?)

- o Cleanliness – a clean, well-maintained environment with clean seats, toilets and operating equipment, an absence of graffiti and litter, and availability of rubbish bins (that is, is the service environment maintained in good health and hygienic?)

- o Customer service – polite, knowledgeable, helpful staff who responds promptly and effectively to service requests, issues and feedback (that is, does the quality of the customer-facing services meet the customers' expectation?)

Business requirements in a BRS should focus on the customer requirements, while being able to incorporate and integrate harmoniously with other stakeholder requirements. These customer requirements form a high-level description of the problem area by describing the end-user functionality. The customer requirements should also state the inputs that are required by the customers to achieve a desired output that meets their needs.

- • Operational requirements

The operational requirements define the operational need, operational outcome and performance measures for the project. This can include capacity requirements, service requirements and timing requirements. Input may be sought from the OCD which presents a potential operational scenario including users, interfaces and modes. The solution should be defined. While the OCD defines one possible solution, the BRS should remain in the 'problem space'.

The operational requirements in the BRS should address all these areas in the OCD such as operational constraints, service levels, performance capabilities, scenarios, users, interfaces and modes. This is to ensure that the requirements map to the operational needs and OCD. The operational requirements should be defined and developed in coordination with the operational users.

- • Policies and regulations

This section should list the documents to be referenced in the project. These documents can be legislative standards, regulation requirements, policies or technical specifications.

- • Future proofing

These requirements should be considered in the detailed planning for each project. Where appropriate, these future requirements should be scoped and priced separately as options for possible inclusion within the project. Alternatively, the optioneering should be undertaken concurrently with the BRS and should be confirmed prior to handover to project delivery team.

- Integration

  The purpose of these requirements is to ensure the integration of the project with other existing systems, services or projects.

- Whole-of-life cost

  These requirements should address the requirements across the life cycle of an asset. These requirements should consider the implementation, operation, maintenance, decommissioning and disposal thereof being fit for purpose and providing value for money.

- RAMS

  The BRS should define the high-level RAMS requirements. These requirements would then be developed into corresponding specific RAMS requirements in the SRS. The operator and maintainer should be consulted when defining RAMS requirements. The RAMS requirements should meet the customer needs for availability of the system to perform the intended functions of the system at the required levels. The specific reliability and maintainability requirements, and specified availability targets should not be written in the BRS but in the SRS.

11. Requirement fields

A requirement should contain a set of information, known as fields, that allows for its unique identification. These fields capture important additional information about a requirement. T MU AM 06004 ST *Requirements Schema* provides a list of requirement fields to be included for each requirement. Although the requirements schema provides a standard set of fields for each requirement, fields such as 'compliance status' or 'proposed verification method' can be difficult to determine. The schema has provided the options 'to be determined' or 'not applicable' for such cases.

Appendix A Sample table of contents of a BRS document

Following is a sample format of the structure of the business requirements specification document:

1. Introduction

  1.1 Document purpose

  1.2 Project context and objective

  1.3 Project constraints

  1.4 Geographical boundaries

  1.5 Interface with other transport modes

  1.6 Relationship to other projects

  1.7 Stakeholders

2. Document framework

  2.1 Interface with other documents

  2.2 Terms and definitions

  2.4 Reference documents

3. Business requirements

Appendix B Example of a business requirement specification

A worked example of a BRS is provided in this appendix. This example is a BRS developed for a fictional signalling project. The sample contents are intended to provide guidance around the level of detail that should be included for particular sections of a BRS. It is emphasised that the BRS provided is only an example. Users should understand that sections and content can vary from one project to another and does not need to correspond exactly with what is provided in this appendix.

T MU AM 06004 ST *Requirements Schema* lists the requirement fields to be included for each business requirement and should be referenced for further information regarding the fields used in this example.

Business Requirements Specification

Forest Valley Signaling Project

Document information

Version:	<x.x>
Version release date:	<dd-mm-yy>
Owner:	<owner name / group>
Print date:	<dd-mm-yy>
Status:	<draft / withdrawn / superseded / released>
Storage:	<location of master copy>
Document confidentiality:	COMMERCIAL IN CONFIDENCE

Document approval

Name and position:	Date	Signature*
<Insert name> <Insert position>		
<Insert name> <Insert position>		
<Insert name> <Insert position>		

*Note that signatures are scanned copies. Records of approval have been retained electronically and can be produced upon request to the <Insert position title (e.g Manager, rail network and service planning)>.

Document version and control log

Version	Date	Name	Organisation	Summary of change
<x.x >	<dd-mm-yy>	<name>	<organisation>	
<x.x>	<dd-mm-yy>	<name>	<organisation>	
<x.x>	<dd-mm-yy>	<name>	<organisation>	

1. Introduction

The New South Wales (NSW) Government has agreed to fund $100 million for the Forest Valley Signalling (FVS) Project. The FVS project was approved in principle by the NSW Government on 1st of June 2014 for integration for timetable 2018. An investment brief for the FVS project was approved with funding of $100 million by the Budget Committee of Cabinet on 9th of September 2014. This project is expected to deliver significant safety, financial, and economic benefits to TfNSW and the community at large.

1.1 Document purpose

This BRS has been developed to define the associated business requirements for the FVS project. This BRS (and documents referenced within) shall be the single source of requirements used to develop the solution, and serves as the primary technical interface document between TfNSW and the designated deliverer for this project.

The BRS captures what needs to be achieved in terms of broad business outcomes. The business requirements are expressed in terms of high-level needs rather than specific characteristics the system should possess. The scope of this BRS is to support validation of the project against the specified business operational objectives.

This document is developed to:

i.   set the business requirements baseline for the project

ii. enable the next stage of the project development of the concept design

1.2 Project context and objective

This project will create a simpler and more reliable network, unlock South Line capacity by increasing the train capacity from 16 trains per hour (TPH) to 20 trains per hour.

The project encompasses amending the existing signalling system on the South Suburban tracks to allow for the operation of 20 TPH at 3 minute headways with 60 second dwells at Forest Valley Station.

The objectives of the FVS project are as follows:

- remove existing constraints on passenger services along the South Line

- completion prior to November 2017 to enable operation of the new timetable by March 2018

- zero unplanned disruption on other train operations

- provide value for money

- safe construction

- minimise the use of critical resources (people and equipment)

- minimise disruption to the customer through minimisation of additional possessions to those required for maintenance

- improve where reasonably possible, safety for users (passenger, train crew, maintenance staff, and so on) during planning, construction, implementation and operation

1.3 Project constraints

The project constraints are as follows:

ID	Constraint	Rationale	Source
1	Residual risks, associated with operations and maintenance, should be reduced as low as reasonably practicable (ALARP)	In accordance with Rail Safety National Law, TfNSW has a duty to ensure safety ALARP	Group Manager Risk
2	The project should be completed by 20 November 2017	The NSW government has agreed to fund $100m for the project to be completed by 20 November 2017	Transport Project Delivery Office
3	Access to the corridor is only permissible outside train operations between 0100-0400 AEDT	TfNSW is committed to complying with safety obligations under its National Rail Safety legislation accreditation, and Work Health and Safety (WHS) laws	Group Manager Risk
4	A defined budget of $100m has been granted to complete this project	NA	Group Manager Capital Investments
5	Standard configurations should be used	Having standard configurations will allow more Commercial Off the Shelf (COTS) equipment, and reduce or avoid customisation	Group Manager Asset Management
6	The project should allow for the operation of 20 TPH at 3 minute headways with 60 second dwells at Forest Valley Station	TfNSW places the customer at the centre of everything. Based on a customer survey and demand analysis, the goal of achieving 20 TPH is associated with the constraints of 3 minute headways and 60 second dwells at Forest Valley Station	TfNSW Customer Experience

1.4 Geographical boundaries

The project boundaries measure approximately 75 km to 74 km from Central station on the South Line.

1.5 Interfaces with other transport modes

There are no interfaces with other modes for the purposes of this project.

1.6 Relationship to other projects

The following are related projects that affect the railway signalling project (whether it is past, current or planned) and their relationship to this project. In addition to this, the impact of these projects on the signalling project is provided in Table 1.

These projects were identified through initial engagement with stakeholders within Sydney Trains, TfNSW project delivery office and other parts of TfNSW.

Table 1 – Project interdependencies

Project title	Owner	Interdependency or relationship	Status
Upgrade of rail Power	TfNSW project delivery sector	Includes upgrading the traction power and feeder cables	In progress
Eastern rail Link	Project Director of the Eastern Rail Link	The eastern rail link is linked to the South Line via the Forest Valley Station	In progress
Digital rolling stock radio system	TfNSW project delivery sector	Upgrade of leaky feeder interface with potential new infrastructure	Detailed design
Upgrade of fire and life safety	Sydney Trains	Installation and/or upgrade of egress lighting and phones across the South Line corridor	Concept design
Forest Valley stabling facility	Sydney Trains	The project is designed to cater for the expected increase in train services in Sydney's south	Completed

1.7 Stakeholders

The stakeholders for this project are as follows:

- TfNSW stakeholders – this BRS will be the functional/ technical agreement between the TfNSW project deliverer and the business clients and users for the duration of the project
    - o Transport planning (funding, investment, strategic alignment and governance)
    - o Transport services (service design, specification and procurement)
    - o Sydney Trains Operations Directorate (operability)
    - o Sydney Trains Maintenance Directorate (maintainability)
    - o Transport project delivery team to manage the delivery of the project
    - o Freight, Strategy and Planning (access and strategic alignment)
- Technical Advisors – to develop concept design and perform associated analysis
- Wider rail industry – to perform detailed design and construction of the project
- Train drivers – to operate the train across the South Line and through Forest Valley Station
- Passengers – the users of the system

2. Document framework

2.1 Interface with other documents

The final and approved version of this BRS will support the development of a final business case. After the BRS and business case are approved, they are then handed over to the project delivery group. The project delivery group will then derive an SRS. The system requirements in the SRS will allocate to the business requirements in the BRS to demonstrate that all requirements are addressed.

2.2 Terms and definitions

The following terms and definitions apply in this document:

ASA Asset Standards Authority

BR business requirement

BRS business requirements specification

FVS Forest Valley Signalling

IFAT integrated factory acceptance test

MCD maintenance concept definition

NA not applicable

OCD operations concept definition

OPEX operational expenditure

OTR on time running (train service punctuality)

RAMS reliability, availability, maintainability and safety

SAT systems acceptance test

SIT systems integration test

TfNSW Transport for New South Wales

TPH trains per hour

TS transport standard

2.3 Reference documents

The following reference documents apply in this document

NSW Sustainable Design Guidelines, TfNSW

Sydney's Rail Future - Modernising Sydney's Trains, June 2012, TfNSW

MCD_FVS_001 Maintenance Concept Definition – FVS Project

OCD_FVS_001 Operations Concept Definition – FVS Project

TS 10504 AEO Guide to Engineering Management, ASA

TS 20001 System Safety Standard for New or Altered Assets, ASA

TS TOC 2 Train Operating Conditions (TOC) Manual – Division Pages, ASA

T MU AM 06007 GU Guide to Requirements Definition and Analysis, ASA

DS-001-54 Preliminary Delivery Schedule and Delivery Strategy

3. Business requirements

The following table contains the minimum level of fields for business requirements as defined by T MU AM 06004 ST *Requirements Schema*. The 'proposed validation method' is for illustrative purposes only and does not necessarily reflect a preferred option.

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_001	Passengers shall be able to board a heavy rail service from the Forest Valley Station within 10 minutes of their arrival at the station.	System	To be determined	Essential	NA	Forest Valley Station	Customer experience	Demonstration	NA	Based on the Transport Customer Survey, a need has been identified to maintain a timeliness customer satisfaction of 88%. This customer requirement is derived from this need.	The source of the requirement is the Forest Valley Station customer survey. Priority: Medium CVP: Timeliness	Accept	Agreed
BR_002	Customer congestion at stations shall be reduced.	System	To be determined	Essential	NA	Rail network	Customer experience	Demonstration	NA	According to the Transport customer survey 2011, there is a direct correlation between frequency of services and customer congestion. Based on three surveys conducted by TfNSW, frequency of services was recorded as the most important attribute to all groups of customers.	Refer to the following surveys; • Survey of City Rail Customers (August 2011) • Transport Customer Survey (2011) • Quantum TfNSW Customer Scorecard Research (2012) Priority: Very high CVP: Comfort	Accept	Agreed
BR_003	The service shall provide a safe environment for the customers across their end-to-end journey along the South Line.	System	To be determined	Essential	NA	Rail network	Customer experience	Demonstration	NA	Based on three surveys conducted by TfNSW, safe services were recorded as one of the most important attribute to all groups of customers.	Refer to the following surveys; • Survey of City Rail Customers (August 2011) • Transport Customer Survey (2011) • Quantum TfNSW Customer Scorecard Research (2012) Priority: High CVP: Safety and Security	Accept	Agreed

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_004	The solution shall improve network capacity for transportation of heavy rail passengers by at least 5%.	System	To be determined	Essential	NA	Rail network	Planning manager	Demonstration	NA	To maintain the OTR figure of 92%, improving the network capacity is critical to achieving this. TfNSW is also committed to growing utilisation of public transport.	Source of requirements is the Rail Operations Centre Director.	Accept	Agreed
BR_005	The solution shall increase train capacity from 16 TPH to 20 TPH across the South Line through Forest Valley Station.	System	To be determined	Essential	NA	South Line	Planning manager	Demonstration	NA	This is a service level requirement based on the customer survey conducted by the customer services division of TfNSW.	Assume the following: • freight traffic is excluded and therefore only EMU cars • trains operate to high and medium speed boards	Accept	Agreed
BR_006	The operational expenditure (OPEX) of the Forest Valley Station precinct should be reduced by at least 10%.	System	To be determined	Desirable	NA	Forest Valley Station	Planning manager	Demonstration	NA	Based on the last financial year summary, Forest Valley Station was in the top 15 stations requiring further review of operation expenditure. The operation costs have increased by 10% from the previous financial year. The operator is committed to stabilising its operating cost and achieving sustainability.	Assume the following: • freight traffic is excluded	Accept	Agreed
BR_007	The energy required to operate the signalling at Forest Valley Station should be reduced by at least 5%.	System	To be determined	Desirable	NA	Forest Valley Station	Project delivery team	Test	SIT	According to the *NSW Sustainable Design* Guidelines, TfNSW is committed to operating more effectively and achieving sustainability.	TfNSW is committed to integrating environmental sustainability into its designs, project life cycle, asset life cycle and operations.	Accept	Agreed
BR_008	The solution shall have an operating life of at least 30 years.	System	To be determined	Essential	NA	Forest Valley Station	Design manager	Inspection	NA	TfNSW is considering the long-term life cycle costs and risks.	This provision should be considered early in the 'plan' phase of the life cycle.	Operate	Agreed

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_009	The solution shall comply with system safety requirements in section 7 of ASA standard TS 20001 *System Safety Standard for New or Altered Assets*.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Demonstration	NA	TfNSW is required to comply with safety obligation under its National Rail Safety legislation accreditation, and Work Health and Safety (WHS) laws.	New assets into the system could potentially introduce safety risks. TS 0001:2013 aims to provide requirements for safety engineering and assurance activities that is required to be conducted when delivering a new or altered asset to TfNSW.	Accept	Agreed
BR_010	The solution shall comply with *The Rail Infrastructure Noise Guidelines*.	System	To be determined	Essential	NA	Forest Valley Station	Project delivery team	Demonstration	NA	Based on a customer survey in 2014, residents living within 1 Km from a railway line were dissatisfied with the noise from operating railway lines.	The *Rail Infrastructure Noise Guidelines* can be found on the EPA website: www.epa.nsw.gov.au/noise/index.htm	Accept	Agreed
BR_011	The solution shall comply with the *NSW Sustainable Design Guidelines*.	System	To be determined	Essential	NA	Forest Valley Station	Project delivery team	Demonstration	NA	Achieving better transport outcomes should include a commitment to sustainability.	TfNSW has a goal to continuously improve the sustainability performance of assets across the network. Version 3 (2014) of the guideline can be found on the TfNSW website: www.transport.nsw.gov.au/projects/Planning-and-assesment/sustainability	Accept	Agreed
BR_012	The solution should make passive provision to accommodate the planned upgrade to signalling in 2023.	System	To be determined	Desirable	NA	Forest Valley Station	Design manager	Inspection	NA	TfNSW is considering the long-term life cycle costs and risks. Location of track circuits may interfere with future masts placed for train radio systems.	This provision should be considered early in the 'plan' phase of the life cycle.	Design	Agreed

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_013	The solution shall make passive provision for a potential future capacity of 30 TPH along the South Line.	System	To be determined	Essential	NA	Forest Valley Station	Design manager	Inspection	NA	Requirement based on a demand analysis completed in 2014, the patronage will almost double by 2034. This requirement is required to be met to reduce the likelihood of asset obsolescence.	This provision should be considered early in the 'design' phase of the life cycle.	Design	Agreed
BR_014	The solution shall reduce the need for maintenance by at least 5% in current costs.	System	To be determined	Essential	NA	Forest Valley Station	Project delivery team	Demonstration	NA	TfNSW is committed to reducing maintenance costs for the maintainer as defined in the FVS business case.	The location of the proposed assets should consider the safety risks and accessibility issues during the design phase.	Design	Agreed
BR_015	The solution shall improve the reliability of the rail network by achieving an OTR greater than 92%.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Demonstration	NA	TfNSW aims to deliver services which are safe, reliable, effective and efficient. The 92% target is set as part of the rail services agreement between TfNSW and the operator of the asset.	Factors affecting OTR include those outside the direct influence of the system. OTR has been measured for several years and allocated to incident type.	Accept	Agreed
BR_016	The solution shall improve service availability to at least 95% on the South Line.	System	To be determined	Essential	NA	Rail network	Planning manager	Test	SAT	TfNSW aims to deliver services which are safe, reliable, effective and efficient. TfNSW also values the safety of its workers.	Minimising daytime possessions will reduce the impact to rail operations and decrease the chances of incidents occurring to railway workers within the rail corridor.	Accept	Agreed
BR_017	The solution shall reduce the need for maintenance activities in the danger zone down to less than 4hrs/week.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Test	SAT	TfNSW values the safety of its workers. Therefore, maintenance activities close to or in danger zones should be avoided.	If the asset cannot be relocated to a safer location, maintenance should only occur outside train operations.	Accept	Agreed

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_018	The solution shall demonstrate value for money for the 30 year life of the asset.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Demonstration	NA	TfNSW aims to achieve much more sustainable, efficient and cost effective solutions that provide value for money over the life of the asset.	Replacing end-of-life assets, reducing maintenance intervention/ sustainable maintenance, designing for future requirements and reducing operational resource requirements will not be required. The recurrent maintenance requirements, OPEX and resources should be determined and provided.	Accept	Agreed
BR_019	The solution should consider the end of life disposal cost if asset is about to be disposed.	System	To be determined	Desirable	NA	Forest Valley Station	Planning manager	Demonstration	NA	With over $100bn worth of assets across NSW, it is critical for TfNSW to consider the cost of disposal or resale value of an asset.	If TfNSW is about to sell the asset during operate/maintain phase, consideration should be taken in: • warranty of the asset (if applicable) • short term depreciation If TfNSW is about to dispose asset, consideration should be taken in: • whole-of-life cost (that is, cost of operation/ maintenance) • materials resale value (that is, copper, scrap metal)	Accept	Agreed

ID	Description	Allocation	Compliance status	Criticality	Proposed verification method	Limit of scope	Owner	Proposed validation method	Validation test type	Rationale	Remarks	Requirement delivery phase	Requirement approval status
BR_020	The solution shall integrate with all existing EMU rolling stock systems operating along the South Line.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Demonstration	NA	TfNSW is moving towards an interoperable and interchangeable environment. All new or altered assets will need to integrate with existing systems as this is a retrofit project	All existing EMU rolling stock systems includes: • existing EMU with modifications • changes to EMUs currently being planned • existing EMU with no modifications System integration is the assembly of component elements into one system and ensuring that all elements function together. Refer to TS 10507:2013 *AEO Guide to Systems Integration.*	Accept	Agreed
BR_021	The solution shall integrate with all existing signalling and control systems (S&CS) operating along the South Line.	System	To be determined	Essential	NA	Forest Valley Station	Planning manager	Demonstration	NA	To achieve the project objective of 20 TPH at 3 minutes headways with 60 second dwells at Forest Valley Station, the new or altered asset will need to integrate with all existing S&CS	All existing S&CS includes: • existing S&CS with modifications • changes to S&CS currently being planned • existing S&CS with no modifications Interface management is performed to ensure that discrete elements and systems can function together to achieve the planned emergent properties. Refer to TS 10507:2013 *AEO Guide to Systems Integration.*	Accept	Agreed