



Corporate Services for the Natural Resource Sector

Information Management Branch

NRS Standards for Modeling with EA:

REQUIREMENTS

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Version Control

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5.0.0	FINAL	2017-03-30	SDLC Sub Committee – Standards Sub Team	Alignment to new SDLC

1 Introduction

This document describes the standards that must be followed for the Requirement phase for NRS IM/IT projects following the new SDLC.

This standard is for projects using Sparx Systems Enterprise Architect.

If a project plans to deviate from these standards, or from the specified versions of the tools and standards, the project must first be approved to do so by the [IM/IT Investment Board](#).

This standard assumes that project teams have completed the “[Project Initiation Meet \(with PMO\)](#)” in the Initiation Phase of the project and have been directed to use EA. The outputs of this meeting include determination on SDLC methodology, the standard and tool to fit the project, and a decision about how the project team will visually represent business processes – either BPMN models or UML activity diagrams.

An NRS-specific template, ***NRS EA Template***, has been provided to guide the process of entering the necessary information into EA. The template is organized to include a package for each artifact to be entered. If a package is not used, the section should be removed from the template.

Artifacts and attributes of artifacts which are optional are noted by the term **[OPTIONAL]**.

All mandatory components within this standard are noted by the term **[MANDATORY]**.

Where a component is **[OPTIONAL]** but a project team decides to include the component in their model, there may be sub-components which are mandatory. Also, there are some helpful hints provided in this document.

Both of these are indicated by ‘Notes’ with an exclamation symbol: 

Hyperlinks to published, related standards to delivery in EA are inserted, where required, in the standard.

1.1 Requirements Documents

There are two types of documents that can be generated during the Requirements Phase of the project using functionality provided within EA: the Business Process Requirements Document (BPRD) and the Software Requirements Specification (SRS) document. These two types of requirements documents are intended to serve different audiences.

The Business Process Requirements Document (BPRD) is a business focussed document intended to be used to communicate with business staff. The methodology used to capture business requirements is a combination of the Business Process Model and Notation (BPMN) language and the Universal Modeling Language (UML). Both of these methodologies are standards-based industry practices.

As depicted in Figure 1, the BPRD is centered around Business Process Models. These models are supported by functional requirements, business rules and a (minimal) logical data model. Optionally, the requirements team may elect to specify screen mock-ups using wireframes and Business Use Cases by elaborating complex BPMN diagrams. Wireframes provide a low-fidelity representation of what the user interface might look like for an IM/IT system based upon the requirements specified in the document.

The Generate Document Package has been customized to generate an NRS BPRD. The primary purpose of the BPRD is communication – the document is a mechanism to formally communicate business requirements to clients. The generated BPRD will require some manual editing before it is ready for clients to review.

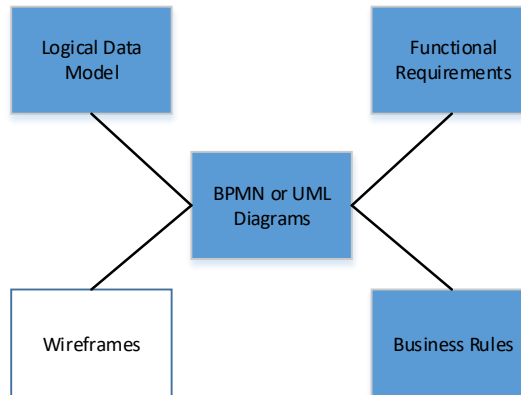


Figure 1 - Key deliverables of the Business Process Requirements Document

The Software Requirements Specification (SRS) is a document that describes the specification for developing a software product (i.e. provides an automated solution for a business problem). The SRS is formalized by the IEEE 830 standard for specifying software requirements. The Generate Document Package has been customized to generate an NRS SRS as an RTF or Word document.

As depicted in Figure 2, the SRS is centered around Business Use Cases. These models are supported by functional requirements, business rules and a (minimal) logical data model. Optionally, the requirements team may elect to depict business processes graphically using either BPMN diagrams or UML Activity diagrams. Wireframe diagrams may also be specified to provide a low-fidelity representation of the user interface for a software system design based upon the requirements specified in the document.

The primary purpose of the SRS is communication. The document provides a mechanism to formally communicate requirements underlying as software design to clients. The focus of the SRS is to ensure that requirements are specified to a sufficient level of detail to support the design of an IM/IT system. The generated SRS will require some manual editing before it is ready for review.

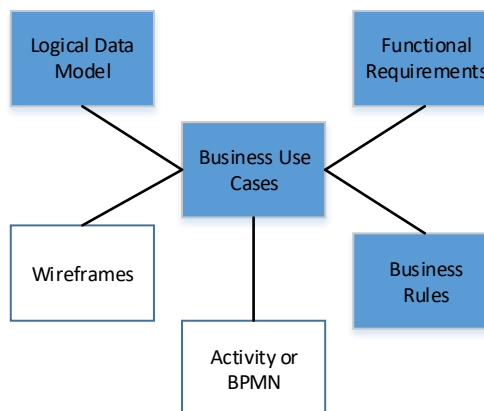
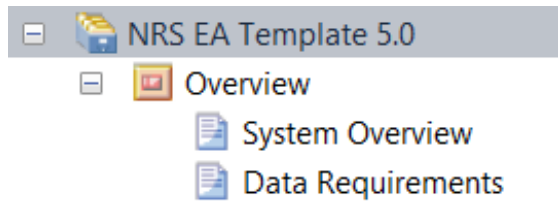


Figure 2 – Key Deliverables of the Software Requirements Specification Document

2 Overview [MANDATORY]

This section of the model Introduces the body of work represented in the EA file.



2.1 System Overview

The system overview should be written when the requirements gathering process is initiated. If necessary it should be updated at the start of the design phase. The System Overview should be no more than one page in length.

For Requirements the following artifacts must be completed by entering relevant content into the *Notes* field:


Purpose:	Define the purpose of the requirements phase and identify the intended audience(s). Describe the intended capabilities of the system. May be copied from Project Charter.
Scope:	Describe project scope. May be copied from Project Charter.

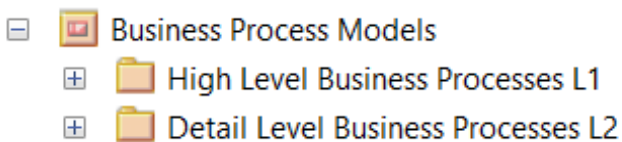
2.2 Data Requirements

Previous versions of the NRS EA Template had different folders for data requirements artifacts, including data conversion, data replication and data archiving. These requirement specifications are typically specified as free-form text. For the sake of brevity, these requirements have all been gathered in a single artifact entitled “data requirements” to be populated as free-form text.

3 Business Process Models [OPTIONAL]

The suggested approach for creating business process models using Business Process Model and Notation (BPMN), a standard graphical representation for business process modeling maintained by the [Object Management Group](#).

 Note: Starting in Fiscal 17/18 project teams have the option to employ either BPMN diagrams or UML activity diagrams to represent business process models. However, if the project is a very simple, no business process models may be required. The project team should use the diagramming approach which best fits the needs of the client for communication purposes.





3.1 Levels of Modeling

Business Process Modeling can vary with respect to the level of detail that is modeled. To assist project teams in understanding the level at which Business Process Models should be developed, the table below provides guidelines for the use of levels in BPMN.


For Business Process Model Notation (BPMN) diagrams, only Levels L1 and L2 are normally specified. Project teams are asked to consider the following guidelines but adjust to the appropriate level for the specific business needs. Project teams should breakdown large models into smaller ones, making them easier to understand. Subprocesses should be used to decompose high-level processes into lower-level diagrams. As a general rule, there should be no more than 30 flow objects in a single diagram. (Flow objects include activities, events and gateways).

Level	Definition	Notes
L0	Enterprise Level (Optional)	Conceptual level - addresses the organization's value chain. May describe processes that represent key business objectives. Note: Not typically depicted in a line-of-business BPMN specification.
L1	Business Level	High level – depicts large business activities and process groups
L2	Process Level	Decomposes high-level processes into business focused subprocesses
L3	Activity Level	May be used to further decompose sub-processes into detailed activities including exception handling but <u>only</u> if BPMN is being used as a design language – however, this is typically <u>not</u> the case for NRS requirements which are <u>not required</u> to specify executable BPM. Note: In the OMG standard, L3 is used to specify executable BPM; the OMG L3 specification represents a fully executable design language.
N/A	Business Use Cases	Detailed level – rather than further decomposing a BPMN sub-process, additional details within an activity can be elaborated by linking Activities to Business Use Cases and populating the scenarios within the Business Use Cases.

 More information on levels of modelling in BPM is available [here](#). Note that BPM Levels 4-5 are primarily associated with executable BPM. The NRS uses BPM as a notation language for describing business processes.

 Additional information concerning the [BPM 2 standard](#) is available from the Object Management Group (OMG), the standards body responsible for maintain the standard.

3.2 Business Process Diagrams [OPTIONAL]

 If project teams are using BPMN for modeling business processes, the below are “mandatory” considerations that should be understood before starting to develop BPMN diagrams:

- Project teams using BPMN elements and attributes must align to the published standard for [Business Process Model and Notation \(BPMN\), 2.0 Syntax](#).
- Must use Diagram Toolbox BPMN 2.0 and Diagram Type “Business Process”
- Must identify the task type (User, Service, Manual, Send, Receive) for all the lowest level BPMN Activities (L3).

- Must set diagram flow direction to Horizontal (Swim lanes: Pools, Lanes).

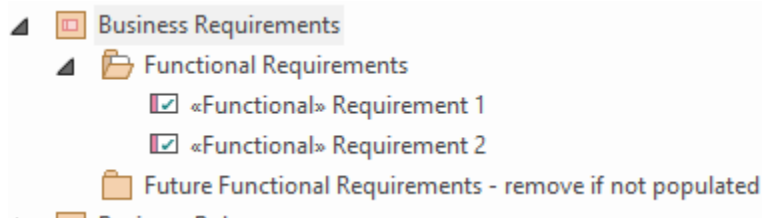
For Business Processes, the Element Properties (Attributes) must include the following:


BPMN 2.0 Element	Properties Dialog Box	Field / Button	Required Attributes (unless specified otherwise)
Package:	Properties > <u>General</u>	Name	Process short description
		Notes	Process detailed description
Pool:	Properties > <u>General</u>	Name	Short description of Pool (Pools representing internal process should be labeled with the name of the process not the organization)
		Notes	Detailed description of Pool
Lane:	Properties > <u>General</u>	Name	Short description of Lane Lanes are used to organize and categorize activities within a pool. (Note: Lanes and Actors in Use Cases synonymous)
		Notes	Detailed description of Lane
Activity:	Properties > <u>General</u>	Name	Short description of Activity (Label Activity as VERB-NOUN)
		Notes	Detailed description of Activity
		Author	Last name, First name
		Complexity	Easy (default) (Used for estimating effort)
		Version	(default)

4 Business Requirements [MANDATORY]

The process for specifying business requirements in EA has been simplified. All functional requirements should be specified under the functional requirements folder. Projects may create sub-folders under the “Functional Requirements” folder if it adds clarity.

To manage incremental change and functional requirements releases within an EAP project file, project teams are encouraged to separate artifacts for requirements and design into folders based upon release versions. In this way you can capture future requirements in the same EA file as used for work on the current version.



 Individual folders can be set so they don't print in a report using the following procedure:

Right-click on the package → Documentation → Generated Report Options → Select the radio button “Exclude Package from Generated Report”.

4.1 Functional Requirements

For Functional Requirements, the Element Properties (Attributes) must include the following:

Requirement Element	Properties Dialog Box	Field / Button	Required Attributes (unless specified otherwise)
Requirement:	Properties > <u>Properties</u>	Short Description	Short description of Requirement
		Type	Functional (default)
		Notes	Detailed description of Requirement

Examples of functional requirements are:

1. The reason for the call shall be recorded.
2. The customer shall approve the usage charge and provide a valid credit card number and the card expiry date.
3. The reason for cancelling the reservation shall be recorded.

4.2 Non-Functional Requirements

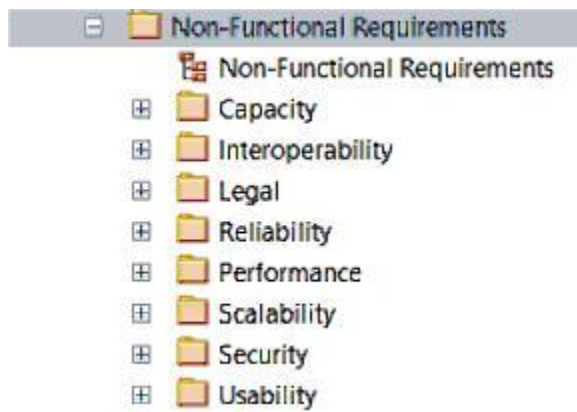
A standard set of common non-functional requirements are specified that the ISSS infrastructure realizes. If the project has non-functional requirements that go beyond the standard list of non-functional requirements, then the project specific non-functional requirements should be added to this folder.

This standard list of non-functional requirements is available for import into your model in xmi format. The xmi file is available [here](#). Once you have downloaded the xmi, follow the below steps to import the xmi file into your project model:

Right-click on the “Business Requirements” package → Import/Export → Import package from XMI file. Select “nfr.xmi” using the Filename dialog box and click on the “Import” button. Respond “Yes” to the prompt “OK to import from this XMI file”. Click on “Close” when the import completes.



Note: Do not strip GUID’s when importing this XMI file.



5 Business Rules [MANDATORY]

Business rules are statements that define or constrain some aspect of the business. Business rules are written in plain text in the form of **IF** <condition> **THEN** <action>. Often, projects will confuse functional requirements and business rules. The test for a business rule is simple – the rule specifies whether or not an action can be performed. For example, “**IF** carrying hazardous materials **THEN** truck routing must avoid suburban streets” is a business rule and not a functional requirement as it specifies what can (or cannot) be done.

Business Rules are linked to requirements. Below are two examples of simple business rules:

Example 1: IF account balance is negative THEN calculate interest owing on the negative balance.

Example 2: IF customer Email address exists THEN forward invoice by Email


The business rules artifact must have the Element Properties (Attributes) shown in the table below.

Business Rule	Properties Dialog Box	Field / Button	Required Attributes (unless specified otherwise)
Requirement:	Properties > Properties	Short Description	Short description of Business Rule created during Requirements Phase
		Type	BusinessRule (NRS custom stereotype)
		Notes	Detailed design description of Business Rule created during Design Phase

6 Business Use Cases [OPTIONAL]

Business Use Cases are <optional>, but should be created where there is a need to elaborate BPMN diagrams with additional details that are not appropriate to be depicted using a BPMN subprocess. If a complete BPMN subprocess can be depicted using a single business Use Case, then the Use Case may be the more appropriate mechanism. Alternatively, some projects may not require Business Use Cases at all.

Refer to the following reference for more information concerning Business Use Cases. Martin Langland and Charles Edwards. [Business vs. System Use Cases](#). 2009.


 **Note:** If a project team creates Business Use Cases, they must link each Business Use Case to a BPMN Activity using the following procedure:

1. Create a Business Use Case in the Use Cases folder - set name to the target BPMN Activity
2. Right-click on business use case --> Add --> Add Custom Reference
3. Select the “element” check box to link (e.g. Activity::AP 31 1.2.7.2 Capture Tenure/Title)

If Business Use Cases have been defined during the requirements phase, information captured in the Business Use Cases should be copied into one (or more) System Use Cases. This ensures that requirements information captured in the Business Use Case is not altered. As well, one Business Use Case may be realized by multiple System Use Cases.

7 Logical Data Model [MANDATORY]

The logical data model must be started in the requirements phase and should include classes, class associations and business keys. It is recommended that only attributes required for business keys be defined during requirements.

 **Note:** Although a formal review of the logical data model is not conducted during the requirements phase, the IMB Data Architect (DA) will perform a high-level review of the model to assess if the class diagram aligns

with business requirements and is clearly described. A more detailed review of the logical data model will be completed and signed off by DA as part of the design phase.

The purpose of the logical data model is to provide a detailed business view defining and documenting detailed data requirements as part of overall design. It can also be used to refine the scope of data to be created, determine data placement within the sector data profile where not previously determined, and to determine detailed data sharing plans.

The IMB Data Architecture team has developed [NRS Data Modeling Standards with EA](#) which further describe data modeling requirements. Refer to *Section 4.0 – Logical Data Model* for details.

8 Wireframes [OPTIONAL]

The expectation is that wireframes in the requirements phase will be low fidelity. Wireframes provide a visual mechanism used for communicating functional requirements to the business. They provide a facsimile of the user experience without the necessity to develop a complete screen mock-up.

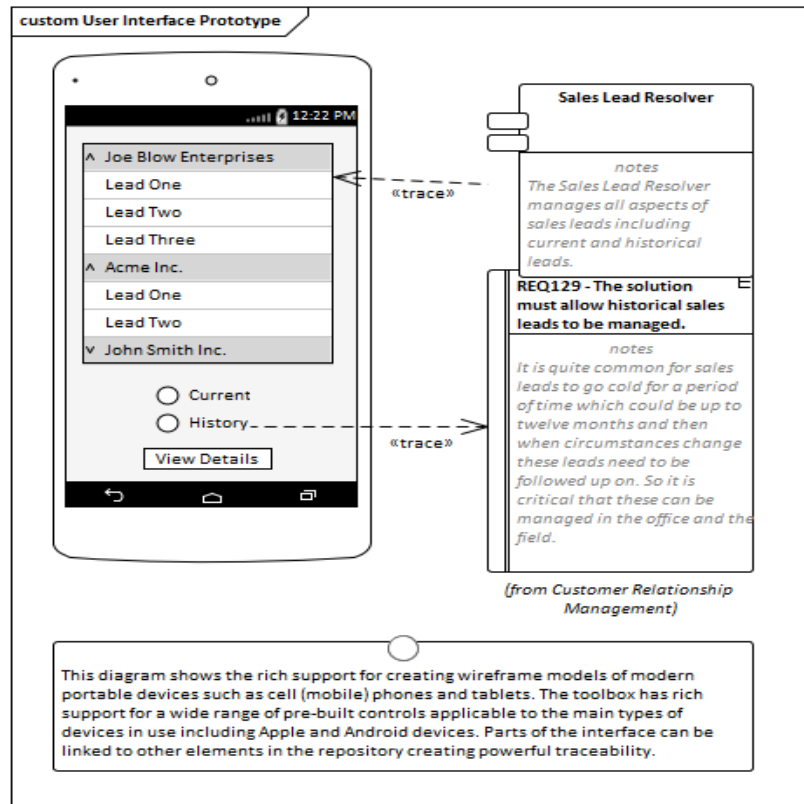
8.1 Wireframe Diagrams

There are several options to providing user interface mock-ups. These standards do not dictate which method is to be used. The mock-up should provide a high-level visual representation of the user interface layout and its controls. User interface mock-up must conform to the following guideline:

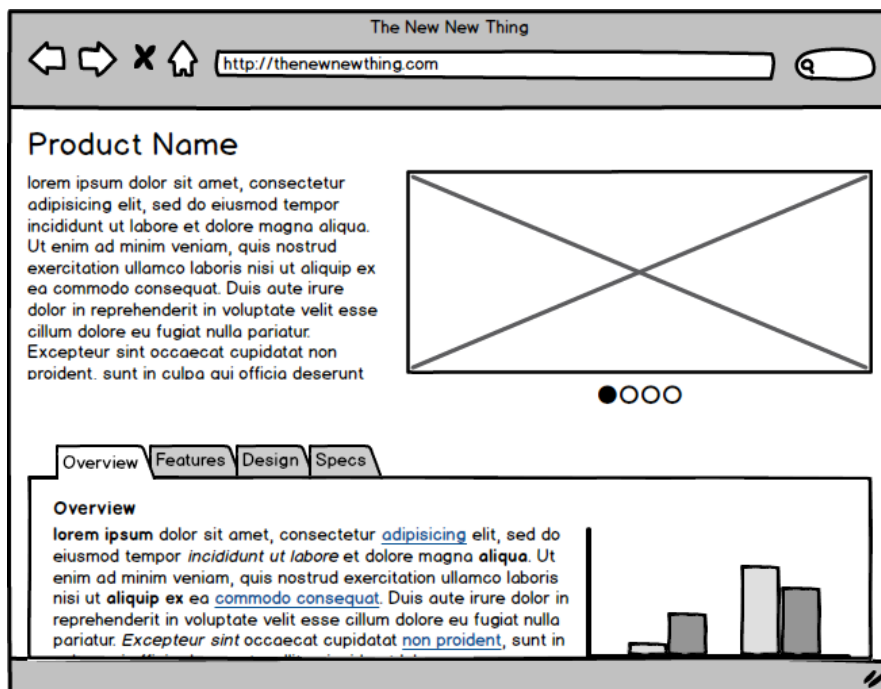
- Size of each image must be under 200kb
- Date fields must be specified using the ISO 8601 date format: YYYY-MM-DD (zero padded)
- Time fields must be specified using the ISO 8601 time format: HH:MM:SS (zero padded)

[OPTIONAL] The three methods that may be used to depict user interface mock-ups include:

- Use of Enterprise Architect's UI Designer capability: these are Win32 screens built into the EA toolset. Please reference [Sparx Systems EA User Guide](#) for more information on this functionality.

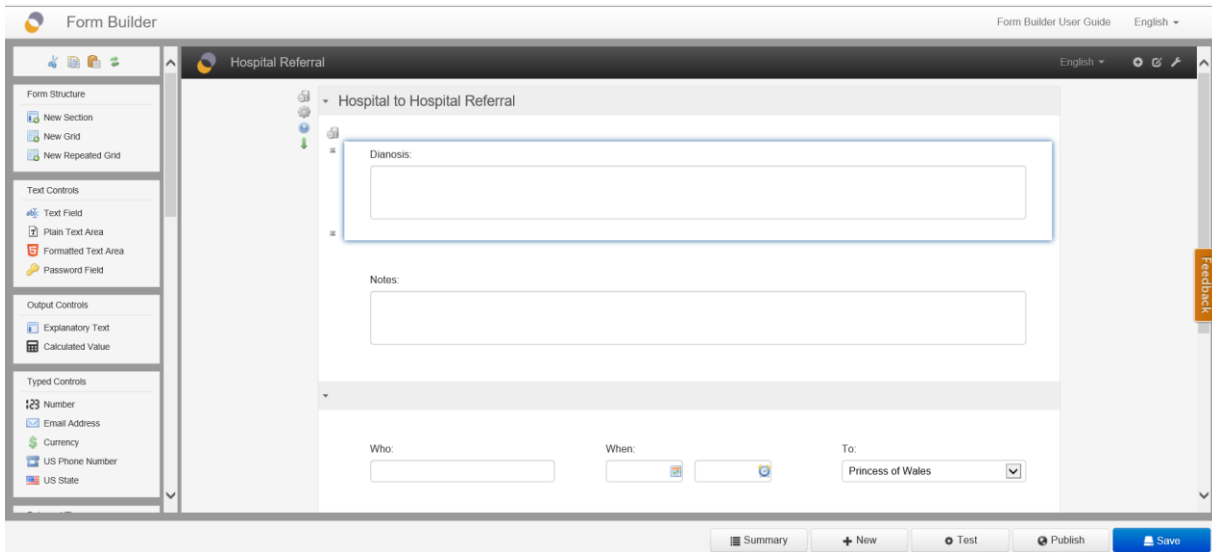


- Importing screen-shots created by another UI tool (eg. Balsamiq): Typically, these afford the project team the ability to cut & paste their results into EA. These are quick direct representations of a screen that doesn't change and doesn't take a lot of effort.



- Orbeon Forms: This tool can be used to create complex user interface mock-ups. Cut and paste layouts created in the Orbeon Forms design tool into EA. Documentation on the use of the Orbeon Forms Designer and Smart Forms within the Natural Resource Sector is available on the [Confluence](#)

[Wiki](#). Note that Orbeon Forms is not a good option for wireless solutions as the technology does not support responsive design.



! For design of date fields please refer to the Date and Time Standard in the [OCIO, ISO 8601 standard](#).

9 Traceability [OPTIONAL]


The Traceability package is used to document links between artifacts. Traceability provided at the requirements stage should include:

Matrix Specification Artifacts & Profiles	Purpose	Source Package (Type)	Target Package (Type)	Link Type Direction	Overlays
Artifact: <<EAmatrixspecification>> PPPP BPMN Activities to Functional Requirements	Identify orphan requirements	Business Process Model (Activity)	Functional Requirements (Requirement)	Realization Source->Target	<None>
Artifact: <<EAmatrixspecification>> PPPP BPMN Activities to Business Use Cases		Business Process Model (Activity)	Business Use Cases		
Artifact: <<EAmatrixspecification>> PPPP Business Rules to Functional Requirements	Identify orphan business rules	Business Rules (Requirement)	Functional Requirements (Requirement)	Realization Source->Target	<None>
Artifact: <<EAmatrixspecification>> PPPP Business Use Cases to Functional Requirements	Identify one to many relationships	Business Use Cases	Functional Requirements (Requirement)		

9.1 BPMN Activities to Functional Requirements [OPTIONAL]

Activities can represent work or tasks carried out by people or systems. The purpose of this matrix is to make sure that every activity has one or more Functional Requirements.

- Activities as Source, Requirements as Target
- Every activity must have one or more requirements

 Note: With Traceability and Functional Requirements, one or more Functional Requirements must be linked to a L2 Activity.

9.2 BPMN Activities to Business Use Cases [OPTIONAL]

For those project teams using this traceability, the purpose of this matrix is to make sure that every activity has one or more business use cases.

9.3 Business Rules to Functional Requirements [OPTIONAL]

Each Business Rule relates to one or more Functional Requirements. As Business Rules and Functional Requirements are documented in separate packages, a traceability matrix is provided to show the linkages between the two artifacts.

9.4 Business Use Cases to Functional Requirements [OPTIONAL]

Specification of Business Use Cases is optional. However, Business Use Cases are used to elaborate details of a BPMN sub-process where there is too much detail to be depicted using BPMN. Where Business Uses Cases are created, they should be linked to the underlying Functional Requirements.


10 Generate Documents – BPRD, SRS [MANDATORY]

There are two deliverables related to requirements, the BPRD and the SRS.

The generate documents package is strictly a tool for generating the noted deliverables using the custom NRS document templates. Manual editing of the generated document may be required to produce a Business Process Requirements Document (BPRD) for review, as well as a Software Requirements Specification (SRS) for review.

Business Process Requirements Document (BPRD): streamlined, short business client focus for communication of requirements. This deliverable is within the Generate Documents package and is intended for communication with the business client on the requirements phase. The BPRD is automatically generated from the EA file.

The **Software Requirements Specification (SRS):** longer, software focused version of requirements for developers can be generated within Sparx EA itself. The SRS is automatically generated from the EA file and is comprehensive of the model contents.

 Note: Project teams should be aware that each component can be printed individually. For more information, reference [Sparx Systems EA User Guide “Generate Documentation”](#).

11 Quality Assurance Review for Models

The following [“Quality Assurance for Sparx EA Models”](#) is available for project teams to guide them through the quality assurance reviews on the Sparx EA Working Group SharePoint Site.

The Business Portfolio Manager (BPM)/Business Transformation Project Lead (BTPL) is accountable for the successful completion of the quality assurance reviews for each of their respective projects.

12 Submission of Sparx EA Models

Project teams are expected to submit their models following the completion of Interim and Final Quality Assurance Reviews within both the Requirements and Design Phases of the SDLC.

For project teams new to the submission process for models into the NRS Sparx EA Repository, please email NRS.SEA@gov.bc.ca (Sparx EA Working Group) for support. Additional information on competencies for use of the NRS Sparx EA Repository environment is available on the Sparx EA SharePoint Site FAQ, specifically the [Sparx EA Repository Competency List](#).

For project teams familiar with the NRS and the use of Tortoise SVN, please check out the documentation available on the Sparx EA Working Group SharePoint Site to ensure you are setup and ready to submit your *.xmi file export from Sparx EA into subversion. Please contact NRS.SEA@gov.bc.ca with any questions.