



# All Requirements are Equal

(But some are more equal than others)

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# All Requirements are Equal

- Introduction
- Traceability - Simple changes
- Traceability - Advanced changes
- Are all requirements equal?
- Ship Spec Editor and Viewer
- Conclusion



# Simple Traceability using Wizard

ID	Object Type	Measure of Performance	In-links (All open modules)
2SSR-2	The vehicle shall have a maximum forward speed of 30 knots when fully <i>submerged</i> .	<b>Maximum speed:</b> 30 knots	<p>3SSR-2 The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.</p> <p>3SSR-3 The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.</p> <p>3SSR-7 The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling points.</p> <p>3SSR-8 The Pressurised Water Reactor shall generate steam for the following systems:</p>

```

Text1
1  if (depth == 1) {
2      s = (identifier othero)
3      if (s == "")
4          displayRich("\pard " " ")
5      else
6          displayRich("\pard " s)
7      s = probeRichAttr_(othero,"Object Text", false)
8      if (s == "")
9          displayRich("\pard " " ")
10     else
11         displayRich("\pard " s)
12     }
13 }
  
```



# Simple Traceability using Modified Wizard

ID	Object Type	Measure of Performance	Incoming Links
2SSR-2	The vehicle shall have a maximum forward speed of 30 knots when fully <i>submerged</i> .	Requirement	<b>Maximum speed:</b> 30 knots
			<b>3SSR-2</b> The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed. <b>3SSR-3</b> The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque. <b>3SSR-7</b> The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling points. <b>3SSR-8</b> The Pressurised Water Reactor shall generate steam for the following systems:

```

Text1
1   if (depth == 1) {
2       s = (identifier othero)
3       if (s == "")
4       displayRich("\pard " " ")
5       else
6       displayRich("\pard [{"b " s "}]")
7       s = probeRichAttr_(othero,"Object Text", false)
8       if (s == "")
9       displayRich("\pard " " ")
10      else
11      displayRich("\pard " s)
12  }
13  }
  
```



# Traceability - Common DXL Attributes

## Text1

```
5 // *****  
5 // Forward declarations  
7 // *****  
8  
9 void displayOutLinks          ( Module, Object, string, string, string )  
0 void displayInLinks          ( Object, string, string, string )  
1 void displayGuardedInLinks   ( Object, string, string, string, string, string )  
2 void displayGuardedInLinkAttributes ( Object, string, string, string, string, string )  
3 void displayGuardedByInLinkAttributes ( Object, string, string, string, string, string )  
4 void displayGuardedOutLinks  ( Module, Object, string, string, string, string, string )  
5 void displayVGOOutLinks      ( Module, Object, string, string )  
6 void displayVGINLinks        ( Object, string )  
7 void displayDCAPicturesInVG  ( Module, Object, string )  
8 void displayExternalOutLinks ( Object )  
9 void displayTraceabilityFromTestSchedule ( Object, string )  
0 void displayVBSOutLinks      ( Module, Object, string )  
1 void displayReviewStatus     ( Module, Object )  
2 void displayTraceabilityStatus ( Module, Object )  
3 void displayVerificationStatus ( Module, Object )  
4 void displayCrossMatrix      ( Module, Object, string, string, string )  
5
```



# Problem 1

- There is too much data to see on a single DOORS view.



'Ship Spec Part 2' current 0.0 in /Successor/01 Level 1 Requirements (Formal module) - DOORS							
ID	Object Type	Overall Rationale	Measure of Performance	Ship Spec part 3	Remarks	Link	
2SSR-2	Requirement	Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.	<b>Maximum speed:</b> 30 knots	<p><b>3SSR-2</b> The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.</p> <p><b>3SSR-3</b> The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.</p> <p><b>3SSR-7</b> The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling points.</p> <p><b>3SSR-8</b> The Pressurised Water Reactor shall generate steam for the following systems:</p> <ul style="list-style-type: none"> <li>• Propulsion turbine</li> <li>• Captains shower</li> <li>• Ironing cubicle</li> </ul> <p>And yes this is very bad example for a requirement as it has bullet points rather than individual statements but it illustrates the bullet points.</p> <p><b>3SSR-9</b> The shaft bearings shall be lubricated by oil.</p> <p><b>3SSR-12</b> The Propellor system shall provide forward motion</p> <p><b>3SSR-13</b> The Propellor system shall provide backwards motion</p>	Higher speed obtained by a Y shaped hull.	Not ma prir fun	

Username: Gordon Woods    Exclusive edit mode



## Problem 2

- There is too much data to see on a single DOORS view.
- The order is very important but DOORS links are always presented in numerical order of Target ID.







## Problem 3

- There is too much data to see on a single DOORS view.
- The order is very important but DOORS links are always presented in numerical order of Target ID.
- Some systems are used by more than one capability and have different importance within each capability.



'Ship Spec Part 2' current 0.0 in /Successor/01 Level 1 Requirements (Formal module) - DOORS

File Edit View Insert Link Analysis Table Tools KeyTrace ISG Company Project Help

View 01 - ship spec review All levels

ID	Object Type	Overall Rationale	Measure of Performance	Ship Spec part 3	Remarks	Link
2SSR-2	Requirement	Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.	<b>Maximum speed:</b> 30 knots	<p><b>3SSR-2</b> The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.</p> <p><b>3SSR-3</b> The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.</p> <p><b>3SSR-7</b> The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling points.</p> <p><b>3SSR-8</b> The Pressurised Water Reactor shall generate steam for the following systems:</p> <ul style="list-style-type: none"> <li>• Propulsion turbine</li> <li>• Captains shower</li> <li>• Ironing cubicle</li> </ul> <p>And yes this is very bad example for a requirement as it has bullet points rather than individual statements but it illustrates the bullet points.</p> <p><b>3SSR-9</b> The shaft bearings shall be lubricated by oil</p> <p><b>3SSR-12</b> The propeller system shall provide forward motion</p> <p><b>3SSR-13</b> The Propellor system shall provide backwards motion</p>	Higher speed obtained by a Y shaped hull.	Not ma prij fun

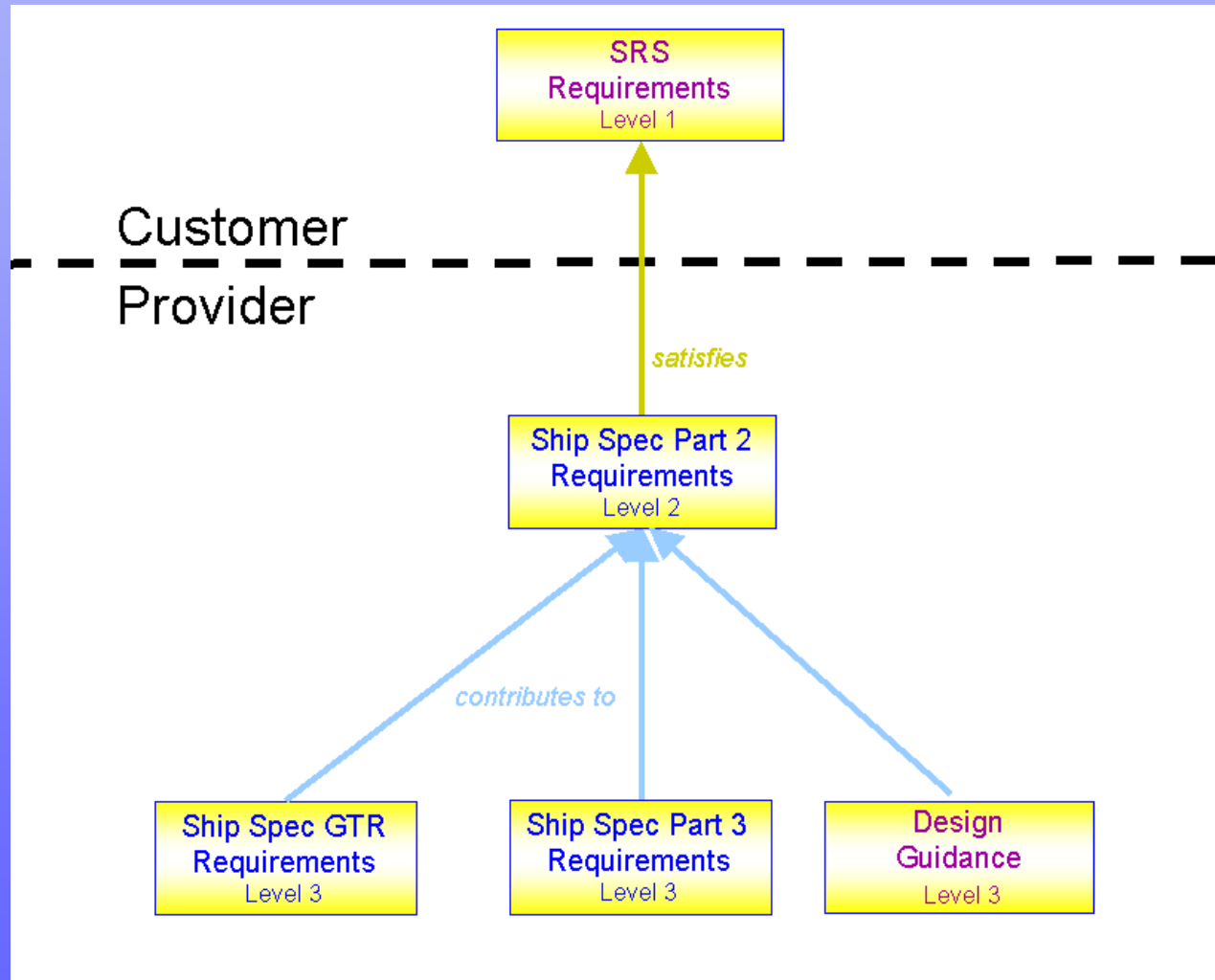
Primary

Secondary

Username: Gordon Woods Exclusive edit mode



# Simplified Data Model





# Ship Spec Link Editor

'Ship Spec Part 2' current 0.0 in /Successor/01 Level 1 Requirements (Formal module) - DOORS

File Edit View Insert Link Analysis Table Tools KeyTrace ISG Company Project Help

View 01 - ship spec review All levels

ID	Object Type	Overall Rationale	Measure of Performance	Ship Spec part 3	Remarks	Link
2SSR-2	Requirement	Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.	<b>Maximum speed:</b> 30 knots	<p><b>3SSR-2</b> The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.</p> <p><b>3SSR-3</b> The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.</p> <p><b>3SSR-7</b> The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling points.</p> <p><b>3SSR-8</b> The Pressurised Water Reactor shall generate steam for the following systems:</p> <ul style="list-style-type: none"> <li>• Propulsion turbine</li> <li>• Captains shower</li> <li>• Ironing cubicle</li> </ul> <p>And yes this is very bad example for a requirement as it has bullet points rather than individual statements but it illustrates the bullet points.</p> <p><b>3SSR-9</b> The shaft bearings shall be lubricated by oil.</p> <p><b>3SSR-12</b> The Propellor system shall provide forward motion</p> <p><b>3SSR-13</b> The Propellor system shall provide backwards motion</p>	Higher speed obtained by a Y shaped hull.	Not ma prij fun

Username: Gordon Woods Exclusive edit mode



Ship Spec Rationale Editor (v2.7) - DOORS



BAE SYSTEMS



This utility is used to edit the Part 3 Requirements and link to the Part 2 requirements of the FSM Ship Specification.

Part 2 Requirement

ID	Requirement	Remarks
2SSR-2	The vehicle shall have a maximum ahead speed of 30 knots when fully <i>submerged</i> .	Higher speed obtained by a Y shaped hull.
Type		
Requirement		
Measure of Performance	<b>Maximum speed:</b> 30 knots	Overall Rationale
		Propulsion is provided by a Pressurised Water Reactor(PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.

Edit Rationale

Part 3 Primary Requirements - ordered

Linked ID	Requirement
3SSR-8	
3SSR-2	The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.
3SSR-11	
3SSR-3	
3SSR-12	
3SSR-13	

Measure of Performance

**Minimum Input Speed:**  
600 revolutions per minute

**Maximum Input Speed:**  
700 revolutions per minute

Primary Link Rationale

Part 3 Secondary Requirements

Linked ID	Requirement
3SSR-9	
3SSR-7	

Measure of Performance

Part 2 Maturity

Linking Issues

Not sure if engine oil maintenance should be a primary or secondary function.

Maturity Status:

Not Started
  Draft
  SE Agreed
  DM Approved
  Client Endorsed
  Not Applicable

Previous Next Bookmark Go To

Viewer Save Close



Ship Spec Rationale Editor (v2.7) - DOORS



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Part 2 Requirement

ID	Requirement	Remarks
2SSR-2	The vehicle shall have a maximum ahead speed of 30 knots when fully <i>submerged</i> .	Higher speed obtained by a Y shaped hull.
Type		
Requirement	Measure of Performance	Overall Rationale
	<b>Maximum speed:</b> 30 knots	Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.
<input type="button" value="Edit Rationale"/>		

Part 3 Primary Requirements - ordered

Linked ID	Requirement
3SSR-8	
3SSR-2	The gearbox system shall provide a <i>sliding-mesh</i> conversion of input speed to output speed.
3SSR-11	
3SSR-3	
3SSR-12	Measure of Performance
3SSR-13	<b>Minimum Input Speed:</b> 600 revolutions per minute
	<b>Maximum Input Speed:</b> 700 revolutions per minute
<input type="button" value="Add New Link"/> <input type="button" value="Remove Link"/> <input type="button" value="Primary to Secondary"/> <input type="button" value="Edit"/>	
<input type="button" value="Up"/> <input type="button" value="Down"/> <input type="button" value="Refresh"/>	
Primary Link Rationale	
<input type="button" value="Revert"/> <input type="button" value="Clear"/>	

Part 3 Secondary Requirements

Linked ID	Requirement
3SSR-9	
3SSR-7	
Measure of Performance	
<input type="button" value="Add New Link"/> <input type="button" value="Remove Link"/> <input type="button" value="Secondary to Primary"/> <input type="button" value="Edit"/>	
<input type="button" value="Up"/> <input type="button" value="Down"/>	

Part 2 Maturity

Linking Issues

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Ship Spec Rationale Editor (v2.7) - DOORS

BAE SYSTEMS



This utility is used to edit the Part 3 Requirements and link to the Part 2 requirements of the FSM Ship Specification.

Part 2 Requirement

ID	Requirement	Remarks
2SSR-2	The vehicle shall have a maximum ahead speed of 30 knots when fully <i>submerged</i> .	Higher speed obtained by a Y shaped hull.
Type		
Requirement		
	Measure of Performance	Overall Rationale
	<b>Maximum speed:</b> 30 knots	Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.
<input type="button" value="Edit Rationale"/>		

Part 3 Primary Requirements - ordered

Linked ID	Requirement
3SSR-8	
3SSR-2	
3SSR-11	The gearbox system shall include safety interlocks such that motion in the reverse direction cannot be <i>commanded</i> when the output speed from the gearbox is greater than 10 RPM, unless the current month has an R in it and the
3SSR-3	
3SSR-12	
3SSR-13	
	Measure of Performance
	<b>MOP 1:</b>
	<b>MOP 2:</b>
	<b>MOP3:</b>

Part 3 Secondary Requirements

Linked ID	Requirement
3SSR-9	
3SSR-7	
	Measure of Performance

Primary Link Rationale

Part 2 Maturity

Linking Issues

Not sure if engine oil maintenance should be a primary or secondary function.

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  Draft
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  Client Endorsed
  Not Applicable





Ship Spec Rationale Editor (v2.7) - DOORS



This utility is used to edit the Part 3 Requirements and link to the Part 2 requirements of the FSM Ship Specification.

Part 2 Requirement

ID	Requirement	Remarks
2SSR-2	The vehicle shall have a maximum ahead speed of 30 knots when fully <i>submerged</i> .	Higher speed obtained by a Y shaped hull.
Type		
Requirement		
	Measure of Performance	Overall Rationale
	<b>Maximum speed:</b> 30 knots	Propulsion is provided by a Pressurised Water Reactor(PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.
<input type="button" value="Edit Rationale"/>		

Part 3 Primary Requirements - ordered

Linked ID	Requirement
3SSR-8 3SSR-2 3SSR-11 3SSR-3 3SSR-12 3SSR-13	The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.
	Measure of Performance
	<b>Maximum Acceptable Torque Loss:</b> 1 N m

Part 3 Secondary Requirements

Linked ID	Requirement
3SSR-9 3SSR-7	
	Measure of Performance

Primary Link Rationale

Part 2 Maturity

Linking Issues

Not sure if engine oil maintenance should be a primary or secondary function.

Maturity Status:

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  Draft
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Part 2 Requirement

ID	Requirement	Remarks
2SSR-2	The vehicle shall have a maximum ahead speed of 30 knots when fully <i>submerged</i> .	Higher speed obtained by a Y shaped hull.
Type		
Requirement		
	Measure of Performance	Overall Rationale
	<b>Maximum speed:</b> 30 knots	Propulsion is provided by a Pressurised Water Reactor(PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.

Edit Rationale

Part 3 Primary Requirements - ordered

Linked ID	Requirement
3SSR-8	The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss of torque.
3SSR-2	
3SSR-11	
3SSR-3	
3SSR-12	
3SSR-13	
	Measure of Performance
	<b>Maximum Acceptable Torque Loss:</b> 1 N m

Part 3 Secondary Requirements

Linked ID	Requirement
3SSR-9	
3SSR-7	
	Measure of Performance

Primary Link Rationale

Design may be a fixed rotating shaft or hydraulic transfer system.

Part 2 Maturity

Linking Issues

Not sure if engine oil maintenance should be a primary or secondary function.

Maturity Status:

Not Started
  Draft
  SE Agreed
  DM Approved
  Client Endorsed
  Not Applicable



Ship Spec Rationale Editor (v2.7) - DOORS
✕

This utility is used to edit the Part 3 Requirements and link to the Part 2 requirements of the FSM Ship Specification.

**Part 2 Requirement**

ID: 2SSR-2

Type: Requirement

**Part 3 Primary Requirement**

Linked ID:

- 3SSR-8
- 3SSR-2
- 3SSR-11
- 3SSR-3
- 3SSR-12
- 3SSR-13

Requirement	Remarks
<p><b>Ship Spec Rationale Editor - Part 3 Tree View - DOORS</b></p> <p>Adding Primary links from the Ship Spec part 3 to the part 2.</p> <p><b>Part 3 Requirements</b></p> <ul style="list-style-type: none"> <li>1 Transmit Propulsion Energy               <ul style="list-style-type: none"> <li>The shaft shall transmit full rotational energy from one end of the shaft to the other with no loss.</li> <li>The shaft bearings shall be lubricated by oil.</li> </ul> </li> <li>2 Gearbox System               <ul style="list-style-type: none"> <li>The gearbox system shall provide a sliding-mesh conversion of input speed to output speed.</li> <li>The gearbox system shall include safety interlocks such that motion in the reverse direction is prevented.</li> </ul> </li> <li>3 Nuclear Power System               <ul style="list-style-type: none"> <li>The Pressurised Water Reactor (PWR) shall not require any maintenance between refuelling.</li> <li>The Pressurised Water Reactor shall generate steam for the following systems: Propulsion and Heating.</li> </ul> </li> <li>4 Propellor               <ul style="list-style-type: none"> <li>The Propellor system shall provide ahead motion.</li> <li><b>The Propellor system shall be thrust vectored.</b></li> <li>The Propellor system shall provide astern motion.</li> </ul> </li> </ul>	<p>ID: 3SSR-4</p> <p>Requirement: The Propellor system shall be thrust vectored.</p> <p>Measure of Performance: <b>Maximum Thrust Angle:</b> 45 degrees to hull centre line</p> <p>Rationale:</p> <p>Add as a Link <span style="float: right;">Clear</span></p> <p>Selected Links: 3SSR-11 selected for linking</p> <p style="text-align: right;">Save <span style="margin-left: 20px;">Cancel</span></p>

**Part 2 Maturity**

Linking Issues: Not sure if engine oil maintenance should be a primary or secondary function.

Maturity Status:  Not Started  Draft  SE Agreed  DM Approved  Client Endorsed  Not Applicable

Update Draft

Previous Next Bookmark Go To

Viewer Save Close



# Summary of Editor Features

- Presents more data than standard view **Problem 1 Solved**
- Can order the links **Problem 2 Solved**
- Primary and Secondary links **Problem 3 Solved**
- Other:
  - Works in any edit mode
  - Only permits editing on what should be edited
  - Enforces data model



**Ship Spec Rationale Editor (v2.7) - DOORS**

**BAE SYSTEMS**

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This utility is used to edit the Part 3 Requirements and link to the Part 2 requirements of the FSM Ship Specification.

**Part 2 Requirement**

ID: 2SSR-2  
 Requirement: The vehicle shall have a maximum ahead speed of 30 knots when fully *submerged*.  
 Remarks: Higher speed obtained by a Y shaped hull.

Type: Requirement

Measure of Performance: **Maximum speed:** 30 knots  
 Overall Rationale: Propulsion is provided by a Pressurised Water Reactor (PWR) generating 45 MW of steam, geared turbine, shaft and seven bladed screw.

Edit Rationale

**Part 3 Primary Requirements - ordered**

Linked ID: 3SSR-8, 3SSR-2, 3SSR-11, 3SSR-3, 3SSR-12, 3SSR-13

Requirement: The gearbox system shall provide a *sliding-mesh* conversion of input speed to output speed.  
 Measure of Performance: **Minimum Input Speed:** 600 revolutions per minute, **Maximum Input Speed:** 700 revolutions per minute

Buttons: Add New Link, Remove Link, Primary to Secondary, Edit

Primary Link Rationale

Buttons: Revert, Clear

**Part 3 Secondary Requirements**

Linked ID: 3SSR-9, 3SSR-7

Requirement  
 Measure of Performance

Buttons: Add New Link, Remove Link, Secondary to Primary, Edit

**Part 2 Maturity**

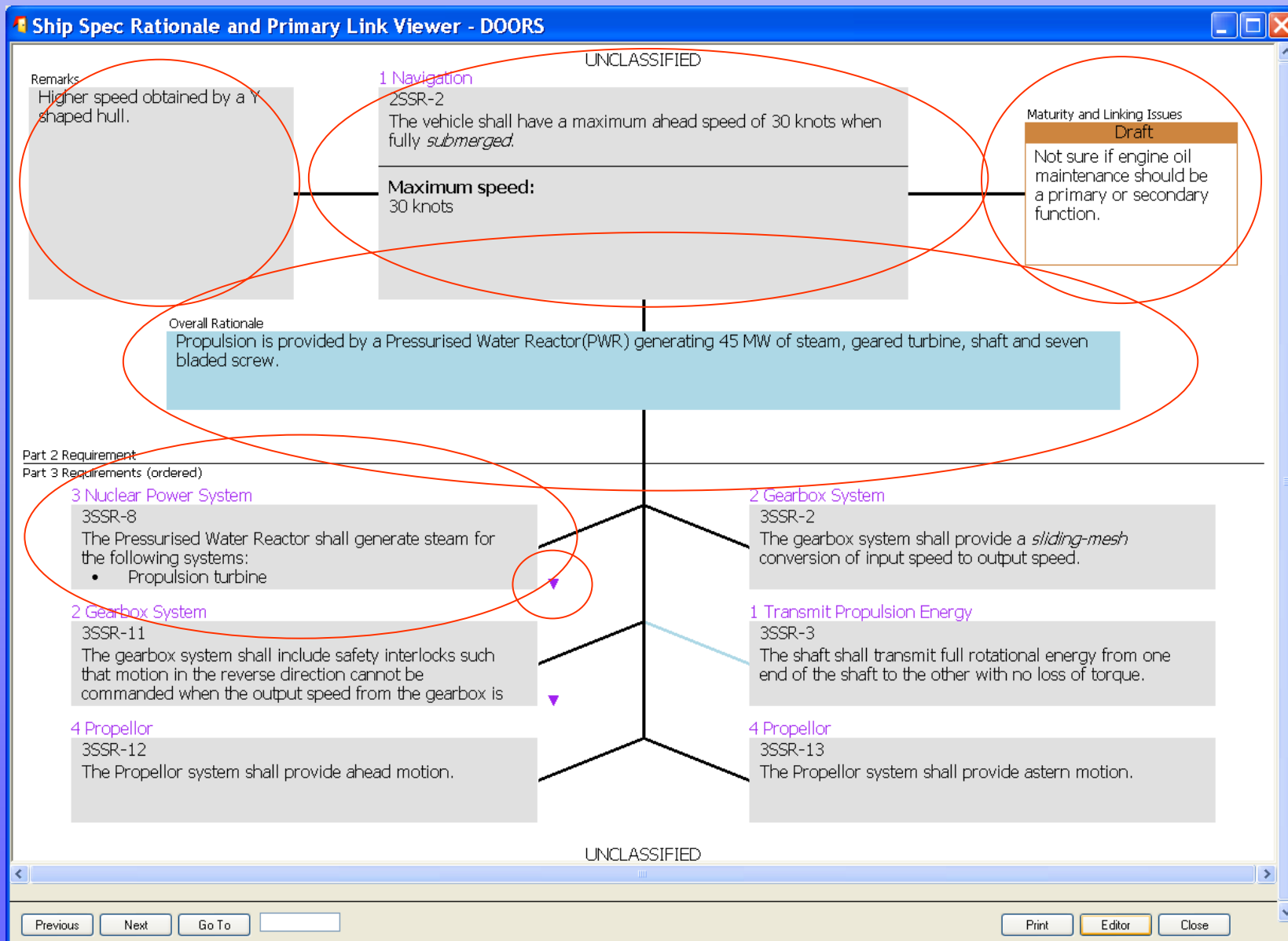
Linking Issues: Not sure if engine oil maintenance should be a primary or secondary function.

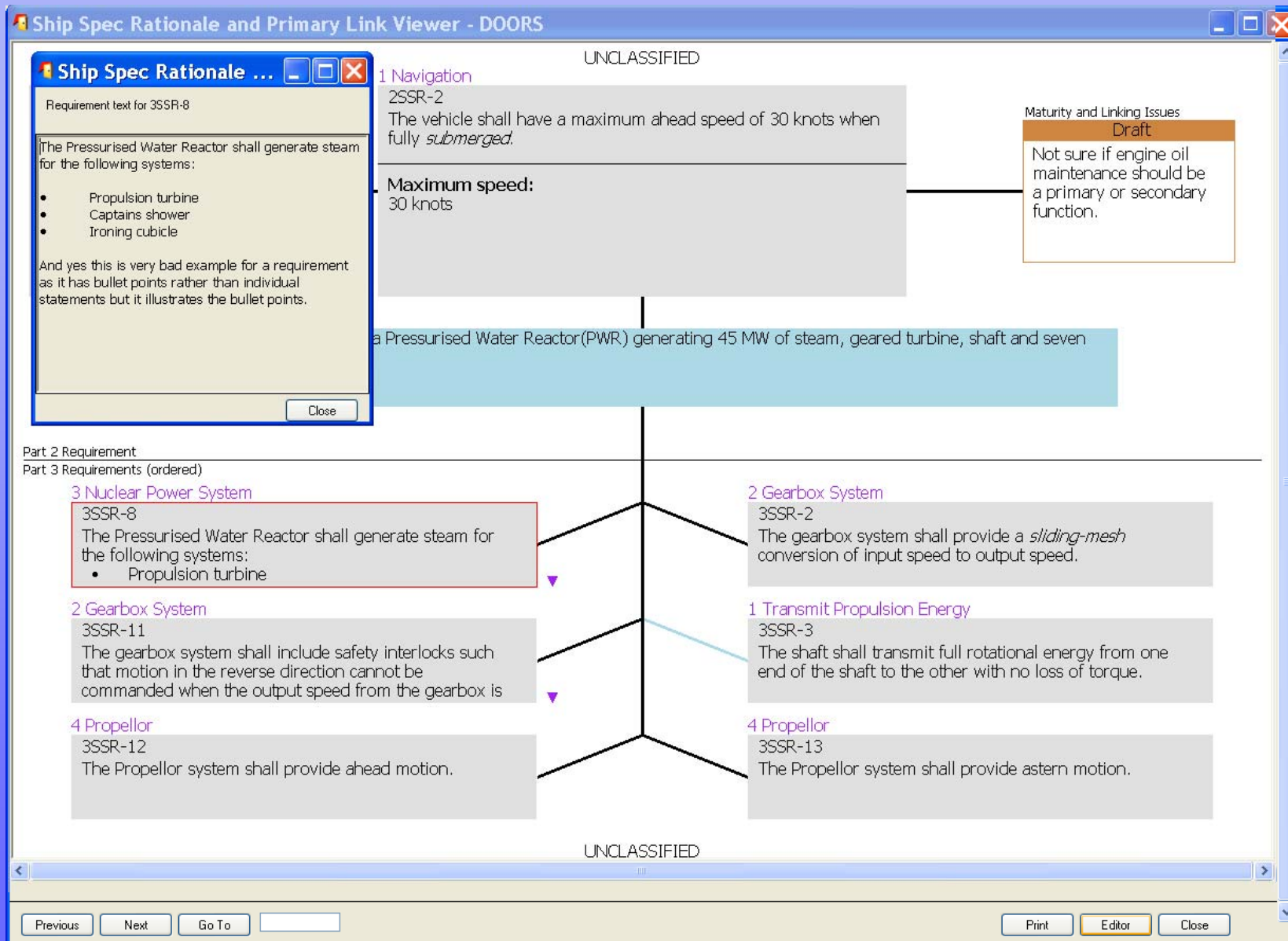
Maturity Status:  Not Started  Draft  SE Agreed  DM Approved  Client Endorsed  Not Applicable

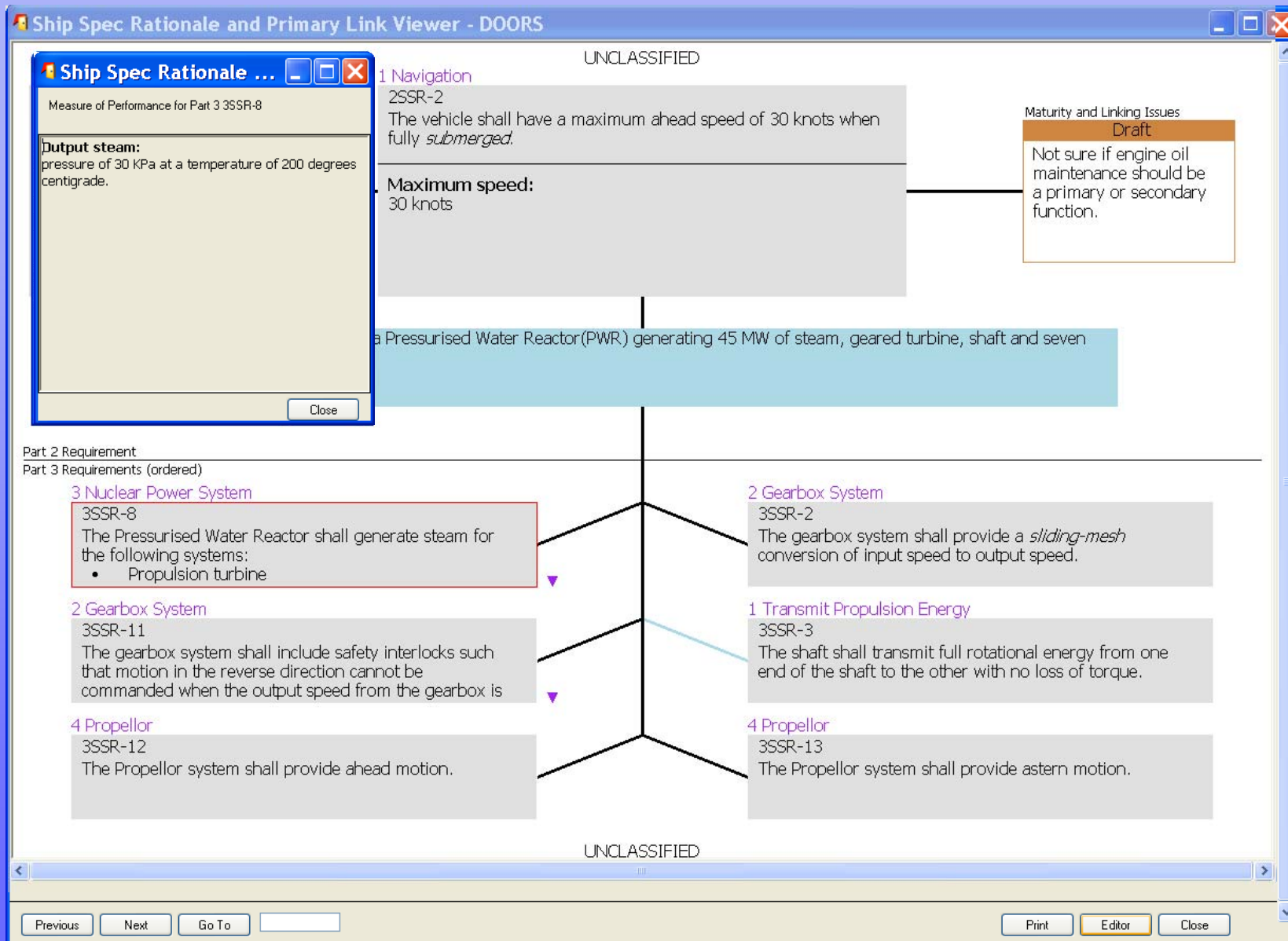
Buttons: Update, Draft

Navigation: Previous, Next, Bookmark, Go To, [input type="text"]

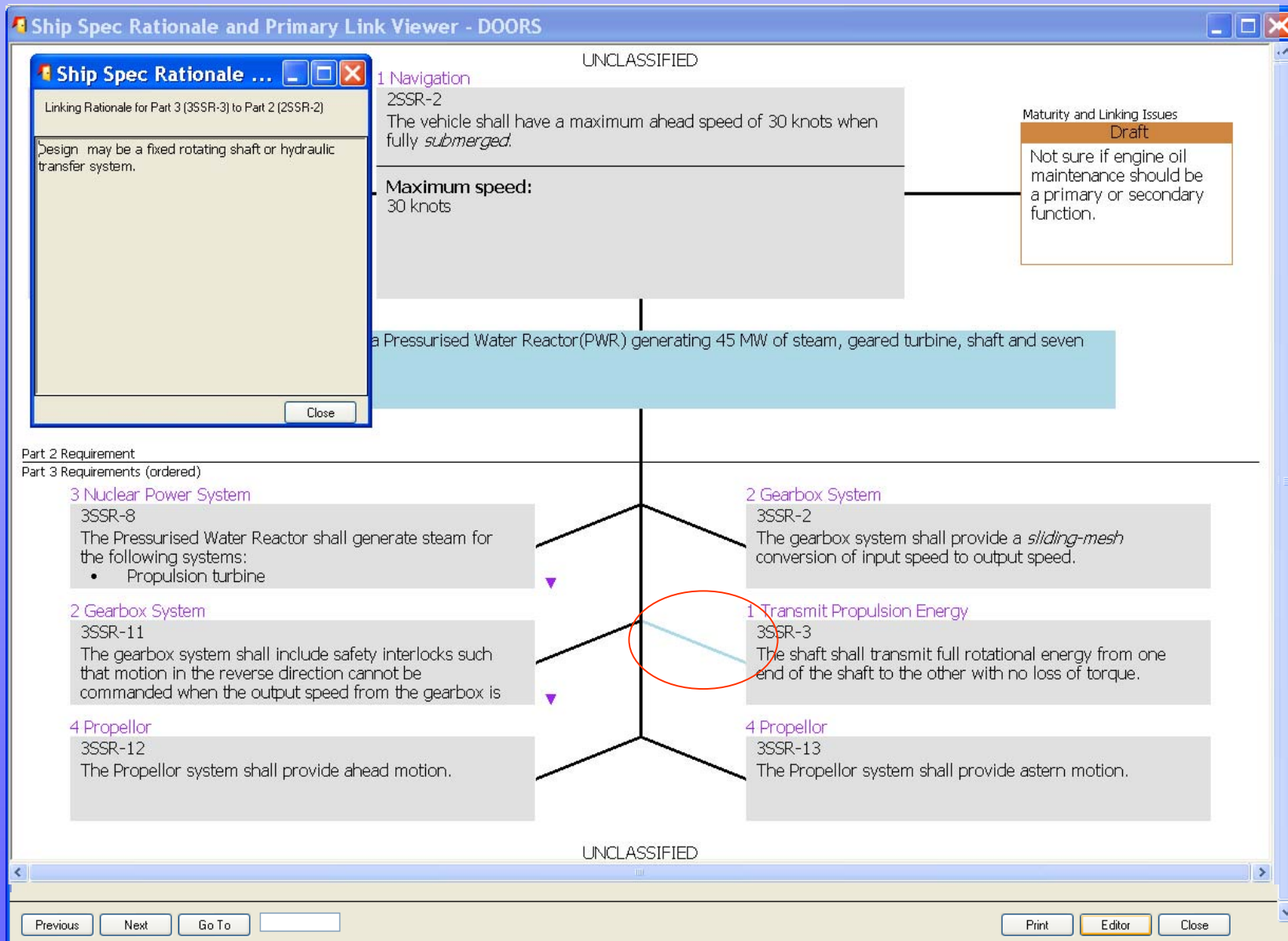
Buttons: Viewer, Save, Close













# Summary of Viewer Features

- Presents more targeted data than editor
- Only Primary links
- Will handle bullet points, bold, italic and strikethru
- Other:
  - No edit functionality
  - Automatic synchronisation with editor
  - Print function
  - Scroll bars
  - Great for reviews



# All Requirements are Equal

- You can prioritise contributing requirements
- You can order contributing requirements
- You can show relationships that involve more context than the existing DOORS basic functionality



... so some can  
be more equal  
than others