

# **Unleash the Power of Telelogic® Focal Point™ with Expressions and Business Rules**

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## Table of Contents

<b>Introduction</b> .....	<b>3</b>
<b>What are Expressions and Business Rules?</b> .....	<b>3</b>
<b>Examples of Expressions</b> .....	<b>4</b>
<b>Examples of Business Rules</b> .....	<b>4</b>
<b>How It Works</b> .....	<b>4</b>
<b>Basic Concepts: Example</b> .....	<b>5</b>
<b>Business Rules</b> .....	<b>6</b>
ChoiceAttributeText.....	6
LinkByText.....	9
LinkInfo.....	13
LinkListAttributeSum .....	16
MailImport.....	19
MatrixWriter .....	22
SetChoice.....	27
TextLog .....	35
TrafficLight.....	37
How to Find the Id Number .....	42
<b>More information</b> .....	<b>43</b>
Contacting IBM Rational Software Support .....	43
Trademarks .....	43

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## Introduction

*One of the most powerful features of Focal Point is the ability to use business rules that improve, automate and support the way you work. Business rules can provide a workflow, give users timely feedback, monitor changes, perform calculations and even improve the decision-making process. By using business rules that are readily available in your Focal Point application, the user experience is taken into a new dimension and the value to the organization is increased tremendously.*

Let's say a project portfolio manager wants to have instant and continuous overview of how all the projects in the portfolio are doing in terms of spent resources versus planned. Each project has its own workspace in Focal Point, but to present the full picture the figures from each project need to be aggregated to a portfolio workspace. No problem. Focal Point comes with a set of extremely powerful business rules designed to handle this and many other situations.

## What are Expressions and Business Rules?

From a usage point of view, expressions and business rules add business intelligence to your data. From a technical point of view, they replace static data attributes with dynamic expressions, in order to perform calculations or otherwise manipulate the value of attributes. One of the simplest examples is to enter a “=PI” instead of “3.1415”. This simple type is referred to as an **expression**.

At the advanced end of the spectrum, an expression can notify selected users when a status is changed, import e-mail to elements (e.g. requirements or support issues from stakeholders) or autcreate new elements when a choice attribute is changed. These advanced expressions are called **business rules**.

Expressions are typically mathematical calculations, summarizing attributes in a module, replacing a static value with a dynamic value in an attribute.

Business rules typically take several parameters, and perform more intricate operations. As mentioned business rules may also provide side effects, apart from returning a simple value, such as sending an e-mail notification.

Business rules are included in the standard Focal Point installation, ready to use.

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## Examples of Expressions

Here are some examples of what expressions can do. In Text attributes they can:

- add strings to each other or pick out parts of strings
- concatenate the title attribute and start and end dates.

In Float/Integer attributes they can:

- multiply the values of two attributes
- do mathematical calculations, such as `sqrt()`, `sin()`, and `exp()`.

In Date attributes they can:

- add 123 days to the reference date
- calculate an approximate end date for a project given start date and resource availability.

## Examples of Business Rules

Here are some more examples of what business rules can do for you. They can:

- aggregate the estimates for all requirements linked to a release, to the release object itself
- calculate the net present value for a specific project and the portfolio as a whole
- enable companies to e-mail requirement proposals directly into Focal Point without having to log in.

## How It Works

Expressions and business rules can “listen” to the changes of specific attributes. If there is an attribute called “Total cost”, which should provide the sum of “Hardware cost” and “Software cost”, the expression in the “Total cost” attribute field would be:

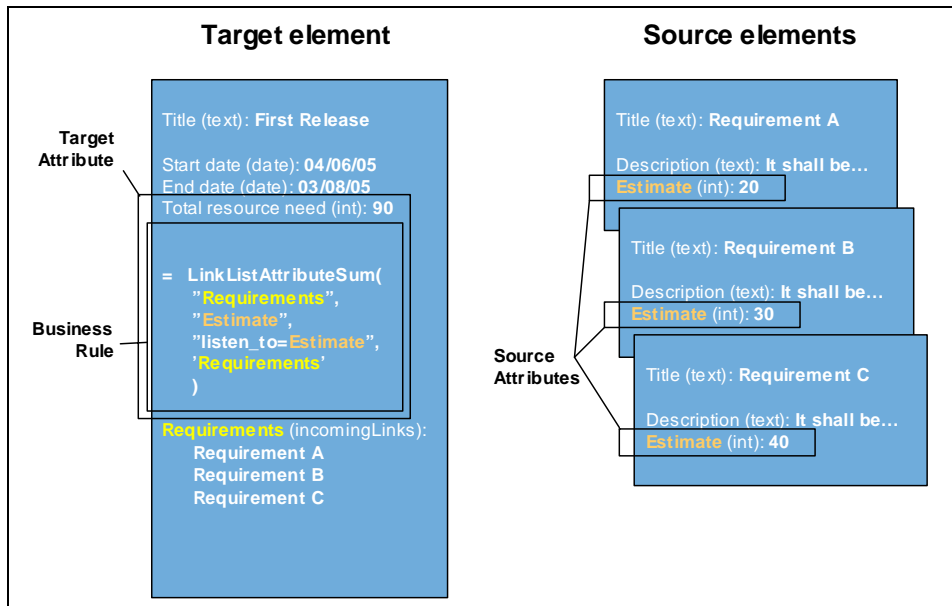
```
= 'Hardware cost' + 'Software cost'
```

In this case, the Hardware cost and Software cost attributes would be referred to as **source attributes**, whereas the Total cost attribute would be the **target attribute**. The target attribute “listens” to changes in the source attributes, and updates itself immediately upon a change. In the case of a business rule, the structure is similar, with source and target attributes and listeners.

All expressions and business rules are stored in attributes. However, in some cases it makes more sense to have the business rule in a dedicated attribute,

separate from the ordinary attributes. For example, a business rule that sends a notification or populates a matrix needs to reside in such a dedicated business rule **container** attribute. The container is simply a Text attribute containing the business rule.

## Basic Concepts: Example



The common business rule LinkListAttributeSum calculates the sum of an attribute for all elements listed in a Link, Link List or Incoming Links attribute. In the example above the target element has an attribute called Total resource need (target attribute) that will get updated whenever any of the source attributes in the linked source elements change. In this case the business rule is stored in the target attribute. The result of the calculation (90) will be visible when displaying the element.

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## Business Rules

Focal Point comes with a number of built-in Business Rules. They are presented in this chapter.

### ***ChoiceAttributeText***

The business rule `ChoiceAttributeText` writes text to a `Text` attribute depending on the value in a `Choice` attribute. It can for example be used for setting up workflow instructions; when a requirement status is `Accepted`, you will see a description of the steps you need to take to propagate the requirement further in the process. The instructions will be visible in the business rule container attribute (type `Text`).

The business rule `ChoiceAttributeText` must be specified in the `Description` attribute in the top folder of the module. By reusing an XML template (which is created with the `"write_defaults"` parameter, see below), defining the business rule is easier.

### **Prerequisites**

To use `ChoiceAttributeText` you need:

- A `Choice` attribute that triggers the business rule.
- A business rule container (`Text` attribute) where you enter the business rule.

### **Format**

In the business rule container attribute for one element, enter the business rule in the following format:

```
=ChoiceAttributeText('Choice Attribute  
Name', "write_defaults")
```

When you click OK and save this change, the default XML template is shown in the `Description` attribute in the top folder. In the business rule container attribute in `Configure/Modules/Requirements`, enter the business rule in the following format:

```
=ChoiceAttributeText('Choice Attribute Name')
```

This has to be copied to all elements by clicking the `Copy Default Value to All Elements` button.

---

## Parameters

Parameter	Explanation
'Choice Attribute Name'	The choice attribute on which the notifier should be triggered.
"write_defaults"	Write the default XML template in the top folder. This parameter is only used once.

## Example

Assume that you want to introduce a workflow for requirements. For example, when status is New, the workflow instructions should say:

"If the requirement has proven to be a valid request, status should be changed to Accepted. If the requirement is not valid, change status to either Rejected or Clarify."

When status is changed to Accepted, the workflow instructions should say:

"The requirements with the highest priority should be planned to a release and be estimated with regards to cost. Change status for these requirements to Planned".

1. In the business rule container attribute for one element, enter:

```
=ChoiceAttributeText('Status', "write_defaults")
```

The business rule container attribute should be a Text attribute and you can for example call it Workflow.

Click OK to get the default XML template in the Description attribute in the top folder. The template XML code is then placed in the Description attribute.

2. Click Configure > Attributes > Requirements.

Open the configuration page for the business rule container attribute (i.e. the Text attribute called Workflow).

Enter a new default value:

---

```
=ChoiceAttributeText('Status')
```

and click the Copy Default Value to All Elements button to update all elements.

3. Click Modules > Requirements and mark the top folder.

The Description attribute for the top folder contains the XML template code. Click the edit button for the Description attribute to be able to write your workflow instructions. It could look something like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<texts>
<item id="47" text="If the requirement has proven to
be a valid request, status should be changed to
Accepted. If the requirement is not valid, change
status to either Rejected or Clarify."/>
<item id="48" text="The requirements with the
highest priority should be planned to a release and
be estimated with regards to cost. Change status for
these requirements to Planned and select a user as
responsible for the requirement."/>
<item id="49" text="This requirement is ready for
implementation. When implementation is started,
change status to Started."/>
<item id="50" text="This requirement is being
implemented. When done, change status to
Completed."/>
<item id="51" text="This requirement is completed
and is ready for test. If the requirements passes
the test, change status to Verified."/>
<item id="52" text="This requirement is ready for
delivery."/>
<item id="53" text="This requirement is rejected.
Enter a reason for the rejection in the Comments
attribute."/>
<item id="54" text="This requirement needs to be
clarified."/>
</texts>
```

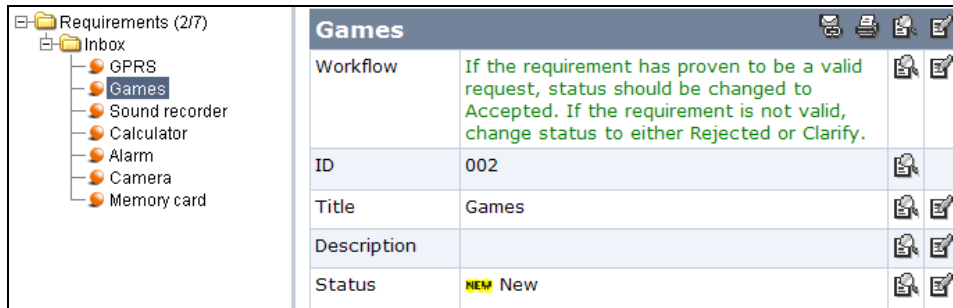
The workflow instructions should be written in the text parameter. The item ids in the XML code are the database ids for the choice items. In this example, 47 corresponds to status New, 48 to status Accepted etc.

Click OK to save the workflow instructions.



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In this example for a New requirement the Workflow instruction should look like below:



**Note:** Please note that Status must be updated in order for the workflow instructions to appear in the business rule container attribute.

## **LinkByText**

The business rule LinkByText sets a Link attribute in the element after a match has been found in an attribute in another module (this module is called configuration module). That is, you do not have to set the link attribute if it is possible to derive that information from another text attribute. The match is made via regular expressions (for more information about regular expressions, we recommend that you search for it on the Internet).

## **Prerequisites**

To use LinkByText you need:

- A configuration module. The elements in the configuration module must have:
  - A Text attribute to hold the regular expression ("Regular Expression Attribute").
  - A Link attribute to be copied when a match occurs ("Link Attribute"). Make sure that the target type matches the links you want to set.
- A business rule container attribute (Text).

## **Format**

In the business rule container attribute, enter the business rule in the following format:

---

```
=LinkByText('Source Attribute',"Target Link Attribute ID","Configuration Module ID","Regular Expression Attribute ID","Link Attribute ID")
```

## Parameters

Parameter	Explanation
'Source Attribute'	The Text Attribute which is the text we will try to match.
"Target Link Attribute ID"	The Link or List/Link Attribute ID to match the Link attribute we will set if a match is found.
"Configuration Module ID"	The ID of the configuration module.
"Regular Expression Attribute ID"	The ID of the Text Attribute in the configuration module that holds the regular expression used for matching
"Link Attribute ID"	The ID of the Link Attribute in the configuration module that will be copied to the Target Link Attribute if a match is found.

## Example

Assume that you have a Support Issues module in which you have a Text attribute. This Text attribute is called "Mail sent from" and it is used for entering who has sent the support issue to you. If the Text attribute 'Mail sent from' contains a pattern that can be recognized, you can have the Customer Link attribute set automatically by using LinkByText.

For example, an element is added in the configuration module to match all `.*@examplecompany.*` to the customer "Example Company Inc.". So when `janedoe@examplecompany.com` is set in the 'Mail sent from' attribute, the Customer link is automatically set to "Example Company Inc".

To get this example to work you need to do the following:

1. Create a configuration module (Configure > Modules > Add Module).

Enter information about the new Module, then click OK	
Name	LinkByText Module
Add Button Name	LinkByText Element
Description	This is the configuration module for the business rule LinkByText
Position in Module List	Last
Prefix Attribute	ID
Icon Attribute	-
Sort Attribute	-

2. Apart from the Element Information attributes (e.g. Owner, Creator etc), the module now contains attributes: ID, Title, and Description. You need to add a Link attribute, which you can call Customer and which links to the Customers module.

LinkByText Module: Click on the attribute you want to configure, or click Add Attribute to add a new attribute						
Name	Description	Type	Log Changes	Mandatory		
ID	Unique ID	Unique Id	Yes			
Title	A short and concise explanation of the element.	Text	Yes			
Description	A thorough explanation of the element.	Text	Yes			
Customer	This attribute links to the Customers module	Link	Yes			
Element Information		Heading				
Owner	The user who owns the element.	Element Information				
Creator	The user who created the element.	Element Information				
Created Date	The date the element was created on.	Element Information				
Last Changed By	The user who last changed the element.	Element Information				
Last Changed Date	The date the element was last changed on.	Element Information				
Parent Folder	The parent folder of the element.	Element Information				

3. In the configuration module LinkByText Module, you now need to add an element, which has the Title Example Company Inc., the regular expression `.*@examplecompany\.com` in the Description attribute, and a link to Example Company Inc. in the Customer attribute. The Id of the Description attribute (i.e. the Regular Expression Attribute Id) is 651 and the ID of the Customer attribute (i.e. the Link Attribute Id) is 661.

If you do not know how to get hold of id numbers, please refer to chapter How to Find the Id Number below.

<div style="border: 1px solid black; padding: 2px;"> <span>LinkByText Module (1/1)</span> <ul style="list-style-type: none"> <li><span>001.Example Company Inc</span></li> </ul> </div>	<table border="1"> <thead> <tr> <th colspan="2">Example Company Inc</th> </tr> </thead> <tbody> <tr> <td>ID</td> <td>001</td> </tr> <tr> <td>Title</td> <td>Example Company Inc</td> </tr> <tr> <td>Description</td> <td>.*@examplecompany\.com</td> </tr> </tbody> </table>	Example Company Inc		ID	001	Title	Example Company Inc	Description	.*@examplecompany\.com
Example Company Inc									
ID	001								
Title	Example Company Inc								
Description	.*@examplecompany\.com								

The next step is to enter the business rule in the business rule container attribute. The container attribute has to be placed in the target module, in this case the Support Issues module. The ID of the target link attribute (i.e. the Customer attribute in the Support Issues module) is 676 and the ID of the configuration module (i.e. the LinkByText module) is 30.

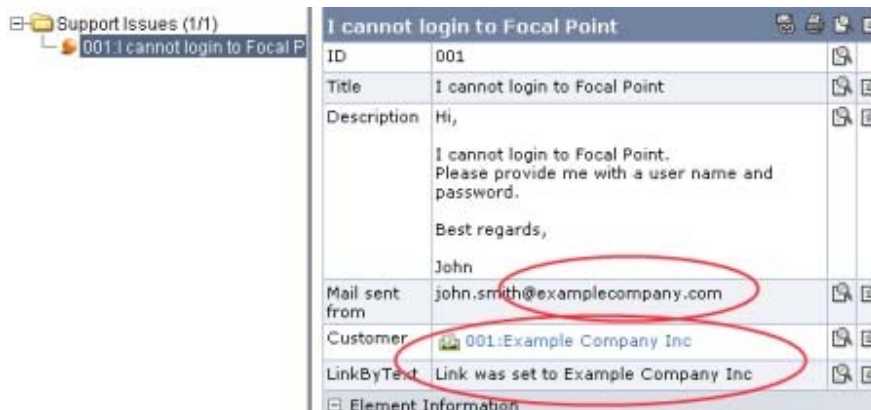
=LinkByText('Mail sent from',"676","30","651","661")

Support Issues: LinkByText (Text)	
General Settings	
Name	LinkByText
Description	This is the business rule container attribute for LinkByText
Position Before	Element Information
Value Settings	
Default Value	=LinkByText('Mail sent from',"676","30","651","661")

The attributes in the Support Issues module are now:

Support Issues: Click on the attribute you want to configure, or click Add Attribute to add a new attribute						
Name	Description	Type	Log Changes	Mandatory		
ID	Unique ID	Unique Id	Yes			
Title	A short and concise explanation of the element.	Text	Yes			
Description	A thorough explanation of the element.	Text	Yes			
Mail sent from		Text	Yes			
Customer		Link	Yes			
LinkByText	This is the business rule container attribute for LinkByText	Text	Yes			

When a new element is created and 'Mail sent from' is set to a mail address that matches any Example Company address, the link will automatically be set to "Example Company Inc" by this business rule. To make other matches you only need to create a new element in the configuration module and create a regular expression of your liking and supply a link to be set if a match is made.



### Known Limitations

If you have configured the Link, Incoming Link, or Link List attribute to only display links to/from a specific view, this will not be considered by the LinkByText business rule.

Use single row and no formatting for the text attribute containing the regular expression. Also, LinkByText is now case-sensitive. To get `.*company.*` to match company and Company, change it to `.*[cC]ompany.*`

### LinkInfo

The business rule LinkInfo displays a selectable number of attributes from other modules (or workspaces) in the elements according to links. For example, if you have an incoming links attribute in one module (e.g. Products) with links from

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another module (e.g Releases), you can display attribute values from these modules and workspaces in your Products module.

## Prerequisites

To use the business rule LinkInfo you need:

- A Link, Link List, or Incoming Lists attribute in the target module.
- A business rule container attribute (Text) in the target module.

## Format

In the business rule container attribute, enter the business rule in the following format:

```
=LinkInfo("Link Attribute Name","Attribute Name1,Attribute Name1,Attribute Name3","Member ID",'Link Attribute Name')
```

**Option:** If you want to display the LinkInfo data in a matrix instead, insert a comma character in front of the first attribute name in the second parameter:

```
=LinkInfo("Link Attribute Name",",Attribute Name1,Attribute Name2,Attribute Name3","Member ID",'Link Attribute Name')
```

## Parameters

Parameter	Explanation
"Link Attribute Name"	The attribute that contains links to/from other elements.
"Attribute Name"	The attribute(s) to look for in the listed elements. You can add as many Attribute Names as you like, just use commas as separators.
"Member ID"	The attributes that are displayed via the LinkInfo business rule must be collected from a member's preferences (e.g. which links, which number and date formats etc). This parameter is the ID number of a selected member for this purpose. Please note that the member ID must be for a member in the workspace where you activate the LinkInfo expression.

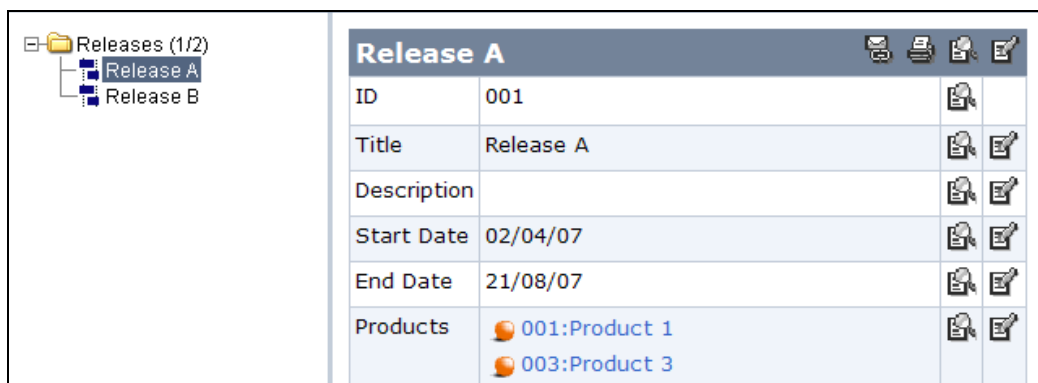
---

**Note:** The parameter "listen\_to=Attribute Name" is not necessary anymore and has been removed.

### Example

Assume that you have a Products module with information about the products you are working with. Also assume that you have related these products to certain releases (Releases module) and needs (Needs module) via links. Now, for each product you want to display values from attributes that belong to the Releases and Needs modules, e.g. Title, Start Date, and End Date from Releases and Title and Document from Needs.

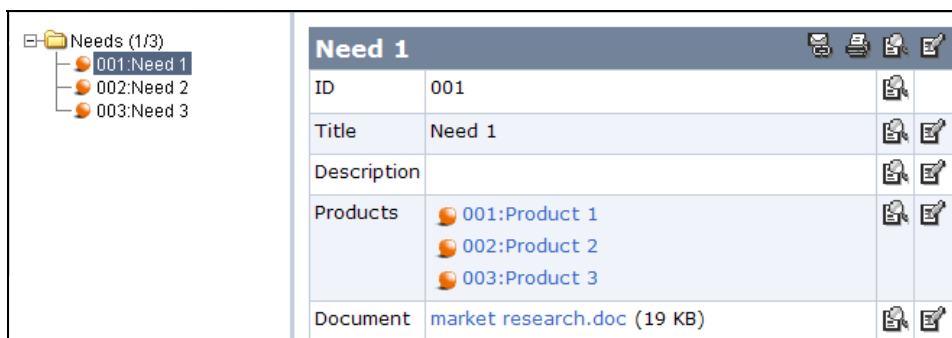
This is what it looks like in the Releases module:



The screenshot shows a software interface for the 'Releases' module. On the left, a tree view displays a folder 'Releases (1/2)' containing 'Release A' and 'Release B'. The main area shows a detailed view for 'Release A'. The table below represents the data shown in this view.

Release A	
ID	001
Title	Release A
Description	
Start Date	02/04/07
End Date	21/08/07
Products	001:Product 1 003:Product 3

This is what it looks like in the Needs module:



The screenshot shows a software interface for the 'Needs' module. On the left, a tree view displays a folder 'Needs (1/3)' containing '001:Need 1', '002:Need 2', and '003:Need 3'. The main area shows a detailed view for 'Need 1'. The table below represents the data shown in this view.

Need 1	
ID	001
Title	Need 1
Description	
Products	001:Product 1 002:Product 2 003:Product 3
Document	market research.doc (19 KB)

So, for each product we want to display Title, Start Date, and End Date from Releases and Title and Document from Needs. To set this up we need to do the following:

1. In the Products module, add a container attribute (Text). In this case, we call this attribute Related Information.

---

In the default value for the container attribute, add the following business rule:

```
=LinkInfo("Links","Title,Start Date,End Date,Document","425",'Links')
```

In the Products module, there is an Incoming Links attribute called Links that we use as the Link Attribute Name parameter. The attributes listed as Attribute Names are matched automatically with attributes that Focal Point can find in the linked modules and workspaces. This means that if you add "Title", you only need to do that once for all attributes in all modules with the attribute name Title.

The result is:

The screenshot shows a software interface with a tree view on the left and a main data pane on the right. The tree view shows a folder 'Products (1/4)' containing four items: '001:Product 1', '002:Product 2', '003:Product 3', and '004:Product 4'. The main pane displays the details for 'Product 1'. The 'Links' attribute is expanded, showing a list of links: 'Need 1' and 'Release A'. Below the 'Links' attribute, there is a 'Related Information' section with a sub-section titled 'Links' containing the following details: 'Need 1', 'Document market research.doc (19 KB)', 'Release A', 'Start Date 02/04/07', and 'End Date 21/08/07'.

Product 1	
ID	001
Title	Product 1
Description	
Links	<ul style="list-style-type: none"><li>Need 1</li><li>Release A</li></ul>
Related Information	<b>Links</b> <ul style="list-style-type: none"><li>Need 1</li><li>Document market research.doc (19 KB)</li><li>Release A</li><li>Start Date 02/04/07</li><li>End Date 21/08/07</li></ul>

### Known Limitations

- The LinkInfo business rule cannot be used in the Prefix attribute.

### ***LinkListAttributeSum***

The business rule LinkListAttributeSum calculates the sum of a Float or Integer attribute for all elements that are listed in a Link, Link List, or Incoming Links attribute. The result is displayed in the business rule container attribute. When changes are made, the sum is automatically recalculated. This business rule is very powerful in all situations when you want to aggregate e.g. estimates or cost figures from requirements in a release or projects in a portfolio.

### Prerequisites

To use the business rule LinkListAttributeSum you need:

- A Link, Link List, or Incoming Links attribute in the target module that lists the elements from which values are gathered.



- A Float or Integer attribute in the source module that contains the value that should be calculated.
- A business rule container attribute (Text, Float, or Integer) in the target module in which the sum is displayed.

## Format

In the business rule container attribute, enter the business rule in the following format:

```
=LinkListAttributeSum("Link Attribute Name","Source Attribute Name","listen_to=Source Attribute Name", 'Link Attribute Name')
```

## Parameters

Parameter	Explanation
"Link Attribute Name"	The attribute that contains links to other elements.
"Source Attribute Name"	The attribute to look for in the listed elements.
"listen_to=Source Attribute Name"	Listen to changes in this attribute.
'Link Attribute Name'	The attribute that contains links to other elements.

## Example

Assume that you have a Requirements module and a Releases module. There is a link from Requirements to Releases and the Releases module has an Incoming Links attribute that lists all the requirements that are connected to each release. In the Requirements module there is also an Implementation Cost attribute. The business rule LinkListAttributeSum can be used for calculating the total implementation cost for each release by summing up the implementation cost of the requirements.

1. This is how it can look like in the Requirements module (the source module). There is a Link attribute, Release, and a Float attribute, Implementation Cost.



In the Releases module, you now want to sum up the implementation cost in the Float attribute "Total Implementation Cost". This attribute is the same as the business rule container attribute, so in the default value for this attribute you need to enter the following:

```
=LinkListAttributeSum("Related requirements",  
"Implementation Cost", "listen_to=Implementation  
Cost",'Related requirements')
```

Releases: Total Implementation Cost (Text)	
General Settings	
Name	Total Implementation Cost
Description	This attribute contains the business rule LinkListAttributeSum and is used for calculating the total implementation cost for all requirements connected to a release.
Position Before	Requirement Information
Value Settings	
Default Value	<pre>=LinkListAttributeSum("Related requirements","Impleme</pre> <p>You may use the + operator.</p> <p><a href="#">Evaluate Expression</a></p> <p>The top folder's attribute values will be used when the expression is evaluated.</p> <p><a href="#">List available Business Rules</a> <a href="#">List available Attributes</a></p>

2. The business rule calculates the sum of the Implementation Cost in all the requirements. For the February 2006 release, the total implementation cost is 209.7.

Release A			
ID	001		
Title	Release A		
Description			
Start Date	02/04/07		
End Date	21/08/07		
Related requirements	<ul style="list-style-type: none"> <li>001:GPRS</li> <li>002:Games</li> <li>003:Sound recorder</li> <li>006:Camera</li> </ul>		
Total Implementation Cost	530		

## Known Limitations

If you have configured the Link, Incoming Link, or Link List attribute to only display links to/from a specific view, this will not be considered by the LinkListAttributeSum business rule.

## MailImport

The business rule MailImport is used to import e-mails from a POP account and place them as elements in a module. One element for each incoming e-mail is created in a subfolder. A typical usage situation is to allow stakeholders to issue requirements or support issues via e-mail.

## Prerequisites

To use this business rule you need the following:

- The module in which to import the e-mails must have attributes in which to store subject, contents, and mail sender. The mail subject will always be stored in the Title attribute and the mail content will always be stored in the Description attribute. These attributes are always included in all modules and the match to these attributes will be made automatically. The name of these two attributes (Title and Description) does not matter for the expression, so if you have changed these names previously, you may keep your changes. However, you must add an attribute in which to store mail sender. You can use a Text attribute for this purpose.
- A Text attribute in which to store mail sender.
- A Text or Integer attribute in which to store mail ID.
- A File attribute in which to store attachments.
- The business rule must be stored in a folder element instead of in a business rule container attribute.

- 
- There must be an email account available on a POP server that is available from the Focal Point server.

## Format

In the business rule container folder (any folder in the module), enter the business rule in the following format:

```
=MailImport("pop3://user name:password@POP3 Server  
Address/INBOX","Delete from Server","Mail Sender  
Attribute","Mail-ID Attribute","File Attribute",  
"update_interval=1m")
```

## Parameters

Parameter	Explanation
"pop3://user name:password@POP3 Server Address/INBOX"	URL to mail server (including user name and password).
"Delete from Server"	If this parameter is set to "true" it means delete e-mail from server after fetching. If you do not want to delete the e-mails from the server after fetching, enter "false" instead.
"Mail Sender Attribute "	Name of attribute to store mail sender to. You can use a Text attribute.
"Mail-ID Attribute"	Name of attribute to store mail ID to. You can use a Text or Integer attribute.
"File Attribute"	Name of attribute to store attachment(s) to. Use a File attribute.
"update_interval=1m"	This parameter makes the business rule update (fetch new mail) every minute.

"run\_at=8,7,3"

With this parameter you can determine when to update the business rule more specifically. You cannot use both "update\_interval=" and "run\_at=" at the same time, you must select one of them. In this case, the business rule will be run at around 8.00 am, once a week, and start running in three days. So the numbers in the parameter represent start\_at, days\_between\_runs, and days\_before\_first\_run.

## Example

Assume you want to import support issue e-mails to a Support Issues module, the INBOX folder.

1. Make sure that you have necessary attributes; a mail sender attribute (Text), a mail-ID attribute (Text or Integer), and file attribute (File) in the Support Issues module. In the screenshot below these attributes are called Mail sent from, Mail-ID, and Attachments:

Support Issues: Click on the attribute you want to configure, or click Add Attribute to add a new attribute						
Name	Description	Type	Log Changes	Mandatory		
ID	Unique ID	Unique Id	Yes			
Title	A short and concise explanation of the element.	Text	Yes			
Description	A thorough explanation of the element.	Text	Yes			
Mail sent from	An attribute to store a sender's email.	Text	Yes			
Mail-ID	An attribute to store a mail ID.	Text	Yes			
Attachments	An attribute to store files attached to a mail.	File	Yes			

2. Enter the following business rule in the business rule container folder (You can use the Description attribute):

```
=MailImport("pop3://support_issues:mypassword@mail.d  
omain.com/INBOX", "true", "Mail sent from", "Mail-  
ID", "Attachments", "update_interval=1m")
```

3. You need to set the Owner attribute for the folder to make the business rule work as well. A tip is to have a user called MailImporter that is set as Owner

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of the folder.

4. Set up is finished. Whenever an e-mail is sent to the specified e-mail address (support\_issues@domain.com), an element will be created in the Support Issues module.

### **Known Limitations**

The business rule must be stored in a folder. POP account user name and password are stored unencrypted in the expression, so be cautious when granting configuration access to the module in which the business rule is activated.

## ***MatrixWriter***

The business rule MatrixWriter is useful if you for an element want to display attribute values in linked elements without having to click the elements' link. This works across modules and workspaces if the attributes in the linked elements have the same name and type. MatrixWriter creates rows in a Matrix attribute and populates the cells with values, based on linked elements. It creates one row for each linked element, and fetches values from each element to populate the matrix.

### **Prerequisites**

To be able to use the business rule MatrixWriter, you need:

- A Matrix attribute.
- A Link List or Incoming Links attribute.
- A Text attribute as a business rule container.

### **Format**

In the business rule container attribute (Text), enter the business rule in the following format (see Example 1):

```
=MatrixWriter("Link Attribute Name", "Matrix  
Attribute Name", "Column Number", "Include Workspace",  
"listen_to=Source Attribute Name", 'Link Attribute  
Name ')
```

---

In case you want to use the Matrix column headings for holding other values than the attribute names from the linked elements (e.g. expressions), you can add a parameter that holds the attribute names (See Example 2).

```
=MatrixWriter("Link Attribute Name", "Matrix  
Attribute Name", "Column Number", "Include  
Workspace", "Source Attribute Name", "listen_to=Source  
Attribute Name", 'Link Attribute Name')
```

## Parameters

Parameter	Explanation
"Link Attribute Name"	The name of the Link List /Incoming Links attribute.
"Matrix Attribute Name"	The name of the Matrix attribute (target attribute).
"Column Number"	The column the matrix should be sorted by, for example "1" to sort according to the first column and "title" to sort by row headers.  The column is sorted in ascending order. You can also reverse the sort order to descending by adding "r" in front of the column number, e.g. "r1".
"Include Workspace"	Set this parameter to "false" if you do not want to include the workspace name if the elements in the list are from other workspaces. Otherwise set this parameter to "true".
"listen_to=Source Attribute Name "	Listen to this attribute in linked elements. You need one listen_to parameter for each attribute you want to display in the matrix. You can have as many of this parameter as you would like to display. Just add "listen_to=Source Attribute" one after the other.
'Link Attribute Name'	The name of the Link List /Incoming Links attribute.

## Example 1

Assume you have a Releases module that is linked to a Requirements module. The Link attribute is called "Requirements". In the Releases module you want to display some of the attributes belonging to each Requirement - "Allocated to", "Status", and "Implementation Cost".

To set this up you need to do the following:

1. In the Releases module (target module), add a Matrix attribute, which you call "Requirement Information". Each column in the matrix must correspond to the attribute names. You do not need to add Title of the Requirement, since this information is automatically included.

Releases: Requirement Information (Matrix)																																	
General Settings																																	
Name	Requirement Information																																
Description	This matrix will show the requirement attributes "Allocated to", "Status", and "Implementation Cost" of Related requirements.																																
Position Before	Products																																
Value Settings																																	
Default Value	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td></td> <td>Allocated to</td> <td>Status</td> <td>Implementation Cost</td> </tr> <tr> <td>1</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td><input type="button" value="Add Row"/></td> <td colspan="2"><input type="button" value="Add Column"/></td> </tr> <tr> <td>Data range in rows from</td> <td colspan="3">1 <input type="text"/> to 1 <input type="text"/></td> </tr> <tr> <td>Data range in columns from</td> <td colspan="3">A <input type="text"/> to C <input type="text"/></td> </tr> </tbody> </table>		A	B	C		Allocated to	Status	Implementation Cost	1	<input type="text"/>	<input type="text"/>	<input type="text"/>										<input type="button" value="Add Row"/>	<input type="button" value="Add Column"/>		Data range in rows from	1 <input type="text"/> to 1 <input type="text"/>			Data range in columns from	A <input type="text"/> to C <input type="text"/>		
	A	B	C																														
	Allocated to	Status	Implementation Cost																														
1	<input type="text"/>	<input type="text"/>	<input type="text"/>																														
	<input type="button" value="Add Row"/>	<input type="button" value="Add Column"/>																															
Data range in rows from	1 <input type="text"/> to 1 <input type="text"/>																																
Data range in columns from	A <input type="text"/> to C <input type="text"/>																																

Now add the business rule container attribute (Text) in the Releases module (target module), and enter the following:

```
=MatrixWriter("Related requirements", "Requirement Information", "1", "false", "listen_to=Allocated to", "listen_to=Status", "listen_to=Implementation Cost", 'Related requirements')
```



Releases: MatrixWriter (Text)	
General Settings	
Name	MatrixWriter
Description	This is the business rule container attribute for MatrixWriter
Position Before	--- Last ---
Value Settings	
Default Value	<div style="border: 1px solid gray; padding: 2px;">           =MatrixWriter("Related requirements","Requirement Inf         </div> <p>You may use the + operator.</p> <div style="border: 1px solid gray; padding: 2px; text-align: center; margin: 5px 0;">             Evaluate Expression           </div> <p>The top folder's attribute values will be used when the expression is evaluated.</p> <p><a href="#">List available Business Rules</a>  <a href="#">List available Attributes</a></p>

The MatrixWriter now populates the matrix with values from the requirements. Every time someone changes Allocated to, Status, or Implementation Cost for a requirement, or adds/removes a requirement from the List attribute, the Matrix will be updated:

Release A				
ID	001			
Title	Release A			
Description				
Start Date	02/04/07			
End Date	21/08/07			
Related requirements	<ul style="list-style-type: none"> <li> Games</li> <li> GPRS</li> <li> Sound recorder</li> </ul>			
Total Implementation Cost	360			
Requirement Information	Allocated to	Status	Implementation Cost	
Games	Wanda	Commented	85	
GPRS	Wanda	New	125	
Sound recorder	Wanda	New	150	

## Example 2

Assume you have a User Requirements module that is linked to a module in another workspace that is in another language, e.g. German. That module is called Benutzerbedürfnisse (translation: user needs). There is a Link List attribute called User Needs in the User Requirements module holding links to elements in the Benutzerbedürfnisse module. In the User Requirements module you want to display some of the attributes in the Benutzerbedürfnisse module; Beschreibung (translation: description) and Benutzer Typ (translation: user type). However, the User Requirements module is in English and a translation of the German attribute names is needed. That is why we use a parameter to hold the attribute names in the business rule instead of referring to them in the Matrix headings (see Example 1). In the Matrix headings we instead enter the English attribute names.

To set this up you need to do the following:

1. In the User Requirements module (target module), add a Matrix attribute, which you call "Related User Needs". The Matrix should have two columns, but just one row. In the two column headings of the Matrix attribute default value, enter Description and User Type.
2. Now add a Text attribute in User Requirements module. This attribute will work as the business rule container attribute. In the default value for the Text attribute, enter the following:

---

```
=MatrixWriter("User Needs","Related User  
Needs","1","true","Beschreibung,Benutzer  
Typ","listen_to=Beschreibung","listen_to=Benutzer  
Typ','User Needs')
```

3. The MatrixWriter now populates the matrix with values from the related elements in the Benutzerbedürfnisse module. Every time someone changes the Beschreibung or Benutzer Typ attributes, the Matrix will be updated.

### Known Limitations

- If you have configured the Incoming Link or Link List attribute to only display links to/from a specific view, this will not be considered by the MatrixWriter business rule.
- Link attributes are not allowed in the MatrixWriter business rule.

### SetChoice

The business rule SetChoice is used to set a Choice attribute to a specific item when one or more other attribute(s) changes.

#### Prerequisites

To use the business rule SetChoice you need the following:

- A Choice attribute.
- A business rule container attribute (Text).

#### Format

In the business rule container attribute (Text), enter the business rule in the following format:

```
=SetChoice("Choice Attribute ID","Choice Item ID",  
"Trigger on Element Creation",'Source Attribute  
Name')
```

#### Parameters

Parameter	Explanation
"Choice Attribute ID"	The ID number of the Choice attribute.
"Choice Item ID"	The ID number of the Choice item.

---

"Trigger on Element Creation"	Set this parameter to "true" if you want to trigger the business rule when an element is created. Set this parameter to "false" if you only want attribute changes to trigger the business rule.
'Source Attribute Name'	The name of one (or more) attribute(s) that the business rule should listen to. If you want more than one Source Attribute Name parameter, just enter them one after the other, e.g. 'Source Attribute Name','Source Attribute Name'.

### Example 1

Assume that you have Requirements module with a Status attribute (Choice) containing the items "New", "Started", "Commented", "Delayed", "Finished" and "Not Approved". Also assume that in the same module, there is a Comment attribute (Text), in which users can add comments about the requirement.

With the business rule SetChoice it is possible to update the Status attribute to "Commented" whenever a comment is added in the Comment attribute.

To set this up you need to do the following:

1. First find out the ID numbers of the Status attribute and the Commented item. In this case the ID numbers are 308 and 14.

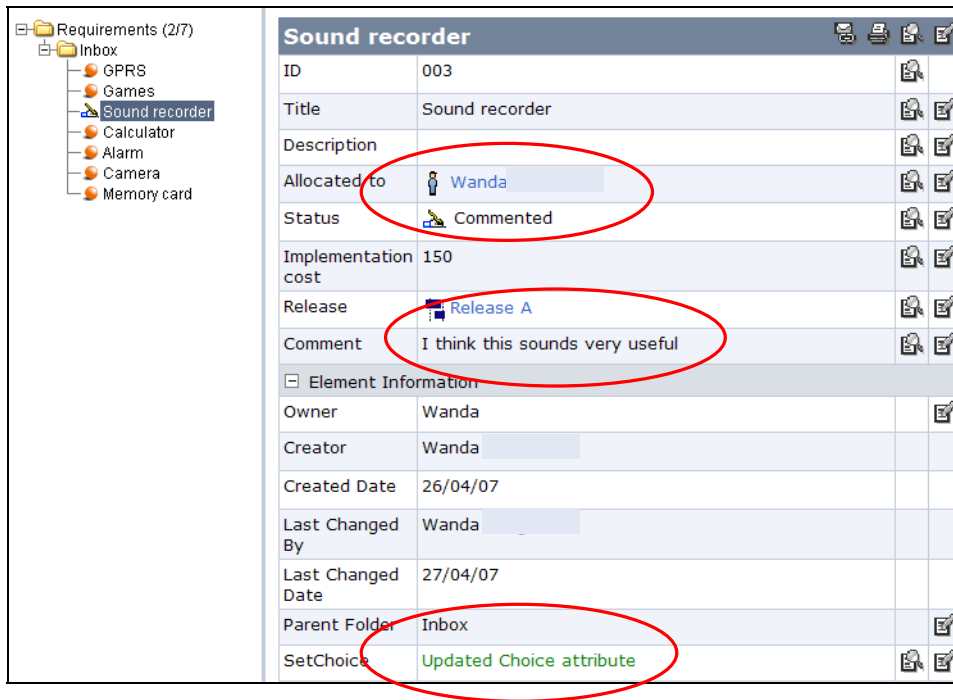
If you do not know how to get hold of id numbers, please refer to How to Find the Id Number beneath.

2. Enter the following business rule in the business rule container attribute (Text) in the Requirements module:

```
=SetChoice("308","14","true",'Comment')
```

Requirements: SetChoice (Text)	
General Settings	
Name	<input type="text" value="SetChoice"/>
Description	<div style="border: 1px solid #ccc; padding: 5px;">This business rule will automatically set Status to Commented, whenever a comment is added in the Comments attribute.</div>
Position Before	<input type="text" value="TextLog"/> ▼
Value Settings	
Default Value	<div style="border: 1px solid #ccc; padding: 5px;"> <pre>=SetChoice("308","14","true",'Comment')</pre> <p>You may use the + operator.</p> <div style="border: 1px solid #ccc; padding: 2px; width: fit-content; margin: 5px auto;">Evaluate Expression</div> <p>The top folder's attribute values will be used when the expression is evaluated.</p> <p><a href="#">List available Business Rules</a>  <a href="#">List available Attributes</a></p> </div>

The business rule SetChoice will now make sure that whenever a comment is added to a requirement, Status is changed to "Commented".



## Example 2

Assume that you want to easily see whether the project cost is within or over budget. In your Project Module you have two attributes called Budget Cost (Integer) and Actual Cost (Integer). The SetChoice business rule can in combination with an expression update a Choice attribute containing the items Within Budget and Over Budget, to reflect the relationship between these two cost values.

To set this up you need to do the following:

1. Make sure that you have two Integer attributes to reflect the actual and budget cost.
2. Add a Choice attribute with two items Within Budget and Over Budget

Budget Cost	The budgeted cost for the project.	Integer	Yes				
Actual Cost	The actual cost cost for the project.	Integer	Yes				
Budget	Indicates whether or not the project cost is within or over budget.	Choice	Yes				

3. Add a new Integer attribute, Cost Evaluation, in which you enter the following expression:

```
= 'Actual Cost' >= 'Budget Cost' ? 1 : 2
```

Explanation:

If Actual Cost is greater than or equal to Budget Cost is true the value will be 1 and if it is false the value will be 2.

Projects: Cost Evaluation (Integer)	
General Settings	
Name	Cost Evaluation
Description	A supporting expression for the SetChoice business rule for determining whether the project cost is within or over budget.
Position Before	SetChoice
Value Settings	
Default Value	<code>= 'Actual Cost' &gt;= 'Budget Cost' ? 1:2</code> You may use the +, -, *, / and ^ operators. <input type="button" value="Evaluate Expression"/> The top folder's attribute values will be used when the expression is evaluated. <a href="#">List available Business Rules</a> <a href="#">List available Attributes</a>

4. Add a Business Container attribute (Text), SetChoice, in which you enter the following business rule:

```
=SetChoice("328", "18", "false", "18_2", "19_1", 'Cost Evaluation')
```

Explanation:

Set the Choice attribute Budget (with id 308) to item Within Budget (with id 18) except


- If the value in Cost Evaluation is 2, set the Choice attribute Budget to item id 18 (Within Budget).

- If the value in Cost Evaluation is 1, set the Choice attribute Budget to item id 19 (Over Budget).

Projects: SetChoice (Text)	
General Settings	
Name	<input type="text" value="SetChoice"/>
Description	<div style="border: 1px solid #ccc; padding: 5px;">A business rule that sets the choice attribute Budget to a specific item.</div>
Position Before	<input type="text" value="--- Last ---"/> ▼
Value Settings	
Default Value	<input type="text" value="=SetChoice(&quot;328&quot;,&quot;18&quot;,&quot;&gt;false&quot;,&quot;18_2&quot;,&quot;19_1&quot;,'Cost Evalu"/> <p>You may use the + operator.</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin: 5px 0;">Evaluate Expression</div> <p>The top folder's attribute values will be used when the expression is evaluated.</p> <p><a href="#">List available Business Rules</a>  <a href="#">List available Attributes</a></p>

5. The result can look like this:



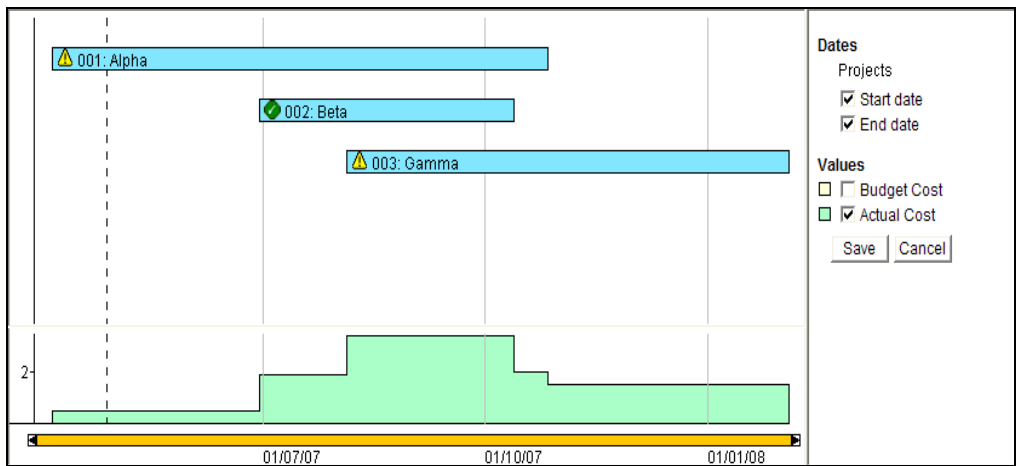
Alpha			
ID	001		
Title	Alpha		
Description			
Budget Cost	89		
Actual Cost	102		
Budget	 Over Budget		
+ Timescale			
+ Element Information			
- Business Rules			
Cost Evaluation	1		
SetChoice	Updated Choice attribute		

Here we can see that the actual cost has exceeded the budgeted cost and the SetChoice business rule has updated the Budget attribute to Over Budget. You can now easily display all the projects which have exceeded budget costs by either creating a view or a filter based on the Budget attribute.

### Suggestions:

If the icons for the Budget attribute items are used as Icon Attribute for the Module, this icon will be visible in the Tree. You can also choose to display it in the Gantt chart. Compare the screenshot above with the one below.

Alpha			
ID	001		
Title	Alpha		
Description			
Budget Cost	89		
Actual Cost	102		
Budget	Over Budget		
+ Timescale			
+ Element Information			
- Business Rules			
Cost Evaluation	1		
SetChoice	Updated Choice attribute		



---

## TextLog

The business rule TextLog will add entries from one Text attribute to another Text attribute and include user name and date. It will also clear the first Text attribute. It can be used instead of a Text List attribute to add comments to an element. The difference is that this business rule will automatically add who changed it and when. The entered comments will be read-only.

**Note:** The TextLog business rule has been implemented as a feature. Please refer to Text List Conversation Style in the online help.

### Prerequisites

To use the business rule TextLog you need the following:

- A Text attribute to enter the source text in.
- A Text attribute to which the source text will be moved (target attribute).
- A business rule container attribute (Text).

### Format

In the business rule container attribute (Text), enter the business rule in the following format:

```
=TextLog( 'Source Attribute Name' , "Target Attribute Name" , "Locale" )
```

### Parameters

Parameter	Explanation
'Source Attribute Name'	The attribute whose value will be moved to the target attribute.
"Target Attribute Name"	The attribute in which the changes will be stored.
"Locale"	The parameter for date format should be set to "sv,SE,". The date format you have selected in My Preferences (or the date format that has been determined for the entire workspace by an administrator) will be used. Please refer to My Preferences in help for more information.

### Example

Assume that you have a Requirements module with a Comments attribute (Text). When users add comments in this attribute, you want the business rule TextLog to enter user name and date to the Comment automatically.

---

To set up this business rule you need to do the following:

1. Add a new Text attribute which is set to be editable. You can call it "Enter a comment". The "Comment" attribute should only be visible, not editable, to avoid confusion on where to enter comments.
2. In the business rule container attribute, enter the following business rule:

```
=TextLog('Enter a comment', "Comment", "sv,SE,")
```

Requirements: TextLog (Text)	
General Settings	
Name	<input type="text" value="TextLog"/>
Description	<div style="border: 1px solid #ccc; padding: 5px;">This attribute contains the business rule TextLog, which automatically adds entered comments in the Comments attribute.</div>
Position Before	<input type="text" value="Support"/>
Value Settings	
Default Value	<input type="text" value="=TextLog('Enter a comment','Comment','sv,SE,')"/>

Add a comment in the Enter a comment attribute.

<ul style="list-style-type: none"><li>Requirements (2/8)</li><li>Inbox<ul style="list-style-type: none"><li>GPRS</li><li><b>Games</b></li><li>Sound recorder</li><li>Calculator</li><li>Alarm</li><li>Camera</li><li>Memory card</li><li>kughjkl</li></ul></li></ul>	<div style="border: 1px solid #ccc; padding: 5px;"><h3 style="margin: 0;">Editing Enter a comment for Games</h3><div style="border: 1px solid #ccc; padding: 5px; min-height: 40px;">I think this sounds very useful.</div></div>
--	---

The Comments attribute will be updated and the Enter a comment attribute will be cleared.

Games		
ID	002	
Title	Games	
Description		
Allocated to	Wanda	
Status	Commented	
Implementation cost	85	
Release	Release A	
Enter a comment		
Comment	<b>Wanda</b> <b>2007-04-27 20:13:</b> I think this sounds very useful.	
<input type="checkbox"/> Element Information		
Owner	Wanda	
Creator	Wanda	
Created Date	26/04/07	
Last Changed By	Wanda	
Last Changed Date	27/04/07	
Parent Folder	Inbox	
TextLog	Log Added	

## TrafficLight

The business rule TrafficLight will display a traffic light in red, green, yellow or black depending on the value of an Integer or Float attribute. When you have entered the expression the first time, editing of the expression is a special form.

## Prerequisites

To use the business rule TrafficLight you need the following:

- An Integer or Float attribute
- A business rule container attribute (Text).

## Format

In the business rule container attribute (Text), enter the business rule in the following format:

```
=TrafficLight('Attribute Name',"Low Threshold Value","High Threshold Value","Red Popup Text","Yellow Popup Text","Green Popup Text")
```

---

## Parameters

Parameter	Explanation
'Attribute Name'	The name of the attribute (Integer or Float) whose value will be evaluated.
"Low Threshold Value"	Values lower than this will make the traffic light green.
"High Threshold Value"	Values higher than this will make the traffic light red.
"Red Popup Text"	Red popup text (and value in e.g. Attribute Statistics) if the traffic light is red.
"Yellow Popup Text"	Yellow popup text (and value in e.g. Attribute Statistics) if the traffic light is yellow.
"Green Popup Text"	Green popup text (and value in e.g. Attribute Statistics) if the traffic light is green.

### Example

Assume that you have a Requirements module with an Accumulated Time attribute (Integer). When users enter values in this attribute, you want an indication if the value is in scope according to estimated time.

To set up this business rule you need to do the following:

1. In the business rule container attribute, enter the following business rule:

```
=TrafficLight('Accumulated Time',"10","20","RED","YELLOW","GREEN")
```

### Requirements: TrafficLight (Text)

**General Settings**

Name:

Description:

Position Before:

**Value Settings**

Default Value:

You may use the + operator.

The top folder's attribute values will be used when the expression is evaluated.

[List available Business Rules](#)  
[List available Attributes](#)

**Note:** When clicking **Evaluate Expression**, the popup text of the corresponding traffic light color is displayed, rather than the actual image.

- When the Accumulated Time attribute is changed, the TrafficLight business rule will be updated and display a different signal depending on the value in this attribute.

Games			
ID	002		
Title	Games		
Description			
Accumulated Time	25		
TrafficLight			

---

In this case, the traffic light will be:



for values 20 and more.



for values 10-19.



for values under 10.



when no value has been entered yet.

If you select the container attribute TrafficLight as Prefix Attribute for the module (go to Configure > Modules > Prefix Attribute to change this), the color of the traffic light will be in print (if you have entered them so in the business rule) before the element title. In this case it would look like this:

GPRS	
ID	001
Title	GPRS
Description	
Accumulated Time	15
TrafficLight	

If you want to edit the business rule afterwards (for one or several elements by using the edit icon, not when changing the default value in Configure / Attribute in Modules), for example to change the values, it will look like this:



Editing TrafficLight for Games		
Traffic Light		
Trigger Attribute Name	Low Threshold	High Threshold
Accumulated Time <input type="button" value="v"/>	<input type="text" value="10"/>	<input type="text" value="20"/>
Red Text	<input type="text" value="RED"/>	
Yellow Text	<input type="text" value="YELLOW"/>	
Green Text	<input type="text" value="GREEN"/>	
<a href="#">Display Input Field</a> An identifier of the element (will be displayed in the tree).		

Here you can change the values for the thresholds. The link [Display Input Field](#) will only be available for administrators. Click that link if you want to look at or change the business rule itself:

Editing TrafficLight for Games		
Traffic Light		
Trigger Attribute Name	Low Threshold	High Threshold
Accumulated Time <input type="button" value="v"/>	<input type="text" value="10"/>	<input type="text" value="20"/>
Red Text	<input type="text" value="RED"/>	
Yellow Text	<input type="text" value="YELLOW"/>	
Green Text	<input type="text" value="GREEN"/>	
<input type="text" value="=TrafficLight('Accumulated Time','10','20','f"/>		
<i>Note: This field overrides form values</i>		
An identifier of the element (will be displayed in the tree).		

### Known Limitations

The TrafficLight business rule cannot be used in the Prefix attribute.

---

## ***How to Find the Id Number***

For some of the expressions, one needs to insert the id number for attributes, modules, users, and/or workspaces as parameters in the expression. You will find the id number this way:

### **Find the Id Number for an Attribute**

1. Enter a "=" character in an attribute.
2. Click the link List available Attributes.

### **Find the Id Number for a Choice or Multichoice Item**

1. Open Configure / Attributes in Modules.
2. Select the module in which the Choice or Multichoice attribute is defined.
3. Select the Choice or Multichoice attribute.
4. Open the list of items.
5. Hold the mouse pointer over the item in question. The id number is visible in parenthesis in the bottom left corner of the Web browser.

### **Find the Id Number for a Module**

1. Open Configure / Attributes in Modules or Configure / Module List.
2. Hold the mouse pointer over the module in question. The id number is visible in parenthesis in the bottom left corner of the Web browser.

### **Find the Id Number for a User/Member**

1. Open Administrate / Users (or search for the user in Information / Find user)
2. Right-click in the frame of attributes.
3. Select View Source.
4. The id for the user is the same as the variable elemId.

### **Find the Id Number for a Workspace**

1. In the list of available workspaces, left-click and hold the link of the workspace in question.
2. The id number is visible in parenthesis in the bottom left corner of the Web browser.

---

## More information

### ***Contacting IBM Rational Software Support***

Support and information for Telelogic products is currently being transitioned from the Telelogic Support site to the IBM Rational Software Support site.

During this transition phase, your product support location depends on your customer history.

#### **Product support**

- If you are a heritage customer, meaning you were a Telelogic customer prior to November 1, 2008, please visit the [Focal Point Support Web site](#).

Telelogic customers will be redirected automatically to the IBM Rational Software Support site after the product information has been migrated.

- If you are a new Rational customer, meaning you did not have Telelogic-licensed products prior to November 1, 2008, please visit the [IBM Rational Software Support site](#).

Before you contact Support, gather the background information that you will need to describe your problem. When describing a problem to an IBM software support specialist, be as specific as possible and include all relevant background information so that the specialist can help you solve the problem efficiently. To save time, know the answers to these questions:

- What software versions were you running when the problem occurred?
- Do you have logs, traces, or messages that are related to the problem?
- Can you reproduce the problem? If so, what steps do you take to reproduce it?
- Is there a workaround for the problem? If so, be prepared to describe the workaround.

#### **Other information**

For Rational software product news, events, and other information, visit the [IBM Rational Software Web site](#).

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