ProjectWise Workflow Rules Engine & BS1192 Business Process Template

Hans Koorneef, EIM Technical Director, EMEA

ProjectWise Rules Engine

- ProjectWise V8i (SELECTseries 4) introduces a new capability for helping organizations enforce document lifecycle-based work processes.
- The ProjectWise Rules Engine provides a flexible set of actions that can be applied to documents during workflow state changes.
- Widely used in the UK Rail and Transportation Industry and other key users such as URS, Trafikverket (Sweden), and Buhler (Switzerland)
- Previously known as Document Action Manager

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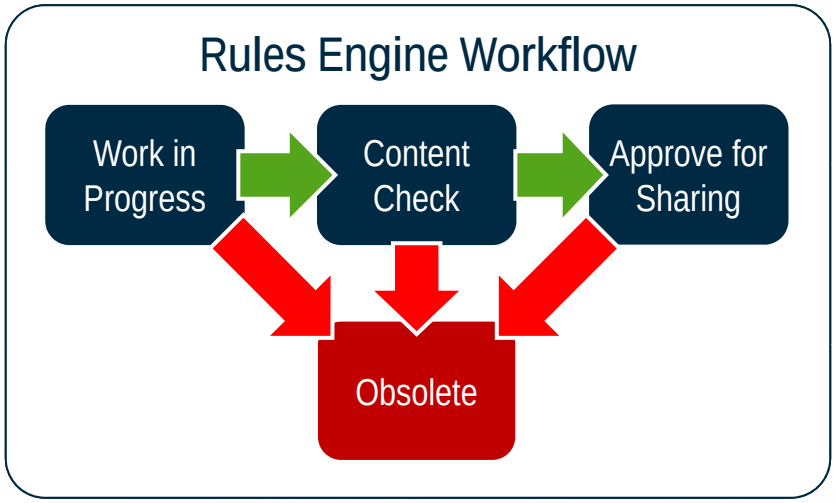
ProjectWise Rules Engine

- Mechanism for enforcing business processes
- Uses and extends existing workflow capabilities
- *Examples:* Automatically set a Document Attribute prior to Approval; Check an attribute has been set
- Non-linear Workflows



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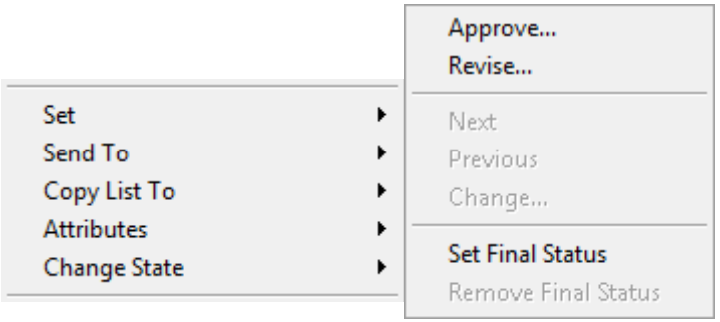
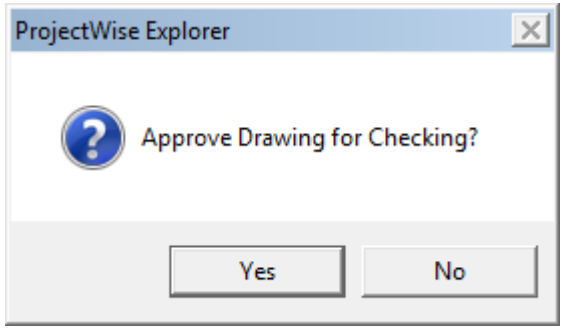
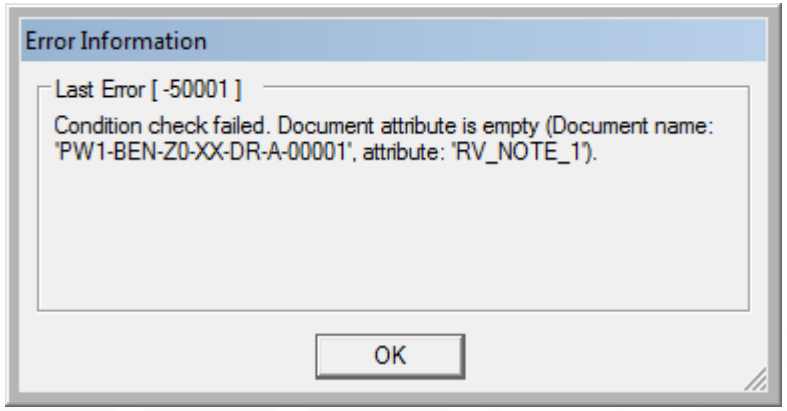
ProjectWise Rules Engine

- Replaces Standard Workflow commands with Rules Engine Operations
- Each Operation triggers a Rule with a confirmation dialog
- Each Rule consists of one or more sequential Actions
- A Rule is not run unless one or more optional Conditions are satisfied







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ProjectWise Rules Engine

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- Each Operation triggers a Rule with a confirmation dialog
- Each Rule consists of one or more sequential Actions
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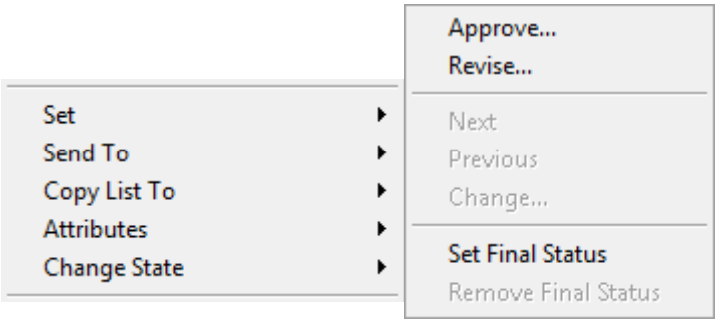

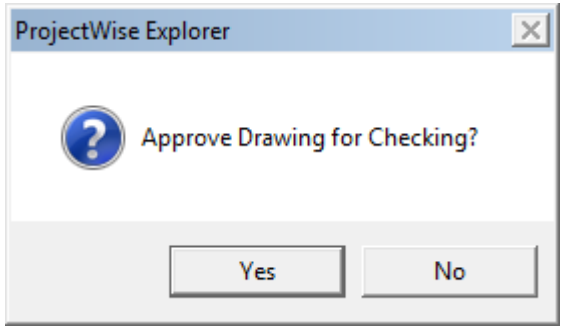

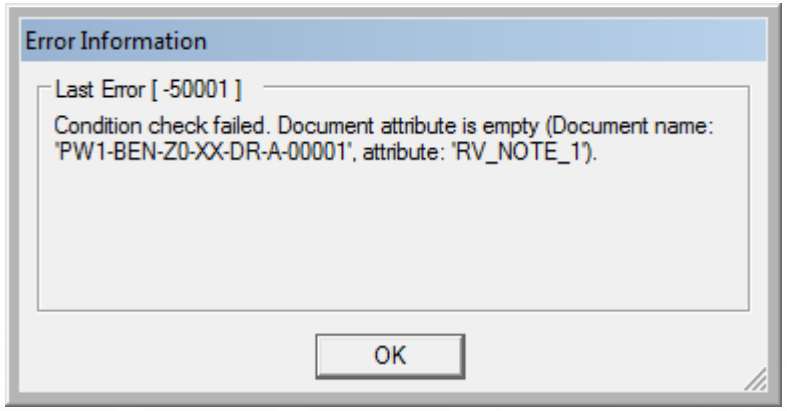

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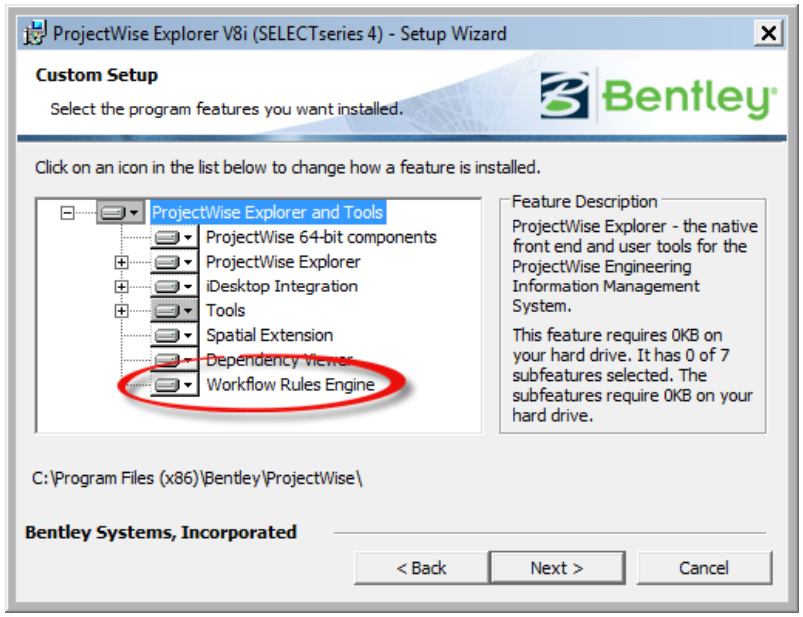
Enabling the Rules Engine

- Installed automatically with ProjectWise Administrator
- Install option for ProjectWise Explorer.
  - If not selected, the Rules Engine will NOT be enabled for that client



- Required database objects are updated with the schema update when logging into Administrator after upgrading to ProjectWise V8i (SELECTseries 4) Update

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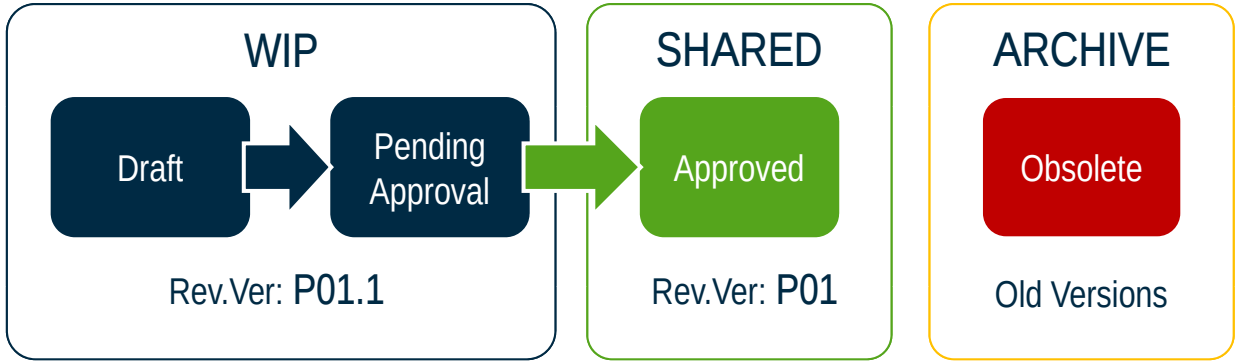
Rules Engine in Action (Example)



- *Draft* and *Pending Approval* Documents may be *Approved* or *Revised*
- *Approved* Documents may only be *Revised*
- *Revised* Documents are move to *Obsolete* State before New Version is created
- *Obsolete* Documents cannot be *Approved* or *Revised*

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Rules Engine in Action

- Standard State Change commands are replaced by Rules Engine Operations e.g. *Approve* or *Revise*.
- Each combination of Workflow, State and Operation defines one unique Rule.
- Each Rule consists of more or more Actions that are run in a defined order.
- Each Rule can be assigned one or more Condition checks that can be run before the Rule's Actions are started.

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Rules Engine in Action – Rule 1

- Workflow: **Rules Engine Workflow**
- State: **Draft**
- Operation: **Approve**
  - Action 1: Set Attribute *TRIG_SUBMITTED* to 1
  - Action 2: Clear Attribute *RejectedBy*
  - Action 3: Clear Attribute *DateRejected*
  - Action 4: Clear Attribute *Remarks*
  - Action 5: Set Attribute *PercentComplete* to 50
  - Action 6: Change State to *Pending Approval*

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ProjectWise Explorer V8i (SELECTseries 4)

Datasource Folder Document View Tools Window Help

Search Interface Manager View

Address pw:\\Rules Engine Example Dataset (ORA) Go

- ProjectWise Explorer Datasources
  - BS1192 Template (SQL)
  - Rules Engine Example Dataset (ORA) (pw

Name	Description

There are no views registered that are able to display current selection.

0 object(s) selected

12:37

Start ProjectWise Explorer ... 12:37

Rules Engine in Action – Rule 2

- Workflow: **Rules Engine Workflow**
- State: **Pending Approval**
- Operation: **Revise**
  - Action 1: Set Attribute *TRIG_REJECTED* to 1
  - Action 2: Change State to *Obsolete*
  - Action 3: Create New Version
  - Action 4: Change State to *Draft*
  - Action 5: Increase Minor Version e.g. P01.1 to P01.2
  - Actions 6 – 15: Clear Attributes

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ProjectWise Explorer V8i (SELECTseries 4)

Datasource Folder Document View Tools Window Help

Search | Interface Manager | View Default

Address pw:\\gphpwdemo1.bentley.com:ORA_PW_Example_Dataset\Documents\P03HA-Shangha_Water\100 - 3D Mo | Go

- ProjectWise Explorer Datasources
  - BS1192 Template (SQL)
  - Rules Engine Example Dataset (ORA) (pv
    - Documents
      - P03HA-Shangha_Water
        - 000 - Project Standard
        - 100 - 3D Models
          - 10010 - Composition
          - 10015 - Architectural
          - 10020 - Structural
          - 10025 - HVAC
          - 10030 - Electrical
          - 10035 - Piping
        - 200 - Drawings
        - Saved Searches
      - dmsSystem
    - Components
    - Saved Searches

Name	Version	State	Title	Percent Comple..	Designed by	Checked by	Subn
BulkTank.dgn	P01.1	Pending Appr...	This is a tank	50	pwadmin	pwadmin	pwac

Document Properties | Project Properties | Folder Properties | Photo Preview | Navigator | Dependency Viewer | Access Control | Components

View: <Default>

Property name	Property value	Property name	Property value
Name	BulkTank.dgn	Description	BulkTank
Folder Name	10025 - HVAC	Folder Description	10025 - HVAC
Environment	Rules Engine	Storage	Storage
File Name	BulkTank.dgn	File Size	1.15 MB (1,210,368 bytes)
Workflow	Rules Engine Workflow	State	Pending Approval
Created By	pwadmin	Created	05/03/2013 11:36:59
Updated By	pwadmin	Updated	05/03/2013 12:39:03
File Updated By	pwadmin	File Updated	05/03/2013 11:36:59
Status	Checked In	Node	
Version	P01.1	Sequence	0
File Revision		Conflicts	False
Local File Revision		Local File Refreshed	
Local File Directory		Local Status	
Shareable		MIME Type	image/vnd.dgn;ver=8

12:39

Start | ProjectWise Explorer ... | 12:39

Rules Engine – Rules Configuration

Note: Some columns hidden for display purposes

					Actions																			Conditions		
				Super User	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE			
				Param2					INC_MAJ	INC_MIN	REMOVE_MIN		1	1	1				0	50	100					
				Param1	Pending Approval	Approved	Draft	Obsolete	REV_RV	REV_RV	REV_RV		TRIG_SUBMITTED	TRIG_REJECTED	TRIG_APPROVED	RejectedBy	DateDesigned	DateApproved	PercentComplete	PercentComplete	PercentComplete	PercentComplete	DatePercentage	DesignedBy	CheckedBy	Remarks
				Type	CHANGE_STATE	CHANGE_STATE	CHANGE_STATE	CHANGE_STATE	CHANGE_REV_NO	CHANGE_REV_NO	CHANGE_REV_NO	CREATE_VER	SET_ATTR	SET_ATTR	SET_ATTR	CLEAR_ATTR	CLEAR_ATTR	CLEAR_ATTR	SET_ATTR	SET_ATTR	SET_ATTR	CLEAR_ATTR	CLEAR_ATTR	NOT_EMPTY	NOT_EMPTY	NOT_EMPTY
Workflow	**State**	**Operation**	**Prompt**	**ID**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**12**	**13**	**14**	**20**	**21**	**24**	**27**	**28**	**29**	**30**	**31**	**1**	**2**	**5**
Rules Engine	Draft	APPROVE	Submit Document fo	1	6								1			2				5				3	4	
Rules Engine	Draft	REVISE	Create New Minor V	2			4	2		5		3		1												1
Rules Engine	Pending Approval	APPROVE	Approve Document	3		4					1				2						3					
Rules Engine	Pending Approval	REVISE	Not Approved. Reje	4			4	2		5		3		1			9		12							1
Rules Engine	Approved	APPROVE	Already Approved. D	5																						
Rules Engine	Approved	REVISE	Change Approved D	6			4	2	5			3		1			10	13				14	15			1
Rules Engine	Obsolete	APPROVE	Obsolete - Cannot b	7																						
Rules Engine	Obsolete	REVISE	Obsolete - Cannot b	8																						

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Rules Engine – Operation Types

- A Workflow and its States have to be enabled for the Rules Engine. This is done on the **Operation Types** sheet of the Rules Configuration Speadsheet.

ID	Name	Prompt	Module	Callback	State callback	Menu order	Workflow
							Rules Engine Workflow
REJECT	Reject..	Reject?	WorkflowRulesEngine.dll	Exec_DefaultCmd	State_DefaultCmd	3	
APPROVE	Approve..	Approve?	WorkflowRulesEngine.dll	Exec_DefaultCmd	State_DefaultCmd	1	TRUE
REVISE	Revise/Reject..	Revise?	WorkflowRulesEngine.dll	Exec_DefaultCmd	State_DefaultCmd	2	TRUE

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Rules Engine – Action Types

- CHANGE_STATE - Used to change the workflow state of the selected document. Non-linear workflows are supported where States may be ‘jumped’.
- SET_ATTR - Used to set the static value of an attribute of the selected document.
- CLEAR_ATTRIBUTE - Used to clear the value of an attribute of the selected document.
- CREATE VER - Used to create a new version of the selected document. The default ProjectWise New > Version command is disabled.

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Rules Engine – Action Types

- SET_FINAL_STATUS – Locks the document down with Final Status. There is no action to remove Final Status as all actions or operations are disabled by Final Status.
- UPDATE_TB – Used for CAD Files to update title blocks. Opens the file in the background in MicroStation or equivalent and uses standard Attribute Exchange Rules

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Rules Engine – Action Types

- CHANGE_REV_NO - Used to change the Revision attribute of the selected document.
  - Supported revision format is XYY.ZZ where X is prefix letter, YY is the Major Version and ZZ is the Minor Version.
  - Parameter 1 is the target attribute
  - Parameter 2 is the change action
    - INC_MAJ – Used to increment YY by 1, and resets ZZ to 1, e.g. P01.2 > P02.1
    - INC_MIN – Used to increment ZZ by 1, e.g. P02.3 > P02.4
    - REMOVE_MIN – Used to remove the Minor version from the Attribute. Used for Issued documents in BS1192, e.g. P02.4 > P02

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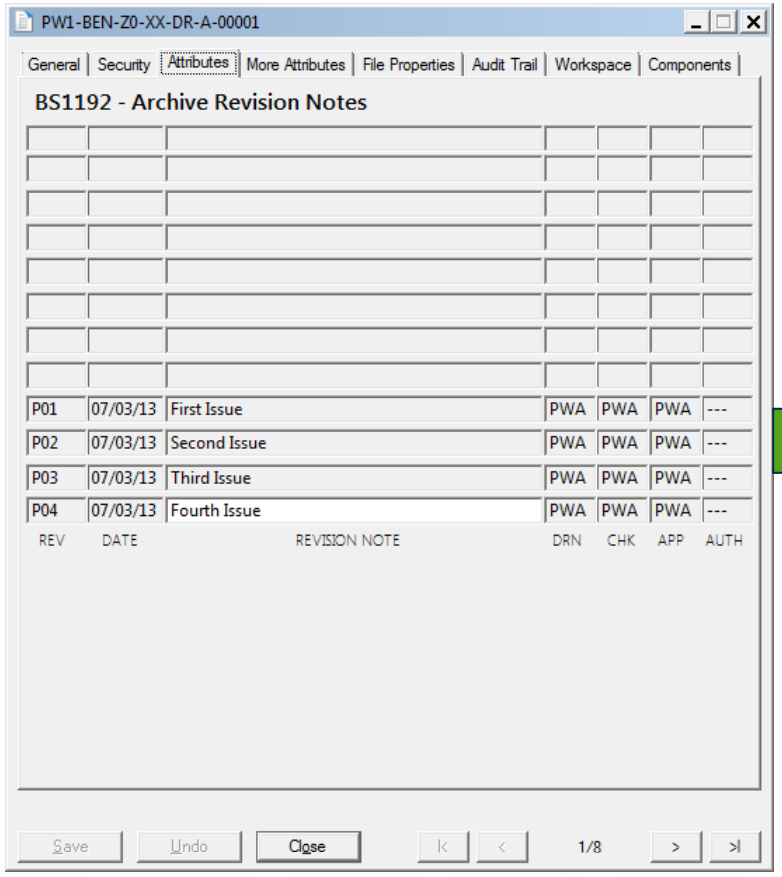
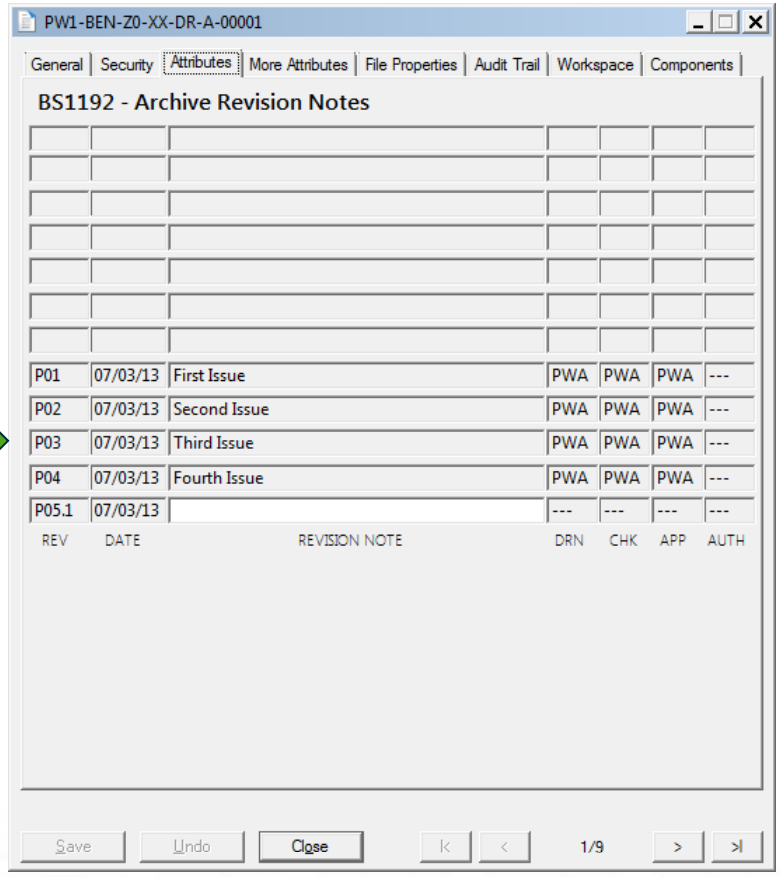
Rules Engine – Action Types

- SHIFT_REV_HIST – Shift Revision History.





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Rules Engine – Condition Checks

- EMPTY – The Attribute defined in Parameter 1 must be empty
- NOT_EMPTY - The Attribute defined in Parameter 1 must NOT be empty
- REFS_VALID – The Attribute defined in Parameter 1 will be checked in all Reference files and is any of them contain the value or one of the values defined in Parameter 2, the Condition will fail, and the Master document cannot have its State changed. E.g. If any references are marked as UNAPPROVED, you cannot approve the Master.

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BS1192 Business Process Template for ProjectWise

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BS1192 Template - Details

- Delivered as an AAM file import
- Provides BS1192 Best Practices for:
  - Project Properties
  - Folder structure
  - Environment and Document Coding
  - Access Control
  - Rules Definition
- Several BS1192 Template specific Stored Procedures are deployed when BS1192 Rules Definition file is imported

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BS1192 Template – Template Folder Structure

- ProjectWise Explorer Datasources
  - BS1192 Template (SQL) (pwadmin)
    - Documents
      - Application Data
      - dmsSystem
      - Projects
      - System Admin
    - Components
    - Saved Searches
  - Rules Engine Example Dataset (ORA)

- Projects
  - Project Example 1
    - Location 1
      - Architect
        - 2D Drawing
        - 2D Model
        - 3D Model
        - Correspondence
        - Model Rendition
        - Report
      - Building Surveyor
      - Civil Engineer
      - Client
      - Contractor
      - Drainage & Highway Engineer
      - Electrical Engineer
      - Facilities Manager
      - General (Non-Disciplinary)
      - Geographical & Land Surveyor
      - Heating & Ventilation Engineer
      - Interior Designer
      - Landscape Engineer
      - Mechanical
      - Public Health Engineer
      - Quantity Surveyor
      - Railway - General
      - Specialist Designer
      - Structural Engineer
      - Sub-Contractor
      - Town & Country Planning
    - Saved Searches

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BS1192 Template – Access Rights

- Users are assigned to a Discipline (Role) User List
- Project access is enabled through membership of a Project User Group
- Users can access their own discipline's WIP data in their own Projects.
- Users can view all other discipline's Shared data in the same Project

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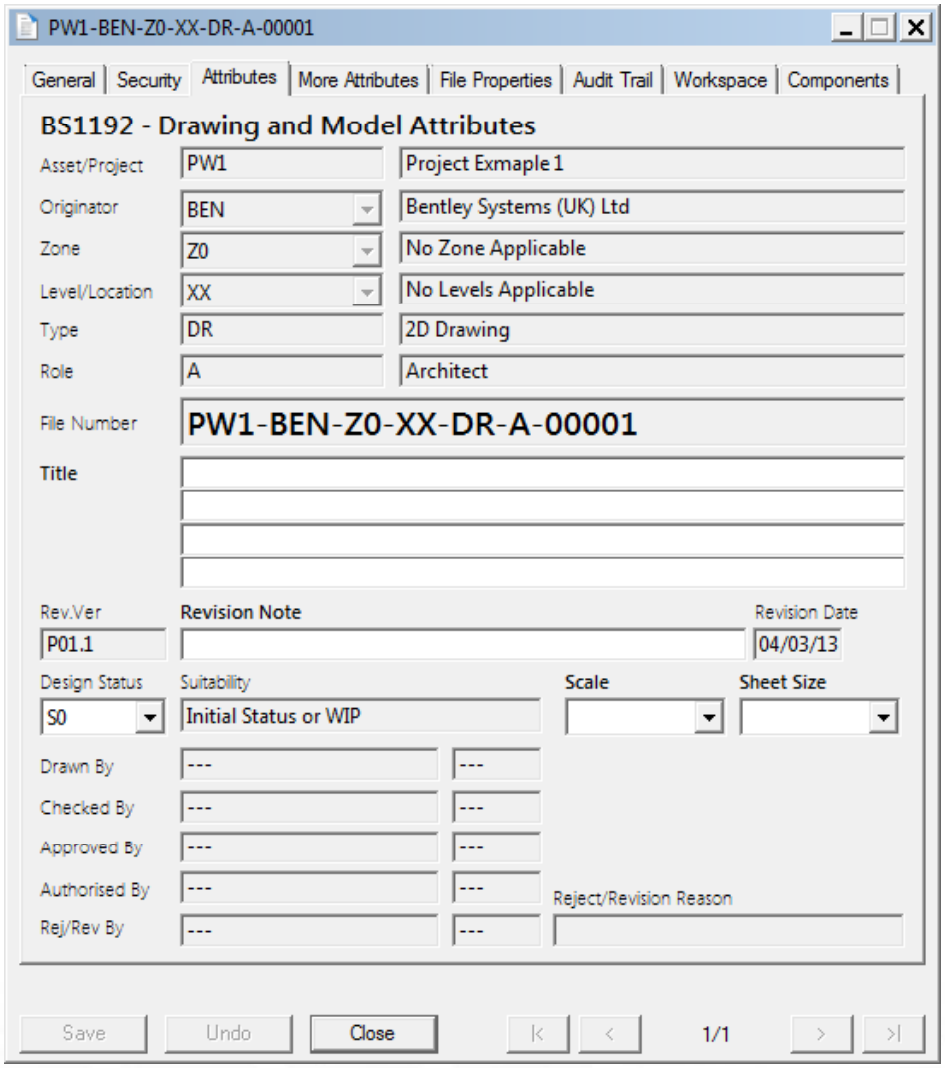
BS1192 Template – Environment

Document environment configured to support automatic BS1192 file naming and metadata with Document Creation Wizard



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BS1192 Template – Lookup Tables

Code	Description	model	drawing	document	Filter
NTS	Not To Scale	0	1	0	Scale
N/A	Not Applicable	0	0	1	Scale
1:2500		0	1	0	Scale
1:1250		0	1	0	Scale
1:1000					
1:500					
1:200					
1:100					
1:50					
1:20					
1:10					
1:5					
1:2					
1:1					
1:100					

Code	Description	Filter
01	First Floor	Level
02	Second Floor	Level
03	Third Floor	Level
05	Fifth Floor	Level
F1	Foundation Level 1	Level
GF	Ground Floor	Level
LG1	Lower-Ground Level 1	Level
LG2	Lower-Ground 2	Level
		Level
		Level
		Level
		Level
		Level

Code	Description	model	drawing	document	Filter
S0	Initial Status or WIP	1	1	1	Status
S1	Fit for Coordination	1	0	0	Status
S2	Fit for Information	0	1	1	Status
S3	Fit for Internal Review and Comment	1	1	1	Status
S4	Fit for Construction Approval	0	0	1	Status
D1	Fit for Costing	1	1	1	Status
D2	Fit for Tender	0	1	1	Status
D3	Fit for Contractor Design	1	1	1	Status
D4	Fit for Manufacture or Procurement	0	1	1	Status
A	Fit for Construction	0	1	1	Status
B	Partially Signed-off	0	1	1	Status
AB	As Built	1	1	1	Status

Code					
DR					
M2					
M3					
MR					
AF	Animation File...	1	0	0	Type
VF	Visualization Fi...	1	0	0	Type
CO	Correspondance	0	0	1	Type
RP	Reports	0	0	1	Type

		Filter
		Role
		Role
		Role
	Engineer	Role
		Role
		Role
	Surveyor	Role
	Engineer	Role
	gner	Role
		Role
	ngineer	Role
	Engineer	Role
	h Engineer	Role
	rveyor	Role
	ack	Role
	ngineer	Role
	untry Planner	Role
W	Contractor	Role
X	Subcontractor	Role
Y	Specialist Designer	Role
Z	General (Non-Disciplinary)	Role

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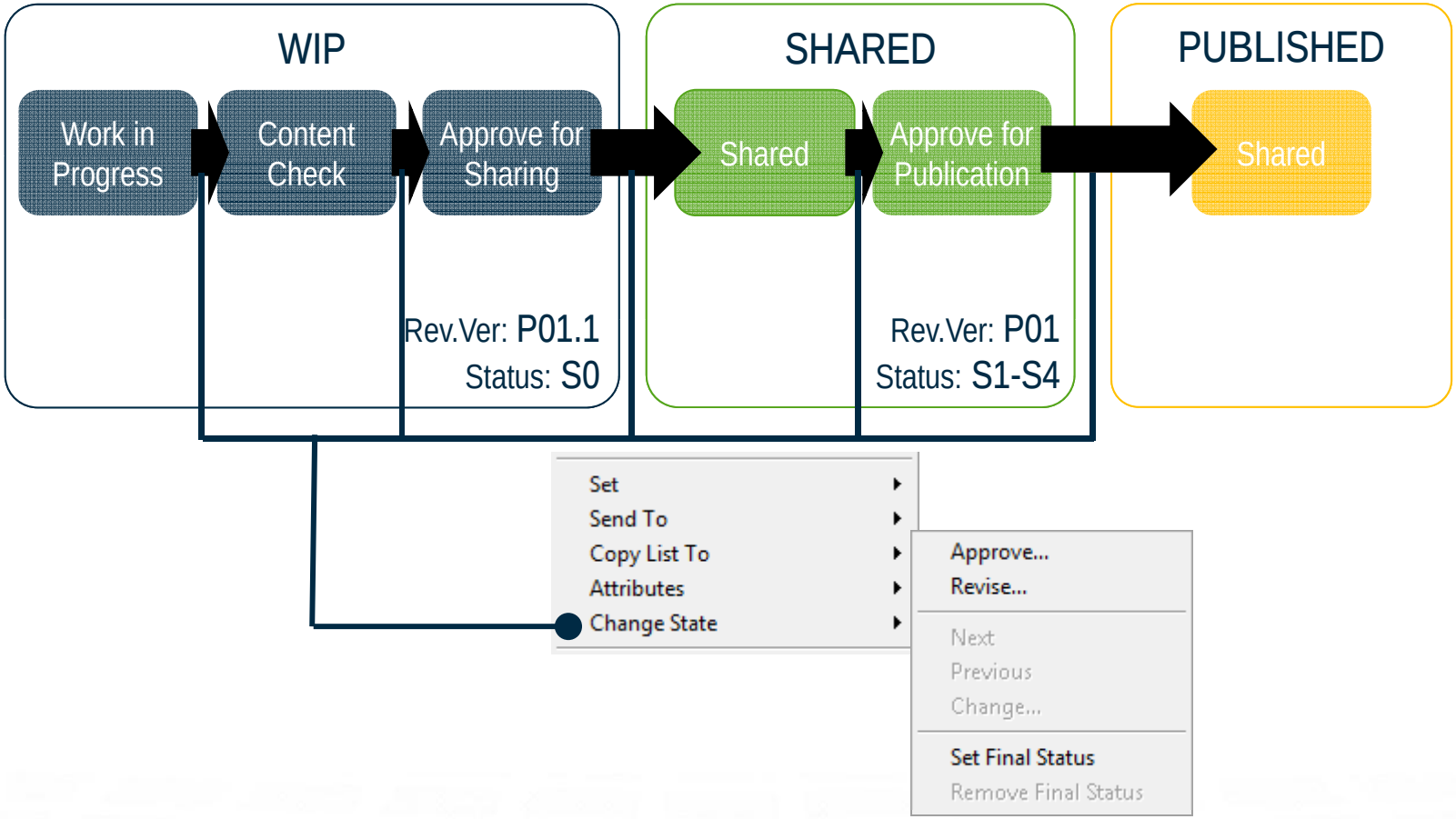
BS1192 Template – Workflow

Configurable Workflow & Dynamic Access Control



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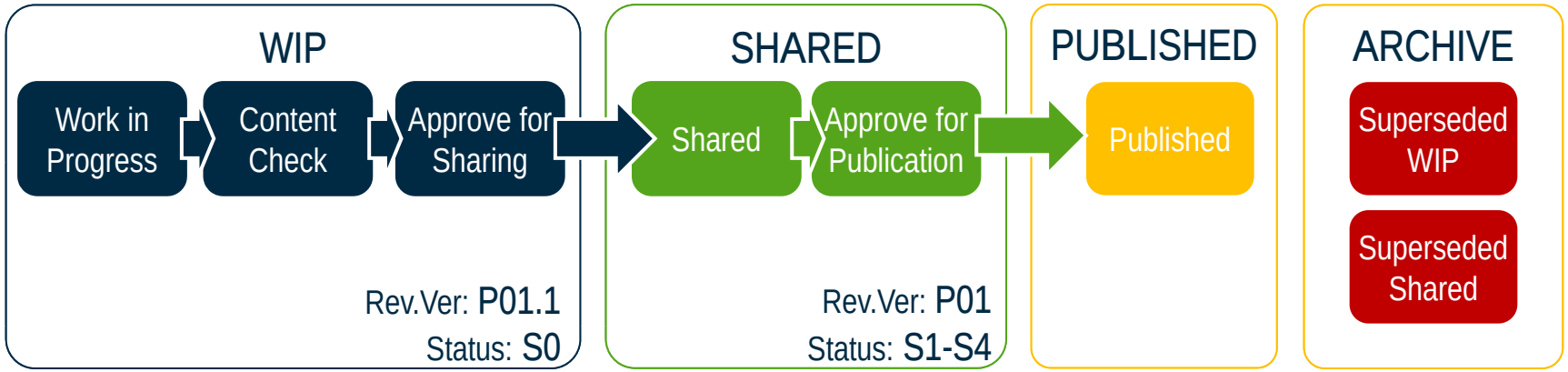
WRE in Action – BS1192 Workflow

- Documents may be *Approved* or *Revised apart from Published* Documents that may only be *Revised*
- *Revised* Documents are move to ***Superseded*** State before New Version is created



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WRE in Action – Document Creation

- Create Model using Document Creation Wizard
- Approve Model
- Reject Model
- Approve Model to Shared State
- Create Drawing using iCS. See filtered Lookup Tables

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WRE in Action – BS1192 Rule 1

- Workflow: **Models**
- State: **Work in Progress**
- Operation: **Approve**
  - Action 1: Set Attribute *TRIG_DRAWN* to 1
  - Action 2: Set Attribute *TRIG_REJECTED* to 0
  - Action 3: Clear Attribute *PW_REJECTED_REASON*
  - Action 4: Change State to *Content Check*

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ProjectWise Explorer V8i (SELECTseries 4)

Datasource Folder Document View Tools Window Help

Search | Interface: Document Attributes | View: Default

Address: pw:\\gphpwdemo1.bentley.com:SQL_PW_BS1192_Template\Documents\Projects\ Go

- ProjectWise Explorer Datasources
  - BS1192 Template (SQL) (pwadmin)
    - Documents
      - Application Data
      - dmsSystem
      - Projects
      - System Admin
    - Components
    - Saved Searches

Name	File Name	Design Status	Rev.Ver	Revision Note	State
Project Example 1					

For Help, press F1

11:38

Start | ProjectWise Explorer ... | 11:38

Summary

- ProjectWise Workflow Rules Engine Overview
- Operations, Rules, Actions, & Conditions
- Rules Configuration
- BS1192 Business Process Template Overview
- Template installation & import
- Example Workflow & Rules in Action
- Document Creation & moving through workflow

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Bentley
Sustaining Infrastructure

ProjectWise Workflow Rules Engine & BS1192 Business Process Template