

PTC® Live Global

Query Builder Tips & Tricks

Windchill PDMLink 10.1 (M020)

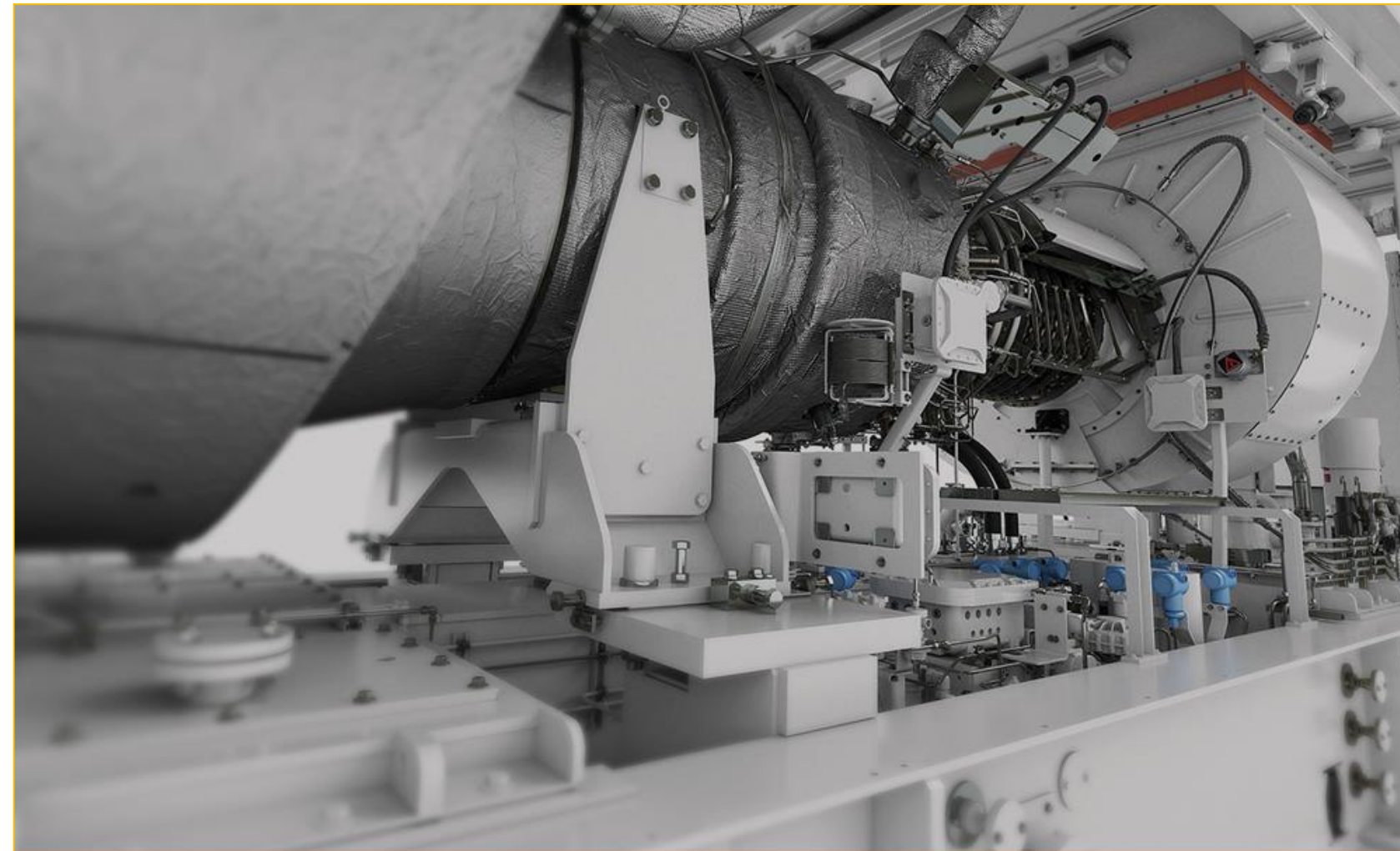
AI Anderson
PLM Architect

September 25, 2015

Caterpillar: Non Confidential



- **Change Process Metrics**
 - Show all WIP and Exits up to 1 Year Old (Rolling)
 - Total Cycle Time = WIP / Exit Rate
 - Group and Filter by Team, Category, etc.
 - Exits by Month and by Day
 - Inputs by Month and by Day
- **Project Task Burn Down Metrics**
 - Task Status: On Time, Late, Not Late, Completed
 - Group project tasks using Ad Hoc “Prefix Codes”
- **Task List Status for Change Management**
 - Outer Joins for Multiple Object Types
 - Group and Filter by Name



A CULTURE OF CUSTOMER CARE

Solar Turbines

A Caterpillar Company

1

2

3

1. ECR Work In Process (WIP)
 - Hide exit states to show only WIP in chart.

2. ECR Exits by Month
 - Hide WIP states to show only Exits in chart so that the “Created” Date for Current Phase = Exit Date

3. ECR Exits by Day

4. ECR Inputs by Month by Team

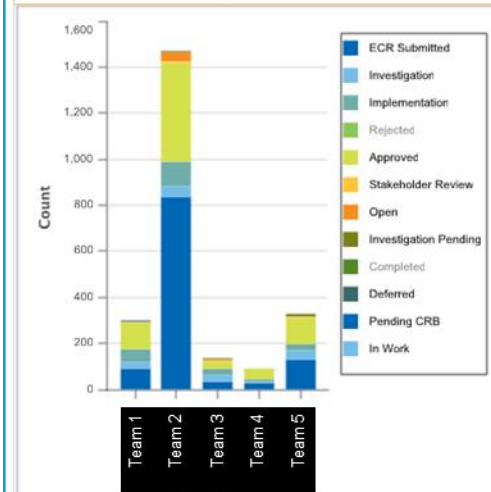
5. ECR Inputs by Category

6. ECR Inputs by Day by Team

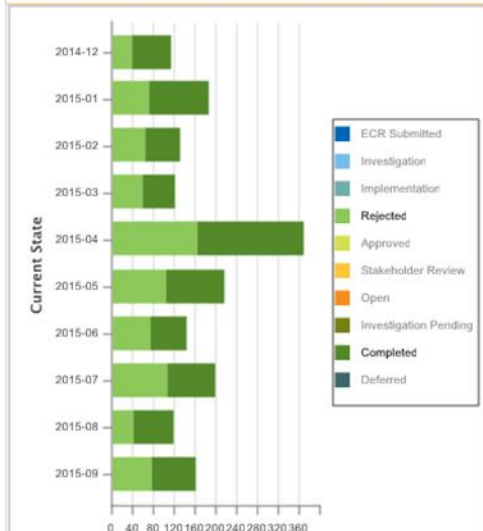
7. Use Legend to Hide Teams
 - Selecting all but one item in any chart will show only one Team or one Category.

Report - ECR WIP and Exits per Month for All Teams

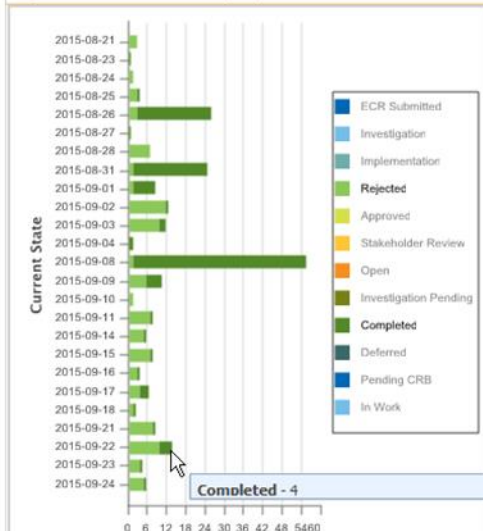
Click on Completed and Rejected in Legend to View ECR WIP by Team. Click on All States in Legend Except Completed and Rejected to View Total ECR Exits by Team for the Last 12 Months Running.



Click on All States in Legend Except Completed and Rejected to View ECR Exits by Month

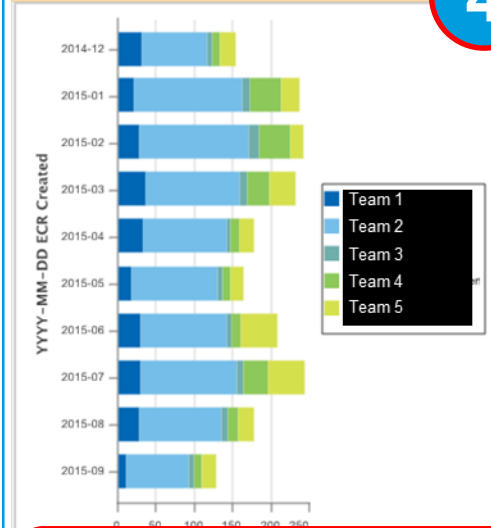


Click on All States in Legend Except Completed and Rejected to View ECR Exits by Day

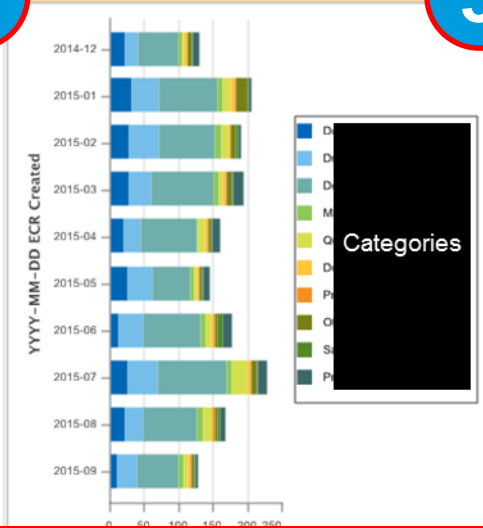


Report - ECR Inputs per Month for All Teams

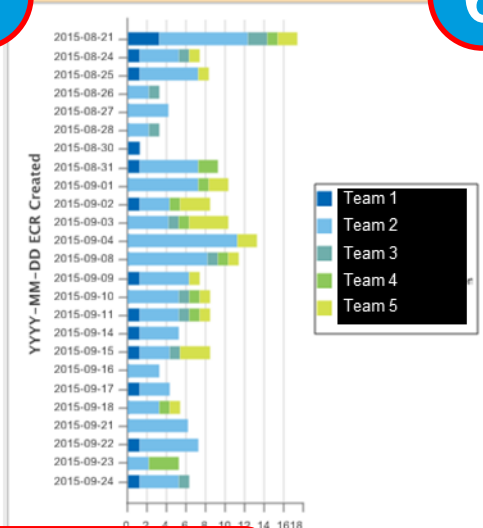
ECR Inputs by Month



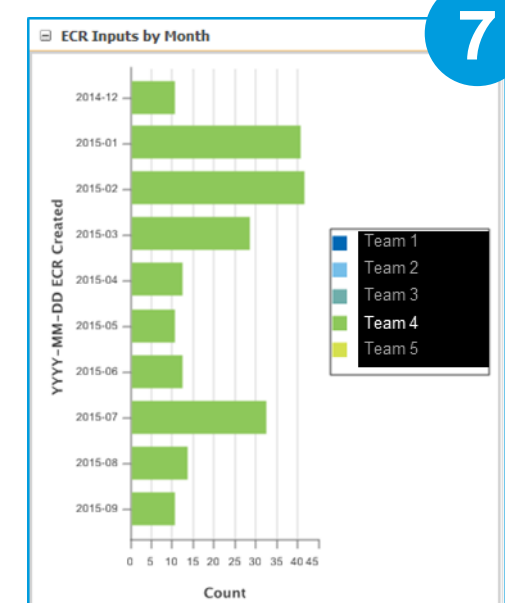
ECR Input by Month by Category



ECR Inputs by Day

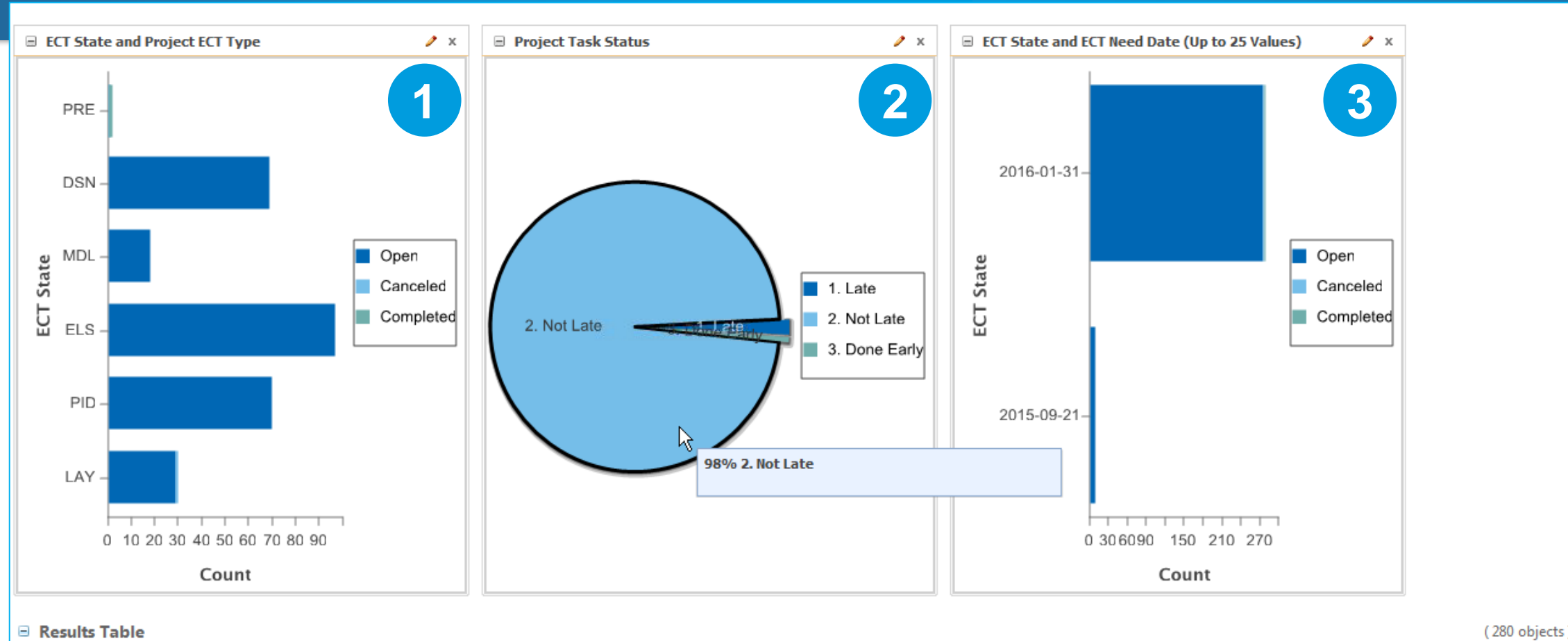


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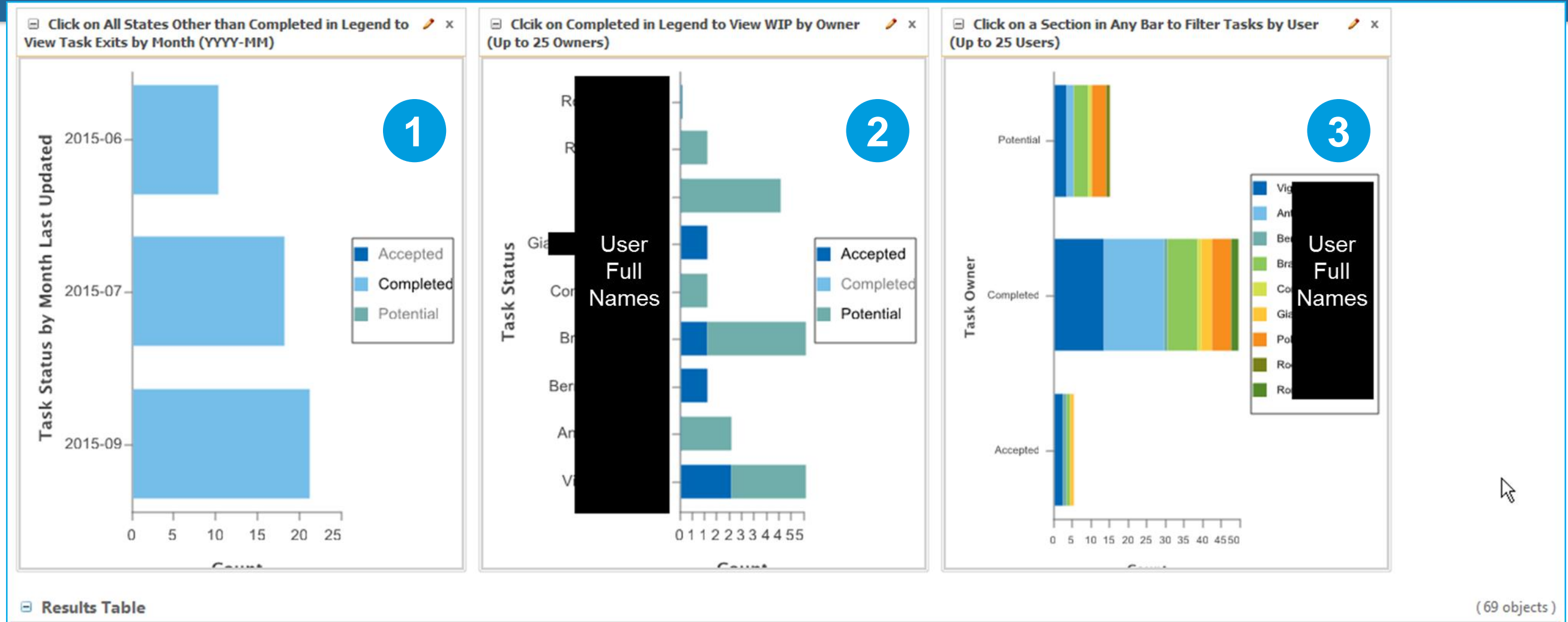


Details for the Inputs per Month is not shown in this presentation. This second report is similar to the WIP and Exits Report with the same results, but sorted by ECR Created (Descending) to chart “Inputs” groups by Month and by Day.

(4618 objects)



1. Enterprise Change Task (WTChangeActivity2) State grouped by ad hoc Name Prefixes
 - ECT Name Prefixes (e.g. “PRE-”, “DSN-”, “MDL-”, “ELS-”, “PID-”, “LAY-”, etc.) allow project manager to create ad hoc groups to track status at any time to suit the needs of the project without help from IT.
 - For NPI-type projects, all ECNs are grouped by a single ECR for reporting purposes, even if other ECRs also exist.
2. ECT Status based on ECT Need Date
 - Need dates are mass updated regularly from Project Plan using copy paste (Solar Customization).
 - Status shown as “1. Late”, “2. Not Late”, “3. Done Early”, and “4. Done” are based on a Query Builder trick shown later.
3. ECTs Grouped by Need Date with the ability to easily filter our Completed and Canceled ECTs using the Legend.



1. Task “Last Modified” shows Date Completed when Accepted and Potential are filtered out.
2. WIP Tasks grouped by User when Completed is filtered out.
3. Task Status by User Full Name allows for viewing any one user’s tasks by filtering others out.
 - Often we will exclude exit task in the Query Builder Criteria to only Show Accepted and Potential Tasks.

File Query Report Help

From Join Select Criteria Sort Description

Root Type Instance:

Name	Type	Alias	Outer Join Against
Context	wt.inf.container.WTContainer	Context	
ECR (wt.change2.WTChangeRequest2)	wt.change2.WTChangeRequest2	ECR (wt.change2.WTChangeRequest2)	
Phase	wt.lifecycle.Phase	Phase	
Team (wt.team.TeamTemplate)	wt.team.TeamTemplate	Team (wt.team.TeamTemplate)	

1

1. From

- **ECR** (WTChangeRequest2)
- **Phase** used to get “Created” Date of “Current Phase” to indicate “Exit” for ECRs in an Exit State.
- **Context** for filtering
- **Team Template** for grouping

File Query Report Help

From Join Select Criteria Sort Description

By Link

From	Link	From Role	To Role	To
Phase	Current Phase	Phase	Life Cycle Managed	ECR (wt.change2.WTChangeRequest2)

Add... Remove

By Reference

From	Reference	To
ECR (wt.change2.WTChangeRequest2)	Context	Context
ECR (wt.change2.WTChangeRequest2)	Team Template	Team (wt.team.TeamTemplate)

2

2. Join

- **Note** the “**Current Phase**” link form **Phase** to **ECR**.

The screenshot shows the SELECT Editor interface with a query tree. Callout 1 points to the 'Group By' checkbox in the editor options. Callout 2 points to the 'Left Pad (with spaces)' function in the date formatting chain. Callout 3 points to the 'Concatenate: Exit Day' function. Callout 4 points to the 'Time Difference(days)' function used for calculating age.

1. “Group By”

- Required for some functions, like “Count” and “Sum”.
- May not actually be required for the functions shown.

2. Select – Note the Left Pad (with spaces) format to create a YYYY-MM and YYYY-MM-DD format to simplify sorting and graphing.

3. Select (continued) – Note the use of “Concatenate” to show “Exit Day (Use for Completed and Rejected States Only)”

4. Select (continued) – Note the use of “Time Difference(days)” to show WIP age for WIP states, and Days to Complete for Exit states.

Change Process Metrics

1. Criteria

- **Note** the use of an OR Boolean to show **all WIP** (where state does not equal either Completed or Rejected) **AS WELL AS** all **Exit States that reached their current terminal state within the last one year, running.**
- Note the use of a second OR Boolean to show exactly 5 Team Templates by Name.

2. Sort

- It is essential to sort **Descending by Current State Full Date (for Sorting)** to ensure that the Exits by Day and Month line up properly in the charts that auto-populate when a saved report runs.
- Do not Sort by the YYYY-MM(-DD) formats because they will not sort in chronological order.

Criteria Tree

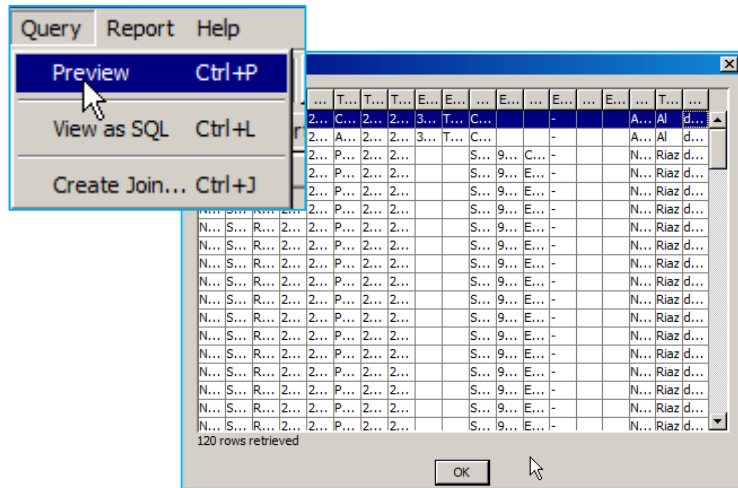
- Criteria Tree
 - AND
 - OR
 - Condition
 - Phase.Created
 - >
 - To Date
 - Concatenate
 - Subtract
 - Get Year
 - System Date
 - 1
 - :
 - Get Month
 - System Date
 - :
 - Get Day
 - System Date
 - YYYY:MM:DD
 - AND
 - Condition
 - ECR (wt.change2.WTChangeRequest2).State
 - <>
 - Rejected
 - Condition
 - ECR (wt.change2.WTChangeRequest2).State
 - <>
 - Completed
 - OR
 - Condition
 - Team (wt.team.TeamTemplate).Team Name
 - =
 -
 - Condition
 - Team (wt.team.TeamTemplate).Team Name
 - =
 -
 - Condition
 - Team (wt.team.TeamTemplate).Team Name
 - =
 - P
- Condition
 - Team (wt.team.TeamTemplate).Team Name
- =
- S
- Condition
 - Team (wt.team.TeamTemplate).Team Name
- =
- C

File Query Report Help

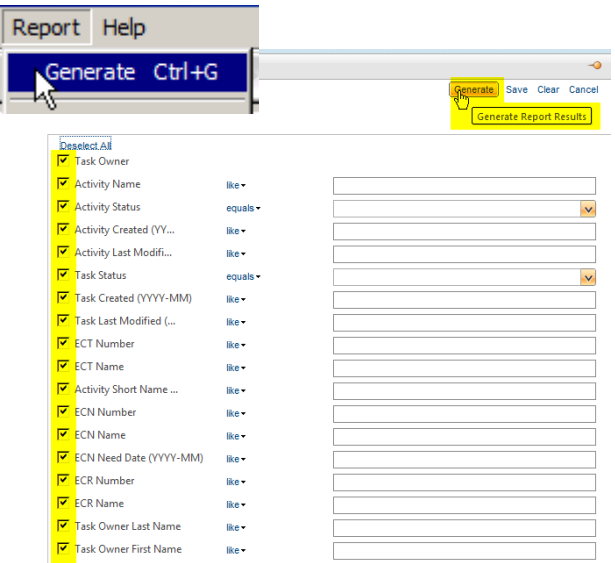
Alias Attribute	Order
Current State Full Date (for Sorting)	Descending

Preview, Generate, Chart, Save & Run Reports

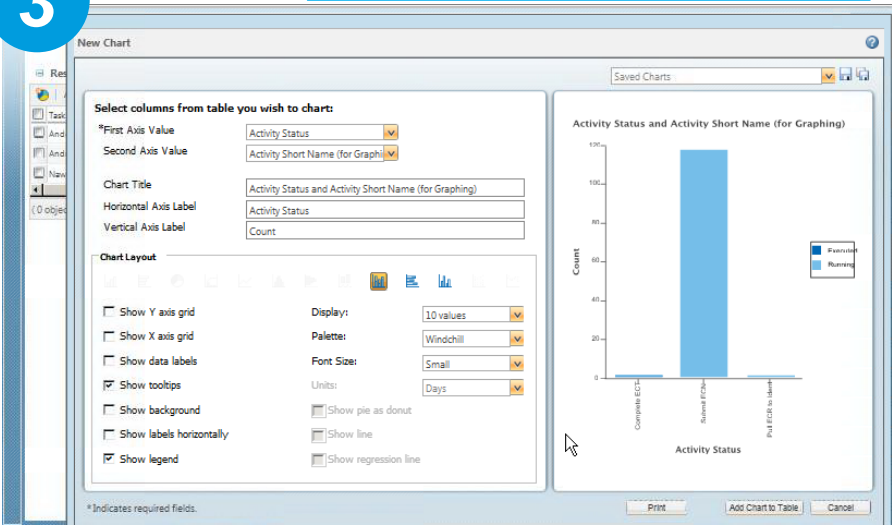
1



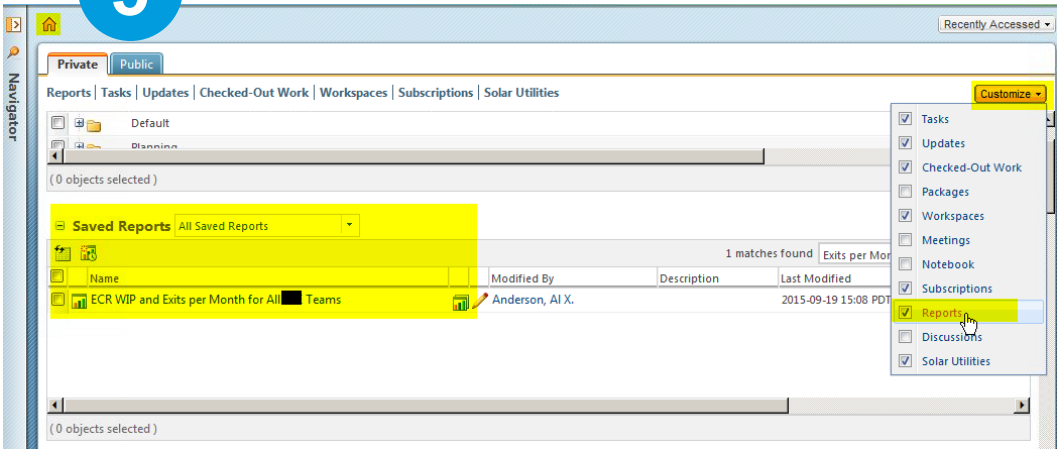
2



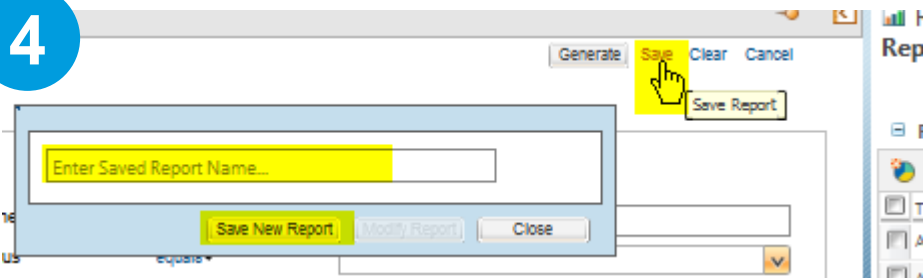
3



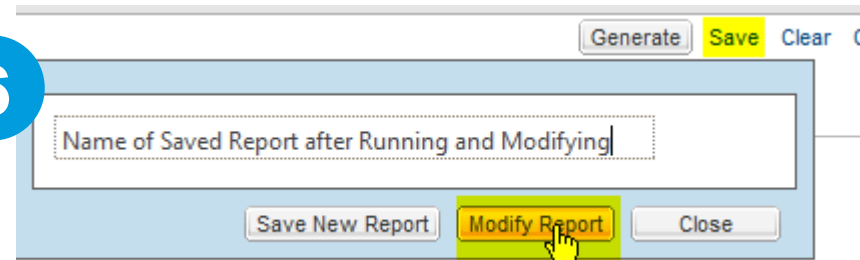
5



4



6



1. Preview
2. Generate
3. Chart up to 4 Charts
4. Save
5. Run
6. Modify
7. Watch out for the affect on charts after column Sorting in the same browser session!
8. You can directly link to the saved report from department websites.

1

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3

1. ECR Work In Process (WIP)
 – Hide exit states to show only WIP in chart.

2. ECR Exits by Month
 – Hide WIP states to show only Exits in chart so that the “Created” Date for Current Phase = Exit Date

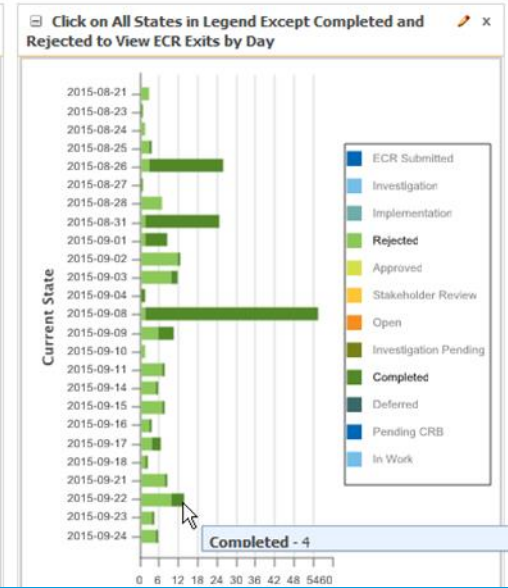
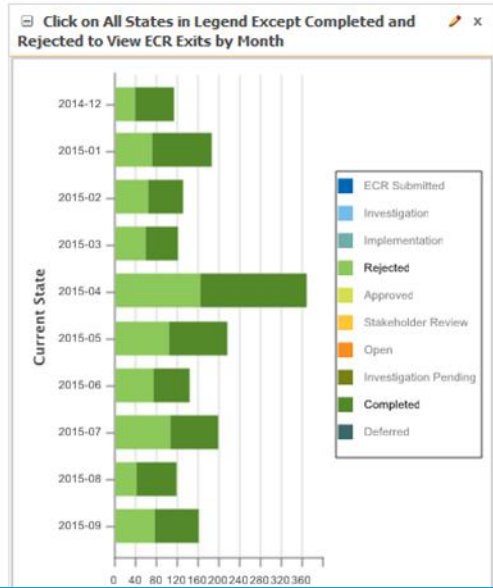
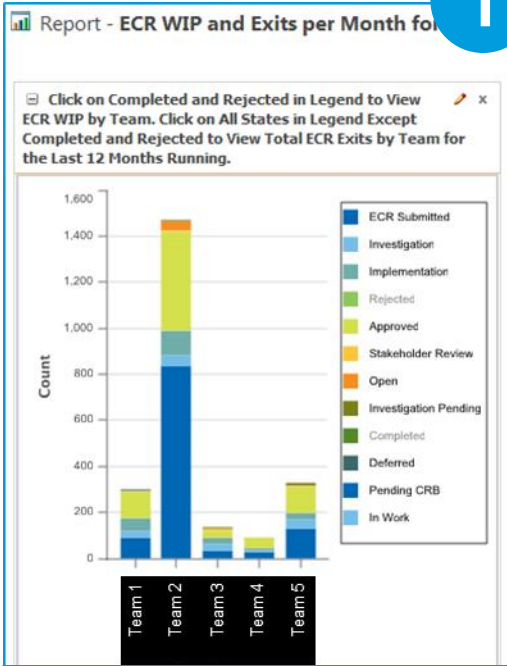
3. ECR Exits by Day

4. ECR Inputs by Month by Team

5. ECR Inputs by Category

6. ECR Inputs by Day by Team

7. Use Legend to Hide Teams
 – Selecting all but one item in any chart will show only one Team or one Category.



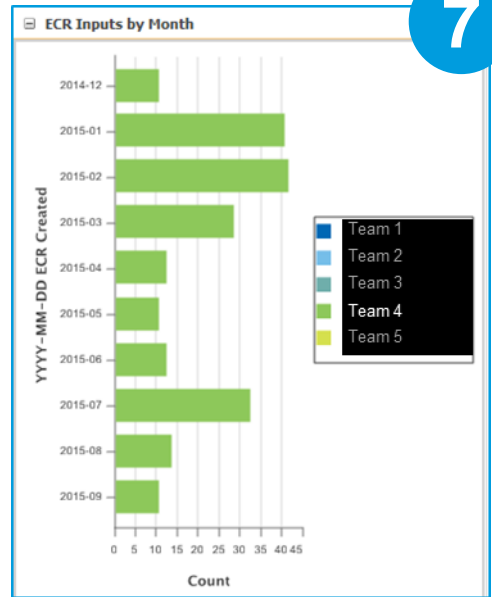
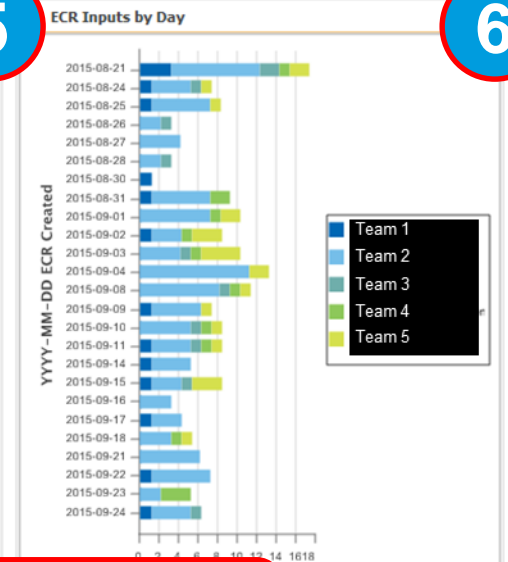
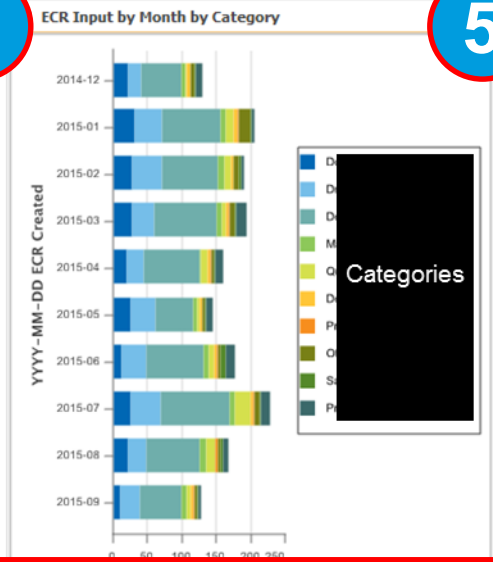
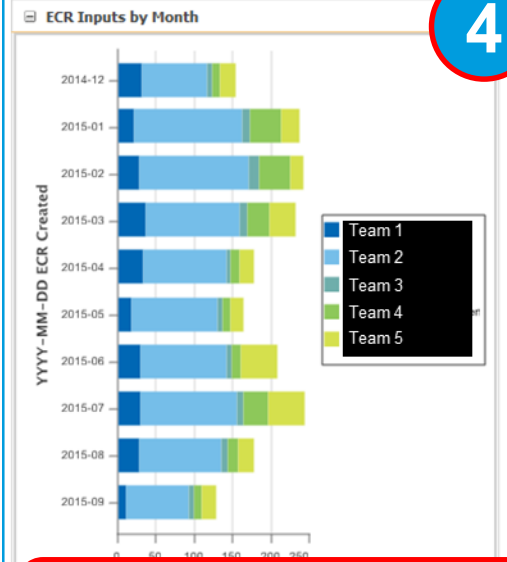
Report - ECR Inputs per Month for All Teams

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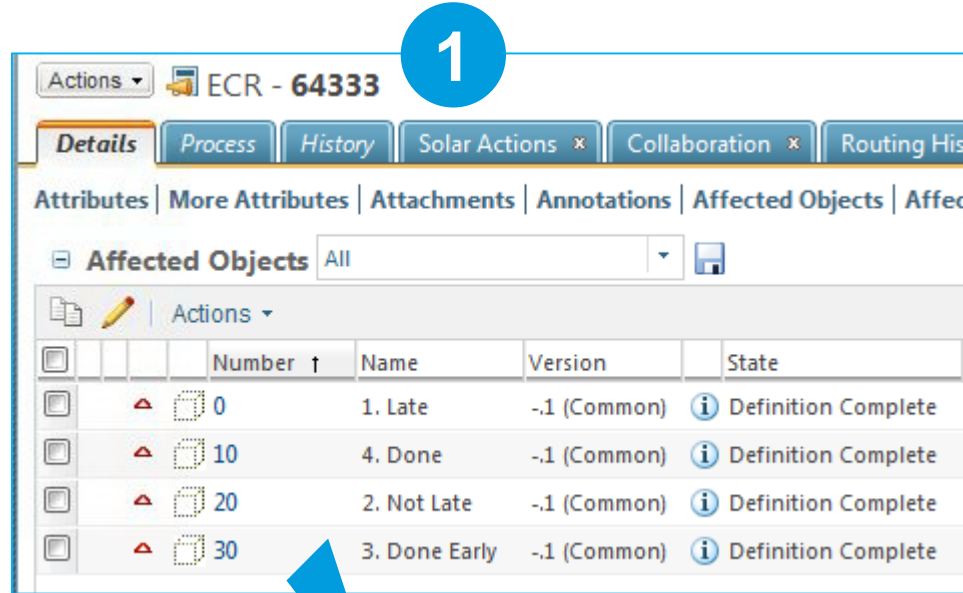
7



Details for the Inputs per Month is not shown in this presentation. This second report is similar to the WIP and Exits Report with the same results, but sorted by ECR Created (Descending) to chart “Inputs” groups by Month and by Day.

(4618 objects)

1



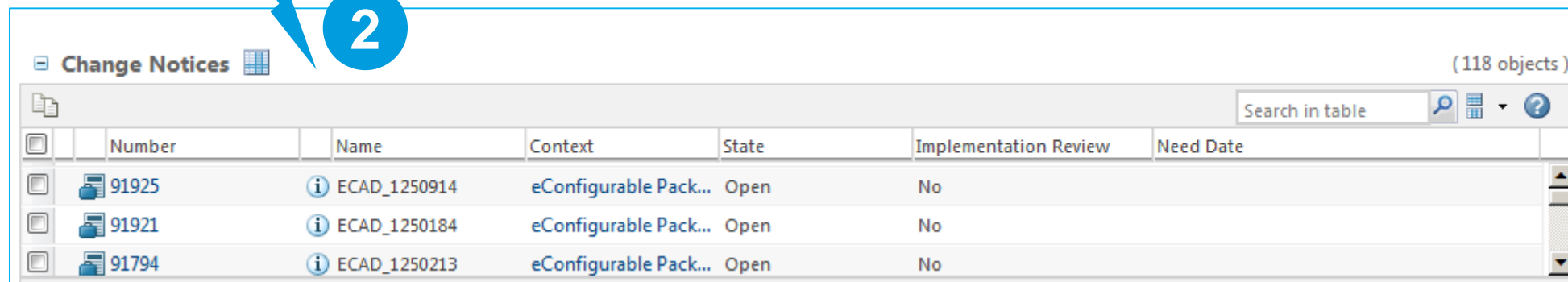
The screenshot shows the 'Affected Objects' table for ECR - 64333. The table has columns for Number, Name, Version, and State. A blue lightning bolt points from the table to the second screenshot.

Number	Name	Version	State
0	1. Late	-1 (Common)	Definition Complete
10	4. Done	-1 (Common)	Definition Complete
20	2. Not Late	-1 (Common)	Definition Complete
30	3. Done Early	-1 (Common)	Definition Complete

1. The trick to calculating whether an ECT is on time or late for a major project (NPI, etc.).

- A master ECR represents the entire project, even if ECNs have other ECRs attached to them.
- The master ECR allows you to group all ECTs on all ECNs by a single ECR number, then use a Sub Select and Functions to compare ECT Need Date to the current System Date in order to reach the value of 0, 10, 20, or 30, and return the “Part” object with that Number, then display its “Name” to show whether the ECT is on time, or late.

2



The screenshot shows the 'Change Notices' table with 118 objects. The table has columns for Number, Name, Context, State, Implementation Review, and Need Date.

Number	Name	Context	State	Implementation Review	Need Date
91925	ECAD_1250914	eConfigurable Pack...	Open	No	
91921	ECAD_1250184	eConfigurable Pack...	Open	No	
91794	ECAD_1250213	eConfigurable Pack...	Open	No	

2. All ECNs that have ECTs that “Burn Down” to complete a project plan are part of the master ECR’s Implementation Plan.

3. Ideally, every ECT is in an MS Project Plan with Need Date.

From | Join | Select | Criteria | Sort | Description

Root Type Instance:

Name	Type	Alias	Outer Join Against
ECN (wt.change2.WTChangeOrder2)	wt.change2.WTChangeOrder2	ECN (wt.change2.WTChangeOrder2)	
Part	wt.part.WTPart	Look Up Status Part	
ECR (wt.change2.WTChangeRequest2)	wt.change2.WTChangeRequest2	ECR (wt.change2.WTChangeRequest2)	
ECT and Part Displacement Record (wt.change2.WTChangeActivity2)	wt.change2.WTChangeActivity2	ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 1	
Phase	wt.lifecycle.Phase	Phase	

1

From | Join | Select | Criteria | Sort | Description

By Link

From	Link	From Role	To Role	To
ECR (wt.change2.WTChangeRequest2)	Addressed By	Change Request	Change Notice	ECN (wt.change2.WTChangeOrder2)
ECR (wt.change2.WTChangeRequest2)	Relevant Request Data	Change Request	Changeable	Look Up Status Part
ECN (wt.change2.WTChangeOrder2)	Included In2	Change Notice	Change Task	ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 1
Phase	Current Phase	Phase	Life Cycle Managed	ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 1

Add... Remove

By Reference

From	Reference	To
------	-----------	----

2

1. From

- Note the “Part” joined to the ECR using the “Relevant Request Data” to link the look up objects to the ECR.

2. Join

- Note that the ECR is linked to the ECN that is linked to the ECT. Since the focus is on ECTs only, no Outer Joins are necessary.

The screenshot displays the PTC SELECT Editor interface. The 'SELECT Tree' on the left shows a hierarchical structure of nodes. A red box highlights the 'Sub String: Project ECT Type' node, which includes a 'Subtract' node and an 'In String' node. A blue circle with the number '1' is positioned near the top of the tree. A blue arrow with the number '2' points to the 'Look Up Status Part.Name: Project Task Status' node. The 'SELECT Editor' on the right has checkboxes for 'Distinct', 'Group By', and 'Bypass Access Control', with 'Bypass Access Control' checked. At the bottom of the tree, there are 'Add' and 'Remove' buttons.

1. Select

- **Note** the use of “Sub String” to find “Project ECT Type” based on the first occurrence of a constant “-” delimiter.

2. Note that it is only necessary to Select the “Look Up Status Part.Name” to show the “Project Task Status” of an ECT based on a user defined prefix in the ECT Name field.

- The correct part number will be found in a Sub Select on the Criteria tab.

Name	Type	Alias	Outer Join...
ECR (wt.change2.WTChangeRequest2)	wt.change2.WTChangeRequest2	ECR (wt.change2.WTChangeRequest2) 1	
Part	wt.part.WTPart	Part 1	
ECT and Part Displacement Record (wt.change2.WTChangeActivity2)	wt.change2.WTChangeActivity2	ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2	
ECN (wt.change2.WTChangeOrder2)	wt.change2.WTChangeOrder2	ECN (wt.change2.WTChangeOrder2) 1	

5. ****Sub-select Criteria****
 - Note the Master ECR Number
 - Map the Sub-select back to the main Select.
 - Note the math functions to calculate Project Task Status!

1. Criteria & Sub-select

2. Sub-select From

3. Sub-select Join

4. Sub-select Select

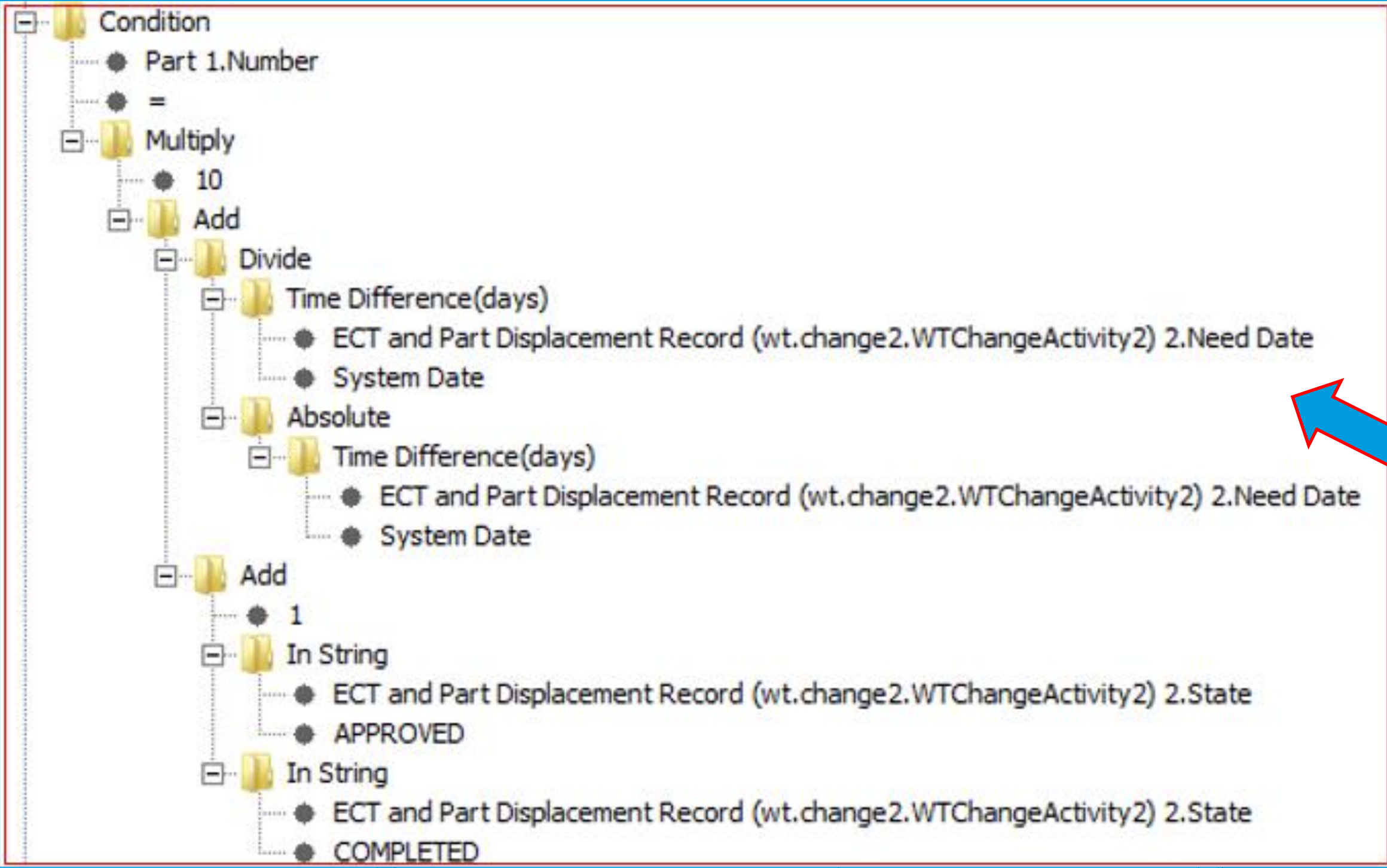
Alias Attribute	Order
Project Task Status	Ascending
ECT Need Date	Ascending
ECT Number for Sort and Export	Ascending

6

```

Criteria Tree
├── AND
│   ├── Condition
│   │   ├── ECR (wt.change2.WTChangeRequest2) 1.Number
│   │   ├── =
│   │   └── 64333
│   └── Condition
│       ├── Part 1.Number
│       ├── =
│       └── Multiply
│           ├── 10
│           └── Add
│               ├── Divide
│               │   ├── Time Difference(days)
│               │   │   ├── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
│               │   │   └── System Date
│               │   └── Absolute
│               │       ├── Time Difference(days)
│               │       │   ├── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
│               │       │   └── System Date
│               │   └── Add
│               │       ├── 1
│               │       └── In String
│               │           ├── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
│               │           ├── APPROVED
│               │           └── In String
│               │               ├── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
│               │               └── COMPLETED
│           └── Condition
│               ├── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 1.Persist Info.Object Identifier.Id
│               ├── =
│               └── ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Persist Info.Object Identifier.Id
    
```

5



select Criteria**
aster ECR Number
ath functions to calculate Project
s!
b-select back to the main Select.

WTChangeRequest2) 1.Number

ifference(days)
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
stem Date
te
ne Difference(days)
ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
System Date

ng
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
PROVED
ng
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
MPLETED

acement Record (wt.change2.WTChangeActivity2) 1.Persist Info.Object Identifier.Id
acement Record (wt.change2.WTChangeActivity2) 2.Persist Info.Object Identifier.Id

Add Criteria Add Boolean
Add Argument Remove

4. Sub-select Select

Project Task Burn Down Metrics

Condition

- Part 1.Number *Master ECR Affected Objects*
- =
- Multiply
- 10
- Add
- Divide
- Time Difference(days)
 - ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
 - System Date
- Absolute
- Time Difference(days)
 - ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
 - System Date
- Add
- 1
- In String
 - ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
 - APPROVED
- In String
 - ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
 - COMPLETED

Part 1.Number =

$$10 \times \left(\frac{\text{ECT.Need Date} - \text{System Date}}{|\text{ECT.Need Date} - \text{System Date}|} + 1 \right) + \text{In String}(\text{ECT.State}, \text{"APPROVED"}) + \text{In String}(\text{ECT.State}, \text{"COMPLETED"})$$

= 10 X (-1 + 1 + 0 + 0) = **0** if ECT is not APPROVED or COMPLETED and Need Date > Today's Date = **"Late"**

= 10 X (-1 + 1 + 1 + 0) or (-1 + 1 + 0 + 1) = **10** if ECT is not APPROVED or COMPLETED and Need Date > Today's Date = **"Done"**

= 10 X (1 + 1 + 0 + 0) = **20** if ECT is APPROVED or COMPLETED and Need Date < Today's Date = **"Not Late"**

= 10 X (1 + 1 + 1 + 0) or (1 + 1 + 0 + 1) = **30** if ECT is APPROVED or COMPLETED and Need Date < Today's Date = **"Done Early"**

Number	Name
0	1. Late
10	4. Done
20	2. Not Late
30	3. Done Early

WTChangeRequest2) 1.Number 5

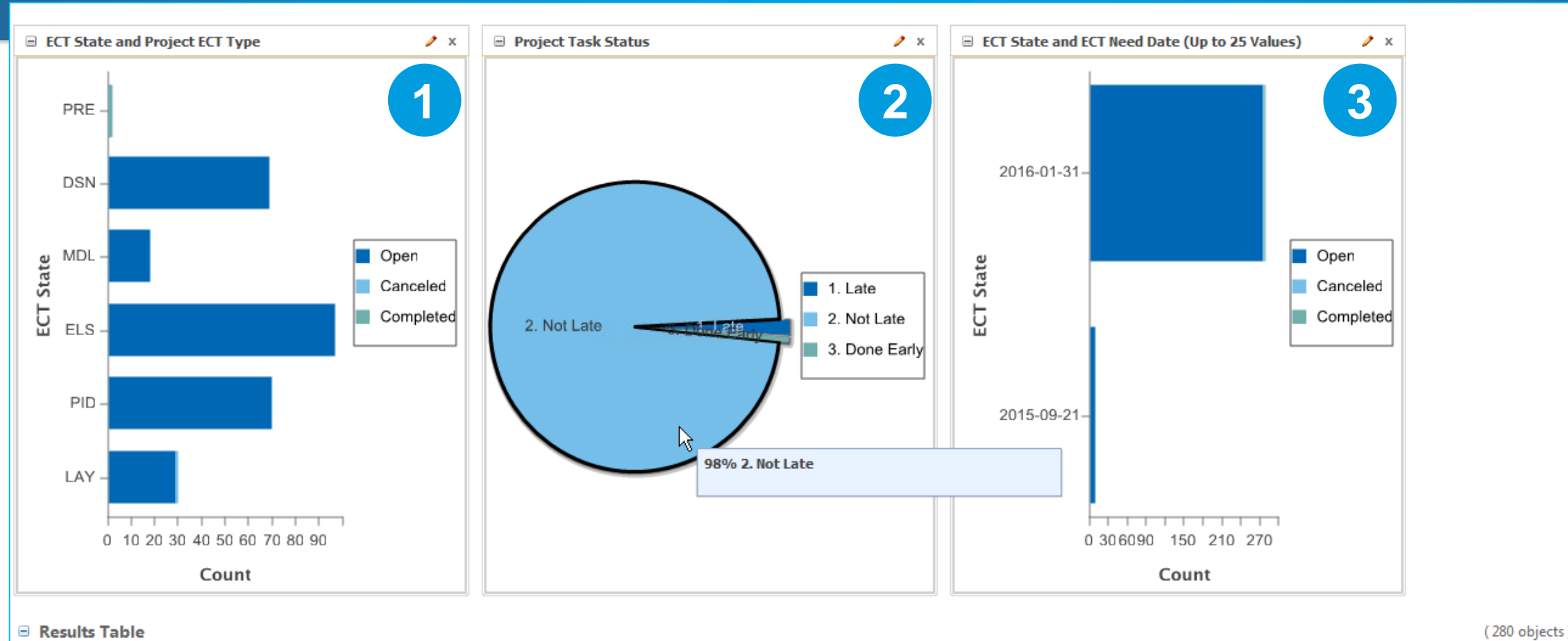
ifference(days)
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
stem Date
te
ne Difference(days)
ECT and Part Displacement Record (wt.change2.WTChangeActivity2) 2.Need Date
System Date

ng
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
PROVED
ng
T and Part Displacement Record (wt.change2.WTChangeActivity2) 2.State
OMPLETED

acement Record (wt.change2.WTChangeActivity2) 1.Persist Info.Object Identifier.Id
acement Record (wt.change2.WTChangeActivity2) 2.Persist Info.Object Identifier.Id

Add Criteria Add Boolean Add Argument Remove

4. Sub-select Select



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3. ECTs Grouped by Need Date with the ability to easily filter our Completed and Canceled ECTs using the Legend.

From | Join | Select | Criteria | Sort | Description

Root Type Instance:

Name	Type	Alias	Outer Join Against
Work Item	wt.workflow.work.WorkItem	Work Item	
Wf Assigned Activity	wt.workflow.work.WfAssignedActivity	Wf Assigned Activity	
Context	wt.inf.container.WTContainer	Context	
Workflow Process	wt.workflow.engine.WfProcess	Workflow Process	
User	wt.org.WTUser	User	
ECR (wt.change2.WTChangeRequest2)	wt.change2.WTChangeRequest2	ECR (wt.change2.WTChangeRequest2)	Work Item
ECT and Part Displacement Record (wt.change2.WTCha...)	wt.change2.WTChangeActivity2	ECT and Part Displacement Record (wt.change2.WTCha...)	Work Item
Team (wt.team.TeamTemplate)	wt.team.TeamTemplate	ECR TeamTemplate	ECR (wt.change2.WTChangeRequest2)
ECN (wt.change2.WTChangeOrder2)	wt.change2.WTChangeOrder2	ECN (wt.change2.WTChangeOrder2)	Work Item
Team (wt.team.TeamTemplate)	wt.team.TeamTemplate	ECN TeamTemplate	ECN (wt.change2.WTChangeOrder2)

1

1. From

- **Note** the liberal use of Outer Join Against Work Item, ECR, and ECN to ensure that any objects that do not have all of the other objects still show up in the report.
- Without the outer joins, the report would only show ECRs with ECNs with ECTs with Tasks, but nothing else.

From | Join | Select | Criteria | Sort | Description

By Link

From	Link	From Role	To Role	To

Add... Remove

2

2. Join

- Note the use of **obscure workflow links** to join a Primary Business Object to a Work Item to a Wf Assigned Activity to a parent Workflow Process.

By Reference

From	Reference	To
Work Item	Source	Wf Assigned Activity
Wf Assigned Activity	Context	Context
Wf Assigned Activity	Parent Process Ref	Workflow Process
Work Item	Ownership.Owner	User
Work Item	Primary Business Object	ECR (wt.change2.WTChangeRequest2)
Work Item	Primary Business Object	ECT and Part Displacement Record (wt.change2.WTChangeActivity2)
ECR (wt.change2.WTChangeRequest2)	Team Template	ECR TeamTemplate
ECN (wt.change2.WTChangeOrder2)	Team Template	ECN TeamTemplate
Work Item	Primary Business Object	ECN (wt.change2.WTChangeOrder2)

1. Select
2. Select (continued)
3. Criteria
4. Sort

From | Join | Select | Criteria | Sort | Description

SELECT Tree

- SELECT Tree
 - Work Item.Ownership.Owner.Full Name: Task Owner
 - Wf Assigned Activity.Name: Activity Name
 - Wf Assigned Activity.State: Activity Status
 - Concatenate: Activity Created (YYYY-MM)
 - Get Year
 - Wf Assigned Activity.Created
 -
 - Left Pad (with spaces)
 - Get Month
 - Wf Assigned Activity.Created
 - 2
 - 0
 - Concatenate: Activity Last Modified (YYYY-MM)
 - Get Year
 - Wf Assigned Activity.Last Modified
 -
 - Left Pad (with spaces)
 - Get Month
 - Wf Assigned Activity.Last Modified
 - 2
 - 0
 - Work Item.Status: Task Status
 - Concatenate: Task Created (YYYY-MM)
 - Get Year
 - Work Item.Created
 -
 - Left Pad (with spaces)
 - Get Month
 - Work Item.Created
 - 2
 - 0

SELECT Editor

- Distinct
- Group By
- Bypass Access Control

Concatenate: Task Last Modified (YYYY-MM)

- Get Year
 - Work Item.Last Modified
-
- Left Pad (with spaces)
 - Get Month
 - Work Item.Last Modified
 - 2
 - 0
- ECT and Part Displacement Record (wt.change2.WTChangeActivity2).Number: ECT Number
- ECT and Part Displacement Record (wt.change2.WTChangeActivity2).Name: ECT Name
- Sub String: Activity Short Name (for Graphing)
 - Wf Assigned Activity.Name
 - 1
 - 17
- ECN (wt.change2.WTChangeOrder2).Number: ECN Number
- ECN (wt.change2.WTChangeOrder2).Name: ECN Name
- Left Trim: ECN Need Date (YYYY-MM)
 - Concatenate
 - Get Year
 - ECN (wt.change2.WTChangeOrder2).Need Date
 -
 - Left Pad (with spaces)
 - Get Month
 - ECN (wt.change2.WTChangeOrder2).Need Date
 - 2
 - 0
 - ECR (wt.change2.WTChangeRequest2).Number: ECR Number
 - ECR (wt.change2.WTChangeRequest2).Name: ECR Name
 - User.Last: Task Owner Last Name
 - User.First: Task Owner First Name
 - User.Name: CWS ID Filter for Task Owner - Pipe Delimited

Add Remove

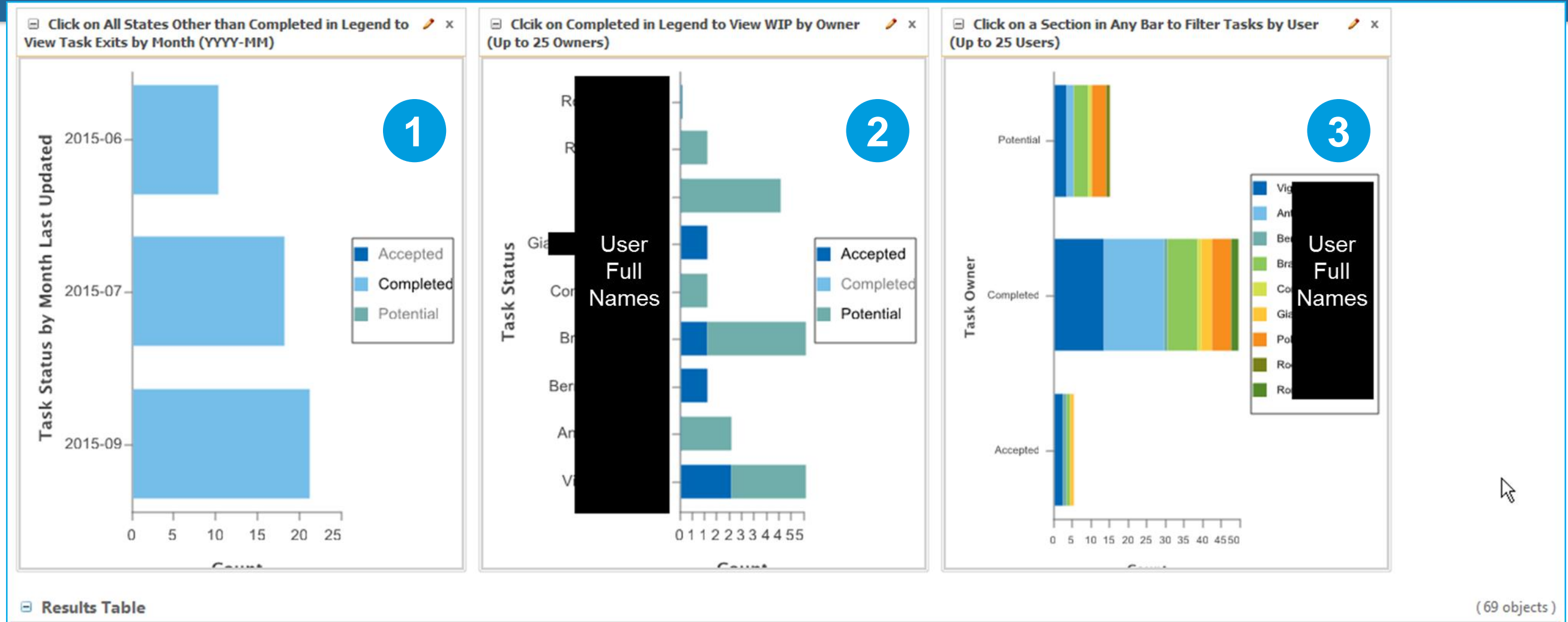
From | Join | Select | Criteria | Sort | Description

Criteria Tree

- Criteria Tree
 - AND
 - Condition
 - Context.Context Name
 - =
 - eConfigurable Context Name

From | Join | Select | Criteria | Sort | Description

Alias Attribute	Order
ECN Need Date (YYYY-MM)	Descending
Task Last Modified (YYYY-MM)	Descending
Activity Last Modified (YYYY-MM)	Ascending
Task Owner Last Name	Ascending
Task Owner First Name	Ascending



1. Task “Last Modified” shows Date Completed when Accepted and Potential are filtered out.
2. WIP Tasks grouped by User when Completed is filtered out.
3. Task Status by User Full Name allows for viewing any one user’s tasks by filtering others out.
 - Often we will exclude exit task in the Query Builder Criteria to only Show Accepted and Potential Tasks.

- **AI Anderson**
 - Enterprise Architect for Front Office & Product Lifecycle Management
 - Solar Turbines Incorporated
 - Anderson_AI_X@solarturbines.com