TFS ASAP – User Guide

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Table of Contents

1 Overview 4
2 Getting started with TFS ASAP 4
2.1 Introduction 4
2.2 Edition Comparison 5
2.3 General Overview 5
2.4 Installation 6
2.4.1 Technical Requirements 6
2.4.2 Administrative Requirements 6
2.4.3 Installation Process 7
2.5 TFS Updates 8
2.6 First Usage 8
2.7 License Activation 9
3 Administering TFS ASAP 10
3.1 Central ASAP Control Page (Home) 10
3.2 Enable/Disable Automations 10
3.3 Manually Triggering Scheduled Automations 11
3.4 Activation of Tracing and Logging 11
4 Using TFS ASAP Automations 13
4.1 General 13
4.1.1 Configuration Location 13
4.1.2 Automation Trigger Types: 13
4.2 Available Automations 15
4.3 Out-Of-The-Box Automations 18
4.3.1 Numeric Aggregation 18
4.3.2 Boolean Aggregation 19
4.3.3 State Aggregation 20
4.3.4 Current Work Automation 21
4.3.5 Remaining Work Automation 23
4.3.6 Consistency Check 25
4.3.7 Classification Copy 26
4.3.8 Daily Status mail 26
4.3.9 Numeric Calculation 29
4.3.10 Advanced Numeric Calculation 30
4.3.11 Suspect Links 31

4.3.12 Destroy Work Item Automation 34
4.3.13 Custom Automations 35
5 Using TFS ASAP Extensions 35
5.1 Available Extensions 36
5.2 Out-Of-The-Box Extensions 37
5.2.1 Work Item Extensions – Latest Test Results 37
5.2.2 Work Item Extensions – Hierarchy 38
5.2.3 Work Item Extensions – Query 39
5.2.4 Work Item Extensions – Timesheet 40
6 Using TFS ASAP global lists 42
6.1 Assigning a global list 42
6.2 Exploring 42
6.3 Rights 44
6.4 Configuration 45
6.5 Working with Process Templates 46

1 Overview

TFS ASAP is a reliable platform for advanced administration and extensions of Microsoft's Team Foundation Server. It serves as a central management location for server-side event-based and scheduled automations such as aggregations as well as administrative extensions such as self-service team project creation and configuration web pages. TFS ASAP is a proven product that will be continuously adapted for future updates and releases of TFS.

Please contact us for more information about the subscription and maintenance options. You will find contact details at the end of the document.

This documentation contains all information which is required to successfully use TFS ASAP. Automated Servicing and Administration Platform (ASAP) is a platform to extend the functionality of Microsoft's Visual Studio Team Foundation Server (TFS) without the need for client-side installations. The main function is to provide work items in TFS with additional rules, which can interact with linked work items. Additional extensions help administering and extending TFS further and are subject to separate documentation.

The purpose of this documentation is to give instructions about how to use TFS ASAP. Therefore it lists all functions and explains some necessary details of the platform.

2 Getting started with TFS ASAP

2.1 Introduction

TFS ASAP uses the TFS Background jobs to process particular automations. To manage the rules which are called automations, TFS ASAP provides a management web site which is hosted within the TFS Web Services via IIS. The management website is shown below:

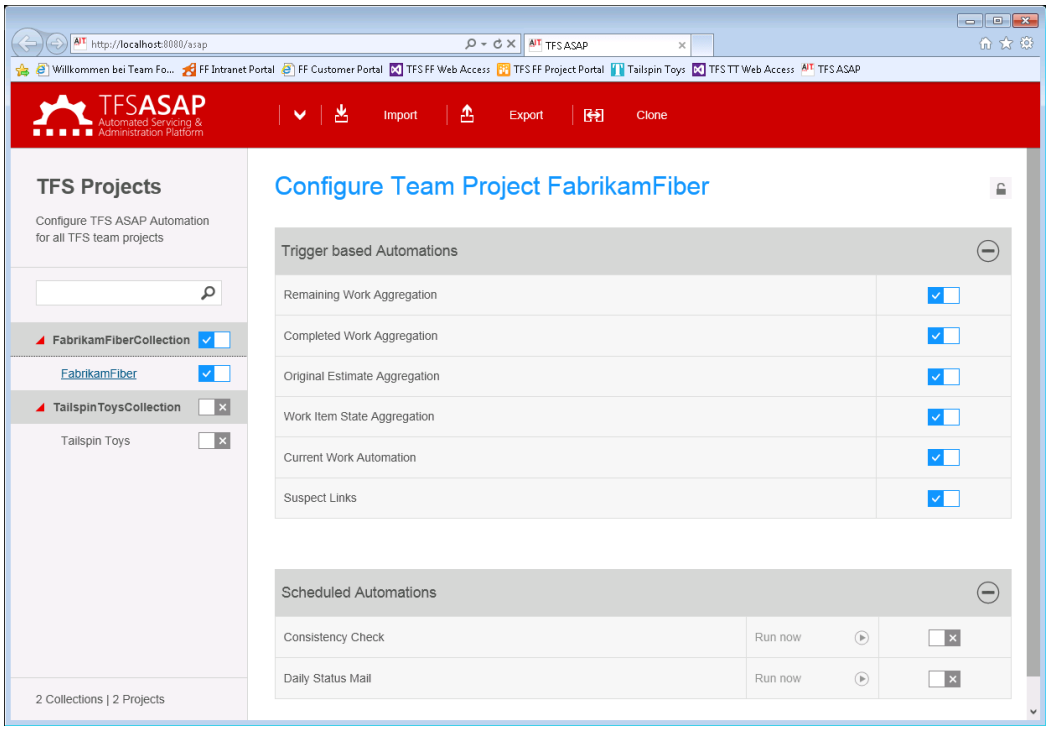


Figure 1 - TFS ASAP's management website

2.2 Edition Comparison

TFS ASAP is provided in different editions. You can see the included functionality of each edition in the comparison chart below.

	TFS ASAP Basic	TFS ASAP Standard	TFS ASAP Enterprise
One License per App-Tier	X	X	
Unlimited App-Tiers			X
Future Updates included	X	X	X
Web based administration	X	X	X
Rule: Numeric Aggregation		X	X
Rule: Boolean Aggregation		X	X
Rule: Current Work Automation		X	X
Rule: Remaining Work Automation	X	X	X
Rule: Suspect links		X	X
Rule: State changes in parent work		X	X
Rule: Scheduled work item e-mail report		X	X
Rule: Consistency check	X	X	X
Rule: Classification Copy		X	X
Rule: Numeric Calculation		X	X
Rule: Advanced Numeric Calculation		X	X
Rule: Suspect Links		X	X
Rule: Destroy Work Item Automation		X	X
Load balancing support	X	X	X
Adaptable configuration	X	X	X
Create your own plugins			X
Additional support available	X	X	X
Global Lists		X	X
Work Item Extensions	X	X	X
Test Result Extensions		X	X

2.3 General Overview

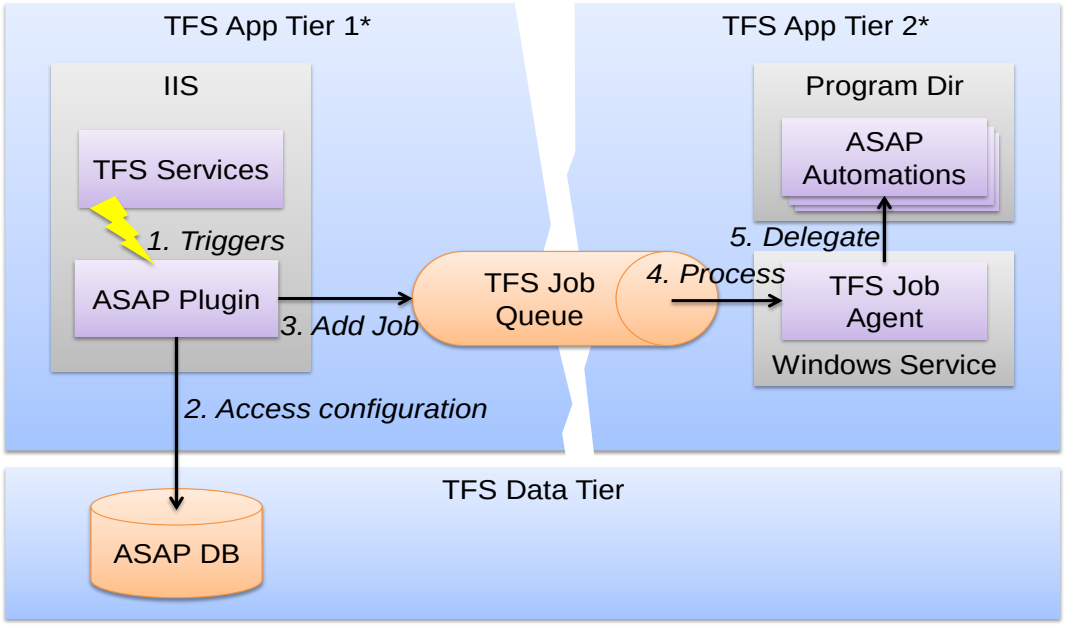
The purpose of the TFS ASAP is to provide a stable platform that can be used to implement all kinds of automations running on TFS app-tiers. Parts of TFS ASAP are implemented as an extension for the official TFS Server extensions API. Therefore this plugin is deployed directly into the TFS server process.

The plugin is responsible for creating a registration for all event types for which the platform shall execute automations. In order to execute the actual automations asynchronously, the plugin is also responsible for the persistence of the change events and the dispatching of the change events to the TFS Job Agent.

The TFS web services which are hosted by the IIS are only supposed to execute direct user interactions. In order to execute recurring or long running jobs asynchronously, TFS offers the TFS Job Agent. TFS ASAP extends the TFS Job Agent to execute the actual automations asynchronously.

The job agent extension is responsible to load the stored change events from the database and finally dispatch all the events to the corresponding automation objects.

During the initialization phase the TFS ASAP will create a new Database on the TFS Data Tier. This database is used to temporarily store all received notification events so that the job agent extension can pick up the change events asynchronously. This enables consistent job execution even in cases of server reboots or other interruptions of TFS services.



*) Load balancing the TFS jobs is part of TFS features. App-tier selection is not influenced by TFS ASAP

Figure 2 - TFS ASAP technical schema

2.4 Installation

2.4.1 Technical Requirements

- Windows OS with Visual Studio Team Foundation Server installed

2.4.2 Administrative Requirements

- Knowledge about the usage and customization of work items
- *Administrative* permissions both on all TFS app-tier machines and in TFS (Team Foundation Administrative Console Users)
- *Sysadmin* role in TFS data tier (SQL Server) – this is the default for Team Foundation Administrative Console Users but could be changed by your SQL admin
- An *sa* user in SQL Server that is *sysadmin* and *dbowner* of *master* database (can be deactivated)

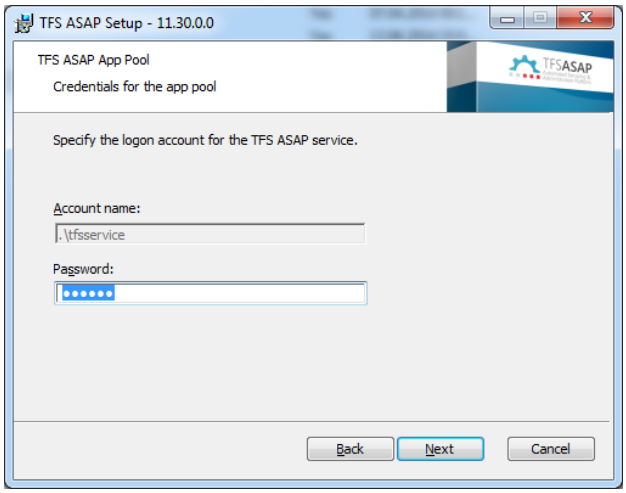
2.4.3 Installation Process

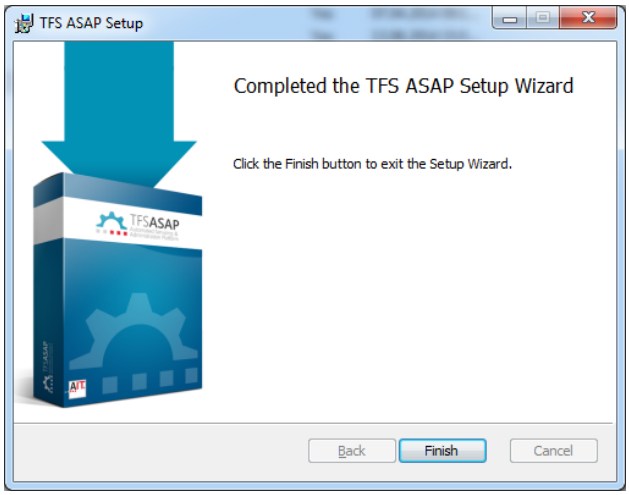
TFS ASAP needs to be installed (and licensed) on all TFS app-tiers separately. During the setup process, a short interruption of TFS services will occur. All current connections to TFS will be cancelled. Since TFS works based on a transactional data access model, no inconsistencies will appear due to the interruption. However, all of your running builds may be aborted!

Start the TFS installation and follow instructions.

1. Launch TFS ASAP.msi

2. Go through the setup wizard (read and accept the license agreement and provide the credentials for your TFSSERVICE account)





3. Navigate to the management website by following the instructions of the next section

2.5 TFS Updates

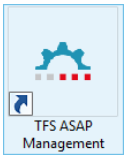
TFS ASAP will be partially uninstalled during TFS update installations. You need to make sure that you to have the current setup of TFS ASAP available prior to any TFS updates!

Due to the easy no-parameter deployments, TFS ASAP will not work correctly after a TFS update installation. You will need to uninstall TFS ASAP before any TFS update and install the current version of TFS ASAP after the TFS update has finished in order to have everything working correctly.

2.6 First Usage

Initially, after installing TFS ASAP all automations are disabled by default. Therefore, TFS ASAP has to be configured for usage. The configuration values can be changed using the management website.

1. To reach the management website you can use the link which is installed at the desktop or the start menu called “TFS ASAP Management”.



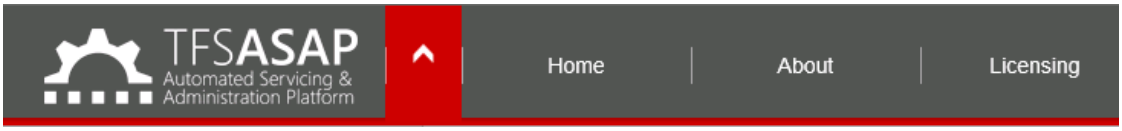
2. It’s opening your web browser and entering the URL under which your TFS is running (in this sample TFS is running under “localhost”). Instead of URL postfix “tfs”, use “asap” in order to open the management website manually.

3. If your TFS ASAP installation was successful and the TFS Service is running, you should see the management web site of TFS ASAP.

2.7 License Activation

To use your installation of TFS ASAP, you have to activate your license. Otherwise none of your automations are working.

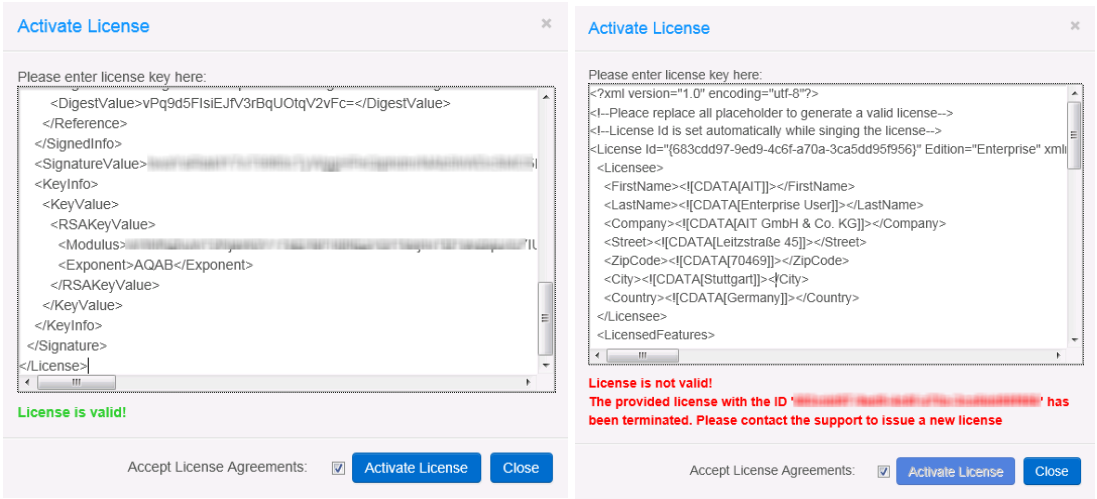
1. To activate your license, use the main menu “Licensing” link.



2. Click “Activate License”

If you do not see the *Activate License* button, you may not have the right permissions. You must be a member of the Team Foundation Administrators role in order to be able to activate the license!

3. Follow the given instructions to activate your license:
   a. Accept License Agreements
   b. Enter (Paste) your license
      - The license will be validated automatically
      - If your license is valid, the license activation button will be enabled
      - If your license is invalid, an error message will be shown.
   c. Click “Activate License”



4. If you’d like to print the license agreement, at any time choose the menu item “License Agreements” on the home page. The license agreement will be shown with an option for printing it.

3 Administering TFS ASAP

3.1 Central ASAP Control Page (Home)

The management web site offers options to configure automations on team project collection level, on team project level and on individual rule level within each team project. Basically, you can enable or disable the automations at each level mentioned.

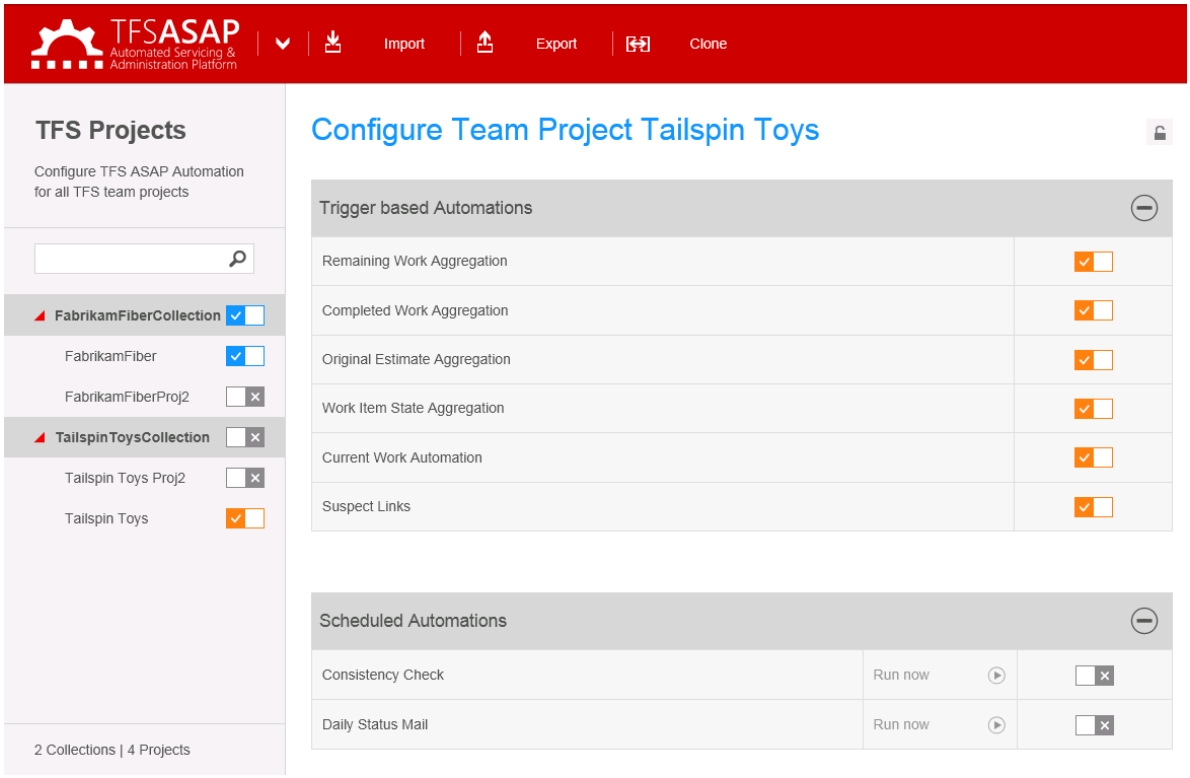


Figure 3 - ASAP management website - Home

3.2 Enable/Disable Automations

On the left-hand side, the side bar displays all the TFS team projects grouped by their team project collection. Using the (On/Off)-Buttons the automations can be switched on or off at the according level. If you'd like to activate or deactivate all automations for only a particular project, you can do this by using the button behind the project name.

In order to enable/disable the automations on collection level you have to be a member of the TFS group "Project Collection Administrators".

By selecting a project, an overview is shown with all automations and their configuration for the selected project. According to the logic of the automation activation for projects, you can control the activation of an individual automation for the selected project.

	Blue	The Automation is enabled.
	Orange	The Automation is deactivated because it is disabled at a higher level (TFS team project or team project collection).
	Grey	The Automation is disabled.

3.3 Manually Triggering Scheduled Automations

Scheduled Automations are only running in a certain timespan. To force an update of the work items it is possible to manually trigger the particular automations. Choose the automation you'd like to trigger and press "Run now".

3.4 Activation of Tracing and Logging

TFS ASAP offers comprehensive logging and tracing support. The logging and tracing support of the automation service platform is built on top of the standard .NET Framework tracing and logging mechanisms. Therefore every built in TraceListener can be used to write log information. In this case, we are using the Windows Event Viewer.

Open Windows Logs -> Application.

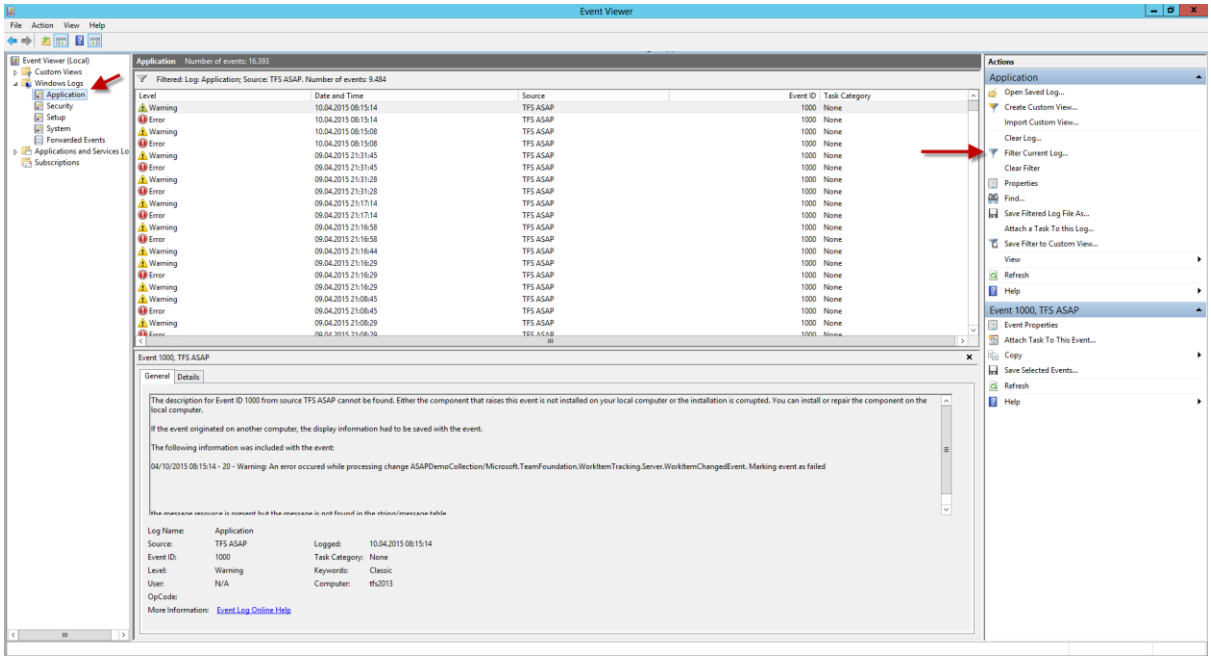


Figure 4 – Event Viewer – Application View

Then set the Filter to TFS ASAP. You should see all Events on Warning and Error Level triggered by TFS ASAP.

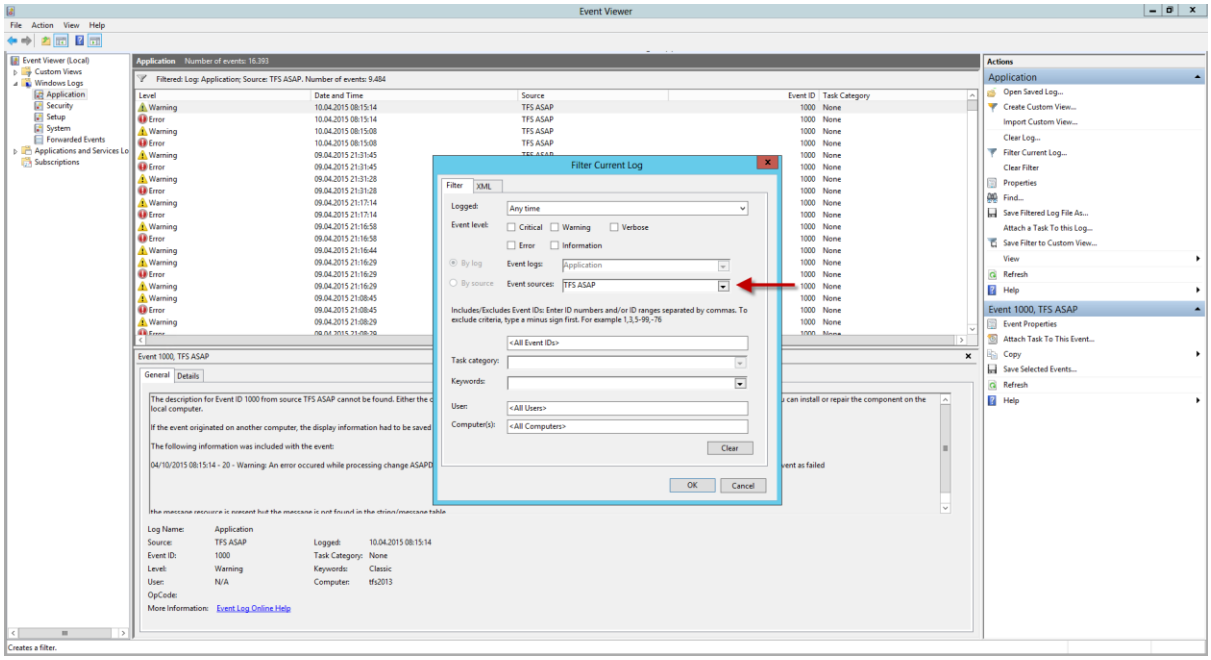


Figure 5 – Event Viewer – Application View with Filter

4 Using TFS ASAP Automations

4.1 General

Each configuration needs to be done on all TFS app-tiers with TFS ASAP installed!

The actual rules that are executed by TFS ASAP can be configured in an XML file. The XML file itself is loaded at runtime:

```
<Automation ID="{128C40DA-B2B6-40B5-8AD7-
907B01DD4B86}" DisplayName="Current Work Automation" name="AIT.ASAP.Automation.TriggeredAutoma
tions.WorkItemAutomations.Common.Configuration.CurrentWorkAutomationConfiguration, AIT.ASAP.Au
tomation.TriggeredAutomations.WorkItemAutomations.Common">
  <CurrentWork>Custom.CurrentWork</CurrentWork>
  <!-- Optional: System.ChangedDate used by default -->
  <WorkDate>Custom.CurrentWorkDate</WorkDate>
  <RemainingWork>Microsoft.VSTS.Scheduling.RemainingWork</RemainingWork>
  <CompletedWork>Microsoft.VSTS.Scheduling.CompletedWork</CompletedWork>
  <!-- Optional: default "h" -->
  <EffortUnit>hours</EffortUnit>
</Automation>
```

The configuration file contains sections for each automation. Every automation configuration has the following parameters:

- ID: A unique ID used to identify the automation
- DisplayName: The name of the automation shown on the management website
- Name: The fully qualified class name of the configuration object that has to be loaded
- The inner XML will be injected into the automation configuration object to provide the configuration values

You should only change the inner configuration values in Standard edition. Do not edit the attributes ID, DisplayName or Name of the Automation element! This is only supported in Enterprise edition!

4.1.1 Configuration Location

The configurations for the automations can be found under the following path (on each TFS app tier):

```
%ProgramFiles%\AIT\TFS ASAP\Automation
```

- AutomationsConfig.xml: All trigger based automations
- ScheduledAutomationsConfig.xml: All scheduled Automations

4.1.2 Automation Trigger Types:

Trigger Based:
Trigger based automations are processed when a work item has been changed and the conditions of any automation are met. By changing a work item, a server-side event is fired.

TFS ASAP is notified about this event and checks the changes and the conditions whether certain automations have to be processed.

Scheduled:
These automations are processed automatically in a specified time interval. The recurring frequency is defined in the configuration files for the automation.

Every available “scheduled automation” must have additional properties:

- Scheduled: The actual schedule for the automation
  - StartDate: The first time when the scheduled automations shall be started
  - RecuringFrequencey: The recurring frequency in seconds

```
<Automation ID="{824E6030-F57B-11E0-8E4D-
8B204924019B}" DisplayName="Daily Status Mail" name="AIT.ASAP.Automation.ScheduledAutomations.
Common.Configuration.EmailAlertsAutomationConfiguration, AIT.ASAP.Automation.ScheduledAutomati
ons.Common">
  <Schedule StartDate="10/1/2011" RecurringFrequency="86400"/>
  <MailMessage Subject="%COLLECTION% - %PROJECT% - Daily Status Mails"/>
  <Query Header="My Work Items">Select [System.ID], [System.WorkItemType], [System.State], [Sy
stem.Title] FROM WorkItems where [System.TeamProject] = @project and [System.AssignedTo] = @me
 order by [System.State], [System.WorkItemType], [System.Id]</Query>
</Automation>
```

4.2 Available Automations

*) This automation needs customization in the process template. The default process templates provided with TFS aren't working with this automation.

**) This automation needs additional configuration in order to work correctly. Otherwise you might get errors.

Automation Name	Description	Automation Example	Trigger	Custom*	Config**	Samples
Numeric Aggregation	Aggregation of numeric field across hierarchies with operations: Add, Multiply	Completed Work Aggregation: Work item P1 has two children C1 and C2. C1 has 20h in field completed work. C2 has 10h in field completed work. P1 is automatically set to 30h.	WI Changed	N	N	4.3.1.1 4.3.1.2 4.3.1.3
Boolean Aggregation	Aggregation of Boolean values (Yes/No or True/False) with operations: And, Or	Blocked Aggregation: Sets the Blocked field of parent work item to "Yes" in case at least one child is set to "Yes"	WI Changed	N	N	4.3.2
State Aggregation	Aggregation of states over related work items.	Work Item State Aggregation: Work item P1 has to children C1 and C2. All items are in state active. C1 and C2 are set to the state Closed. P1 is automatically set to the state Resolved.	WI-Changed	N	N	4.3.3
Current Work	Tracks the work and automatically assign it to a date.	Current Work Automation Track efforts with Current Work and Work Date for a distinct date (not only for current date).		Y	N	4.3.4 TFS Blog
Remaining Work	Increases completed work when remaining work is decreased.	Remaining Work Automation Task item P1 has Remaining Work set to 10h and Completed Work set to 4h. Remaining Work is reduced by 7h to 3h. Completed Work is automatically set to 11h.	WI-Changed	N	N	4.3.5

Automation Name	Description	Automation Example	Trigger	Custom*	Config**	Samples
Consistency Check	Incremental or full consistency check for the automation rules	Consistency Check: This automation ensures a consistent state of all work items that might be inconsistent due to unfired events or blocking changes. It checks for such events and retries execution (incremental check). It's also possible to do a full consistency check, which reprocesses the chosen automation for all work items (potentially long running process).	Scheduled or Manually	N	N	4.3.6
Classification Copy	Copies a specified Area Path level to a custom field in order to work with rules based on Area Path	Area Path Copy: Set the AssignedTo field to a default value based on the Area Path selected. The automation will copy the first level Area Path value into a custom field "Custom.Subproject". Custom work item rules are configured for the AssignedTo field.	WI-Changed	Y	Y	4.3.7
Scheduled Email Query Report	Sends a query result list via mail on a daily basis.	Daily Status Mail: Sends a daily mail to each user that shows the list of all open tasks in all projects of TFS. Only in case at least one work item matches the query, the mail is sent.	Scheduled or Manually	N	Y	4.3.8
Numeric Calculation	Executes numerical calculations for values from different fields into one field within the same work item. Supported: Addition, Multiplication and Subtraction	Analyze-Implement-Test-Efforts: Sum up efforts of separate fields for analysis, implementation and test efforts into completed work.	WI-Changed	Y	Y	4.3.9
Advanced Numeric Calculation	Extends the numeric calculation with source field severity and threshold.	Issue Ranking (Calculated): Multiplies several kinds of issue classification numbers to get a ranking.	WI-Changed	Y	Y	4.3.10

Automation Name	Description	Automation Example	Trigger	Custom*	Config**	Samples
Suspect Links	Marks work items as "suspected" in case of relevant changes in linked work items	Suspected Requirements: In case of changes to relevant requirements fields (description, title), all child and affected work items will be marked as "suspected" – that is, the custom Suspected field will be set to "Yes" and a link of type "suspected by" is created.	WI-Changed	Y	Y	4.3.11
Custom Automation	 Enterprise edition only!	Build your own automations…	WI-Changed or Scheduled	Y	Y	Separate guide

4.3 Out-Of-The-Box Automations

4.3.1 Numeric Aggregation

Numeric Aggregation means that the values of linked work items are aggregated in a certain way. For numeric aggregations the available aggregations are: **ADDITION and MULTIPLCATION.** This can be used to adding up all sub items to parent items, for example estimated work of several child tasks to their parent requirement.

Configuration for numeric aggregations is as follows:

```
<Automation ID="{DDFCFE4C-3834-4AA9-B271-
D090AB57B174}" DisplayName="Aggregate Original Estimate" name="AIT.ASAP.Automation.TriggeredAu
tomations.WorkItemAutomations.Common.Configuration.NumericAggregationAutomationConfiguration,
AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Common">
    <SourceField>Microsoft.VSTS.Scheduling.OriginalEstimate</SourceField>
    <DestinationField>Microsoft.VSTS.Scheduling.OriginalEstimate</DestinationField>
    <LinkType ReferenceName="System.LinkTypes.Hierarchy" ForwardName="Child" ReverseName="Pare
nt"/>
    <AggregateValuesTo>Parent</AggregateValuesTo>
    <DefaultValue>0</DefaultValue>
    <Operation>Add</Operation>
  </Automation>
```

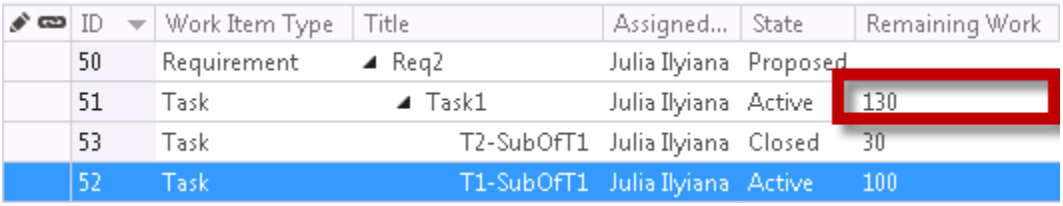
With the following Xml elements:

Xml Element	Description
SourceField	The reference name for the source field of the source work item
DestinationField	The reference name for the destination field of the destination work item
LinkType	The link type to follow for aggregation
AggregateValuesTo	The link direction name to aggregate values to
DefaultValue	The default value in case the aggregated numeric value is not a number or null
Operation	The operation for aggregation “Add” or “Mul”.

4.3.1.1 Remaining Work Aggregation

This automation aggregates the content of the field “Remaining Work” of a work item. The aggregation process keeps on going up the tree from leafs till the root.

ID	Work Item Type	Title	Assigned...	State	Remaining Work
50	Requirement	◢ Req2	Julia Ilyiana	Proposed	
51	Task	◢ Task1	Julia Ilyiana	Active	30
53	Task	T2-SubOfT1	Julia Ilyiana	Closed	30
52	**Task**	**T1-SubOfT1**	**Julia Ilyiana**	**Active**	**100**



ID	Work Item Type	Title	Assigned...	State	Remaining Work
50	Requirement	Req2	Julia Ilyiana	Proposed	
51	Task	Task1	Julia Ilyiana	Active	130
53	Task	T2-SubOfT1	Julia Ilyiana	Closed	30
52	Task	T1-SubOfT1	Julia Ilyiana	Active	100

4.3.1.2 Completed Work Aggregation

This automation aggregates the field “Completed Work Aggregation”. It works similar to the “Remaining Work Aggregation”-Automation.

4.3.1.3 Original Estimate Aggregation

This automation aggregates the field “Original Estimate”. It works similar to the “Remaining Work Aggregation”-Automation.

4.3.2 Boolean Aggregation

Boolean Aggregation means that values of linked work items, which contain Boolean values (Yes/No or True/False), can be aggregated. For Boolean aggregations the available aggregations are: **AND** and **OR.**

Configuration for boolean aggregations is as follows:

```
<Automation ID="{DDFCFE4C-3834-4AA9-B271-D090AB57B175}" DisplayName="Blocked Aggregation"
name="AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Common.Configuration.BooleanAggregationAutomationConfiguration,
AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Common">
  <SourceField>Microsoft.VSTS.CMMI.Blocked</SourceField>
  <DestinationField>Microsoft.VSTS.CMMI.Blocked</DestinationField>
  <LinkType ReferenceName="System.LinkTypes.Hierarchy" ForwardName="Child"
ReverseName="Parent"/>
  <AggregateValuesTo>Parent</AggregateValuesTo>
  <DefaultValue>No</DefaultValue>
  <Operation>Or</Operation>
</Automation>
```

With the following Xml elements:

Xml Element	Description
SourceField	The reference name for the source field of the source work item
DestinationField	The reference name for the destination field of the destination work item
LinkType	The link type to follow for aggregation
AggregateValuesTo	The link direction name to aggregate values to
DefaultValue	The default value in case the aggregated Boolean value is not a Boolean
Operation	The operation for aggregation “And” or “Or”.

4.3.2.1 Blocked Aggregation

This can be used to aggregate values from child items to their parent item. For example if all subtasks are set to Blocked = “Yes”, the parent task also (automatically) changes to Blocked = “Yes”.

4.3.3 State Aggregation

4.3.3.1 Active/Closed State Aggregation

This automation aggregates the field “State” of work items. To aggregate as expected it needs to be configured by the user. The shipped default configuration aggregates the states “Active” and “Closed” to its parent work items.

For example if the last child of a work item (T1-SubOfT1) is changed to state “Closed”, the parent (Task1) will automatically be set to “Resolved”. If any child gets reactivated, also the parent will be changed back to active.

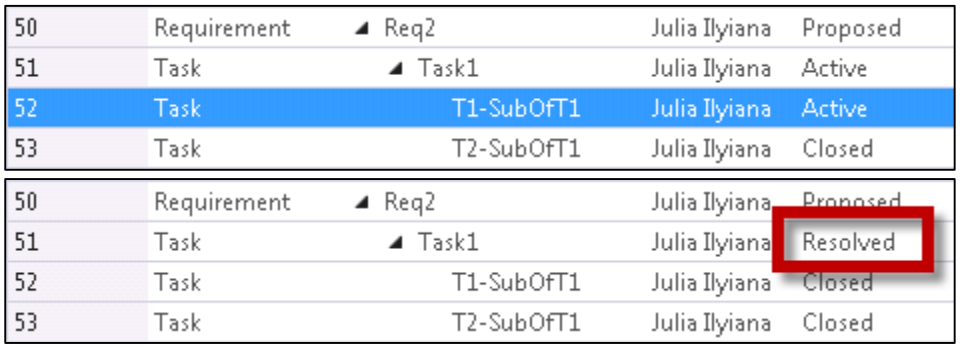


Figure 6 - Sample hierarchy with aggregated state value “Resolved” after all children have been set to “Closed”

```
<Automation ID="{0FED142F-FAA4-4DE2-9D96-
E88BF397571F}" DisplayName="Aggreate Work Item State (CMMI)" name="AIT.ASAP.Automation.Trigger
edAutomations.WorkItemAutomations.Extended.Configurations.StateAggregationAutomationConfigurat
ion, AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Extended">
    <SourceField>System.State</SourceField>
    <DestinationField>System.State</DestinationField>
    <LinkType ReferenceName="System.LinkTypes.Hierarchy" ForwardName="Child" ReverseName="Pare
nt"/>
    <AggregateValuesTo>Parent</AggregateValuesTo>
    <ChildStates Scope="All">
      <State>Closed</State>
      <State>Resolved</State>
    </ChildStates>
    <NewParentState>
      <OnRuleEnter>
        <State WorkItemType="*">Resolved</State>
      </OnRuleEnter>
      <OnRuleLeave>
        <State WorkItemType="*">Active</State>
      </OnRuleLeave>
    </NewParentState>
  </Automation>
```

To adjust the configuration or add another aggregation, see the following possible values for the configuration:

<table>
<tr><th>Xml Element</th><th>Description</th></tr>
<tr><td>SourceField</td><td>The reference name for the source field of a work item</td></tr>
<tr><td>DestinationField</td><td>The reference name for the destination field of a work item</td></tr>
<tr><td>LinkType</td><td>The link type between work items for which this automation is meant.
<table>
<tr><td>ReferenceName:</td><td>The reference name for the source field of a work item</td></tr>
<tr><td>ForwardName:</td><td>Name of the link at the source work item. This name appears when you add links to the source work item.</td></tr>
<tr><td>ReverseName:</td><td>Name of the link at the target work item. This name appears when a listing of the links at the target work item appears.</td></tr>
</table></td></tr>
<tr><td>AggregateValuesTo</td><td>Direction where the automation should go. (ForwardName or ReverseName)</td></tr>
<tr><td>ChildStates</td><td>Defines for which source states and when to process the automation.
<table>
<tr><td>Scope</td><td>Defines the scope for which the state are checked</td><td>All: All work items in one state
Any:
Any of the work items is in that state</td></tr>
</table>
State: The states on which the automation should be processed</td></tr>
<tr><td>NewParentState</td><td>The state changes which should be made to the destination Field.</td></tr>
<tr><td>OnRuleEnter</td><td>Defines the state the parent should be changed to if the child conditions are true.
WorkItemType uses reference names of work items and filters the work items for which the state change is valid. ‘*’ is a wildcard and means all types of work item references.</td></tr>
<tr><td>OnRuleLeave</td><td>Defines the state the parent should be changed to, if the child conditions are not true.
WorkItemType uses reference names of work items and filters the work items for which the state change is valid. ‘*’ is a wildcard and means all types of work item references.</td></tr>
</table>

4.3.4 Current Work Automation

This automation allows time tracking for persons who work with a work item. It automatically adds the current work to the completed work field. Therefore the completed work field should be disabled, and can only be changed through the automation or influenced through the current work field.

With further adjustments and as soon as the user has entered a value in the current work field, another field for choosing the date appears. The user can now enter the date he’d like to use to track the current work.

To actually see who was working when on this item an overview can be given by a time sheet report.

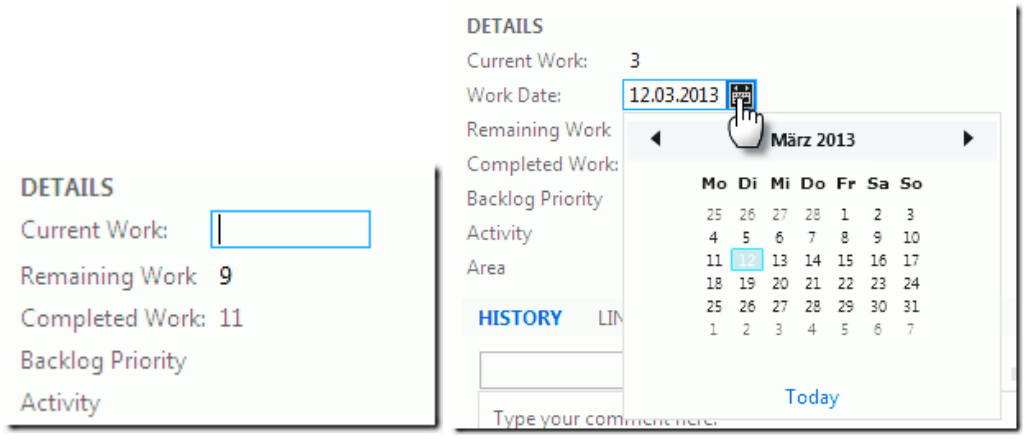


Figure 7 - Only Current Work and Remaining Work can be edited (Work Date only shows when Current Work entered)

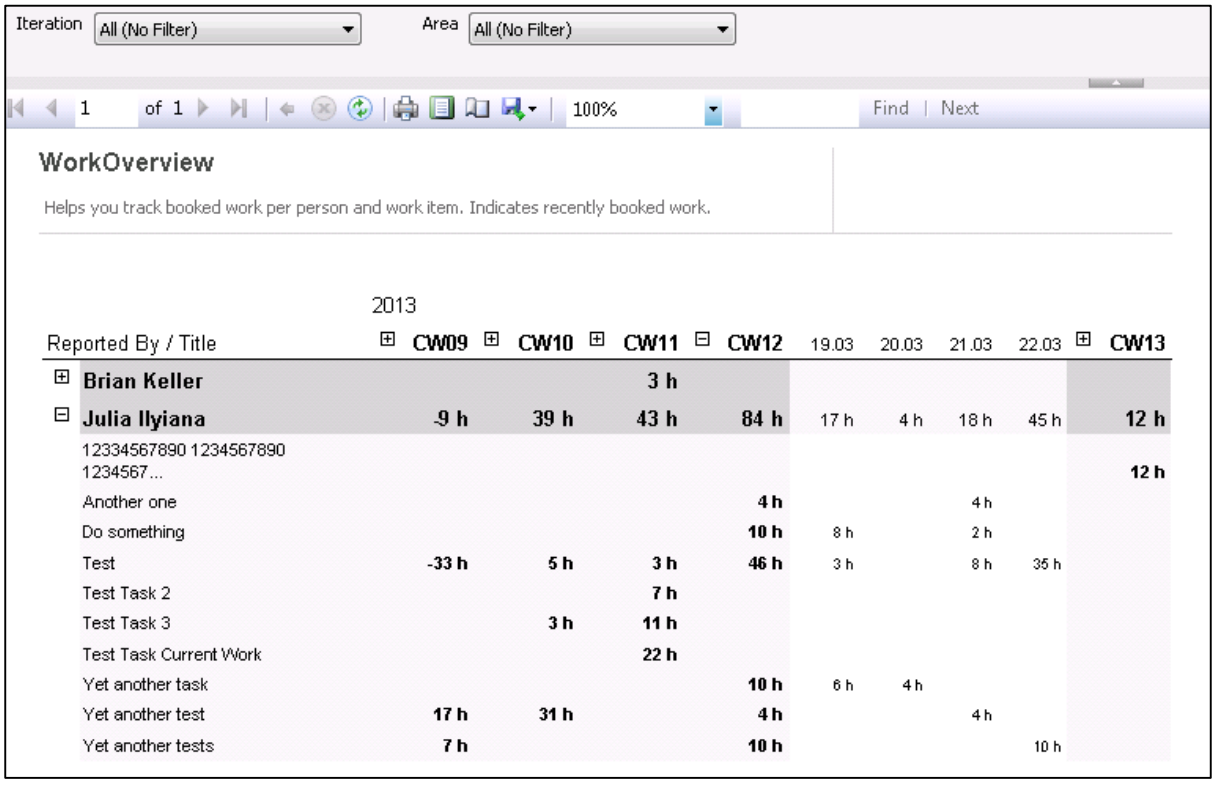


Figure 8 - Time sheet report

```
<Automation ID="{128C40DA-B2B6-40B5-8AD7-
907B01DD4B86}" DisplayName="Current Work Automation" name="AIT.ASAP.Automation.TriggeredAutoma
tions.WorkItemAutomations.Common.Configuration.CurrentWorkAutomationConfiguration, AIT.ASAP.Au
tomation.TriggeredAutomations.WorkItemAutomations.Common">
  <CurrentWork>Custom.CurrentWork</CurrentWork>
  <!-- Optional: System.ChangedDate used by default -->
  <WorkDate>Custom.CurrentWorkDate</WorkDate>
  <RemainingWork>Microsoft.VSTS.Scheduling.RemainingWork</RemainingWork>
  <CompletedWork>Microsoft.VSTS.Scheduling.CompletedWork</CompletedWork>
  <!-- Optional: default "h" -->
  <EffortUnit>hours</EffortUnit>
</Automation>
```

The configuration elements are described below:

Xml Element	Description
CurrentWork	The reference name for the current work field of a work item (user input)
WorkDate	The reference name for the work date field of a work item (user input)
RemainingWork	The reference name for the Remaining Work field of a work item used to subtract the current work value from.
CompletedWork	The reference name for the Completed Work field of a work item used to add the current work value to.
EffortUnit	Defines the unit with which Current Work values will be annotated inside the history comment that is created for each change.

In order to enable this automation, several process template customizations have to be done:

1. Download the work item type definitions and report definitions for Current Work.

2. Upload all of your changes to the team projects you want Current Work to be enabled for. For more information see: http://msdn.microsoft.com/en-us/library/vstudio/ms243782.aspx

4.3.5 Remaining Work Automation

The project task board is one of the most important tools during an iteration to discuss the current state and the upcoming tasks. It is often used to directly reduce Remaining Work values, i.e. during the daily standup meeting.

If the team uses a process template that also tracks Completed Work, e.g. to find deviations between the original estimation and actual work, each team member has to set Completed Work on task level as well. For instance, if Remaining Work was 10h and Completed Work was 4h and user reduces Remaining Work by 7h to 3h, the other field values remain the same (see Figure 9 and Figure 10).

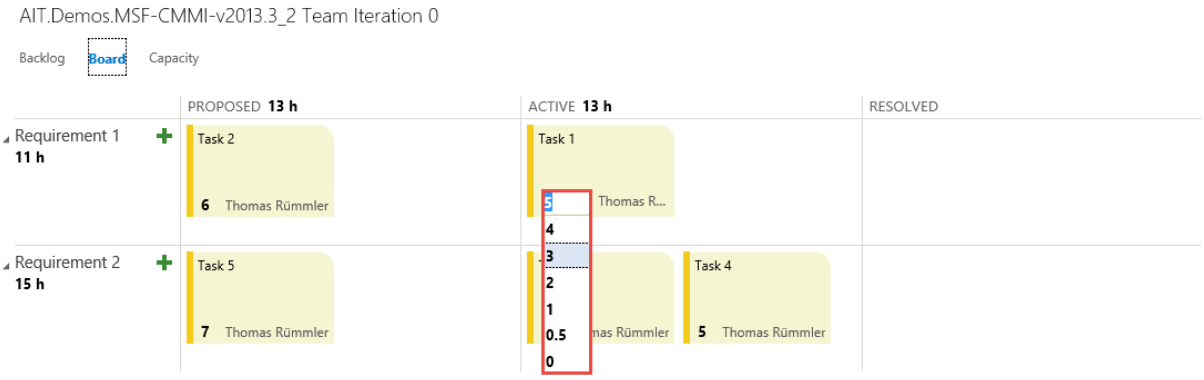


Figure 9 - Changing remaining work using the Task Board

Figure 10 - Inconsistent effort fields

As the screenshot above unveils, completed work field is still set to 4h. If the user had no impediments so that Completed Work shall be increased by the same value the Remaining Work difference, manual action by the user is needed. Otherwise the fields are inconsistent and hence worthless for downstream analysis.

This automation simplifies updating of the time fields. In case when Remaining Work value is decreased and Completed Work value is not manually updated, Completed Work is automatically increased with the value of the difference between old and new Remaining Work values.

For example, if Remaining Work was 10h and Completed Work was 4h and user reduces Remaining Work by 7h to 3h and leave Completed Work unchanged, Completed Work will be updated with the difference (7h) and will have the value 11h (4h+7h) (see Figure 11 and Figure 12).

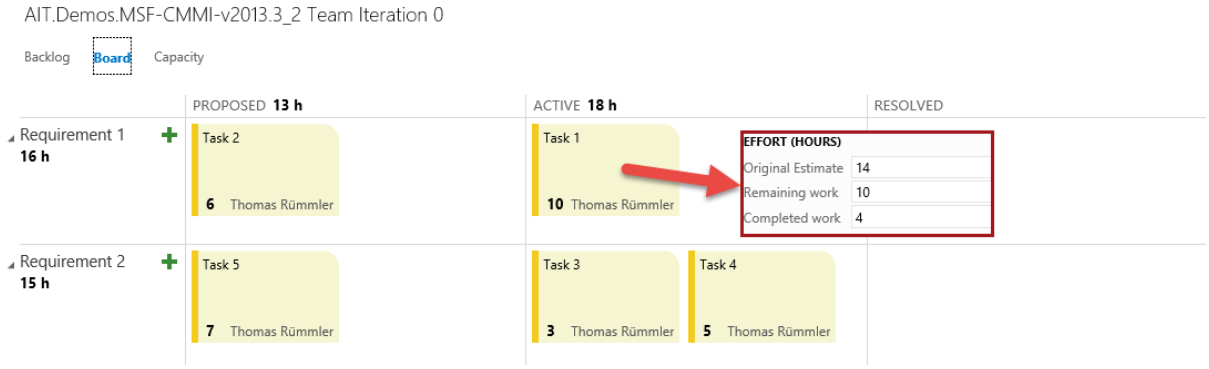


Figure 11 - Task Board and Effort fields before changing Remaining Work

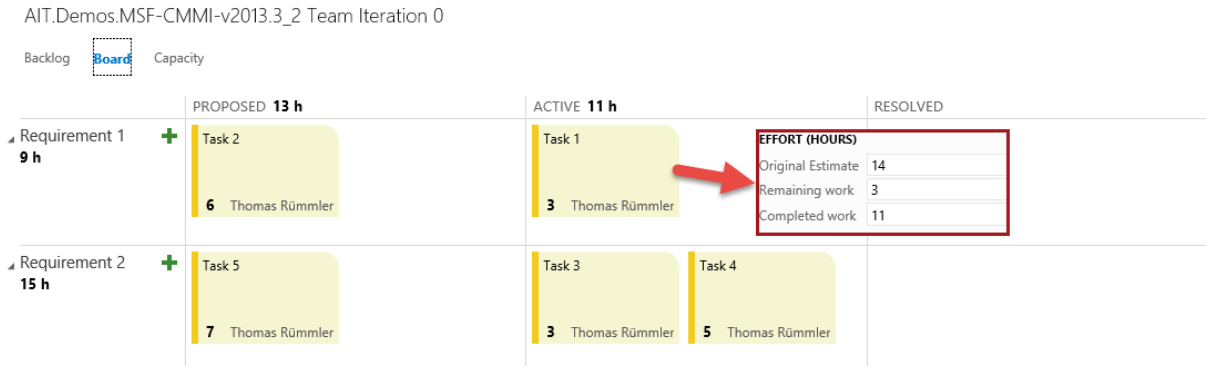


Figure 12 - Task Board and Effort fields after changing Remaining Work

TFS ASAP and TFS ASAP Online is taking care of calculating Completed Work field in the happy day scenario. Hence, in most cases, the developer only has to maintain Remaining

Work without any further manual effort. This reduces manual work and avoids mistakes and inconsistencies.

Configuration:

```
<Automation ID="{1B93867D-C01C-447B-9646-EF3D03E5A2C5}" DisplayName="Remaining Work Automation (CMMI and Agile)"
name="AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Common.Configuration.RemainingWorkAutomationConfiguration, AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Common">
    <WorkItemType>Task</WorkItemType>
    <RemainingWork>Microsoft.VSTS.Scheduling.RemainingWork</RemainingWork>
    <CompletedWork>Microsoft.VSTS.Scheduling.CompletedWork</CompletedWork>
</Automation>
```

The configuration elements are described below:

Xml Element	Description
WorkItemType	The type of the work item on which this automation can be used.
RemainingWork	The reference name for the Remaining Work field of a work item.
CompletedWork	The reference name for the Completed Work field of a work item used to add the difference between old and new Remaining work value to.

4.3.6 Consistency Check

The Consistency Check is used to ensure that all the information which is applied by an automation is in a consistent state. There are two modes:

- Incremental Consistency Checks based on a schedule
- Full consistency checks that can be triggered manually via management website

4.3.6.1 Incremental Consistency Check

The Consistency Check handles all failed events or events which haven't been processed due to service interruptions, validation errors or alike. Those failed events are still kept within TFS ASAP database. Based on a schedule the incremental consistency check will pick up the failed automations and issues a re-execution. Typically the incremental consistency check gets executed once per day. The schedule itself can be configured if a higher or lower frequency is desired.

4.3.6.2 Full Consistency Check

The full consistency check is used to ensure that the information is in a consistent state without being dependent on events. Typically the full consistency check is used to provide an initial population of aggregated values for instance.

The execution of a full consistency check is a length operation because many artifacts may have to be processed. Therefore the full consistency check will not be executed automatically. Furthermore the full consistency check is triggered per automation and not for all automations per se.

The full consistency check can be triggered using the management website using the "Run Now" button. Once the "run now" button is pressed a new dialog will appear. In this dialog you can select for which automations a full consistency check shall be executed.

Figure 13- Run Now Button

4.3.7 Classification Copy

This automation copies the value of a specified Area Path level to a custom field within the same work item. This way, custom work item rules can be configured based on the selected Area Path which is not possible out-of-the-box in TFS.

For instance, you could have the AssignedTo field set to a default value based on the Area Path selected. The automation will copy the first level Area Path value into a custom field "Custom.Subproject". Custom work item rules are configured for the AssignedTo field.

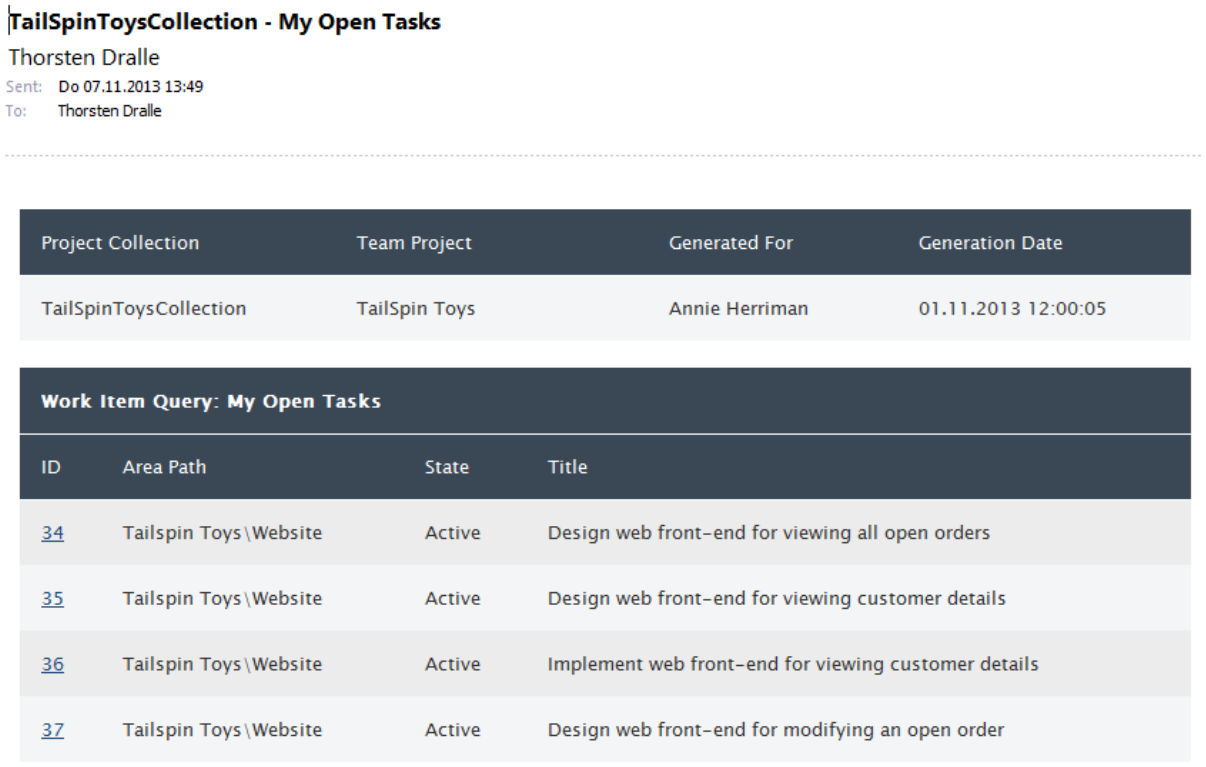
```
<Automation ID="{4CFEBE51-441C-4715-AF90-
9B83B12117DC}" DisplayName="Classification Automation" name="AIT.ASAP.Automation.TriggeredAutomations.
WorkItemAutomations.Extended.Configurations.ClassificationAutomationConfiguration, AIT.ASAP.Automation
.TriggeredAutomations.WorkItemAutomations.Extended">
  <ClassificationField>System.AreaPath</ClassificationField>
  <ClassificationMappings>
    <ClassificationMapping Index="2" DestinationFieldName="Custom.SubProject" />
  </ClassificationMappings>
  <BlacklistedClassificationPaths>
    <BlacklistClassificationPath>SomeArea\\OldArea</BlacklistClassificationPath>
  </BlacklistedClassificationPaths>
</Automation>
```

The configuration elements are described below:

Xml Element	Description
ClassificationField	The field from which the value should be copied and which should be used to classify.
ClassificationMappings	Contains all mappings to which the the parts of the area path should be copied to.
ClassificationMapping	The single mapping which level should be copied to which field.
BlacklistedClassificationPaths	Contains all paths which should be ignored (blacklisted).
BlacklistClassificationPath	The specific blacklisted path.

4.3.8 Daily Status mail

This scheduled automation sends an email with a list of work items based on a configurable work item query to users in case of at least one matching work item. This way, a daily status mail with all open task assigned to an individual user can be sent. Only a single configuration is necessary to accomplish that. No individual user alerts need to be configured and only a single mail is sent per day – not per work item change. The following sample exposes how such a mail looks like:



TailSpinToysCollection - My Open Tasks

Thorsten Dralle

Sent: Do 07.11.2013 13:49
To: Thorsten Dralle

Project Collection	Team Project	Generated For	Generation Date
TailSpinToysCollection	TailSpin Toys	Annie Herriman	01.11.2013 12:00:05

Work Item Query: My Open Tasks

ID	Area Path	State	Title
34	Tailspin Toys\Website	Active	Design web front-end for viewing all open orders
35	Tailspin Toys\Website	Active	Design web front-end for viewing customer details
36	Tailspin Toys\Website	Active	Implement web front-end for viewing customer details
37	Tailspin Toys\Website	Active	Design web front-end for modifying an open order

Figure 14 - Mail Notification

Configuration is as follows:

```
<Automation ID="{824E6030-F57B-11E0-8E4D-8B204924019B}" DisplayName="Daily Status Mail"
name="AIT.ASAP.Automation.ScheduledAutomations.Common.Configuration.EmailAlertsAutomationConfi
guration, AIT.ASAP.Automation.ScheduledAutomations.Common">
  <Schedule StartDate="10/1/2011" RecurringFrequency="86400"/>
  <MailMessage Subject="%COLLECTION% - %PROJECT% - Daily Status Mails"/>
  <Query Header="My Work Items">
  Select [System.ID], [System.WorkItemType], [System.State], [System.Title]
  FROM WorkItems
  WHERE [System.TeamProject] = @project and [System.AssignedTo] = @me
  order by [System.State], [System.WorkItemType], [System.Id]</Query>
  <ExcludedAccount Name="Jon Doe" />
  <ExcludedAccount Name="Jane Doe" />
  <XSLT>MailNotificationFormatter.xslt</XSLT>
</Automation>
```

Xml Element	Description
MailMessage	The subject used for the mail. The following placeholder will be substituted: - %COLLECTION%: The collection Name - %PROJECT%: The project Name
Query	A work item query language (WIQL) statement that is used to query work item data from the work item store. It is possible to define multiple query elements. Header: The table header for every single WIQL

	Query
ExcludedAccounts (Optional)	Defines account names to which not mail shall be sent. You can define multiple elements to execlude multiple accounts
SendEmptyQueryResults (Optional)	Defines whether the mail shall be sent if at least one work item has been returned or not
XSLT (Optional)	Defines an XML transformation that is used to format the mail.

As outlined above a XSL transformation is used to generate the final mail format. The input data for the XML transform uses the following xml:

```
<?xml version="1.0" encoding="utf-8"?>
<Report>
  <ServerName>yourserver</ServerName>
  <CollectionName>DefaultCollection</CollectionName>
  <CollectionUri>http://yourserver:8080/tfs/DefaultCollection</CollectionUri>
  <ProjectName>TeamProject</ProjectName>
  <ReportTime>01.11.2013 12:00:05</ReportTime>
  <User>Jon Doe</User>
  <QueryResults>
    <QueryResult>
      <QueryName></QueryName>
      <QueryString></QueryString>
      <WorkItems>
        <WorkItem>
          <WorkItemID>12621</WorkItemID>
          <TeamWebAccessUri>http://yourserver:8080/tfs/web/wi.aspx?pcguid=61c145e9-f9f7-4da7-
9cf7-5e412c64b08c&id=12621</TeamWebAccessUri>
          <Fields>
            <Field>
              <DisplayName>Assigned To</DisplayName>
              <ReferenceName>System.AssignedTo</ReferenceName>
              <Value>Jon Doe</Value>
            </Field>
            <Field>
              <DisplayName>Title</DisplayName>
              <ReferenceName>System.Title</ReferenceName>
              <Value>This is a title</Value>
            </Field>
          </Fields>
        </WorkItem>
        <WorkItem>
          <WorkItemID>12622</WorkItemID>
          <TeamWebAccessUri>http://yourserver:8080/tfs/web/wi.aspx?pcguid=61c145e9-f9f7-4da7-
9cf7-5e412c64b08c&id=12622</TeamWebAccessUri>
          <Fields>
            <Field>
              <DisplayName>Assigned To</DisplayName>
              <ReferenceName>System.AssignedTo</ReferenceName>
              <Value>Jon Doe</Value>
            </Field>
            <Field>
              <DisplayName>Title</DisplayName>
              <ReferenceName>System.Title</ReferenceName>
              <Value>This is a second title</Value>
```

```
            </Field>
          </Fields>
        </WorkItem>
      </WorkItems>
    </QueryResult>
  </QueryResults>
</Report>
```

4.3.9 Numeric Calculation

Numeric Calculation can be used in order to process numeric calculation on fields within the same work item. Currently, only the following numeric operations are supported: **Addition**, **Multiplication** and **Subtraction**. E.g. assume that there are three fields within a Task work item: analysis effort, implementation effort and test effort. An effort field shall be filled with the sum of all three fields.

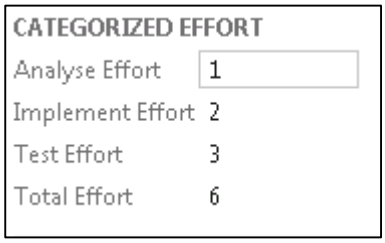


Figure 15 – Example Numeric Calculation with Addition

Configuration is as follows:

```
<Automation ID="{2B477204-592D-41DC-8202-
B985EF77E8DE}" DisplayName="Effort Addition" name="AIT.ASAP.Automation.TriggeredAutomations.WorkItemAu
tomations.Extended.Configurations.NumericCalculationAutomationConfiguration, AIT.ASAP.Automation.Trigg
eredAutomations.WorkItemAutomations.Extended">
  <DestinationField>Custom.TotalEffort</DestinationField>
  <SourceFields Operation="Add">
    <SourceField>Custom.AnalyseEffort</SourceField>
    <SourceField>Custom.ImplementEffort</SourceField>
    <SourceField>Custom.TestEffort</SourceField>
  </SourceFields>
</Automation>
```

<table>
<tr><th>Xml Element</th><th>Description</th></tr>
<tr><td>Destination Field</td><td>The destination field, for the result of the calculaiton</td></tr>
<tr><td>SourceFields</td><td>This Element contains the sourcefields which and specefices the operation.
<table>
<tr><td>Operation:</td><td>Specifies the operator
Possible values are: “
• “Add” = Addition
• “Mul = Multiplication
• “Sub” = Subtraction</td></tr>
</table></td></tr>
<tr><td>SourceField</td><td>A single source field used for the operation.</td></tr>
</table>

4.3.10 Advanced Numeric Calculation

Advanced Numeric Calculation is an extended version of Numeric Calculation. For further information see the previous chapter. This calculation provides the same functionality of calculation within a work item combined with the functionality of using a severity and a threshold for source fields. E.g. assume that there are three fields within an issue work item to calculate an issue rank: Severity, Frequency, Relevance and Issue Rank. The Issue Rank represents the rank calculated by multiplying all the other fields. The source field values are all within the range from 0 to 10. The maximum multiplication result would be 1000 (10^3). Using a severity of 2 for the field Frequency raises the maximum results (10*(10*2)*10) to 2000 and weights this field doubled compared to the others. For a certain frequency the issues might be ranked higher. That is where the source field threshold can be used and the maximum value of the source field:

Figure 16 - Example 1 Severity of Advanced Numeric Calculation

Figure 17 – Example 2 Threshold of Advanced Numeric Calculation

Configuration is as follows:

```
<Automation ID="{E29D0B4F-6B35-4D8B-85F7-
66B922E1C232}" DisplayName="Issue Ranking" name="AIT.ASAP.Automation.TriggeredAutomations.WorkItemAuto
mations.Extended.Configurations.AdvancedNumericCalculationAutomationConfiguration, AIT.ASAP.Automation
.TriggeredAutomations.WorkItemAutomations.Extended">
  <DestinationField MaxValue="3000">Custom.IssueRank</DestinationField>
  <SourceFields Operation="Mul">
    <SourceField ThresholdOperator="GreaterEqual" Threshold="10">Custom.IssueSeverity</SourceField>
    <SourceField Severity="2.0">Custom.IssueFrequency</SourceField>
    <SourceField>Custom.IssueRelevance</SourceField>
  </SourceFields>
</Automation>
```

Xml Element	Description
Destination Field	The destination field, for the result of the calculaiton MaxValue: (optional) — Specifies the maximum value, which is applied to the field when a Treshold of a source field has been reached.
SourceFields	This Element contains the sourcefields which and specefices the operation. Operation: — Specifies the operator Possible values are: “ • “Add” = Addition • “Mul = Multiplication • “Sub” = Subtraction

<table>
<tr><td>SourceField</td><td>A single source field used for the operation.
<table>
<tr><td>ThresholdOperator:
(optional)</td><td>Specifies the comparison operator for the value of the source field and the trheshold
Possible values are: “
• “Equal”, “Greater”, “GreaterEqual”, “Smaller”, “SmallerEqual” and “NotSet”
• “NotSet” is the default value, means no threshold comparison will be performed.</td></tr>
<tr><td>Threshold:
(optional)</td><td>The value of the threshold used for the comparison. The default value is -1.</td></tr>
<tr><td>Severity:
(optional)</td><td>Gives the possibility to wight a source field within the calculation by multiplying its value with the specified severity.

Double-based values should only be used if the destination field is also of type double. Otherwise rounding errors might occur.</td></tr>
</table></td></tr>
</table>

4.3.11 Suspect Links

Assume a requirements hierarchy broken down into three levels. Someone changes the description of a higher-level requirement. The suspected links automation now sets lower-level requirements into the suspected state that can easily be queried and navigated. First, a custom “Suspected” field will be set to “Yes” (see (1) in image below). Second, links of type “Suspected by” will be created connecting the original source of change and suspected work items (see (2) in image below). This way, a change impact analysis can easily be accomplished following the links from the changed requirement or querying all “Suspected=Yes” requirements. The behavior can be toggled by the user. By setting the Auto Suspect field to empty (see (3) in image below), it will not be suspected in case of changes in the parent work item.

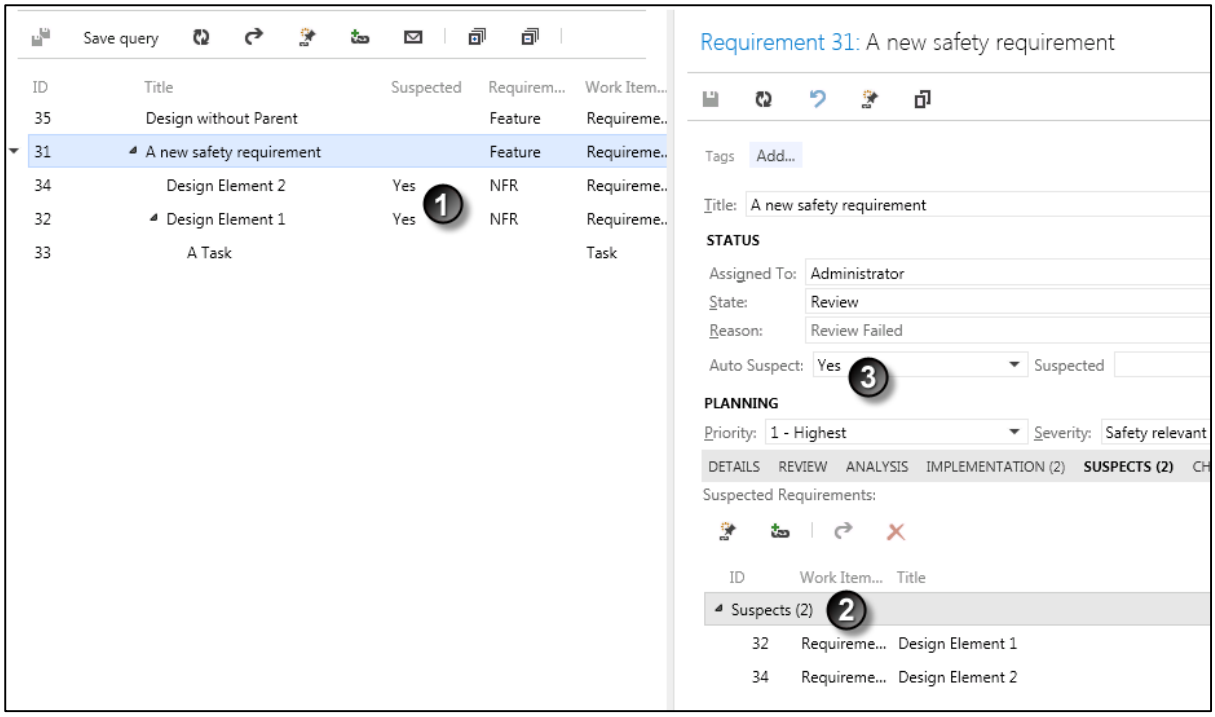


Figure 18 - Sample hierarchy and suspect links and fields

Configuration is as follows:

```
<Automation ID="{CA515A36-95EB-485C-8A9F-659628874923}" DisplayName="Suspect Links"
name="AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Extended.Configurations.Sus
pectLinksAutomationConfiguration,
AIT.ASAP.Automation.TriggeredAutomations.WorkItemAutomations.Extended">
  <MonitoredFields>
    <Field>System.Title</Field>
    <Field>System.Description</Field>
  </MonitoredFields>
  <MonitoredLinks>
    <MonitoredLink>Child</MonitoredLink>
  </MonitoredLinks>
  <SuspectLink ReferenceName="Custom.Suspects" ForwardName="Suspects" ReverseName="Suspected
By"/>
  <AutoSuspectFieldName>Custom.AutoSuspect</AutoSuspectFieldName>
  <SuspectedFieldName>Custom.Suspected</SuspectedFieldName>
</Automation>
```

Where elements have the following meaning:

Xml Element	Description
MonitoredFields	The fields of the work item which are monitored for changes and cause linked work items to become suspected. Field: — The reference name for field of a work item
MonitoredLinks	The link names which are followed to identify suspected items. Field: — The reference name for field of a work item
SuspectLink	The link name of the suspected link which is created from changed to suspected work items with forward and reverse

	name.
AutoSuspectFieldName	Reference name of the field which contains the AutoSuspect value.
SuspectedFieldName	Reference name of the field which will be set to “Yes” for suspected items.

In order to enable this automation, several process template customizations have to be done:

3. Create a file suspects.xml which includes the link type definition:

```
<?xml version="1.0" encoding="utf-8"?>
<LinkTypes>
  <LinkType ReferenceName="Custom.Suspects" ForwardName="Suspects"
ReverseName="Suspected By" Topology="Dependency" />
</LinkTypes>
```

4. Add the following field definitions to the affected work item type definitions:

```
<FIELD name="Auto Suspect" refname="Custom.AutoSuspect" type="String" >
  <HELPTEXT>Determines whether you want TFS to create links to affected items in case
of changes to relevant contents.</HELPTEXT>
  <ALLOWEDVALUES>
    <LISTITEM value="Yes" />
  </ALLOWEDVALUES>
</FIELD>
<FIELD name="Suspected" refname="Custom.Suspected" type="String" >
  <HELPTEXT>Determines whether the work item is still suspected. Set back to empty
after you have checked and adopted the changes.</HELPTEXT>
  <ALLOWEDVALUES>
    <LISTITEM value="Yes" />
  </ALLOWEDVALUES>
</FIELD>
```

5. Add the following form changes to the affected work item type definitions:

```
<Group>
  <Column PercentWidth="50">
    <Control Type="FieldControl" FieldName="Custom.AutoSuspect" Label="Auto Suspect:"
LabelPosition="Left" />
  </Column>
  <Column PercentWidth="50">
    <Control Type="FieldControl" FieldName="Custom.Suspected" Label="Suspected"
LabelPosition="Left" />
  </Column>
</Group>
```

6. Optionally add the following form changes to the tabgroup of the affected work item type definition:

```
<Tab Label="Suspects">
```

```
  <Control Type="LinksControl" Name="Suspects" Label="Suspected:" LabelPosition="Top">
    <LinksControlOptions>
      <WorkItemLinkFilters FilterType="include">
        <Filter LinkType="Custom.Suspects" />
      </WorkItemLinkFilters>
      <WorkItemTypeFilters FilterType="include">
        <Filter WorkItemType="Requirement" />
      </WorkItemTypeFilters>
      <ExternalLinkFilters FilterType="excludeAll" />
      <LinkColumns>
        <LinkColumn RefName="System.ID" />
        <LinkColumn RefName="System.WorkItemType" />
        <LinkColumn RefName="System.Title" />
        <LinkColumn RefName="System.AssignedTo" />
        <LinkColumn RefName="System.State" />
        <LinkColumn LinkAttribute="System.Links.Comment" />
      </LinkColumns>
    </LinksControlOptions>
  </Control>
</Tab>
```

7. Upload all of your changes to the team projects you want Suspect Links to be enabled for. For more information see: http://msdn.microsoft.com/en-us/library/vstudio/ms243782.aspx

4.3.12 Destroy Work Item Automation

The destroy work item automation is used to tidy up your project. There are several situations where work items were created which are no longer needed. This automation will help you to delete this kind of work item. Based on a user defined work item query the artifacts to delete will be selected and deleted afterwards.

Configuration is as follows:

```
<Automation ID="{D805F0B0-F633-4816-8D7E-4A62F554CA0B}" DisplayName="Destroy Work Items"
name="AIT.ASAP.Automation.ScheduledAutomations.Common.Configuration.DestroyWorkItemsAutomation
Configuration, AIT.ASAP.Automation.ScheduledAutomations.Common">
    <Schedule StartDate="10/1/2011" RecurringFrequency="86400"/>
    <Query>Select [System.ID] FROM WorkItems where [System.TeamProject] = @project and
[System.State] = 'Closed'</Query>
  </Automation>
```

Where elements have the following meaning:

Xml Element	Description
Query	A work item query language (WIQL) statement that is used to query work item data from the work item store. The set of work items returned will be deleted.

Please note that all work items covered by the provided work item query will be deleted from your TFS server. Therefore you should configure the query with care because once the work items are deleted they cannot be recovered. The operation is **irreversible**.

4.3.13 Custom Automations

Enterprise edition customers can implement their own automations. TFS ASAP provide a C#-interface for custom automations that can leverage the complete mechanism of TFS ASAP including the job model that allows for load-balancing as well as inheritance of existing base automations. Make sure to build against the binaries currently installed by TFS ASAP.

Standard edition users will not be able to load custom plugins. Only automations signed by AIT will be loaded!

However, there are two options:

1. Buy an Enterprise license: www.tfsasap.com/order.html or
2. Send your automation idea or implementation to AIT – we provide an individual offer of integrating that in future versions of TFS ASAP: www.tfsasap.com/contact.html

5 Using TFS ASAP Extensions

5.1 Available Extensions

*) This automation needs customization in the process template. The default process templates provided with TFS aren't working with this automation.

**) This automation needs additional configuration in order to work correctly. Otherwise you might get errors.

Extension Name	Description	License	Custom*	Config**	Details
Work Item Extensions - Latest Test Results	Provides a web page view of the latest test results of a particular test case work item in all test plans/suites. URL: `http://<TFS>:8080/wie/<CollectionName>/TestResults/LatestTestResults/<TestCaseId>` This web page can be integrated into work items using the web page control. See details section for further information.	Standard or Enterprise	Y	Y	
Work Item Extensions - Hierarchy	Provides a web page view of the complete hierarchy of the work item (all parent and child items as well as siblings (optional)). URL: `http://<TFS>:8080/wie/<CollectionName>/WorkItems/Hierarchy/<WorkItemId>` (optional parameter: `?includeSiblings=true`) This web page can be integrated into work items using the web page control. See details section for further information.	Basic, Standard or Enterprise	Y	Y	
Work Item Extensions - Query	Provides a web page view of a list of work items based on a configured query (e.g. all bugs created at the same day). URL: `http://<TFS>:8080/wie/<CollectionName>/WorkItems/Query/<WorkItemId>?Title=<Title>&Query=<wiql query>` This web page can be integrated into work items using the web page control. See details section for further information.	Basic, Standard or Enterprise	Y	Y	
Work Item Extensions - TimeSheet	Provides a web page view of all time bookings for a specific work item (per date and user). URL: `http://<TFS>:8080/wie/<CollectionName>/WorkItems/TimeSheet/<WorkItemId>` This web page can be integrated into work items using the web page control. See details section for further information.	Basic, Standard or Enterprise	Y	Y	

5.2 Out-Of-The-Box Extensions

5.2.1 Work Item Extensions – Latest Test Results

Usually, test cases do not provide a direct view on their test results. Test cases can be used in multiple test plans and suites and hence test results might be different. This ASAP extension provides an easy-to-integrate view on all latest results of all appearances of a particular test case in any test plan within the collection.

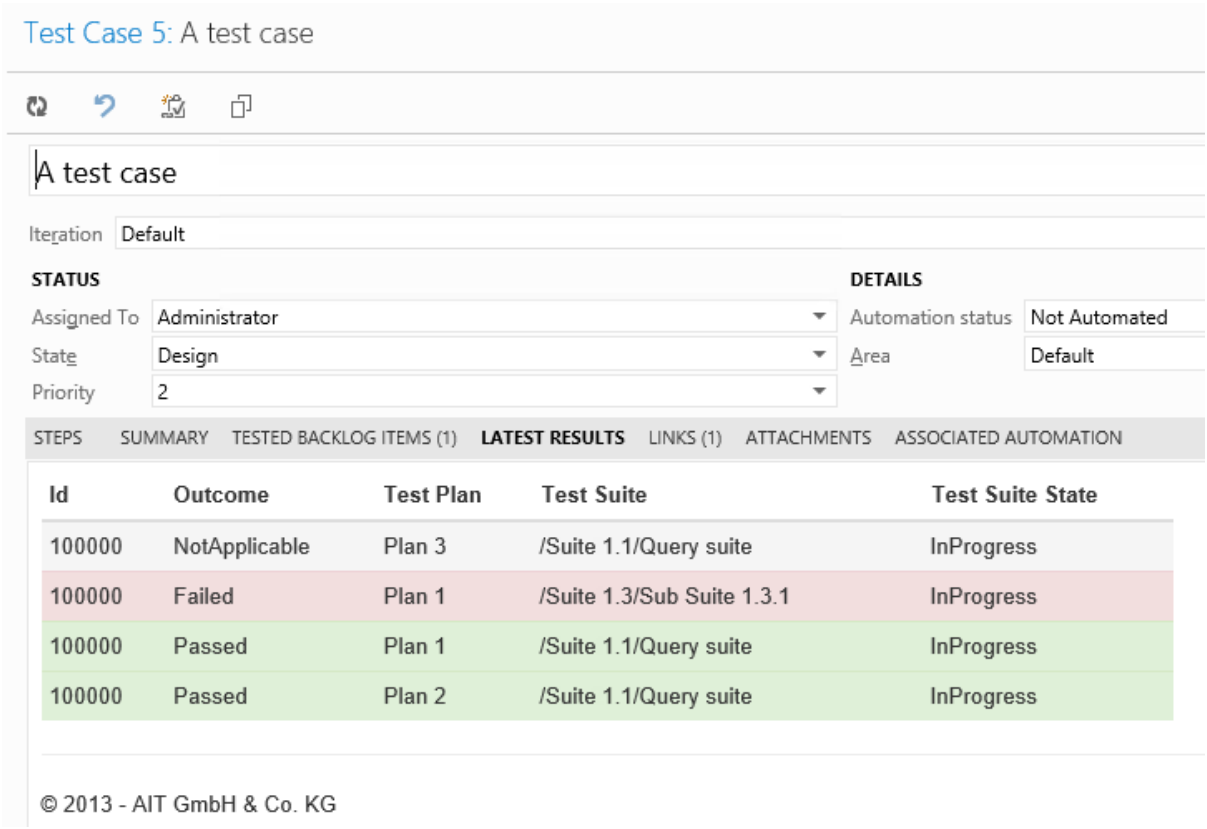


Figure 19 - Sample test case form

In order to use the view within the test case work item, you have to adapt the work item type defintion of the test case work item type as follows:

```
<WORKITEMTYPE name="Test Case">
  [...]
  <FORM>
    <Layout>
      [...]
      <TabGroup>
        [...]
        <Tab Label="Latest Results">
          <Control Type="WebpageControl" LabelPosition="Top">
            <WebpageControlOptions AllowScript="true" ReloadOnParamChange="true">
              <Link UrlRoot="http://<TFS>:8080/wie"
                    UrlPath="/<CollectionName>/TestResults/LatestTestResults/{0}">
                <Param Index="0" Value="System.Id" Type="Current" />
              </Link>
            </WebpageControlOptions>
          </Control>
        </Tab>
        [...]
```

Please replace <TFS> and <CollectionName> with the values that fit your TFS instance and team project collection.

5.2.2 Work Item Extensions – Hierarchy

Links can be displayed as a list within the work item form. However, only one level can be displayed (resp. two levels – one level in each link direction). Especially for hierarchy link types, a view on the full hierarchy is particularly useful. The hierarchy work item extension provides a web page which displays the complete hierarchy within which a particular work item is contained.

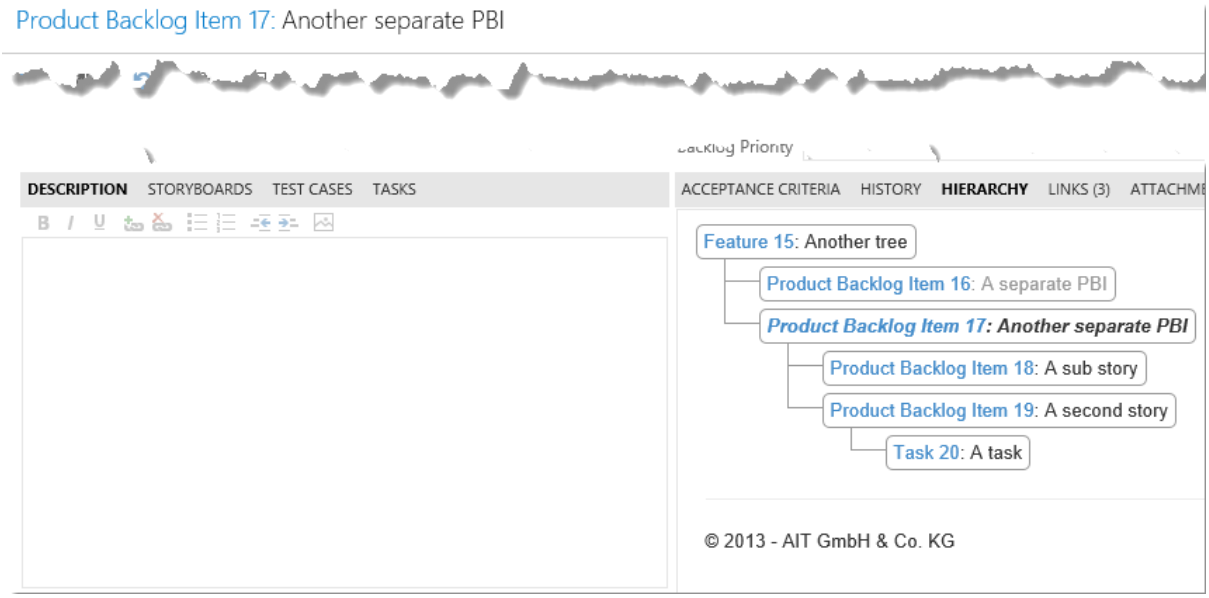


Figure 20 - Sample work item form

In order to use the view within a work item, you have to adapt the work item type defintion as follows:

```
<WORKITEMTYPE name="…">
  [...]
  <FORM>
    <Layout>
      [...]
      <TabGroup >
        [...]
        <Tab Label="Hierarchy">
          <Control Type="WebpageControl" LabelPosition="Top">
            <WebpageControlOptions AllowScript="true" ReloadOnParamChange="true">
              <Link UrlRoot="http://<TFS>:8080/wie"
                UrlPath="<CollectionName>/WorkItems/Hierarchy/{0}?includeSiblings=false">
                <Param Index="0" Value="System.Id" Type="Current" />
              </Link>
            </WebpageControlOptions>
          </Control>
        </Tab>
        [...]
```

Please replace <TFS> and <CollectionName> with the values that fit your TFS instance and team project collection.

The includeSiblings parameters defines how the hierarchy is queried:

- false: Only shows the direct parents and all children of the selected work item
- true: Searches the root work item and shows the whole hierarhcy.

5.2.3 Work Item Extensions – Query

Work item forms can contain a list of linked work items such as Related Work Items. However, sometimes, other “relations” need to be shown. For instance, within a bug, a user wants to easily see all other bugs created at the same day for the same product.

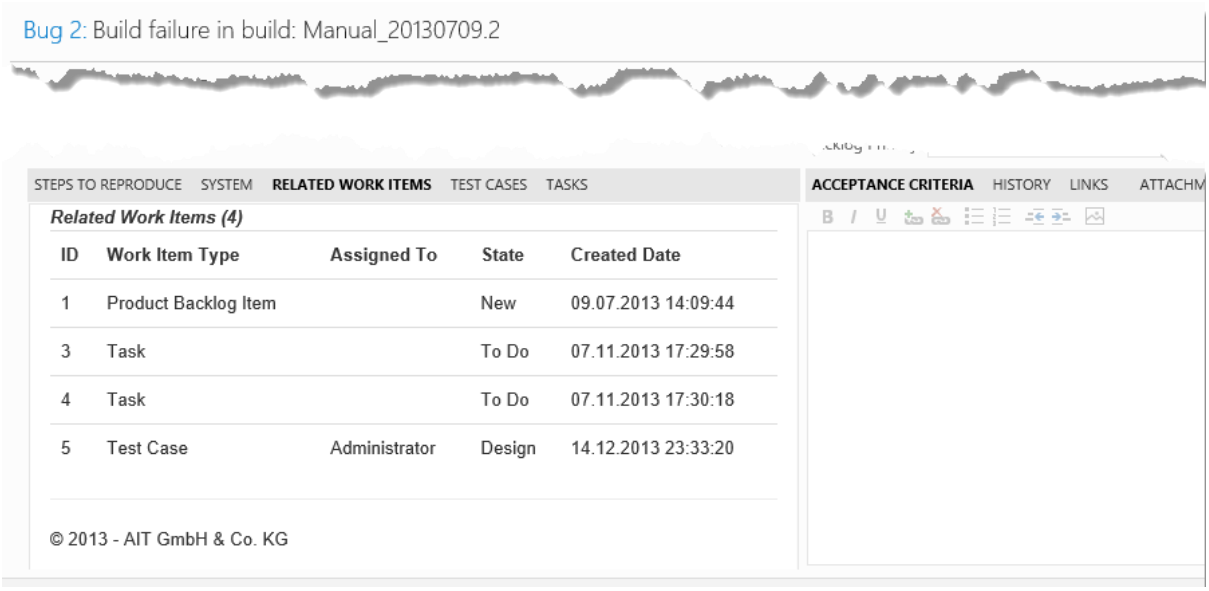


Figure 21 - Sample work item form

This can be achieved using the work item extensions – query.

In order to use the view within a work item, you have to adapt the work item type defintion as follows:

```
<WORKITEMTYPE name="…">
  [...]
  <FORM>
    <Layout>
      [...]
      <TabGroup >
        [...]
        <Tab Label="Related Work Items">
          <Control Type="WebpageControl" LabelPosition="Top">
            <WebpageControlOptions AllowScript="true" ReloadOnParamChange="true">
              <Link UrlRoot="http://<TFS>:8080"
                 UrlPath="wie/<CollectionName>/WorkItems/Query/{0}?Title=SameArea&amp;Que
             ry=select [system.id], [system.title] from workitems where [system.areapath]
             under [system.areapat]={1}">
                 <Param Index="0" Value="System.Id" Type="Current" />
                 <Param Index="1" Value="System.areapath" Type="Current" />
              </Link>
            </WebpageControlOptions>
          </Control>
        </Tab>
        [...]
```

Please replace <TFS> and <CollectionName> with the values that fit your TFS instance and team project collection. Additionally you have to substitute the <Title> and <WQIL> accordingly.

The provided WIQL query will be executed against TFS. The fields defined in the select clause will be shown in the result set. Additionally you can use the custom macro

“@DisplayNameWithoutWhiteSpaces” for any field to match with the selected work item field values (e.g. @AreaPath will match the System.AreaPath).

5.2.4 Work Item Extensions – Timesheet

As users track their work in work items, an overview is necessary for any bookings that happened in a work item. The Current Work Automation helps users to book efforts for specific dates (past, present, future). The timesheet work item extension lets you view a table of all bookings for a particular work item.

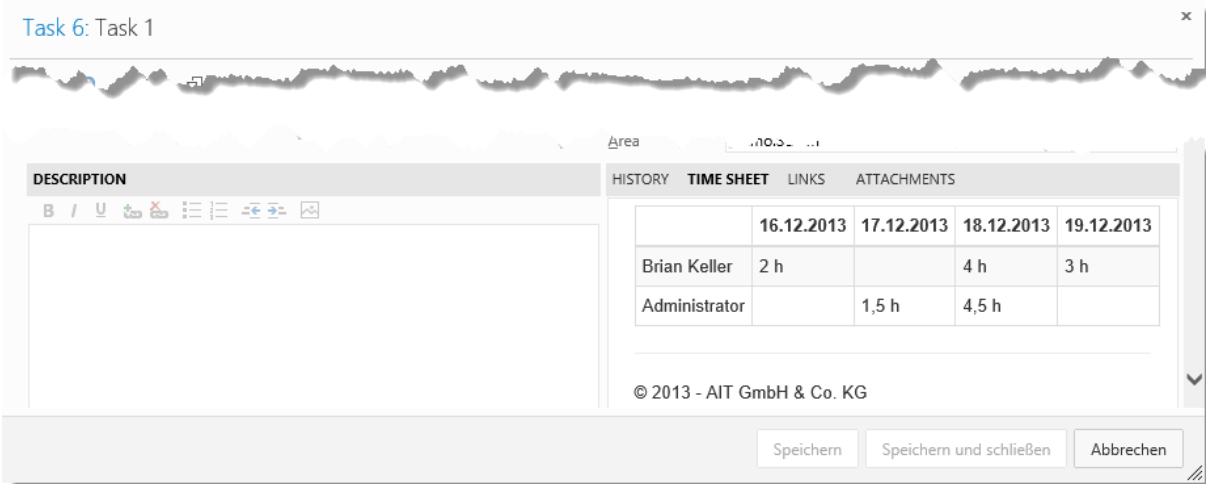


Figure 22 - Sample work item form

This can be achieved using the work item extensions – timesheet.

In order to use the view within a work item, you have to adapt the work item type defintion as follows:

```
  <WORKITEMTYPE name="…">
    [...]
    <FORM>
      <Layout>
        [...]
        <TabGroup >
          [...]
         <Tab Label="Time Sheet">
           <Control Type="WebpageControl" LabelPosition="Top">
             <WebpageControlOptions AllowScript="true" ReloadOnParamChange="true">
               <Link UrlRoot="http://<TFS>:8080/wie"
UrlPath="<CollectionName>/WorkItems/TimeSheet/{0}
?workField=Custom.CurrentWork&amp;dateField=Custom.CurrentWorkDate&amp;unit=h">
                 <Param Index="0" Value="System.Id" Type="Current" />
               </Link>
             </WebpageControlOptions>
           </Control>
         </Tab>
```

Please replace <TFS> and <CollectionName> with the values that fit your TFS instance and team project collection.

The URL contains several parameters which are described below:

Parameter Name	Description
workField	The reference name of the field containing the effort information. In case of the Current Work AutomationCurrent Work

	Automation this would be `Custom.CurrentWork`. If you don't use this automation, it could be `Microsoft.VSTS.Scheduling.CompletedWork` instead.
dateField	The reference name of the field which contains the date information for which the tracked effort applies. In case of the Current Work AutomationCurrent Work Automation this would be `Custom.CurrentWorkDate`. If you don't use this automation, it could be `System.ChangedDate` instead.
unit	The textual representation of the unit used. E.g. "h" for hours or "d" for days. This is only a label in the results table and not used for any calculations.

6 Using TFS ASAP global lists

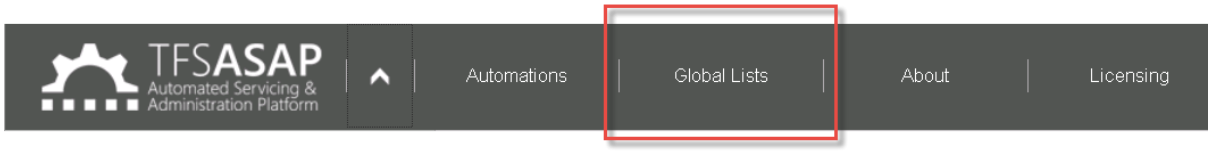
In TFS, management of global lists is only possible on collection-level. The user has to be a member of the collection level administrators to add, change and remove global lists. Global lists are visible to the whole collection. A limitation to a specific team project is not possible out-of-the-box. With TFS ASAP it is possible to assign global lists to team projects and to edit them the user must not have edit project collection information rights.

6.1 Assigning a global list

The algorithm of assigning a global list to either a team project or team project collection works as following. It searches for the last occurring of "- " (Unicode: U+0020 U+002D) in the name of the global list. If the text after this position matches the name of a team project, the global list is assigned to this matched team project. Otherwise it is assigned to the team project collection. So if a team project was deleted, but its global lists not, the global list are assigned to the team project collection.

6.2 Exploring

After clicking on the "Global Lists" menu item, you can explore the global lists in the tree on the left.



Global lists which do not belong to any team project are displayed in the "not assigned" node in the tree as you can see in Figure 23 - Global Lists Tree

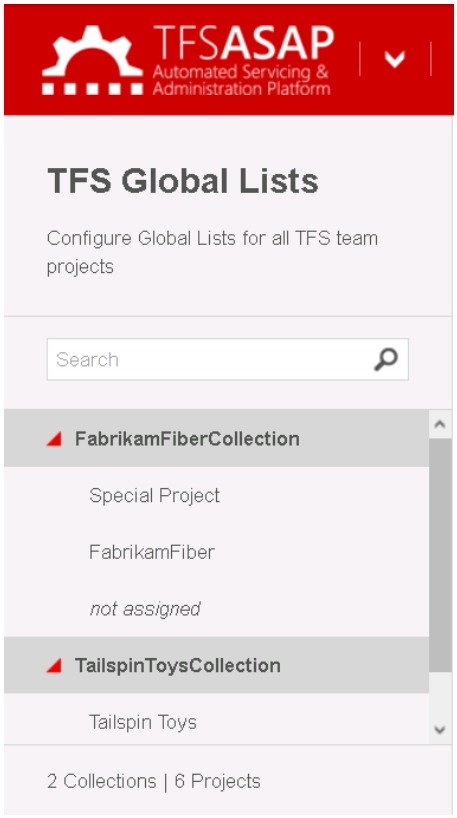


Figure 23 - Global Lists Tree

There are five actions you can perform in TFS ASAP: Reloading the current creating a global list, view, saving, deleting and editing global lists. These actions are described in the next sub chapters.

Viewing
If you want to view global lists of a specific team project or team project collection without navigating in the tree. Just enter http://tfs:8080/asap/SelfService/GlobalLists/Index/<*optional:CollectionName*>/<*optional:TeamProject*> in the location bar of the browser and hit enter.

You can also view global lists by browsing the tree.

Reloading
It is possible to reload the current view by a click on “Reload” menu item.

Editing
After browsing to a team project you can edit the items of a global list by clicking on the pen button, now you can rename the items. If you want to stop editing click on the augmented edit button. You can also mark item as deleted if you leave its name empty or click on the trash button in the row of this item. You can revive the item if you click on the augmented trash button.

Once a global list is submitted, it is not possible to rename it. If you want to rename the global list, you have to delete it and create a new global list with the wanted name and the same items.

Creating

You can create a new global list by clicking on the "new" menu item. Until you save the global lists of the current view, it is the only possibility to change the name of a global list.

Add new items

New items can be added to a global list with the "+" buttons. The button on the right in the header of the global list adds an item in the beginning of the list. Wheras the "+" button in the row of item adds an item below this item.

Saving

After editing or creating global lists these changes has to be committed to TFS ASP. A click on the "Save" menu item on top of the page performs this action.

Deleting

It is also possible to delete a global list. Therefore you have to click on the "Trash" button inside the top right corner of the global list. This action is immediate, it is not possible to get the global list back. However a confirmation is shown before effectively deleting the global list.

6.3 Rights

Because TFS ASAP introduces an additional team project layer in the global lists. You can restrict the access to them via rights. These rights are View and Edit.

The permission concept of TFS is not overridden. So if a user has got the proper permissions, the user can still access the information via the TFS API.

Viewing

In opposite of TFS, the user needs only Generic Read Permission (View project-level information) for the corresponding level to view the global lists.

A user needs explicit view right to see the global lists of the team project and the node of the tree. This means if the user has got edit rights, but not the view rights. The user will not see the team project and its global lists.

Editing

If a user wants to edit or create a global list, the identity must either have Generic Write Permission (Edit project level-information) or must be inside the "Global List Editors" in the team project collection or in the team project. The permissions inside the "Global List Editors" group are not evaluated. A "Global List Editors" group must not exist, it is optional. The group must be created via TFS web access. The "Global List Editors" group of a team project collection only gives the permission to edit team projects which are not assigned to any team project.

Figure 24 shows how the User “LessPriviliges” gains editing permission for the global list of TFS ASAP on the team project “Fabrikam Fiber” (Screenshot taken from the security page of TFS web access).

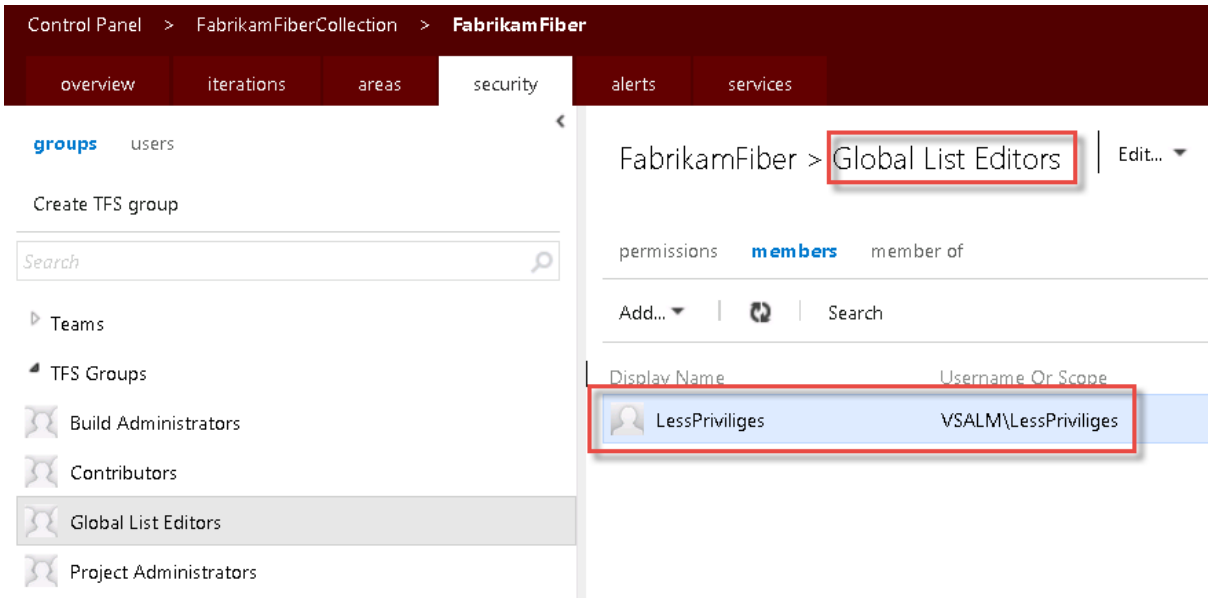


Figure 24 - Editing Permission global lists

6.4 Configuration

If it should be permitted to create and/or delete global lists in TFS ASAP. The system provides a configuration via two keys: “*SelfService.GlobalList.DenyDeleting*” for denying deleting global lists and “*SelfService.GlobalList.DenyCreating*” for denying creating global lists. These keys resides inside “C:\Program Files\AIT\TFS ASAP\Management\web.config” and inside the element “appSettings”. Each value is a Boolean and the default value is *false*. Each key is optional and case sensitive.

If the instance of TFS is a multiple app-tier environment, the configuration has to be deployed on each app-tier!

Example:
The following snippet (Table 1) shows how creating and deleting global lists can be denied.

```
<configuration>
 <!--  more configuration here -->
  <appSettings>
    <!--  more configuration here -->
    <add key="SelfService.GlobalList.DenyDeleting" value="true" />
    <add key="SelfService.GlobalList.DenyCreating" value="true" />
    <!--  more configuration here -->
  </appSettings>
 <!--  more configuration here -->
</configuration>
```

Table 1 – Configuration global lists

6.5 Working with Process Templates

In the previous sections you experienced how to work with global lists inside TFS ASAP. Often project managers want to add new items to a global list. Because for example the selection inside a field of a work item should match their needs. This chapters shows you how this can be accomplished with the minimal possible effort.

First you create a Master Process Template (MPT) which serves as a “meta template” for the new team projects. This MPT must not be published as a process template. It has the advantages, that nobody can create a team project from this template. Later we will see why it is advisable not do this. However the sources of the MPT should be stored in a save place, preferably inside the version control system of TFS (TVF or git).

Let’s say you want to define two global lists for each team project, which should be adaptable:

a) *Meeting Type* with the items *offline* and *online*
b) *Replication System* with the items *System A*, *System B* and *System C*

Unfortunately in process templates it is not possible to deploy global lists. So we store the wanted global lists (Priority and Replication System) as global lists itself. However a pattern is appended to the names of each global list. This pattern can be “- [TeamProjectName]”. Reasons for this pattern are: TFS ASAP assigns global lists to a team project with the divider “- “, the tailing text is chosen because “[“ and “]“ are forbidden characters for the name of a team project. In this case the names are: “Priority - [TeamProjectName]” and “Replication System - [TeamProjectName]”.

Now the MPT can be adapted, at the position where the global list templates should be replaced with the correct global list. A comparison of the “*Meeting Type*” global list inside the MPT and after the modification is shown in Table 2 and Table 3.

```
  <FIELD name="Meeting Type" refname="Microsoft.VSTS.CMMI.MeetingType" type="Strin
g">
    <ALLOWEDVALUES>
      <GLOBALLIST name="Meeting Type - [TeamProjectName]" />
    </ALLOWEDVALUES>
    <HELPTEXT>The type of the review meeting</HELPTEXT>
  </FIELD>
```

Table 2 – Global lists in the Master Process Template

```
  <FIELD name="Meeting Type" refname="Microsoft.VSTS.CMMI.MeetingType" type="Strin
g">
    <ALLOWEDVALUES>
      <GLOBALLIST name="Meeting Type - [TeamProjectName]" />
    </ALLOWEDVALUES>
    <HELPTEXT>The type of the review meeting</HELPTEXT>
  </FIELD>
```

Table 3 – Global lists in the modified process template

After preparing our MPT, we can create team projects from it. Let’s say we want to create a team project with the name “FabrikamFiber”. The specific workflow can be the following:

1. Get the Master Process Template
    a. Replaces all occurrences of “[TeamProjectName]” with “FabrikamFiber”
2. Get the global list from TFS

   a. Extracts the global lists matching your pattern
3. Replace the pattern with the specific name of the global lists.
4. Create the global lists with
   a. TFS ASAP
   b. Via a script
5. Upload the modified Master Process Template with a meaningful name
6. Create a team project with this modified process template

If you now assigned users the “Global List Editors” group inside the team project “FabikamFiber”, they can edit the global list with the TFS ASAP without being collection administrators.

Hint: You can also create groups and assign member in a process template. If you already have a special group for e.g. Manager. These group can be assigned here. So only at one time you need to care about this matter.

You can perform the workflow for other team project. Each of these team projects now have their own predefined global lists, which the can change to their needs. In this scenario the items of the global lists “*Meeting Type - FabrikamFiber*” and “*Replication System – FabrikamFiber”*. So the manager of the “FabrikamFiber” team project can add its wished item “telephone conference” without asking a team project collection administrator.

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