RTA-BSW v3.2.0
RTA-BSW Getting Started Guide
Status: Release

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Document RTA-BSW Getting Started Guide v3.2.0 R01 EN - 03.2019

Contents:

1   Introduction

The RTA-BSW Installation and Getting Started Guide describes how to install RTA-BSW and how to start using the product. RTA-BSW takes the form of a plug-in to the ETAS AUTOSAR Authoring Tool, ISOLAR-AB.

1.1   Applicable Versions

This document applies to RTA-BSW v3.2.0. This is compatible with:

- ISOLAR-AB v5.0

All stacks within RTA-BSW are at version v3.2.0.

The Operating System (RTA-OS) and Runtime Environment (RTA-RTE) are not part of RTA-BSW and must be installed separately.

As far as is possible the configuration of RTA-BSW and RTA-RTE uses standard ARXML and therefore the configuration aspects described in this User Guide are also applicable to later versions of the software.

1.2   Safety Notice

Warning: Any configuration(s) described in this Getting Started Guide are provided as an example only and must be reviewed and adapted for specific project requirements before use.

1.3   Privacy Statement

Your privacy is important to ETAS so we have created the following Privacy Statement that informs you which data are processed in RTA-BSW, which data categories RTA-BSW uses, and which technical measure you have to take to ensure the users privacy. Additionally, we provide further instructions where this product stores and where you can delete personal or personal-related data.

1.3.1   Data Processing

Note that personal or personal-related data respectively data categories are processed when using this product. The purchaser of this product is responsible for the legal conformity of processing the data in accordance with Article 4 No. 7 of the General Data Protection Regulation (GDPR). As the manufacturer, ETAS GmbH is not liable for any mishandling of this data.

When using the ETAS License Manager in combination with user-based licenses, particularly the following personal or personal-related data respectively data categories can be recorded for the purposes of license management:

- Communication data: IP address

- User data: UserID, WindowsUserID

1.3.2   Technical and organizational measures

This product does not itself encrypt the personal or personal-related data respectively data categories that it records. Ensure that the data recorded are secured by means of suitable technical or organizational measures in your IT system. Personal or personal-related data in log files can be deleted by tools in the operating system.

1.4   Definitions and Abbreviations

ARXML AUTOSAR XML used to describe SWCs, Systems and ECU configurations.

ASW AUTOSAR Application Software. In AUTOSAR the application consists of multiple communicating SWCs including service, application and complex device driver SWCs.

BSW AUTOSAR Basic Software module. AUTOSAR defines a comprehensive BSW architecture consisting of service, interface and driver BSW modules that provide a device independent ECU abstraction to ASW and thus promote SWC reuse and relocation. See Section 4 for a list of AUTOSAR BSW modules.

BSW Stack A slice through the AUTOSAR Layered SW Architecture that comprises functionally related BSW modules from the Service, ECU Abstraction and Microcontroller Abstraction layers.

CAN Controller Area Network – peer-to-peer message protocol designed for automotive use.

CDD Complex Device Driver – a custom BSW module for accessing hardware for which AUTOSAR defines no standardized access. The form of the upper interface of a CDD is standardized – ports – and therefore accessible to ASW using the Rte. However, the functionality provided by the CDD, for example how it accesses hardware, is implementation specific.

DTC Diagnostic Trouble Code.

ECU Electronic Control Unit. In the context of AUTOSAR, an ECU comprises one microcontroller/peripherals and associated ASW and AUTOSAR configuration. In particular, AUTOSAR does not consider the mechanical design in the definition of an ECU and thus if a single housing contains multiple microcontrollers each requires its own AUTOSAR configuration and BSW stack.

E/E Electrical and Electronic.

FlexRay Automotive bus supporting high data rate communication with a static, time-sliced, segment providing real-time messages and a dynamic segment for event-triggered communication.

EEPROM Electronically Erasable Programmable Read-only memory.

I-PDU Interaction Layer PDU.

IOC Inter-OsApplication Communication – Os API for sending and receiving data between OsApplications.

MCAL Microcontroller Abstraction Layer – the lowest software layer of the Basic Software within the AUTOSAR SW architecture. The MCAL contains internal drivers (BSW with direct access to the microcontroller and its internal peripherals) and serves to make higher layers independent or the microcontroller.

OSEK Offene Systeme und deren Schnittstellen für die Elektronik im Kraftfahrzeug (Open Systems and their Interfaces for the Electronics in Motor Vehicles). OSEK include the specification of OSEK-OS and OSEK-COM which were use as the basis

for the AUTOSAR Os and Com BSW modules

PDU Protocol Data Unit – a set of messages sent/received over a network as a co-herent entity.

PIM Per-Instance Memory – provides instance-specific state accessed through an Rte generated API.

Schema A XML file that describes the permitted structure and content type of an-other XML file including data types, available elements and their permitted or-der as well as more specialized rules such as multiplicity constraints. An ARXML file is defined using an AUTOSAR supplied schema.

SPI Serial Peripheral Interface – synchronous serial interface using a master-slave architecture and widely used in automotive embedded systems.

SWC AUTOSAR Software Component – A functional unit within ASW. An AUTOSAR application consists of multiple SWCs.

TP Transmission Protocol – A transport mechanism used to transmit and receive I-PDUs larger than a single bus frame.

UDS Unified Diagnostic Services – A standardized set of diagnostic services defined by ISO—15765 and supported by the AUTOSAR Dcm module.

VFB AUTOSAR Virtual Function Bus. The VFB is an abstract composition of the ASW including all SWCs in the system their connections but not the mapping to par-ticular ECUs. The VFB enables integration of ASW to occur early in the develop-ment phase and permits verification of the consistency of the communication relationship between SWCs.

1.5   Bibliography

1. AUTOSAR Motivation and Goals

2. RTA-RTE User Guide

3. RTA-OS User Guide

4. RTA-BSW User Guide, v3.2.0, ETAS GmbH

1.6   Conventions

`OCI_CANTxMessage msg0`	Code snippets are presented on a gray background and in the Courier font.
Choose **File->Open**.	Menu commands are shown in boldface.
Click **OK**.	Buttons are shown in boldface.
Press <ENTER>.	Keyboard commands are shown in angled brackets.
The 'Open File' dialog box is displayed.	Names of program windows, dialog boxes, fields, etc. are shown in quotation marks.
Select the file *setup.exe*	Text in drop-down lists on the screen, program code, as well as path- and file names are shown in italics.
A *distribution* is always a one-dimensional table of sample points.	General emphasis and new terms are set in italics.

2 How to use this User Guide

The RTA-BSW Installation and Getting Started Guide describes how to install RTA-BSW.

3　　Installation

3.1　RTA-BSW Installation

3.1.1　Prerequisites

ISOLAR-AB 5.0 is required for this product to function correctly.

It is expected that the computer will meet the minimum system requirements for the target version of ISOLAR-AB. Please refer to the ISOLAR-B Getting Started Guide for the exact requirements.

Please refer to the ISOLAR-B Getting Started Guide for exact requirements.

3.1.2　Installation

You may require local administrator rights for this installation.

1. Launch the RTA-BSW installer *setup.exe*.

2. Select the desired language for the installer and click [Next].

3. Read and accept the EULA, then click [Next].

4. Read and accept the Safety Hints, then click [Next].

5. Ensure that the RTA-BSW Component is selected, then click [Install]

6. Once the installation is complete, click [Finish] to complete the installation.

3.1.3　Open Source Software

The RTA-BSW installer uses Open Source components. Please refer to the files below for license information:

- *OpenSourceSoftware_GENESIS_V171.pdf*

- *Lima_OSS_Attribution_Document_V168.pdf*

3.2　Check the installed version of RTA-BSW

After installation of the RTA-BSW plug-in new icons for ConfGen and CodeGen will appear in the ISOLAR-AB toolbar. To check the installed version of RTA-BSW use the "Installation Details" dialog from the help menu.
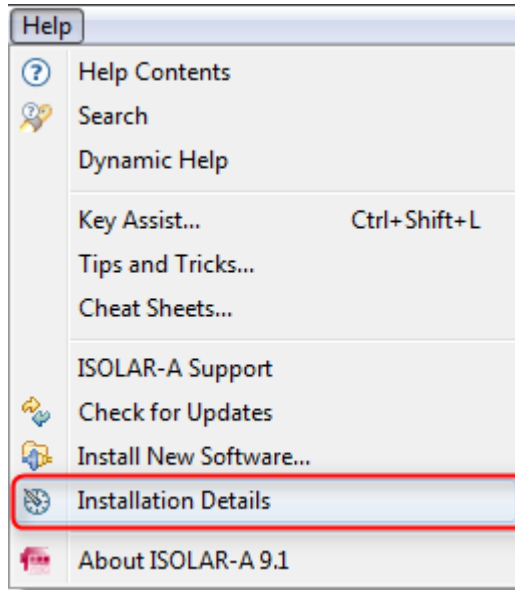
Fig. 3.1: ISOLAR-AB Help Menu

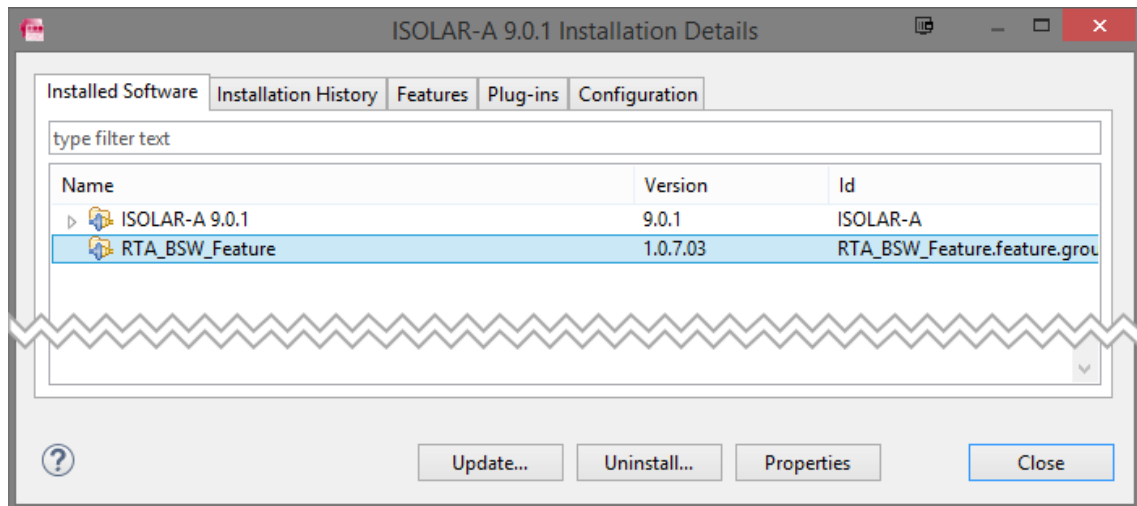The "Installation Details" dialog shows the installed version of RTA_BSW_Feature:

Fig. 3.2: ISOLAR-AB Installation details

3.3 Software Licensing

To be able to work with an ETAS software product, you require a license. This section contains basic details on ETAS License. Details concerning the scope of the licenses and other legal aspects can be found in "Terms and Conditions".

3.3.1 ETAS License Models

There are three different license models available for licensing your ETAS software:

Machine-Named License, Local

- A license of this type is managed by the user himself/herself.

- As it is linked to a particular PC (more precisely: to the MAC address of the Ethernet adapter), it is valid wherever the PC is used.

- When you change your PC, you require a new license

User-Named License, Server-Based

- The licenses (of a department or company) are managed centrally on a server by a designated person.

- The license is linked to the user name with which the user is registered in the network and is available on every PC in the network.

- If the relevant PC is disconnected from the network, the license can be "borrowed."

Concurrent (or Floating) License, Server-Based

- The licenses are provided for the specific user names. Several users share a limited number of licenses.

How to get a License

Contact the responsible person, if your company has a tool coordinator and server-based license management for ETAS software. Otherwise (in case of a machine-named license) you obtain your license from the ETAS license-portal (the URL is shown on your Entitlement Certificate). There are three ways of logging in on the welcome page:

Activation ID Once you have logged in, a specific activation is visible and can be managed – the activation ID is shown on your Entitlement Certificate.

Entitlement ID All activations of the entitlement are visible and can be managed (e.g. for a company with just one entitlement).

E-mail and password All activations of the entitlements assigned to the user account are visible and can be managed (e.g. for a tool coordinator responsible for several entitlements).

If you need help in the portal, click Help link.

What Information is required?

Information on the hosts must be entered to activate licenses:

Machine-named license The MAC address of the Ethernet adapter to which the license is to be bound is required.

User-named license You need a server host or a server triad as well as a user name.

Concurrent (floating) license You need a server host or a server triad.

Note: If this data changes (e.g. due to changes in the hardware or a change of user), the license must be given a "rehost". This procedure is also described in the portal help file.

License File

The result of your activities is the provision of a file <name>.lic with which you can license your software in the ETAS License Manager.

Open ETAS License Manager:

- Click **All Programs®->ETAS®License Management®->ETAS License Manager** on Windows 7 Start menu.

<or>

- Click ETAS License Manager directly on "Apps" view in the Windows 8 / Windows 8.1 Start menu.

Check License Status:

- Open the ETAS License Manager.

- Check the "Status" column.

The ETAS License Manager contains one entry for each installed product. The symbol at the beginning of the entry and the "Status" column entry indicate if a valid license has already been obtained or not. To add a License file:

- Open the ETAS License Manager.

- Select the menu, **File->Add** Licensing File.

The "Install License" window opens.

- Next to the "Select License File" field, click the [. . .] Button to select the .lic file.

- Click OK.

The "ETAS License Manager" window shows information on the selected license. The "Feature Version" column shows the version number of the license, not the version number of the software.

> **Warning:** If the green symbol is not displayed, there might be a problem with the license file or the license relates to another product. Additional information on ETAS License Manager can be found in the "Online Help" of the ETAS License Manager.

4   Getting Started

4.1   How to use the RTA-BSW plugins

The RTA-BSW plugin is split into two tools:

- ConfGen runs a set of scripts which will read the AUTOSAR System Template (EcuInstance, SystemSignal, etc.) and create an equivalent configuration in EcucValueDescription format, which allows specific parameterisation and is the input for BSW code generation tools.

- CodeGen is an AUTOSAR BSW code generation tool, consuming configuration in EcucValueDescription format to create source code equivalent in .c/.h format using the RTA-BSW generator.

The following sections will provide information on navigating these two tools focusing on the different options that presented in the tools GUI.

Note: For an explanation on how these tools can be used in a development workflow please see the RTA-BSW User Guide [2].

4.1.1   ConfGen

The ConfGen process parses the System Description to produce an equivalent configuration using the AUTOSAR EcucValueDescription.

To start ConfGen:

1. Select an AUTOSAR Project.

   Note: The selected project should contain at least the System Template Description (i.e. the SWCs, their mapping to ECUs, network information including mapping data communicated by SWCs to network signals) To make full use of this tool it is recommended that the complete Virtual Functional Bus (VFB) configuration is present.
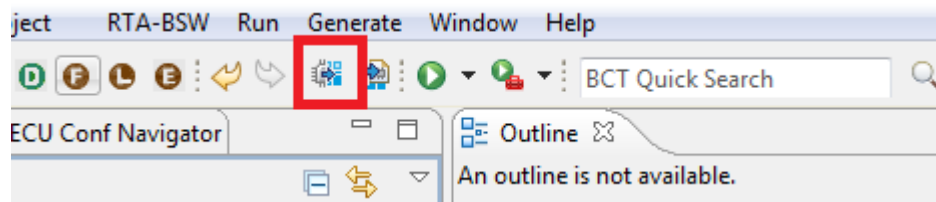2. Click on the ConfGen toolbar icon.

Fig. 4.1: ConfGen Button on the ISOLAR-AB toolbar.

3. Select the ECU Instance for which you wish to generate the EcucValueDescription values.
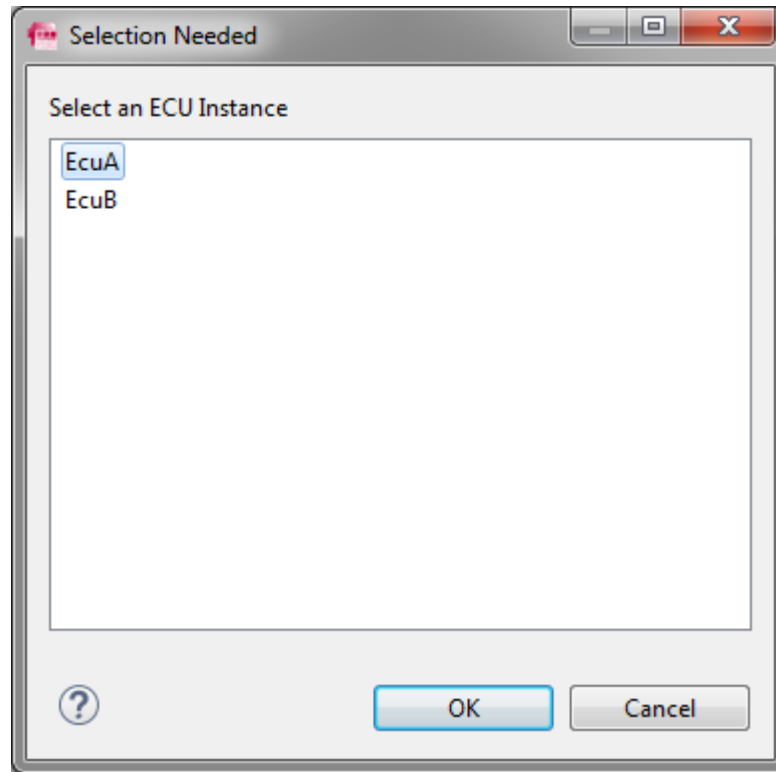
Fig. 4.2: ECU Instance Selection Dialog

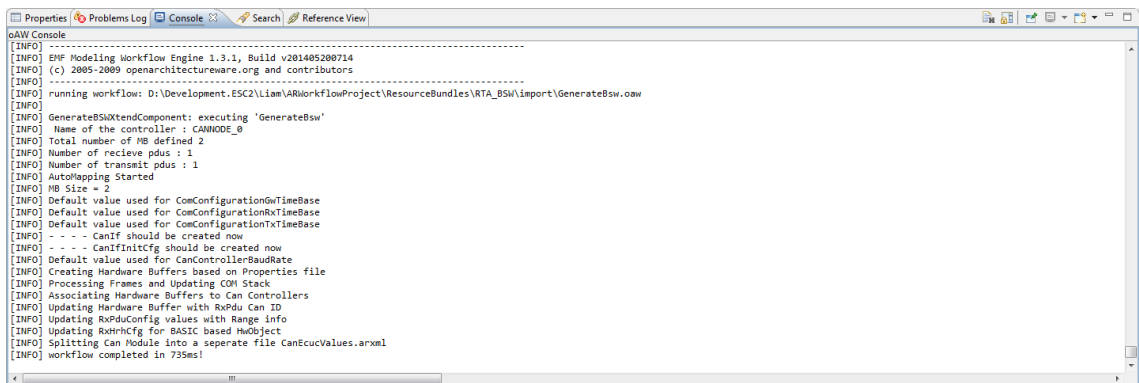4. Click [OK] and the ConfGen process will begin, reporting results to the console.

Fig. 4.3: Example ConfGen Console Log

When ConfGen completes, the project will contain EcucValueDescription ARXML files and Parameter definitions (ParamDefs). This will allow you to customize the ECU configuration and generate AUTOSAR BSW.

4.1.2 CodeGen

The RTA-BSW CodeGen process creates BSW source code (.c/.h files) from the an EcucValueDescription. The BSW CodeGen process is activated by either creating a new "CodeGen Launch Configuration" (see the the "play" button diagram) which allows the configuration of

the generation process. Alternatively the process can be run by clicking the toolbar icon, which will run an existing configuration, or create a default if one cannot be found.
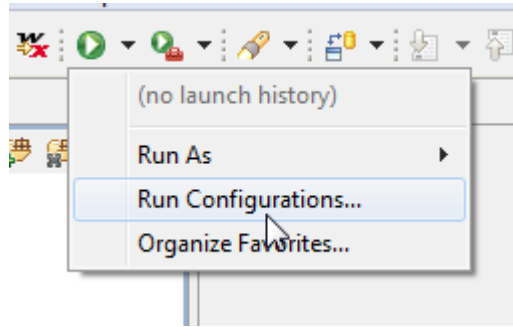

Fig. 4.4: ISOLAR-AB Play Button

The following section will describe this tool in greater detail.

To control the execution of this process you must enter the run configuration menu (click the arrow next to the "play" button and select "Run Configurations. . . ") This will open the run configuration menu showed on the following page, the sections of this GUI are as follows:
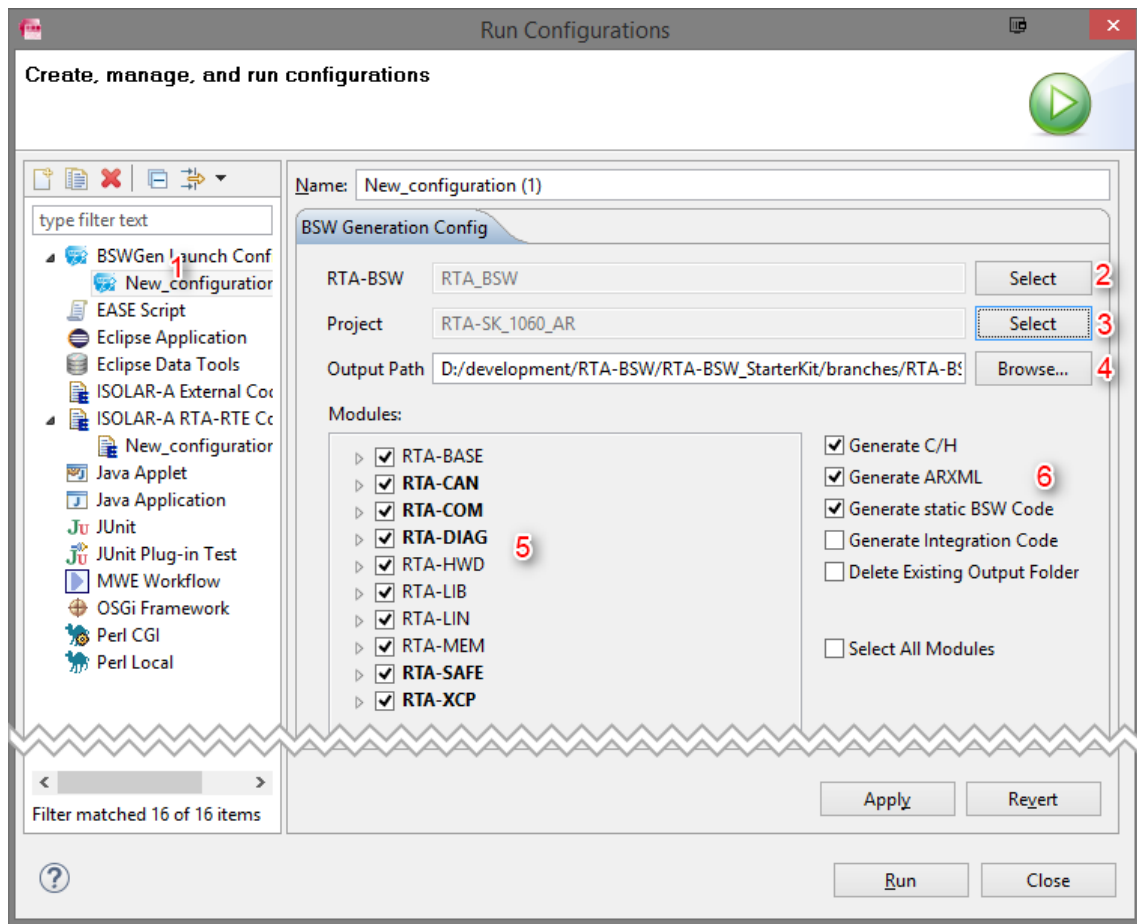
Fig. 4.5: ISOLAR-AB Run Configurations Dialog

1. List of run configuration instances: each item listed here is a configuration; you could have a run configuration per project, or create custom configurations for different use cases. (e.g. Validate only and only run the Com module)

2. Select RTA-BSW: presents a list of installed RTA-BSW versions and prompts for a selection, this will control the available modules (5) as long as a valid project is selected.

3. Select Project: prompts for a selection of a workspace project. If this is a valid AUTOSAR project and an RTA-BSW version has been selected, then the list of modules (5) will be populated with available modules.

4. Select Output Path: by default the path will be set to `{ProjectPath}/src/BSW/Gen`, but can be set to any directory, the process will then organise the generated files by module in the selected directory

5. Module List: this contains the list of available modules for generation/validation this is populated by seeing which modules have been configured in the selected project and comparing that to the available modules in the selected RTA-BSW. You can then turn a module or stack on/off by clicking the check button.

6. Misc options: contains other options for controlling the process such as turning code generation off (validate only) or instruct the process to not produce SWCD ARXML (to avoid overwriting manual configuration)

Once the generation plugin has been run, the source code (.c/.h) implementation of the AUTOSAR BSW system configured by the above process will be found in the specified output directory.

4.2 Importing an Example Application into ISOLAR-AB

The RTA-BSW example applications are ISOLAR-AB projects. To work with the example application, e.g. to generate the BSW source, import it into the ISOLAR-AB workspace. In an ISOLAR-AB workspace, select the **File->Import...** menu
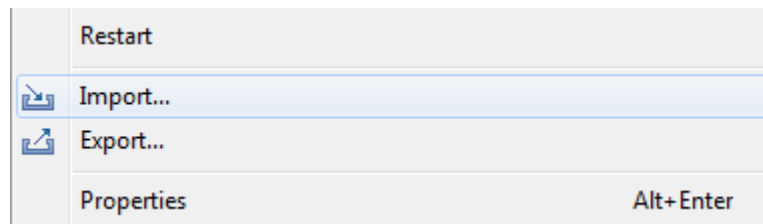

Fig. 4.6: ISOLAR-AB Import Menu Selection

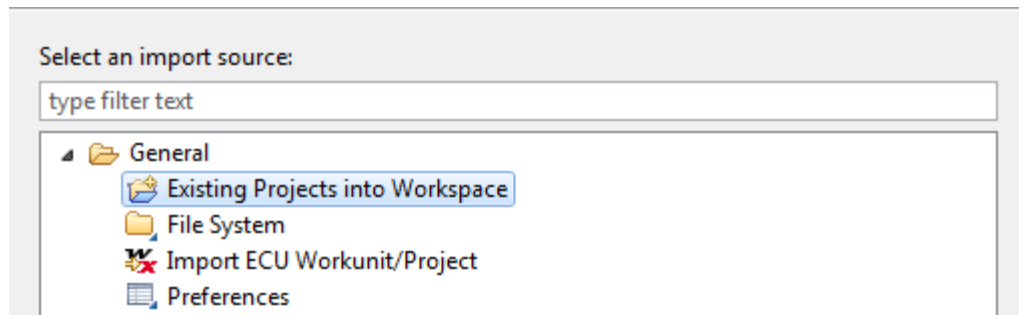From the "Import Dialog", select Existing Projects into Workspace.

Fig. 4.7: ISOLAR-AB Import Existing Project

From the "Import Projects", choose the appropriate location of the projects. For RTA-BSW example applications, choose Select root directory. Alternatively, select Select archive file when the existing project is distributed as a compressed archive file. Click the associated [BROWSE] button to locate the directory or file containing the projects. Under Projects, select the project(s) to import. When importing from a root directory, the "Import Projects" dialog includes options to search for projects in directories below the selected root directory and to copy the project(s) into the workspace.
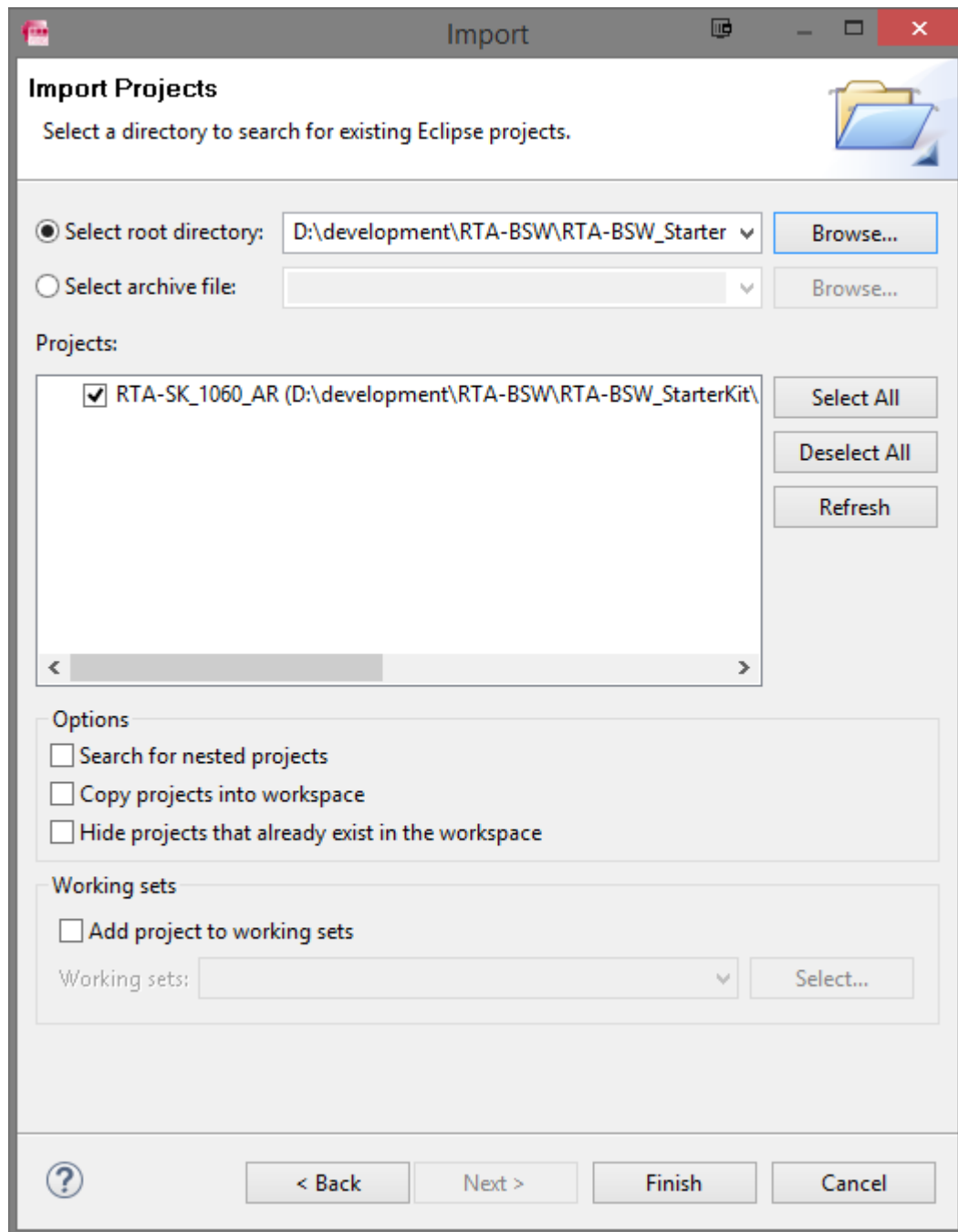
Fig. 4.8: ISOLAR-AB Import Projects Dialog

Click [FINISH] to start the import. The result of the import is viewed in the AR Explorer:
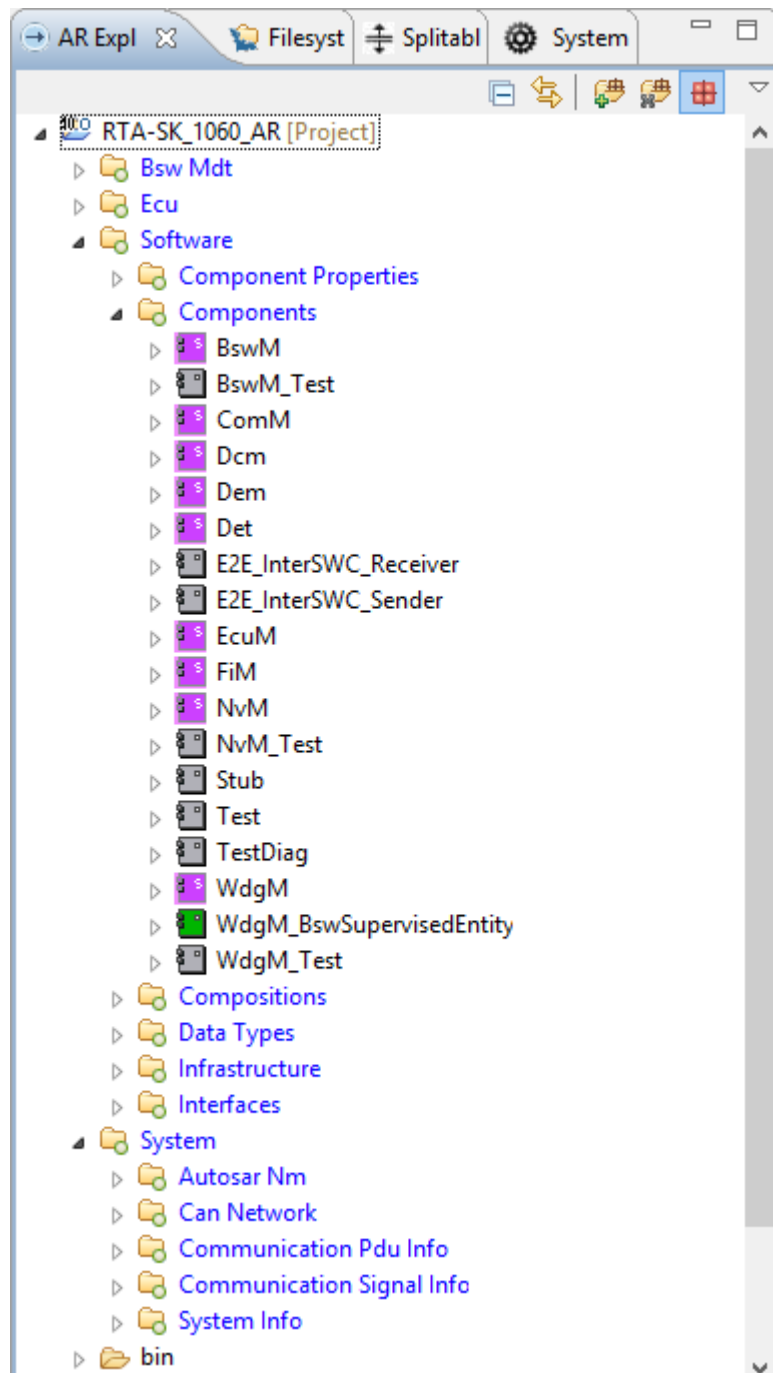
Fig. 4.9: ISOLAR-AB AR Explorer view of RTA-BSW Starter Kit import

5 Example Project

5.1 Project Creation

First create a new AUTOSAR project in ISOLAR-AB by clicking **File->New->AUTOSAR Project**. Choose the name of the project and click "finish".
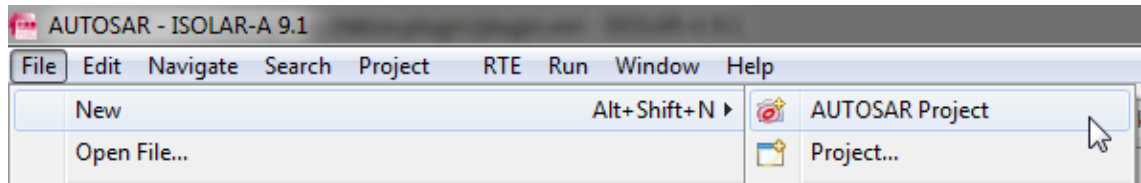

Fig. 5.1: ISOLAR-AB AUTOSAR Project Creation

5.2 System Description Creation

Next, the System template must be configured, ISOLAR-AB provides a number of import tools for legacy file formats (LDF, DBC and FIBEX) which can be used to complete this step automatically. Alternatively, manually configure/use an example ISOLAR-AB project.

5.3 ASW Configuration

Following the system template configuration, we need to define the VFB/ASW configuration before running the RTA-BSW plugins to fully take advantage of the BSW ConfGen process. Doing so will allow the import process to use the ASW configuration for assigning EcuC values, alternatively default values and assumptions will be made about the system. To achieve this, we will import pre-made configurations from the Example folder. Firstly, import the "Import ASW" files into your project. Right click on the project and select Import:
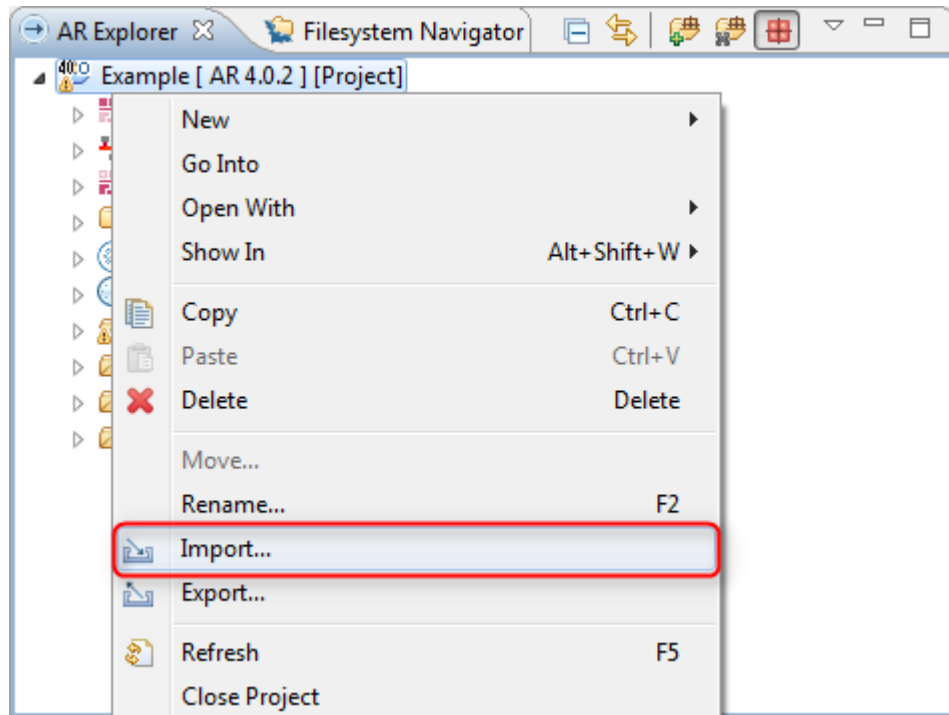
Fig. 5.2: ISOLAR-AB Project Context Menu Import

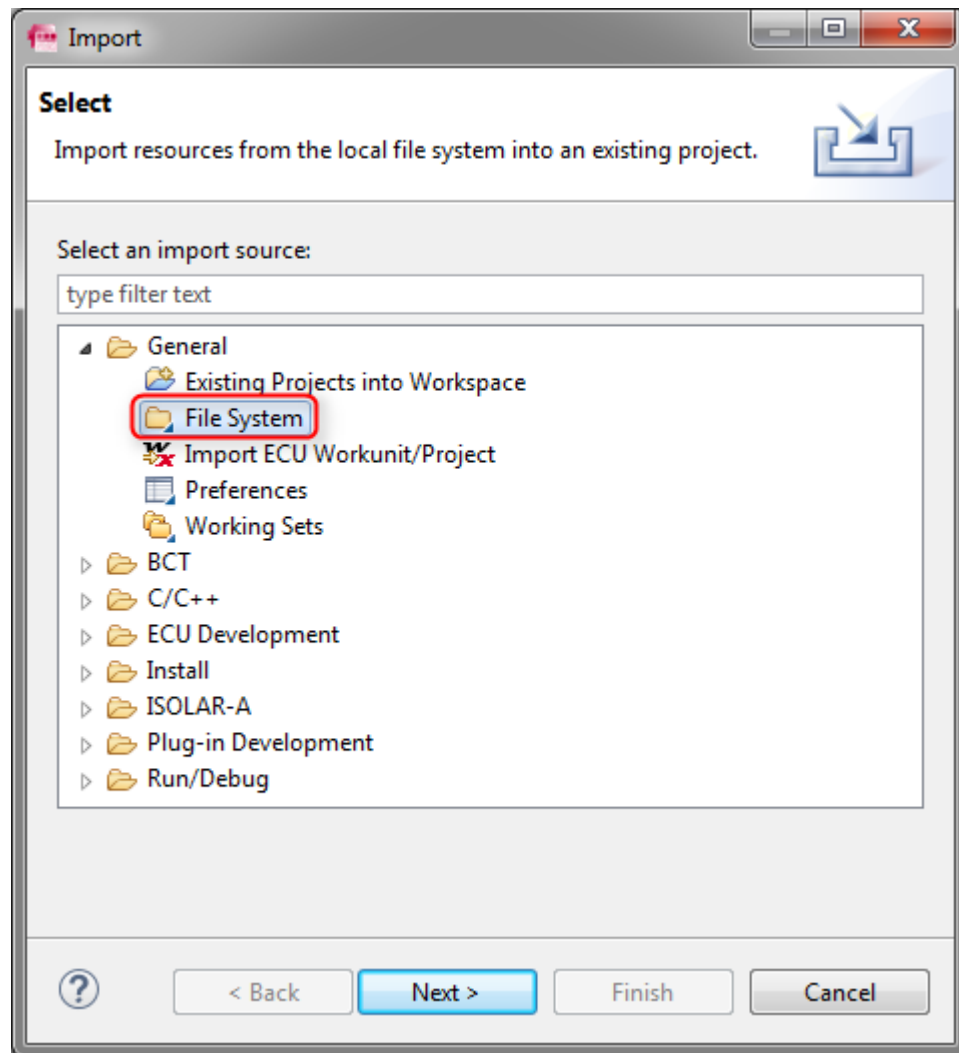Then choose File System from the selection menu:

Fig. 5.3: ISOLAR-AB Import Wizard

Navigate to the Example\Import folder and select [ASW]. Select all files and import them into the project root by clicking [FINISH]:
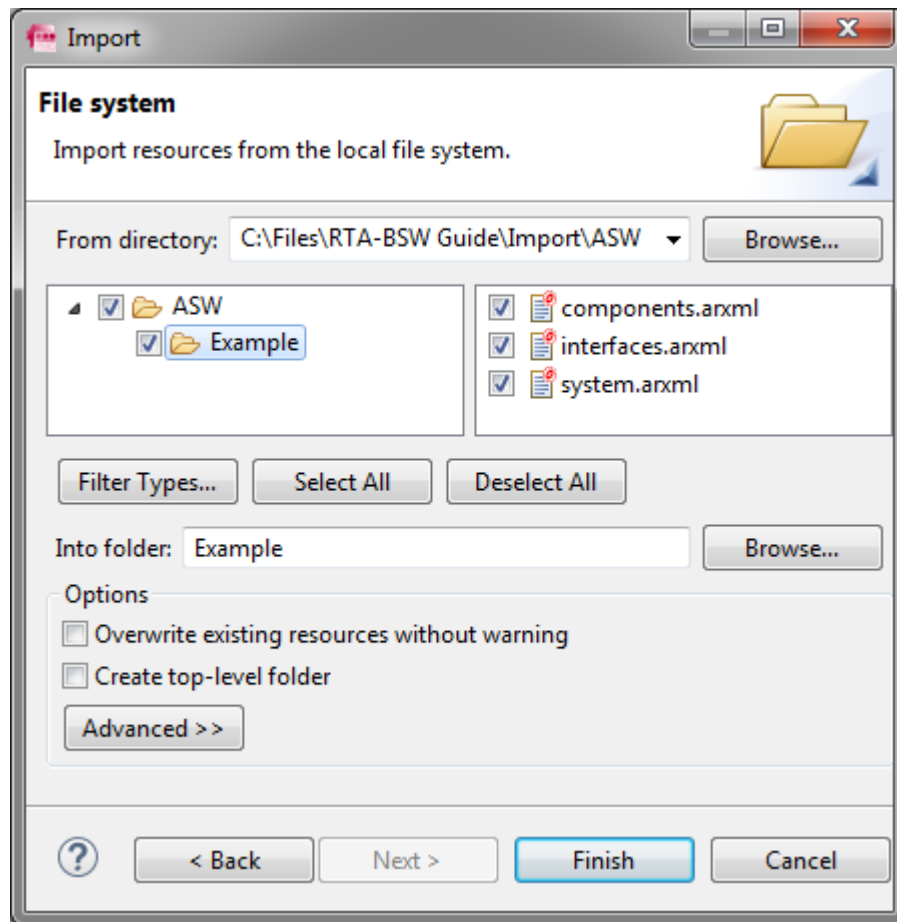
Fig. 5.4: ISOLAR-AB File System Import Dialog

Refresh the project, and there should now be a basic ASW configuration.

5.4   ECU Extract

The next step is to create the ECUExtract for which ISOLAR-AB provides a tool to generate this element automatically. In the context menu of an ECU Instance select [Create ECU Extract], select the default settings and navigate to the [Finish] button, the project will now contain the complete set of information needed for the BSW Import step.
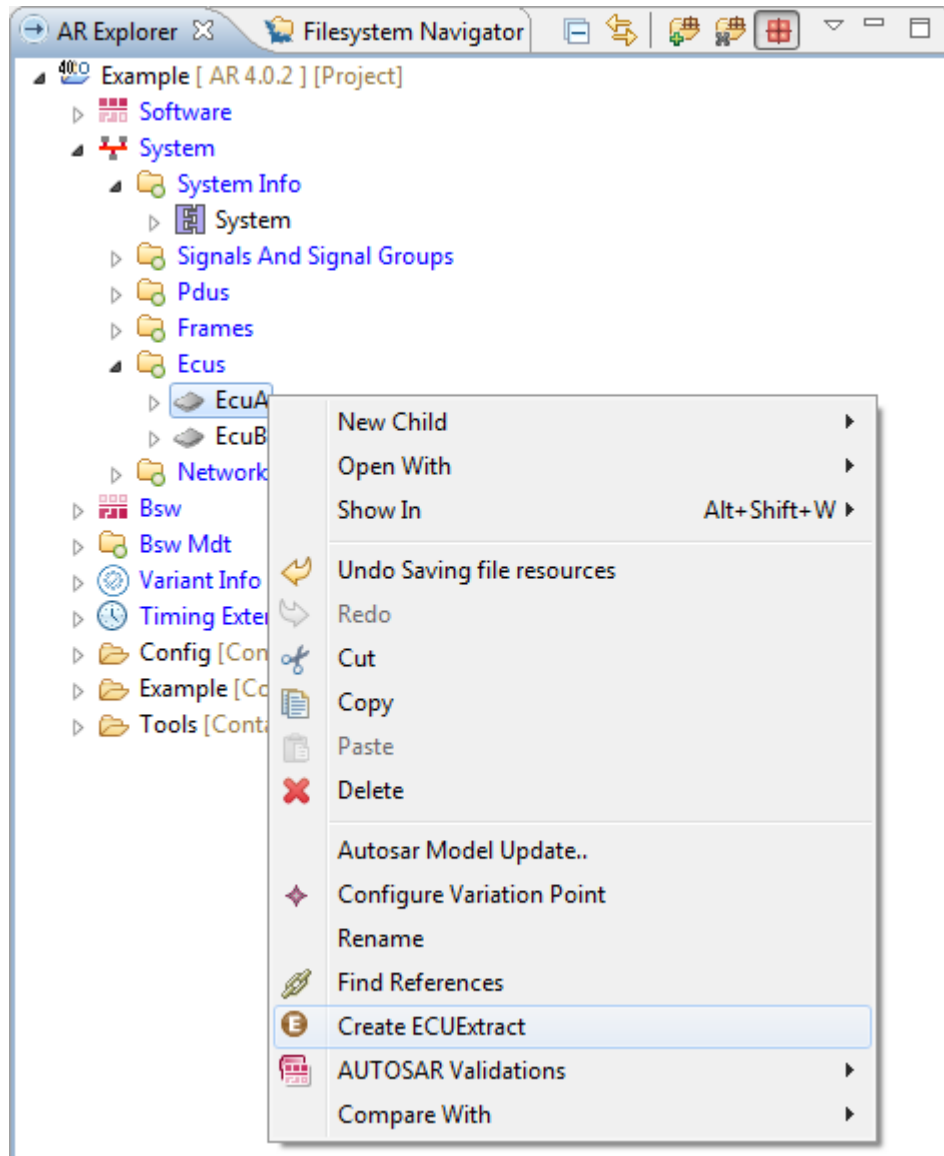
Fig. 5.5: ISOLAR-AB Create ECU Extract menu

5.5   BSW Configuration and Generation

Run BSW ConfGen process by selecting the icon in the ISOLAR-A toolbar, the plugin will prompt you to select the RTA-BSW version and ECU Instance to generate for, and then create the Ecuc-ValueConfiguration.

Now you may run the BSW Generate plugin by selecting the icon for source code generation which will result in the configuration and implementation of your BSW, no additional configuration is required between Import and Generate in order to run the basic EVE example.

5.6   OS and RTE

Now that the BSW has been generated you can create the OS and RTE configuration for scheduling BSW and ASW runnables, for the EVE example project a second ISOLAR-A pre-made config-

uration is included.

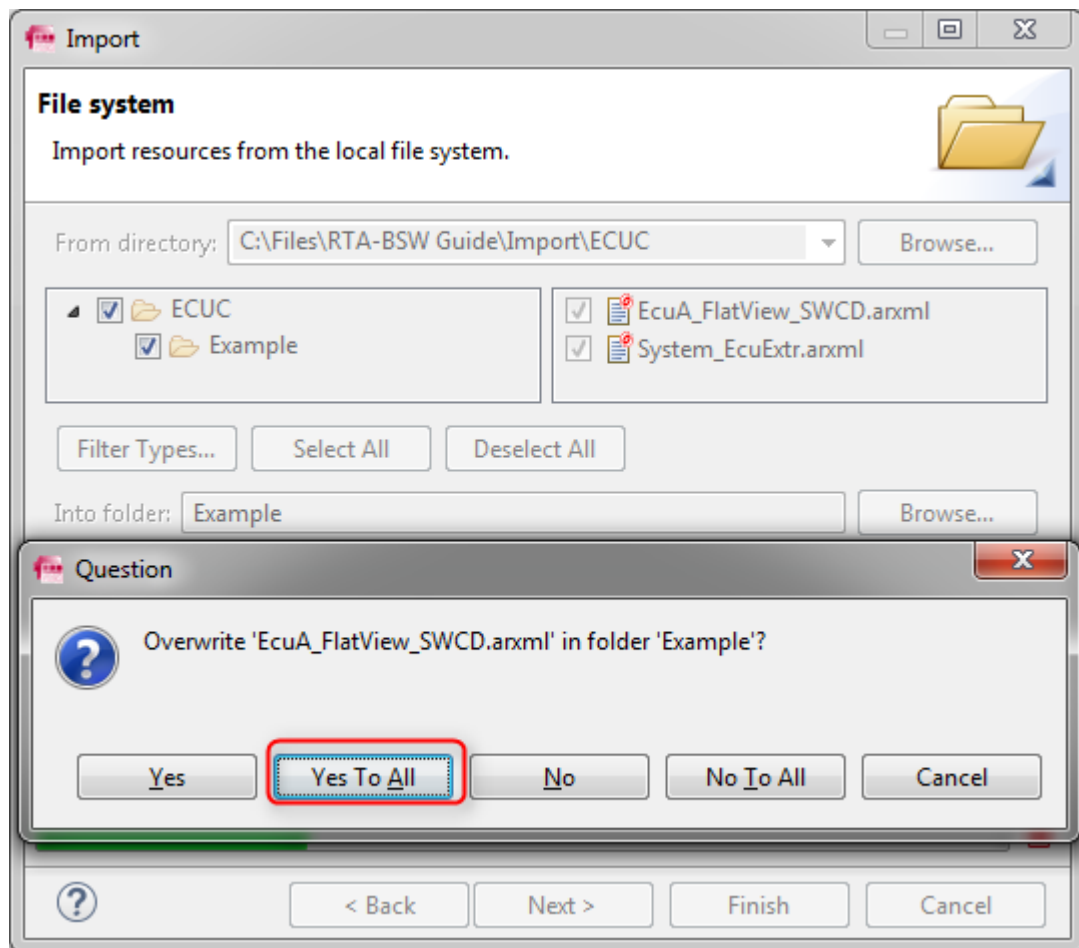Import ExampleImportECUC into the project, overwriting all files:

Fig. 5.6: ISOLAR-AB File System Import Overwrite Dialog

5.7   ASW Templates

This process will generate a software component named after the extracted ECU Instance. Right click on this **component->Generate->Component Code-Frame**.
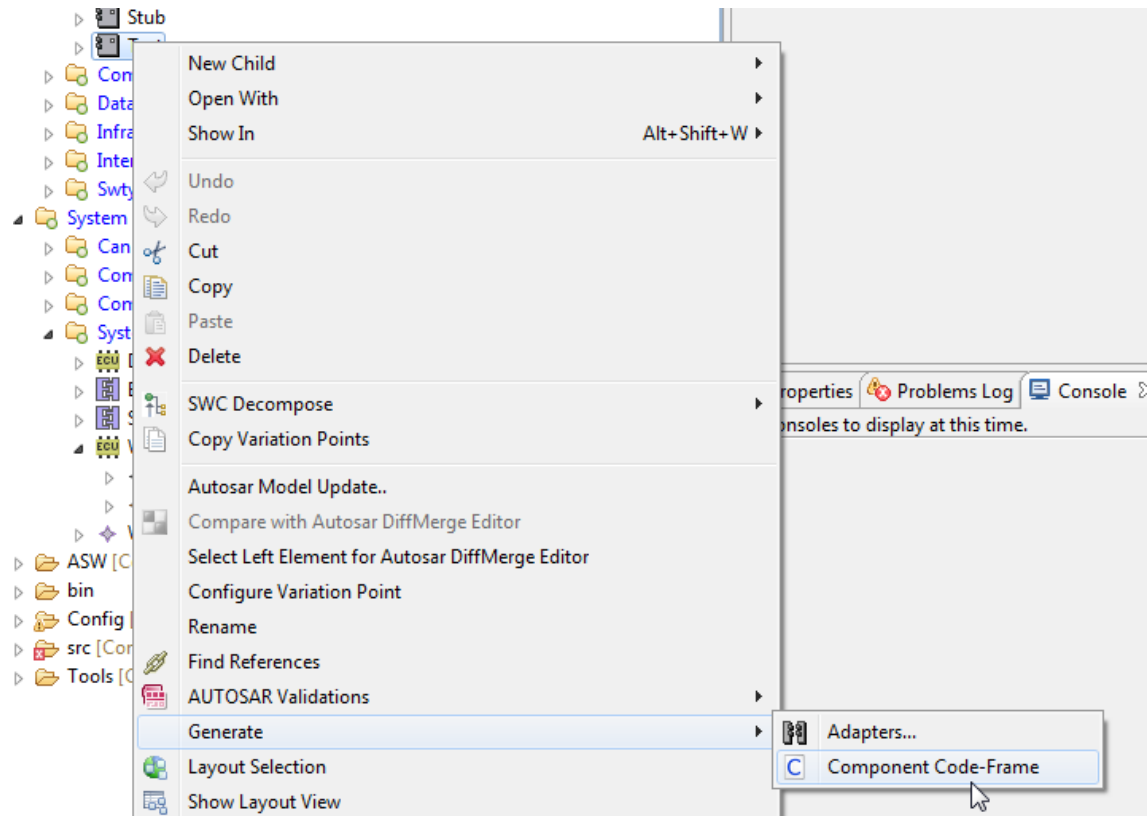
Fig. 5.7: ISOLAR-AB Generate

In the window that opens you will need to uncheck Use default "templates" and then select `Templates\template\MainTemplate.xpt` as the template to use in the box that appears. Click [Next] then choose an output directory before finally selecting [FINISH].

6   ETAS Contact Addresses

6.1   ETAS HQ

ETAS GmbH Borsigstraße 24 70469 Stuttgart Germany	Phone:	+49 711 3423-0
	Fax:	+49 711 3423-2106
	WWW:	www.etas.com

6.2   ETAS Subsidiaries and Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries	WWW:	www.etas.com/en/contact.php
ETAS technical support	WWW:	www.etas.com/en/hotlines.php

6.2.1   RTA Hotline

The RTA hotline is available to all RTA users with a valid support contract.

- rta.hotline.uk@etas.com

- +44 (0)1904 562624. (0900-1730 GMT/BST)

Please provide support with the following information:

- Your support contract number.

- Your AUTOSAR XML and/or OS configuration files.

- Reproduction steps that result in an error message.

- The version of the ETAS tools you are using.