VECTOR

VectorCAST IBM CLM Integration

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Author Yue, Jeanne
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Abstract Information on the IBM CLM and VectorCAST Integration.

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1 Overview

The VectorCAST Requirements Gateway provides traceability between software requirements and test cases and allows the import and mapping of requirements to test cases. Requirements Gateway provides a way to:

- Import testing requirements from your Requirements Management Tool (RMT) or Requirements tool into a VectorCAST RGW repository,
- Assign specific requirements to test cases in a unit test environment and then
- Export the resulting pass or fail status back to the RMT tool.

Requirements Gateway (RGW) version 2 is no longer supported in VectorCAST version 2023 and later.

Customers who are currently using RGW version 2 and need guidance on migrating to RGW version 3 should contact Vector Tech Support at support@vector.com or visit www.vector.com/support.

In RGW 3.0, the requirements database is implemented using JSON, allowing the user to commit the repository to Source Control Management (SCM).

In addition to CSV Files, VectorCAST RGW currently supports the following Requirements Management Systems:

- Codebeamer
- IBM CLM
- IBM DOORS
- Jama
- Polarion®
- Visure

This Application Note will show you how to use the RGW IBM CLM Integration with the ability to import from DOORS Web Access (DWA) or from DOORS Next Generation (DNG).

2 Use Cases

The following use cases will be shown:

- Create a Requirements Repository
- Authenticate with the Server
- Import Requirements
- Link Requirements to Test Cases
- Export Requirements
- Review Updated Requirements

2.1 Use Case: Create a Requirements Repository

To use the Requirements Gateway, a location must be specified for the Repository. If no location is specified, a prompt opens allowing the user to select the location. A standard Choose a Directory dialog opens, prompting the user to enter the path to the directory.

Set the repository location by selecting **Tools => Requirements Gateway => Options...** from the Menu Bar shown in Figure 1.

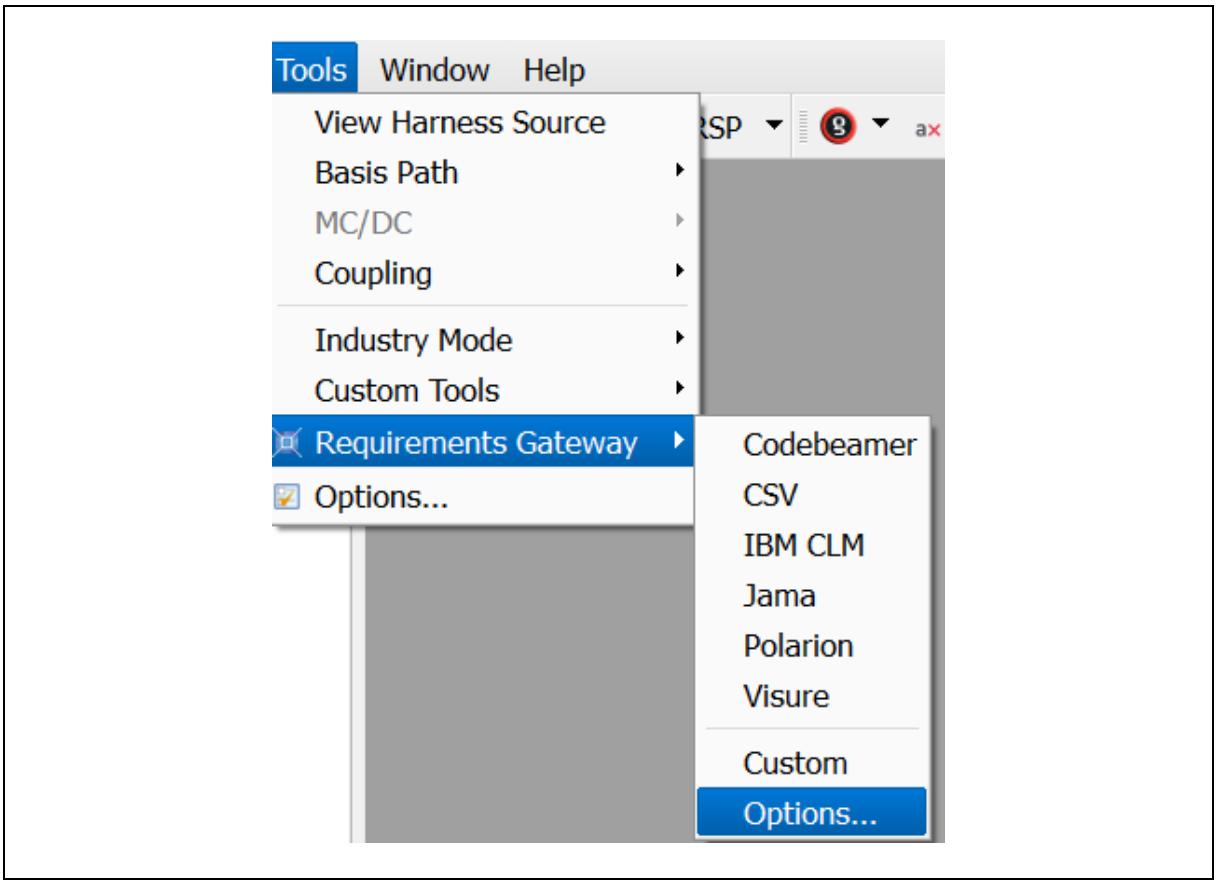

Figure 1-Select Requirements Gateway Options

The **Requirements Gateway Options** dialog will open as shown in Figure 2.

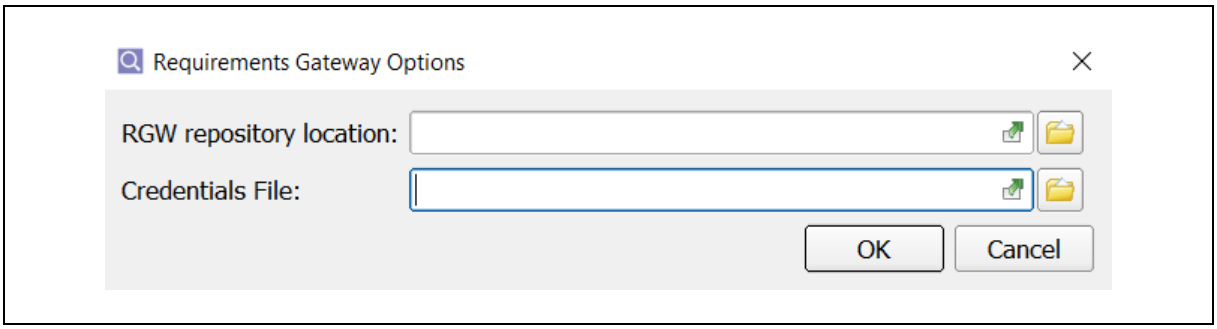

Figure 2-The Requirements Gateway Options Dialog

In the **RGW Repository Location** field, enter the path to the repository and select the **OK** button as shown in Figure 3.

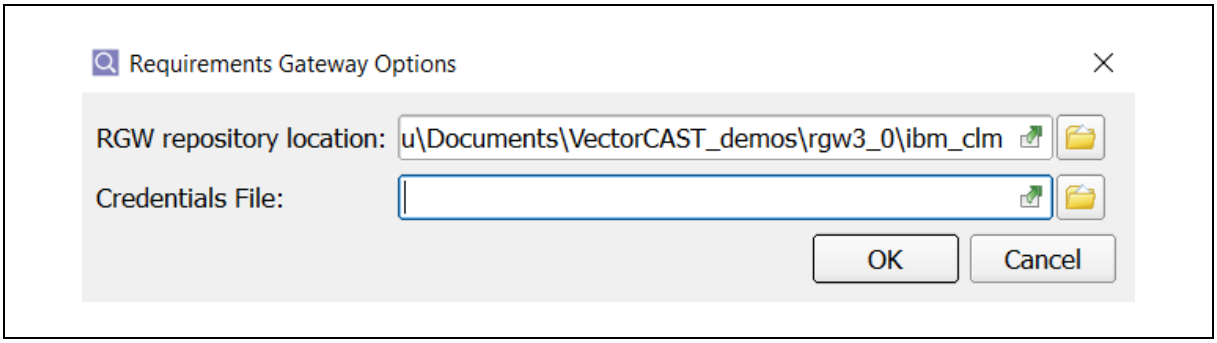

Figure 3-Set RGW Repository Location

The RGW repository location is now set, and the initial Requirements Repository is created in this location. VectorCAST creates a directory under the set location called `requirements_gateway`, that will hold the setting and log files used by RGW.

A new option starting in VectorCAST 2021SP5 is the ability to store server credentials in a Credentials File. The previous option of adding the credentials during the authentication step is still available. The Credentials File can be set in the Requirements Gateway Options GUI, shown in Figure 4, or set the environment variable VCAST_CREDENTIALS_FILE to the location of the file.

The RGW credentials file can store the username and password for a specific user, to save time when logging in to the RMT.

The location of the credentials file can be assigned to a .json file by selecting **Tools => Requirements Gateway => Options...** from the Menu Bar.

Use the Browse button to navigate to the location of the credentials file and then select the OK button. The path to the file is typically specified as a full path but can be a relative path.

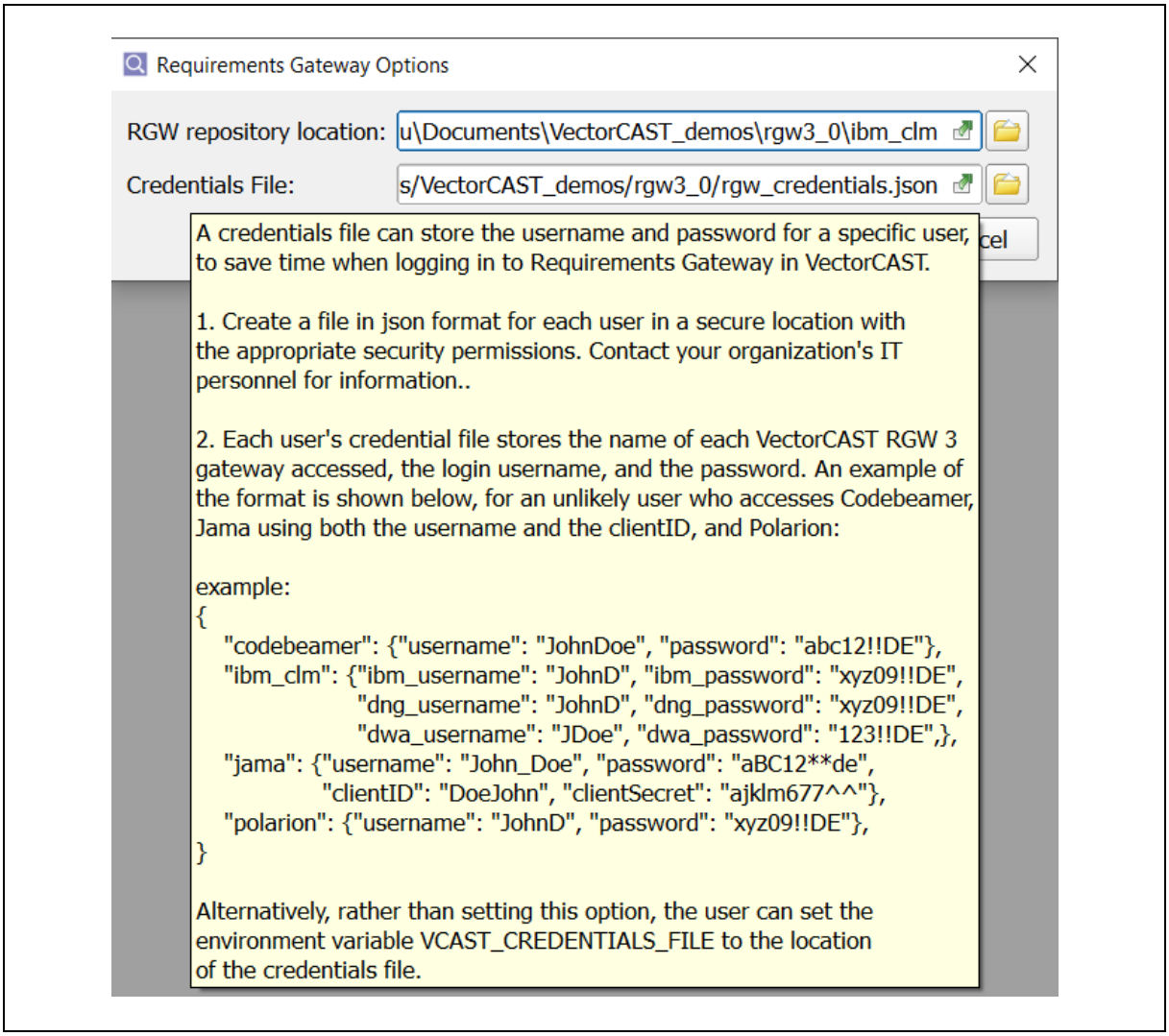

Figure 4-Credentials File

2.2 Use Case: Authenticate with the Server

To authenticate with the IBM CLM server, first Select **Tools => Requirements Gateway => IBM CLM** from the Menu Bar as shown in Figure 5.

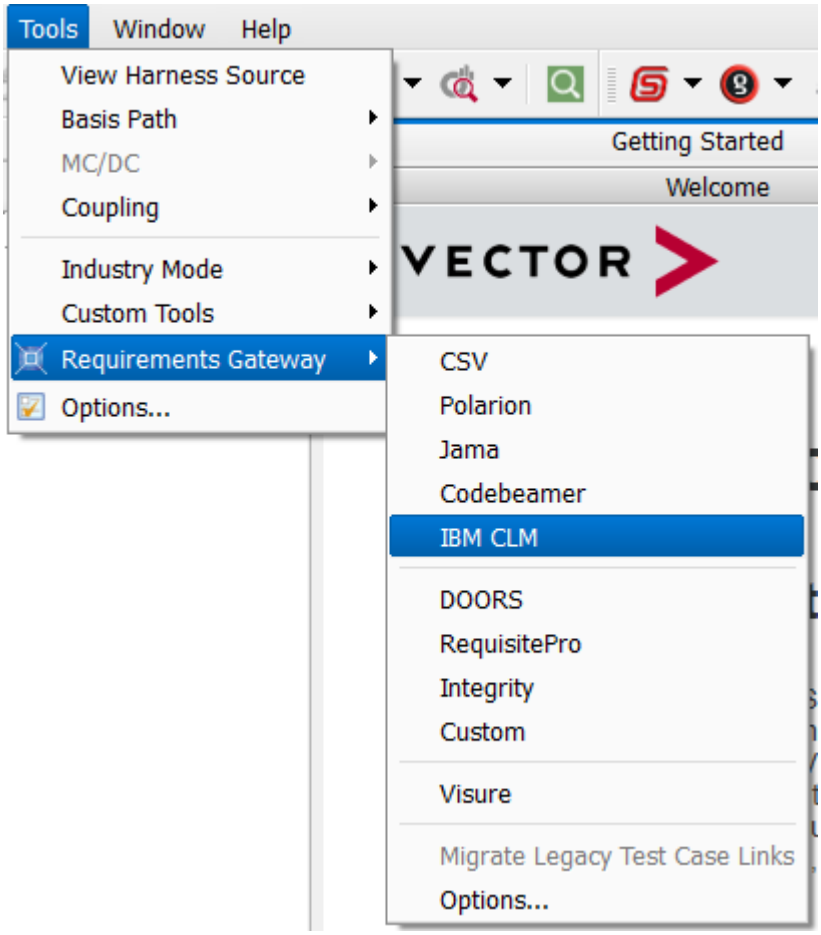

Figure 5-Select the Gateway

The **Requirements Gateway** dialog will open with IBM CLM as the selected **Gateway Profile** and the **Authentication** tab selected at the bottom as shown in Figure 6.

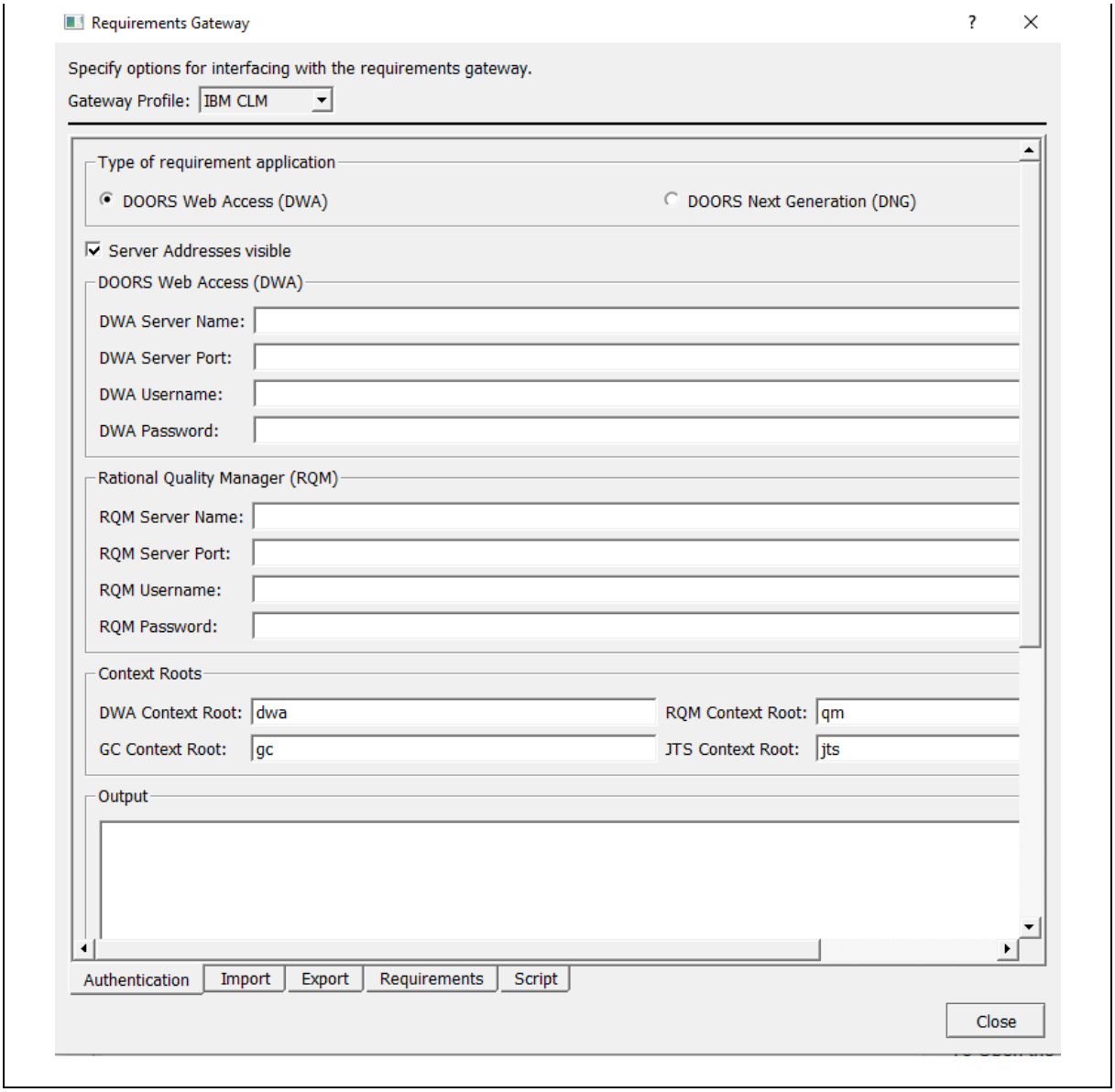

Figure 6-Authentication Tab

Choose the requirement application, DOORS Web Access (DWA) or DOORS Next Generation (DNG). Enter the information needed to connect to the IBM CLM server. This should be the same information you would use normally to connect to the IBM CLM server via the web interface.

2.2.1 DOORS Web Access (DWA)

DOORS Web Access (DWA) is chosen as the default option. Once the required information is entered, select the **Authenticate** button as shown in Figure 9. The integration will now attempt to connect to BOTH the DWA and RQM servers with the authentication details provided. Note that authentication details for BOTH DWA and RQM MUST be provided for the integration to work. Once authenticated, a “CLM RM system connect success” and a “CLM QM/GC system connect success” can be seen in the Output.

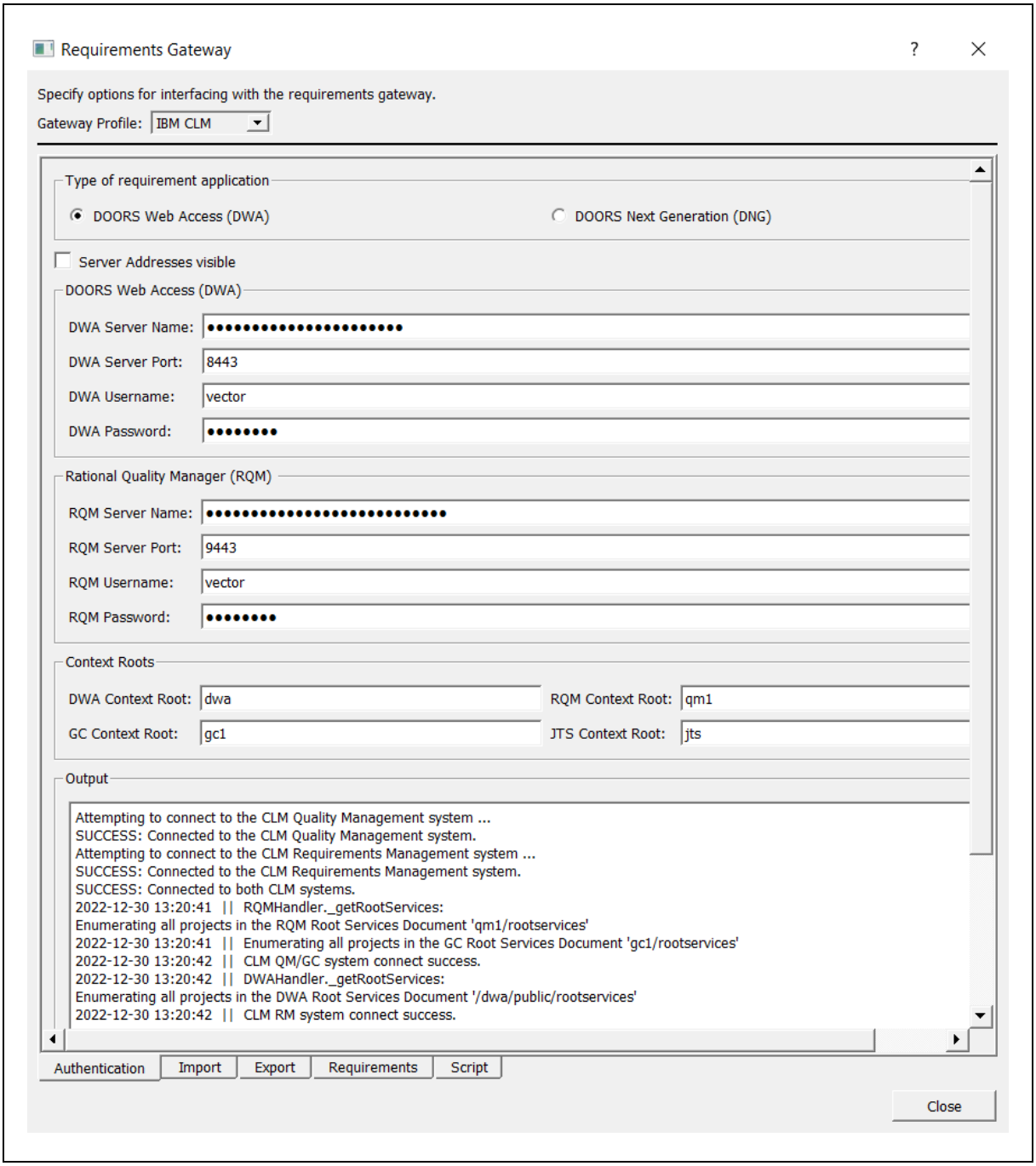

Figure 7-Authenticate with the Server: DWA

You will see a message indicating the status of the authentication. If the authentication fails, you will see the reason for failure in the **Output** window of the **Authentication** tab, as seen in Figure 8.

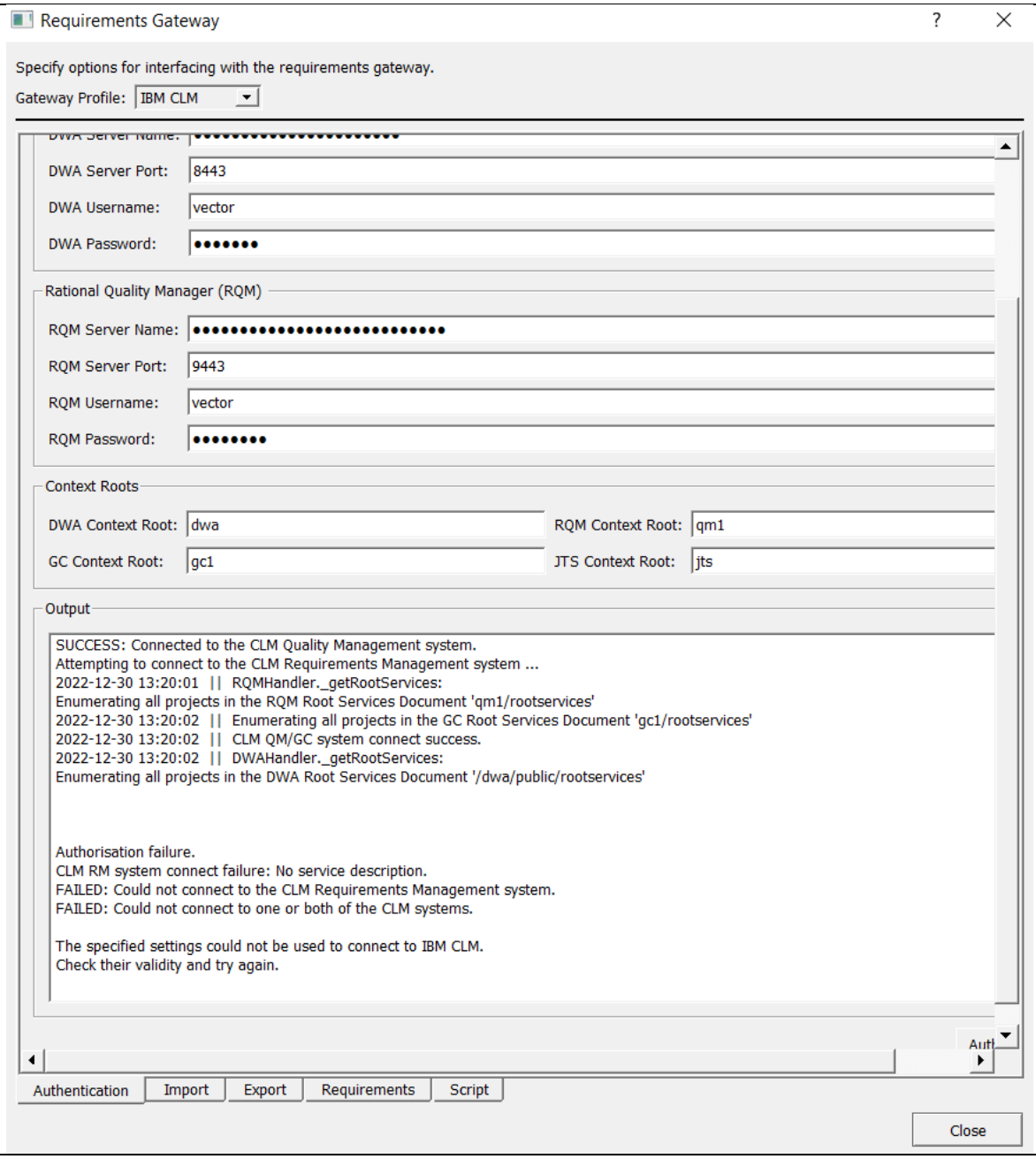

Figure 8-Authentication failure: DWA

2.2.2 DOORS Next Generation (DNG)

DOORS Web Access (DWA) is chosen as the default option, select the option next to it for DOORS Next Generation (DNG). Once the information is entered, select the **Authenticate** button as shown in Figure 7.

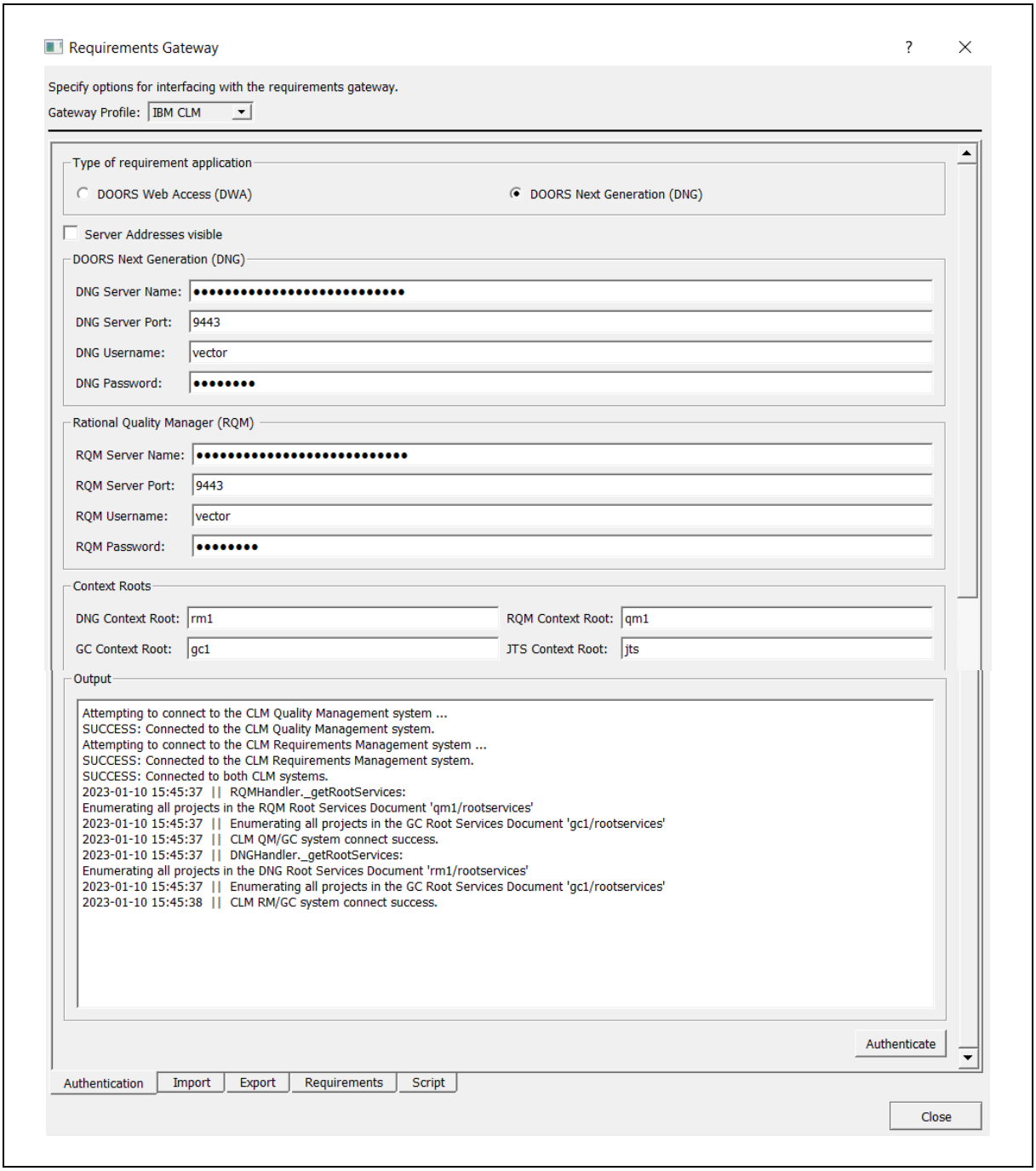

Figure 9-Authenticate with the Server: DNG

You will see a message indicating the status of the authentication. If the authentication fails, you will see the reason for failure in the **Output** window of the **Authentication** tab, as seen in Figure 8.

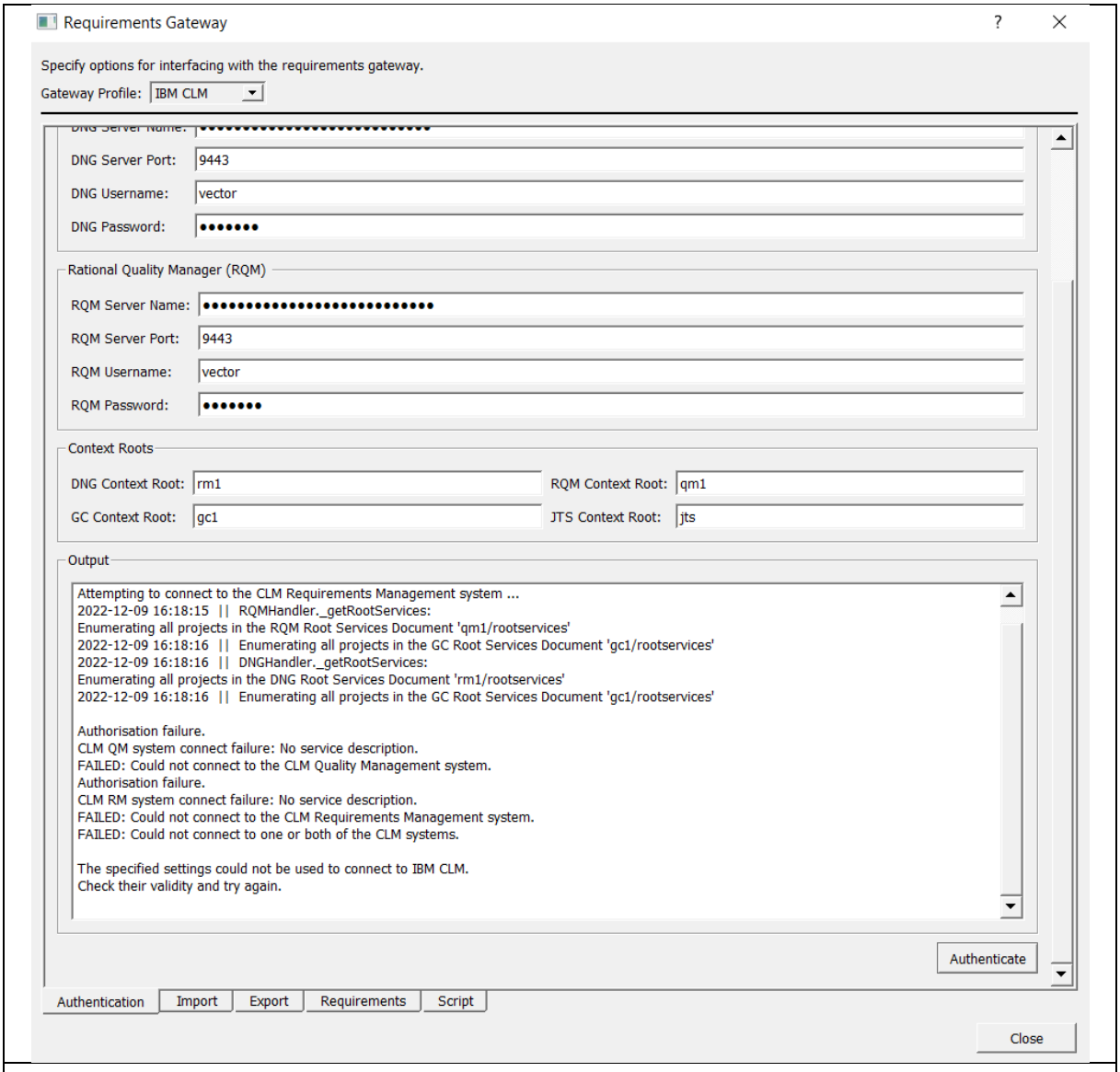

Figure 10-Authentication failure: DNG

2.3 Use Case: Import Requirements

2.3.1 DOORS Web Access (DWA)

To import requirements from DWA, you will need to open the Requirements Gateway dialog as shown in Figure 5. Once the dialog is open, select the import tab at the bottom. The Module / Service Provider Selection fields will automatically be filled with available modules if already authenticated. Select the valid module and fill in the Field Selection as seen in Figure 11 and then click the import button.

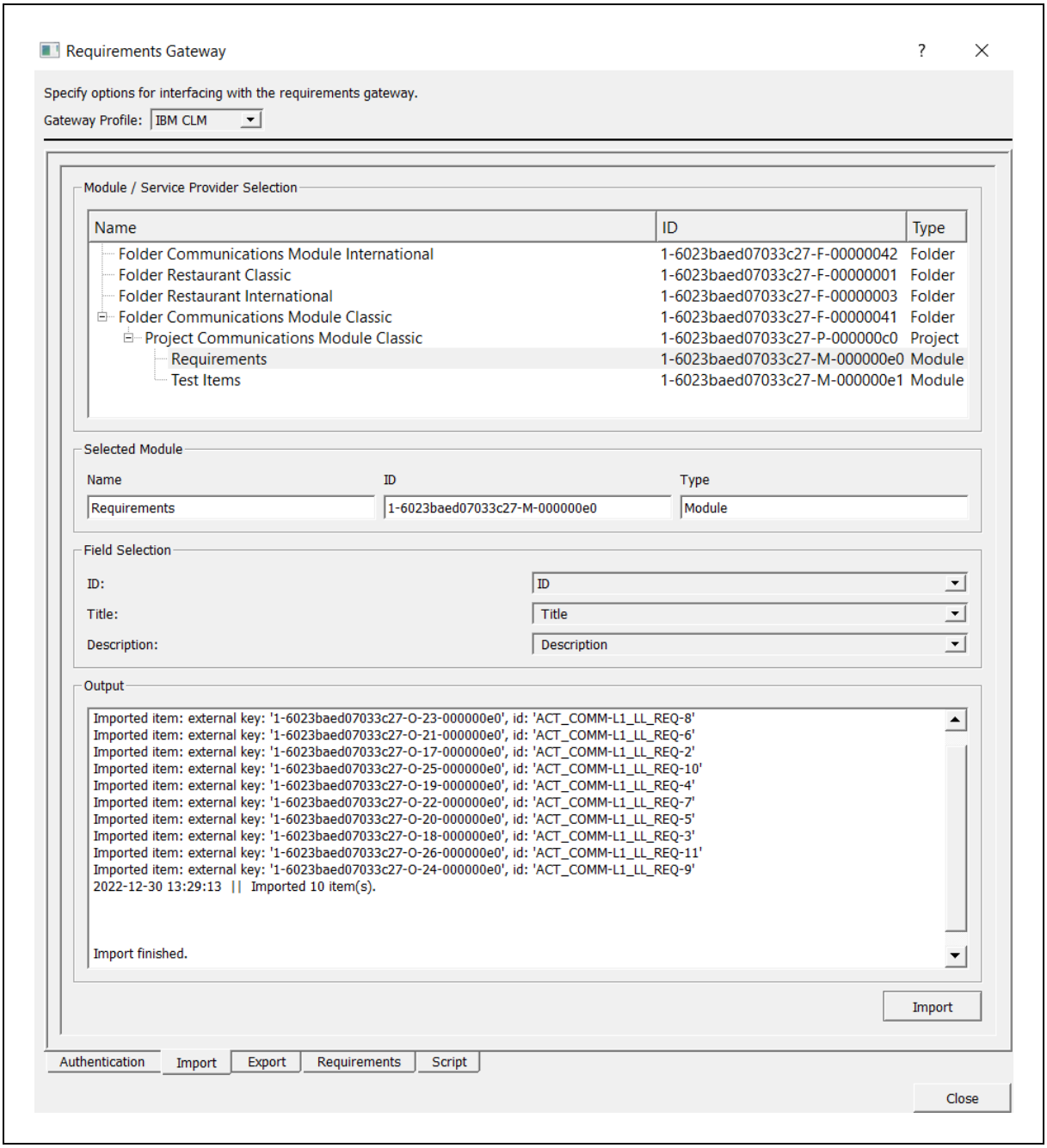

Figure 11-Select Requirements to be import from the Server: DWA

VectorCAST will now fetch the requirements selected from the DWA server and import them into VectorCAST. A listing of the requirements will be shown after clicking on the **Requirements** tab as seen in Figure 12.

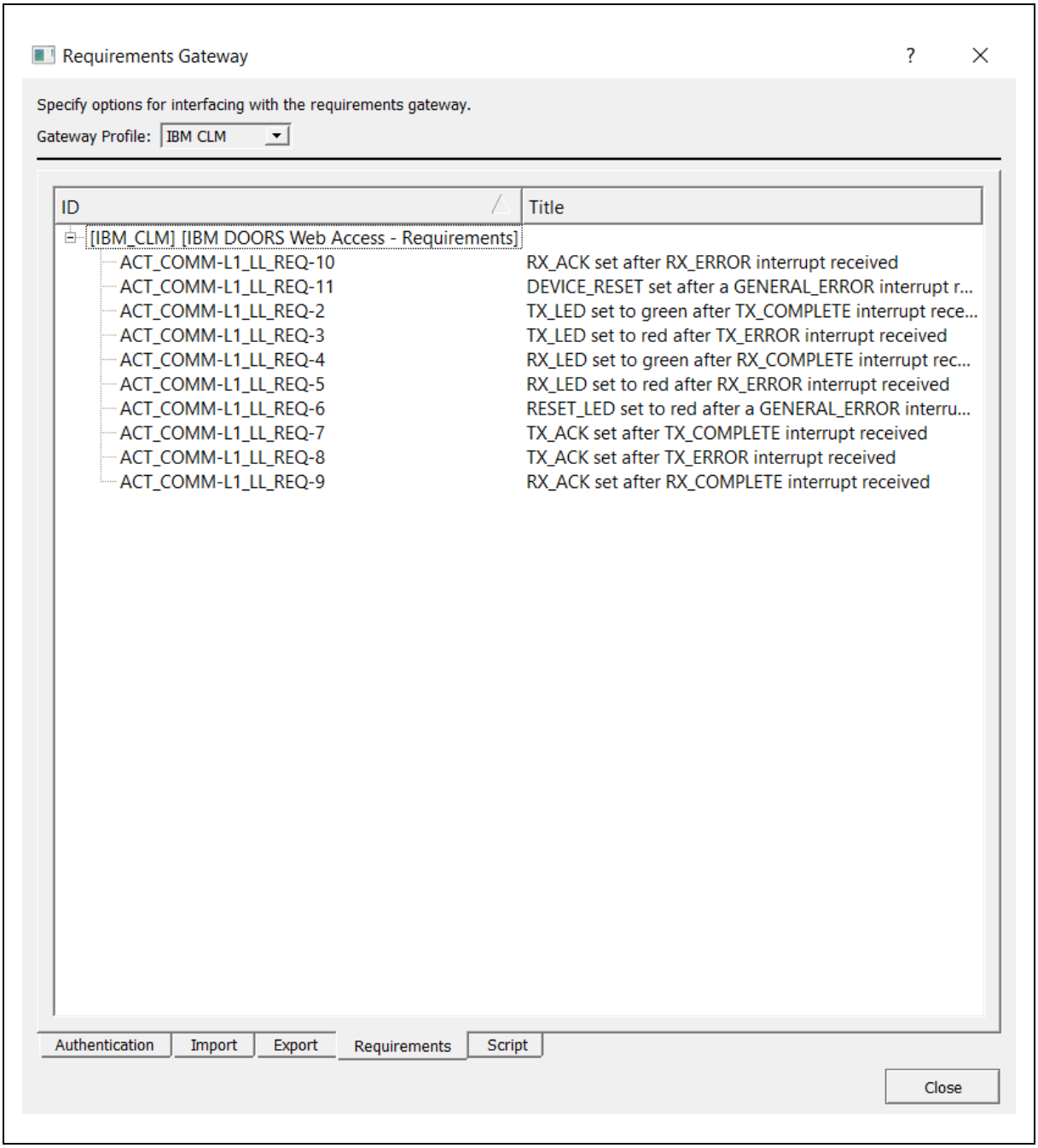

Figure 12-Import Requirements from the Server: DWA

2.3.2 DOORS Next Generation (DNG)

To import requirements from DNG, you will need to open the Requirements Gateway dialog as shown in Figure 5. Once the dialog is open, select the import tab at the bottom and select the correct project and in the case of projects which are enabled for Components and Configurations the respective component and configuration (stream).

Note that projects which are not enabled for Components and Configurations, or do not participate in Global Configuration Management must be selected by using the option Selection Method Local tab, seen in Figure 13.

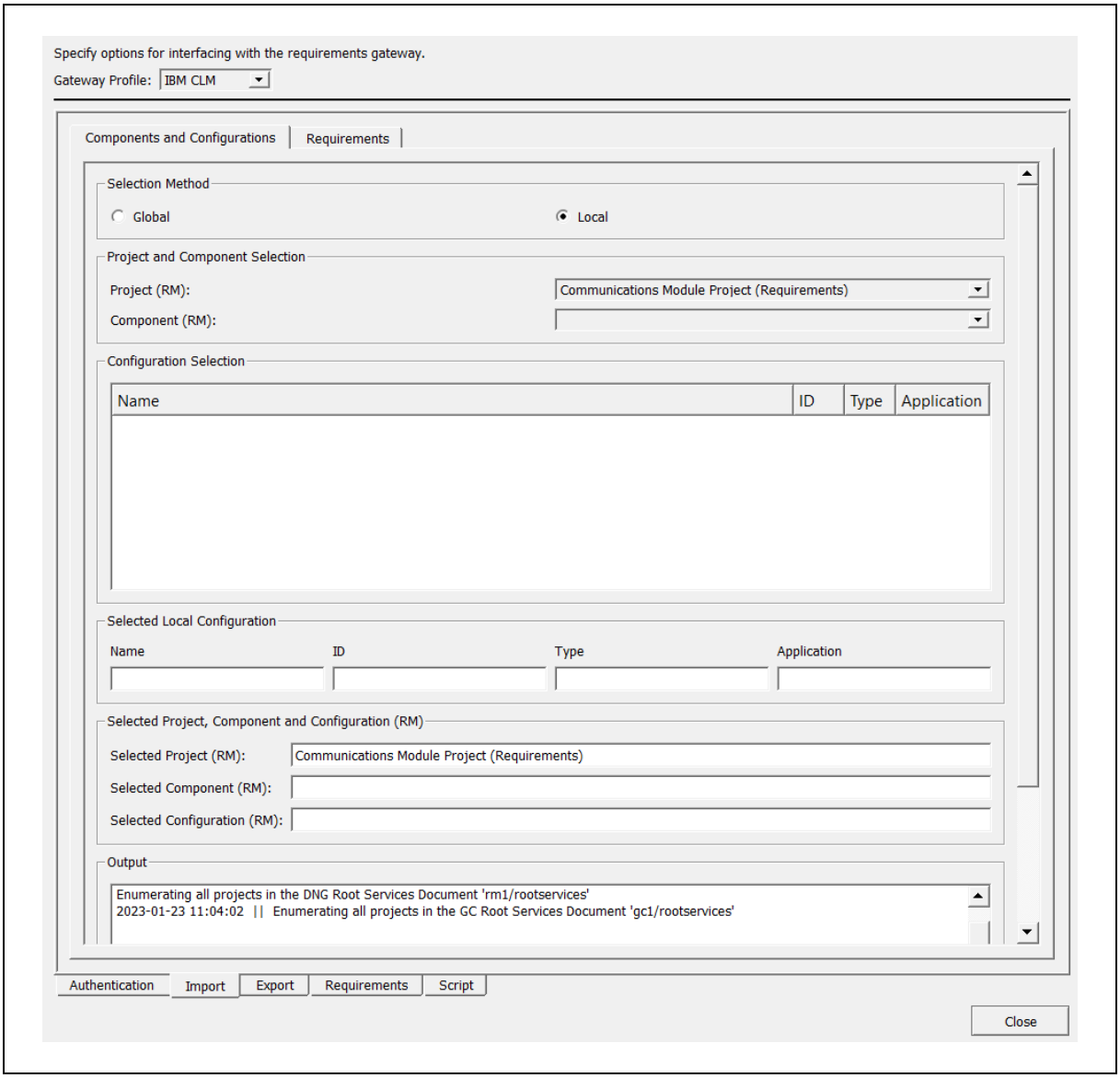

Figure 13-Selection Method Local

Select the Requirements tab and fill in the Folder Selection, Selected Collection, Type Selection and Field Selection as seen in Figure 14 and then click the import button.

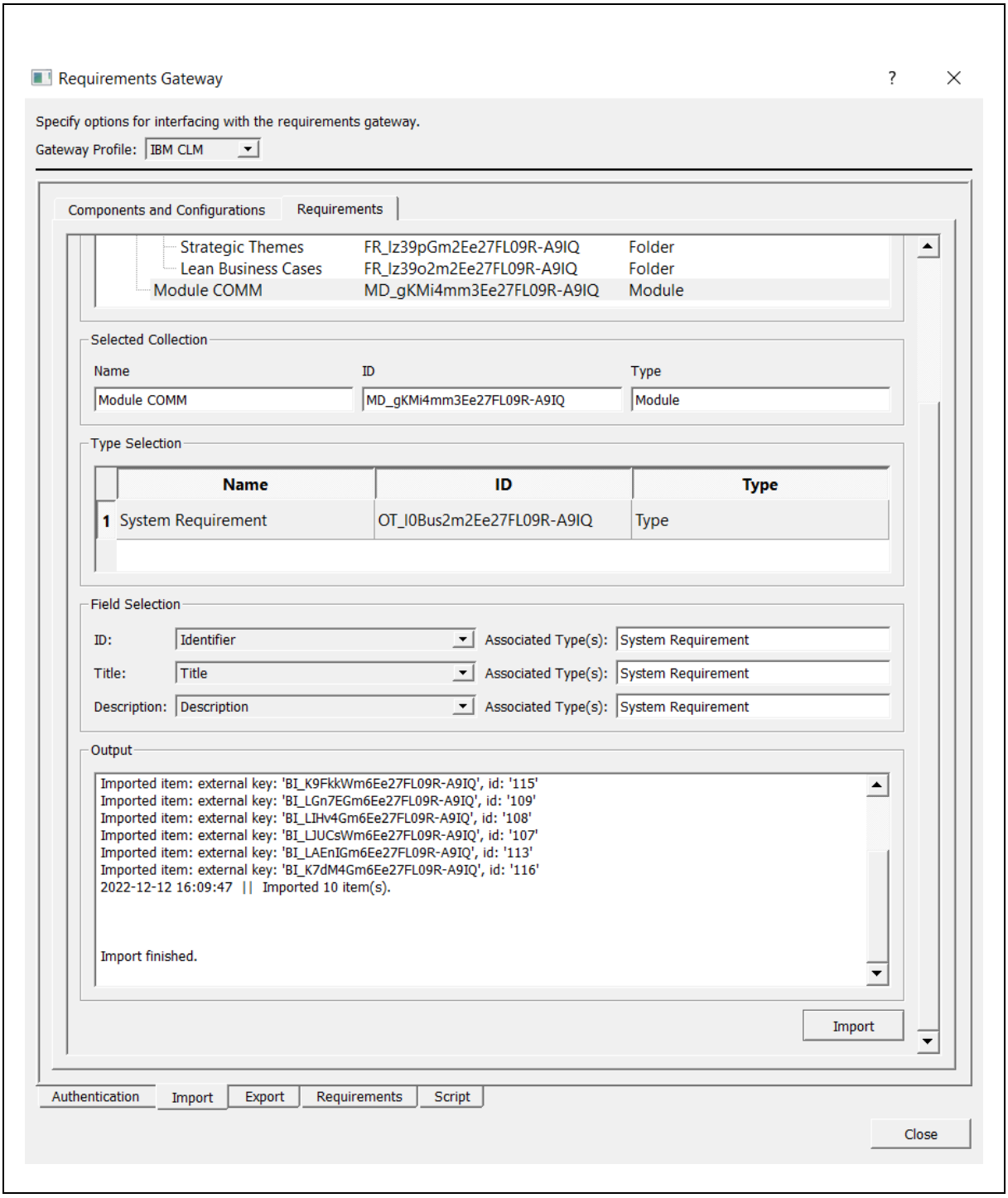

Figure 14-Select Requirements to be import from the Server: DNG

VectorCAST will now fetch the requirements selected from the IBM CLM server and import them into VectorCAST. A listing of the requirements will be shown after clicking on the **Requirements** tab as seen in Figure 15.

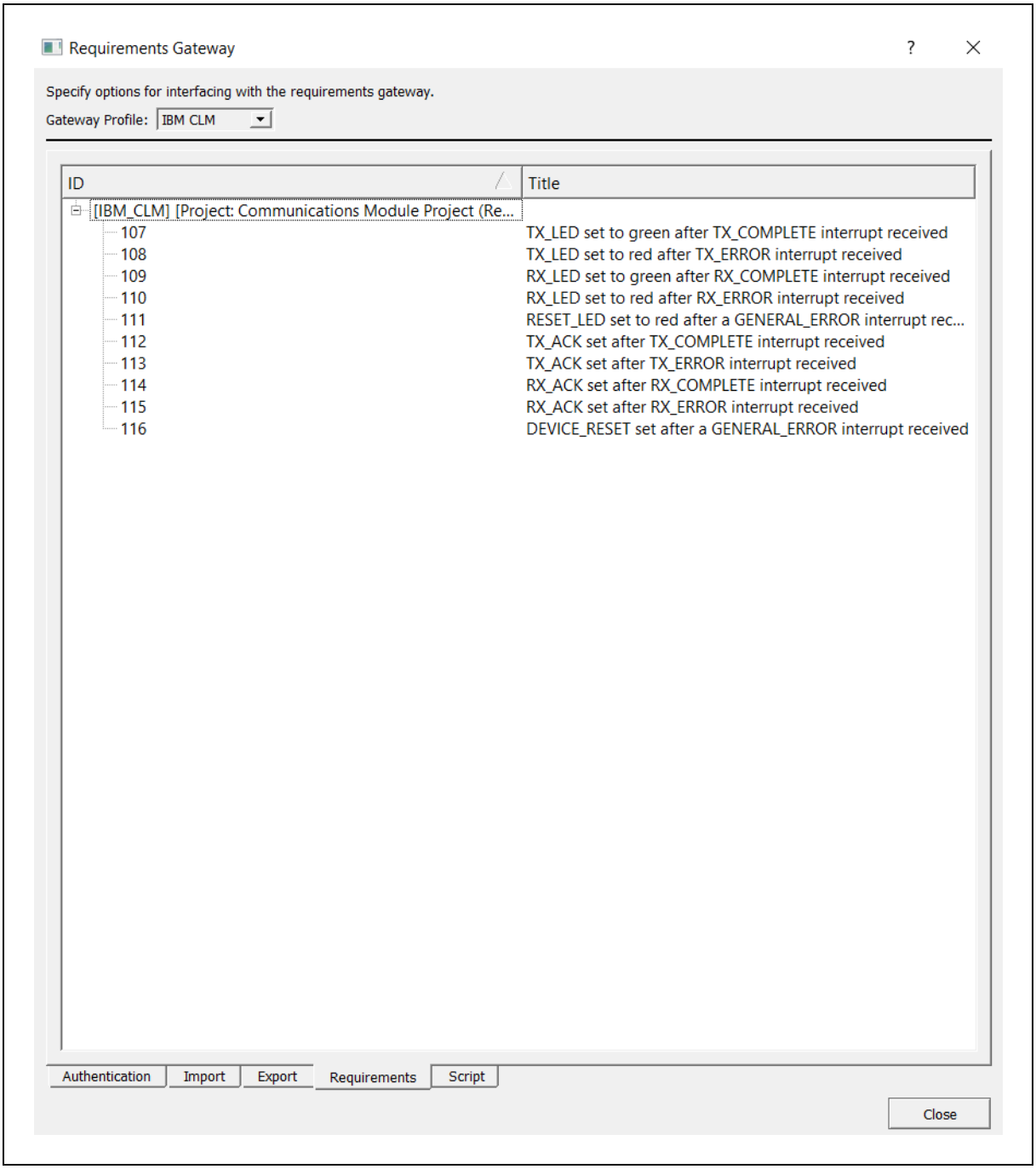

Figure 15-Import Requirements from the Server: DNG

2.4 Use Case: Link Requirements to Test Cases

2.4.1 DOORS Web Access (DWA)

To link requirements to a test case, first open a unit test environment and select a test case. Select the **Requirements** button as shown in Figure 16.

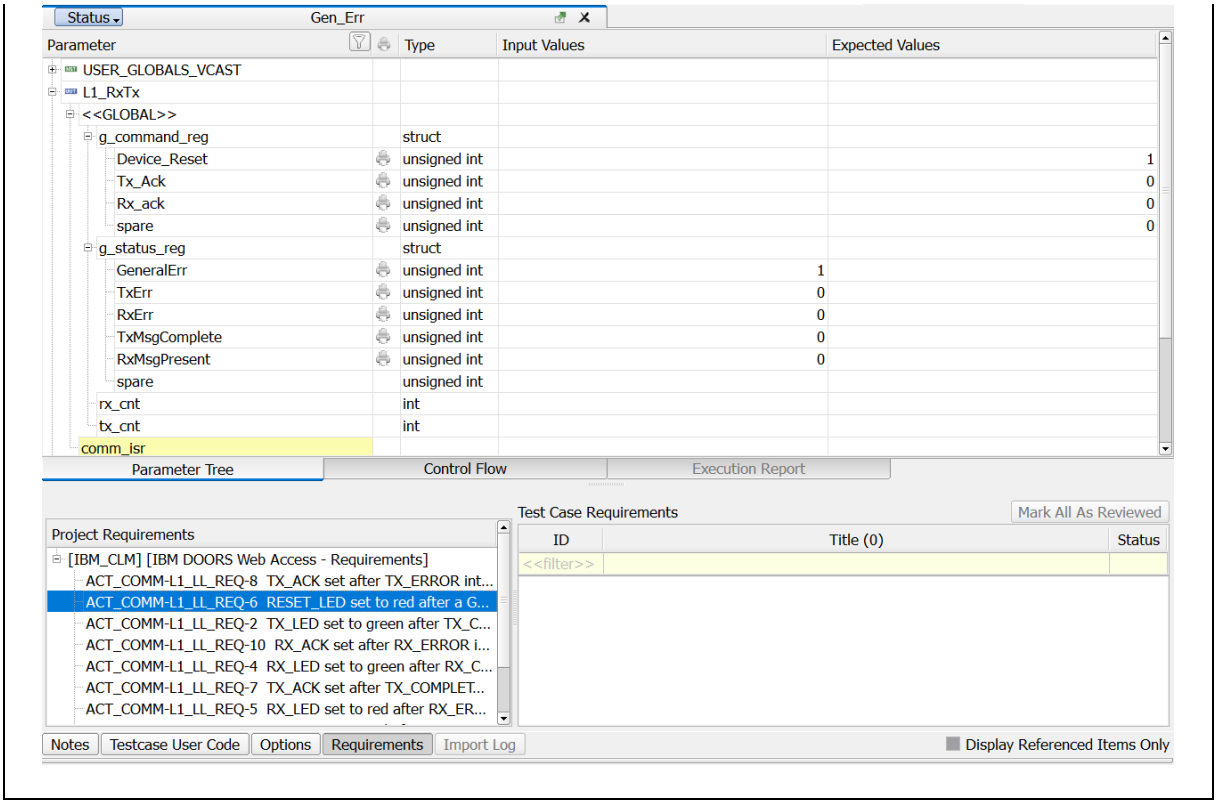

Figure 16-Select Requirements in the Unit Test Environment: DWA

In the Project Requirements window, you will see the list of imported requirements from DWA. To link a requirement to the test case, double click on the requirement. This will add the requirement to the **Test Case Requirements** as seen in Figure 17.

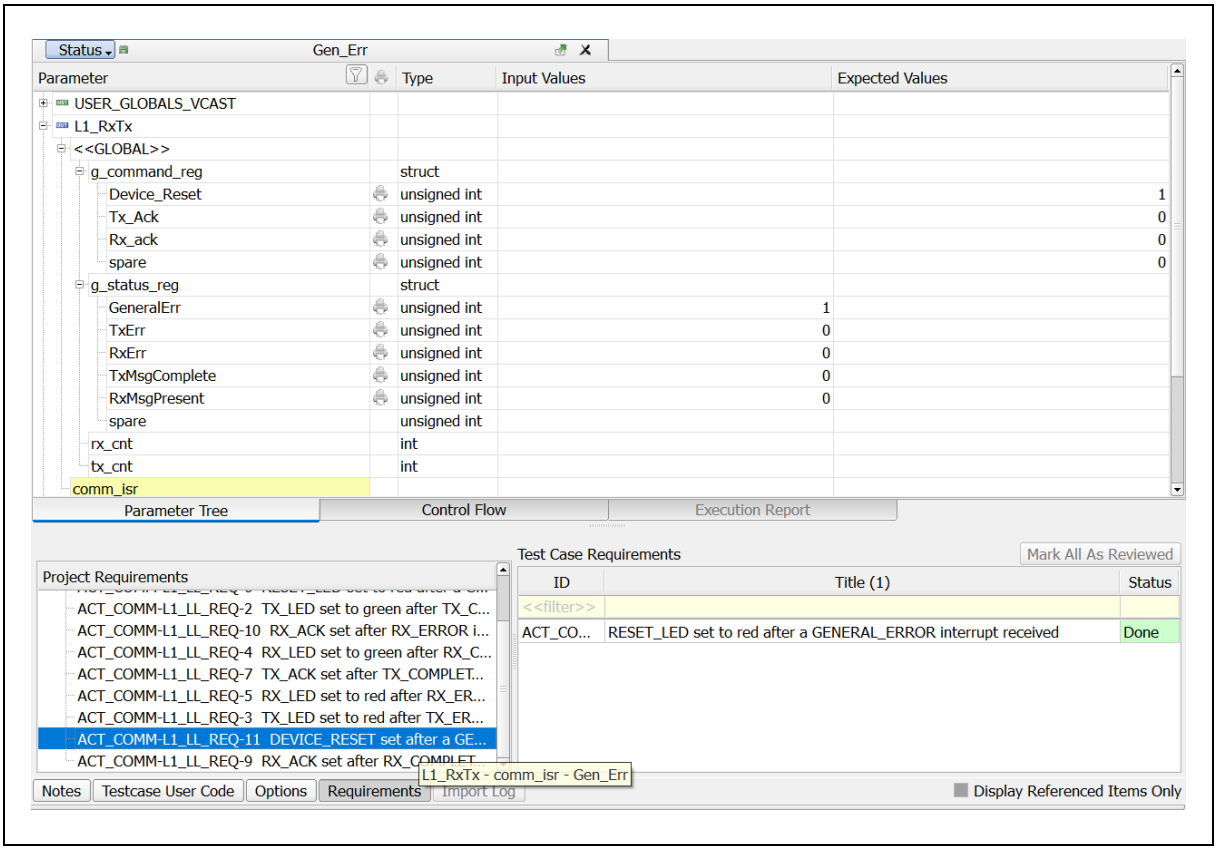

Figure 17-Link a Requirement to a Unit Test Case: DWA

At this point, execute the test case to prepare for exporting the requirements as shown in Figure 18.

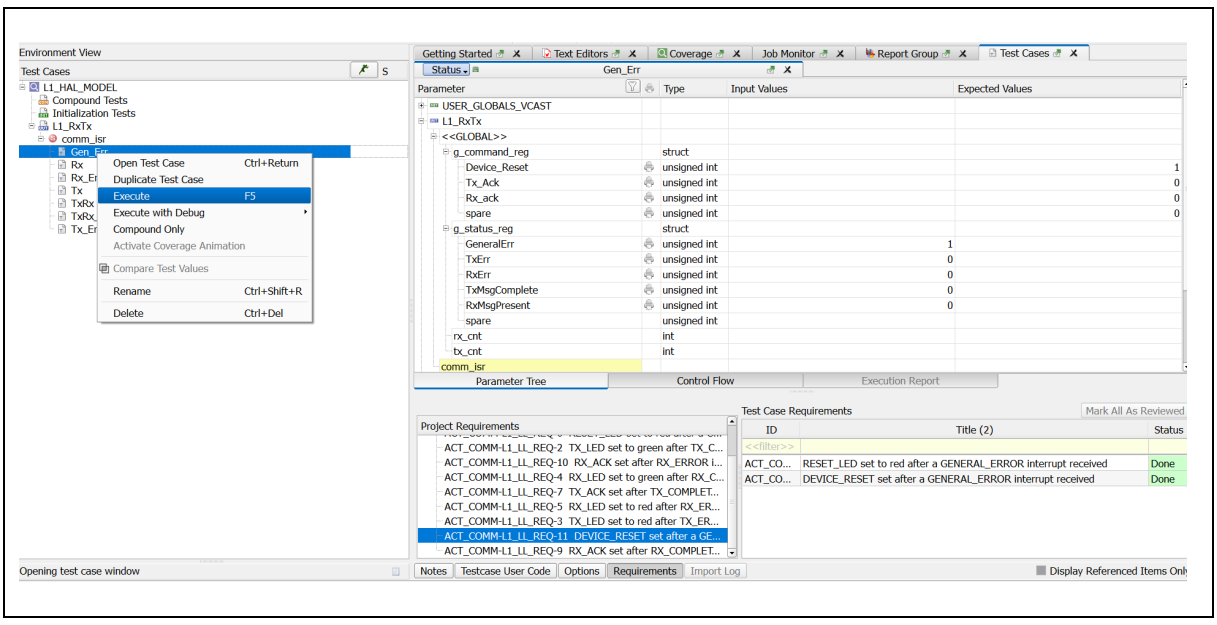

Figure 18-Execute the Unit Test Case: DWA

Once the test case is executed (see Figure 19), you are ready to perform the export.

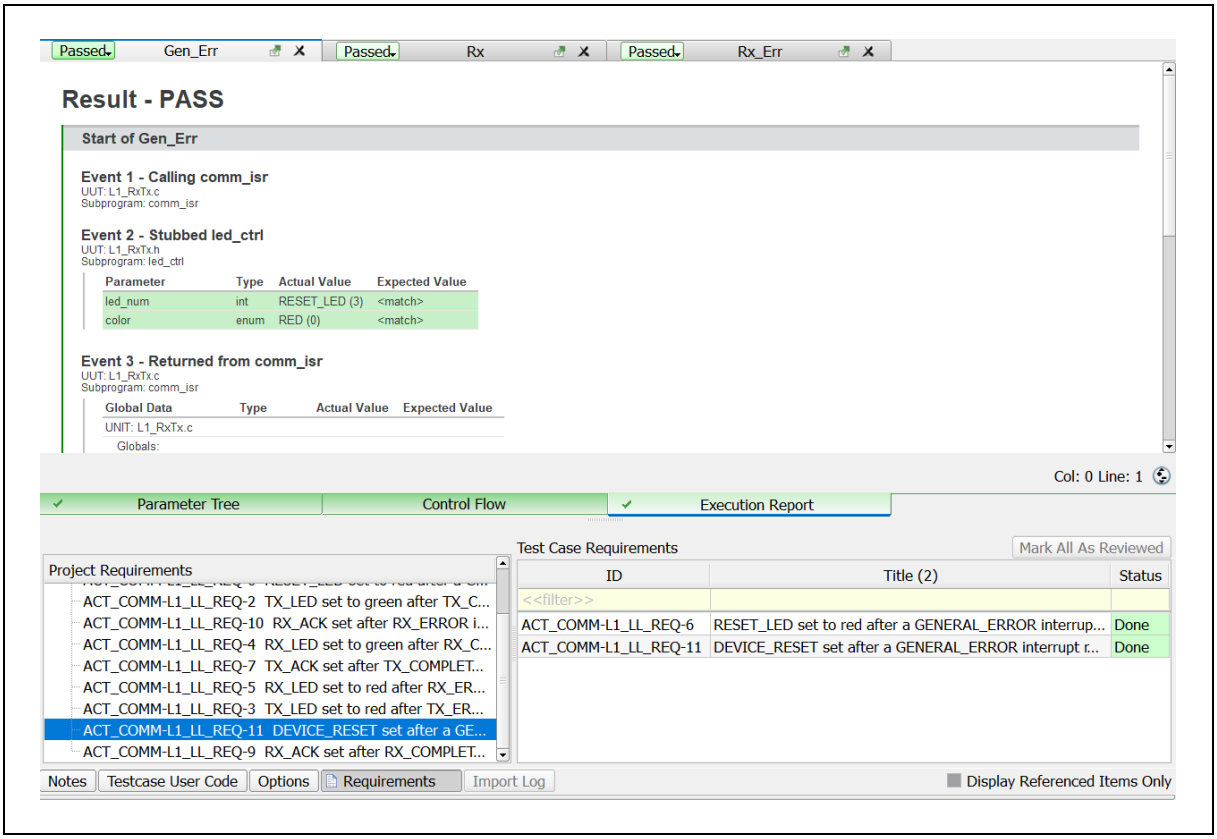

Figure 19-Unit Test Case After Execution: DWA

2.4.2 DOORS Next Generation (DNG)

The process is very much the same for DNG as it is for DWA, however, instead of choosing from the DWA requirements, the DNG requirements will be selected.

Select the **Requirements** button as shown in Figure 20.

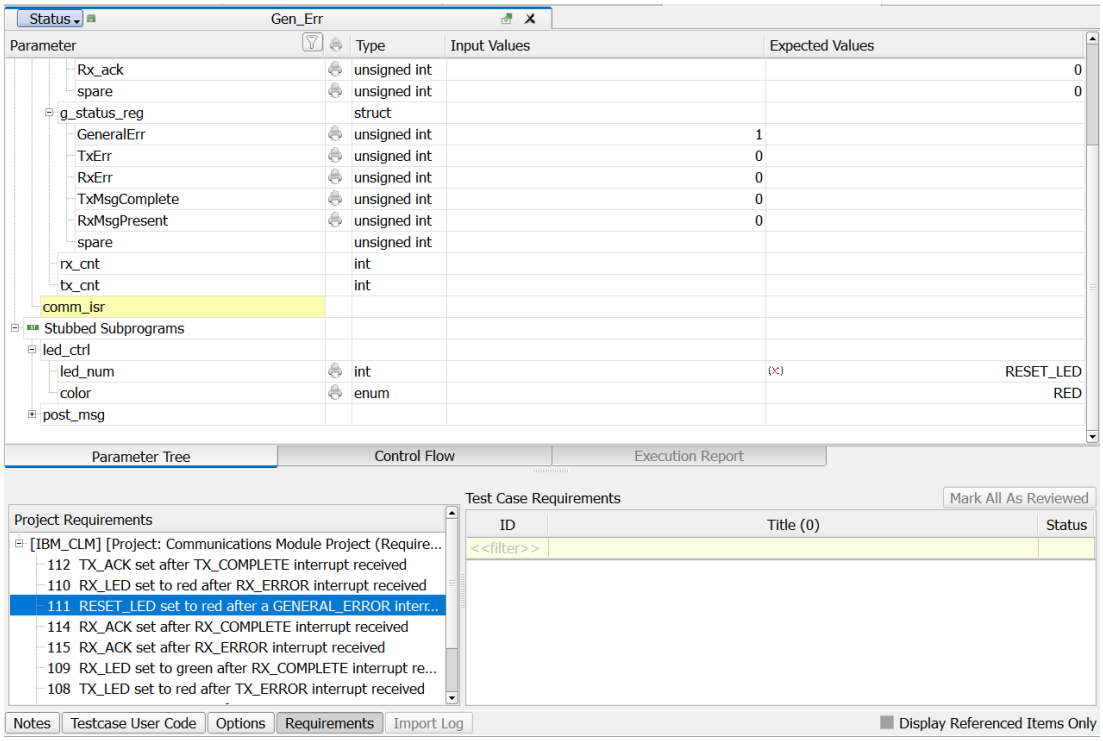

Figure 20-Select Requirements in the Unit Test Environment: DNG

To link a requirement to the test case, double click on the DNG requirement. This will add the requirement to the **Test Case Requirements** as seen in Figure 21.

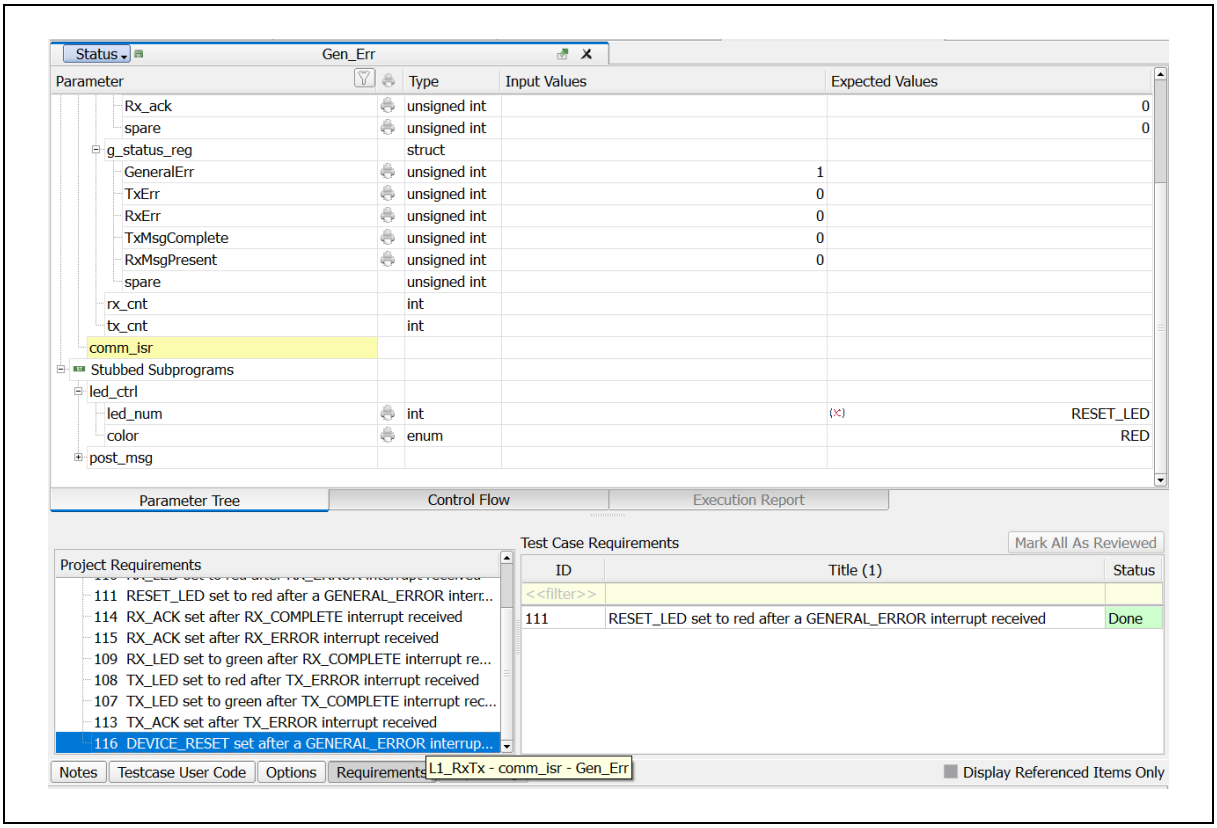

Figure 21-Link a Requirement to a Unit Test Case

At this point, execute the test case to prepare for exporting the requirements as shown in Figure 22.

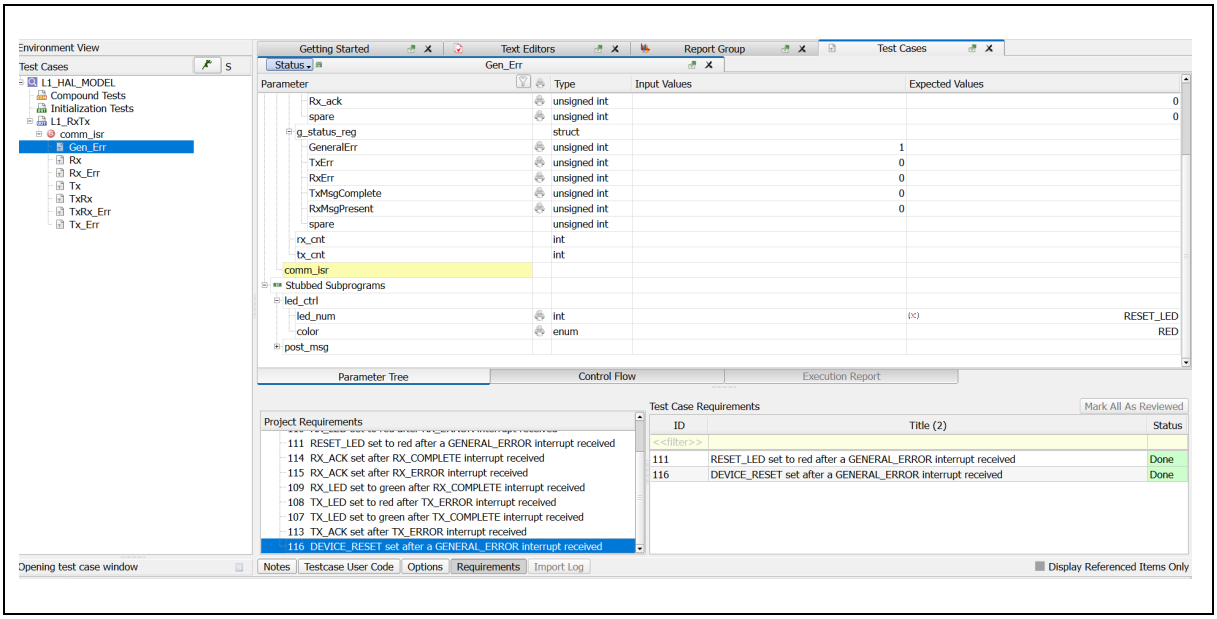

Figure 22-Execute the Unit Test Case

Once the test case is executed (see Figure 23), you are ready to perform the export.

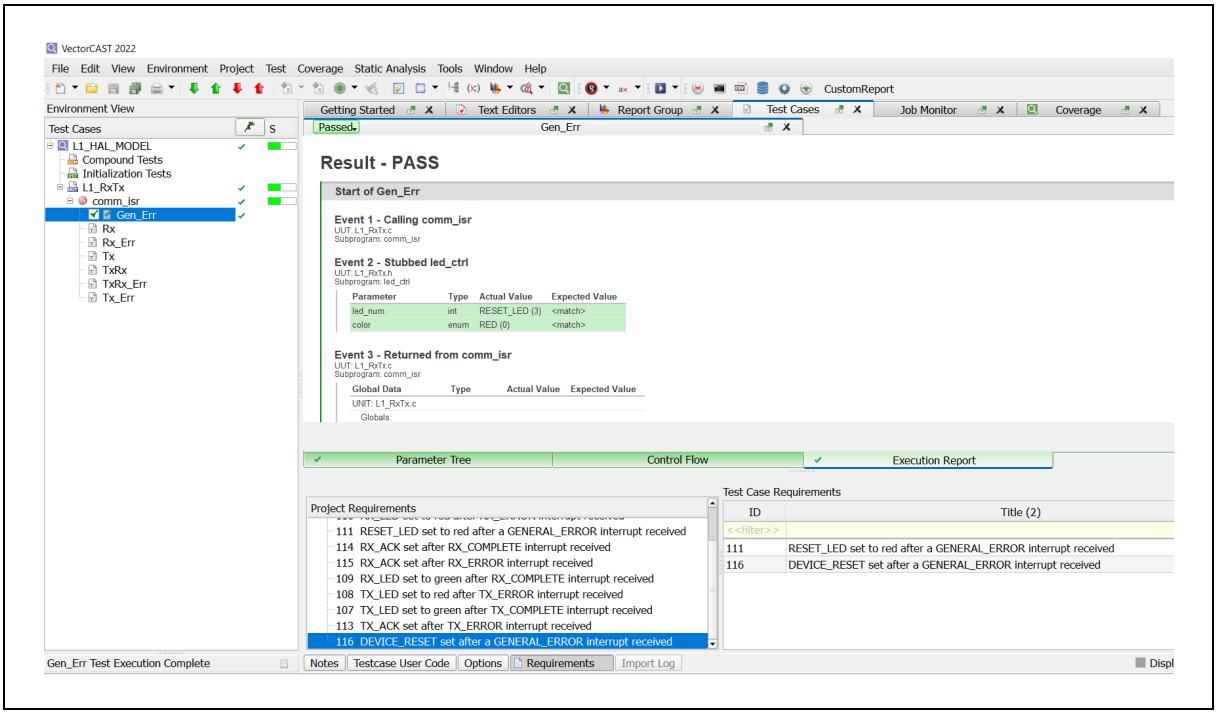

Figure 23-Unit Test Case After Execution

2.5 Use Case: Export Requirements

To export the requirements, first Select **Tools => Requirements Gateway => IBM CLM** from the Menu Bar as shown in Figure 5. The **Requirements Gateway** dialog will open with IBM CLM as the selected **Gateway Profile.** Select the **Export** tab at the bottom as shown in Figure 24. Once the Export tab loads, it will automatically connect and use the settings previously selected during **Authentication** phase.

There are three configuration pages for the **Export** tab. **Components and Configurations**, **Test Scripts and Test Results** and **Export Filter**. Not all of the information is necessary, it will depend on the IBM CLM server as well as the development environment.

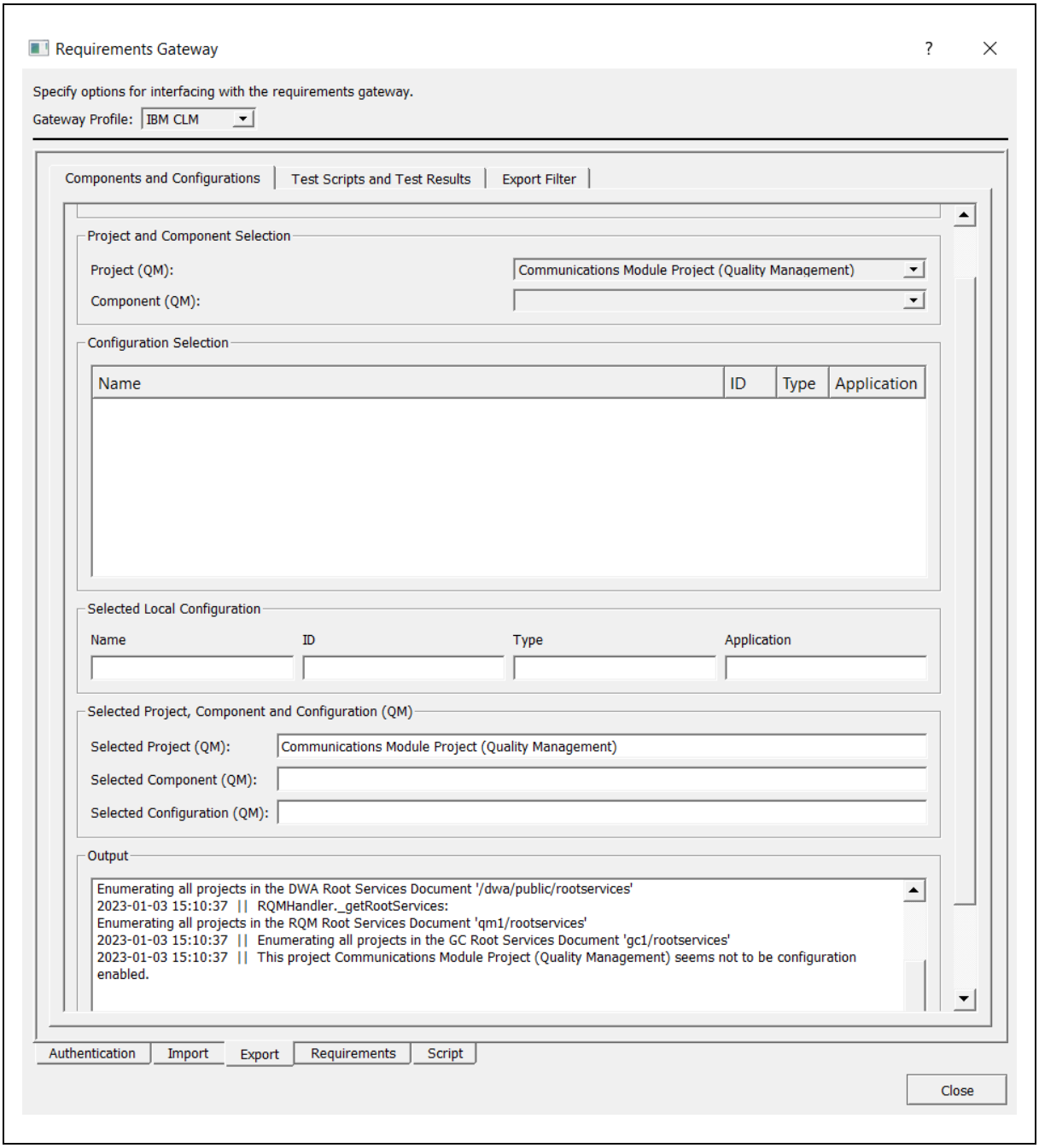

Figure 24-Select the Export Tab

Select the Project and Component settings if available from the corresponding drop down boxes, depending on the stream.

2.5.1 Export

In this scenario Uncheck the **Test Scripts** and **Execution Variables of Test Scripts** boxes and choose Export Method **Direct**, see Figure 25 so that the Test Results will be created in RQM at least once directly on export as the Command Line Adapter can't be used under these circumstances (Test Scripts and respective Execution Variables missing as not exported).

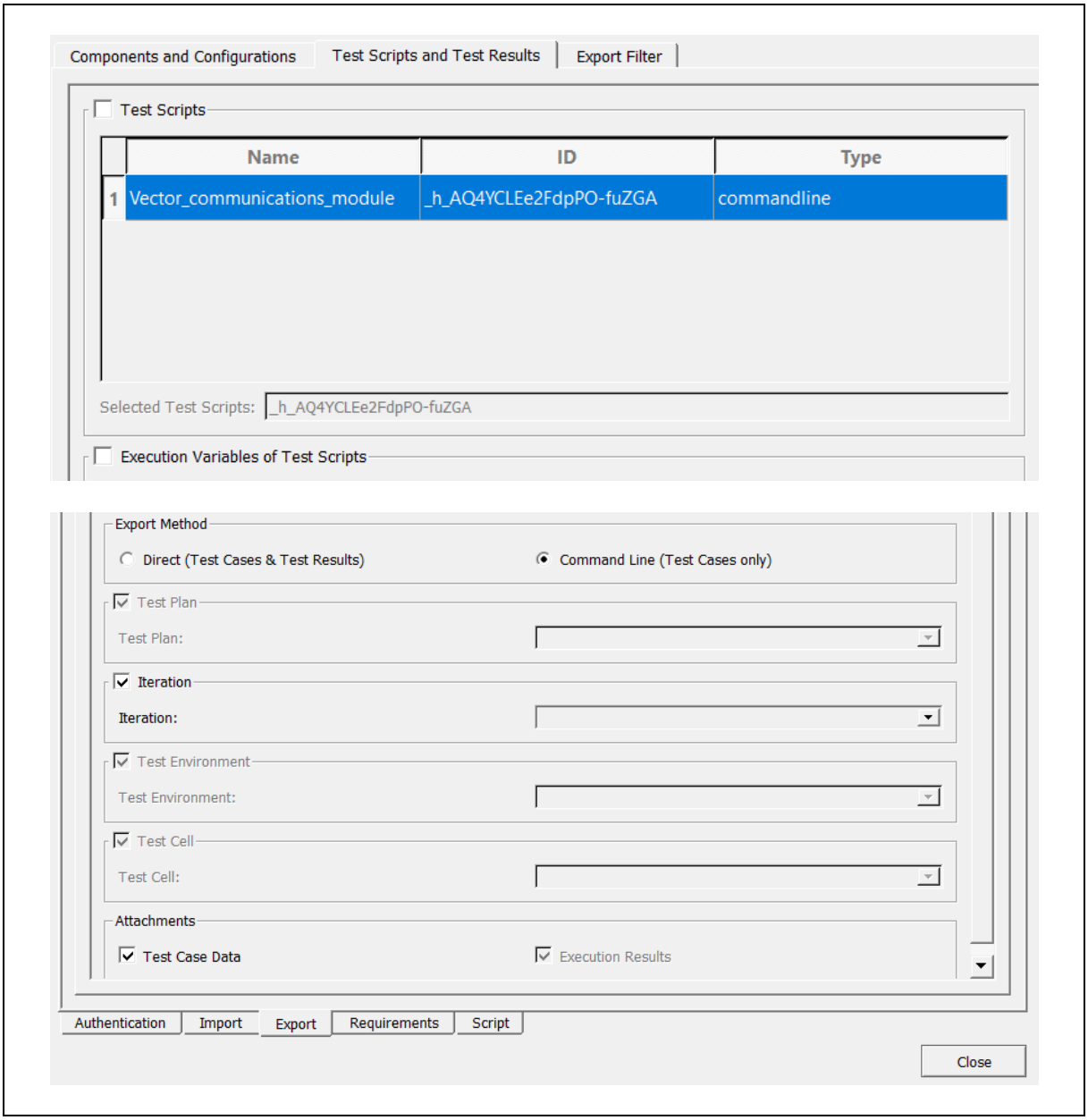

Figure 255-Test Scripts and Test Results: Command Line

Test cases in projects will require the following parameters in the command:

```
%vectorcast_dir%\manage -p <project> -c <compiler> -t
<testsuite> -e <environment> --clicast-args -u <unit> -s
<subprogram> -t <testcase> Execute Run:
```

For each of the parameters <> on the command line exists a corresponding execution variable on:

- Test Script: <project (**vcm file**)> and <report folder> (not necessary to run the test but later to create the report, also on the command line).
- Test Suite: <compiler>, <testsuite>, <environment>.

- Test Case: <unit>, <subprogram>, <testcase> + repetition of the execution variables of a Test Suite.

Test cases in standalone unit tests, located in a **common parent directory**.

The following command must be executed in this directory:

```
%vectorcast_dir%\clicast -e <environment> -u <unit> -s
<subprogram> -t <testcase> Execute Run:
```

For each of the parameters <> on the command line exists a corresponding execution variable on:

- Test Script: <project (**common parent directory**)> and <report folder> (not necessary to run the test but later to create the report, also on the command line).
- Test Suite: <environment>
- Test Case: <unit>, <subprogram>, <testcase> + repetition of the execution variables of a Test Suite.

2.5.2 Export Filter

Select the Export Filter and fill in the Environment Info section. Check From manage project if the environment is part of a manage project and leave it unchecked if the environment is a standalone Unit Test environment. Click on Get Environment Info to load and then select the environment, see Figure 26 for DWA and Figure 27 for DNG.

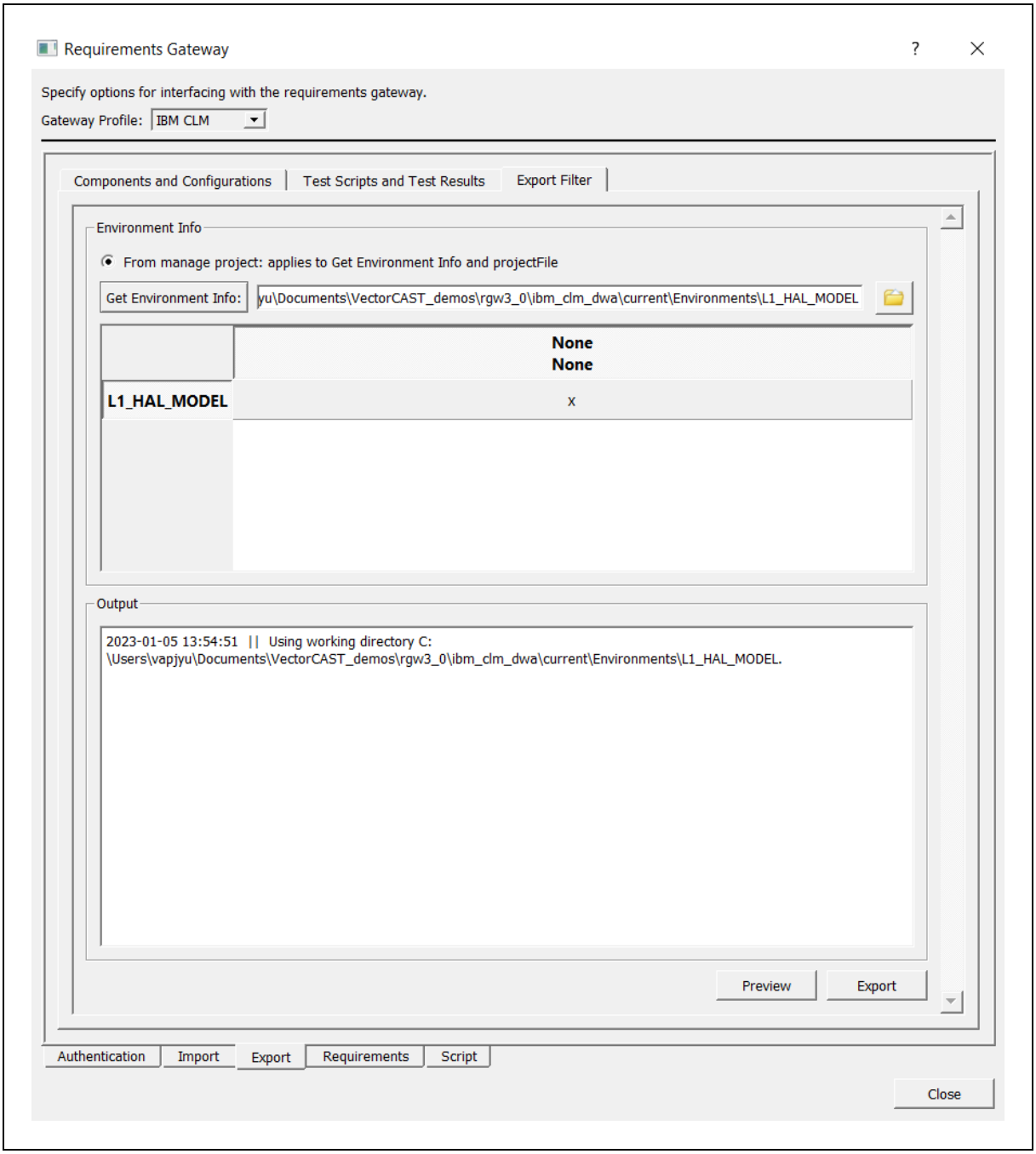

Figure 26-Select Environment: DWA

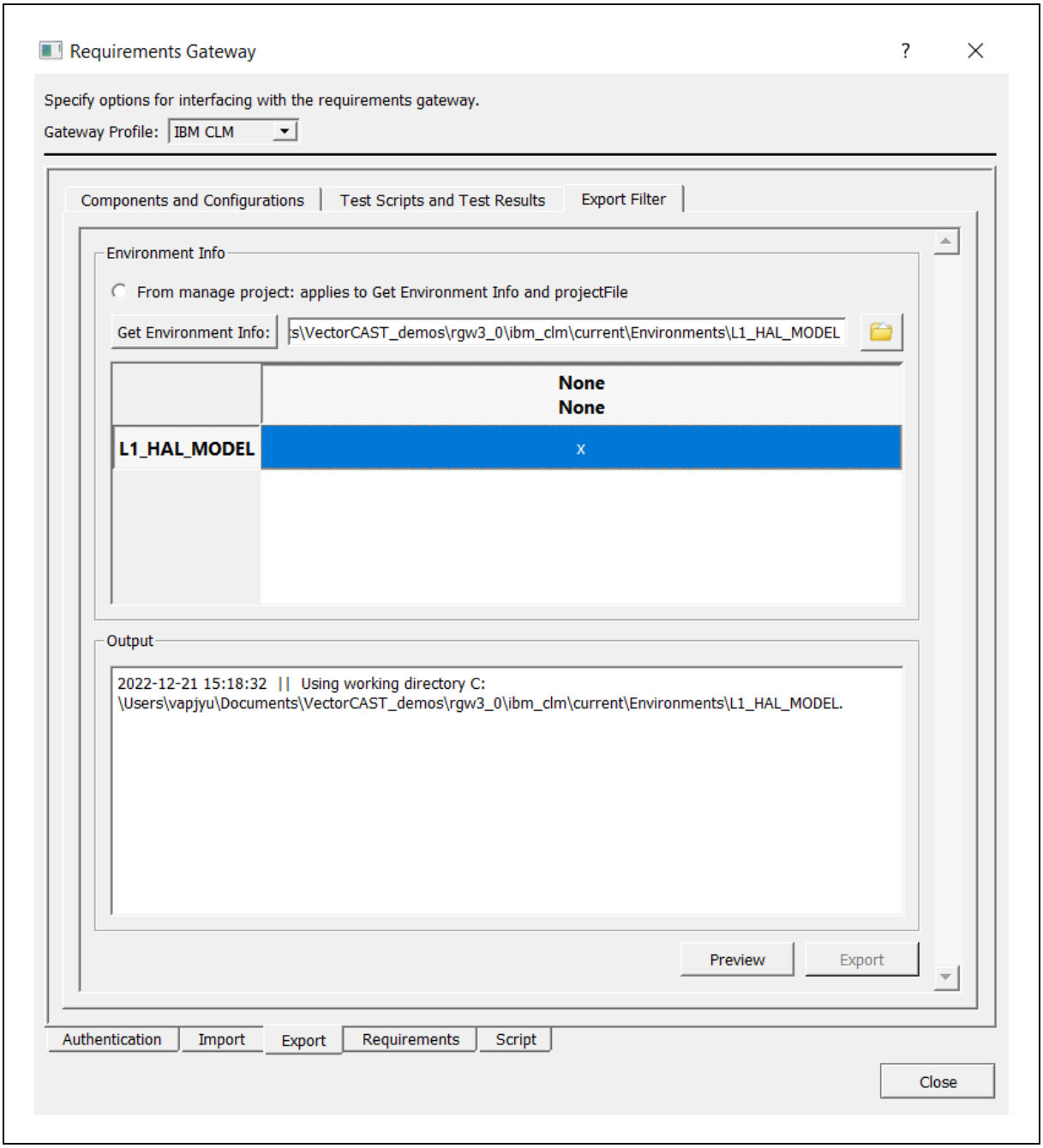

Figure 27-Select Environment: DNG

Click on the Preview button to see which results will be exported, seen in 28 for DWA and 29 for DNG.

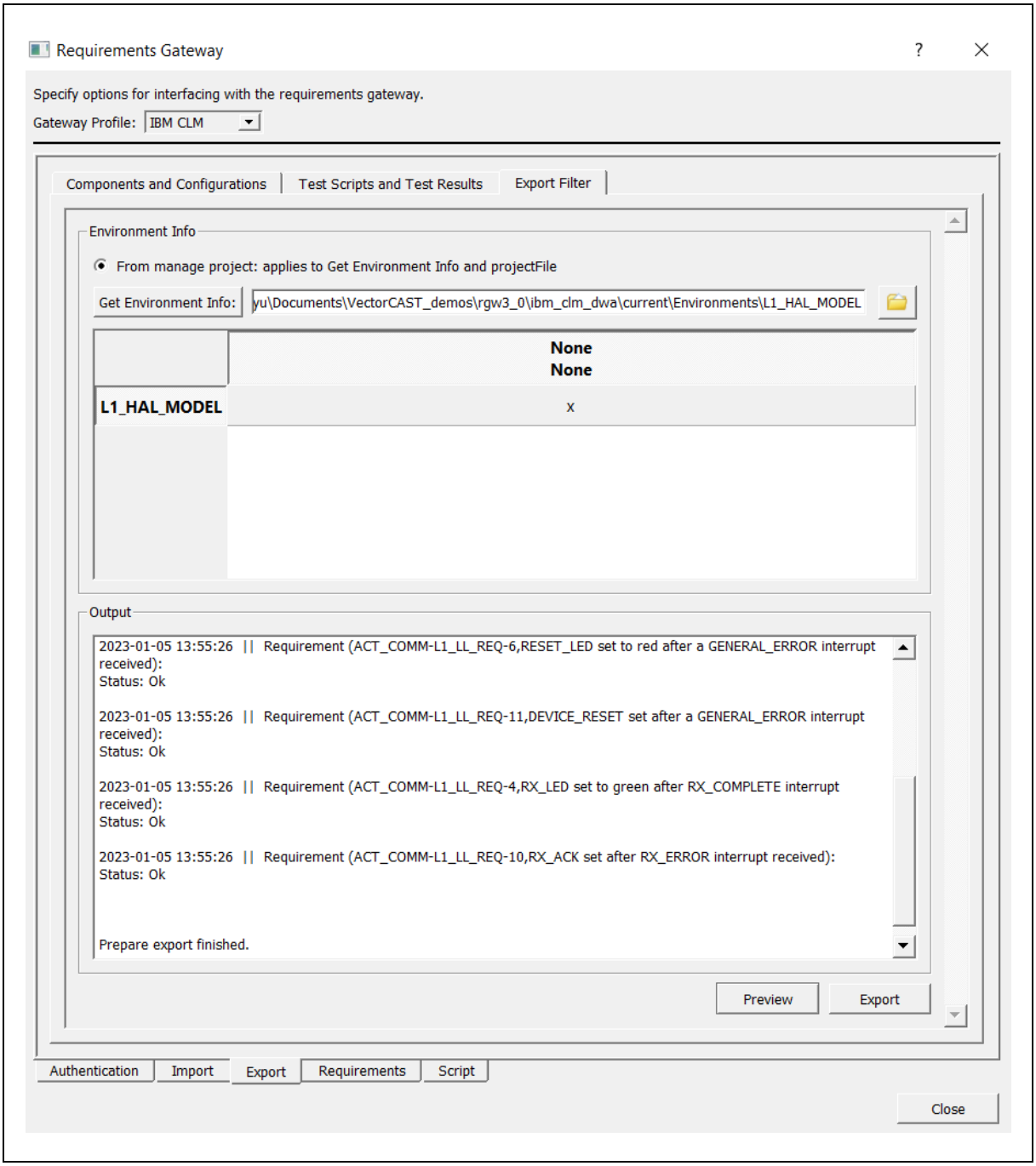

Figure 28-Preview Export: DWA

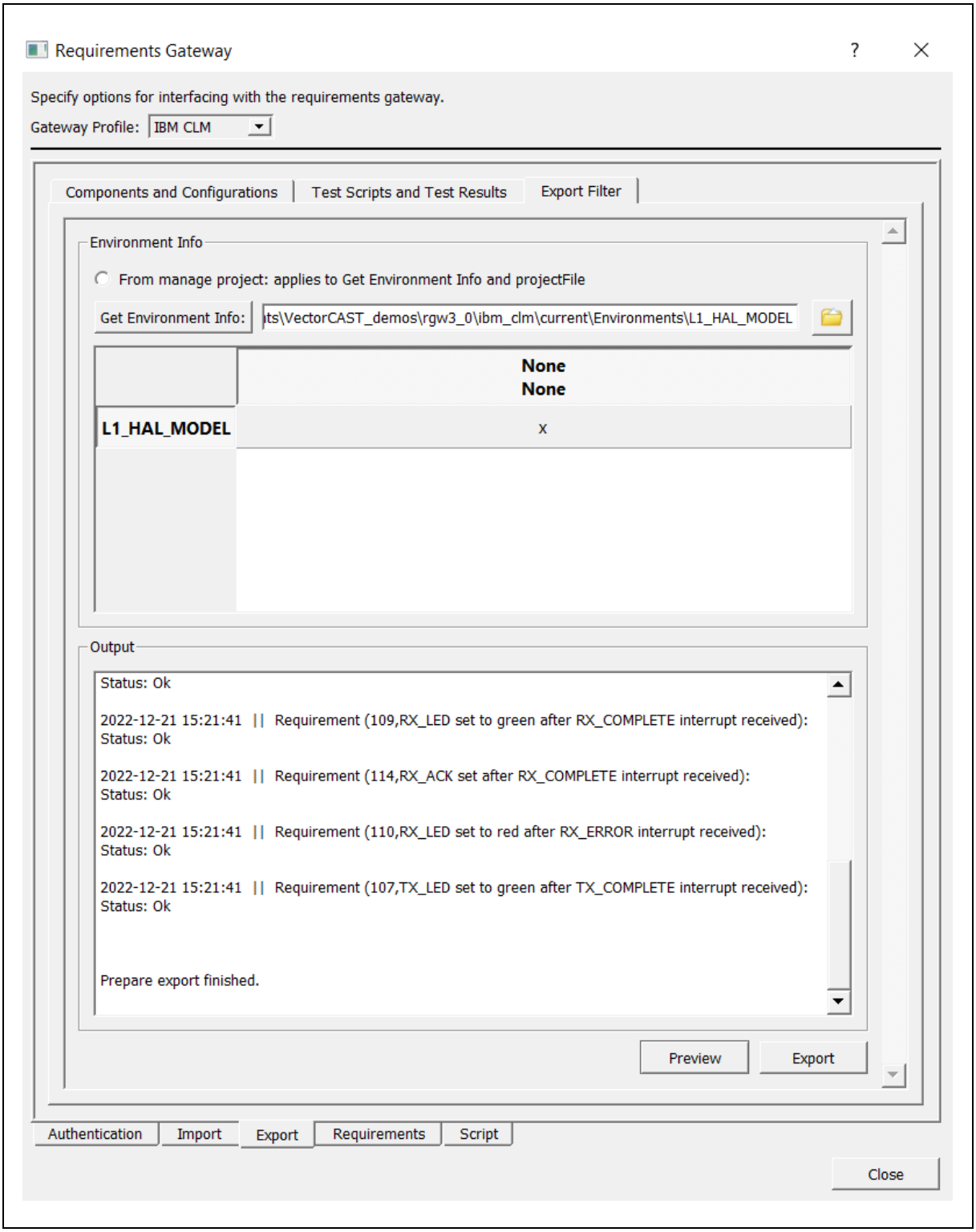

Figure 29-Preview Export: DNG

Click on the Export button to send the previewed test case to IBM CLM, see 30.

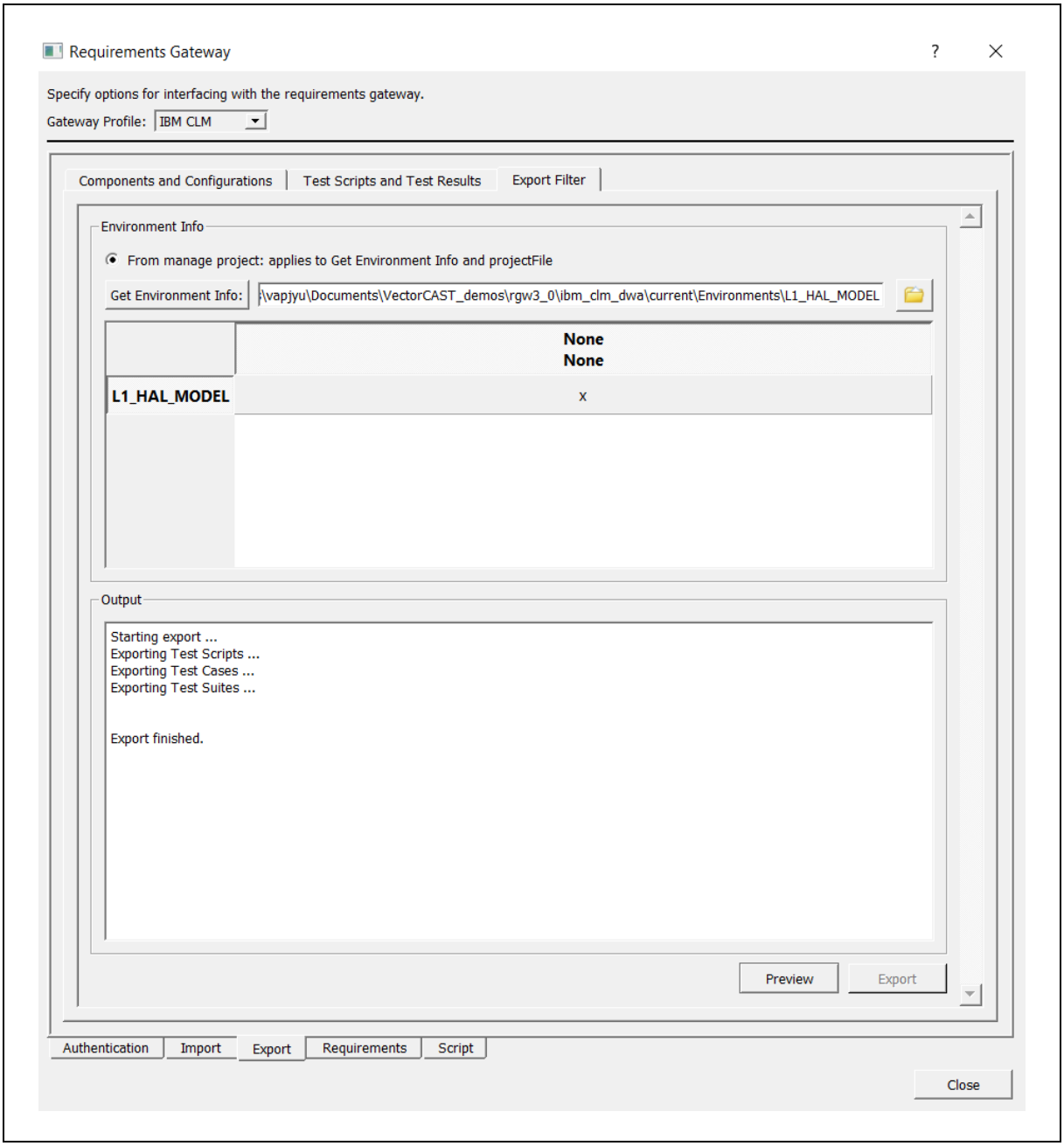

Figure 30-Export Results

2.6 Use Case: Review Updated Requirements

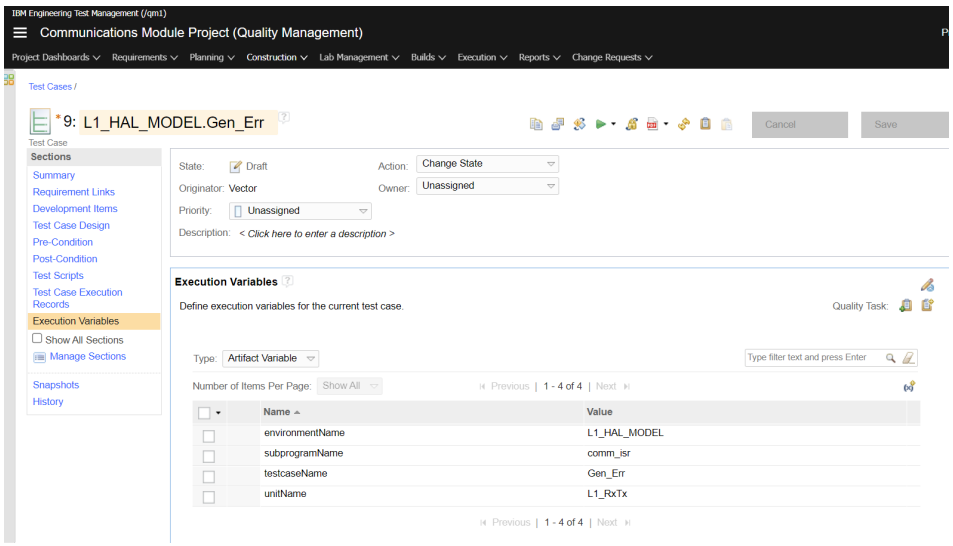

Figure 261-Test Case's Execution Variables

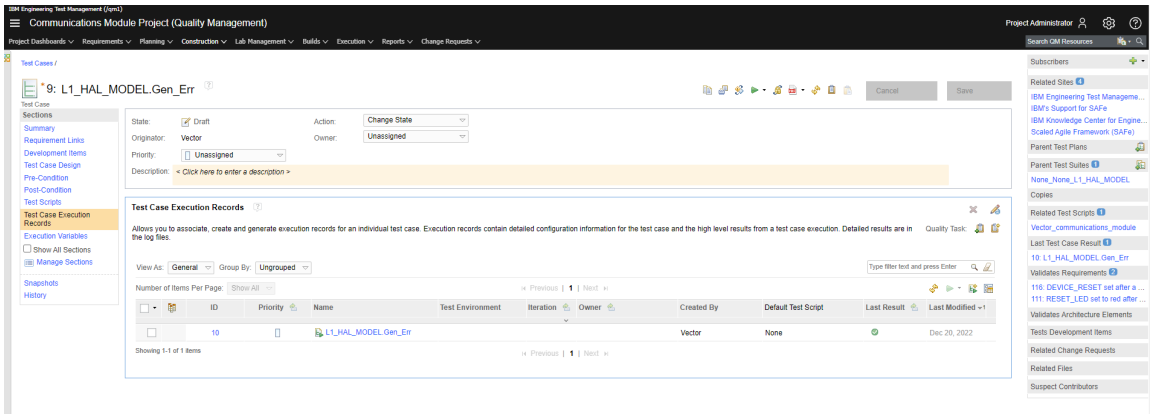

Figure 272-Test Case in IBM CLM with Execution Records and results

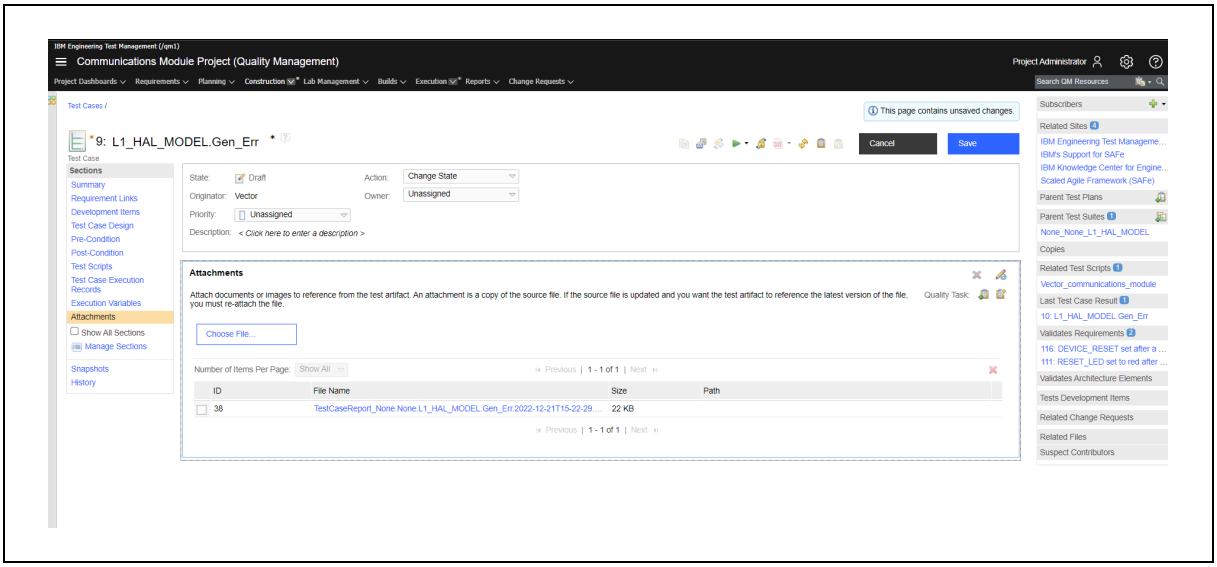

Figure 283-Test Case in IBM CLM Test Case Report from VectorCAST in Attachments.

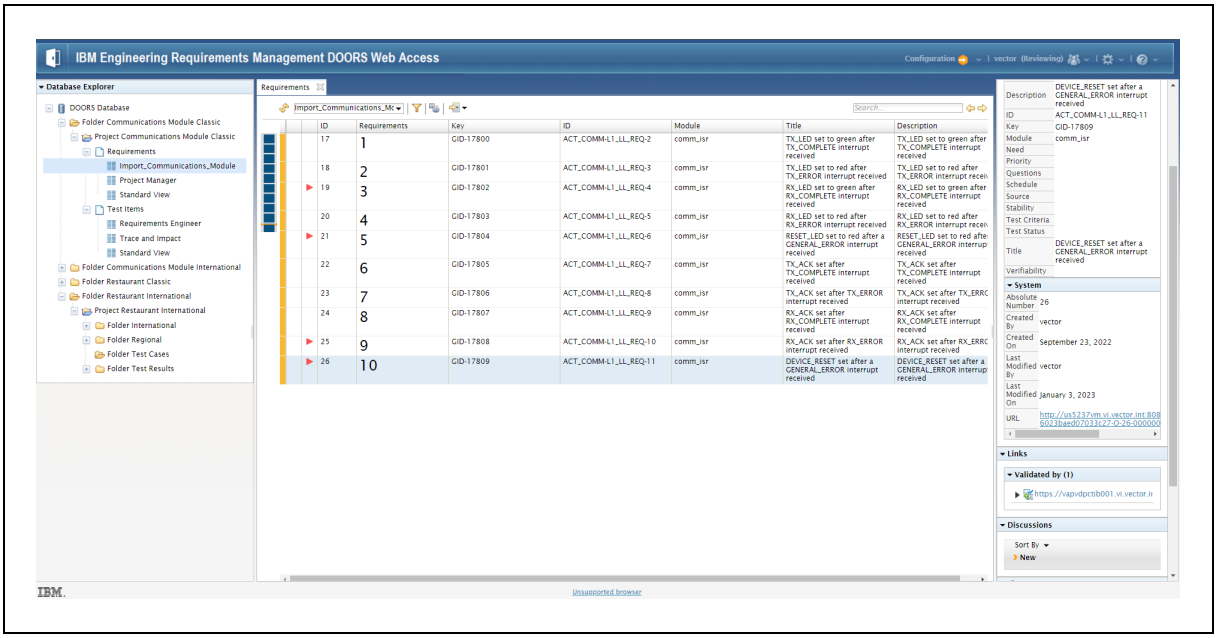

Figure 294-Requirements in DOORS Web Access with link to QM.

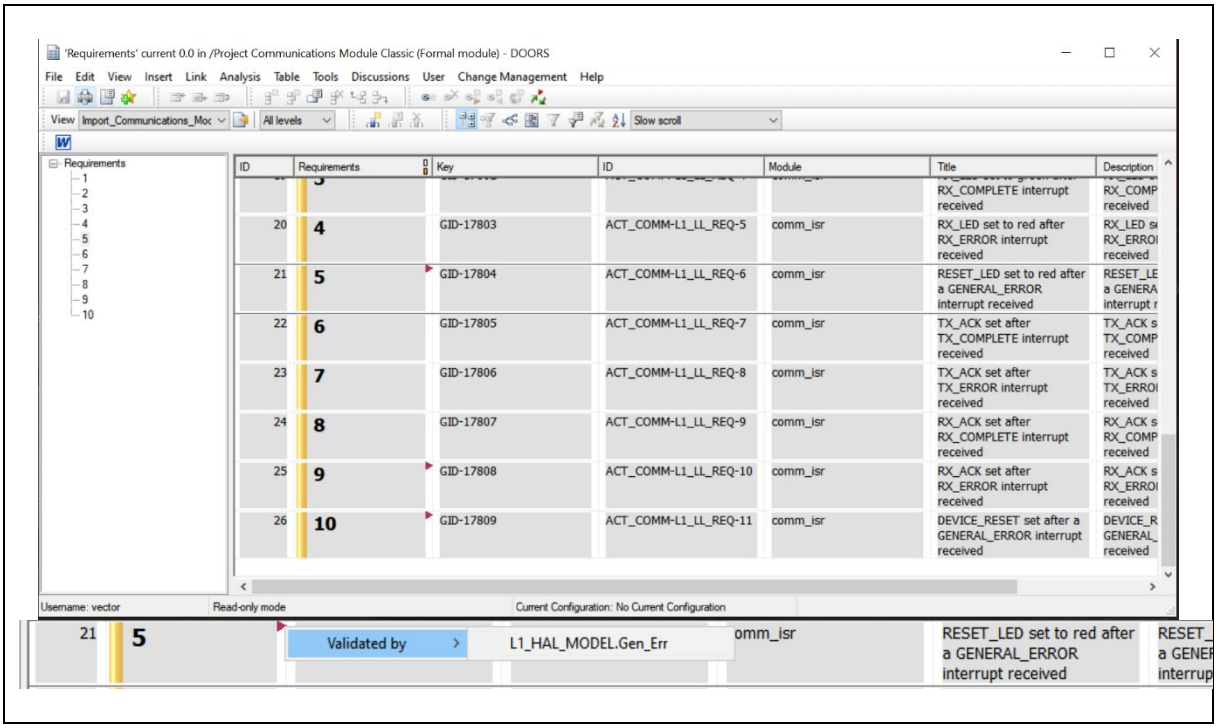

Figure 305-Requirements in DOORS with links to the test case.

2.7 Use Case: Command Line Adapter

The Command Line Adapter is used to create Test Results in RQM in an automated way based on the information which has been previously exported (Execution Variables of Test Cases, Test Suites, and Test Scripts).

With the Command Line Adapter, a target test machine is used for command line execution of test cases in VectorCAST which have been previously exported to the IBM CLM server. The runs of Test Cases in RQM are triggered on the IBM CLM server. The target test machine is the host on which the corresponding test cases in VectorCAST will be run. Therefor it requires that VectorCAST is installed on or is accessible by the target test machine. The same applies to the Project or Unit Test Environments containing the corresponding test cases in VectorCAST.

To use the Command Line Adapter provided by IBM (the start.bat which comes with the installation package), a few parameters must be provided by the user, the network location of the IBM CLM server as well as the RQM project to connect to. Details will be listed below. Launching the Command Line Adapter on the target test machine establishes a client server connection between the target test machine and the IBM CLM server. After this runs of Test Cases or Test Suites in RQM can then be triggered which will lead to the corresponding runs of test cases in VectorCAST on the target test machine. The runs are controlled by the Python script **vector_adpater.py.** At the end of each run of a Test Case, an Execution Result is returned. The Execution Result includes attachments that contain the standard out and standard error information of the test process as well as the execution result report (HTML).

Please refer to https://www.ibm.com/docs/en/elm/7.0.3?topic=tests-setting-up-starting-command-line-adapter for more details on setting up the Command Line Adapter.

There are a few parameters you need when starting the Command Line Adapter. These are explained in the above document, but they are repeated here for convenience:

- **-repository**
  - The fully qualified URL to the RQM system.
- **-user / -password**
  - The username and password that the adapter will use to login.
- **-adapterName**
  - The (internal to RQM) name of the adapter (if left unspecified, this defaults to "Command Line Adapter")
- **-projectArea**
  - The RQM Project Area you wish to create the Adapter in.
  - This MUST be the name of the Project Area as displayed in the Project Overview page in RQM.
  - If the name contains spaces or special characters, it is recommended you enclose this parameter in quotes.

The Execution Variables to create Test Results via the Command Line Adapter are distributed across Test Scripts, Test Suites, and Test Cases. These three together specify the details of a complete VectorCAST command on the command line to run a particular test case and create the associated execution results report.

2.7.1 Preparation

The Command Line Adapter launches the Python script **vector_adpater.py** for each single Test Case that will be run. All required information needed by vector_adapter.py is exchanged with the aid of environment variables and represents the assembly of the Execution Variables of the involved Test Scripts, Test Suites and Test Cases.

2.7.1.1 Configure a Test Script

A separate Test Script is required for each distinctive combination of target test machine and Project or location of Unit Test Environments.

Open the RQM project in the CLM web interface and create a Test Script.

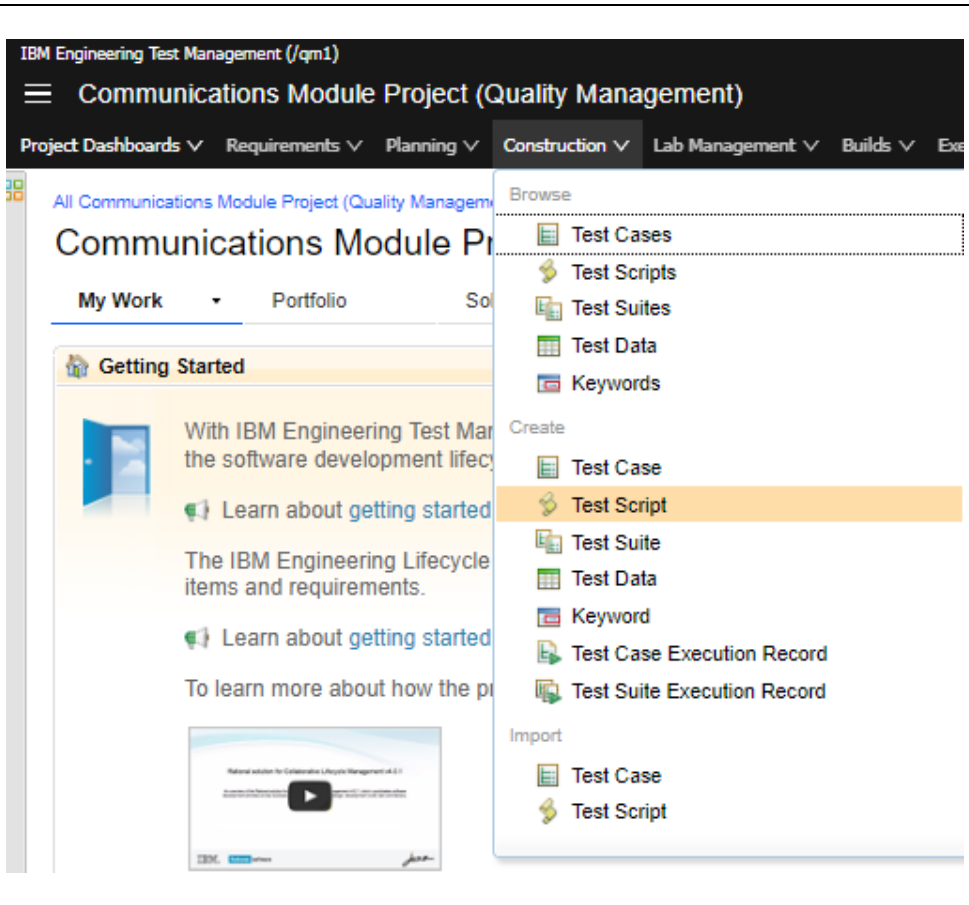

Figure 31-Create Test Script

- Name the Test Script and select “Command Line” in the Type.
- Choose the option “Use test resource that are local to a test machine”.
- Set the Command field to:
  $VECTORCAST_DIR/vpython.exe (it is important not to drop the file extension .exe!)
- Set the Argument field to the location of the Python script **vector_adpater.py**:
  $VECTORCAST_DIR/
  python/vector/lib/rgw/plugins/ibm_clm/adapter/vector_adpater.py

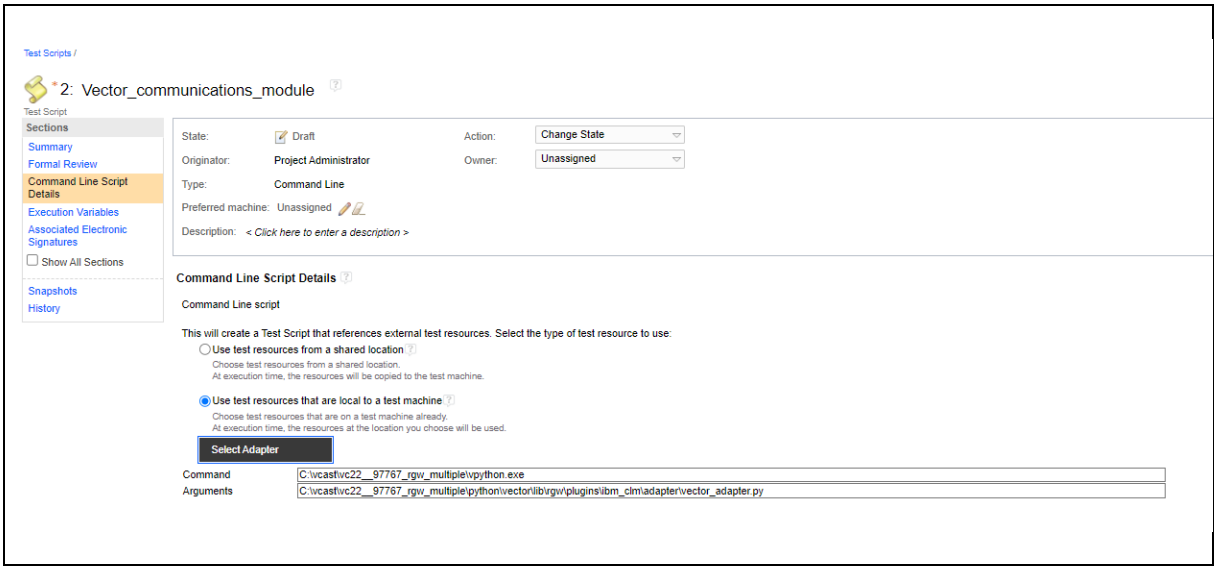

Figure 37-Create Test Script

2.7.1.2 Meaning of the Execution Variables

RQM Test Cases can be executed individually or within a Test Suite.

When Test Cases in RQM are executed, a list of Execution Variables is passed to vector_adapter.py, which the script uses to execute the corresponding test cases in VectorCAST.

All the Execution Variables can and should be exported from VectorCAST to minimize manual set up. Execution variables of Test Suites and Test Cases are set automatically. Information on the Execution Variables of the Test Script(s) can be provided on the tab **Test Scripts and Test Results** of the Export dialog.

Execution variables of **Test Suites** set automatically by VectorCAST on Export:

- **projectLevel**
  A string formatted like <compilerName>/<testsuiteName>
  Only exported if a Project is used.
- **compilerName**
  The name of the compiler used in a Project of VectorCAST.
  Only exported if a Project is used.
- **testsuiteName**
  The name of the Test Suite used in a Project of VectorCAST.
- **environmentName**
  The name of the environment used in a Project or of a Unit Test Environment (standalone). Always exported.

Execution variables of **Test Cases** set automatically by VectorCAST on Export:

- **All execution variables of the associated Test Suite (if unique). See above.**
- **unitName**
  The name of the unit in VectorCAST to which the test case belongs to.
- **subprogramName**
  The name of the subprogram in VectorCAST to which the test case belongs to.

- **testcaseName**
  The name of the test case in VectorCAST.

Information for Execution Variables of **Test Scripts** should be provided during export on the Test Scripts and Test Results tab of the Export dialog. The Test Scripts to which these Execution Variables will be applied must be selected on export as well.

- **vectorcast_dir**
  The path to the installation folder of VectorCAST on the target machine.
- **projectFile**
  Absolute path to the Manage Project File or to the parent directory with the Unit Test Environments as children (subfolders) on the target machine.
- **reportFolder**
  The (temporary) folder on the target machine used to store the reports of the Test Cases created during the run via the Command Line Adapter.
- **retryCount**
  Number of retries if the Manage Project is locked.
- **scriptMode**
  Whether the RQM Adapter Script is being run in "run" mode or "export" mode.

Once the Execution Variables of Test Scripts, Test Suites and Test Cases have been configured (usually as the result of a previous export or manually), the Test Suite as a whole or individual Test Cases can be executed.

The execution results will contain both a log file, and an execution result report (HTML) of the test case execution in Manage or in the Unit Test Environment.

2.7.2 Export

Test Scripts are required when planning to use the Command Line Adapter at a later stage to create the Test Results. Test Scripts contains some of the Execution Variables needed to run the Test Cases.

The Export Methods which can be chosen (Figure 27, Figure 39) are **independent** to a planned usage of a Command Line Adapter:

The Export Method **Direct** means that test cases and test results in VectorCAST will be exported creating Test Cases, Test Suites and Execution Records as well as Execution Results for Test Cases and Test Suites in RQM.

The Export Method **Command Line Adapter** means that only test cases in VectorCAST will be exported creating Test Cases and Test Suites in RQM.

Click on the tab **Test Scripts and Test Results**.

The first section is the selection of Test Scripts. Test Scripts that exist in the selected RQM Project in IBM CLM will be loaded here. Test Scripts must be created manually, export does not automatically create them, but VectorCAST does maintain Execution Variables of the Test Scripts which will be exported to the IBM CLM server.

Fill in the Variables of the Test Scripts, Export Method, and other options if present in the IBM CLM Project.

Test Scripts and **Execution Variables of Test Scripts** (Figure 38) can also be used if the Export Method **Direct** (Figure 39) is selected. This will create Test Results in RQM directly. The exported corresponding Test Cases in RQM are then ready to be used with a Command Line Adapter at a later stage to produce another set of Test Results against a newer version of the software (regression testing).

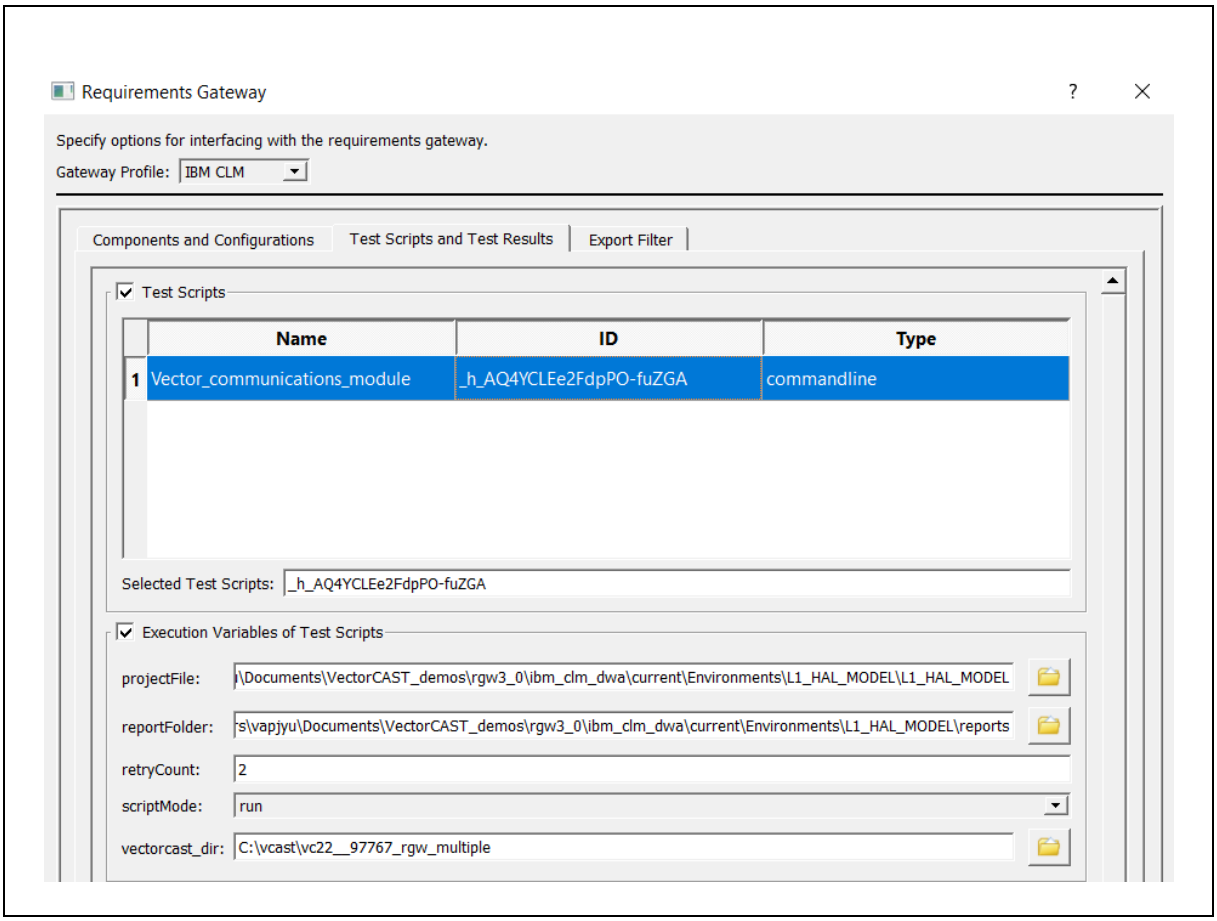

Figure 38-Test Scripts and Test Results: Test Scripts Option Part 1

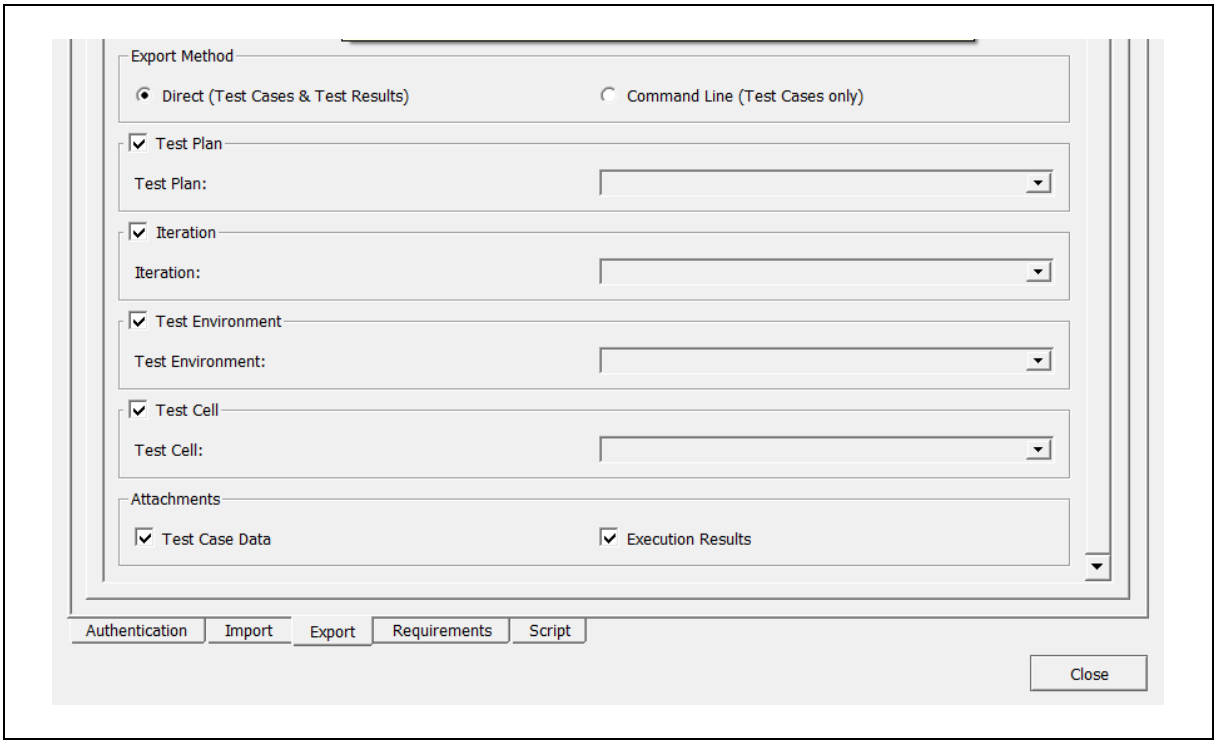

Figure 32-Test Scripts and Test Results: Test Scripts Option Part 2

3 Additional Resources

IBM Rational DOORS Web Access

IBM DOORS Next Generation

4 Trademarks

All mentioned names are either registered or unregistered trademarks of their respective owners.

5 Contacts

For a full list with all Vector locations and addresses worldwide, please visit http://vector.com/contact/.