SANDIA REPORT

SAND2010-7097

Unlimited Release

February 2011

Migrating Data from TcSE to DOORS: An Evaluation of the T-Plan Integrator Software Application

David A. Manzanares, Debbie S. Post, and Jeffrey L. Taylor

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Approved for public release; further dissemination unlimited.

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof, or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof, or any of their contractors.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

Telephone: (865) 576-8401
Facsimile: (865) 576-5728
E-Mail: reports@adonis.osti.gov
Online ordering: <http://www.osti.gov/bridge>

Available to the public from

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Rd.
Springfield, VA 22161

Telephone: (800) 553-6847
Facsimile: (703) 605-6900
E-Mail: orders@ntis.fedworld.gov
Online order: <http://www.ntis.gov/help/ordermethods.asp?loc=7-4-0#online>

SAND2010-7097
Unlimited Release
February 2011

Migrating Data from TcSE to DOORS: An Evaluation of the T-Plan Integrator Software Application

David A. Manzanares
Information Services for Product Information
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-MS0626

Debbie S. Post
Program Analysis and Integration
Sandia National Laboratories
P.O. Box 969
Livermore, California 94551-MS9154

Jeffrey L. Taylor
WFO MCAD and ePrime Support
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-0648

Abstract

This report describes our evaluation of the T-Plan Integrator software application as it was used to transfer a real data set from the Teamcenter for Systems Engineering (TcSE) software application to the DOORS software application. The T-Plan Integrator was evaluated to determine if it would meet the needs of Sandia National Laboratories to migrate our existing data sets from TcSE to DOORS. This report presents the struggles of migrating data and focuses on how the Integrator can be used to map a data set and its data architecture from TcSE to DOORS. Finally, this report describes how the bulk of the migration can take place using the Integrator; however, about 20-30% of the data would need to be transferred from TcSE to DOORS manually. This report does not evaluate the transfer of data from DOORS to TcSE.

BLANK PAGE

CONTENTS

1	Background	7
1.1	Purpose.....	7
1.2	Motivation.....	8
1.3	Summary	8
2	Installing the T-Plan Integrator	8
3	Release History of T-Plan Integrator	9
4	Running of the T-Plan Integrator Software	11
4.1	Recommended Mapping File.....	21
5	Evaluation of Migrating TcSE data to DOORS.....	22
5.1	Requirements	22
5.2	Building Blocks	22
5.3	Property Definitions.....	22
5.4	Trace Links	23
5.5	Versions and Baselines	23
5.6	Shortcuts	23
5.7	Object References	23
5.8	TcSE Images	23
5.9	TcSE Tables	24
5.10	Special Characters.....	24
5.11	Folder Hierarchy in TcSE and Nested Objects	24
5.12	TcSE Connections and Ports.....	25
5.13	Items that are not Transferrable from TcSE	25
6	Configuration	26
7	Cost	26
8	Notes and Lessons Learned	26
9	Conclusion Notes	27
9.1	Summary Information	28
	Distribution	30

NOMENCLATURE

DOORS	Dynamic Object-Oriented Requirements System
GB	Gigabyte
MB	Megabyte
RAM	Random-access memory
SCN	Sandia Classified Network
SLATE	System Level Automation Tool for Engineers
SNL	Sandia National Laboratories
SRN	Sandia Restricted Network
SysML	Systems Modeling Language
TcR	Teamcenter Requirements/System Engineering
TcSE	Teamcenter Systems Engineering

1 BACKGROUND

The task of migrating data from any one software application to another is typically not a one-to-one mapping. In most cases, one tool has different features and functionality than the other, which makes it difficult to map objects. For instance, the Teamcenter for Systems Engineering (TcSE) tool was very different from its predecessor tool SLATE and is also very different from the DOORS (Dynamic Object-Oriented Requirements System) tool, in terms of the data types and the handling of certain data types.

Prior to the year 2004, the Information Services for Product Information Department had an installation of the SLATE tool and in January 2005 it was decided to move to the Teamcenter Requirements/Systems Engineering (TcR) tool that the vendor was ultimately moving to. The migration process of the data from the SLATE tool into TcR was not an easy task; one of the biggest hurdles was that there was no tool that could easily transfer the data from the SLATE database to the TcR database. Staff had to move the data from the SLATE database to the TcR database essentially manually, starting from scratch, importing MS Word documents and creating parsing macros that would try to mimic what was in SLATE. This was not an easy task; any migration tool, no matter how limited in functionality, would have been worth it to migrate the data from SLATE to TcR, but there was not a tool available on the market at that time.

Today in the year 2010, the once TcR tool has turned into TcSE and now the question is: How do we migrate the data from TcSE to DOORS? Most software tools have matured since 2005 and there is a tool on the market that can migrate data from TcSE to DOORS, and visa versa. Since TcSE and DOORS are two different tools, the data will not look exactly the same inside the two tools. For instance, TcSE has features such as Building Blocks: How does this data transfer into DOORS? Another feature that TcSE has is that a user can name a folder or a project object with characters like commas, parenthesis, braces, question marks, and other “special characters” but special characters are not allowed in DOORS. We are faced with the problem of not just “moving data” but of mapping one data structure into another.

1.1 Purpose

The purpose of our study was to evaluate a tool named T-Plan Integrator that can be used to migrate, or transfer, data from the Teamcenter for Systems Engineering (TcSE) tool to the DOORS tool. Hopefully, you will be able to see the struggles of using this tool but you will also see the benefits that come with using this tool for the migration. This tool is not perfect, no tool is perfect, but it can be used to migrate about 70-80% of the data from TcSE to DOORS very effectively while 20-30% of the data may need manual intervention.

This report also documents in considerable detail the process of using T-Plan Integrator for the migration of real TcSE system data. We anticipate other projects will need to move data between these tools, and this report contains the details needed for database administrators and database owners to be successful.

1.2 Motivation

This study was performed at the request of the Senior Manager's Group of the California Weapons Systems Engineering Center, Sandia National Laboratories, California (SNL/CA). Two projects at SNL/CA use TcSE, yet DOORS appears to be the upcoming SNL tool of choice. The managers wanted to understand the true ease or difficulty to transfer data from TcSE to DOORS, and identified the real TcSE system project data as a good, realistic test case.

1.3 Summary

We recommend that Sandia use the T-Plan Integrator, which is the only product available on the market that can migrate, or transfer, data from TcSE to DOORS.

T-Plan Integrator works well for the migration of small data sets; we found it necessary to break up large sets of data prior to migration. Some modest preprocessing of the TcSE data will be needed, and the data owner must first make careful and detailed decisions about mapping their TcSE schema into a DOORS schema. Some manual post-processing of the data may also be needed, e.g., manually moving over graphics larger than five megabytes. The user must realize that it is going to be a slow and tedious process but T-Plan Integrator is a far better alternative than creating MS Word documents from TcSE and importing them into DOORS.

2 INSTALLING THE T-PLAN INTEGRATOR

Installation of the T-Plan Integrator software is an easy task. The T-Plan Integrator is released via a ZIP file. In order to run the software, Microsoft .NET Framework version 3.5 needs to be installed but it comes bundled with the software. So, once the ZIP file is received from the company, then you would:

1. Unzip the ZIP file.
2. Execute the setup.exe file.
3. If you need MS .NET Framework 3.5, it will install it for you.
4. Accept the license agreement.
5. Install the software for everyone on the workstation.
6. Click the Next button for all other prompts.
7. Copy the license file to the directory where the software is installed.

The configuration of the T-Plan Integrator was as easy as installing the software on a user's workstation. There was a different approach to the architecture where a System Administrator can install files on the TcSE web server, but this approach did not work in Sandia's environment.

The workstation configuration should include Microsoft Word, the TcSE client software, the DOORS client software, and the T-Plan Integrator software; no additional software needs to be loaded onto the DOORS and the TcSE servers.

3 RELEASE HISTORY OF T-PLAN INTEGRATOR

The authors of this document have been through four iterations of the T-Plan Integrator software to get to where we needed to be in order to properly evaluate the software. Each iteration gave us some additional functionality that was needed in order to migrate the data from TcSE to DOORS. Here is a listing of the software versions that were provided to us, when it was provided, and what it added to the capability.

Release ZIP Name	Release Date	Release Notes	Bugs/Needed Improvement
Integrator_4276.zip	February 25, 2010	Initial Version	There was a bug in this one where it did not allow the user to transfer any data into DOORS.
Integrator_4285.zip	March 8, 2010	Fixed the bug that allowed the user to transfer data into DOORS.	The trace links were not being migrated into DOORS from TcSE. Also, this release was really unstable; the user had to do a "Configuration" multiple times in order for it to transfer correctly.
Integrator_4322.zip	March 18, 2010	Enabled the user to migrate trace links across modules. Caveat is that you needed to first create a Formal module then 2 objects and create a trace link between the two objects in order to create a default DOORS link module.	Prior releases, including this release, only allowed the user to migrate one TcSE Folder at a time into a DOORS Formal Module. This was not an acceptable solution because the user needed trace links to be transferrable and also the data to look similar to that as of TcSE. Also, this release was really unstable; the user had to do a "Configuration" multiple times in order for it to transfer correctly.

Release ZIP Name	Release Date	Release Notes	Bugs/Needed Improvement
Integrator_4340.zip	March 29, 2010	Enabled the user to map TcSE folders to DOORS projects, folders, and formal modules; it also enabled the user to migrate the entire project from TcSE to DOORS. This release was more stable where it allowed the user to transfer data more efficiently from TcSE to DOORS.	
Integrator_4372.zip	April 14, 2010	For the case where a DOORS object is larger than the threshold, then the Integrator will copy the corresponding object to a folder (of your choice) and create a hyperlink to it in DOORS. This is used with a new setting in the "Import Options" screen.	

4 RUNNING OF THE T-PLAN INTEGRATOR SOFTWARE

This section describes how to run the T-Plan Integrator software tool. The key to the transfer of the data from TcSE to DOORS is the Integrator mapping file.

1. Launch TcSE.

2. Go to the Administration module.

3. Click on the project of interest.

4. Right click on the same project and select Export > Project.

5. Save it to an XML file.

6. Log out of TcSE and close the Internet Browser window that launched it.
7. Log into the DOORS application.

8. Launch the T-Plan Integrator software application.

9. Click the “Create a new configuration” folder at the top of the window.

10. Click **Next**.

11. Click the “Teamcenter systems engineering” option at the bottom and click **Next**.

12. Click the “Connection via project or schema file” radio button and select US. Click **OK** when done.

13. Select your TcSE XML project export file.

14. Click the object within the TcSE database that you want to transfer over to DOORS and click **OK**.

15. Select “DOORS 9.2” and click **Next**.

16. If you get the following error, close the existing DOORS session, restart it, and log into DOORS again. After you log back into DOORS, click the **Retry** button.

NOTE: This step can be frustrating because if you break a large project up into manageable chunks of data when migrating, then you will probably need to do this step many times.

17. Click the location in DOORS where you want to put the data transferred from TcSE into and click **OK**.

18. Click **Yes**.

19. Click **OK**.

NOTE: The recommended threshold is 5 MB. The threshold in this screen shot shows the maximum size of the Text value of a TcSE object that the T-Plan Integrator software will import into an object in DOORS. You will have to copy and paste objects that are bigger than this size after the transfer is complete.

20. Click the “Define a new mapping” radio button and click the **Define** button.

21. At this point you can load an existing Integrator mapping file by right clicking inside the Type Mapper control form and select “Load from File”. If you are starting from scratch, you can select the TcSE type in the left pane and drag and drop it to the DOORS Type that you would want to map it to. You can also right click in the control form and save the mapper file. Click **OK** when finished.

- a. You can also map by a TcSE property value on a TcSE type to a DOORS type. For instance, in the graphic below you will see that I have a “DOORS Type” property definition assigned to a Folder type object, when a Folder has this “DOORS Type” property set to “DOORS Heading” then it is mapped to a Heading object in DOORS. The “DOORS Type” property was added to the TcSE schema to facilitate the migration of data from TcSE to DOORS.

22. Click the “Define a new mapping” radio button and click **Define**.

23. During the first cut at transferring data from TcSE to DOORS for your project, click the new TcSE property and click the **Create** button at the bottom left of the screen.

24. If you have already defined an Integrator mapping file, you can right click in the mapper window and select “Load from file”. You can also right click in the mapper window and save the mapping to an XML file, you can save it to the same XML file as the Type Mapper just click OK when asked if you want to override the file. Click **OK** when you are finished with this window.

25. Give the configuration a name and a description if you choose to and click **Next**.

26. Click **Finish**.

4.1 Recommended Mapping File

TcSE	TcSE “DOORS Type” Property	DOORS	Rationale
Requirement	N/A	Heading	If you want the Name field of the Requirement object to be migrated to DOORS, then you must map to a DOORS Heading. However, if the Name field is not important throughout the entire project, then go ahead and map to a DOORS Requirement; mapping to DOORS Requirement will not transfer the Name of the Requirement object.
Building Block	N/A	Heading	This would be the recommended setting because if you have trace links in TcSE that you want to be preserved then you can migrate those trace links to a Heading object rather than say a Folder object, since that is not linkable in DOORS.
Folder	DOORS Folder	Folder	Most folder objects you would want to be created as DOORS folders. See the caveat in the next row.
Lowest Level Folder w/Requirements	DOORS Module	Module	Some folder objects you would want to be created as DOORS Modules; for example, TcSE folders that have requirement, paragraph, or building block objects.
Document	DOORS Folder	Folder	Some document objects you would want to be created as DOORS folders. See the caveat in the next row.

TcSE	TcSE “DOORS Type” Property	DOORS	Rationale
Lowest Level Document Folder w/Paragraph Requirements	DOORS Module	Module	Most document objects you would want to be created as DOORS Modules; for example, TcSE folders that have requirement, paragraph, or building block objects.
Trace Link	N/A	Link	This is the basic Link object that DOORS uses.

5 EVALUATION OF MIGRATING TCSE DATA TO DOORS

Let us evaluate how each of the features and functionalities of TcSE would be migrated to the DOORS application.

5.1 Requirements

By creating an Integrator mapping file, this would be handled by mapping a Requirement object to a DOORS Heading or to a DOORS Requirement. The advantage of mapping a Requirement to a DOORS Heading is that T-Plan will transfer the Text and the Name field to DOORS; whereas, if one maps a Requirement to a DOORS Requirement, then only the Text field will be transferred to DOORS. Of course, all the properties of the requirement object will be transferred if you define this in the Integrator mapping file.

Note that TcSE requires that all Requirement objects have a Name attribute in addition to the text of the requirement. DOORS does not have this requirement.

5.2 Building Blocks

Building Blocks are a tough call because they can have Trace Links and they can also have directional flow (ports and connectors). Since DOORS does not have a similar feature, it would not make sense to transfer a Building Block to a DOORS Folder object, it would rather make sense to transfer the Building Block to a DOORS Heading object, thus capturing the Name field and the linkages on that object.

5.3 Property Definitions

Property Definitions can be transferred from TcSE to DOORS by two methods using the T-Plan Integrator tool, both using the Integrator mapping file. If the target location in DOORS is a new location, you can create new Property types or Module attributes in the T-Plan Integrator and this will allow you to seamlessly transfer this information from TcSE to DOORS. However, we have found that the TcSE “Numeric Definition” property type defaults to a DOORS “Real” attribute type. In some instances, this is not an ideal situation because the DOORS “Real” attribute type does not allow for commas in the value; however, the TcSE “Numeric Definition” property type does not allow for removal of the comma in the value if the value is greater than or equal to 1,000 or less than or equal to -1,000. What has been found to circumvent data loss in the transfer

of data is to first create a Formal Module underneath the target location that contains the property names and the types that you would want. For instance, when transferring the real system data from TcSE to a location in DOORS, it would be recommended to first create a Formal Module under that folder with the “PS Max” property or attribute as String.

5.4 Trace Links

The TcSE Trace Links were able to seamlessly be transferred from TcSE to DOORS through the T-Plan Integrator software by mapping this type to a DOORS Link. Sub-types of the TcSE “Trace Link” type can also be transferred from TcSE to DOORS through defining the mapping in the Integrator mapping file to a DOORS Link type. Note that DOORS supports only one kind of link.

5.5 Versions and Baselines

The T-Plan Integrator does not transfer the TcSE feature of versions and baselines very well into the DOORS application. After a few trials of transferring some of the versioned objects, the T-Plan Integrator tool seems to create multiple objects within a Formal Module and they do not seem to be in any logical order.

5.6 Shortcuts

Conceptually, how would you transfer TcSE shortcuts to DOORS? It is still not certain, but the T-Plan Integrator does not transfer these at all from TcSE to DOORS. Since DOORS does not have a similar concept of TcSE shortcuts and if a project has a need to preserve this information while migrating to the DOORS application, then the user would probably need to manually copy and paste the “main objects” after the transfer into DOORS.

5.7 Object References

An “Object Reference” is a TcSE feature that allows the user to refer to an object’s property and have its value show up in the Text of another object. The way the T-Plan Integrator handles this is that they get what the Text of the object has and it is transferred to DOORS. One could say that the reference is broken since it is just a copy of what the value was at the point in time, but there is no related feature in DOORS. So, when a user of DOORS would modify the referred to property in one location, the “object reference” still stays the same as it was imported from the T-Plan Integrator.

5.8 TcSE Images

Images that are in TcSE are transferred to DOORS since DOORS has that capability. However, images can be rather big when they are housed inside TcSE. The threshold parameter limits the size of the TcSE Text that is transferred over to DOORS. If the Text of an object in TcSE is saved in an RTF format and the file is larger than the threshold set in the Configuration then that object will need to be transferred over manually. As stated previously, the threshold parameter is recommended to be set at 5 MB. It has been tested to exceed this value to try to capture as much

data as possible automatically rather than manually; however, the small value of 5 MB is the way to go even if there is a lot of data that needs to be transferred manually.

5.9 TcSE Tables

The DOORS application has a DOORS table object that can be created and each cell would be a different object inside the DOORS database. However, when the table from a TcSE object is transferred over to DOORS using the T-Plan Integrator software, the table is simply created in DOORS as another textual item and not a DOORS table object. That is, the table is stored as you would expect a textual item like “The product shall...” is stored in the text field of the DOORS Formal Module. It is recommended that Tables be imported manually so that the user can take advantage of the powerful DOORS Table features.

5.10 Special Characters

There is a difference between the way that TcSE handles “Special Characters” and how DOORS handles these. In the DOORS application, you cannot have the following characters in the name field of DOORS Projects, Folders, and Modules:

1. .
2. ,
3. ‘
4. “
5. (
6.)
7. \
8. /
9. *
10. %
11. etc

So, when you are transferring data from TcSE to DOORS, you will first need to check each of the TcSE objects that can become DOORS Projects, Folders, and Modules and make sure that the name field does not contain the “Special Characters” that DOORS will not allow in the name field.

5.11 Folder Hierarchy in TcSE and Nested Objects

For a hierarchy of folders to be transferred from TcSE to DOORS and to properly transfer the data that is stored in these folders, the T-Plan Integrator has a way to help transfer this data. The Integrator mapping file has a method on how to assign a DOORS Type based on a TcSE property value. For example, consider a TcSE choice property, named “DOORS Type”, with values “DOORS Project”, “DOORS Folder”, “DOORS Module”, “DOORS Heading”, and “DOORS Requirement”; assign this property to all TcSE Folders and Document objects. If a TcSE Folder has a “DOORS Type” value of “DOORS Folder” then create a folder in DOORS with this value, and so on.

One caveat to this feature or function within the T-Plan Integrator software: What if you have your TcSE data stored similar to the following graphic?

The folder named "Some other folder with objs" would probably need to have the "DOORS Type" property set to "DOORS Module" in order to properly catch the three requirement objects; however, the data within the folders named "Sub-Folder 1" and "Sub-Folder 2" would be in the same Formal Module with these two names as main section headings. Conversely, you could restructure this folder hierarchy to have third sub-folder to put the three requirement objects into it and have three separate Formal Modules. This is a migration issue rather than a software issue: How do you want it to look within DOORS?

By creating a new property "DOORS Type" inside TcSE and manually assigning values to the objects in a nested folder structure, the user can force a similar structure in DOORS. This is an example of the preprocessing that may be required in TcSE so that your data appears in DOORS as you intend.

5.12 TcSE Connections and Ports

A few trials of transferring data which utilized this feature from TcSE to DOORS were unsuccessful using the T-Plan Integrator software. Since these are not used very much in TcSE, this was not fully explored. However, if a project has a need to transfer this information to DOORS then that user would probably manually create a link inside DOORS that would mimic the relationship in TcSE.

5.13 Items that are not Transferrable from TcSE

The following items are not transferrable from TcSE to DOORS via the T-Plan Integrator tool:

1. Activators
2. Reports, Formatting, and Views
3. Security Profiles
4. Change Logs
5. Notes
6. Diagrams

7. Shortcuts
8. Versions and Baselines
9. Object References
10. Connections and Ports

These items must be recreated or do not exist in DOORS.

6 CONFIGURATION

T-Plan Integrator must be installed on a single user's workstation. If multiple users need to use the tool, then it is recommended that the software be installed on a kiosk system that can be shared by multiple users. On the SRN, users can remote over the network to the kiosk system. On the SCN, remote desktop connections are not allowed. If T-Plan Integrator is needed on the SCN, then it is recommended that a SCN system be set up in vaults in Buildings 836 in NM and 915 in CA.

7 COST

The initial cost to purchase a T-Plan Integrator license was \$10,000. This included software updates and hotline support for one year starting 1 February 2010. Two software licenses were included so that the tool could be installed on the SRN and on the SCN. However, the tool was only evaluated on the SRN.

If software updates and hotline support are needed after one year, then the next year's renewal cost is expected to be \$10,000. If more than two software licenses are needed, then additional licenses may be negotiated.

8 NOTES AND LESSONS LEARNED

Here is a listing of Notes and Lessons Learned from migrating the real system data from TcSE to DOORS.

1. Be careful with "Special Characters" because DOORS does not handle this very well in the names for Projects, Folders, and Modules. For instance, the characters: '*', '(', ')', ',', '&', etc, etc. This is really frustrating because when you try to migrate data from TcSE with these characters in Folder names and if there is one error in the import into DOORS, then the T-Plan Integrator just halts and does not go any further.
2. By default, TcSE Properties that are of "Numeric Definitions" will be migrated to DOORS as a "Real"; in DOORS, a "Real" property does not like a comma in the property values. If you create the property first in DOORS as a "String" type, say in a Test Formal Module, then the T-Plan Integrator will pick it up as a "String" type, otherwise it will become a "Real" type and the DXL import will error out because of the comma in the property value. Numbers in TcSE with commas are a problem, so numbers like 1,000,000 will be translated to DOORS as a String.

3. Using the T-Plan Integrator to migrate data from TcSE to DOORS is an iterative process. The user will not be able to successfully migrate data the first time; it will take several attempts to get the right configuration and the right data values that both tools can accommodate. Be patient.
4. It is recommended to shutdown all applications running on the workstation other than DOORS and the T-Plan Integrator software tools because when the Integrator is importing data into DOORS, it utilizes a great deal of computer memory (RAM) to import this data. It can render your usage of other applications to a crawl or even stall the import of the data since it requires a considerable amount of memory to operate. Our experience has shown that a multiprocessor workstation with more than 2 GB of memory should be set up to do the translations.
 - a. DO NOT open and close MS Word when the T-Plan Integrator is running!!
5. When testing the migration using the real system data, after a number of trials, there were some data objects that were found that stalled the import into DOORS. If you find that the T-Plan Integrator tool stalls at a certain point, it is recommended to explore what your data looks like in both DOORS and TcSE, you might have something that will hang DOORS on import. If you find this, put it in the recycle bin in TcSE and start the Configuration over again.
6. The T-Plan Integrator tool seems to not be very stable because if it errors out often – as seen in most of the Lessons Learned – it can sometimes freeze your workstation and it will take some time to kill the correct process and most times you will have to reboot your machine.
7. The T-Plan Integrator tool will sometimes give the user a Runtime Error Message during the translation process that the user can use to determine which requirement or object the translator had difficulty with.

9 CONCLUSION NOTES

Migrating of data from one software application to another is a difficult task, and it is the problem that the T-Plan Integrator software is trying to solve. By enabling the user to transfer data from the TcSE application to DOORS, the T-Plan Integrator software is a handy tool. This software seems to be very unstable in the migration of large data sets and large images. The author tried many different threshold parameters to figure out the right value for the real system data; finally, the author decided to set the threshold to 5 MB and remove some of the data from the TcSE project in order for it to end the transfer. After the transfer of data, it was still needed to manually transfer a lot of data from TcSE to DOORS. Frustrations arose when using the T-Plan Integrator to transfer the real system data from TcSE to DOORS in that most times it stalled considerably at a certain point and the workstation that it was running on had to be restarted in order to clean out hung processes. It took a few times to get the values set in the TcSE project data to even be able to have some kind of mapping into a DOORS data set; for example, names of TcSE objects that would eventually become DOORS Projects, Folders, and Formal Modules.

A few iterations of creating the correct mapping configuration to transfer the information would be needed as well. The key to transfer of the data from TcSE to DOORS is the mapping configuration: How does an object in TcSE map to an object in DOORS?

It is believed that the T-Plan Integrator software application is the only product available on the market that can migrate, or transfer, data from TcSE to DOORS. Given that the T-Plan Integrator is a handy tool for small data sets it would be OK to go ahead and use this software application for the migration of the data, but if a user needs a large data set to be transferred over, then first break the information up into manageable chunks of data. If a data set has to be broken into sub data sets, then each data set must contain all the links between requirements. If two requirements are linked together and are translated at different times, then the link will be lost.

It is recommended that Sandia use the T-Plan Integrator as the tool to move data from TcSE to DOORS. The user must realize that it is going to be a slow and tedious process but it is a better alternative than creating MS Word documents from TcSE and importing them into DOORS.

9.1 Summary Information

If MS Word documents have been imported into TcSE and very little additional work has been done to the data, then it may be quicker to import the original TcSE formatted Word document into DOORS. The formatting requirements to import an MS Word document into TcSE and DOORS are about the same, so very little, if any, changes would need to be made to import a document into DOORS if the document that was used to import the data into TcSE still exists.

The T-Plan Integrator does a good job of transferring the Name of the requirement and the text, or shall, statement of the requirement and the attributes. If Word documents are used to transfer data, then the attribute data is lost and the linkage between requirements is lost. MS Excel could be used to transfer attribute data, but linkage between requirements would be lost and the structure of the data may be lost too.

Before any data is moved, the data owner must be versed in the use of TcSE and DOORS. The tools have different capabilities, functions, and features. A mapping of data objects in TcSE to DOORS objects must be done before any data is transferred. The table in section [4.1](#), Recommended Mapping File, must be fully understood by the data owner.

Graphic files in TcSE that are over 5 MB in size cannot be translated and must be manually cut from TcSE and pasted into DOORS.

TcSE has Systems Engineering capabilities that DOORS does not have. If Building Block objects are used in TcSE, only the name, properties, and links of the Building Block can be translated to DOORS. If Connector objects are used in TcSE, these cannot be translated to DOORS. DOORS does not have a Connector like object feature, so there is no object type that can mapped from TcSE to DOORS. If the user has done extensive Systems Engineering work in TcSE by doing Functional and Physical decompositions, then it may be best if the user continue to use TcSE and not move the data to DOORS. An alternate possible solution is that the user

may be able to use a SysML (Systems Modeling Language) tool to model their system and then move the requirements generated in the SysML tool to DOORS.

Both TcSE and DOORS have Versioning and Baselining capabilities and requirements can be migrated from TcSE to DOORS. When a versioned requirement is migrated, the initial requirement and all its versions are transferred to DOORS which show up as individual requirements; the concept of versioning is lost in the transfer of the data. TcSE linkages are preserved in each version of the requirement object that was transferred to DOORS.

Baselined requirements in TcSE are migrated to DOORS and, like versioned requirements, they show up as individual requirements. The concept of being baselined is lost, so they must be re-baselined using the DOORS Baselining capabilities. To ensure the user knows the original requirements in TcSE were baselined, the TcSE “Baseline” property should be mapped and transferred to DOORS.

T-Plan Integrator does not verify which or how many requirements are correctly transferred. Verification of requirements that were successfully transferred must be done by inspection.

Trace links are migrated from TcSE to DOORS using the T-Plan Integrator. However, TcSE has the concept of Trace Link Subtypes but DOORS does not. So, if there are subtypes of Trace Links in TcSE then the trace link will be preserved but the naming convention will not; all trace links are migrated into the default DOORS Link Module.

DISTRIBUTION

1	MS0626	Tony D. Hernandez	2998
1	MS0626	David A. Manzanares	2998
1	MS0648	Abraham L. Sego	2997
1	MS0648	Jeffrey L. Taylor	2997
1	MS9154	Mary E. Gonzales	8240
1	MS9154	Debbie S. Post	8248
1	MS0899	Technical Library	9536 (electronic copy)