

T321: Applying Your Test Plan to TMDD Standard



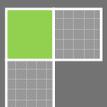
RITA Intelligent Transportation Systems
Joint Program Office



T321: Applying Your Test Plan to TMDD Standard

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Module Description

The module includes a brief description of the TMDD Standard with materials and examples that describe how to develop test documentation for the purposes of performing system interface validation and verification. This module covers the role of testing including: compliance, manufacturing and acceptance tests, and verification and validation as part of the testing and quality life cycle expressed in the systems engineering "V" model. The "V" model is depicted in Figure 1.

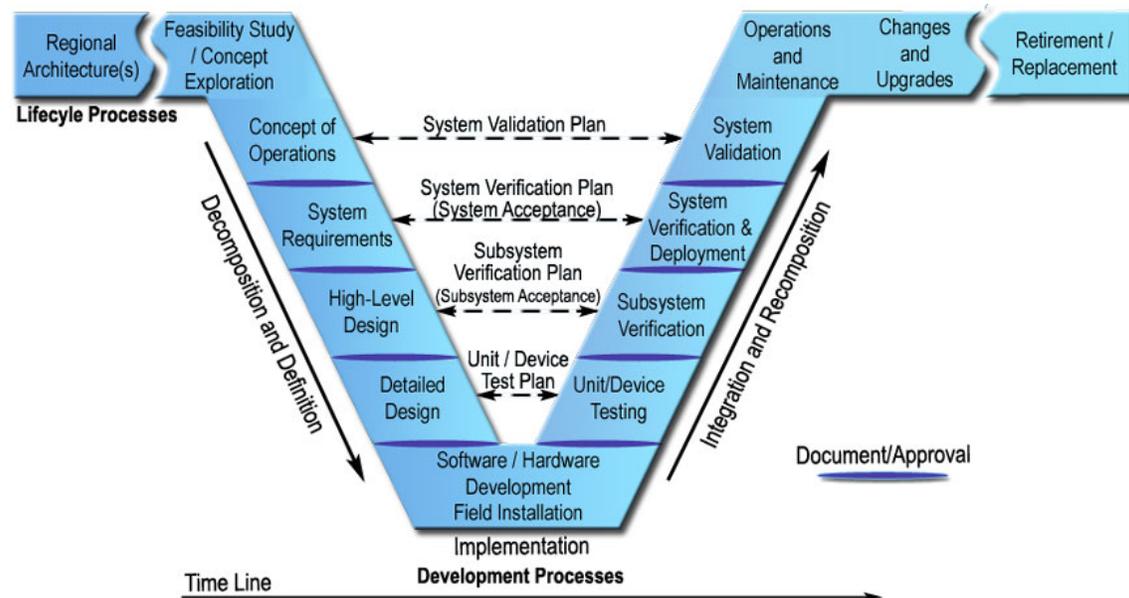


Figure 1. Systems Engineering "V" Diagram

Introduction/Purpose

This module assists user agencies to create a test plan specific to their TMDD v3 Standard based system interface. Prior to developing such a test plan, the user is expected to be knowledgeable of the TMDD v3 Standard and testing methodologies. This module covers material related to elements of the TMDD Standard required to apply test plans to verify that an agency's product or system meets design specifications and other requirements of the TMDD Standard, while following standard testing methodologies discussed in the plan and in IEEE Std 829 IEEE Standard for Software Test Documentation.

The focus of this course is on development of test documentation to test for TMDD system interface compliance. During the test phase, the system interface implementation is tested against the requirements that were developed for the project. A Requirements to Test Case Traceability Matrix (RTCTM) will be used to verify that the software being implemented fulfills all of the system interface requirements. To conduct the system interface test phase, the interface must be isolated from the hardware and central system software. TMDD testing focuses on the compliance with the

requirements and system interface specification and not the software implementation. The test documentation developed is used to guide and document the processes used to verify compliance with the requirements and specification to ensure that the dialogs and data content of message exchanges are implemented correctly.

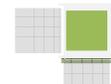
1. Samples/Examples

This section contains an example that traces a specific user need, Need to Share DMS Inventory, to the requirements that satisfies that user need, then to the (standard) design that will fulfill those requirements. An example Requirements to Test Case Matrix is then created, along with portions of an example test design specification, test case specifications and test procedure specifications.

From TMDD v3.03 Volume I, the example, completed NRTM in Table 1 depicts the following for User Need 2.3.5.4.1, Need to Share DMS Inventory:

Table 1. Example NRTM

Requirement ID	Requirement	Conformance	Support	Other Requirements
Dialogs				
3.3.5.5.1.1	Send DMS Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See Section 3.4.2.
3.3.5.5.1.2	Publish DMS Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See Section 3.4.1.
3.3.5.5.1.3	Subscribe to DMS Inventory Information	Subscription:O	Yes / No / NA	
Request Message				
3.3.5.1.1.1	Contents of Device Information Request	M	Yes	
3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
3.3.5.1.1.1.2.1	Authentication - Device Information (DeviceAuth)	O	Yes / No	
3.3.5.1.1.1.2.1.1	Operator Identifier - Device Information	DeviceAuth:O	Yes / No / NA	
3.3.5.1.1.1.2.2	External Center Organization - Device Information	O	Yes / No	
3.3.5.1.1.1.3.1	Device Identifier Filter	O	Yes / No	
3.3.5.1.1.1.3.2	Roadway Network Identifier Filter	O	Yes / No	
3.3.5.1.1.1.3.3	Link Identifier Filter	O	Yes / No	
3.3.5.1.1.1.3.4	Route Designator Filter	O	Yes / No	
3.3.5.1.1.1.3.5	Linear Reference Filter	O	Yes / No	
3.3.5.5.1.4	Contents of the DMS Inventory Request	M	Yes	
Response Message				
3.3.5.1.2.1	Contents of the Device Inventory Header	M	Yes	
3.3.5.1.2.1.1	Required Device Inventory Content	M	Yes	
3.3.5.1.2.1.2.1	Restrictions - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.2	Device Description	O	Yes / No	
3.3.5.1.2.1.2.3	Device Control Type	O	Yes / No	



Requirement ID	Requirement	Conformance	Support	Other Requirements
3.3.5.1.2.1.2.4	Controller Description	O	Yes / No	
3.3.5.1.2.1.2.5	Roadway Network Identifier - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.6	Node Identifier - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.7	Node Name - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.8	Link Identifier - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.9	Link Name - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.10	Link Direction - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.11	Linear Reference - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.12	Linear Reference Version	O	Yes / No	
3.3.5.1.2.1.2.13	Route Designator - Device Inventory	O	Yes / No	
3.3.5.1.2.1.2.14	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
3.3.5.1.2.1.2.15	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
3.3.5.1.2.1.2.16	Device Inventory Date and Time Change Information	O	Yes / No	
3.3.5.5.1.5	Contents of the DMS Inventory Information	M	Yes	
3.3.5.5.1.5.1	Required DMS Inventory Content	M	Yes	
3.3.5.5.1.5.2.1	Sign Technology	O	Yes / No	
3.3.5.5.1.5.2.2	Sign Pixel Height	O	Yes / No	
3.3.5.5.1.5.2.3	Sign Pixel Width	O	Yes / No	
3.3.5.5.1.5.2.4	Sign Height	O	Yes / No	
3.3.5.5.1.5.2.5	Sign Width	O	Yes / No	
3.3.5.5.1.5.2.6	Character Pixel Height	O	Yes / No	
3.3.5.5.1.5.2.7	Character Pixel Width	O	Yes / No	
3.3.5.5.1.5.2.8	DMS Beacon Type	O	Yes / No	
3.3.5.5.1.5.2.9	Vertical Border	O	Yes / No	
3.3.5.5.1.5.2.10	Horizontal Border	O	Yes / No	
3.3.5.5.1.5.2.11	Sign Vertical Pixel Pitch	O	Yes / No	
3.3.5.5.1.5.2.12	Sign Horizontal Pixel Pitch	O	Yes / No	
3.3.5.5.1.5.2.13	Maximum Number of Pages	O	Yes / No	
3.3.5.5.1.5.2.14	Maximum Message Length	O	Yes / No	
3.3.5.5.1.5.2.15	Color Scheme	O	Yes / No	
3.3.5.5.1.5.2.16	MULTI Tags Supported	O	Yes / No	
Error Report Message				
3.3.1.4.1	Contents of the Error Report	M	Yes	
3.3.1.4.1.1	Required Error Report Contents	M	Yes	
3.3.1.4.1.2.1	Restrictions - Error Report	O	Yes / No	

For this example, requirement id 3.3.5.1.2.1.2.2, Device Description, is the only optional requirement that was selected for this test example. This completed NRTM can also be used to indicate the test items to be tested in a Test Design Specification.

Based on the requirements selected, Table 2 depicts the (standard) design that will fulfill each requirement according to the TMDD Standard.

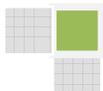


Table 2. Example RTM

Req ID (Vol. I)	Requirement	Dialog	DC Type	Definition Class Name	DC ID (Vol. II)	Data Concept Instance Name
3.3.1.4.1	Contents of the Error Report		Message	errorReportMsg	3.2.3.3	errorReportMsg
3.3.1.4.1.1	Required Error Report Contents		data-frame	organizationInformation	3.3.16.3	organization-information
3.3.1.4.1.1	Required Error Report Contents		data-frame	organizationInformation	3.3.16.3	organization-requesting
3.3.1.4.1.1	Required Error Report Contents		data-element	error-report-code	3.4.3.1	error-code
3.3.1.4.1.1	Required Error Report Contents		data-element	informationalText	3.4.3.2	error-text
3.3.5.1.1.1	Contents of Device Information Request		Message	deviceInformationRequestMsg	3.2.5.4	deviceInformationRequestMsg
3.3.5.1.1.1.1	Required Device Information Request Content		data-frame	organizationInformation	3.3.16.3	organization-information
3.3.5.1.1.1.1	Required Device Information Request Content		data-element	device-type	3.4.5.15	device-type
3.3.5.1.1.1.1	Required Device Information Request Content		data-element	device-information-type	3.4.5.7	device-information-type
3.3.5.1.2.1	Contents of the Device Inventory Header		data-frame	deviceInventoryHeader	3.3.5.8	deviceInventoryHeader
3.3.5.1.2.1.1	Required Device Inventory Content		data-frame	organizationInformation	3.3.16.3	organization-information
3.3.5.1.2.1.1	Required Device Inventory Content		data-element	organization-resource-identifier	3.4.16.8	device-id
3.3.5.1.2.1.1	Required Device Inventory Content		data-frame	geoLocation	3.6.9.4	device-location
3.3.5.1.2.1.1	Required Device Inventory Content		data-element	organization-resource-name	3.4.16.9	device-name
3.3.5.1.2.1.2.2	Device Description		data-element	organization-resource-name	3.4.16.9	device-description
3.3.5.5.1.1	Send DMS Inventory Information Upon Request	2.4.1	Dialog	dIDMSInventoryRequest	3.1.6.1	dIDMSInventoryRequest
3.3.5.5.1.4	Contents of the DMS Inventory Request		Message	deviceInformationRequestMsg	3.2.5.4	deviceInformationRequestMsg
3.3.5.5.1.5	Contents of the DMS Inventory Information		Message	dMSInventoryMsg	3.2.6.4	dMSInventoryMsg
3.3.5.5.1.5.1	Required DMS Inventory Content		data-frame	deviceInventoryHeader	3.3.5.8	device-inventory-header
3.3.5.5.1.5.1	Required DMS Inventory Content		data-element	dmsSignType	3.6.3.35	dms-sign-type

Based on the requirements selected in Table 1, develop a Requirements to Test Case Traceability Matrix (RTCTM). An example RTCTM is shown in Table 3.

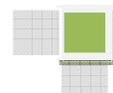


Table 3. Example RTCTM

Req ID (Vol. I)	Requirement	Test Case ID	Test Case Title
3.3.1.4.1	Contents of the Error Report		
		TC-Support-01	TC-ErrorReport
3.3.1.4.1.1	Required Error Report Contents		
		TC-Support-01	TC-ErrorReport
3.3.5.1.1.1	Contents of Device Information Request		
		TC-Device-01	TC-DevInformRequest-NoError
		TC-Device-02	TC-DevInformRequest-Error
3.3.5.1.1.1.1	Required Device Information Request Content		
		TC-Device-01	TC-DevInformRequest-NoError
		TC-Device-02	TC-DevInformRequest-Error
3.3.5.1.2.1	Contents of the Device Inventory Header		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.1.2.1.1	Required Device Inventory Content		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.1.2.1.2.2	Device Description		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.5.1.1	Send DMS Inventory Information Upon Request		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.4	Contents of the DMS Inventory Request		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.5	Contents of the DMS Inventory Information		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.5.1	Required DMS Inventory Content		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error

The example RTCTM can then become part of a Test Design Specification. An example Test Design Specification is shown in Table 4.

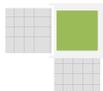
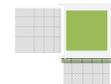


Table 4. Example Test Design Specification

Test Design Specification			
ID: TD-DMS-01		Title: Need to Share DMS Inventory	
Approach Refinement:		Automated test scripts will be used Communications configuration tables	
Features to be Tested		Test Identification	
ID	Title	ID	Title
3.3.1.4.1	Contents of the Error Report		
		TC-Support-01	TC-ErrorReport
3.3.1.4.1.1	Required Error Report Contents		
		TC-Support-01	TC-ErrorReport
3.3.5.1.1.1	Contents of Device Information Request		
		TC-Device-01	TC-DevInformRequest-NoError
		TC-Device-02	TC-DevInformRequest-Error
3.3.5.1.1.1.1	Required Device Information Request Content		
		TC-Device-01	TC-DevInformRequest-NoError
		TC-Device-02	TC-DevInformRequest-Error
3.3.5.1.2.1	Contents of the Device Inventory Header		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.1.2.1.1	Required Device Inventory Content		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.1.2.1.2.2	Device Description		
		TC-Device-03	TC-DeviceInventory-NoError
		TC-Device-04	TC-DeviceInventory-Error
3.3.5.5.1.1	Send DMS Inventory Information Upon Request		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.4	Contents of the DMS Inventory Request		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.5	Contents of the DMS Inventory Information		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
3.3.5.5.1.5.1	Required DMS Inventory Content		
		TC-DMS-01	TC-DMSInventory-NoError
		TC-DMS-02	TC-DMSInventory-Error
Feature Pass-Fail Criteria		This test design is passed if: 1) all test cases are passed; and 2) the data content of dialog responses are verified to be correct against the TMDD XML schema.	



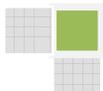
An example Test Case Specification is provided in Table 5.

Table 5. Example Test Case Specification

Test Case Specification	
ID: TC-DMS-01	Title: TC-DMSInventory-NoError
Test Items	<ul style="list-style-type: none"> • REQ 3.3.5.5.1.1 - Send DMS Inventory Information Upon Request • REQ 3.3.5.5.1.4 - Contents of the DMS Inventory Request • REQ 3.3.5.5.1.5 - Contents of the DMS Inventory Information • REQ 3.3.5.5.1.5.1 - Required DMS Inventory Content
Input Specifications	TCI-DMS-01 - Need to Share DMS Inventory Inputs (No Error)
Output Specifications	TCO-DMS-01 - Need to Share DMS Inventory Outputs (No Error) Perform TPS-DMS-01
Environmental Needs	No additional needs outside of those specified in the test plan
Special Procedure Requirements	None
Intercase Dependencies	None

Table 6. Example Test Procedure Specification

Test Procedure Specification			
ID: TPS-DMS-01	Title: Need to Share DMS Inventory Procedures		
Purpose	This test procedure verifies that the dDMSInventoryRequest dialog of an Owner Center system interface is implemented properly. It tests when a deviceInformationRequestMsg is sent to an owner center that the owner center responds with an dMSInventoryMsg response message.		
Special Requirements	None		
Preconditions			
<ol style="list-style-type: none"> 1. Verify that the XML Request Message is valid against Project XML Schema 2. Verify that the WSDL for the Dialog to be tested is correct 			
Step	Test Procedure	Results	References
1	CONFIGURE: Determine the organization identifier, device identifier, location, name, and type of the dynamic message sign (per the Owner Center's database) being requested from the Owner Center. RECORD that information as, respectively: organization_id, dms_id, dms_location, dms_name, dms_type		
2	SETUP: Verify the deviceInformationRequestMsg inputs are: >organization-id = "Center5" >device-type = "dynamic-message-sign (3)" >device-information-type = "device-inventory (1)"	Pass / Fail (Req 3.3.5.5.1.4)	TCI-DMS-01 TMDD Vol. II (3.2.5.4)
3	SETUP: Start HTTP Client		
4	Load XML deviceInformationRequestMsg		TMDD Vol. II (3.2.5.4)
5	Send XML deviceInformationRequestMsg to Owner Center	Pass / Fail (Req 3.3.5.5.1.1)	TMDD Vol. II (3.1.6.1)
6	Receive XML dMSInventoryMsg from Owner Center	Pass / Fail (Req 3.3.5.5.1.1)	TMDD Vol. II (3.1.6.1) TMDD Vol. II (3.2.6.4)
7	Log XML dMSInventoryMsg from Owner Center to a file.		
8	Verify that the saved dmsInventoryMsg file validates against the TMDD XML Schema.	Pass / Fail (Req 3.3.5.5.1.5)	



9	VERIFY that the XML dmsInventoryMsg contains only the following data elements, and each has a valid value: >organization-id >device-id >device-location >device-name >dms-sign-type	Pass / Fail (Req 3.3.5.5.1.5)	TCO-DMS-01 TMDD Vol. II (3.2.6.4)
10	VERIFY that the RESPONSE VALUE for organization-id is equal to organization_id.	Pass / Fail (Req 3.3.5.5.1.5.1)	TCO-DMS-01 TMDD Vol. II (3.3.5.8)
11	VERIFY that the RESPONSE VALUE for device-id is equal to dms_id.	Pass / Fail (Req 3.3.5.5.1.5.1)	TCO-DMS-01 TMDD Vol. II (3.3.5.8)
12	VERIFY that the RESPONSE VALUE for device-location is equal to dms_location.	Pass / Fail (Req 3.3.5.5.1.5.1)	TCO-DMS-01 TMDD Vol. II (3.3.5.8)
13	VERIFY that the RESPONSE VALUE for device-name is equal to dms_name.	Pass / Fail (Req 3.3.5.5.1.5.1)	TCO-DMS-01 TMDD Vol. II (3.3.5.8)
14	VERIFY that the RESPONSE VALUE for dms-sign-type is equal to dms_type.	Pass / Fail (Req 3.3.5.5.1.5.1)	TCO-DMS-01 TMDD Vol. II (3.6.3.35)
Test Procedure Results			
Tested By:		Test Date:	Pass / Fail
Test Notes:			

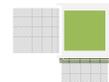
2. Reference to Other Standards

- IEEE 829-2008 - IEEE Standard for Software and System Test Documentation, IEEE, July 18, 2008.
- NTCIP 2304: Application Profile for DATEX-ASN (AP-DATEX) v01.07, AASHTO/ITE/NEMA, June 20, 2001.
- NTCIP 2306: Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications, version v01, AASHTO/ITE/NEMA, December 2008.

3. Glossary

Additional descriptions/acronyms used primarily in the module.

Term	Definition
Boundary Testing	A test that verifies the System Under Test reacts properly to error conditions.
Requirements To Test Cases Traceability Matrix	A matrix that defines the traceability from a requirements to the associated test case.
Risk	A subjective estimate of the probability of an error occurring and the amount of damage that may occur as a result of the error.
Test Case Specification	A document that specifies the test inputs, execution conditions, and predicted results for an item to be tested.



Term	Definition
Test Design Specification	Documentation specifying the details of the test approach for a software feature or combination of software features and identifying the associated tests.
Test Documentation	Documentation describing plans for, or results of, the testing of a system or component. Types include test case specification, test incident report, test log, test plan, test procedure, and test report.
Test Incident Report	A document reporting on any event that occurs during the testing process which requires investigation.
Test Log	A chronological record of relevant details about the execution of tests.
Test Plan	A document describing the scope, approach, resources, and schedule of intended test activities. It identifies test items, the features to be tested, the testing tasks, who will do each task, and any risks requiring contingency planning.
Test Procedure Specification	See Test Procedure.
Test Summary Report	A document summarizing testing activities and results. It also contains an evaluation of the corresponding test items.

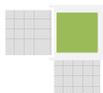
Acronyms. A list of acronyms, and their definitions, used in the course materials.

ConOps	Concept of Operations
INCOSE	International Council On Systems Engineering
NRTM	Needs to Requirements Traceability Matrix
RTCTM	Requirements to Test Cases Traceability Matrix
RTM	Requirements Traceability Matrix

4. References

Traffic Management Data Dictionary (TMDD)

- Guide to Traffic Management Data Dictionary (TMDD) Standard v3.0 for Traffic Management Center-to-Center Communications, AASHTO/ITE, July 11, 2011.



- TMDD Standard
www.ite.org/standards/tmdd
- TMDD Standard, v3.03, Volume I: Concept of Operations and Requirements, AASHTO/ITE, 2013.
- TMDD Standard, v3.03, Volume II: Design Content, AASHTO/ITE, 2013.

Standards

- IEEE 829-2008 - IEEE Standard for Software and System Test Documentation, IEEE, July 18, 2008.
- ITS PCB Training
http://www.pcb.its.dot.gov/stds_training.aspx

Systems Engineering

- Systems Engineering Handbook - A Guide for System Life Cycle Processes and Activities, Version 3.2, INCOSE, 2010.
- United States Department of Transportation Federal Highway Administration. *Systems Engineering Guidebook for Intelligent Transportation Systems Version 3.0*. November 2009. <http://www.fhwa.dot.gov/cadiv/segb/>

5. Study Questions

Questions in the presentation

Question 1:

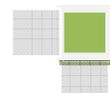
Which of the following is NOT a reason to perform testing?

- a) Develop Concept of Operations
- b) Verify requirements are fulfilled
- c) Validate the user needs are satisfied
- d) Assess a system upgrade versus the existing system

Question 2:

Which of the following does NOT belong in a well-written test plan?

- a) Testing Environment
- b) Testing Plan Staff Requirements
- c) Pass / Fail Criteria
- d) Sequence of Actions to be Performed



Question 3:

Which of the following is NOT in the TMDD Standard v03?

- a) Needs to Requirements Traceability Matrix
- b) Requirements Traceability Matrix
- c) Requirements to Test Case Traceability Matrix
- d) A single design to fulfill each requirement

Question 4:

Which of the following is part of the Requirements to Test Case Traceability Matrix?

- a) User Needs
- a) Requirements
- b) Design
- c) Test Plans

Question 5:

Which of the following is permitted by the TMDD Standard?

- a) Create a new message to fulfill a new requirement
- b) Change the meaning of an existing data element
- c) Create a new data element using an existing requirement
- d) Modify an existing dialog

Question 6:

Learning Objective #6

Example TMDD Dialog

```

3.1.37.2 dlVideoSwitchStatusUpdate
3.1.37.2.1 PRE CONDITIONS
An owner center shall provide updates to an external center upon acceptance of a
dlDeviceInformationSubscription dialog.
3.1.37.2.2 DIALOG REFERENCE
See Clause 2.4.3 Generic Publication Update Dialog
3.1.37.2.3 ASN.1 REPRESENTATION
dlVideoSwitchStatusUpdate ITS-INTERFACE-DIALOGUE ::= {
  DESCRIPTIVE-NAME "OwnerCenter-<DlVideoSwitchStatusUpdate->ExternalCenter"
  ASN-NAME "DlVideoSwitchStatusUpdate"
  ASN-OBJECT-IDENTIFIER { tmddDialogs 122 }
  URL "Pub.gif"
  DEFINITION
    "A publication dialog that allows an owner center to provide status updates to an
    external center on the owner center's video switches."
  DESCRIPTIVE-NAME-CONTEXT ("Manage Traffic")
  ARCHITECTURE-REFERENCE { "emergency traffic control information",
    "device status",
    "field equipment status" }
  ARCHITECTURE-NAME ("U.S. National ITS Architecture")
  ARCHITECTURE-VERSION ("7.0")
  DATA-CONCEPT-TYPE interface-dialogue
  STANDARD "TMDD"
  REFERENCED-MESSAGES {
    { tmddMessages 85 } , -- videoSwitchStatusMsg (Input Message)
    { c2cMessages c2cMessageReceipt(1) } , -- c2cMessageReceipt (Output Message)
    { tmddMessages 10 } -- errorReportMsg (Fault Message)
  }

```

Which of the following is not an appropriate test step for the previous dialog?

- a) The Owner Center sends the videoSwitchStatusMsg to the External Center
- b) Pre-condition to execute the dlDeviceInformationSubscription dialog
- c) The External Center sends a c2cMessageReceipt message to the Owner Center
- d) The External Center sends a deviceInformationRequestMsg to the Owner Center