NIEM 302 Exercises

Note:** All stories in the exercises are fictitious, and no bias was used in the selection of actors.

Exercise 1: Building a Mapping Document

The Commercial Vehicle Tracker Information Exchange

A hypothetical information exchange has been set up for the exercises in this course, the Commercial Vehicle Tracker (CVT) information exchange. The scenario and business context surrounding the information exchange can found below (Figure 1). Also, the exchange content model for the CVT exchange can be found below (Figure 2) and within the training materials downloaded for this course.

A U.S. Customs and Border Protection (CBP) border station and the Transportation Security Administration (TSA) are setting up an information exchange of person and vehicle data using a centralized, TSA Commercial Vehicle Tracking Application. CBP would like to share information regarding commercial vehicles that cross our borders. CBP would like to do this with the TSA Commercial Vehicle Tracking Application to help identify suspicious vehicles, safety concerns, and possible illegal cargo.

CBP currently enters information for commercial drivers and vehicles into its own CBP Commercial Vehicle Tracking Application upon inspection. The CBP Commercial Vehicle Tracking Application queries its own database for any past activities for the driver or vehicle entered by the CBP officer. Based on this information, as well as an inspection of the vehicle, a CBP officer determines whether to allow the vehicle across the border.

CBP would like to access TSA's Commercial Vehicle Tracking Application to provide additional query results for the driver or vehicle that might not be present in the CBP database. In addition, TSA would like to receive the completed inspection reports from CBP officers to keep its own database updated.

Figure 1: Scenario and Business Context for Commercial Vehicle Tracker (CVT) Service

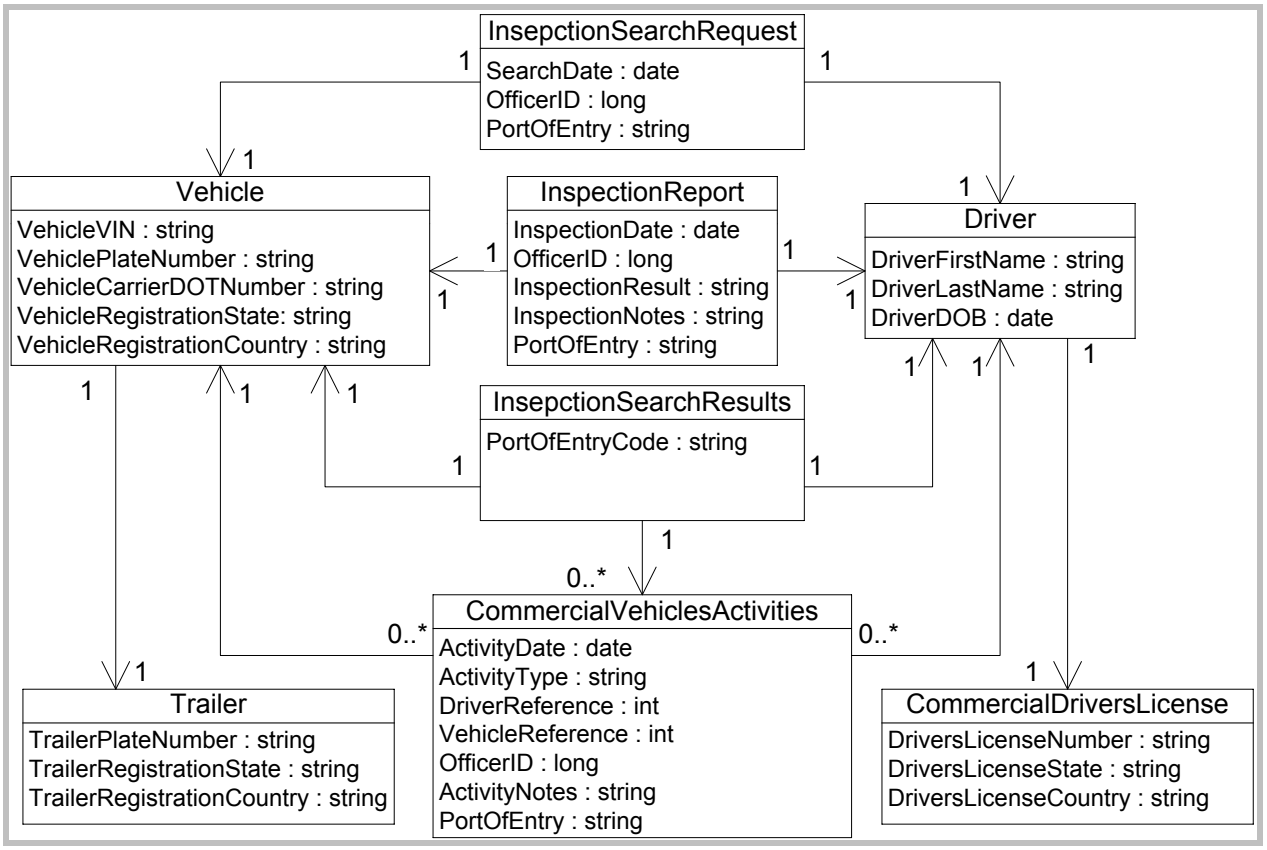


Figure 2: Exchange Content Model for Commercial Vehicle Tracker (CVT) Service

Setting Up the Mapping Document

Following the instructions within the course slides, each element in the exchange content model needs to be entered into a *blank mapping document*. The template is available within the downloaded training materials. Below are the recommended columns in the mapping document for source elements:

- Source Container Type
- Source Element
- Source Data Type
- Source Element Description

Pick one or two source container types (such as `InspectionReport` and/or `Driver`) and input that entire hierarchy (for `Driver` it would be `DriverFirstName`, `DriverLastName`, etc.) into the mapping document. After you have completed this and are comfortable with the process, you may move on to the next step.

The next step in the mapping process is to map each of the elements entered into the mapping document to elements within NIEM. There are search tools available to aid you in this process.

Mapping to the NIEM Data Model

Once the data objects are recorded from an exchange content model, each data object within the mapping document will be mapped to objects within NIEM. Using an available NIEM search tool such as NIEM Wayfarer or the search interface within the Subset Schema Generation Tool (SSGT), you can search for each of the source elements within NIEM. Appropriate matches can be documented within the mapping document.

Follow these recommended steps to complete the manual mapping process for this exercise:

1. Open up the *prefilled mapping document* included within the downloaded course materials.

2. Open up a Web browser and navigate to NIEM Wayfarer. Either Wayfarer or SSGT can be used to complete the exercise:

   - NIEM Wayfarer <http://www.ncsconline.org/niemwayfarer>
   - SSGT http://niem.gtri.gatech.edu/niemtools/ssgt/index.iepd

   Note: *Screen shots of these tools can be found in the pages following these instructions. They can be extremely helpful in completing this exercise.*

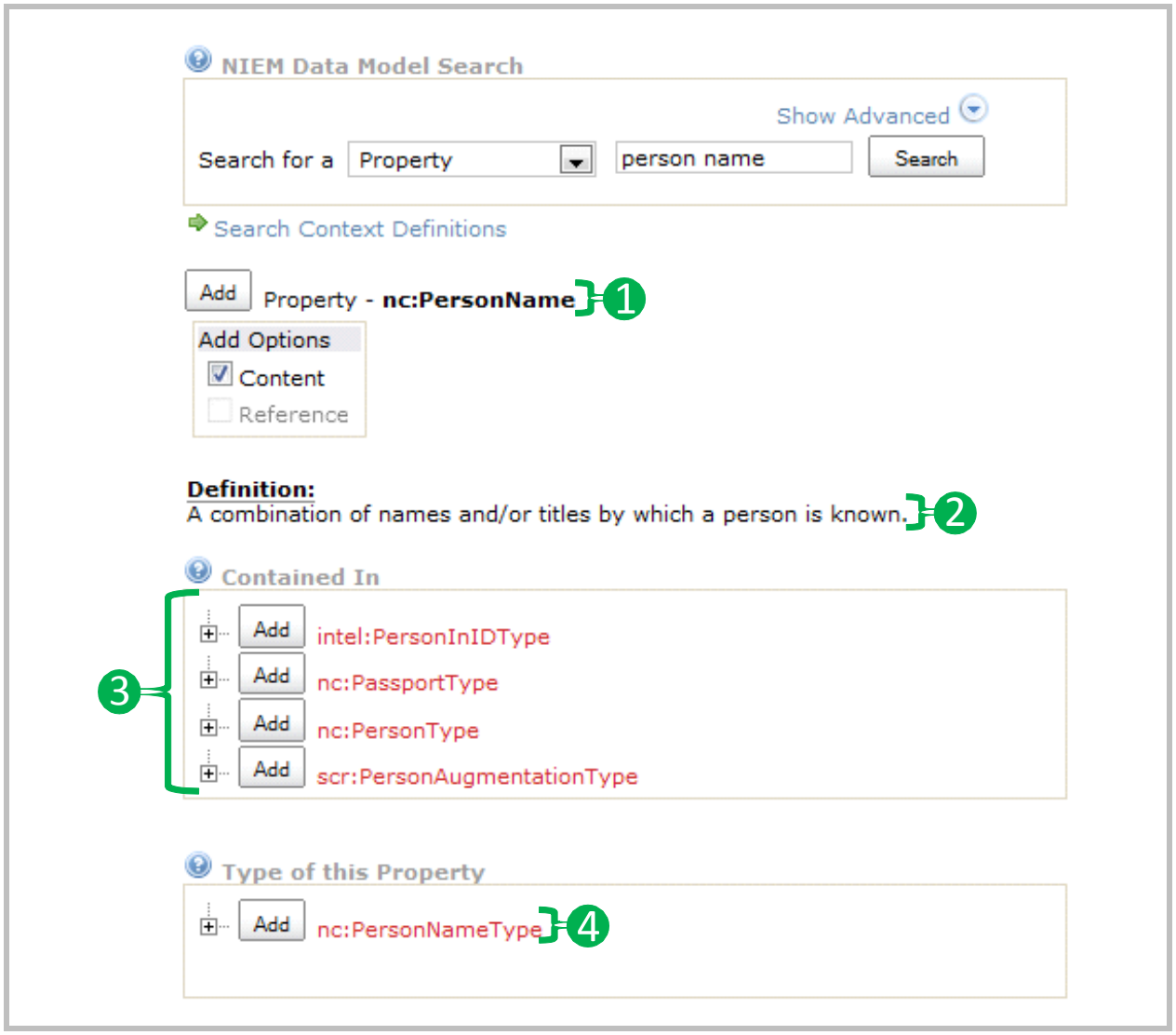
3. For an element in the mapping document, search for related matches within the NIEM search tool by searching first for the element name and then for synonyms of the element name.

4. Once a match has been found for an element, enter the required information for the mapping of the element to NIEM within the mapping document. The following columns should be filled out for each mapping:

   - Mapping (Equivalent Match, Partial Match, or No Match)
   - NIEM Element
   - NIEM Element Path
   - NIEM Type
   - NIEM Element Definition

5. Again, pick one or two source container elements (such as `InspectionReport` and `Driver`) and repeat Steps 3 and 4 until all of those elements (`Driver`, `DriverFirstName`, `DriverLastName`, etc.) have been mapped to an element in NIEM or have been declared as "No Match."

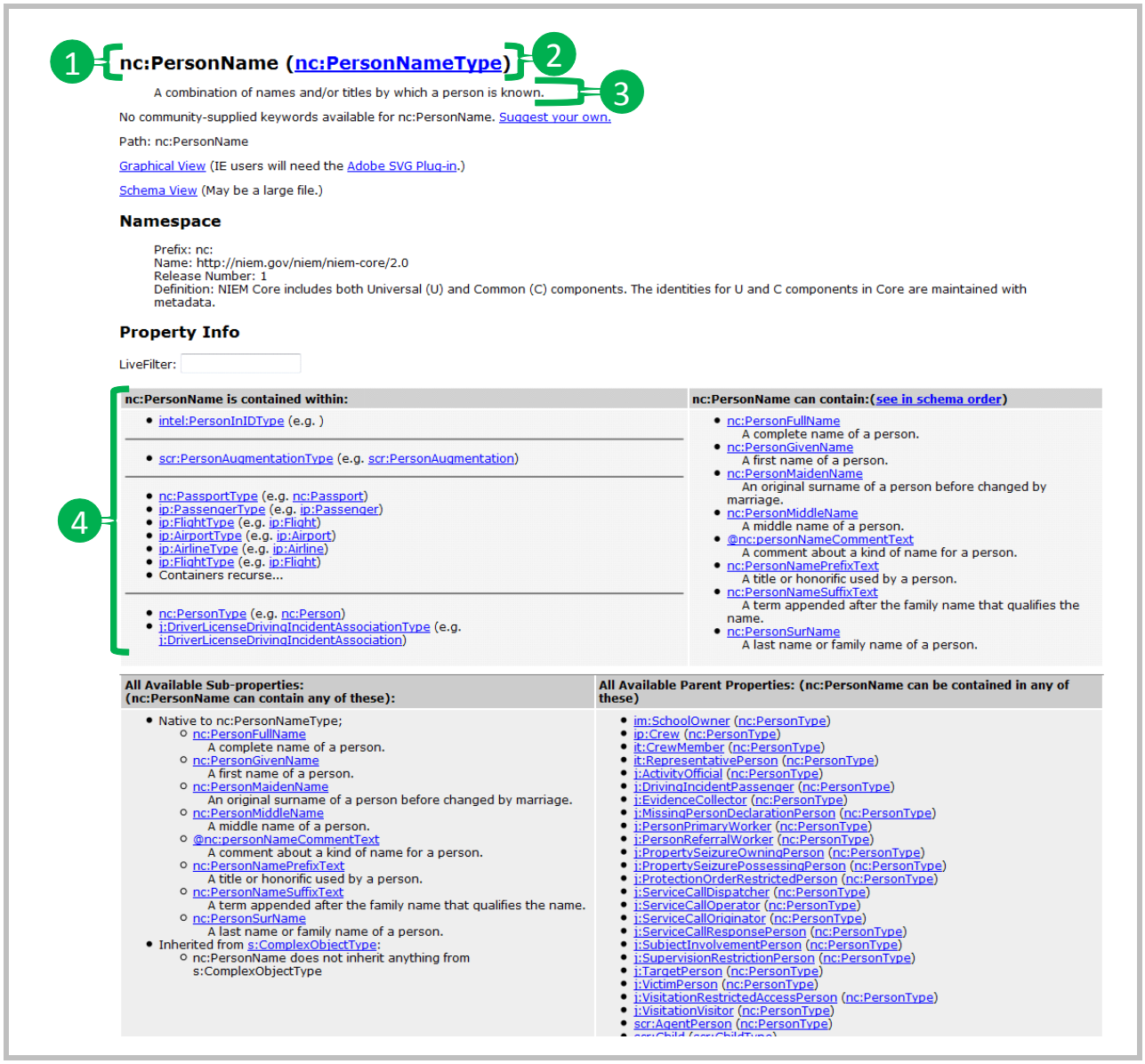
Screen Shot: Searching the GTRI "Schema Subset Generation Tool"



After using the search engine to find data objects in the NIEM data model, you can click on a particular object in the search result to yield the following screen.

1. NIEM Element
2. NIEM Element Definition
3. NIEM Element Path (nc:Person/nc:PersonName). Choose the appropriate element that logically makes sense.
4. NIEM Type

Screen Shot: Searching the NIEM Wayfarer Tool



After using the search engine to find data objects in the NIEM data model, you can click on a particular object in the search result to yield the following screen.

1. NIEM Element
2. NIEM Type
3. NIEM Element Definition
4. NIEM Element Path (nc:Person/nc:PersonName). Choose the appropriate element that logically makes sense.

Exercise 2: Generating Schemas

XML schemas that are included in IEPDs can be generated using many different NIEM tools. In this exercise, the Georgia Tech Research Institute (GTRI) Schema Subset Generation Tool (SSGT) will be used to generate some of these XML schemas included in IEPDs. These schema-generation tools reduce the total time necessary to create NIEM-conformant XML schemas. During this exercise, you will generate schemas for the Commercial Vehicle Tracker (CVT) information exchange.

The Schema Subset Generation Tool (SSGT) can be used to generate XML schemas for IEPDs. The SSGT is primarily used to generate subset schemas but can also be used to initiate the development of other schemas. The SSGT provides the ability to create subset schemas by searching for and selecting elements to include in the exchange. In addition, the SSGT can generate subset schema through the use of an inputted wantlist. Wantlists allow for precise control over the elements that will be included within each type. During this exercise, a wantlist that has already been completed will be uploaded to the SSGT and then subset schemas will be generated. ***Note:*** *Wantlists can be either input or output for the SSGT. For the purposes of this exercise, a wantlist has been created for input into the SSGT*.

Follow these recommended steps to generate subset schemas through the SSGT:

1. Open up a Web browser and navigate to the SSGT

   <http://niem.gtri.gatech.edu/niemtools/ssgt/index.iepd>

   Note: *If you would like to save your work on the GTRI Web site, you must register with the site and log in. However, you do not have to do this to complete the exercise.*

2. Click on the "Options" link on the top right side of the page.

3. In the "Load Wantlist" section, click the "Browse" button to the right of "Filename:"

4. Browse to the wantlist labeled "wantlist_CVT.xml" that is included within the training materials downloaded for this course and click "Open."

5. The elements to be included within the subset schema are then shown on the left side of the page in the "NIEM Schema Subset" section.

6. Click on the "Generate Documents" link on the top right side of the page.

7. Click on the "Save Subset Schema to a file" link in the "Generate Subset Schema" section. A zip file will then be available for downloading.

After the zip file for the subset schemas have been downloaded to your computer, extract the files within the zip file to a new folder on your computer. Review each of the schemas that were extracted to understand the schema code that was generated by the tool.

Exercise 3: Generating a Code List

Using NIEM Tools, you can generate other recommended XML artifacts. Specifically, this exercise will have a code list automatically generated using the GTRI NIEM Tools. Code lists can be generated through the Generate Code List Schema tool by uploading an Excel spreadsheet template containing code list values. This artifact will be created for the Commercial Vehicle Tracker (CVT) information exchange.

Code List Generation

Code lists constrain the possible values for a given element in an information exchange. Also called "facets," code lists are implemented through XML schema code that lists the allowed enumerations for an element value. Code list schema code can be generated through the Generate Code List Schema tool using a template for code list values. During this exercise, the template for code list values will be filled in and then uploaded to the Generate Code List Schema tool.

Follow these recommended steps to generate code list schema through the tool:

1. Open up the "template.xls" file located within the training materials downloaded for this course.

2. Replace the tab name "TemplateCode" with "ActivityTypeCode."

3. Delete the tab labeled "SecondTabTemplateCode."

4. Click on the "ActivityTypeCode" tab to bring that tab into focus.

5. Enter the intended name of the code list in the first row, replacing "TemplateCode."

6. Enter a description of the code list in the second row, replacing "Definition of the code set."

7. Delete all of the existing information found in the template (the color code values).

8. Starting in the fourth row, enter the following codes and descriptions:

Code	Description
PE	Port Entry
TS	Traffic Stop
WS	Weigh Station
IM	In Motion
VA	Vehicle Accident

9. Save the template spreadsheet under a new name such as "CVT_ActivityTypeCode.xls."

10. Open up a Web browser and navigate to Generate Code List Schema Tool

    http://niem.gtri.gatech.edu/niemtools/util/codelist/index.iepd.

11. In the Namespace Prefix box, enter the name of the intended namespace for the code list (e.g., "iepd-extension").

12. In the Namespace URI box, enter the URI for the namespace (e.g., <http://niem.gtri.gatech.edu/iepd-extension>).

13. In the Namespace Schema Location box, enter the location for the namespace schema (e.g., iepd-extension.xsd).

14. In the Namespace Version box, enter the version for the namespace (e.g., 1).

15. Click the "Browse" button for the Code List Excel Spreadsheet box and browse for the spreadsheet template saved in Step 8 above. Click "Open" to select the spreadsheet.

16. Click the "Build Schema" button to generate the code list schema.

17. Save the zip file generated from the tool to a location on your computer.

After the zip file for the code list has been downloaded to your computer, extract the files within the zip file to a new folder on your computer. Review the directory structure of the files that were downloaded as well as review "iepd-extension.xsd" to understand the schema code for the code list that was generated by the tool.