

# NIEM 300 Exercises

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

## Exercise 1: Rating the Complexity

When evaluating IEPD candidates, you can determine the complexity of each information exchange to help gauge the level of resources necessary to build the exchange. Rating the complexity of an information exchange will enable proper planning for completion of IEPDs and allow for prioritization among IEPDs. Four example information exchanges are outlined below. The goal of this exercise is to rank each of the information exchanges based on their complexity. Please rank these examples in order from lowest complexity to highest complexity.

**Example 1:** The U.S. Citizenship and Immigration Services (USCIS) agency needs to share information about citizenship applicants with the Department of Justice. Through this information sharing, USCIS wants to identify any legal problems for applicants that will be used in the decision for citizenship. The proposed exchange would include not more than 20 types of data elements. The request made by USCIS would include information that describes an applicant, and the return by the Department of Justice would include any legal activity for the applicant. Unfortunately, not much information has been collected for the proposed exchange, and additional time must be spent to fully understand the process.

**Example 2:** The Federal Emergency Management Agency (FEMA) manages a database that stores information about wildfires and their impact on people and buildings. The FBI would like to access this information to collect information about possible arson activities. The wildfire database has been used for years to track wildfire activity and is well-documented. Significant work has already been done to document the proposed process for the information exchange between FEMA and the FBI. Because of the large amount of information that can be collected for a wildfire, more than 100 data elements have been identified as necessary in the exchange.

**Example 3:** The Transportation Security Administration (TSA) collects and stores information about passenger luggage that is used to identify suspicious activity. Leadership within the TSA has mandated better information sharing for this data between the TSA and federal, state, and local agencies as well as with commercial airlines and airports. The data to be shared includes more than 75 data elements that describe the passenger, destination, and characteristics about the luggage. The current system for collecting and storing this information is not well-documented and is not well-structured because it has been integrated with several legacy applications. In addition, commercial airlines and airports use an external standard outside of NIEM to share information. The TSA must use this standard in addition to NIEM in order to share information with these organizations.

**Example 4:** The U.S. Coast Guard maintains a database that stores information about missing people reports. A Web service was built several years ago to share this information with the FBI, and it has been used successfully to share information between these organizations. The data shared by this exchange includes 25 data elements that contain person and location information. The process for the

information exchange with the FBI has been well-documented and reviewed extensively. The U.S. Coast Guard wants to align this information exchange with NIEM, and its team on this project has previous experience with NIEM.

## **Exercise 2: Developing the Scenario**

Use case diagrams are often used to understand the overall scenario for an information exchange. Use case diagrams and scenarios can be created to determine the business context behind an information exchange as well as to identify the participants, systems, and data elements involved in an information exchange. For this exercise, you will create both a use case diagram and a scenario to describe an information exchange between the Customs and Border Protection (CBP) and the Transportation Security Administration (TSA).

CBP wants to share information regarding commercial vehicles that cross our borders with a 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, the 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 with current information.

Follow these recommended steps in the creation of the scenario:

1. Identify a starting point for the exchange.
2. Identify the basic steps in the process for the exchange after the starting point.
3. Identify each of the actors involved in the exchange.
4. Create use cases for each of the actors in the exchange and draw associations between them.
5. Create a use case diagram that includes all of the actors in the exchange.
6. Create a scenario for the exchange, based on the summary use case.

### Exercise 3: Modeling the Exchange

Creating a graphical model of an information exchange helps to visualize the process surrounding the exchange as well as the actions taken by certain actors in the process. Based on the scenario developed in the last exercise, create a business process diagram and sequence diagram of the information exchange. The business process diagram should show each of the steps in the process as well as the actors involved in the process. The sequence diagram should show the flow of messages in the exchange between applications. Use the business process diagram as a reference when completing the sequence diagram.

#### Part 1: The Business Process Diagram

The following steps can be used to guide the creation of your business process diagram:

1. Determine how many actors (people or applications) are involved in the process for the information exchange by analyzing the scenario created in the last exercise. Write the names of the actors involved in the scenario in the spaces provided below.

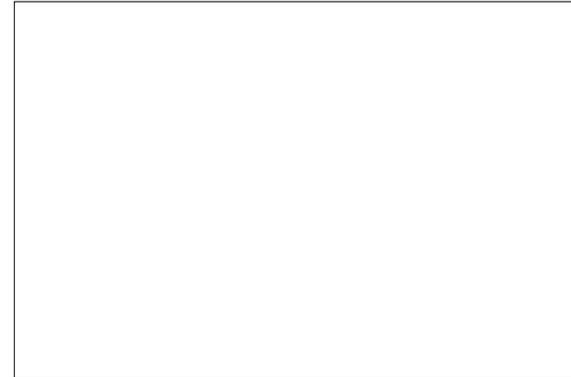
Actor 1: \_\_\_\_\_

Actor 2: \_\_\_\_\_

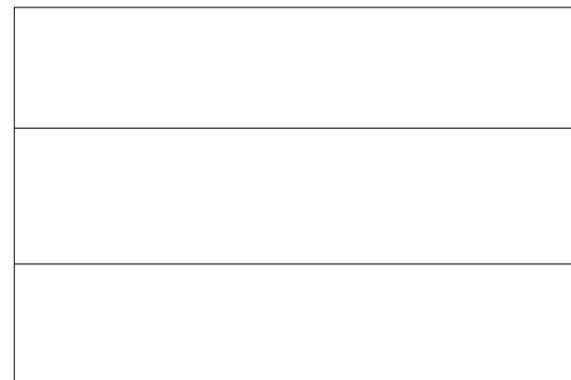
Actor 3: \_\_\_\_\_ (if necessary)

Actor 4: \_\_\_\_\_ (if necessary)

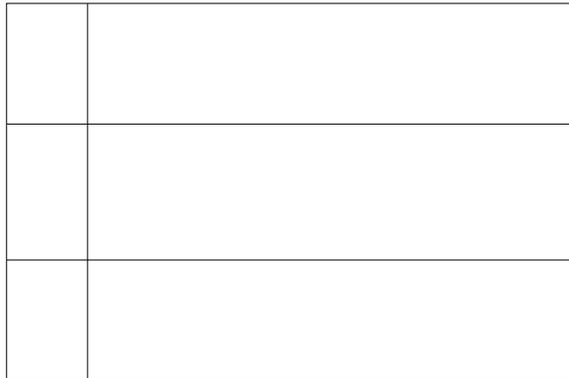
2. Start your diagram by creating a box that will serve as the frame containing your business process diagram.



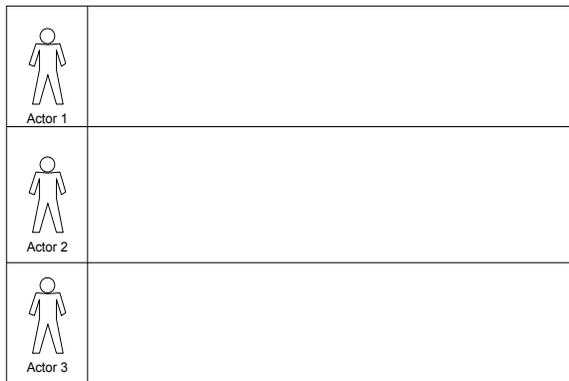
3. Divide the box into “swim lanes” for each of the actors in the process. If there are three actors, divide the frame into three equal sections.



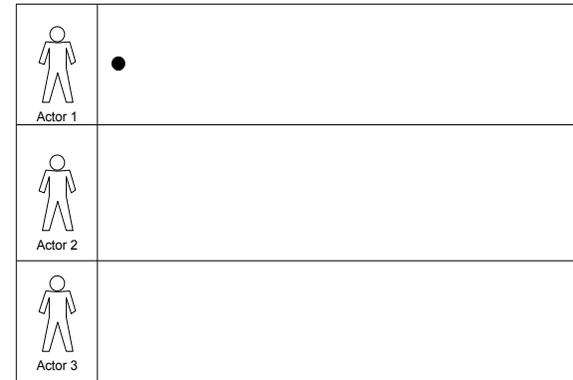
- Draw a line to divide the header section where each actor will be indicated from the section that will contain the actor's activities.



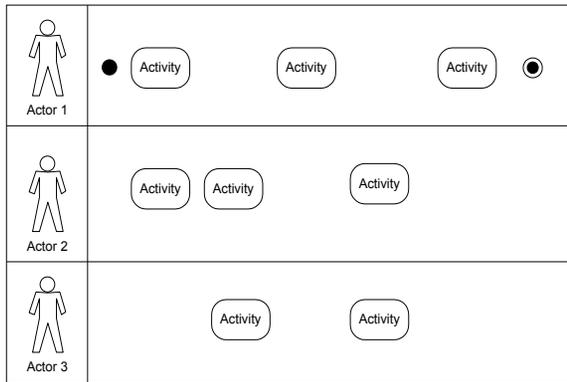
- Insert each of the actors into the header section so that each has his or her own "swim lane" in the diagram.



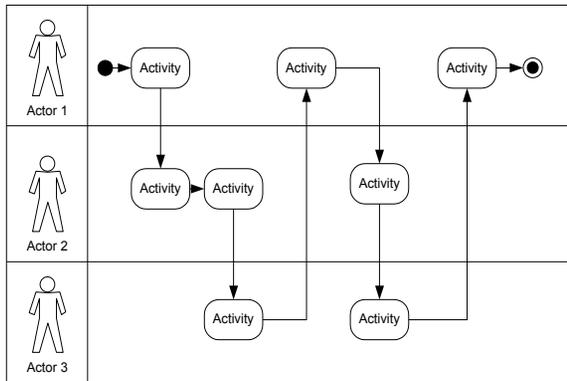
- Create a starting node on the diagram in the far left of the swim lane for the actor who initiates the process for the information exchange



- Fill in the business process diagram from left to right, beginning after the starting node, placing each of the activities or events involved in the information exchange in chronological order. Make sure to put each activity/event in the proper "swim lane" for the actor who completes the action. Also make sure to insert a terminal node that indicates the end of the process. A rounded rectangle or box can be used to indicate the activities for each actor.



8. With the activities for each actor inserted into the diagram in chronological order, now fill in the arrows that connect each of the activities in the diagram and show the flow of the exchange.



9. Review your business process diagram to ensure that it matches the process described in the scenario.

**Part 2: The Sequence Diagram**

The following steps can be used to guide the creation of your sequence diagram:

1. Determine how many applications are involved in the process for the information exchange by analyzing the scenario created in the last exercise. Write the names of the applications involved in the scenario in the spaces provided below.

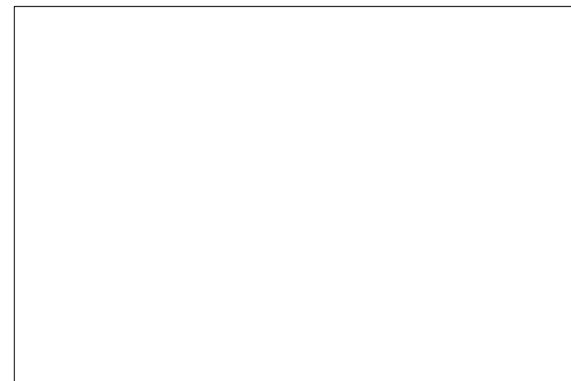
Actor 1: \_\_\_\_\_

Actor 2: \_\_\_\_\_

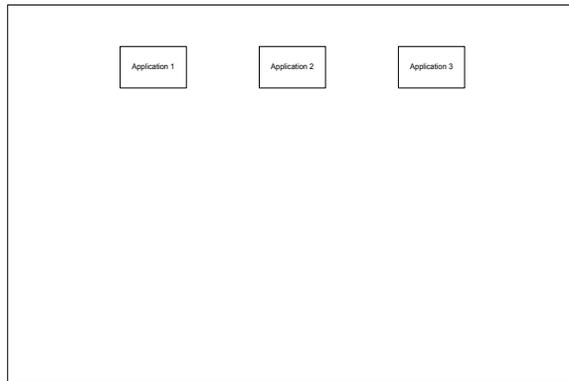
Actor 3: \_\_\_\_\_ (if necessary)

Actor 4: \_\_\_\_\_ (if necessary)

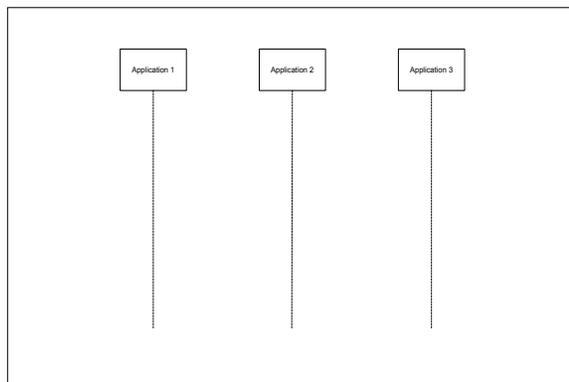
2. Start your diagram by creating a box that will serve as the frame containing your sequence diagram.



3. Insert each of the applications involved in the exchange as boxes into the top portion of the diagram.

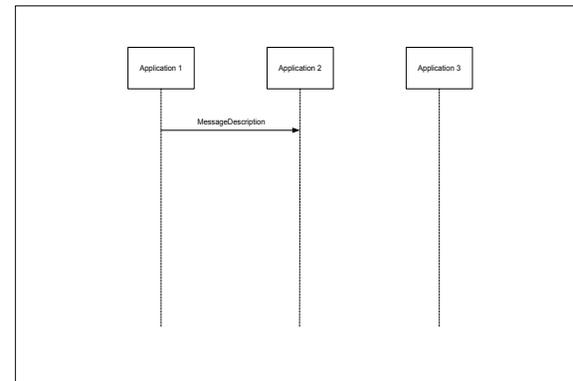


4. Draw "lifelines" for each of the applications as vertical dashed lines that extend downward from each application.

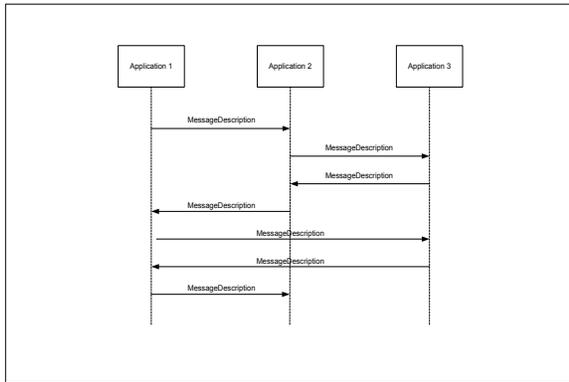


5. Determine the messages that occur within the exchange by using the business process diagram as a reference and identifying those points where an application passes control of the process over to another application.

6. Create the first message that occurs in the exchange by drawing a solid line from the origin application to the destination application, with an arrow at the end indicating the direction of the message. The first message in the exchange should appear at the top of the application lifelines and should run from the lifeline of the origin application to the lifeline of the destination application. Insert descriptive text above the message line indicating the purpose of the message.



7. Draw each of the remaining messages involved in the exchange below the first message. The messages should be drawn sequentially, with each message appearing below the previous message. Each solid line for a message should have accompanying text above the line indicating the purpose of the message.



8. Review your sequence diagram to ensure that it matches the process described in the scenario.

## **Exercise 4: Determining Requirements**

Business requirements constitute a specification of a business need. They describe in business nomenclature what must be delivered or accomplished to provide value. This is usually expressed in terms of broad outcomes the business requires, rather than specific functions the system may perform. For this exercise, identify five unique business requirements for the information exchange described in the previous two exercises. Use the recommended solutions for the previous two exercises along with the following information to come up with these business requirements.

### **Quote From CBP IT Manager:**

- “I would really like to see this application provide CBP officers with the information they need to make important decisions regarding whether to allow a commercial vehicle into our transportation system. Currently, CBP officers are not able to access TSA’s commercial vehicle tracking application which contains valuable tracking information about commercial drivers and vehicles. Without this information, CBP officers are not able to see a full picture of the activities of a driver or vehicle and therefore are making decisions based on incomplete information. In the future, I hope that the CVT is able to access other information sources beyond TSA’s commercial vehicle tracking application in order to broaden the level of available information. As an overall goal, I do not want the CVT to make decisions for officers but be used as an information source to help in the inspection process.”

### **Quote From TSA IT Manager:**

- “Currently, TSA manages a database that contains reported activities of commercial drivers and their vehicles. The information stored in this database is collected from numerous sources and represents our most complete picture of the activities of a commercial driver or vehicle. As the information stored in this database could be used in an inappropriate manner, it is important to secure access to this information. The records stored in this database can be searched by commercial driver or commercial vehicle information. I envision that our web service would return a list of reported activities or events tied to a specific commercial driver or vehicle being searched. In addition, it would be very useful if we could receive the final inspection report from CBP for each commercial vehicle in order to update our database.”

### **Quote From CBP Officer Focus Group:**

- “When making decisions about whether to allow a commercial vehicle to cross the border and enter our transportation system, it is vitally important that we are able to view all available historical information about the commercial driver and vehicle. Currently, we use our own information system managed by CBP in order to search and view information about commercial drivers and vehicles. We are concerned that the information we review for a commercial vehicle does not contain the most up-to-date information, so it is critical that we are able to access this information in real time. We are aware that TSA manages a database containing similar information about commercial vehicles and it would be very helpful if we could access

this information. Ideally, we would like to initiate an inspection report into the CBP system in the traditional manner and be able to click a button on the screen in order to view all related activity records for the commercial driver and vehicle obtained from the TSA database.”

**Quote From Commercial Driver Focus Group:**

- “We are very concerned about any delay this new system causes when inspecting commercial vehicles. Of course, we support the goal of this project to share information and help identify any suspicious or unsafe commercial vehicles but we are already under tight time constraints for delivery of these goods. Our primary concern is that the CVT does not extend the time it already takes to inspect a commercial vehicle.”

**Exercise 5: Building a Domain Model**

Domain models are used to communicate the data structures and data elements that will be used within an information exchange. Domain models represent, in a technology-agnostic way, what the information content of the exchange document needs to be. Domain models can be created in various forms, such as a “flat” textual model in the form of a spreadsheet, an informal graphical model, or a more formal graphical model built with the Unified Modeling Language (UML). Within this exercise, you will create a domain model for the CBP Commercial Vehicle Tracker information exchange, either by using ArgoUML to create a domain model on your computer or by creating a domain model by hand on paper. Use the solutions for the last three exercises, along with the information provided below, as the basis for creating the domain model.

**Information Collected From CBP Database Administrator:**

- “Within the CBP Commercial Vehicle Tracking Application, we identify commercial drivers using the following information:”
  - Driver First Name
  - Driver Last Name
  - Driver Date of Birth
  - Commercial Driver’s License Number
  - Commercial Driver’s License State
  - Commercial Driver’s License Country
- “Within the CBP Commercial Vehicle Tracking Application, we identify commercial vehicles using the following information:”
  - Vehicle VIN
  - Vehicle License Plate Number
  - Vehicle License Plate Issuing State
  - Vehicle License Plate Issuing Country
  - Vehicle DOT Number
  - Carrier DOT Number
  - Trailer License Plate Number
  - Trailer License Plate Issuing State
  - Trailer License Plate Issuing Country

- “Within the CBP Commercial Vehicle Tracking Application, our final inspection report for a commercial vehicle contains the following information:”
  - Inspection Date
  - CBP Officer Number
  - Port of Entry Code
  - Inspection Results
  - Inspection Notes
  - Driver Identification Information (indicated in first bullet above)
  - Vehicle Identification Information (indicated in second bullet above)

**Information Collected From TSA Database Administrator:**

- “Within the TSA Commercial Vehicle Tracking Application, we identify commercial drivers using the following information:”
  - Driver First Name
  - Driver Sur Name
  - Driver DOB
  - CDL Number
  - CDL State
  - CDL Country
- “Within the TSA Commercial Vehicle Tracking Application, we identify commercial vehicles using the following information:”
  - VIN
  - Truck Plate Number
  - Truck Plate State
  - Truck Plate Country
  - DOT Number
  - Trailer Plate Number
  - Trailer Plate State
  - Trailer Plate Country
- “Within the TSA Commercial Vehicle Tracking Application, we identify commercial vehicle activities using the following information:”
  - Activity Date
  - Activity Type
  - Port of Entry Code
  - Officer Identification Number
  - Activity Notes
  - Driver Identification Information (indicated in first bullet above)
  - Vehicle Identification Information (indicated in second bullet above)
- “Within the TSA Commercial Vehicle Tracking Application, each search request is logged for tracking purposes. We need the following information included within each search request to satisfy our tracking needs:”
  - Search Date
  - Officer Identification Number
  - Port of Entry Code