NIEM 300

IEPD Discovery and Development

NIEM
TRAINING

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COURSE DESCRIPTION

4-hour Course

This 4-hour course is designed to equip participants with the skills necessary to plan for, analyze, and begin to build NIEM-conformant Exchanges, also referred to as Information Exchange Package Documentations (IEPDs).

Course Overview

The course is organized into the following modules:

Module 1: NIEM Concept Refresh

Module 2: Scenario Planning

Module 3: Analyze Requirements

Module 4: Map and Model

Course Objectives

By the end of this course, participants will be able to:

- Perform the necessary research to begin to develop an IEPD
- Develop a Use Case, Sequence Diagram, Business Process Diagram, and an Exchange Content Model to define the business and technical structure of the information exchange
- Define the Business Scenario, Rules, and Requirements necessary for IEPD development

Target Audience and Prerequisites

The target audience for this course includes technical resources in an organization or agency such as architects, analysts, and developers.

Participants should have completed NIEM 100: NIEM General Overview and NIEM 101: Technical Introduction to NIEM before taking this course. They should also have a basic knowledge of modeling business processes.

Materials Required

Materials required for this course include:

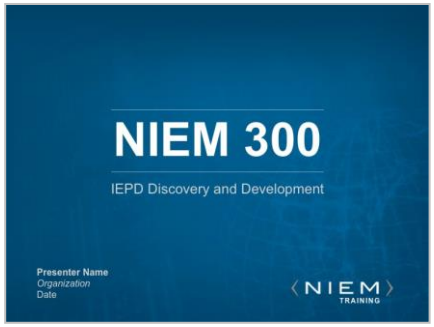
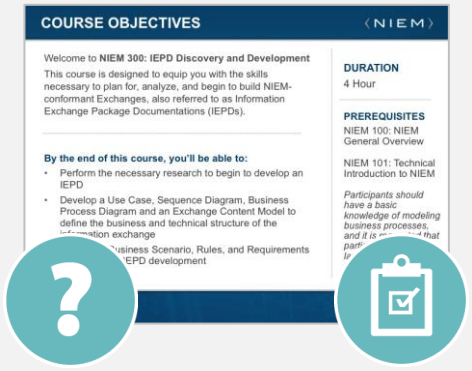
- Laptop or computer with Microsoft PPT installed
- Projector
- Speakers
- Instructor Guide
- NIEM 300 PPT presentation

Participants should use a laptop to more effectively participate in course exercises.

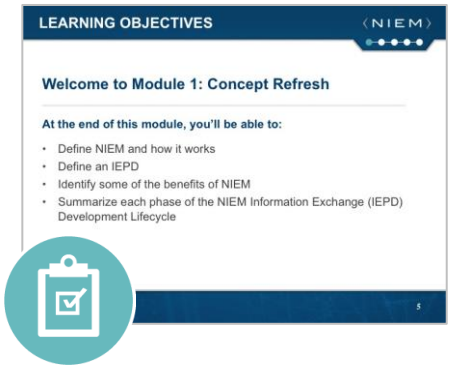
FEATURES OF THE INSTRUCTOR GUIDE

The Instructor Guide is designed to facilitate a smooth presentation of the material. The right column of the guide contains the content to be presented to the participants, as well as instructor notes (in italicized text). The left column includes thumbnail images of the slides. Icons are also used to act as visual cues for you as you present the course. The table below describes the purpose of each icon.

Icons	Description	Icons	Description
	**Objectives** This icon appears in the unit overview section to remind you to communicate the overall objectives to the participants for that unit.		**Activity** This icon indicates the use of an activity, such as a small group discussion. As suggested by the graphic, a flipchart may be beneficial for these activities. Italicized text in the right column indicates special notes for the instructor about facilitating the activity. A time estimate for completing the activity is included under the icon.
	**Instructor Note** This icon is used to draw your attention to special notes for leading a discussion, communicating instructions, or other actions to be taken by the instructor. These notes are listed in italicized text in the right column.		**Transition** This icon appears next to suggested language that can be used to transition from one topic, activity, or unit to another. Remember, this text is not meant to be read word-for-word.
	**Question** Whenever you see this icon in the left column, it will be accompanied by bold, italicized questions for the participants in the right column. Potential responses appear below the questions.		

Visuals	Instructor Notes / Talking Points
	**Slide 1: Introduction** Leave title slide up as participants enter the room. When you are ready to begin the training, welcome participants to the seminar and move to the next slide. Continue to slide 2.
	**Slide 2: Course Overview** *Welcome participants to the course. Take a moment to introduce yourself and your experience with NIEM.* *Ask participants to go around the room and answer the following questions:* • What is your name, organization, and role in your organization? • Why are you attending this seminar? • What do you hope to learn from this seminar? *Then go into the course overview:* This course is designed to equip you with the skills necessary to plan for, analyze, and begin to build NIEM-conformant Information Exchanges, also referred to as Information Exchange Package Documentations (IEPDs). By the end of this course, you should be able to: • Perform the necessary research to begin to develop an IEPD • Develop a Use Case, Sequence Diagram, Business Process Diagram, and an Exchange Content Model to define the business and technical structure of the information exchange

	• Define the Business Scenario, Rules, and Requirements necessary for IEPD development Prerequisites for this course are NIEM 100: NIEM General Overview and NIEM 101: Technical Introduction to NIEM. You should also have a basic knowledge of modeling businesses processes. This course should take approximately 4 hours. Continue to slide 3.
	**Slide 3: Course Agenda** This course is divided into four modules: • Module 1: Concept Refresh • Module 2: Scenario Planning • Module 3: Analyze Requirements • Module 4: Map and Model Let's get started with Module 1, Concept Refresh. Continue to slide 4.
	**Slide 4: Module 1: Concept Refresh** This module will provide a quick recap of content presented in previous courses. Continue to slide 5.



Slide 5: Module 1 Learning Objectives

Welcome to Module 1: NIEM Recap and Model Overview.

By the end of this module, you'll be able to:

- Define NIEM and how it works
- Define an IEPD
- Identify some of the benefits of NIEM
- Summarize each phase of the NIEM Information Exchange (IEPD) Development Lifecycle

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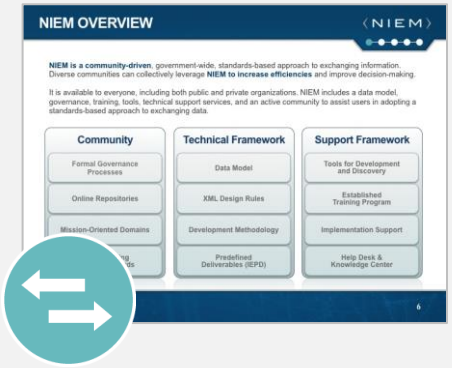


Slide 6

Present the content on this slide, covering the following speaking points:

NIEM is a community-driven, government-wide, standards-based approach to exchanging information. Diverse communities can collectively leverage **NIEM to increase efficiencies** and improve decision-making.

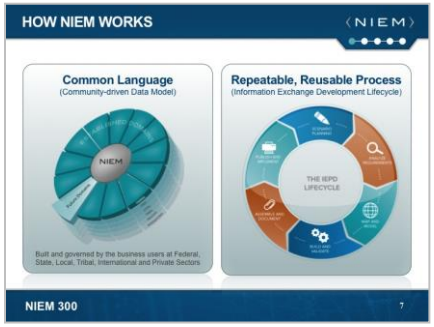
There are three different aspects to the value of NIEM: community interaction, a technical framework that helps define data structures, and a support framework that helps from an implementation perspective.

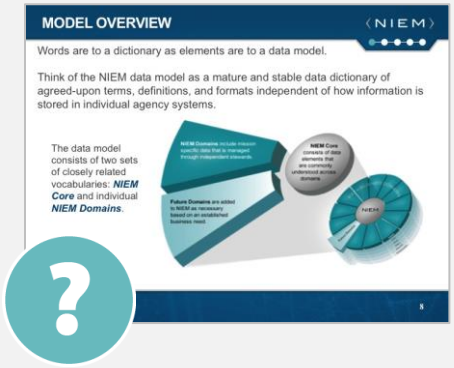
NIEM is available to everyone. The NIEM community spans federal, state, local, tribal, international, and private sector entities. It is this diverse group of people who drive NIEM forward. NIEM was built by the community, for the community.

Community:

Information exchange partners have a business need to come together to exchange information, and NIEM is the mechanism that allows them to do so.

NIEM provides formalized governance that allows self-organized, self-managed communities to proactively address their specific needs. This ensures information exchanges are flexible and adaptable over time. NIEM Governance provides rigor in defining rules for information exchange, while at the same time encouraging diverse communities to define their own data requirements.

	Technical Framework: NIEM consists of a technical framework, which is what most people associate with NIEM. This includes a data model – the common vocabulary, rules and methodologies around the creation and use of the data model, and a standardized exchange development approach which can be repeated and reused by everyone. **Support Framework:** NIEM provides extensive support for information exchange. This includes tools to support development, discovery, and reuse of information exchanges. In addition, there is training available, technical support through a help desk, and a searchable online knowledgebase. ***Are there any questions before moving on?*** Continue to slide 7.
	**Slide 7: How NIEM Works** There are two concepts that can help illustrate NIEM. The data model is the collective representation of the communities that leverage NIEM. This is where NIEM provides a consistent set of data definitions and a structure to define the relationships between them. The diverse communities that leverage NIEM collaboratively govern the data model. The NIEM information exchange development lifecycle—commonly referred to as the Information Exchange Package Documentation (IEPD) Lifecycle provides a repeatable, reusable process for using NIEM to define information exchanges. Continue to slide 8.



Slide 8: Model Overview

Now, let's take a look at the NIEM data model.

Words are to a dictionary as elements are to a data model. The NIEM data model provides common, agreed-upon terms, definitions, and formats independent of how information is stored in individual systems.

It consists of two related vocabularies: NIEM Core and individual NIEM domains.

NIEM Core consists of data elements that are commonly understood across domains. It is governed jointly by all NIEM domains and includes elements common across many domains.

A NIEM domain represents both the governance and model content oriented around the business needs of a community. A NIEM domain manages their portion of the NIEM data model and works with other NIEM domains to collaboratively identify area of overlapping interest.

Future Domains are added by NIEM as necessary based on an established business need.

What are the NIEM Data Components?

- ***NIEM Core***
- ***NIEM Domains***

Continue to slide 9.

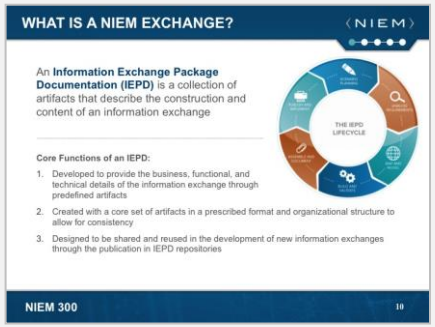
Slide 9: NIEM Provides

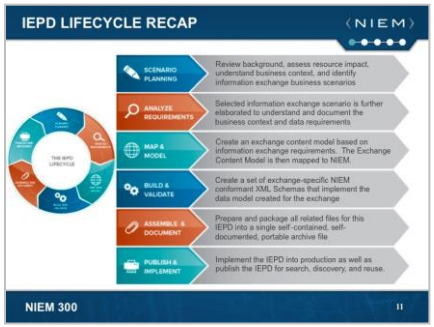
Collaboration: NIEM provides a forum for collaboration to accelerate information exchange development and reuse.

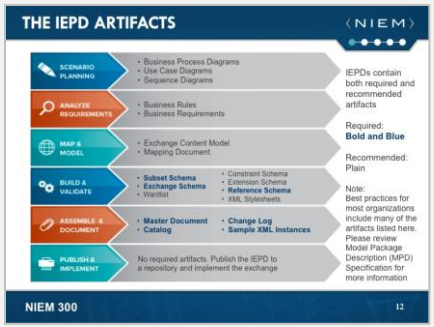
Consistency: NIEM provides a common vocabulary, standardized framework, and mature governance that promotes reuse and consistency of structure and documentation across stakeholders.

Development: NIEM provides tools to support development, discovery, and reuse of information exchanges.

Support: NIEM provides support in the form of training, a help desk, governance processes, and technical assistance to help answer NIEM related questions. In addition, NIEM is driven by a large, diverse, and actively engaged stakeholder community that can offer support for issues ranging from governance to exchange

	development. All of this is in support of efforts to lower the barrier to NIEM understanding and adoption. Each of these concepts leads to benefits such as: enhanced mission capabilities and organizational cost avoidance from reduced development and maintenance costs. Specifically, • **Lower Development Cost:** Organizations that implement NIEM can leverage a repeatable process to shorten exchange development time. In addition, previously developed exchanges can be completely or partially reused as accelerators for development. • **Enhanced Mission Capabilities:** By increasing interoperability between organizations, NIEM can help agencies enhance services across key mission and function areas. • **Common Vocabulary:** NIEM helps to eliminate confusion associated with different data definitions across organizations by providing a consistent set of definitions for everyone to use. • **Reduced Maintenance Costs:** Organizations can reduce maintenance costs by reusing common data exchange objects and messages; by utilizing standardized processes, development, and implementation methodologies; and by leveraging economies of scale savings realized by shared governance, training, and technical assistance. Continue to slide 10.
	**Slide 10: What is a NIEM Exchange?** Let's discuss what a NIEM information exchange is and what its core functions are. In NIEM, an information exchange is also known as an Information Exchange Package (IEP), a description of specific information exchanged between a sender and a receiver. The IEP is usually coupled with additional documentation, sample XML instances, business rules, and more to compose an Information Exchange Package Documentation (IEPD). An IEPD is the final product of the NIEM information exchange development process, also known as the IEPD Lifecycle. IEPDs have three core functions. IEPDs are: 1. Developed to provide the business, functional, and technical details of the information exchange through predefined artifacts. 2. Created with a core set of artifacts in a prescribed format and organizational structure to allow for consistency. 3. Designed to be shared and reused in the development of new information exchanges through the publication in IEPD repositories.

	Continue to slide 11.
	**Slide 11: IEPD Lifecycle Recap** The IEPD Lifecycle consists of six phases. **Scenario Planning:** During the Scenario Planning phase, you review background information related to your information exchange, assess resource impact, understand business context, and identify information exchange business scenarios. **Analyze Requirements:** During the Analyze Requirements phase, the selected information exchange scenario is further elaborated to understand and document the business context and data requirements. **Map and Model:** During the Map and Model phase, you create an exchange content model based on your information exchange requirements. The Exchange Content Model is then mapped to the NIEM data model. **Build and Validate:** During the Build and Validate phase, you create a set of exchange-specific, NIEM-conformant XML schemas that implement the exchange content model created for the exchange. **Assemble and Document:** During the Assemble and Document Phase, you prepare and package all related files for the IEPD into a single, self-contained, self-documented, portable archive file. **Publish and Implement:** During the last phase, the Publish and Implement phase, you implement the IEPD into production and publish the IEPD for search, discovery, and reuse. Continue to slide 12.



Slide 12: IEPD Artifacts

The required and recommended artifacts associated with each phase of the IEPD lifecycle are highlighted here. Artifacts can be considered the deliverables in the IEPD development process.

Some artifacts are required while others are recommended. Always follow best practice methodologies for IEPD development.

The artifacts associated with the ***Scenario Planning*** phase include Business Processes Diagrams, use Case Diagrams, and Sequence Diagrams.

Business Processes Diagrams provide a bridge between use cases and other business scenarios, such as Sequence Diagrams. Business processes provide background for how the exchange is currently being designed, so that other entities may leverage their exchanges through re-use.

Use Case Diagrams depict the business level perspectives of the information exchange.

Sequence Diagrams represent the sequence of events that occur during an information exchange.

None of the artifacts indicated in this phase are required but are recommended to better understand and document the business need.

The artifacts associated with the ***Analyze Requirements*** phase include business rules and business requirements.

Business rules define rules around how data is structured and represented as part of the exchange.

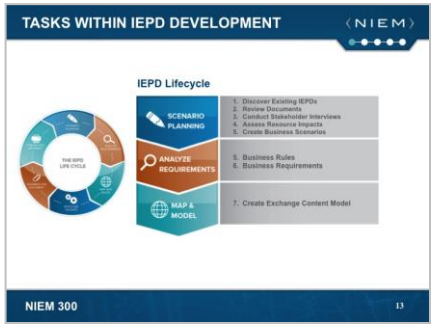
Business requirements express business drivers or business needs for the exchange.

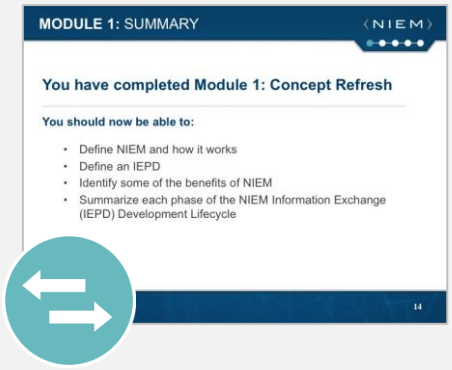
None of the artifacts indicated in this phase are required but are recommended to better understand and document the business need.

The artifacts associated with the ***Map and Model*** phase include the Exchange Content Model and mapping document.

Exchange Content Model is a graphical representation of the data and relationships involved in the information exchange.

	Mapping document is created to align elements identified in your exchange content model to the NIEM data model. None of the artifacts indicated in this phase are required but are recommended. The artifacts associated with the ***Build and Validate*** phase include subset schema, extension schema, wantlist, constraint schema, and exchange schema, among other artifacts such as reference schema and XML style sheets. Typical artifacts you will see include: **Subset schema** is a subset of the NIEM schemas, whose components are taken entirely from the parent reference schema while excluding those components that are unnecessary for a given exchange. **Exchange schema** is a NIEM-conformant schema that describes the data to be exchanged. XML style sheets show how the data in the XML message can be formatted to be presentable. **Wantlist** is a tool-specific construct used in the Subset Schema Generation Tool (SSGT) to save and reuse schema subsets of the overall NIEM data model. Simply, it is those items that you want from NIEM. **Constraint schema** restricts or constrains content that appears in instances of the subset schema. **Extension schema** is a NIEM-conformant schema that defines data elements that are to be used in an exchange but do not exist in the NIEM data model, which therefore must be added to the schema. The exchange schema is a required artifact for this phase. Please note that a NIEM conformant IEPD is required to contain at least one schema that is either a NIEM Reference Schema or a Subset Schema The artifacts associated with the ***Assemble and Document*** phase include master document, catalog, change log, and sample XML instances. **Master document** is used to organize the required documentation and provide business and functional context of the information exchange. **Catalog** is a file that details the structure of the IEPD and links to each of the artifacts within the IEPD.

	Change log is a file representing all of the changes made to the schema files of a domain update. **Sample XML instances** are sample XML data that can be used to test the XML schemas. The master document, catalog, change log, and sample XML instances are all required artifacts. For the ***Publish and Implement*** phase, while no artifacts are required, you should publish the IEPD for search, discovery, and reuse, as well as implement the exchange. Again, as a best practice, it's recommended to include many of the artifacts listed here, not just the required ones. Continue to slide 13.
	**Slide 13: Tasks Within IEPD Development** Most of the content presented in this course occurs within the first three phases of the IEPD lifecycle. The remaining phases of the IEPD lifecycle will be presented in the subsequent NIEM 302 and 303 courses. Phase 1 – Scenario Planning includes the following tasks: • Discover existing IEPDs, • Review documentation, • Conduct stakeholder interviews, • Assess resource impacts, and • Create business scenarios Phase 2 – Analyze requirements defines the following tasks: • Business rules, • Business requirements Phase 3 – Mapping and Model involves creating the Exchange Content Model. Continue to slide 14.



Slide 14: Module 1 Summary

You have completed Module 1: Concept Refresh. You should now be able to:

- Define NIEM and how it works
- Define an IEPD
- Identify some of the benefits of NIEM
- Summarize each phase of the NIEM Information Exchange (IEPD) Development Lifecycle

Do you have any questions before we continue to the next module?

Continue to slide 15.

Slide 15: Module 2: Scenario Planning

We'll now begin with Module 2, Scenario Planning.

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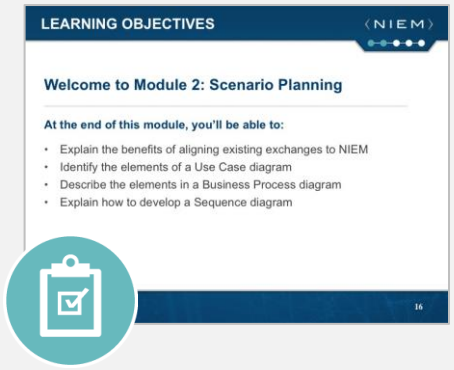

Slide 16: Learning Objectives

By the end of this module, you will be able to:

- Explain the benefits of aligning existing exchanges to NIEM
- Identify the elements of a use case diagram
- Describe the elements in a business process diagram
- Explain how to develop a sequence diagram

Continue to slide 17.

Slide 17: Discover Existing IEPDs

The first step in developing information exchanges is to identify existing exchanges, which may be similar to the information exchange being developed. To identify existing exchanges, you should search online IEPD repositories or leverage the NIEM community

By reusing existing IEPDs, your organization can ease the IEPD development process by minimizing redundant efforts needed for new exchange development. This helps save time and money.

What is your experience in reusing IEPDs? How have they helped your organization?

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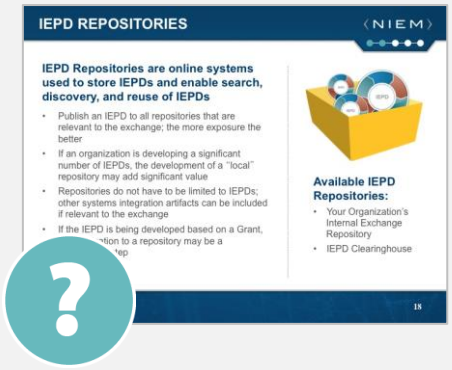

Slide 18: IEPD Repositories

IEPD Repositories are online systems used to store IEPDs and enable search, discovery, and reuse of IEPDs. A few things to remember while publishing in a repository:

- Publish an IEPD to all repositories that are relevant to the exchange; the more exposure the better
- If an organization is developing a significant number of IEPDs, the development of a local, or organizational, repository may add significant value
- Repositories do not have to be limited to IEPDs; other systems integration artifacts can be included if relevant to the exchange

If the IEPD is being developed based on grant funding, publication may be a REQUIRED step.

You may choose to publish to your own organization's Exchange Repository or two other widely known repositories: The IEPD Clearinghouse and the NIEM.gov online repository.

Do you have experience in using IEPD Repositories? What were the challenges and successes? Do you have any helpful information to share with the group?

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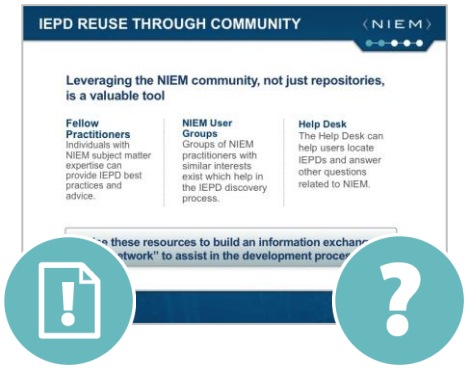

Slide 19: IEPD Reuse Through Community

In this section, list specific resources (names of practitioners, specific user groups) that you believe would be of particular use to the group.

The NIEM community, not just repositories, is a valuable tool.

Fellow Practitioners: Individuals with NIEM subject matter expertise can provide IEPD best practices and advice.

NIEM User Groups: Groups of NIEM practitioners with similar interests can help in the IEPD discovery process.

Help Desk: The help desk can assist users to locate relevant IEPDs and answer other questions related to NIEM.

Use these resources to build an information exchange "network" to assist in the development process.

Have you used any of these resources? Share your experiences. If you haven't, which resources will you leverage?

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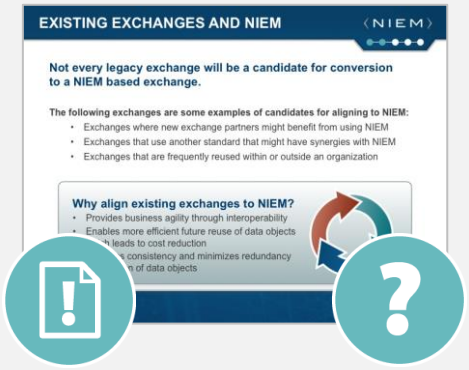
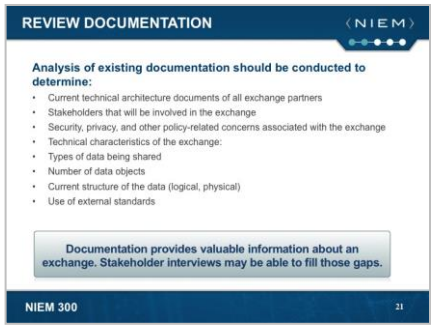
	**Slide 20: Existing Exchanges and NIEM** Not every legacy exchange will be a candidate for conversion to a NIEM based exchange. The following exchanges are some examples of candidates for aligning to NIEM: • Exchanges where new exchange partners might benefit from using NIEM, • Exchanges that use another standard that might have synergies with NIEM, and • Exchanges that are frequently reused within or outside an organization. *If possible, give examples of exchanges that may be useful for this particular audience.* **Why align existing exchanges to NIEM?** Aligning to NIEM: • Provides business agility through interoperability; • Enables more efficient future reuse of data objects, which leads to cost reduction; and • Improves consistency and minimizes redundancy in definition of data objects. **Are there any existing exchanges your organization uses that would align to NIEM and your organization's goals?** Continue to slide 21.



Slide 21: Review Documentation

In order to understand the characteristics of an information exchange, documentation about the exchange should be reviewed and analyzed.

Technical architecture documentation can help the exchange designer make informed implementation decisions.

Documentation that defines the stakeholders involved in the exchange and their expectations may exist. It's important to understand the stakeholders involved in an exchange in order to meet expectations and properly manage communication.

Documentation related to security and privacy concerns for an exchange may also exist. Specific privacy laws may exist, which could influence the information exchange.

The technical characteristics of the exchange may also already be documented and available for review.

The documentation describing these technical characteristics can be used to determine the types of data that will be shared, the number of data objects involved in an exchange, how the data to be used in the exchange is currently being stored, the current structure of the data, and whether external standards will be used in the exchange and in what manner.

By reviewing this documentation, you'll be able to understand valuable key aspects of the information exchange. You can also use stakeholder interviews to fill any further gap in understanding.

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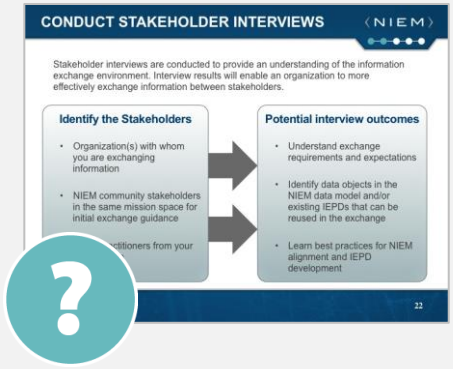


Slide 22: Conduct Stakeholder Interviews

Stakeholder interviews are conducted to provide an understanding of the information exchange environment. Interview results will enable an organization to more effectively exchange information between stakeholders.

The initial step in this interview process is to identify the stakeholders involved in the information exchange.

Individuals initiating the interview process may identify stakeholders based on the following criteria:

- Organization(s) with whom you are exchanging information to understand their information exchange environment,
- NIEM community stakeholders in the same mission space for initial information exchange guidance, and
- NIEM practitioners from your organization.

List some key stakeholders you should interview in your organization(s) and community.

To gather the information needed, the questions interviewers ask stakeholders must be clear, with little ambiguity to produce the desired results. Interviewers must understand the information needed and ask stakeholders questions that address those needs.

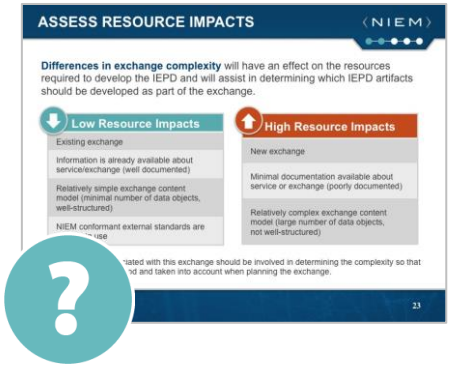
What types of interview questions should you ask?

The interview results should produce information that prepares the organization to create an information exchange using NIEM.

Examples of potential outcomes include the ability to:

- Understand information exchange requirements and expectations,
- Identify data objects in the NIEM data model and/or existing IEPDs that can be reused in the exchange, and
- Learn best practices for NIEM alignment and IEPD development.

Continue to slide 23.



Slide 23: Assess Resource Impacts

Differences in exchange complexity will have an effect on the resources required to develop the IEPD and will assist in determining which IEPD artifacts should be developed as part of the exchange.

Low resource impacts imply a low complexity to create an exchange, while high resource impacts imply a high complexity, and may need additional resources to complete.

Some examples of low resource impacts are:

- The information exchange currently exists;
- Information is already available about the service/exchange (and it is well documented);
- The Exchange Content Model is relatively simple, which means there are a minimal number of data objects and the exchange is well-structured; and
- NIEM conformant external standards are already in use.

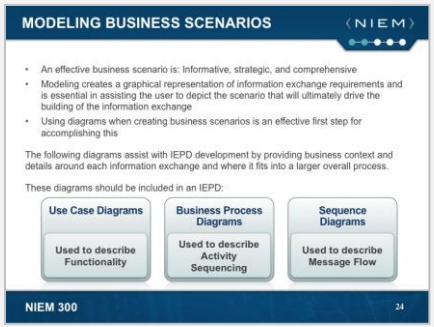
Some examples of high resource impacts are:

- The information exchange is new;
- Minimal documentation is available about the service/exchange (and it is poorly documented);
- The Exchange Content Model is relatively complex, which means there is a large number of data objects and the exchange is not well structured.

All stakeholders associated with this exchange should be involved in determining the complexity so that all factors are understood and taken into account when planning the exchange.

What low resource and high resource impacts do you need to take into consideration?

Continue to slide 24.



Slide 24: Modeling Business Scenarios

An effective business scenario is informative, strategic, and comprehensive.

Modeling creates a graphical representation of information exchange requirements and is essential in assisting the user to depict the scenario that will ultimately drive the building of the information exchanges.

Using diagrams when creating business scenarios is an effective first step for accomplishing this.

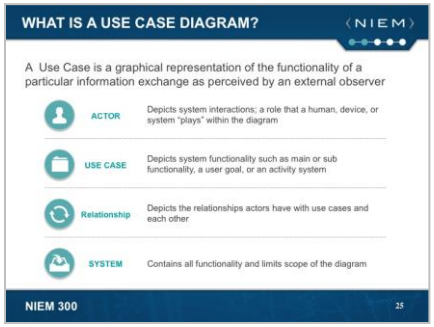
The following diagrams assist with IEPD development by providing context and details around each information exchange and where it fits into a larger process.

Use Case Diagrams: Used to describe functionality

Business Process Diagrams: Used to describe Activity Sequencing

Sequence Diagrams: Used to describe Message Flow

Continue to slide 25.

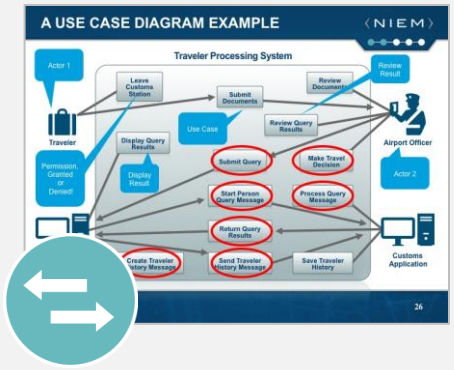


Slide 25: What is a Use Case Diagram

A "Use Case" is a graphical representation of the functionality of a particular information exchange as perceived through an external observer.

- An Actor depicts system interactions: a role that a human, device, or system "plays" within a diagram
- A Use Case depicts system functionality such as a main or sub functionality, a user goal, or an activity system
- A Relationship depicts the interactions that the actors have with the use case as well as with each other
- The System contains all functionality and limits the scope of the diagram

Continue to slide 26.



Slide 26: A Use Case Diagram Example

Let's discuss how a Traveler Processing System works through a Use Case Diagram.

A traveler arrives at an international airport checkpoint and hands his or her passport or other identifiable information to the airport officer.

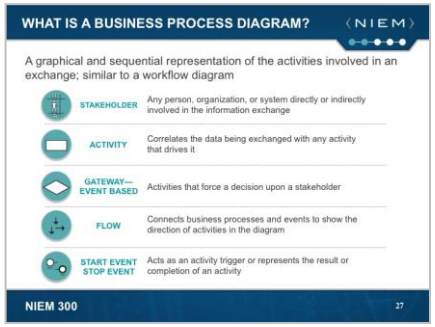
With this information the airport officer enters the traveler's information into the Airport Screening Application.

The Airport Screening Application sends the traveler's information as a 'person query' to the Customs Application and the Airport Traveler History Application.

The results, including the traveler's history, are sent back to the Airport Screening Station Application, allowing the airport officer to determine if it's appropriate for the traveler to board an aircraft or if additional security measures are necessary.

Are there any questions about the Use Case Diagram before moving on to the Business Process Diagram?

Continue to slide 27.



Slide 27: What is a Business Process Diagram?

Similar to process flow diagrams, a Business Process Diagram is a graphical and sequential representation of the activities involved in an exchange. A Business Process Diagram is built upon and includes all components of a use case diagram, but is depicted in a different layout and may include additional operational details. The Business Process Diagram segments activities in a horizontal swim lane for every actor involved. The result is a graphic that displays all activities in sequential order, organized by actor.

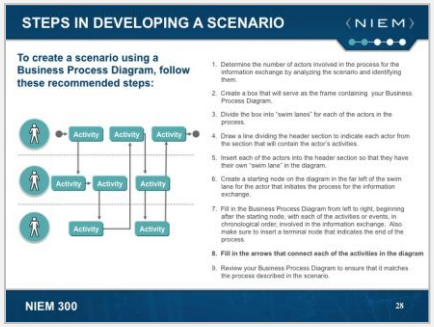
A typical Business Process Diagram should include the following:

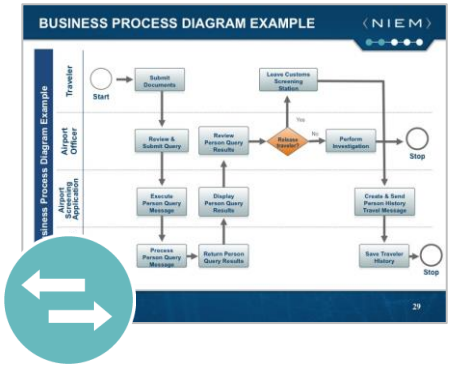
Stakeholder

Any person, organization, or system directly or indirectly involved in the information exchange

Activity

Correlates the data being exchanged with any activity that drives it

	Gateway – event based Activities that force a decision upon a stakeholder to make a decision **Flow** Connects business processes and events to show the direction of activities in the diagram **Start Event Stop Event** Acts as an activity trigger or represents the result or completion of an activity Note: It's important to note that Business Process Diagrams aren't a required IEPD artifact, but are helpful in creating information exchanges. Continue to slide 28.
	**Slide 28: Steps in Developing a Scenario** To create a scenario using a "Business Process Diagram," follow these recommended steps: • Determine the number of actors involved in the process for the information exchange by analyzing the scenario and identifying what actors should be included • Create a box that will serve as the frame containing your Business Process Diagram • Divide the box into "swim lanes" for each of the actors in the process • Draw a line dividing the header section to indicate each actor from the section that will contain the actor's activities • Insert each of the actors into the header section so that they have their own "swim lane" in the diagram • Create a starting node on the diagram in the far left of the swim lane for the actor that initiates the process for the information exchange and create an end node at the far right of the swim lane for the actor that completes the process • Fill in the Business Process Diagram from left to right, beginning after the starting node with each of the activities or events involved in the information exchange in chronological order • Fill in the arrows that connect each of the activities in the diagram • Review your Business Process Diagram to ensure that it matches the process described in the scenario Continue to slide 29.



Slide 29: Business Process Diagram Example

Let's review the business diagram on the slide.

A traveler arrives at an international airport checkpoint and hands his or her passport and other identifiable information to the airport officer.

The airport officer uses this information to perform a primary inspection. Then, the airport officer submits the inspection record as a query to the Airport Screening Application.

The Airport Screening Application, upon analyzing the received data, creates an appropriate query and submits it to the Customs Application.

After receiving the query, the Customs Application processes it to come up with a result. The Customs Application then sends the result to the Airport Screening Application, which is displayed to the airport officer.

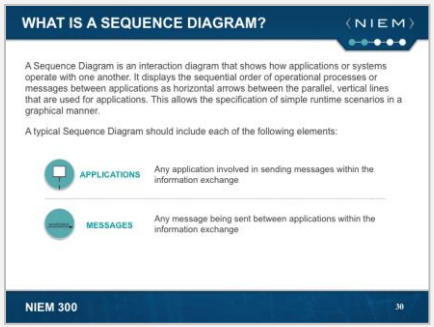
The officer analyzes the displayed data to determine if it's appropriate to allow the traveler to pass or to perform a secondary inspection.

On a success, the officer allows the traveler to pass. After allowing the traveler to pass, the airport officer enters the decision report and submits it to the Airport Screening Application, which sends it to the Customs Application.

The received data is saved in the application for future usage.

Do you have any questions about the Business Process Diagram before moving onto the Sequence Diagram?

Continue to slide 30.



Slide 30: What is a Sequence Diagram

A “Sequence Diagram” is an interaction diagram that shows how applications or systems operate with one another. It displays the sequential order of operational processes or messages between applications in an easy to read and understand format.

A “Sequence Diagram” displays these processes as horizontal arrows between the parallel, vertical lines that are used for applications. This allows the specification of simple runtime scenarios in a graphical manner.

A Sequence Diagram should include both applications and messages.

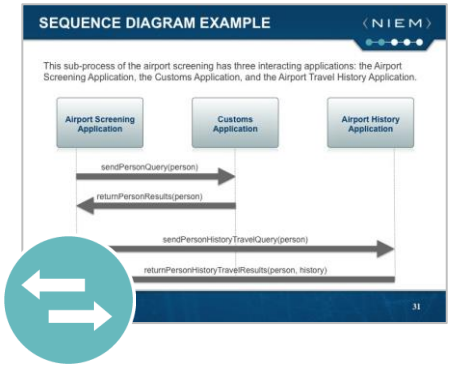
Applications

Any application involved in sending messages within the information exchange.

Messages

Any message being sent between applications within the information exchange.

Continue to slide 31.



Slide 31: Sequence Diagram Example

Let’s learn how a sub-process of a customs screening system works through a Sequence Diagram.

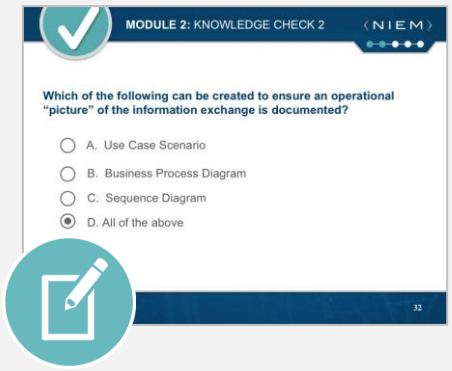
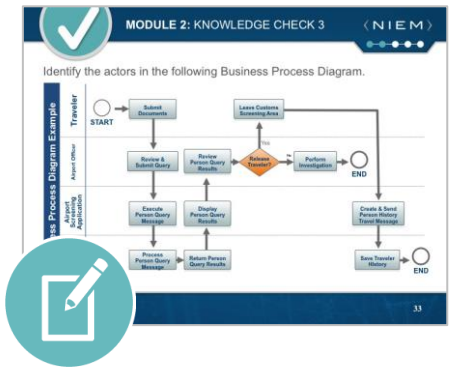
This sub-process of the airport screening system has three interacting applications: the Airport Screening Application, the Customs Application, and the Airport Travel History Application.

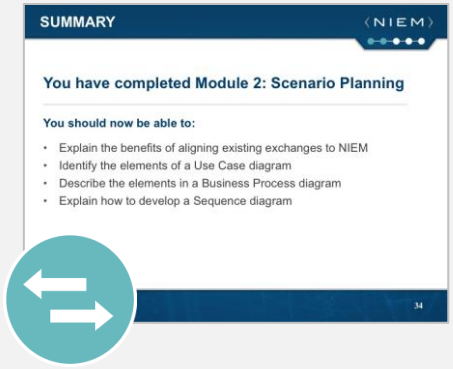
The Airport Screening Application sends a request message to the Customs Application to retrieve the history of the traveler.

Subsequently, the Customs Application returns the response message to the Airport Screening Application with the relevant information.

After analyzing the information, the Airport Screening Application sends the history report to the Airport Travel History Application.

Subsequently, the Airport Travel History Application returns the response message to the Airport Screening Application.

	Do you have any questions before moving on? Continue to slide 32.
	**Slide 32: Knowledge Check** Which of the following can be created to ensure an operational "picture" of the information exchange is documented? A. Use Case Scenario B. Business Process Diagram C. Sequence Diagram D. All of the above The correct answer is D, "all of the above." Continue to slide 33.
	**Slide 33: Knowledge Check** Identify the actors in the following Business Process Diagram. Correct answers include: • Traveler • Airport Officer • Airport Screening Application • Customs Application Continue to slide 34.



Slide 34: Module Summary

You have completed Module 2: Scenario Planning.

You should now be able to:

- Explain the benefits of aligning existing exchanges to NIEM
- Identify the elements of a use case diagram
- Describe the elements in a business process diagram
- Explain how to develop a sequence diagram

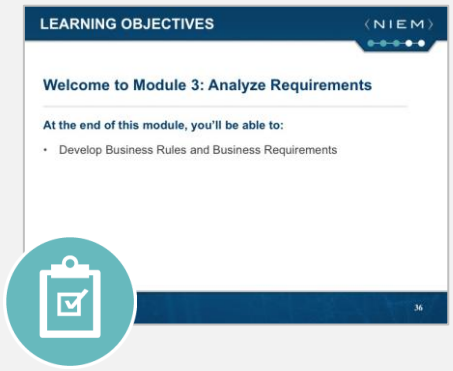
Are there any questions before we go to the next module?

Continue to slide 35.

Slide 35: Module 3: Analyze Requirements

Welcome to Module 3: Analyze Requirements.

Continue to slide 36.



Slide 36: Learning Objectives

At the end of this module, you will be able to develop business rules and requirements.

Continue to slide 37.

Slide 37: Business Needs

A business rule is a specific qualification for data that usually refers to how the data should be structured, including field lengths, data constraints, etc.

For example, if a student's enrollment status is not available or is unknown, it is assumed that they are not enrolled and an information-needed flag will be added by setting X element to the value of 1.

Business Requirement

A business requirement is a business driver for an information exchange that is primarily an operational or functional requirement.

For example, the Verification Service shall respond only to search requests issued by the client application, the Verification Information System (VIS).

Can you think of other examples of Business Needs or Requirements?

Continue to slide 38.

Slide 38: Developing Business Requirements

Requirements are not always obvious to define, which complicates the development process.

Follow a formal process to define and validate business requirements and accurately document an information exchange following these processes:

Initiate the Requirements Process: the first process in defining business requirements. It involves the following steps:

- Prepare and Plan
- Perform Analysis

The Prepare and Plan step provides bidirectional traceability of the information exchange requirements to the IEPD artifacts that satisfy them.

The Prepare and Plan step includes:

- Identifying requirement stakeholders,
- Planning the Requirements Engineering activities, and
- Identifying components for traceability.

The Perform Analysis step involves developing understanding of the current information exchange capabilities of all stakeholders.

The Perform Analysis phase includes:

- Modeling existing business functionality, and
- Reviewing the current data models and existing information exchanges.

Define the Exchange Requirements - defines the specific requirements necessary for the information exchange.

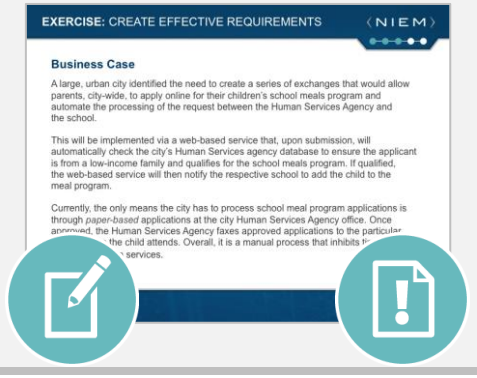
The Define the Exchange Requirements process includes the following steps:

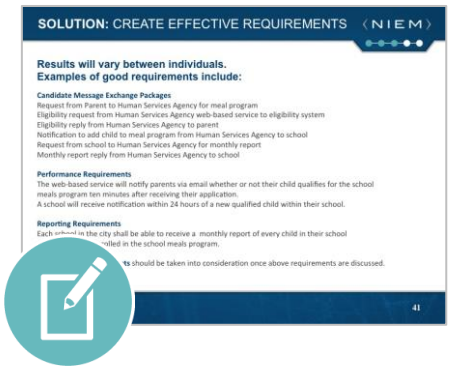
- Gather User Requirements,
- Define Privacy and Security Requirements, and
- Specify Exchange Requirements.

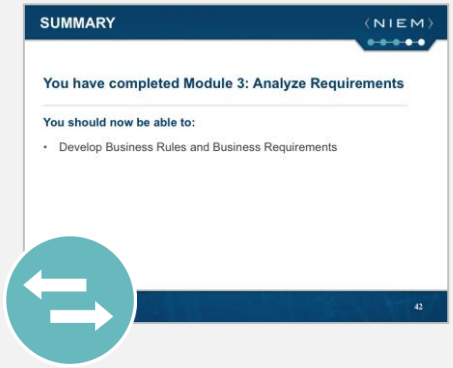
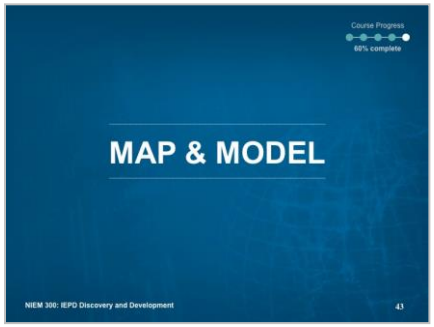
The Gather User Requirements step involves identifying end-user requirements to make certain that the functionality that the user requires is built into the information exchange.

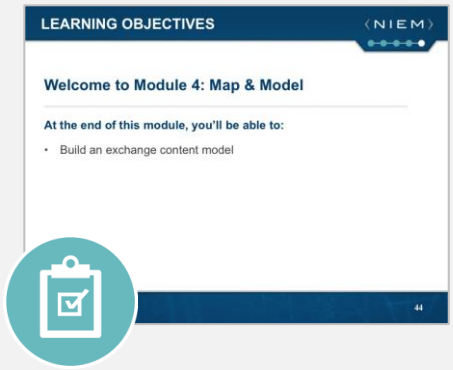
The Gather User Requirements phase includes:

	• Identifying exchange features and functions, and • Obtaining verification of the requirements. The Define Privacy and Security Requirements step involves making certain that the information exchange follows organizational policy for security and privacy. The Define Privacy and Security Requirements step may include completing a Privacy Threshold Analysis and a consequent Privacy Impact Assessments, if necessary. The Specify Exchange Requirements step involves stating the functions and capabilities of the software necessary for the information exchange to take place. The Specify Exchange Requirements phase includes: • Identifying requirements that dictate software features and • Defining external communication and interface requirements. **Prepare Requirements for Design** - prepares the requirements for design through analysis, verification, and most importantly, documentation. The Prepare Requirements for Design Process includes the following steps: • Analyze Requirements • Verify and Validate Requirements The Analyze Requirements step helps the users to finalize their defined requirements by thoroughly reviewing them for inaccuracies, oversights, and other deficiencies. The Analyze Requirements phase includes: • Prototyping future system state to align with the requirements gathered, • Reviewing and reconciling use cases and scenario diagrams with requirements, and • Prioritizing based on constraints such as cost, schedule, and functionality. The Verify and Validate Requirements step makes certain that before development, all requirements are defined, consistent, and of high quality. The Verify and Validate Requirements phase includes: • Creating a final requirements and design plan document, • Including a test case with quantifiable metrics for the final product, and

	• Reviewing the user requirements, design specifications, and test cases. Please note that not all requirements for an exchange are applicable to an IEPD. Some requirements are related to implementation and fall out of the scope of NIEM and IEPDs. **That was a lot of information to cover, and we're going to complete an exercise on creating effective requirements. Any questions before we begin the exercise?** Continue to slide 39.
	**Slide 39: Exercise: Create Effective Requirements** *This exercise should take approximately 15 minutes to complete.* Instructions: Following an effective method for creating requirements can lead to more precise business requirements. Using the business case on the next slide, think about and create three effective business requirements then share with other project managers to validate. **Objective:** Create business requirements for an example exchange. **Exercise:** You will create business requirements. Continue to slide 40.
	**Slide 40: Business Case** *Read the business case out loud:* A large urban city identified the need to create a series of exchanges that would allow parents, city wide, to apply online for their children's school meals program and automate the processing of the request between the Human Services Agency and the school. This will be implemented via a web-based service that, upon submission, will automatically check the city's Human Services agency database to ensure the applicant is from a low-income family and qualifies for the school meals program. If qualified, the web-based service will then notify the respective school to add the child to the meal program.

	Currently, the only means the city has to process school meal program applications is through paper-based applications at the city Human Services Agency office. Once approved, the Human Services Agency faxes approved applications to the particular school where the child attends. Overall, it is a manual process that inhibits timely delivery of citizen services. *Give participants 10 minutes to create effective requirements for this case. When they are finished, ask participants to share their requirements. Then go to the next slide to list some examples of good requirements.* Continue to slide 41.
	**Slide 41: Business Case Solution** *Results will vary between individuals.* *Examples of good requirements include:* **Candidate Message Exchange Packages** • Request from parent to Human Services Agency for meal program • Eligibility request from Human Services Agency web-based service to eligibility system • Eligibility reply from Human Services Agency to parent • Notification to add child to meal program from Human Services Agency to school • Request from school to Human Services Agency for monthly report • Monthly report reply from Human Services Agency to school **Performance Requirements** • The web-based service will notify parents via email whether or not their child qualifies for the school meals program ten minutes after receiving their application. • A school will receive notification within 24 hours of a newly qualified child within their school. **Reporting Requirements** • Each school in the city shall be able to receive a monthly report of every child in their school who is currently enrolled in the school meals program. • Data Quality Requirements should be taken into consideration once above requirements are discussed Continue to slide 42.

	**Slide 42: Module Summary** You have completed Module 3: Analyze Requirements You should now be able to develop business rules and requirements. **Are there any questions before proceeding to the final module?** Continue to slide 43.
	**Slide 43: Module 4: Map & Model** Welcome to Module 4: Map and Model Continue to slide 44.

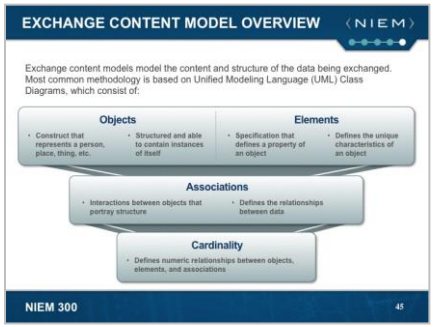


Slide 44: Learning Objectives

At the end of this module, you will be able to:

- Build an exchange content model

Continue to slide 45.



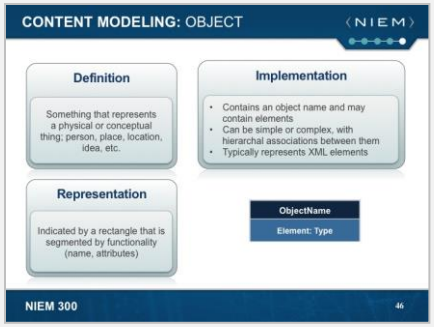
Slide 45: Exchange Content Model Overview

Exchange Content Models model the content and structure of the data being exchanged. The most common methodology is based on Unified Modeling Language (UML) Class Diagrams, which consist of:

- Objects
- Elements
- Associations

Associations can be a type, such as cardinality.

Continue to slide 46.



Slide 46: Content Modeling: Object

Objects are one of the vital components of any Exchange Content Model. Let's learn more about the characteristics of an object.

Definition

Something that represents a physical or conceptual thing like person, place, location, idea, etc.

Implementation

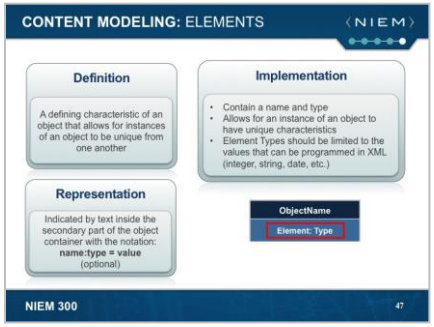
A typical object:

- Contains an object name and may contain elements;
- Can be simple or complex, with hierarchal associations between them; and
- Typically represents XML elements.

Representation

An object is represented by a rectangle that is segmented by functionality, such as name and attributes. An example of an object representation is shown here.

Continue to slide 47.



Slide 47: Content Modeling: Elements

Elements are a part of the Exchange Content Model that define the characteristic of an object. Let's learn more about the characteristics of an element.

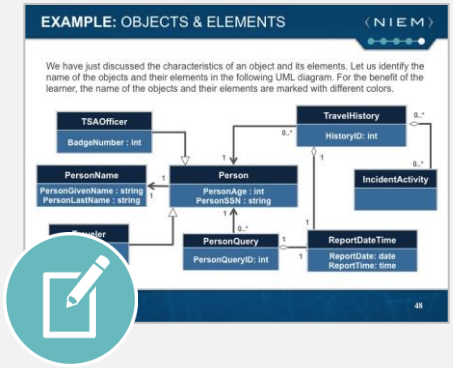
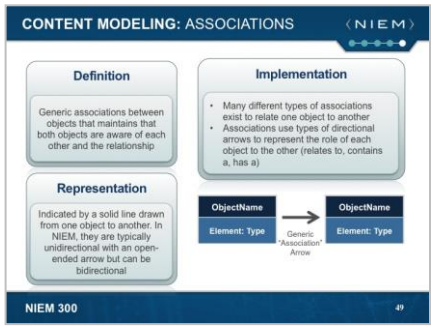
Definition

An element is a defining characteristic of an object that allows for instances of an object to be unique from one another.

Implementation

A typical element:

- Contains a name and type, and
- Allows for an instance of an object to have unique characteristics,
- Element Types should be limited to the values that can be programmed in XML (such as integer, string,

	date). **Representation** An element of an object is indicated by text inside the secondary part of the object container with the notation: name: type = value *Point out the example of the element on the screen.* Continue to slide 48.
	**Slide 48: Content Modeling Example: Objects & Elements** We have just discussed the characteristics of an object and its elements. Let us identify the name of the objects and their elements in the UML diagram. Objects and elements are marked with different colors. For example, an Object “SecurityOfficer” has an element of “BadgeNumber.” Continue to slide 49.
	**Slide 49: Content Modeling: Associations** Associations are generic relationships between objects in an Exchange Content Model. **Definition** Association is the generic association between objects that maintains that both objects are aware of each other and the relationship. **Implementation** An association may have the following characteristics: • Many different types of associations exist to relate one object to another • Associations use types of directional arrows to represent the role of each object to the other (such as

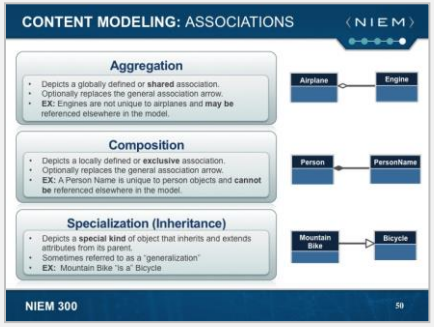
relates to, contains a, has a)

Representation

Representation is indicated by a solid line drawn from one object to another. In NIEM, they are typically unidirectional with an open-ended arrow, but can be bidirectional.

An example of an associate is shown on the slide.

Continue to slide 50.



Slide 50: Content Modeling: Associations

Apart from the general association that we've discussed, there can be more specialized associations used in class directions.

Exchange Developers and architects sometimes use specialized associations to better describe the information exchange and to add specificity to the model. The most commonly used specialized associations are "aggregation" and "inheritance."

Aggregation

- Aggregation depicts a globally defined or shared association
- Optionally replaces general association arrow
- Example: Engines are not unique to airplanes and may be referenced elsewhere in the model

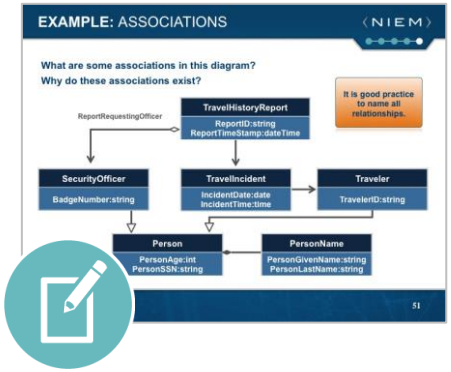
Composition

- Depicts a locally defined or exclusive association
- Optionally replaces the general association arrow
- Example: A Person Name is unique to person objects and cannot be referenced elsewhere in the model

Inheritance

- Depicts a special kind of object that inherits and extends attributes from its parent
- Sometimes referred to as a "generalization"
- Example: Mountain Bike "is a" Bicycle

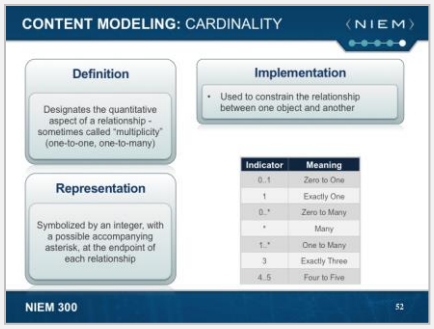
Continue to slide 51.



Slide 51: Example: Associations

We've discussed the characteristics of associations among various objects in an exchange data model. Let's identify the associations existing between the objects in the following UML diagram.

Continue to slide 52.



Slide 52: Content Modeling: Cardinality

Cardinality is a part of associations among objects, which qualifies the relationship in quantitative terms. Let's learn more about the characteristics of cardinality.

Example—Cardinality

The tabled numeric labels represent the cardinality of each association.

Definition

Cardinality designates the quantitative aspect of a relationship between objects – sometimes called "multiplicity" (such as one-to-one or one-to-many)

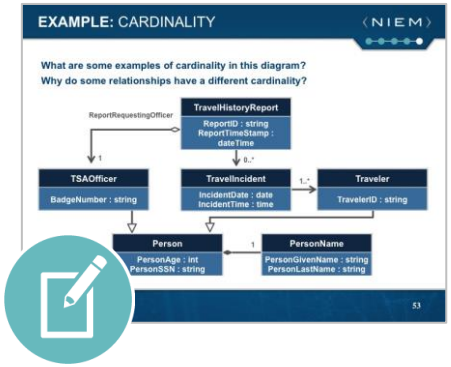
Implementation

Cardinality is used to constrain the relationship between one object and another

Representation

Cardinality is symbolized by an integer, with a possible accompanying asterisk, at the endpoint of each relationship (sometimes called multiplicity).

Continue to slide 53.



Slide 53: Example: Cardinality

We've just discussed cardinality. Let's identify the cardinalities existing between the objects in the UML diagram.

- What are some examples of cardinality in the diagram?
- Why do some relationships have different cardinality?

As shown here with the One and Asterisk, travel incident to traveler has a one-to-many relationship. This implies that each travel incident may have one or more travelers associated with it.

Continue to slide 54.

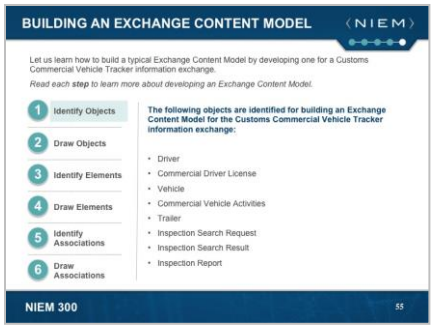
Slide 54: Building an Exchange Content Model

Let's review the recommended steps for building an Exchange Content Model:

- Step 1: Identify Objects
- Sept 2: Draw Objects
- Step 3: Identify Elements
- Step 4: Draw Elements
- Step 5: Identify Associations
- Step 6: Draw Associations

Please note that the end result is a visual representation of the data objects and elements that will be included within the exchange.

Continue to slide 55.



Slide 55: Building an Exchange Content Model

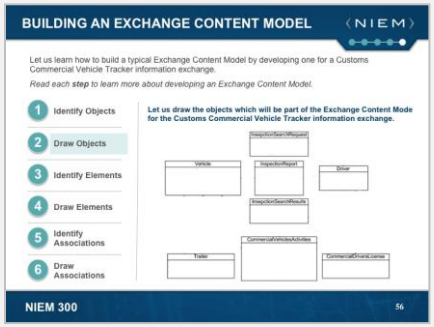
Let's learn how to build a typical Exchange Content Model by developing one for a Customs Commercial Vehicle Tracker information exchange.

Identify Objects

The following objects are identified for building an Exchange Content Model for a Customs Commercial Vehicle Tracker information exchange:

- Driver,
- Commercial Driver License,
- Vehicle,
- Commercial Vehicle Activities,
- Trailer,
- Inspection Search Request,
- Inspection Search Result, and
- Inspection Report.

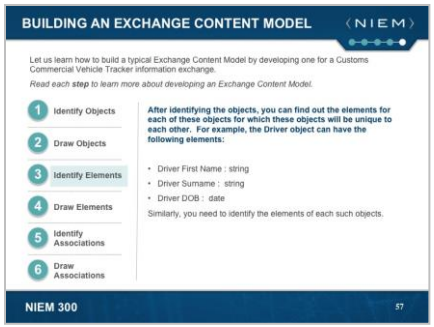
Continue to slide 56.



Slide 56: Building an Exchange Content Model

Let's draw the objects that will be part of the Exchange Content Model for a Customs Commercial Vehicle Tracker information exchange.

Continue to slide 57.



Slide 57: Building an Exchange Content Model

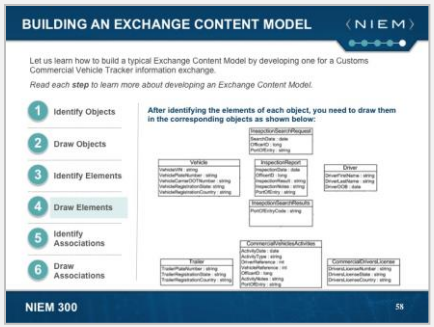
After identifying the objects, you should find the elements for each of these objects.

For example, the Driver object can have the following elements:

- Driver First Name:string
- Driver Surname:string
- Driver DOB:date

Similarly, you need to identify the elements of each such object.

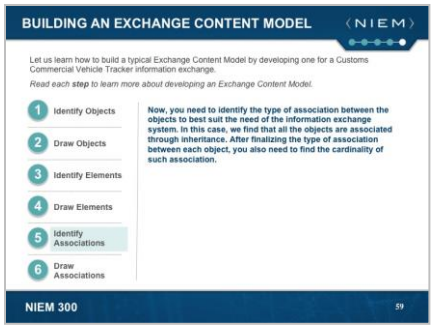
Continue to slide 58.



Slide 58: Building an Exchange Content Model

After identifying the elements of each object, draw them in the corresponding objects as shown.

Continue to slide 59.

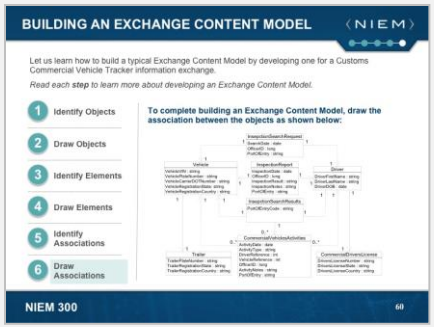


Slide 59: Building an Exchange Content Model

Now, you need to identify the type of association between the objects to best suit the need of the information exchange. In this case, we find that all the objects are associated through inheritance.

After finalizing the type of association between each object, you also need to find the cardinality of such association.

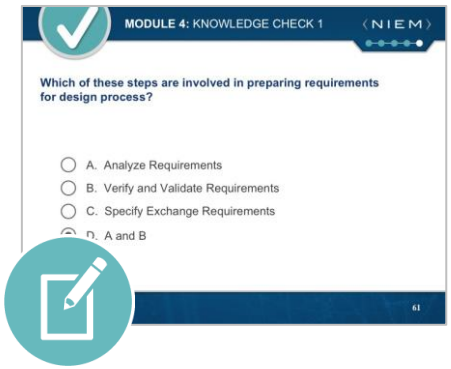
Continue to slide 60.



Slide 60: Building an Exchange Content Model

To complete building an Exchange Content Model, draw the association between the objects as shown.

Continue to slide 61.



Slide 61: Module 4 – Knowledge Check 1

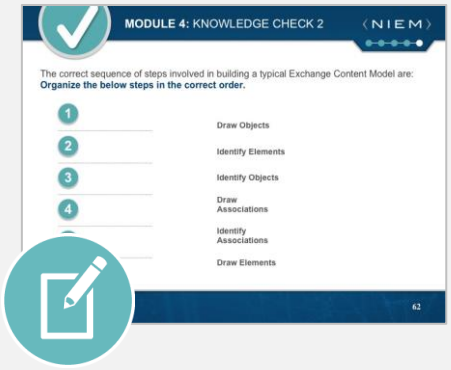
It's time now to test your knowledge of the concepts presented in this module.

Which of these steps are involved in preparing requirements for design process?

A. Analyze Requirements
B. Verify and Validate Requirements
C. Specify Exchange Requirements
D. A and B

The correct answer is D.

Continue to slide 62.



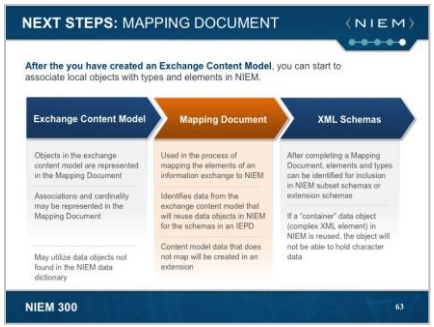
Slide 62: Module 4 – Knowledge Check 2

What is the correct sequence of steps in building a typical Exchange Content Model?

Correct Answer:

Identify Objects
Draw Objects
Identify Elements
Draw Elements
Identify Associations
Draw Associations

Continue to slide 63.



Slide 63: Next Steps: Mapping Document

After you have created an Exchange Content Model, you can start to associate local objects with types and elements in NIEM. To learn more about each process, click on each of the following steps.

Exchange Content Model: Objects in the exchange content model are represented in the mapping document.

Associations and cardinality may be represented in the mapping document.

The Exchange Content Model may utilize data objects not found in the NIEM data dictionary.

Mapping document: The mapping document is used in the process of mapping elements of an information exchange to NIEM.

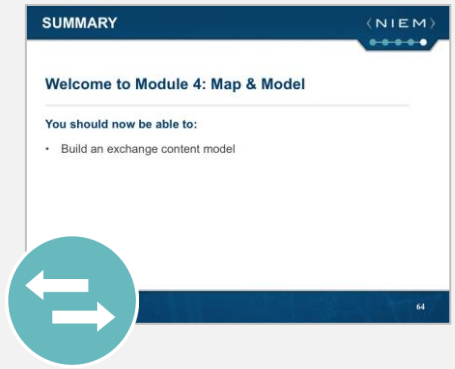
It identifies data from the exchange content model that will reuse data objects in NIEM for the schemas in an IEPD.

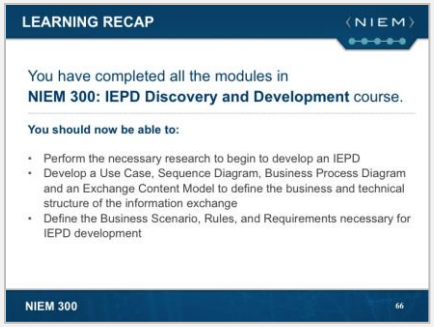
Content model data that does not map will be created in an extension

XML Schemas: After completing a mapping document, elements and types can be identified for inclusion in NIEM subset schemas or extension schemas.

If a container data object in NIEM is reused, the object will not be able to hold character data.

Continue to slide 64.

	**Slide 64: Module 4 Summary** You have completed module 4: Map and Model You should now be able to build an exchange content model. **Are there any questions about anything that was covered in this course?** Continue to slide 65.
	**Slide 65: Conclusion** You have completed NIEM 300: IEPD Discovery and Development. Continue to slide 66.

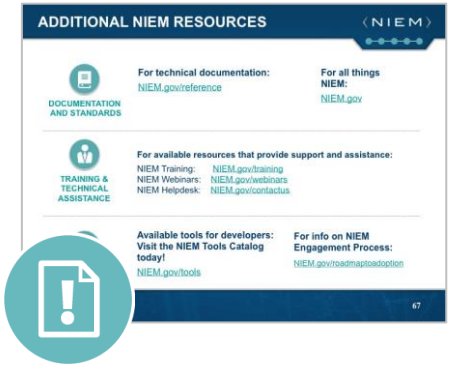


Slide 66: Learning Recap

You should now be able to:

- Perform the necessary research to begin to develop an IEPD
- Develop a Use Case, Sequence Diagram, Business Process Diagram, and an Exchange Content Model to define the business and technical structure of the information exchange
- Define the Business Scenario, Rules, and Requirements necessary for IEPD development

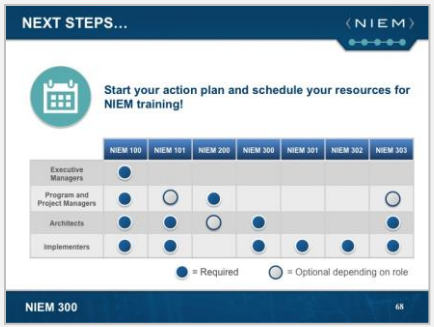
Continue to slide 67.



Slide 67: Additional NIEM Resources

Review the resources on the slide.

Continue to slide 68.

	**Slide 68: Next Steps** Start your action plan and schedule your resources for NIEM training. Continue to slide 69.
	**Slide 69: End of Course** *Answer any remaining questions participants have and dismiss the group.*