

< NIEM >

TM

NIEM 101

Technical Introduction to NIEM

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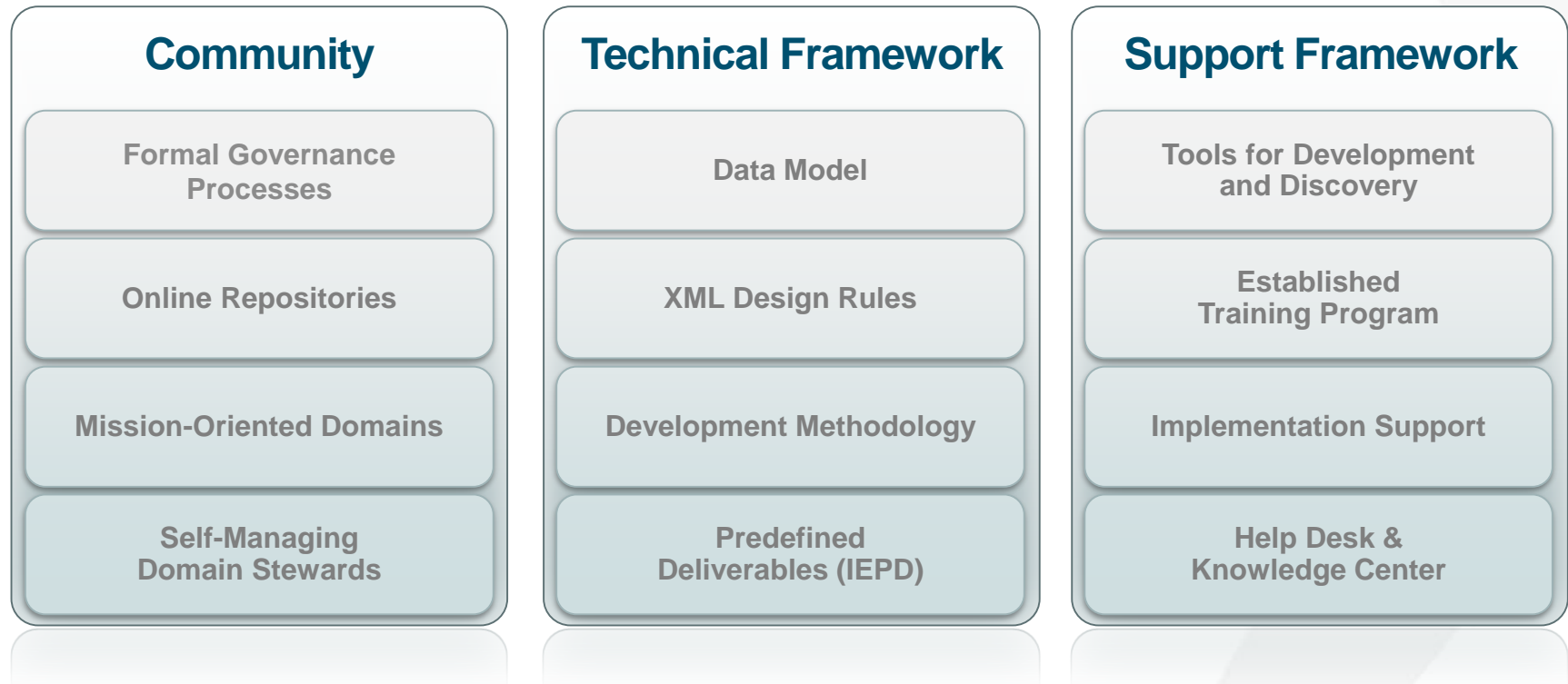
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NIEM RECAP & MODEL OVERVIEW

NIEM OVERVIEW

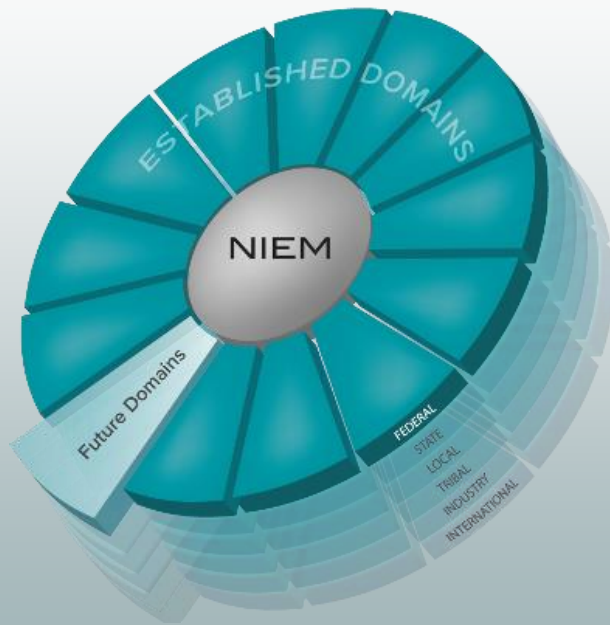
NIEM is a community-driven, government-wide, standards-based approach to exchanging information. Diverse communities can collectively leverage **NIEM to increase efficiencies** and improve decision-making.

It is available to everyone, including both public and private organizations. NIEM includes a data model, governance, training, tools, technical support services, and an active community to assist users in adopting a standards-based approach to exchanging data.



HOW NIEM WORKS

Common Language (Community-driven Data Model)



Built and governed by the business users at Federal, State, Local, Tribal, International and Private Sectors

Repeatable, Reusable Process (Information Exchange Development Lifecycle)

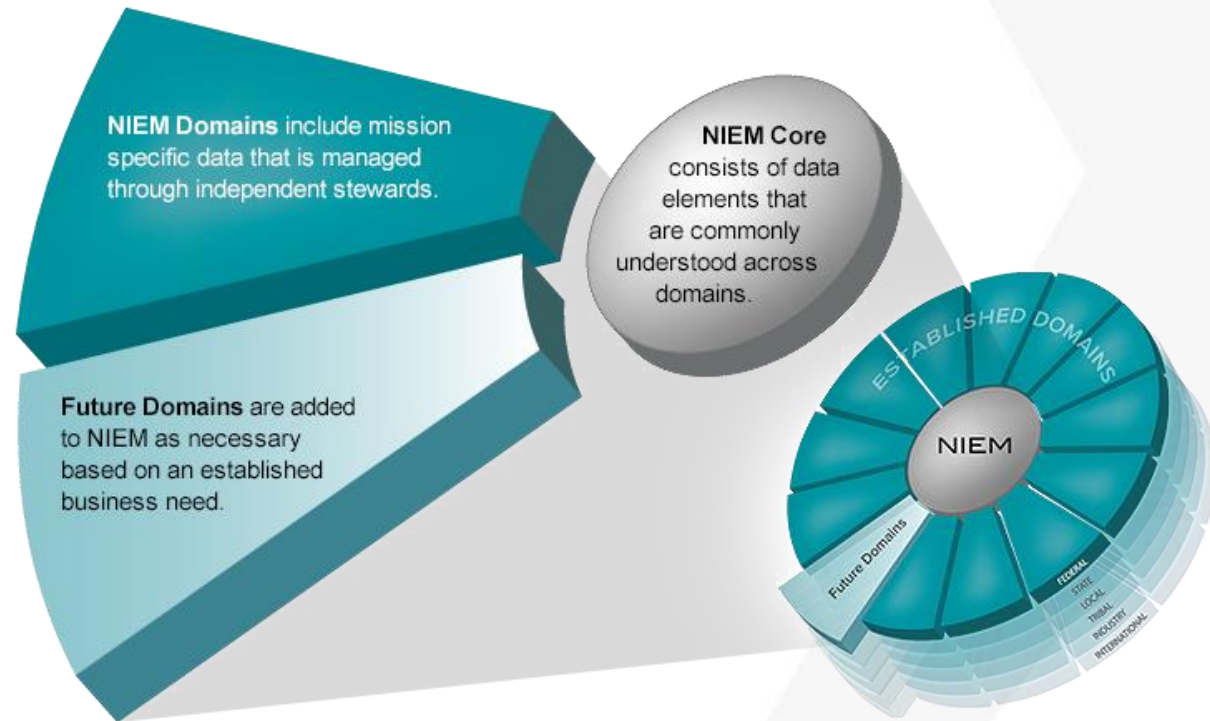


MODEL OVERVIEW

Words are to a dictionary as elements are to a data model.

Think of the NIEM data model as a mature and stable data dictionary of agreed-upon terms, definitions, and formats independent of how information is stored in individual agency systems.

The data model consists of two sets of closely related vocabularies: **NIEM Core** and individual **NIEM Domains**.



NIEM CORE COMPONENTS

Some important, practical NIEM Core components

<nc:Person>
<PersonBirthDate>
<PersonEyeColorText>
<PersonHairColorText>
<PersonSexText>
...

<nc:Activity>
<ActivityCategoryText>
<ActivityDate>
<ActivityDescriptionText>
<ActivityDisposition>
...

<nc:Item>
<ItemConditionText>
<ItemDescriptionText>
<ItemName>
<ItemValue>
...

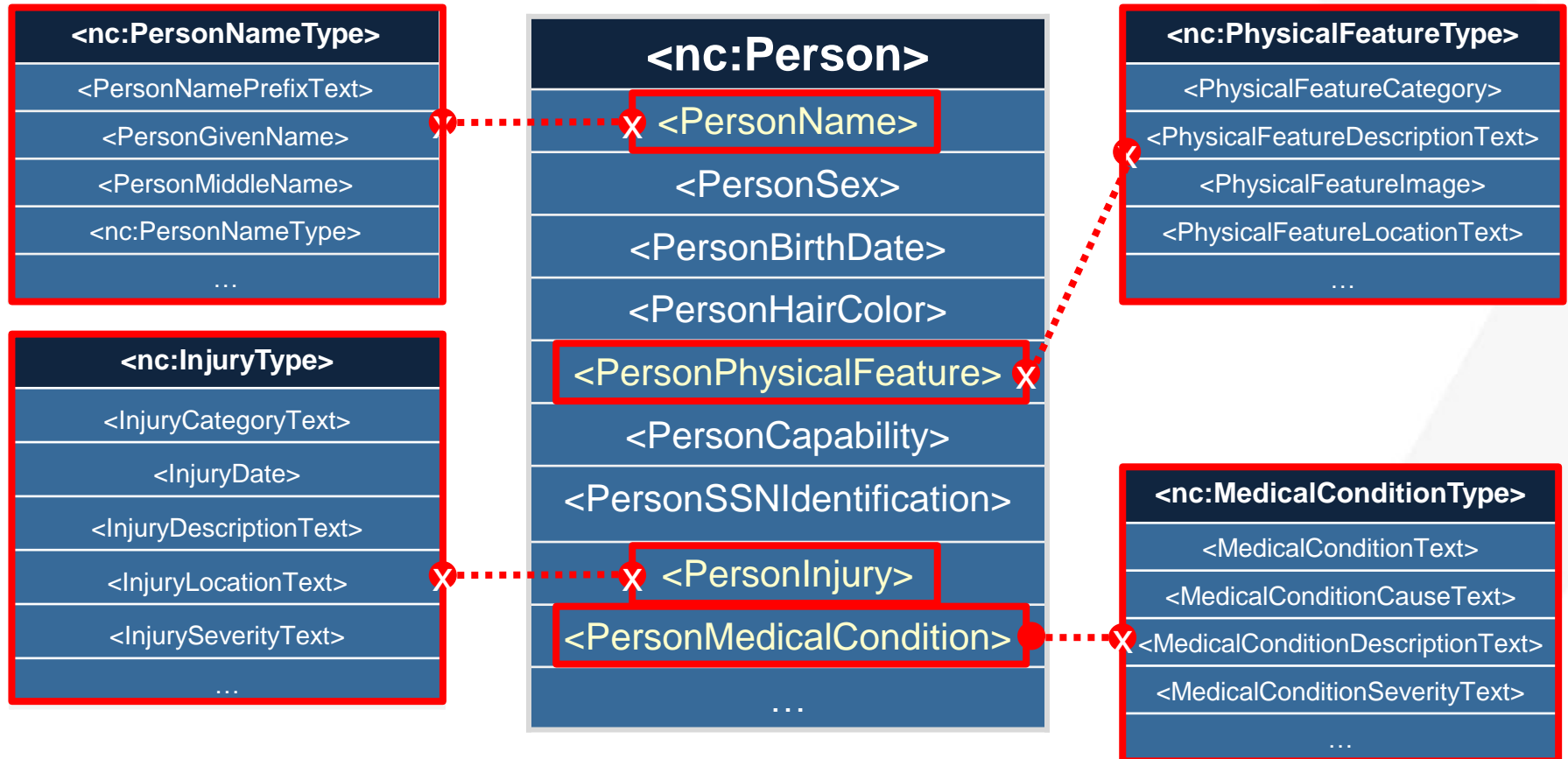
<nc:Identification>
<IdentificationID>
<IdentificationJurisdiction>
<IdentificationEffectiveDate>
<IdentificationStatus>
...

<nc:Location>
<Address>
<LocationDescriptionText>
<LocationLandmarkText>
<LocationName>
...

<nc:Organization>
<OrganizationName>
<OrganizationDescriptionText>
<OrganizationCategoryText>
<OrganizationEstablishedDate>
...

NIEM CORE COMPONENT: <NC:PERSON>

Approximately 200 discreet fields for Person information across all domains



NIEM CORE COMPONENT: <NC:ACTIVITY>



<nc:Activity>

has different derived types in NIEM

- Derived types inherit all parent fields
- Field meaning depends on context

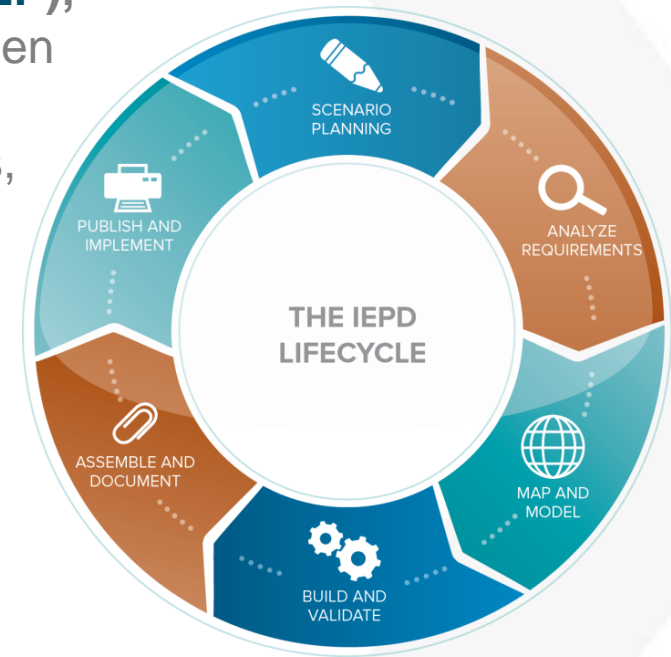
NIEM INFORMATION EXCHANGE OVERVIEW

WHAT IS A NIEM INFORMATION EXCHANGE?

In NIEM, an information exchange is also known as an **Information Exchange Package Documentation (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)**

Core Functions of an IEPD:

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



SCOPE OF IEPDS



IEPDs DO

Include the XML schemas that define the XML message structure

Contain standardized artifacts that document an information exchange

Have a defined development methodology (IEPD Lifecycle)

Ease the documentation process for reuse

Allow for the capture of business rules that define an exchange



IEPDs DO NOT

Specify how exchange data is physically transferred between entities or systems

Describe an interface or Interface Control Document (ICD)

Specify any technical information outside of the message structure

THE IEPD LIFECYCLE



SCENARIO PLANNING

Review background, assess resource impact, understand business context, and identify information exchange business scenarios



ANALYZE REQUIREMENTS

Selected information exchange scenario is further elaborated to understand and document the business context and data requirements



MAP & MODEL

Create an exchange content model based on information exchange requirements. The Exchange Content Model is then mapped to NIEM.



BUILD & VALIDATE

Create a set of exchange-specific NIEM conformant XML schemas that implement the exchange content model created for the exchange



ASSEMBLE & DOCUMENT

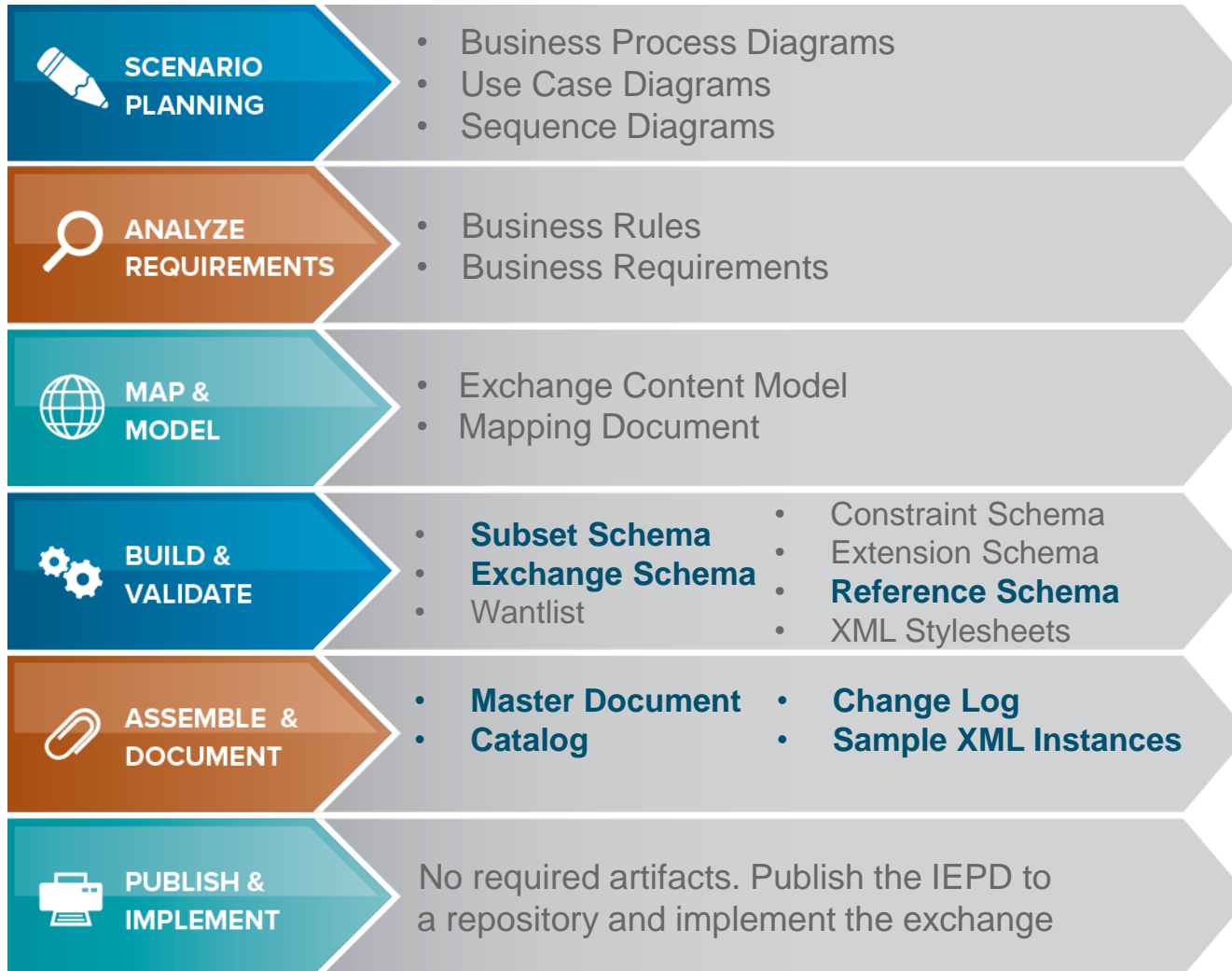
Prepare and package all related files for the IEPD into a single self-contained, self-documented, portable archive file



PUBLISH & IMPLEMENT

Publish the IEPD as well as implement the IEPD into production for search, discovery, and reuse

THE IEPD ARTIFACTS



IEPDs contain both required and recommended artifacts

Required:
Bold and Blue

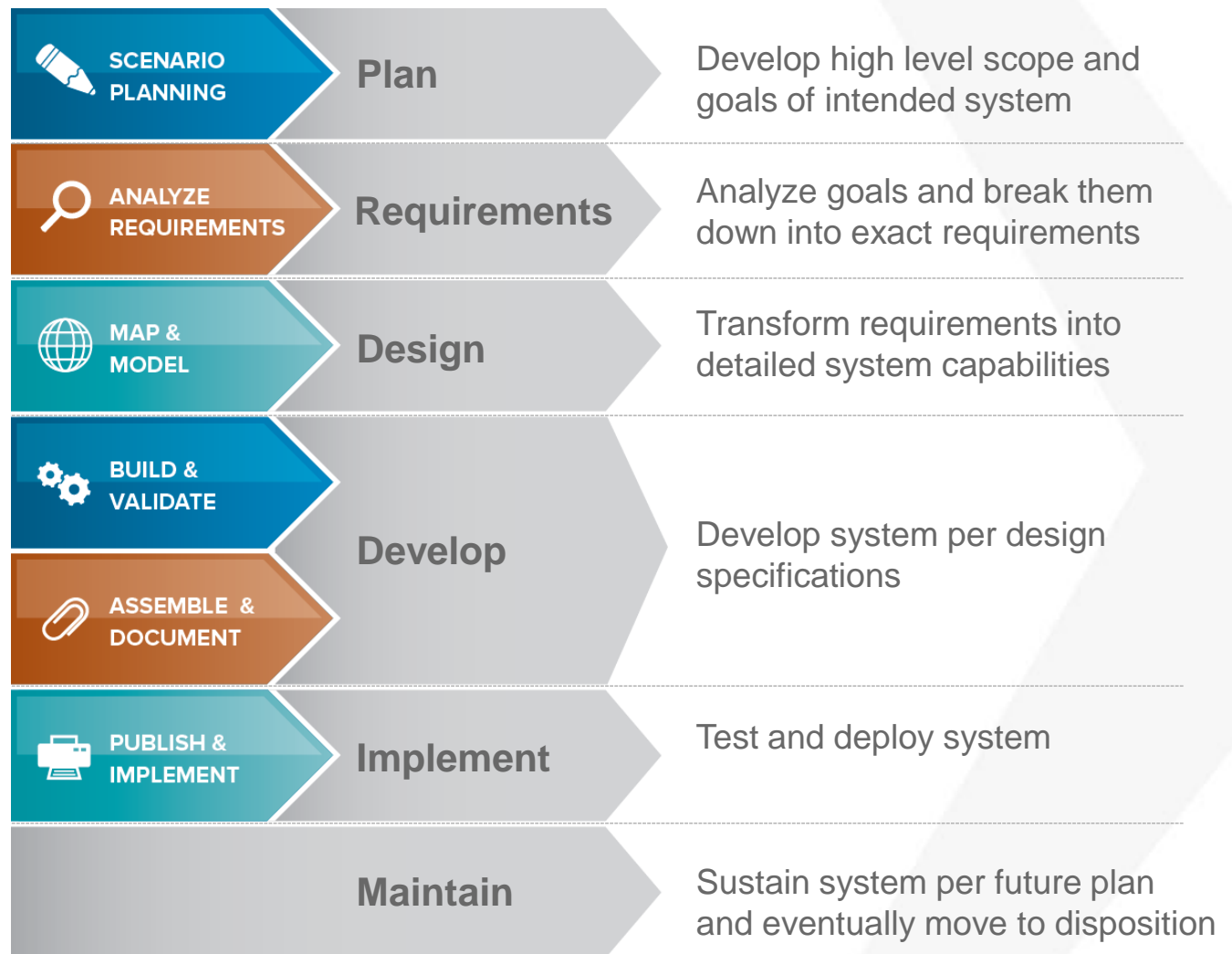
Note:
Best practices for most organizations include many of the artifacts listed here. Please review the Model Package Description (MPD) Specification for more information.

SYSTEMS DEVELOPMENT LIFE CYCLE

The **Systems Development Life Cycle (SDLC)**

is a common methodology used for creating information systems.

The IEPD Lifecycle aligns closely with the phases of the SDLC.



MAINTAIN AN EXCHANGE

After the project is complete, the IEPD needs to be maintained throughout its existence.

To sustain an IEPD:



Ensure that any changes to an information exchange are correctly reflected within the IEPD.



A governance process, if applicable, should be established to actively manage the changes identified for an IEPD



Once changes are made to the IEPD, publish a new version of the IEPD within online repositories



Over time, the technical architecture of the information exchange is likely to change; update the IEPD to reflect these changes



Choosing to not maintain an IEPD inhibits re-use within and outside the organization.

IEPD REUSE AND SHARING

Existing IEPDs, after publication, can be reused partially or fully, which can:

- Decrease IEPD development time
- Reduce development cost
- Increase Return on Investment (ROI)
- Increase consistency of data definitions

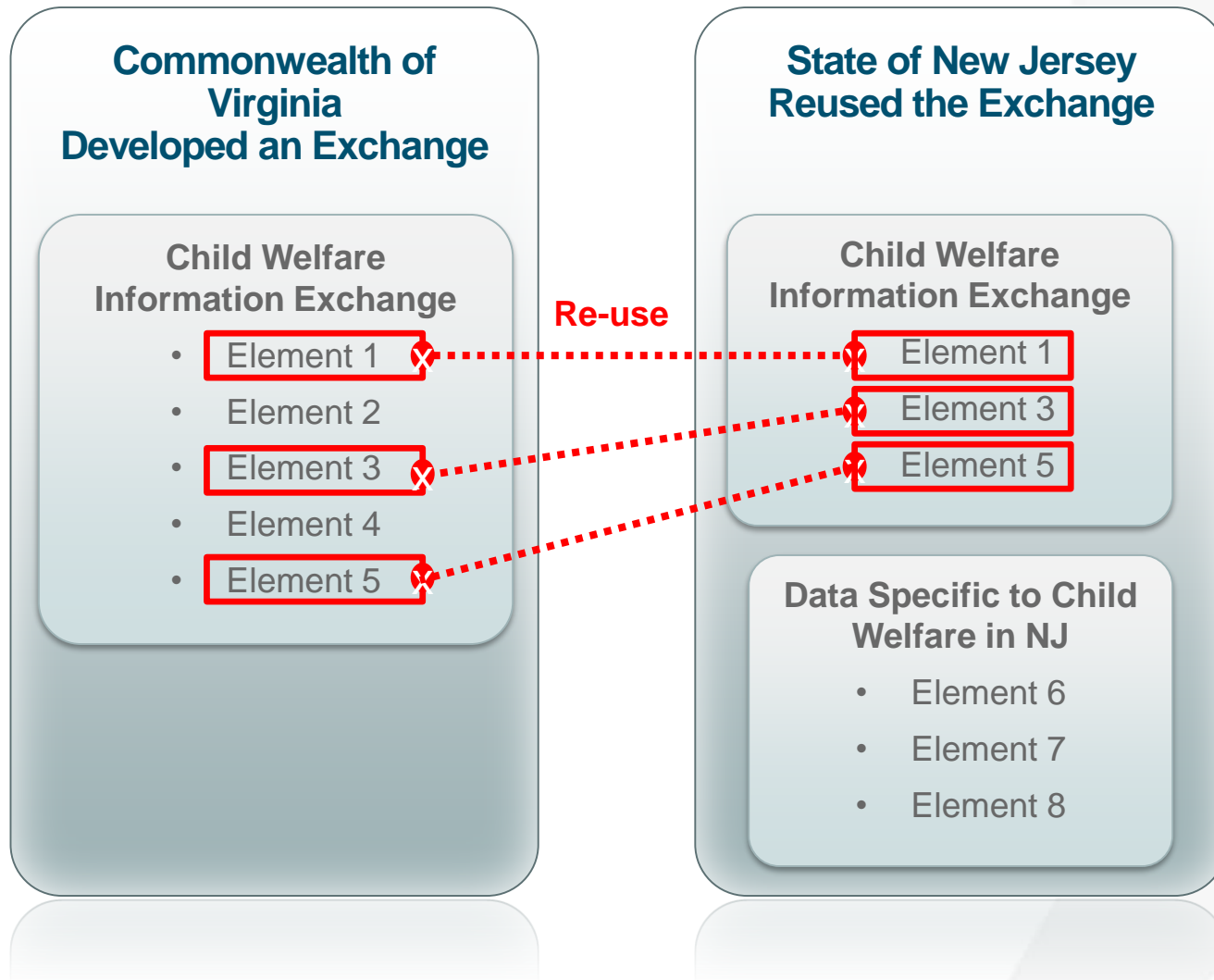


IEPD REPOSITORIES, such as the IEPD Clearinghouse, can be leveraged to search and reuse existing IEPDs.

[NIEM.gov/ojplepdclearinghouse](https://niem.gov/ojplepdclearinghouse)

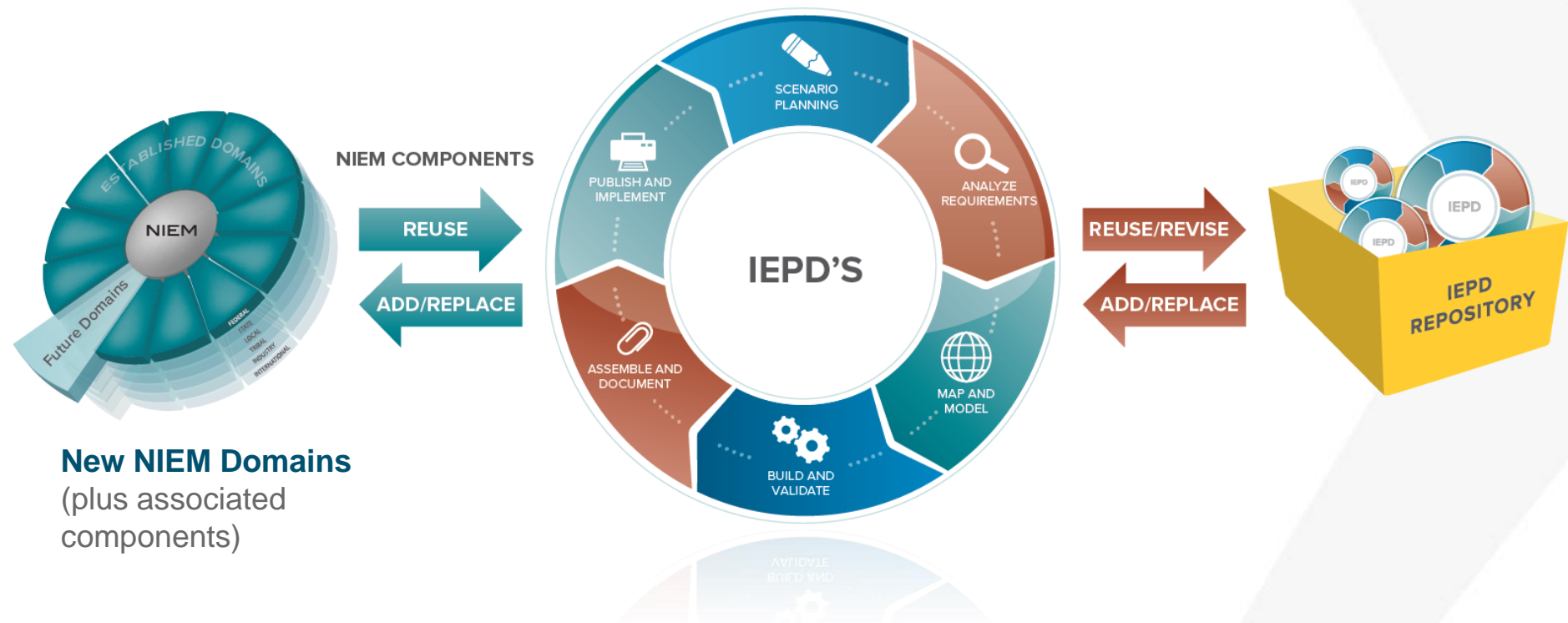
ARTIFACTS and ELEMENTS within IEPDs can be leveraged to facilitate development and ease the burden on resources.

EXAMPLE: REUSE OF AN EXCHANGE



IEPDS AND NIEM ARCHITECTURE

NIEM continues to grow and evolve with practitioners' contributions



NIEM IMPLEMENTATION

IMPLEMENTING YOUR NIEM EXCHANGE



NIEM Does:

Define XML instance document format and structure.



NIEM Does Not:

Define implementation specifications.

Specify how a document is transmitted, but may employ encryption, Efficient XML Interchange (EXI), etc.

EXAMPLE: IMPLEMENTING NIEM

There are many ways to implement NIEM.

NIEM conformant exchanges are implemented based on business needs and vary as a result.

Two common examples include:

- **Message Queue:** An organization can store NIEM conformant XML instances within a message queue during its response to a stakeholder's information request service.
- **Web Services:** An organization can embed a NIEM conformant schema into a new or existing Web Service and perform an electronic transfer with one or more exchange partners potentially through a Service Oriented Architecture (SOA) based environment.

EXAMPLE: SOA IMPLEMENTATION

Service Oriented Architecture (SOA) is an architectural style whose goal is to achieve loose coupling among interacting software agents.



Standards-Based:

- **NIEM provides** the standard for data layer interoperability among services in SOA
- **NIEM can be used** to standardize and structure the messages passed between services in SOA
- **NIEM can decrease** development time of new services in SOA through reuse of similar IEPDs

CONSIDERATIONS FOR IMPLEMENTATION



ARCHITECTURE

Systems on either side of the exchange can use different implementation architectures (i.e. different programming languages, operating systems)



CONSISTENCY

All participants in an information exchange must agree on the definition and structure for the data in the exchange—NIEM provides this standardization



DEVELOPMENT

IEPD Lifecycle should be used to guide development of NIEM conformant information exchanges to make sure all of the necessary artifacts are created



REUSE

Elements already defined within NIEM should be used whenever possible; exchange elements outside of or created to fill requirements not covered in NIEM should also be reused whenever possible

SECURITY AND PRIVACY

Security and privacy should always be key considerations when implementing an exchange.

1. NIEM allows you to tag data with security and privacy, however, other technologies are required upon exchange implementation to enforce security and privacy rules.
2. NIEM allows the use of metadata to describe specific requirements in regard to information security and the handling of sensitive privacy-protected information.
 - Including this metadata allows systems that implement NIEM to automatically enforce rules that govern the use, protection, dissemination, and access controls for data being shared.
 - This has been put to use in the Intelligence community, which established the Intelligence Community Information Security Marking (IC-ISM) as a standard for classified information.
 - NIEM 3.0 provides support for existing versions of IC-ISM metadata attributes

**NIEM does not dictate how agencies handle privacy issues.
Consult with your organization's privacy standards.**

NIEM-UML

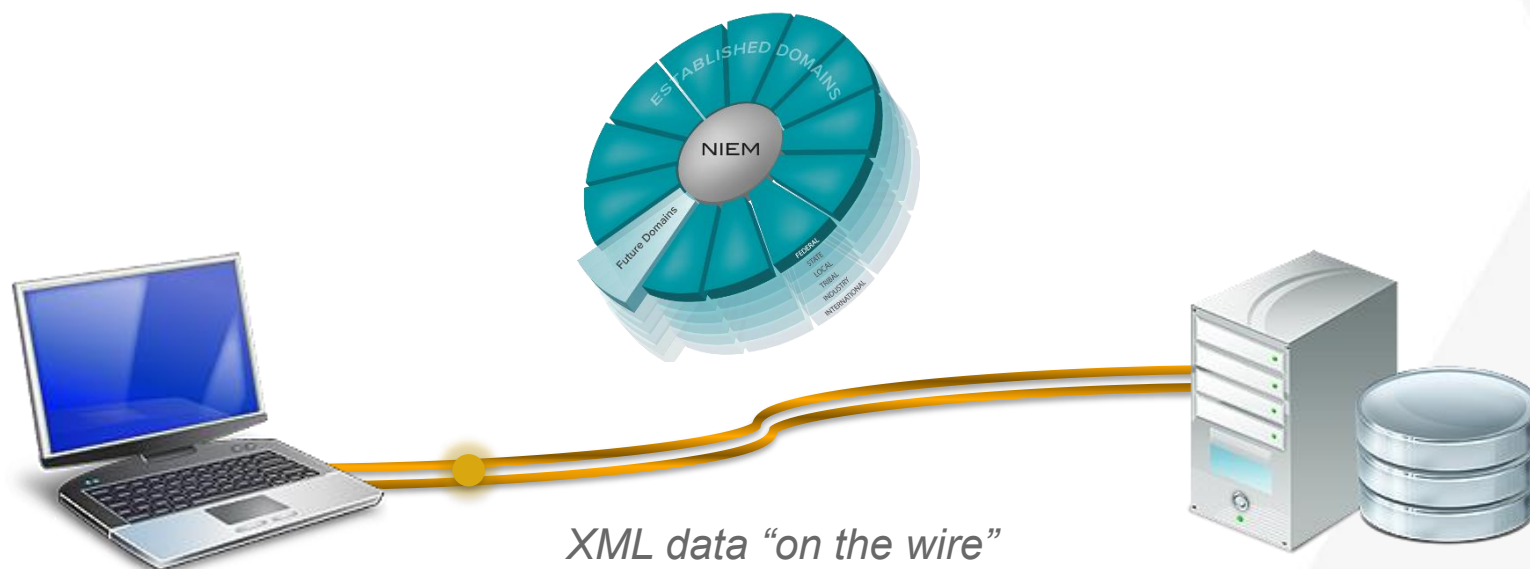
WHAT IS THE NIEM-UML PROFILE?

NIEM-UML Profile: An extension of a subset of Unified Modeling Language (UML) that is specific to NIEM.

- NIEM-UML generates 100% NIEM conformant information exchanges. This means that architects and developers who build NIEM exchanges don't need to worry as much about the technology details, as outlined in the NIEM Naming and Design Rules (NDR), and the Model Package Description (MPD) Specification.
- If you already use and understand UML, the typical learning curve that comes with NIEM development is greatly reduced.
- UML provides a visual representation of an exchange that would be understandable to both technical and non-technical resources such as business stakeholders.
- NIEM-UML's use is dependent on tools that implement the profile.

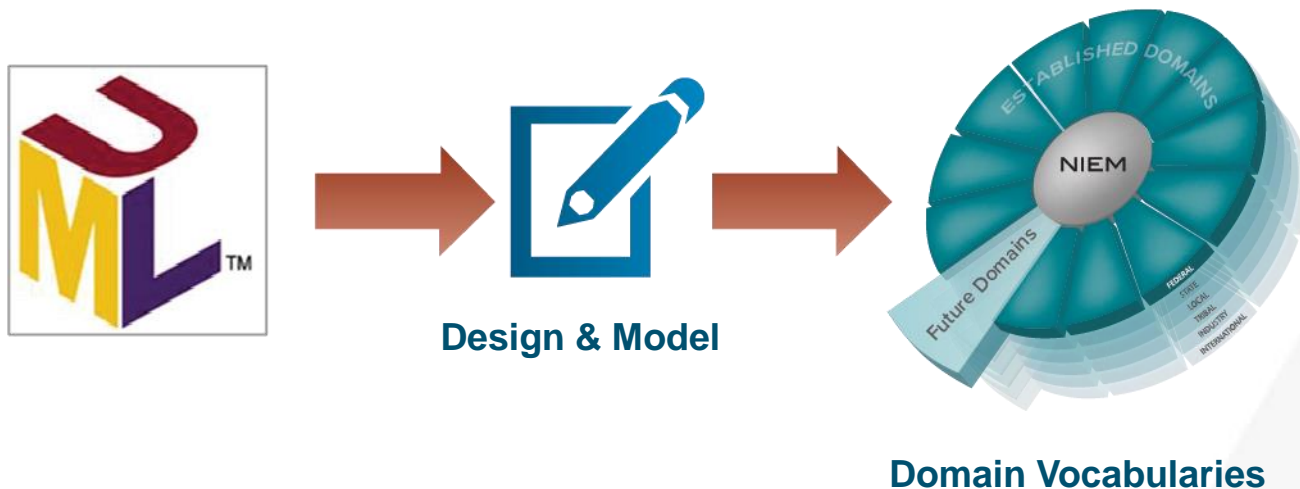
USING NIEM-UML TO MODEL INFORMATION EXCHANGES

Using the NIEM-UML profile with UML modeling tools, Developers can combine their own unique needs with the NIEM reference vocabularies to design information exchange models that will produce NIEM information exchange packages that power XML “on the wire” technologies.



USING NIEM-UML TO DEFINE NEW DOMAINS

NIEM-UML can also help users manage NIEM domain data model content. Domains created with NIEM-UML will have both a UML and XML schema representation.



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