## $\langle NIEM \rangle$

## NIEM-UML Specification Overview Transcript

## **NIEM Program Management Office Resource**

Welcome to the NIEM-UML specifications overview. In this tutorial, we expect you have a little background. Perfect, you've seen the NIEM-UML high level introduction, and have a basic understanding of NIEM. In this tutorial, we'll review the basic parts of the NIEM-UML specifications. If you need more background, please see the tutorial webinars on the NIEM website. The National Information Exchange Model, NIEM, is a well-established U.S. sponsored program and community for standardized information exchange. The NIEM program is sponsored by the Department of Homeland Security, Department of Health and Human Services, and the Department of Justice. The Object Management Group, OMG, is a leading industry consensus organization specifying many of the popular modeling and middleware standards.

UML, the Unified Modeling Language, is an established standard for modeling from the OMG. NIEM-UML includes a profile of UML for modeling NIEM at a logical level and mapping of these models to NIEM XML technology artifacts. NIEM-UML has been adopted by the OMG with the support of the NIEM Program Management Office (PMO) and NIEM community. The NIEM specification has multiple parts applicable to different stakeholders. Section 1 is the scope and provides a good overview and intro to NIEM-UML. The Conformance specification is intended to specify how tools and models conform to the NIEM-UML specification. References, Terms and Definitions, and Symbols provide background for how to read the specification. Additional information also provides some background information and may be a good introduction to the specification. Those who will be modeling with NIEM-UML, or want to understand NIEM-UML models better, Section 7, the modeling guide is an excellent reference. The more detailed reference is the Profile Reference, which specifies in detail how UML is used to model NIEM. Section 9 the Transformation Reference, is primarily intended for tool vendors who are implementing the transformation between models and NIEM XML artifacts or from NIEM XML artifacts back into models. Annex A provides an example, and is also something that would be useful for those intending to model in NIEM-UML. Annex B is a Structured English Mapping that defines the transformation rules between models and XML artifacts in a very precise English format. Essential to NIEM-UML are the Machine Readable Artifacts.

The profiles, which plug into UML tools, the QVT (query/view/transformation) mappings that provide the transformations between models, and models and artifacts, and the NIEM reference name spaces derived from the existing NIEM reference models. Conformance is essential to NIEM, and the NIEM conformance documents are strictly adhered to in NIEM-UML specifications. This includes the NIEM conformance rules, the Naming and Design Rules, and the Model Package specifications. The output of NIEM-UML compliant tools fully conforms with these existing technical specifications. In the design of NIEM-UML, it was required that there be different entry points for different users. Users intending to model at a more logical level, that's more business centric, would use the NIEM PIM Profile. Users, who are intending to model and view the model in a more XML specific manner, would use the NIEM PSM Profile. All of these have a mapping in the NIEM artifacts as defined by the Model Packaging Description rules. Because there are different layers for different purposes, there's a layered architecture to the NIEM-UML profile specs. The Platform Independent Perspective is intended to be used by business modelers and includes higher level concepts. It also imports what we call the Common Profile. The Common Profile are concepts that are shared between the Platform Independent level, the business level, and the Platform Specific level, which is more XML centric. The platform specific perspective includes those profile elements to consume a NIEM-UML model to output XML precisely as specified. The model packaging perspective provides the metadata to take either of these models and produce or consume a NIEM MPD artifact, such as an IEPD. We'll get into more detail on each of these profiles and perspectives as we proceed.

The NIEM profile is a simplified subset of the Unified Modified Language, specifically for the purpose of modeling information exchanges. A set of UML constructs and stereotypes in NIEM-UML extends UML for the NIEM business concepts and technical concepts that are not found natively in UML. The business concepts are augmented with the platform independent mapping, such that they enforce the Naming and Design Rules as specified in the NIEM technical specifications. This is all validated by what's called OCL, or Object Constraint Language, the mechanism within UML to make sure that a model is valid according to its specifications. The way the NIEM-UML profile is constructed is intended to correspond to normal UML usage patterns with well-defined mappings to NIEM. It also provides for general information modeling not specific to NIEM. It can be used for other purposes. All the mappings, from the NIEM models to NIEM, support and enforce the Naming Design Rules and the model packaging specifications. For example, the names a business user may use in a model are automatically modified to comply with the NDR rules.

Reviewing the parts of the specification in more detail, we have the PIM Profile, or Platform Independent Model Profile. This is used for both the in-reference models, and for the models that users create for their own purposes. The NIEM reference models use the PIM Profile, as does NIEM Core, and the XML primitive types. These are extended, referenced, and reused within a PIM model for a specific domain, application, or IEPD. The Model Package Description Profile is then used for a specific model of an MPD or IEPD. This adds the metadata that allows the Platform Independent Model to be mapped into the XML technologies. The transformation specifications



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define how PIM model plus an MPD is mapped into a platform specific model that is a model that more precisely mirrors the XML schema. This is represented using the PSM Profile. There's then another level of mapping which transforms that to the NIEM platform specifications. Everything produced by a valid UML model is intended to produce a valid and conformant NIEM IEPD.

Let's review the NIEM-UML profiles. As we discussed there's the NIEM Common Profile. This is imported and reused by both the PIM Profile and the PSM Profile. Thus, all the concepts defined in the Common Profile are available at both the PIM and PSM level. Note also that the PIM Profile is allowed to use PSM concepts; however the PSM Profile is not allowed to use PIM concepts. There is then the Model Package Description Profile, for adding the metadata about a specific MPD or IEPD. The NIEM-UML profile is considered the union of all these sub-profiles allowing modeling at the PIM, PSM, or MPD levels. This is a graphical representation of the Common Profile. These are all the concepts needed at that level. The boxes marked as metaclass are existing UML concepts, such as class, data type, package, realization, enumeration, and generalization. Where necessary, NIEM specific concepts extend these existing UML concepts, such as object types, metadata, name spaces, and unions. For more detail, please see the modeling guide section of the NIEM-UML specification. The Platform Independent Profile adds some specific concepts to allow modeling at a more logical level. This includes UML associations and association classes, the concepts of roles, a higher level way to represent NIEM augmentations, and the concept of an information model for a specific purpose. The NIEM Platform Specific Profile includes stereotypes intended to mark a model to make XML specific commitments to decide how that model is going to map to or has mapped from XML. For example, whether elements or attributes are used, how white space is handled, how declarations are handled between name spaces, and the handling of any properties. The NIEM-UML specification also includes all of the NIEM reference name spaces. This includes NIEM Core, which is used by all domains, all name spaces included by NIEM core, and specific NIEM domains, such as Emergency Management, Family Services, and Maritime.

That concludes the NIEM-UML Specification Overview. For more information on NIEM, or NIEM-UML, please see the webinars on the NIEM.gov website. Thank you for your interest in NIEM-UML.

