DoD Adoption of NIEM:
Frequently Asked Questions About NIEM

The questions in this list are related to NIEM itself, not the DoD adoption policy. The answers should be applicable to all organizations, not just the DoD.

1. Is NIEM a data standard, a data model, or what?

NIEM is best understood as a standards-based framework approach to exchanging information. Data exchange[1] designers follow the NIEM approach to create exchange specifications. Developers use those specifications to write software that creates and consumes the exchanged data at runtime.

A NIEM-based exchange specifications are voluntary consensus data standards. NIEM includes a data model, expressed by the data components in the NIEM Core and NIEM domains. However, NIEM also includes governance, training, tools, technical support services, and an active community.[2] Any understanding of NIEM as just a data standard or just a data model is therefore incomplete.

2. What if NIEM can't handle the information I need to exchange?

It is always possible to express your information in the form of an IEP [3]; that is, a NIEM-conforming XML document. If you need an alternative to NIEM, it is because that alternative works better than NIEM in your situation, not because NIEM won't work at all.

3. What if NIEM doesn't have all the data components I need in my IEPD [4]?

That is usually the case. The data components in the NIEM Core and the NIEM domains are intended to be useful in many data exchanges, but they are not expected to be complete for every data exchange. If you can't find the data component you need in the Core or in any domain, then you simply create a new component as needed for your IEPD. If your new component will be useful in many exchanges, then you should see about adding it to the appropriate domain.

4. What if NIEM has data components I can't use in my IEPD?

Data exchange designers should avoid needlessly duplicating a data component in the NIEM core or a NIEM domain. However, exchange designers are never required to use a component that is not suitable for their business needs. If a data component for your concept won't work, and can't be extended or augmented as you need, then you don't have to use it. You are free to create your own data component instead. As before, if your new component will be useful in many exchanges, then you should see about adding it to the appropriate domain.

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[1] "Data exchange" and "information exchange" are equivalent terms in this document.
[2] *About NIEM*. http://www.niem.gov/aboutniem
[3] IEP = Information Exchange Package. The message or XML document exchanged at runtime. See question #25.
[4] IEPD = Information Exchange Package Documentation. The specification of the data exchange.

5. *What if I want to use data components from an external (non-NIEM) standard in my data exchange?*

This happens often and is easily done. For example, you may need to provide the geospatial location of some object in your message, and decide to use the `Point` element from GML to represent that location. This can be done by defining an *adapter type* for the external content and then using elements of that type as needed in your exchange specification.[5] This permits use of external standard components exactly as they are defined, without any modification to bring the external standard into conformance with NIEM.

Adapters provide schema metadata to inform tools and developers that the adapted external schema and XML instance data may not conform to the NIEM Naming and Design Rules (NDR). Adapter elements also include the attributes defined by default for every NIEM object. Developers usefully depend on finding these attributes as needed in the message.

NIEM adapters do not involve significant additional effort during development, and do not require special processing at runtime. The entire message can be validated and processed normally. There is no need for a special "NIEM validation engine", and no need to extract the external content for separate processing. For an illustration of a NIEM adapter in practice, see [EmbeddedGML].

6. *What if I can't afford the runtime performance penalty for a NIEM adapter?*

You are thinking of a different kind of "adapter." For example, developers frequently employ a "software adapter" to integrate legacy software with an enterprise service bus (ESB). That software executes at runtime and transforms data from the legacy format into an ESB message and vice versa. NIEM adapters are completely different. They are distinguished by XML schema `appinfo` metadata, which has no effect on runtime processing. They impose no significant performance penalty.

7. *What if I want to use data components from GML in my data exchange?*

Your exchange specification can use any component defined in the GML schema or in a GML application schema. For convenience, NIEM 3.0 provides a set of predefined adapter types and elements in the `adapters/geospatial` directory tree. These may be used in Core, domains, and IEPDs. However, if you need a GML component for which there is no pre-defined convenience adapter, then you may always define your own adapter type.

8. *Do adapters cause problems with accuracy or precision in GML data?*

No. The GML data within the adapter element is the same data found in a GML Document, with the same interpretation, valid against the same schema. If there are problems with accuracy or precision, the blame belongs to the runtime data producer, not the NIEM adapter type. A more detailed explanation is available in [Precision].

[5] NIEM 3.0 includes predefined adapter types for gml:Point and other GML components, based on recommendations from the OGC's *Geo4NIEM* interoperability program pilot.

9. What if my NIEM domain doesn't approve my IEPD?

It doesn't work that way. Nothing in NIEM gives a domain steward the power to approve or disapprove your IEPD. So far as NIEM is concerned, the IEPD Designer Is King. If your IEPD is subject to external approval, then you must be subject to some governance beyond what NIEM imposes. You might ask people in the NIEM domains to review your IEPD, but you would do this for advice, not permission.

10. What happens when the Core or a domain updates a component in my IEPD?

Nothing, unless and until you are ready to make the corresponding change. Your IEPD is still valid with the old definition. Software implementations of your IEPD will still work and can continue to exchange IEPs that follow your IEPD. Developers can still implement your IEPD in new software. When you are ready, you may define a new version of your IEPD using the new Core or domain definitions. It's possible for producers and consumers to support both the old and new versions of your IEPD, should they happen to need that sort of backward-compatibility.[6]

11. What happens if the Core or domain won't change a component as quickly as I need?

If the existing data component does not suit your business needs, you are free to define your own component in your own namespace. The IEPD Designer Is King.

12. What happens if my domain needs to change faster than the NIEM Core?

The version control architecture in NIEM 3.0 permits each domain to update its own content on its own timetable. Domains are not required to wait for a Core update.

13. Can my community use its well-known acronyms instead of ISO 11179 component names?

Yes. In general, each term in a data component name is supposed to be a word found in the Oxford English Dictionary. However, the *local terminology* feature introduced in NIEM 3.0 permits a community to define its own terms within its reference schema. For example, the Immigration domain defines the "ICE" acronym to mean "Immigration and Customs Enforcement", which permits it to define data components such as `ICEEmployeeType`.

14. What if my IEPD or domain contains classified or limited-distribution data components?

As a reminder, here we are not talking about the data exchanged at runtime, but rather the design-time specification of that data. Perhaps the specification includes a classified code list. Data exchange designers are encouraged to publish their exchange specifications, but nothing in NIEM requires them to do so. If you can't share your IEPD with the world, then don't.

Everything in the NIEM distribution is released to the public, including the domain data models, so these must not include limited-distribution data components. However, nothing prevents a domain steward from creating additional reference schemas with limited distribution. In effect

[6] This takes work, of course. There's no magic in the NIEM version architecture to effortlessly provide compatibility among versions. NIEM versioning only guarantees that you can tell versions apart and change them independently.

this divides your domain's subject area into a public zone and one or more private zones. This is an accepted practice in the NIEM community.

15. Does NIEM provide support for OWL and/or SKOS?

NIEM allows IEPs to contain values taken from taxonomies defined elsewhere in OWL or SKOS. That is the extent of the support at present. According to the forthcoming NIEM Technical Strategy, the NTAC will soon begin collecting use cases to show the purpose, methods, and benefit of supporting OWL and SKOS. If compelling use cases are found, then support will be added in a future release.

16. Does NIEM provide support for JSON?

It is possible to convert an IEP into JSON syntax. However, at present NIEM does not specify the rules and conditions for this conversion. The NTAC will collect use cases for JSON along with OWL and SKOS. If compelling use cases are found, then support will be added in a future release.

17. Does NIEM provide support for RDF?

NIEM is based on the RDF model. Objects and associations in a NIEM IEP are RDF resources. However, NIEM does not have any explicit support for RDF syntax. The NTAC will collect use cases for RDF syntax along with OWL, SKOS, and JSON.

18. Can I use `xs:any` *schema wildcards in my IEPD? What about* `xs:choice`*?*

Yes. The NDR does not permit schema wildcards or the `choice` particle in a reference schema, so these can't be part of a reusable data component in NIEM Core or in a NIEM domain. However, the NDR does allow `xs:any` and/or `xs:choice` within extension and exchange schemas. That means you are perfectly free to use these constructs within your exchange specification.

19. How do I make my system conform to NIEM?

This is a trick question. You can't do it, because a system or acquisition program is not the sort of thing that can conform to NIEM. Conformance is only defined for XML documents, XML schemas, and Model Package Descriptions (MPDs).

Compliance is a different matter. NIEM has nothing to say about compliance.[7] However, your governing authority might impose a NIEM mandate, requiring you to use the NIEM standards-based framework approach for some or all of your data exchanges. You may have to comply with that mandate – but that is something between you and your governing authority.

[7] *NIEM Conformance Specification*, version 3.0

20. Is NIEM only used for data exchange between different Federal government agencies?

No. NIEM is useful whenever you need a specification for a machine-to-machine data exchange. You may be thinking of the Office of Management and Budget (OMB) *FY11 Budget Passback Report* (March 2010). That report directed all Federal agencies to evaluate the adoption and use of NIEM for "cross-boundary" information exchanges. The "boundaries" are those between agencies, or between an agency and international, state, local, tribal, industry, and non-governmental agency partners. Nothing in that OMB report limits the use of NIEM to such exchanges.

21. Does OMB Circular A-119 mean we must use industry standards in preference to NIEM?

No. If the OMB wanted Federal agencies to abandon NIEM in favor of comparable voluntary consensus standards (such as ebXML), then the OMB would not have directed the agencies to evaluate the adoption and use of NIEM in the FY11 budget passback.

Although Circular A-119 does not apply to NIEM as a whole, it may apply to a particular information exchange specification (IES) created through the NIEM standards-based framework approach. When a NIEM-conforming IES is created or adopted by a voluntary consensus standards body, that IES becomes a voluntary consensus standard, one that is preferred by the A-119 rule. In other cases, the A-119 rule prefers an IES from a voluntary consensus standard over an equivalent, government-unique NIEM IES.

22. Is the use of NIEM limited to SOAP-based web services?

No. NIEM makes no assumptions about data transport. You can send a NIEM IEP as the payload of a SOAP message, as the XML response to a REST-based HTTP request, or even as an email attachment.

23. What if I have to make my messages as small as possible?

In that case you should consider using Efficient XML Interchange (EXI), which is the W3C standard for a compressed binary serialization of XML data. NIEM and EXI used together can produce a message that is very close to the smallest possible size.

24. Can NIEM be used to exchange data with mobile devices?

Yes. There is nothing special or unusual about this.

25. What is the difference between IEP, IEPD, and IES?

IEP stands for Information Exchange Package. This is a NIEM-conforming XML document containing the instance data exchanged between producer and consumer at runtime. IEPD stands for Information Exchange Package Documentation. This is a NIEM-conforming specification of a data exchange. It describes for developers the instance data that their software will exchange at runtime. IES stands for Information Exchange Specification. A "NIEM-conforming IES" is the same thing as an IEPD. Every IEPD is an IES. Some IESs are IEPDs.

DoD Adoption of NIEM:
Frequently Asked Questions About the Policy

The questions in this list are related to the DoD adoption policy, not to NIEM itself. The answers are probably of little interest outside the DoD.

1. *What is the "NIEM First" rule (in 25 words or less)?*

Provide a NIEM-conforming interface for every new data exchange, or submit a waiver to the DoD CIO specifying and demonstrating why the use of NIEM is not capable of meeting your data exchange need and what standard is requested for approval.

2. *What is required to convince the DoD CIO that my alternative is better?*

This process is called "obtaining an exception" to the NIEM First rule. Exceptions are justified by a business case for the proposed alternative approach. The answer to the question, "why not use NIEM? " should take the form of a proposed alternative that will allow producers and consumers to exploit an existing (or anticipated) community and its software base, saving time and/or money. The exception process will be made as simple and easy as possible for the requesting organization.

3. *Do I have to replace my existing data exchanges to make them NIEM conforming?*

No. Existing exchanges need not be modified at all. Beginning in FY15, when you make a significant modification to a data exchange, then you must either use NIEM or obtain an exception.

4. *When do I have to retire (turn off) my existing non-NIEM data exchanges?*

The NIEM First rule does not require you to turn off any existing non-NIEM data exchange.

5. *Do I have to use NIEM for every data exchange?*

No. You are not required to replace existing data exchanges just to make them NIEM conforming. You don't have to use NIEM for new and modified data exchanges if you obtain an exception.

6. *Do I have to use NIEM inside my system?*

No. The NIEM First rule doesn't apply to data stores or data exchanges entirely within a single system or acquisition program. It only applies when data is accessed across a system or program boundary.

7. *OK, I built a NIEM interface for my system. Now I'm all done, right?*

Sure, if your system only has one interface for one data exchange. If you have more than one data exchange, the NIEM First rule applies to each one separately.

8. Who will pay for all this NIEM work?

Whoever is responsible for funding your new or modified data exchange. If there is no funding for a new or modified data exchange, then the NIEM First rule does not apply. The NIEM First rule is direction for how to perform work that is funded.

9. If I make my data available through NIEM, can I also make it available some other way?

Yes. Providing a NIEM-conforming interface for your data exchange completely satisfies the NIEM First rule. You are then free to provide any number of additional interfaces to the same data, using any standard or approach you like.

10. Can I still use GML for geospatial data?

Yes. It is easy to embed GML data within a NIEM IEP by defining an adapter type (or reusing the predefined geospatial adapters in NIEM 3.0).

11. Can I still use GML documents instead of NIEM IEPs for geospatial data?

Yes, but you may need an exception. A *GML document* is an XML document that follows all of the GML rules and is defined by a GML application schema. It is not a conforming IEP and so doesn't satisfy the NIEM First rule. Beginning in FY15, you have two choices for a new or modified data exchange. You may obtain an exception and provide an interface that exchanges GML documents, defined by a GML application schema. Or, instead of obtaining an exception, you may provide two interfaces – a NIEM-conforming interface in addition to the GML interface. Either choice satisfies the NIEM First rule. And, of course, interfaces providing GML documents before FY15 may continue to do so afterwards, with no action required. As a rule of thumb, if you are providing GML documents today, you can probably get an exception to use GML for similar data in similar circumstances tomorrow.

12. Can I still use UN/CEFACT for electronic trade documents? How about ANSI X12?

Yes. Beginning in FY15, you have the same two choices for a new or modified data exchange: obtain an exception, or provide a NIEM-conforming interface in addition to your preferred alternative. UN/CEFACT and X12 interfaces in operation before FY15 may continue to operate, with no action required.

13. Does the NIEM MilOps domain encompass the entire DoD so far as NIEM is concerned?

No, absolutely not. DoD is already involved in several other NIEM domains; for example, Biometrics, CBRN, Cyber, and Maritime Domain Awareness. IEPD designers are expected to find reusable data components in the NIEM Core and in any of the NIEM domains. The purpose of the MilOps domain is to create reusable data components for concepts especially related to military operations, concepts which are not captured in other domains.

14. What is the precise scope of the MilOps domain?

The purpose of the MilOps domain is to form useful, shared data definitions in the form of NIEM data components. NIEM domains do not exert any control over IEPD designers or system developers, so there is no sense in which COIs and PORs become "subject" to the MilOps domain. In particular, the NIEM MilOps domain does not approve or manage the IEPDs that reuse its data components. Therefore the precise subject-area scope of the domain does not matter a great deal, because the domain is all about cooperation, and not about control. Roughly speaking, the MilOps domain will be interested in the same topics as the Warfighter Mission Area, and will seek to create shared data components for that subject area. Like every NIEM domain, it will try to harmonize with content in the NIEM Core and other domains, and avoid duplicating that content in its own definitions.

15. Will all of the warfighting COIs be absorbed into the MilOps domain?

Probably not. COIs still have a distinct role. They may create community IEPDs, and may create reusable data components that are too specialized for the MilOps domain. These COIs need to work with the MilOps domain (and potentially the other NIEM domains) to create shared data components and to reuse those components where appropriate in their own vocabulary and IEPDs. In short, while these COIs need to cooperate with the MilOps domain, there is no reason why they should be subsumed into the domain.

16. Are tactical data exchanges (MIL-STDs) exempt from the NIEM First rule?

The NIEM First rule applies to these exchanges like any other. However, it is not difficult to imagine the business case for an exception. Most of these standards are defining XML equivalents to their message formats, and these XML equivalents should be made NIEM-conforming. Over time it may be possible use the MilOps domain to harmonize some data definitions across these standards.

17. Are data exchanges with allies exempt from the NIEM rule?

Again, the NIEM First rule applies to these exchanges like any other, and again it is not difficult to imagine the business case for exceptions. In the future some of these exchanges may be designed using the NIEM standards-based framework approach, in which case there is no conflict.

18. When should I start considering NIEM in my acquisition program?

As early as possible. Consider NIEM as soon as you recognize the need for a new or modified data exchange. Approach the CIO for an exception as soon as you can provide a business case for your preferred alternative. The NIEM First rule only applies to data exchanges fielded in FY15 and thereafter, but the time to start thinking about those exchanges is now.

19. Is NIEM compatible with ISM?

Yes. The *XML Data Encoding Specification for Information Security Markings (ISM)* is entirely attribute-based. That is, if your document has the right ISM attributes with the right values on the

right elements, then it conforms to the ISM specification. NIEM 3.0 permits every possible arrangement of ISM attributes within an IEP. Therefore NIEM conformance can never conflict with ISM conformance.[8]

20. Is NIEM compatible with NTK?

Yes. The conformance tests in the *XML Data Encoding Specification for Need-To-Know Metadata (NTK)* may be considered in two pieces. First, a conforming document must include the `ntk:Access` element at an appropriate location chosen by the schema designer. In NIEM, this can always be accomplished by defining an adapter type and element in the exchange schema. Second, NTK includes attribute-based portion marks that are similar to ISM attributes and are handled by NIEM 3.0 in the same way. Therefore NIEM conformance can never conflict with NTK conformance.

21. Is NIEM compatible with TDF?

Yes. The *XML Data Specification for Trusted Data Format (TDF)* provides two options for a document root element: a Trusted Data Object (TDO), or a Trusted Data Collection (TDC), which is a collection of TDOs. Each TDO contains a payload and some assertions about that payload. When using NIEM and TDF together, the NIEM IEP becomes the payload in a TDO. NIEM conformance says nothing about the TDO wrapper around the IEP. The TDF conformance rules say very little about the structured payload: it must be well-formed XML, and its root element must not be in the TDF namespace.[9] Every IEP is well-formed XML, and the namespace of the root element is chosen by the IEPD designer. Therefore NIEM conformance can never conflict with TDF conformance.

22. Does the ODNI CIO agree that NIEM is compatible with ISM, NTK, etc.?

ODNI CIO has not made that determination as of the time of this writing. Their plan calls for evaluating the conformance of IEPs from a number of detailed use cases. The results will either reinforce the DoD findings, or identify exception cases where those findings are incorrect. (Any such cases, should they exist, are natural candidates for an exception to the NIEM First rule.)

23. Will the DoD offer NIEM training or a NIEM developer certification?

Unknown as of this writing. According to the DoD's NIEM implementation plan, the DoD will formally establish a NIEM Center of Excellence (COE) by 2QFY14. The COE will offer technical assistance to the DoD Components, and this will probably include NIEM training. The online training provided by the NIEM PMO is available to DoD developers at no cost on the NIEM website. At present no organization is offering NIEM developer certification.

[8] The DoD findings in questions 18-20 are based on the study performed for the C2 Data and Services Steering Committee (C2 DSSC).

[9] Defined as `<xs:any namespace="##other" processContents="skip"/>` in the TDF schema.

24. Is there a DoD-specific process for verifying that my data exchange is NIEM-conforming?

No, not at present. The NIEM PMO provides tools which automate large portions of the NIEM conformance tests for IEPs and IEPDs. These are available at no cost to IEPD developers.

25. Where can I find the existing NIEM IEPDs?

There is no single repository that contains every IEPD. The niem.gov site allows users to upload IEPDs and provides a search interface[10] to those uploaded. Many IEPDs can be found through the *IEPD Clearinghouse*[11] registry provided by DoJ. IEPDs developed by the DoD should be registered in the DSE and can be found there. For example, the *Maritime Domain Awareness Positions and Tracks IEPD*[12] can be found in the "NIEMMaritime" namespace.

List of Acronyms

ANSI	American National Standards Institute
CBRN	Chemical - Biological – Radiological- Nuclear
CIO	Chief Information Officer
COE	Center of Excellence
COI	Community of Interest
DoD	Department of Defense
DoJ	Department of Justice
DSE	Data Services Environment
ESB	Enterprise Service Bus
EXI	Efficient XML Interchange
GML	Geography Markup Language
HTTP	Hypertext Transfer Protocol
IEP	Information Exchange Package
IEPD	Information Exchange Package Description
IES	Information Exchange Specification
ISM	Information Security Marking
ISO	International Organization for Standardization
JSON	JavaScript Object Notation
MPD	Model Package Description
NDR	Naming and Design Rules
NIEM	National Information Exchange Model
NTAC	NIEM Technical Architecture Committee
NTK	Need To Know
ODNI	Office of the Director of National Intelligence
OMB	Office of Management and Budget
OWL	Web Ontology Language
POR	Program of Record
RDF	Resource Description Framework
REST	Representational State Transfer

[10] Available at http://tools.niem.gov/niemtools/iepdt/index.iepd
[11] Available at https://it.ojp.gov/default.aspx?area=implementationAssistance&page=1108
[12] Available at https://metadata.ces.mil/dse/dse_assets/100135440/submission_package

SKOS	Simple Knowledge Organization System
SOAP	Simple Object Access Protocol
TDC	Trusted Data Collection
TDF	Trusted Data Framework
TDO	Trusted Data Object

References

[EmbeddedGML]: Renner, S., "Embedded GML in NIEM", Sept. 2012.

[Precision]: Renner, S., "Geolocation Accuracy and Precision in NIEM", May 2013.