

**Track  
IEPD V3.0  
Master Document**

**For**

**National Information Exchange Model –  
Maritime (NIEM-M) Domain**

**24 February 2012**

## Record of Changes

Date	Description	Author
15 March 2011	V 0.1 release	Ross Kim
24 May 2011	V1.0_1 – Draft of Track elements and attributes	Daniel Ruiz
25 May 2011	V1.0_2 – Internal review changes, corrected content to Track	Daniel Ruiz
31 May 2011	V1.0_3 – External review changes, added record of changes and cover page	Daniel Ruiz
30 September 2011	V2.0 release	Daniel Ruiz
24 February 2012	V3.0 release	Priscilla Walmsley

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## Introduction

The DOD Executive Agent for Maritime Domain Awareness is championing an effort to develop a common, community-defined exchange specification for the sharing of vessel track information and associated access control policy. The vessel track schema is:

- Intended to capture salient information elements that inform analytical and decision-making processes.
- A proposed model for vessel track exchanges within the Maritime Community.
- Based on the National Information Exchange Model-Maritime (NIEM-M).

The basic message structure is as follows:

### Message

- Creation Date
- Received Date
- Creator
- Message ID URI
- Message Mode
- Track Source
- Vessel
- Contact Information
- Additional Remarks
- Expansion

## About NIEM-M

The National Information Exchange Model (NIEM) provides the basic definitions for the components used in this exchange. Specifically, this IEPD draws from:

- *NIEM core* for data components for describing universal objects such as people, locations, activities, and organizations
- The NIEM Maritime Domain for maritime-specific data elements such as more detailed vessel and cargo information.

The NIEM Maritime (NIEM-M) XML vocabulary is model is a combination of objects that come from NIEM core, the Maritime domain, and additions via the EIEM and IEPD, described in the next sections.

## Enterprise Information Exchange Model

An Enterprise Information Exchange Model (EIEM) is a NIEM-conformant set of XML schemas and other artifacts. The NIEM Maritime EIEM defines core entities (called Business Information Exchange Components or BIECs) that serve as building blocks that are reused in many maritime exchanges.

The high-level entities defined by the Maritime EIEM are:

- Vessels
- Activities (e.g., an incident or MOTR response)
- Person (e.g., a crew member, person of interest or vessel owner)
- Organizations (e.g., a MOTR participating organization or vessel owner)
- Cargo
- Port
- Arrivals and Departures
- Threats
- Geospatial Position/Track

Using an EIEM increases the commonalities among exchanges, which has a number of benefits:

- It makes it easier to develop processes that work across multiple record types, for example to search for vessels, or to represent geospatial positions to an end user.
- It reduces complexity in terms of number of overall elements that need to be supported.
- It decreases the time and cost of maintaining the model because it is simpler and has less overlap.

## Information Exchange Package Documentation

Each IEPD in the NIEM-M family defines a particular XML message, which is the basic unit of shared information. As depicted in Figure 1, an IEPD uses a subset of the core entities defined in the EIEM and assembles them into a particular record type with its own unique root element. As new requirements are defined, new IEPDs can be created that build on the same EIEM core entities.

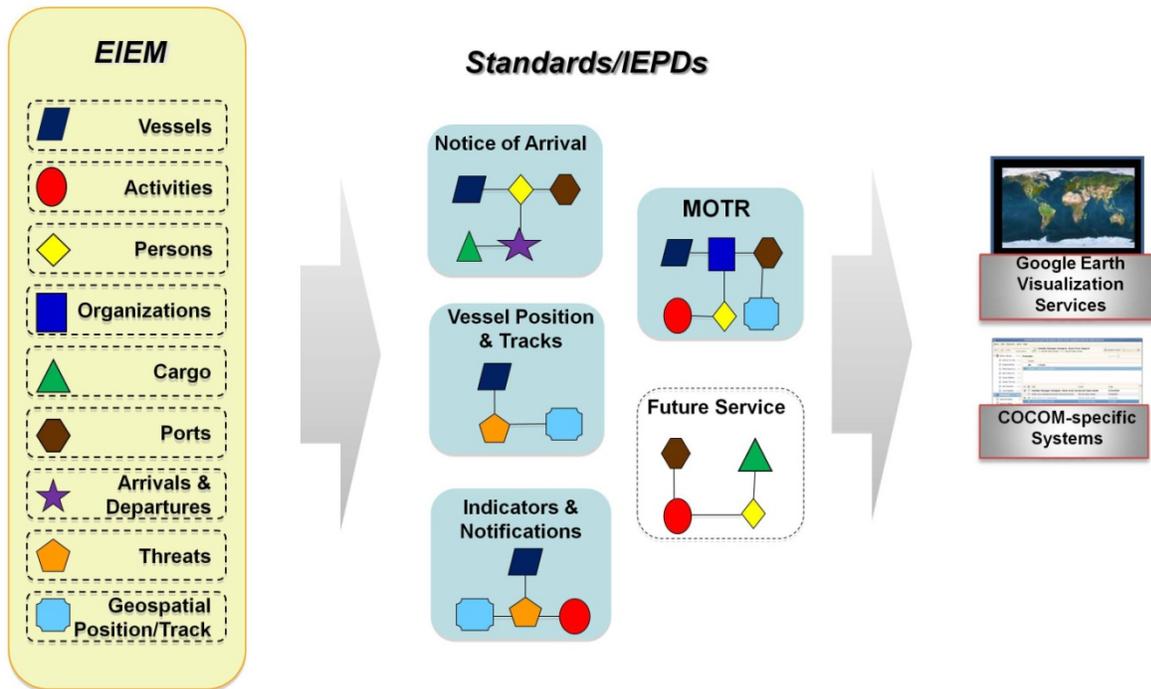


Figure 1 IEPDs combine core entities from the EIAM

The architecture is flexible enough to allow an IEPD to extend or restrict the EIAM components, as long as no required properties are removed.

For example, this Track IEPD defines a Vessel Position and Track message. It uses the definition of Vessels, Threats and Geospatial Positions from the EIAM; these are the elements in the exchange prefixed with "mda:". It contains a restricted subset of the EIAM schema that contains only the high-level objects pertinent to Track messages.

In addition, the Track IEPD defines new exchange-specific information, for example the track source. These are the elements in the exchange prefixed with "trk:".

## Structure of the Track IEPD

This IEPD is a set of NIEM 2.1-conformant exchange artifacts. It is conformant to the NIEM MPD (Model Package Description) Specification, version 1.0, and uses the file structure recommended by that document. Specifically, the file structure is as follows:

- *catalog.xml* is a machine-readable list of files included in the IEPD, conformant to the MPD specification.
- *catalog.xsl* provides a human-readable rendering of the *catalog.xml* document.
- *catalog.html* and *metadata.xml* are generated from *catalog.xml* in order for the IEPD to be supported by non-MPD-aware tools.
- *changelog.pdf* lists changes in the IEPD since version 2.0.
- *master-document.pdf* is this document.
- *XMLSamples*
  - *SampleTrack.xml* contains an example XML document that would be considered complete for the exchange.
- *XMLSchemas*
  - *exchange/3.0*
    - *track-exchange.xsd* is the exchange schema that defines the root element.
  - *extension*
    - *external/ISMV6*
      - This folder contains the IC-ISM V. 6 schemas, which are treated as NIEM external schemas.
    - *track/3.0*
      - *track.xsd* is the extension schema that defines Track-specific components.
    - *mda/3.0*
      - *mda.xsd* is the EIEM schema, subsetted appropriately for the Track IEPD.
    - *mda-codes/3.0*
      - *mda-codes.xsd* is the EIEM codelist schema, subsetted appropriately for the Track IEPD.
  - *subset*
    - *wantlist.xml* is the list of components reused from NIEM.
    - *niem*
      - This folder contains the NIEM subset used in the Track exchange.

## Track Schema Element Tables

To give a coherent overview of the Track Schema, the report is broken up into several tables based on logical objects. Each table consists of three columns: element, description and path. The element column contains a name of a data element. The description column contains a description of the element or attribute. Finally the path column contains an XPath expression giving the location of element or attribute in the schema.

### Message Metadata

The root element is the `trkex:Message` element defined in the track exchange schema. The message will include some initial metadata elements defined in the NIEM Core schema.

Metadata		
Element	Description	Path
Creation Date	Date the content of this resource was created	<code>trkex:Message/nc:DocumentCreationDate</code>
Received Date	Date the content of this resource was received	<code>trkex:Message/nc:DocumentReceivedDate</code>
Creator	Entity primarily responsible for creating the content of the resource, represented by an <code>nc:EntityOrganization</code>	<code>trkex:Message/nc:DocumentCreator</code>
Message ID URI	Unique ID identifying this message	<code>trkex:Message/mda:MessageIDURI</code>
Message Mode	The mode of the message can be: exercise, test or real	<code>trkex:Message/mda:MessageModeCode</code>
Track Source	Text description of the source of this track information	<code>trkex:Message/trk:TrackSourceText</code>

### Vessel Information

Vessel characteristics, capabilities, dynamic state, and relationships

Vessel		
Element	Description	Path
Call Sign	The call sign for a vessel	<code>trkex:Message/mda:Vessel/m:VesselAugmentation/m:VesselCallSignText</code>
Description	Text description of a vessel	<code>trkex:Message/mda:Vessel/m:VesselAugmentation/m:VesselDescriptionText</code>

Hull Number	The hull number of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselHullNumberText
IMO Number	An International Maritime Organization Number (IMO number) of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselIMONumberText
MMSI	A Maritime Mobile Service Identity (MMSI) of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMMSIText
Name	The name of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/m:VesselName
National Flag	A country under which a vessel sails, represented as an ISO 3166 three letter code	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselNationalFlagISO3166Alpha3Code
Owner	The entity that owns a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/m:VesselOwner
SCONUM	A Ship Control Number (SCONUM) of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselSCONUMText
Crew Nationality	Nationalities of the crew onboard the vessel	trkex:Message/mda:Vessel/ mda:VesselCrewNationalityList/ mda:VesselCrewNationalityCode
Current Position	A geospatial position, course, heading, speed of a vessel at a given time (see Vessel Track table for detailed breakdown)	trkex:Message/mda:Vessel/ mda:VesselCurrentPosition

## Vessel Track

Track of a vessel over time, including geospatial position, course, heading, speed

Vessel		
Element	Description	Path
Track	The track of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack
Track Bounding Area	The geographic area encompassing the set of vessel positions in a vessel track, represented as a GML envelope	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/ m:VesselTrackBoundingArea
Track Bounding Date Range	The dates and times (inclusive) encompassing the set of vessel positions in a vessel track	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/ m:VesselTrackBoundingDateRange

Position	A geospatial position, course, heading, speed and status of a vessel at a given time (allows multiple positions, each with a point, speed, course, heading and date/time).	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition
Location Point	Geospatial position of the vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition/ m:LocationPoint
Speed Measure	A measure of the speed of a vessel.	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition/ m:VesselSpeedMeasure
Course Measure	A measure of the angular course of a vessel.	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition/ m:VesselCourseMeasure
Heading Measure	A measure of the angular heading of a vessel	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition/ m:VesselHeadingMeasure
Position Date Time	The date and time that a position of a vessel was recorded or measured	trkex:Message/mda:Vessel/ m:VesselAugmentation/ m:VesselMovementDetails/ m:VesselTrack/m:VesselPosition/ m:VesselPositionDateTime

## Threat Information

Information about a threat posed by a vessel

Threat		
Element	Description	Path
CANUS Lexicon APR07 Category	Threat category from the April 2007 CANADA/USA Bi-National Vessel of Interest (VOI) Lexicon	trkex:Message/mda:Vessel/ mda:VesselThreat/ mda:CANUSLexiconAPR07CategoryCode
CANUS Lexicon APR07 Threat	Threat code from the April 2007 CANADA/USA Bi-National Vessel of Interest (VOI) Lexicon	trkex:Message/mda:Vessel/ mda:VesselThreat/ mda:CANUSLexiconAPR07ThreatCode
General Threat Category	A generalized threat category	trkex:Message/mda:Vessel/ mda:VesselThreat/ m:ThreatCategoryText

General Threat Level	A generalized threat level	trkex:Message/mda:Vessel/ mda:VesselThreat/m:ThreatLevelText
General Threat Description	A generalized threat description	trkex:Message/mda:Vessel/ mda:VesselThreat/ m:ThreatDescriptionText
Threat Lexicon	A generalized threat lexicon	trkex:Message/mda:Vessel/ mda:VesselThreat/ mda:ThreatLexiconSourceText
USMTF Threat Category	Threat category defined by USMTF	trkex:Message/mda:Vessel/ mda:VesselThreat/ mda:USMTFEnvironmentCategoryCode
USMTF Threat Level	Threat code or force-designator defined by USMTF	trkex:Message/mda:Vessel/ mda:VesselThreat/ mda:USMTFThreatCode

## Contact Information

Means of contacting a person and/or an organization for further information about the contents of the message

Contact Details		
Element	Description	Path
Email ID	An electronic mailing address by which a person or organization may be contacted	trkex:Message/nc:ContactInformation/ nc:ContactEmailID
Mailing Address	A postal address by which a person or organization may be contacted	trkex:Message/nc:ContactInformation/ nc:StructuredAddress
Telephone Number	A telephone number by which a person or organization may be contacted	trkex:Message/nc:ContactInformation/ nc:ContactTelephoneNumber
Fax Number	A fax number by which a person or organization may be contacted	trkex:Message/nc:ContactInformation/ nc:ContactFaxNumber
Website URL	A website address by which a person or organization may be contacted	trkex:Message/nc:ContactInformation/ nc:ContactWebsiteURI
Contact Entity	An entity that may be contacted by using the given contact information represented by an nc:EntityOrganization and/or nc:EntityPerson	trkex:Message/nc:ContactInformation/ nc:ContactEntity
Contact Entity Description Text	A description, title or function of a person with the given contact information	trkex:Message/nc:ContactInformation/ nc:ContactEntityDescriptionText
Contact Information Description	Further details on the contact information	trkex:Message/nc:ContactInformation/ nc:ContactInformationDescriptionText

Text	
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## Additional Information

Additional data fields to be exchanged that were not previously defined elsewhere in the schema

Additional Information		
Element	Description	Path
Expansion	Additional information	trkex:Message/mda:Expansion
Data Field	A single data field	trkex:Message/mda:Expansion/ mda:DataField
Data Field Name	The name of a data field	trkex:Message/mda:Expansion/ mda:DataField/mda:DataFieldName
Data Field Content	The value of a data field	trkex:Message/mda:Expansion/ mda:DataField/ mda:DataFieldContentText

## IC-ISM Markings

IC-ISM (version 6.0) security markings for this message

IC-ISM Markings		
Element	Description	Path
Classification	A single indicator of the highest level of classification applicable to an information resource or portion within the domain of classified national security information	trkex:Message/mda:ICISMMarkings/ @classification
Owner Producer	One or more indicators identifying the national government or international organization that have purview over the classification marking of an information resource or portion therein	trkex:Message/mda:ICISMMarkings/ @ownerProducer
Dissemination Controls	One or more indicators identifying the expansion or limitation on the distribution of information	trkex:Message/mda:ICISMMarkings/ @disseminationControls

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