IES Examples

Based on version 4.2.0

Examples included:

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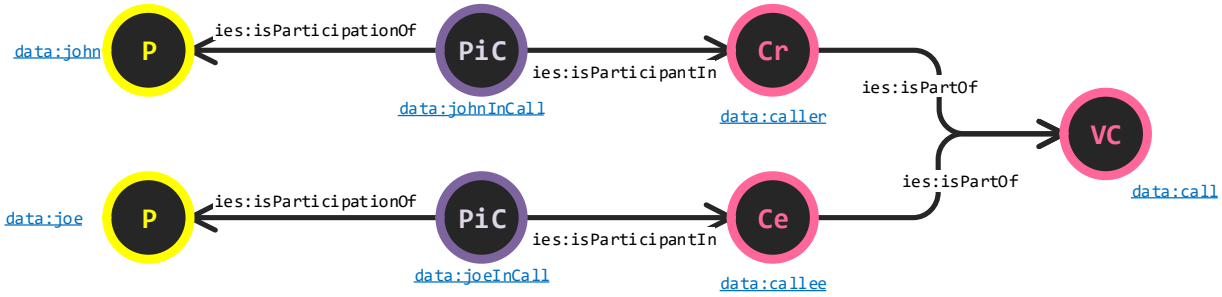
Notation used in this document

Throughout the following examples we use a commonly used IES graphical notation. An example of such is shown below. All IES instances are shown as circular nodes where their type is indicated by an abbreviation. Pentagonal nodes are used for local ontology extensions to IES. A key is provided for these abbreviations on each diagram. The colour coding from the IES model is carried through to these diagrams – e.g. yellow indicated Entity. If the node has its IES colour as the fill-colour, then this represents a class. If its IES colour is that of the border, it represents an instance. In some examples we provide a descriptive label for the instance using blue, underlined text.



Namespaces:

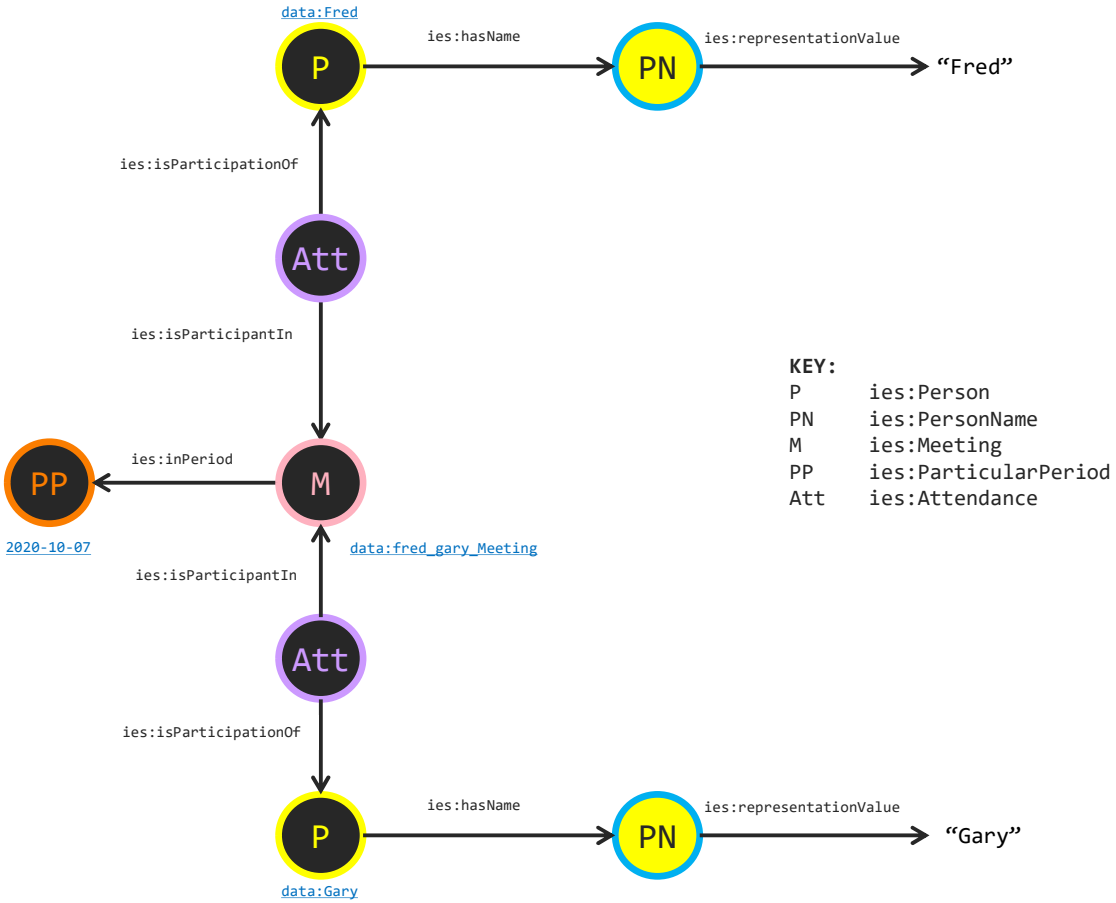
```
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix ies: <http://ies.data.gov.uk/ies4#> .
@prefix data: <http://data.gov.uk/testdata#> .
```

KEY:

Ce	ies:Callee
Cr	ies:Caller
P	ies:Person
PiC	ies:PersonInCommunication
VC	ies:VoiceCall

A Meeting: diagram

In this example we have a meeting involving two persons. When entities like a person participate in events, that participation if a special form of State called EventParticipant. Attendance here is a subtype of EventParticipant. The pattern used here is a common one seen across multiple types of event.

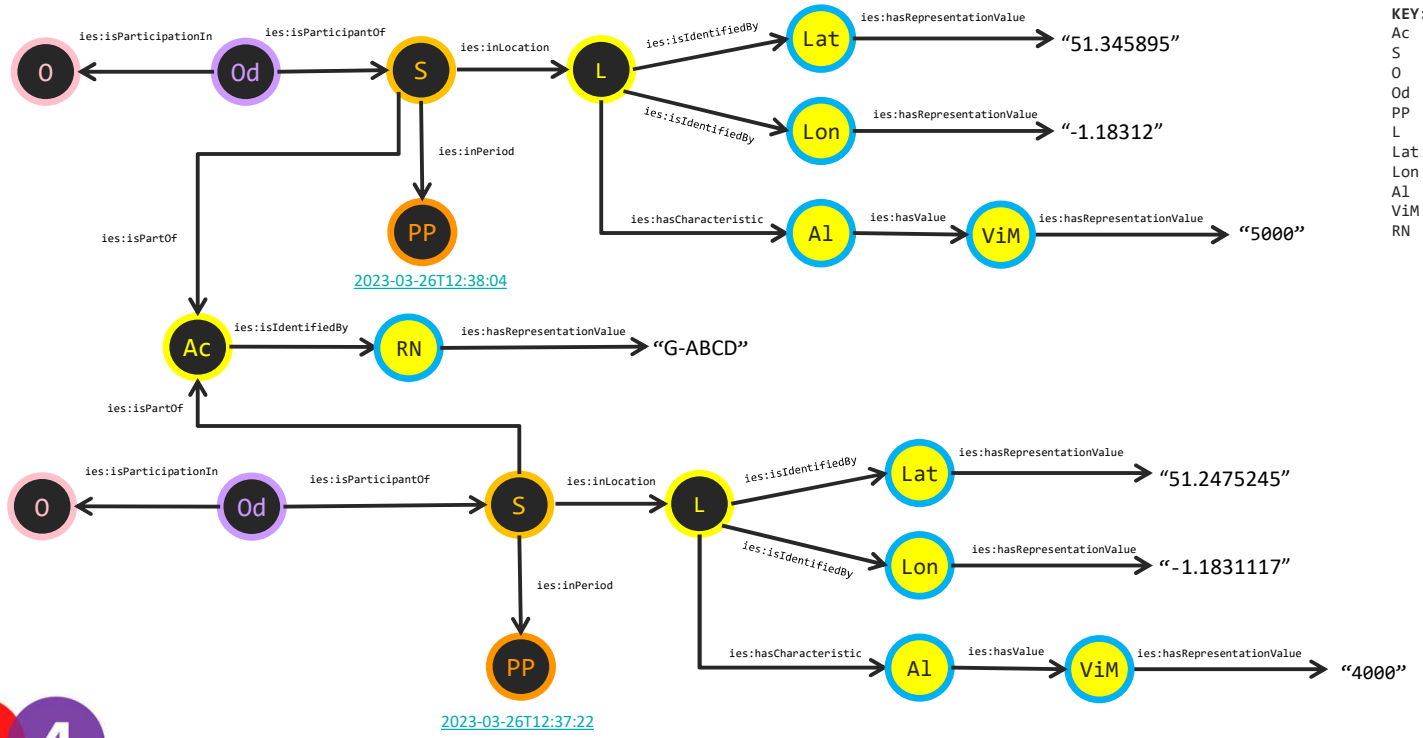


Planned Meeting: triples

```
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix iso8601: <http://iso.org/iso8601#> .
@prefix data: <http://example.com/local-data#> .

data:Fred a ies:Person;
    ies:hasName data:FredName .

data:FredName a ies:PersonName;
    ies:representationValue "Fred"^^xsd:string .

data:Gary a ies:Person;
    ies:hasName data:GaryName .

data:GaryName a ies:PersonName;
    ies:representationValue "Gary"^^xsd:string .

data:FredAttendance a ies:Attendance;
    ies:isParticipationOf data:Fred;
    ies:isParticipantIn   data:FredGaryMeeting .

data:GaryAttendance a ies:Attendance;
    ies:isParticipationOf data:Gary;
    ies:isParticipantIn   data:FredGaryMeeting .

data:FredGaryMeeting a ies:Meeting;
    ies:inPeriod iso8601:20301007.

iso8601:20301007 a ies:ParticularPeriod;
    ies:iso8601PeriodRepresentation "2030-10-07"^^xsd:string .
```

Observations of a moving aircraft: diagram

In this example we have two observations of an aircraft moving through the air. Note, how these are observations of different states of that aircraft in different positions in the air and at different altitudes.



KEY:

Ac	ies:Aircraft
S	ies:State
O	ies:Observation
Od	ies:Observed
PP	ies:ParticularPeriod
L	ies:Location
Lat	ies:Latitude
Lon	ies:Longitude
Al	ies:Altitude
ViM	ies:ValueInMetres
RN	ies:RegistationNumber

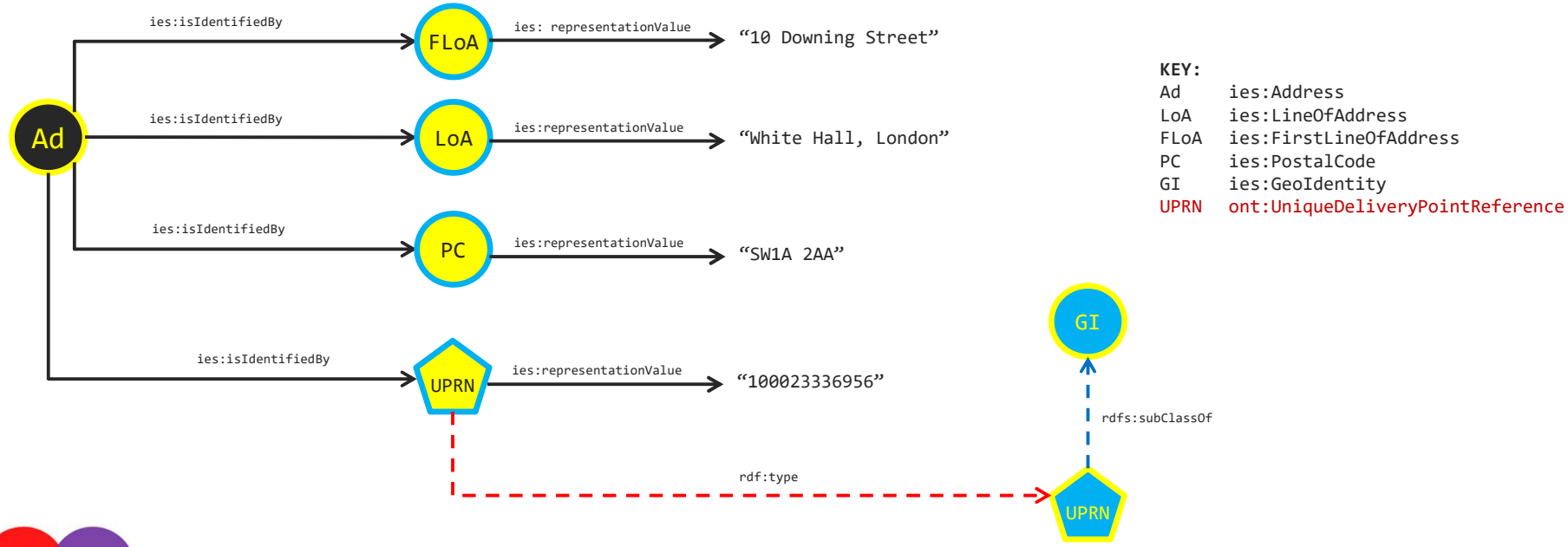
Observations of a moving aircraft: triples

```
# 1 of 2
@prefix ies:     <http://ies.data.gov.uk/ontology/ies4#> .
@prefix iso8601: <http://iso.org/iso8601#> .
@prefix data:    <http://example.com/local-data#> .


data:observation1 a ies:Observation .
data:observation2 a ies:Observation .

data:observer1 a ies:Observed;
       ies:isParticipationIn data:observation1;
       ies:isParticipationOf data:aircraftState1 .

data:observer2 a ies:Observed;
       ies:isParticipationIn data:observation2;
       ies:isParticipationOf data:aircraftState2 .

data:aircraft a ies:Aircraft;
       ies:isIdentifiedBy data:aircraftRegID .

data:aircraftRegID a ies:RegistrationNumber .
       ies:representationValue "G-ABCD"^^xsd:string .

data:aircraftState1 a ies:State;
       ies:isStateOf   data:aircraft;
       ies:inLocation  data:location1;
       ies:inPeriod    iso8601:20230326T123804 .

data:aircraftState2 a ies:State;
       ies:isStateOf   data:aircraft;
       ies:inLocation  data:location2;
       ies:inPeriod    iso8601:20230326T123722 .

iso8601:20230326T123804 a ies:ParticularPeriod ;
       ies:iso8601PeriodRepresentation "20230326T123804"^^xsd:string .

iso8601:20230326T123722 a ies:ParticularPeriod ;
       ies:iso8601PeriodRepresentation "20230326T123722"^^xsd:string .
```

```
# 2 of 2
data:location1 a ies:Location;
       ies:isIdentifiedBy     data:lat1;
       ies:isIdentifiedBy     data:long1;
       ies:hasCharacteristic  data:altitude1 .

data:location2 a ies:Location;
       ies:isIdentifiedBy     data:lat2;
       ies:isIdentifiedBy     data:long2;
       ies:hasCharacteristic  data:altitude2 .

data:lat1  a ies:Latitude ;
       ies:representationValue "51.345895"^^xsd:float .
data:long1 a ies:Longitude ;
       ies:representationValue "1.18312"^^xsd:float .
data:altitude1 a ies:Altitude;
       ies:hasValue data:vim1 .

data:vim1 a ies:ValueInMetres;
       ies:representationValue "5000"^^xsd:integer .

data:lat2  a ies:Latitude;
       ies:representationValue "51.2475245"^^xsd:float .

data:long2 a ies:Longitude;
       ies:representationValue "-1.1831117"^^xsd:float .

data:altitude2 a ies:Altitude ;
       ies:hasValue data:vim2 .

data:vim2 a ies:ValueInMetres;
       ies:representationValue "4000"^^xsd:integer .
```

Representations of an Address: diagram

In this example we demonstrate how to assign address information to a location. He we have 10 Downing street with some traditional address information; lines of address and postcode. Here we utilise existing geo identifier classes in IES. This example also demonstrates using an extension of IES to articulate the UPRN of this address. UPRNs, or Unique Deliver Point References are unique identifiers for addressable locations in the UK. See how the class UPRN (blue filled pentagon) is an extension of the existing GeoIdentity class found in IES.

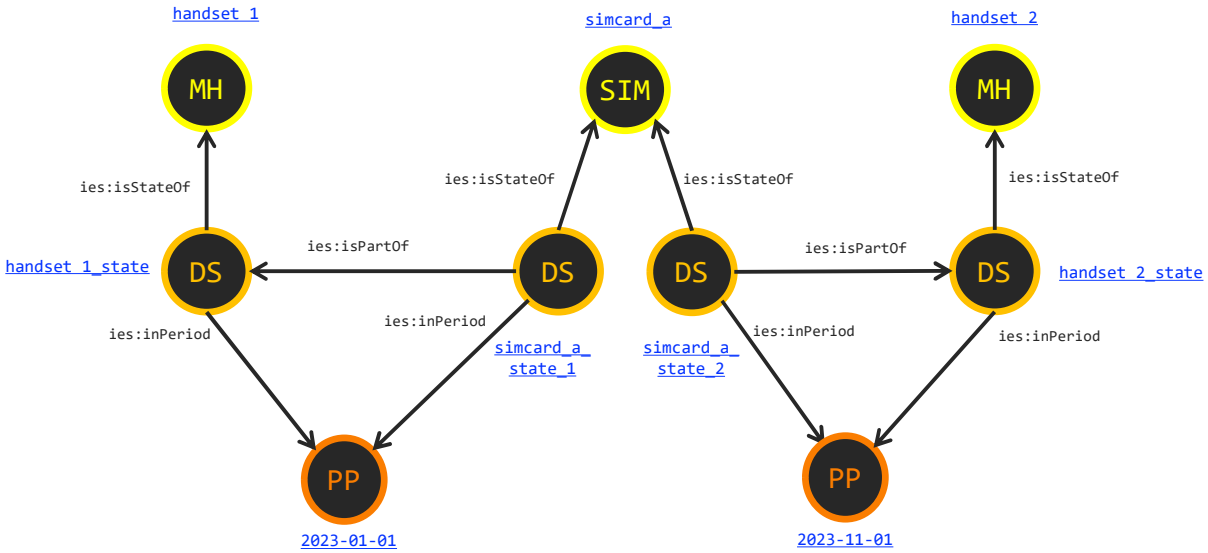


Representations of an Address: triples

```
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix iso8601: <http://iso.org/iso8601#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix ont: <http://example.com/local-ontology#> .
@prefix data: <http://example.com/local-data#> .

ont:UniqueDeliveryPointReference rdfs:subClassOf ies:GeoIdentity .

data:10DowningStreet a ies:Address;
      ies:isIdentifiedBy data:10DowningStreetFLoA;
      ies:isIdentifiedBy data:10DowningStreetLoA;
      ies:isIdentifiedBy data:10DowningStreetPC;
      ies:isIdentifiedBy data:10DowningStreetUDPR .

data:10DowningStreetFLoA a ies:FirstLineOfAddress;
      ies:representationValue "10 Downing Street"^^xsd:string .

data:10DowningStreetLoA a ies:LineOfAddress;
      ies:representationValue "White Hall, London"^^xsd:string .

data:10DowningStreetPC a ies:PostalCode;
      ies:representationValue "SW1A 2AA"^^xsd:string .

data:10DowningStreetUDPR a ont:UniqueDeliveryPointReference;
      ies:representationValue "100023336956"^^xsd:string .
```

Sim Card Swap in a Mobile Handset: diagram

This example demonstrates how IES can be used to express how parts can move from one whole to another over time. In this example, we have a sim card which at one point in time (2023-01-01) is in one mobile handset and at another point in time (2023-11-01) is found in another. This is achieved by building isPartOf relations between the states of the handset and the sim card which is swapped between the two.



KEY:

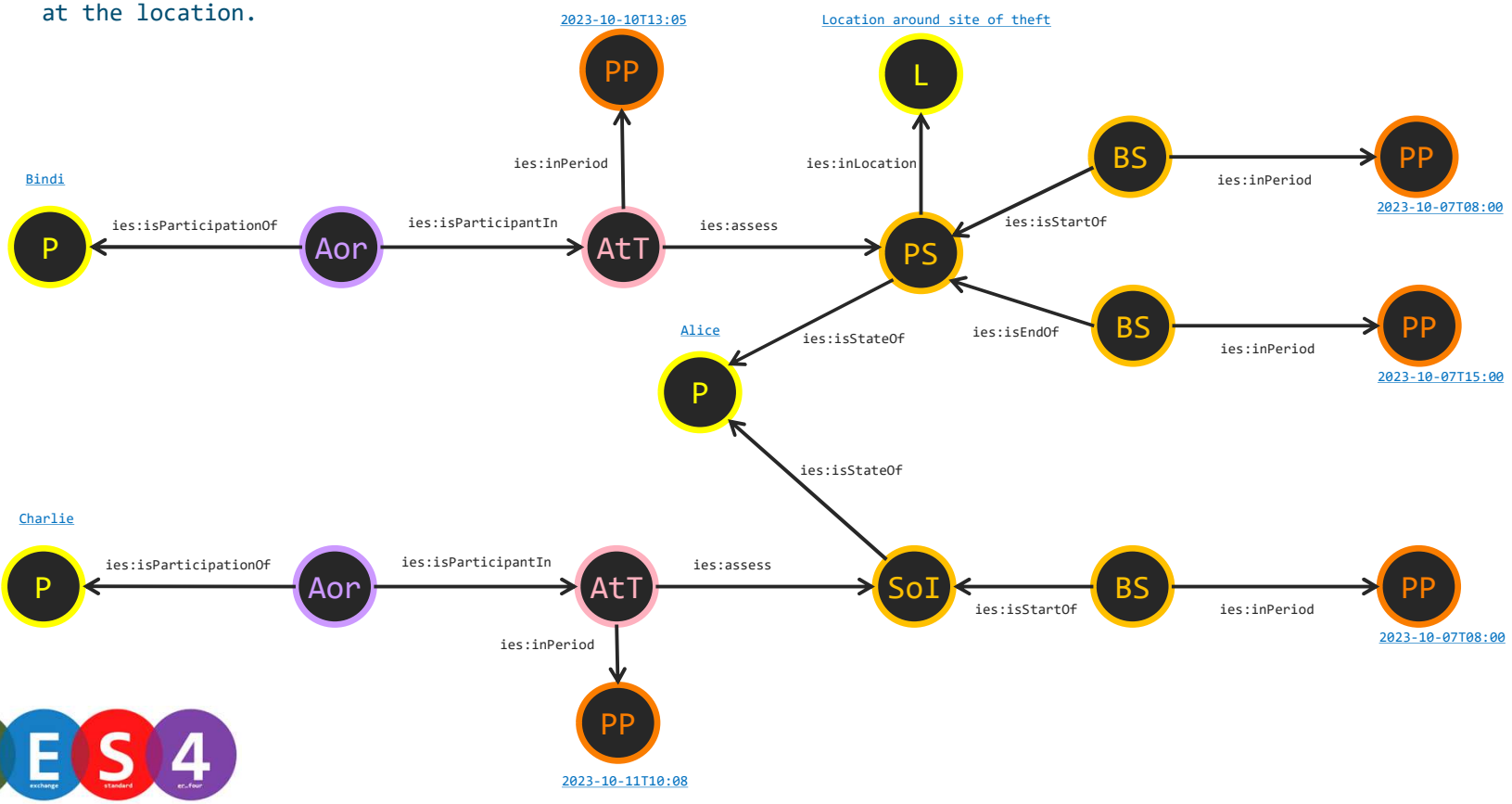
MH	ies:MobileHandset
SIM	ies:SIMCard
DS	ies:DeviceState
PP	ies:ParticularPeriod

Sim Card Swap in a Mobile Handset: triples

```
@prefix data: <http://example.com/local-data#> .
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix iso8601: <http://iso.org/iso8601#> .


data:handset_1 a ies:MobileHandset .
data:handset_2 a ies:MobileHandset .
data:simcard_a a ies:SIMCard .

iso8601:20230101 a ies:ParticularPeriod ;
      ies:iso8601PeriodRepresentation "20230101"^^xsd:string .

iso8601:20230101 a ies:ParticularPeriod ;
      ies:iso8601PeriodRepresentation "20231101"^^xsd:string .

data:handset_1_state_1 a ies:DeviceState;
      ies:inPeriod        iso8601:20230101;
      ies:isStateOf       data:handset_1 .

data:simcard_a_state_1 a ies:DeviceState;
      ies:inPeriod        iso8601:20230101;
      ies:isStateOf       data:simcard_a;
      ies:isPartOf        data:handset_1_state_1 .

data:handset2_state_2 a ies:DeviceState;
      ies:inPeriod        iso8601:20231101;
      ies:isStateOf       data:handset_2 .

data:simcard_a_state_2 a ies:DeviceState;
      ies:inPeriod        iso8601:20231101;
      ies:isStateOf       data:simcard_a;
      ies:isPartOf        data:handset_1_state_2 .
```

Assessments and subject of interest: diagram

This example demonstrates the assessment pattern. Here we have two investigators Bindi and Charlie. They are investigating a theft. Bindi assesses that a person called Alice was in the location of and at the time of the theft. Her colleague Charlie then assesses that Alice should therefore be a subject of interest in their investigation from the period of time she was known to be at the location.



KEY:

P	ies:Person
PS	ies:PersonState
SoI	ies:SubjectOfInterest
BS	ies:BoundingState
PP	ies:ParticularPeriod
AtT	ies:AssessToBeTrue
Aor	ies:Assessor
L	ies:Location

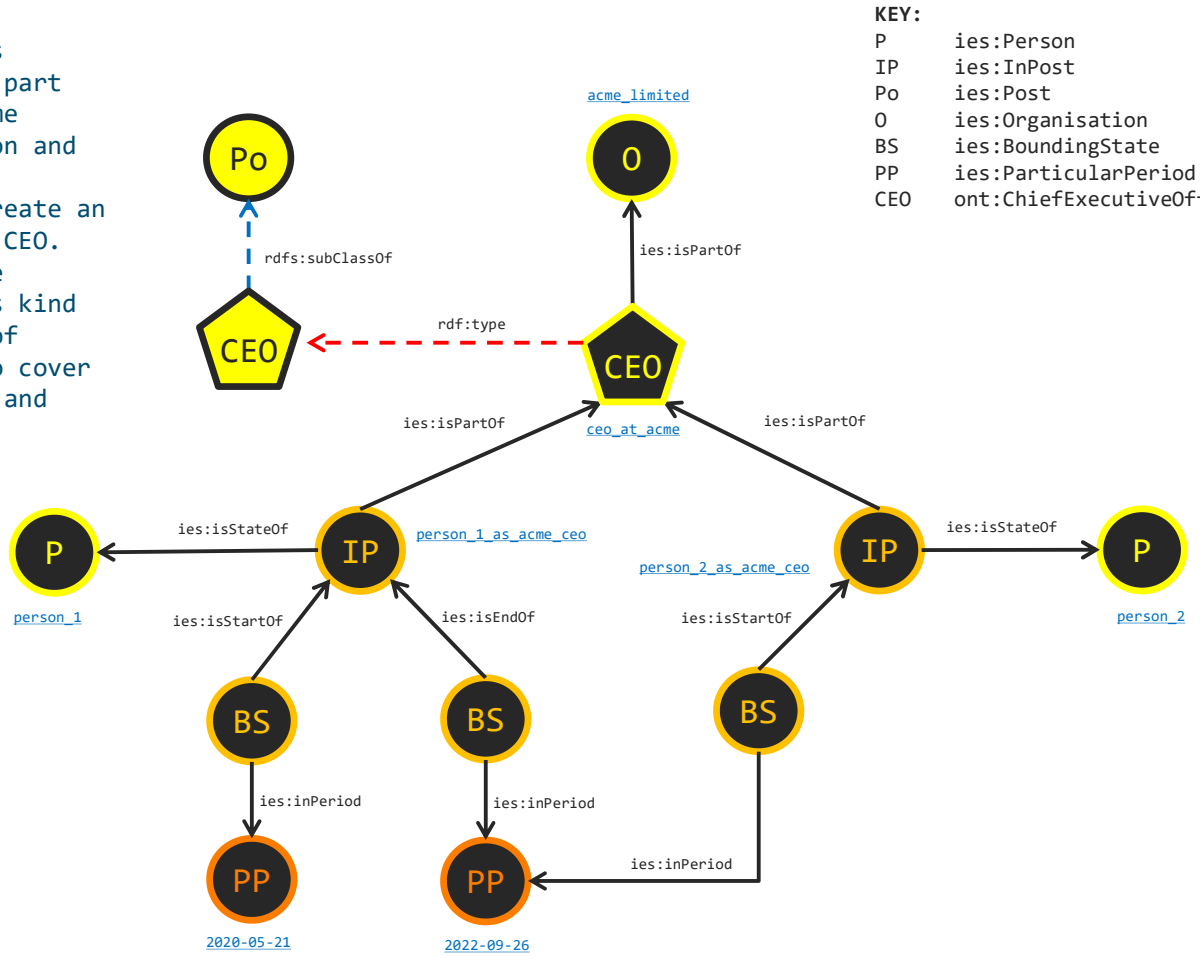
Assessments and subject of interest: triples

```
# 1 of 2
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix iso8601: <http://iso.org/iso8601#> .
@prefix data: <http://example.com/local-data#> .


data:Bindi a ies:Person .
data:Charlie a ies:Person .
data:Alice a ies:Person .
data:Canberra a ies:Location .

data:AliceSubjectofInterest a ies:SubjectOfInterest;
      ies:isStateOf data:Alice .

data:AlicePersonState a ies:PersonState;
      ies:isStateOf      data:Alice;
      ies:inLocation     data:Canberra .

data:BindiAssessToBeTrue a ies:AssessToBeTrue ;
      ies:inPeriod       iso8601:20231010T1305 ;
      ies:assess         data:AlicePersonState .

data:CharlieAssessToBeTrue a ies:AssessToBeTrue ;
      ies:inPeriod       iso8601:20231011T1008 ;
      ies:assess         data:AliceSubjectofInterest .

data:BindiAssessor a ies:Assessor ;
      ies:isParticipantIn      data:BindiAssessToBeTrue;
      ies:isParticipationOf    data:Bindi .

data:CharlieAssessor a ies:Assessor ;
      ies:isParticipantIn      data:CharlieAssessToBeTrue;
      ies:isParticipationOf    data:Charlie .
```

```
# 2 of 2
data:BindiBoundingState1 a ies:BoundingState;
      ies:isStartOf      data:AlicePersonState;
      ies:inPeriod       iso8601:20231007T0:00 .

data:BindiBoundingState2 a ies:BoundingState;
      ies:isEndOf        data:AlicePersonState;
      ies:inPeriod       iso8601:20231007T1500 .

data:CharlieBoundingState a ies:BoundingState;
      ies:isStartOf      data:AliceSubjectofInterest;
      ies:inPeriod       iso8601:20231007T0800 .

iso8601:20231010T1305 a ies:ParticularPeriod;
      ies:iso8601PeriodRepresentation "20231010T1305"^^xsd:string .

iso8601:20231011T1008 a ies:ParticularPeriod;
      ies:iso8601PeriodRepresentation "20231011T1008"^^xsd:string .

iso8601:20231007T0800 a ies:ParticularPeriod;
      ies:iso8601PeriodRepresentation "20231007T0800"^^xsd:string .

iso8601:20231007T1500 a ies:ParticularPeriod;
      ies:iso8601PeriodRepresentation "20231007T1500"^^xsd:string .
```

Posts of organisations: diagram

This example demonstrates the IES Posts pattern which is a form of replaceable part pattern. Here we have a CEO post at Acme Limited which is fulfilled by one person and then transitioned to another on the 26 September 2022. Notice how we had to create an extension to ies:Post for the class of CEO. Then an instance of CEO is used for the specific instance at Acme Limited. This kind of pattern is required for other uses of classes that are naturally too broad to cover certain data requirements; ies:Vehicle and ies:Device are other such examples.



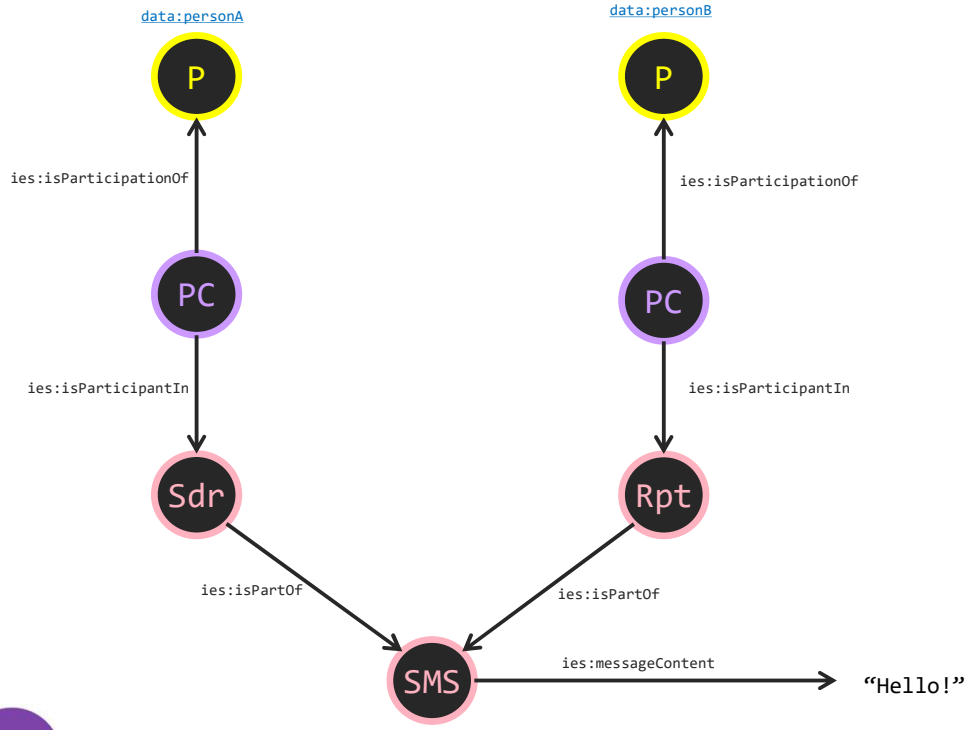
Posts of organisations: triples

```
#1 of 2
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix iso8601: <http://iso.org/iso8601#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix ont: <http://example.com/local-ontology#> .
@prefix data: <http://example.com/local-data#> .


ont:CheifExecutiveOfficer rdfs:subClassOf ies:Post .

data:person_1       a ies:Person.
data:person_2       a ies:Person .
data:acme_limited   a ies:Organisation .

data:ceo_at_acme a ont:CheifExecutiveOfficer;
    ies:isPartOf    data:acme_limited .

data:person_1_as_acme_ceo a ies:InPost;
    ies:isStateOf   data:person_1;
    ies:isPartOf    data:ceo_at_acme .

data:person_2_as_acme_ceo a ies:InPost;
    ies:isStateOf   data:person_2;
    ies:isPartOf    data:ceo_at_acme .
```

```
#2 of 2
data:person_1_as_acme_ceo_start a ies:BoundingState;
    ies:isStartOf   data:person_1_as_acme_ceo;
    ies:inPeriod    iso8601:20200521 .

data:person_1_as_acme_ceo_end a ies:BoundingState;
    ies:isEndOf     data:originalCEOInPost;
    ies:inPeriod    iso8601:20220926 .

data:person_2_as_acme_ceo_start a ies:BoundingState;
    ies:isStartOf   data:person_2_as_acme_ceo;
    ies:inPeriod    iso8601:20220926 .

iso8601:20200521 a ies:ParticularPeriod ;
    ies:iso8601PeriodRepresentation "20200521"^^xsd:string .

iso8601:20200926 a ies:ParticularPeriod ;
    ies:iso8601PeriodRepresentation "20200926"^^xsd:string .
```

SMS Message: diagram

This example shows how the sending and receiving of a text message is modelled in IES. Note how the SMS event itself is composed of two events which the people-in-communication participate in respectively; a Sender event and a Recipient event.



KEY:

P	ies:Person
PC	ies:PersonInCommunication
Sdr	ies:Sender
Rpt	ies:Recipient
SMS	ies:SMS

SMS Message: triples

```
@prefix data: <http://example.com/local-data#> .
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

data:personA a ies:Person .
data:personB a ies:Person .

data:personAinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf   data:personA;
    ies:isParticipantIn     data:senderEvent .

data:personBinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf   data:personB;
    ies:isParticipantIn     data:recipientEvent .

data:senderEvent a ies:Sender;
    ies:isPartOf data:messageEvent .

data:recipientEvent a ies:Recipient;
    ies:isPartOf data:messageEvent .

data:messageEvent a ies:SMS;
    ies:messageContent "Hello"^^xsd:string .
```

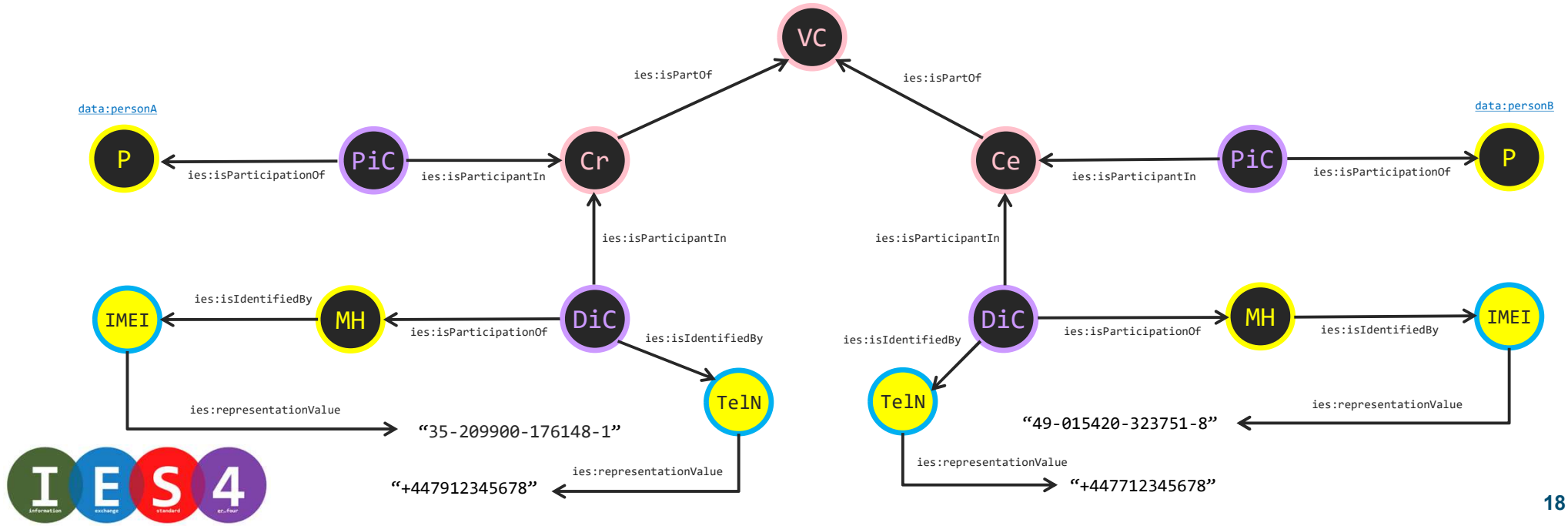
Voice call: diagram

This example is similar to the SMS example where event parts are used to group participations to convey something which can't be conveyed solely by the participations themselves i.e., the participants on the Caller side and the participants on the Callee side.

Note, that as telephone numbers can swapped between devices, these identifiers appear on the participant states involved in the call while the IMEIs are associated to the handsets themselves. There are handsets that allow you to change the IMEI so it being associated to the Handset entity is not always going to be true.

KEY:

P	ies:Person
PiC	ies:PersonInCommunication
Cr	ies:Caller
Ce	ies:Callee
VC	ies:VoiceCall
MH	ies:MobileHandset
DiC	ies:DeviceInCommunication
IMEI	ies:imei
TelN	ies:TelephoneNumber



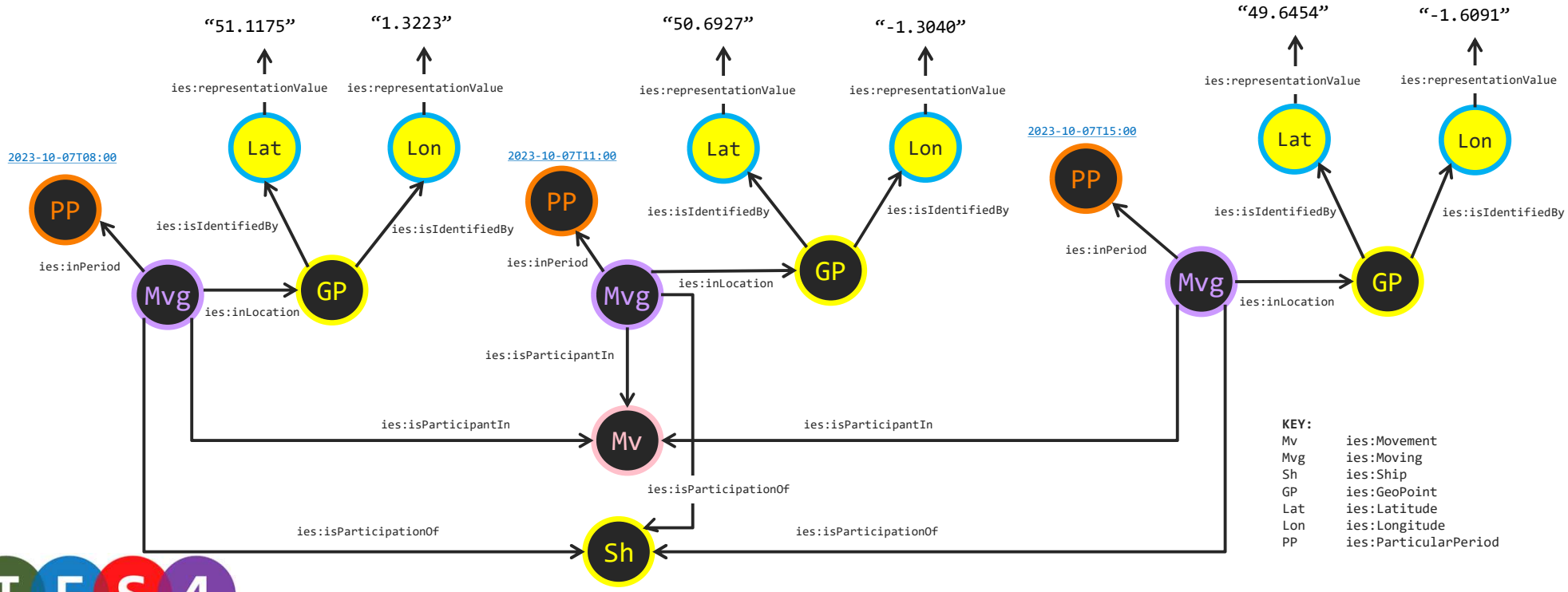
Voice call: triples

```
# 1 of 2
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix data: <http://example.com/local-data#> .


data:personA a ies:Person .
data:personB a ies:Person .

data:device1inCommunication a ies:DeviceInCommunication;
    ies:isParticipationOf data:mobiledevice1;
    ies:isParticipantIn   data:calleeEvent;
    ies:isIdentifiedBy    data:telephonenumber1 .

data:mobiledevice1 a ies:MobileHandset;
    ies:isIdentifiedBy data:imei1 .

data:imei1 a ies:imei;
    ies:representationValue "35-209900-176148-1"^^xsd:string .

data:telephonenumber1 a ies:TelephoneNumber;
    ies:representationValue "+447912345678"^^xsd:string .
```

```
# 2 of 2
data:device2inCommunication a ies:DeviceInCommunication;
    ies:isParticipationOf data:mobiledevice2;
    ies:isParticipantIn   data:callerEvent;
    ies:isIdentifiedBy    data:telephonenumber2 .

data:mobiledevice2 a ies:MobileHandset;
    ies:isIdentifiedBy data:imei2 .

data:imei2 a ies:imei;
    ies:representationValue "49-015420-323751-8"^^xsd:string .

data:telephonenumber2 a ies:TelephoneNumber;
    ies:representationValue "+447712345678"^^xsd:string .

data:personAinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf data:personA;
    ies:isParticipantIn   data:calleeEvent .

data:personBinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf data:personB;
    ies:isParticipantIn   data:callerEvent .

data:calleeEvent a ies:Callee;
    ies:isPartOf data:voicecallEvent .

data:callerEvent a ies:Caller;
    ies:isPartOf data:voicecallEvent .

data:voicecallEvent a ies:VoiceCall .
```

Movement: diagram

This example models the movement of a ship along the English Channel. This uses the IES Movement pattern. The end-to-end movement is an event (ies:Movement) with each known position of the ship during the movement a participant state (ies:Moving) of the ship.



Movement: triples

```
#1 of 2
@prefix ies: <http://ies.data.gov.uk/ontology/ies4#> .
@prefix data: <http://example.com/local-data#> .


data:personA a ies:Person .
data:personB a ies:Person .

data:device1inCommunication a ies:DeviceInCommunication;
    ies:isParticipationOf data:mobiledevice1;
    ies:isParticipantIn data:calleeEvent;
    ies:isIdentifiedBy data:telephonenumber1 .

data:mobiledevice1 a ies:MobileHandset;
    ies:isIdentifiedBy data:imei1 .

data:imei1 a ies:imei;
    ies:representationValue "35-209900-176148-1"^^xsd:string .

data:telephonenumber1 a ies:TelephoneNumber;
    ies:representationValue "+447912345678"^^xsd:string .

data:device2inCommunication a ies:DeviceInCommunication;
    ies:isParticipationOf data:mobiledevice2;
    ies:isParticipantIn data:callerEvent;
    ies:isIdentifiedBy data:telephonenumber2 .
```

```
#2 of 2
data:mobiledevice2 a ies:MobileHandset;
    ies:isIdentifiedBy data:imei2 .

data:imei2 a ies:imei;
    ies:representationValue "49-015420-323751-8"^^xsd:string .

data:telephonenumber2 a ies:TelephoneNumber;
    ies:representationValue "+447712345678"^^xsd:string .

data:personAinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf data:personA;
    ies:isParticipantIn data:calleeEvent .

data:personBinCommunication a ies:PersonInCommunication;
    ies:isParticipationOf data:personB;
    ies:isParticipantIn data:callerEvent .

data:calleeEvent a ies:Callee;
    ies:isPartOf data:voicecallEvent .

data:callerEvent a ies:Caller;
    ies:isPartOf data:voicecallEvent .

data:voicecallEvent a ies:VoiceCall .
```