UKEOF schema guidelines

v. 1

NOTE: This is version 1 of this document – the schema it describes is http://www.ukeof.org.uk/schema/1, version 1.0.0

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Introduction

The UKEOF schema is expressed using the W3Cs XML (Extensible Markup Language) schema language. XML is flexible and serves well as syntax for metadata.

By using the XML schema language, the schema defines elements, child elements (i.e. sub-elements), and attributes of those elements.

The schema defines four elements which relate to the four environmental monitoring object types:

- Programme
- Activity
- Network
- Facility

UKEOF data model

There are four types of information that the catalogue will handle:

Programmes A programme is a related group of environmental monitoring campaigns which is policy-led and which is normally run over a long period (years or decades).

Activities An activity is an environmental monitoring campaign that is carried out with specific equipment for a specific period of time.

Facilities A facility is a specific area (site) or object (station/sensor/platform) which directly collects or processes data about environmental properties (physical, chemical and biological). Examples of facilities include:

- sites – e.g. A nature reserve
- stations – e.g. a weather station inside the nature reserve
- sensors – e.g. instruments on the station which are generating data

Networks Networks are groups of facilities that are managed for a specific purpose, targeting a specific area. They can be at an organisational, regional, national or international level.

Relationships between monitoring object types

The relationships between the four object types can get complex but to try to simplify it:

A **programme** normally consists of multiple **activities**

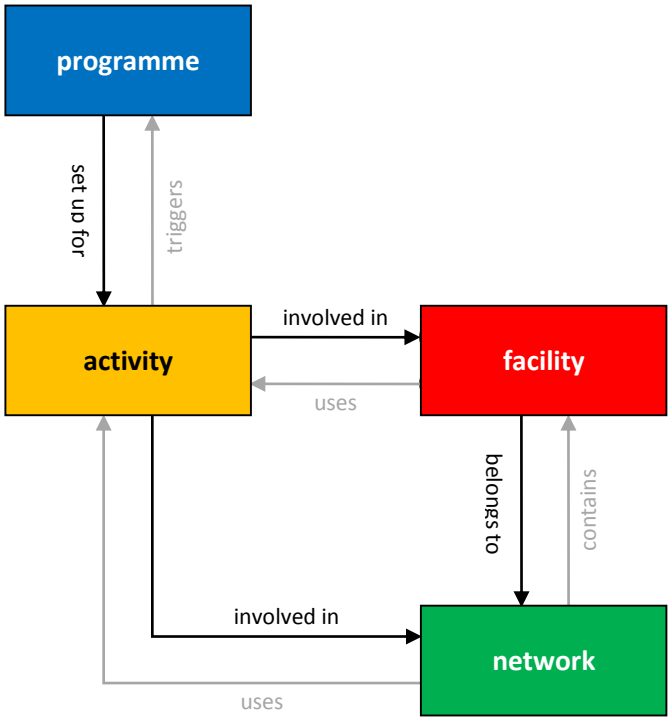
(An **activity** can also contribute to multiple **programmes**)

A **network** is a collection of **facilities**

(A **facility** can belong to more than one **network**)

An **activity** uses one or more **facilities** (or **networks**) to collect data

(A **facility** (or **network**) can generate data for more than one **activity**)



Example

The *national meteorological monitoring programme* is a long term programme designed to monitor weather patterns in the UK. The programme is composed of several different activities including one to monitor rainfall and another to monitor wind speed.

The *rainfall monitoring* activity collects data from facilities all over the UK including "Penrith site 1" and "Rainfall gauge A7RB4A".

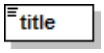
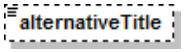
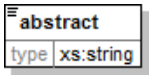
The wind speed monitoring activity also collects data from facilities all over the UK including "Anemometer 2011/06/AQZXG". Many of these facilities are grouped together in networks such as the *Cumbrian weather sites* network.

Programme .....National meteorological monitoring programme
Activity.....National rainfall monitoring
Facility.....Penrith site 1
Facility.....Rainfall gauge no.A7RB4A
Activity.....National winds speed monitoring
Facility.....Anemometer no.2011/06/AQZXG
Network.....Cumbrian weather sites
Facility.....Penrith site 1
Facility.....Brampton site 1
Facility.....Drumburgh site 3

The UKEOF Schema

How to read schema diagrams

We recommend you view the schema in a compatible viewer such as XMLSpy (http://www.altova.com/xmlspy) or XSD diagram (http://regis.cosnier.free.fr/?page=XSDDiagram)

<table>
<tr><td> 
</td><td>A box with a solid line indicates a mandatory element</td></tr>
<tr><td> 
</td><td>A box with a dotted line indicates an optional element</td></tr>
<tr><td> 
</td><td>The “type” descriptor specifies what type of data is allowed in the element. Common data types are:

string As expected, a string can include alphanumeric characters, punctuation, carriage returns, line feeds and many other Unicode characters.

date The date datatype follows the format YYYY-MM-DD

Valid values include: Invalid values include:
2013-01-01 2013-01 (year month and day must be supplied)
1970-12-25 2013-1-1 (all digits, including leading zeros, must be supplied)
2105-06-16 2001-06-31 (31st June is an invalid date)

integer A whole number without a decimal component. The only characters allowed are the numbers 0-9, plus and minus signs (‘+’, ‘-‘).

Valid values include: Invalid values include:
1235 1.567 (decimal numbers are not allowed)
-456 1,283 (commas are not allowed)
+35 -1 234 334 (spaces are not allowed)

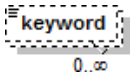
decimal Decimal numbers. The only characters allowed are the numbers 0-9, the decimal separator (‘.’) & plus and minus signs (‘+’, ‘-‘).

Valid values include: Invalid values include:
1235 1,283 (commas are not allowed)
45.75 -1 234 334.90 (spaces are not allowed)
.978
-10.597

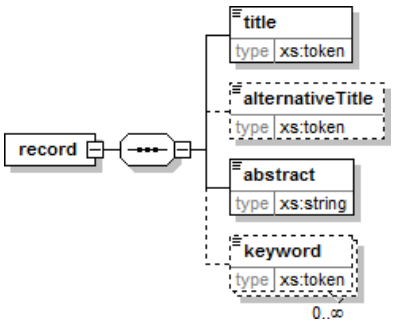
token A token is a string in which all whitespace is replaced with spaces, trailing spaces are removed and contiguous sequences of spaces are replaced by single spaces. For example:

Hydrometric Network
(England and Wales)
Becomes:
Hydrometric Network (England and Wales)

CCW Benthic Rock Monitoring
Becomes:
CCW Benthic Rock Monitoring</td></tr>
</table>

	Footers at the bottom right of an element indicate the number of occurrences of that element that are allowed. For example: 1..3 There must be at least one and at most 3 occurrences 0..10 There can be between 0 and 10 occurrences (i.e. the element is optional) 1.. ∞ There is no limit to the number of occurrences but there must be at least one. 0..∞ There is no limit to the number of occurrences and it is optional. If nothing is displayed it means that the maximum number of occurrences is 1.

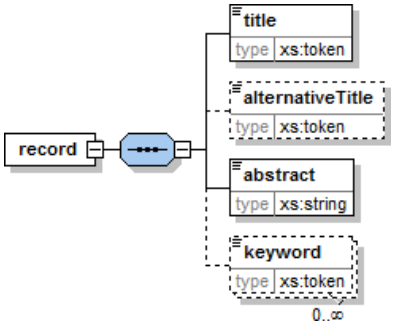
Elements can be composed of one or more child elements. In the example shown below, the `record` element is composed of the child elements: `title`, `alternativeTitle`, `abstract` and several `keyword`s



When represented in xml, it would look something like:

```
<record>
     <title>xxxx</title>
     <alternativeTitle>xxxx</alternativeTitle>
     <abstract>xxxx</abstract>
     <keyword>xxxx</keyword>
     <keyword>xxxx</keyword>
     <keyword>xxxx</keyword>
</record>
```

The Sequence compositor (highlighted in blue in the diagram below) specifies that the elements that follow must appear in the specified sequence.



Correct:

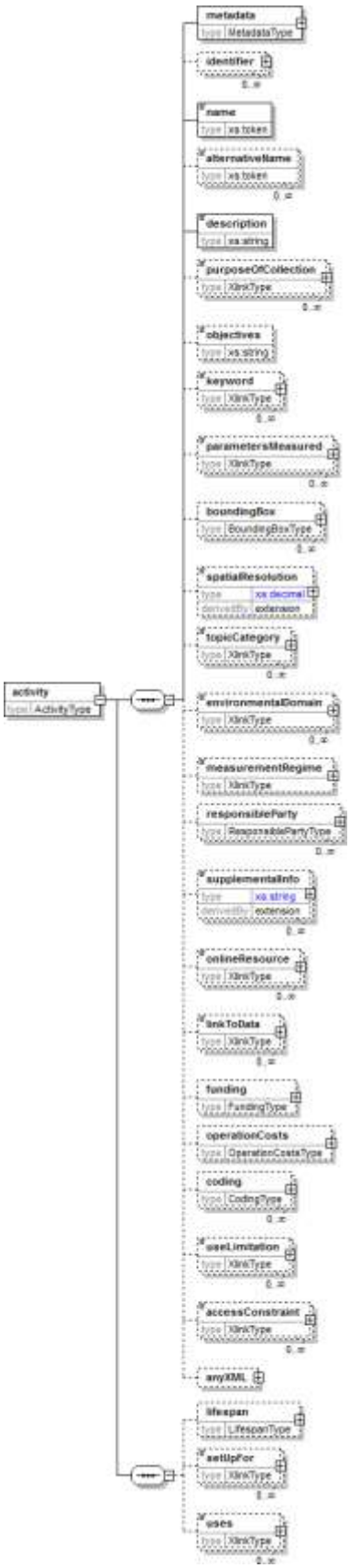
```
<record>
     <title>xxxx</title>
     <abstract>xxxx</abstract>
</record>
```

Incorrect:

```
<record>
     <abstract>xxxx</abstract>
     <title>xxxx</title>
</record>
```

Outline of Elements

Activity



metadata	
Obligation	Mandatory
Multiplicity	1
Datatype	MetadataType
Definition	A group of elements which describe the record
Child elements	**fileIdentifier** **Obligation** Mandatory **Multiplicity** 1 **Datatype** UUID **Definition** An identifier which uniquely identifies each document **authorDate** **Obligation** Optional **Multiplicity** 1 **Datatype** dateTime **Definition** The date on which the metadata document is authored **author** **Obligation** Mandatory **Multiplicity** 1 **Datatype** ResponsiblePartyType (*see responsibleParty below)* **Definition** The author of the document **publicationState** **Obligation** Mandatory **Multiplicity** 1 **Datatype** Token **Definition** The publication status of the document. There are three options: private The record should only be viewable by the author organisation sensitive The record is available to all organizations in the UKEOF community public The record is publically available **quality** **Obligation** optional **Notes** This element has been included in the UKEOF schema to ensure future compatibility with the INSPIRE metadata regulation ([6.1] lineage and [7] conformity) and is not currently required by UKEOF

identifier	
Obligation	Optional
Multiplicity	unbounded
Datatype	-
Definition	An identifier uniquely identifying the resource *in a specific context*. For example a data publisher might assign an identifier that they use in their internal systems and UKEOF might have a different identifier used for their own purposes
Attributes	localIdentifier – the unique id namespace – a label specifying the id's context
Example	... <ukeof:identifier ukeof:localIdentifier="46879" ukeof:namespace="UKEOF"/> <ukeof:identifier ukeof:localIdentifier="A21" ukeof:namespace="CEH"/> ...

name	
Obligation	Mandatory
Multiplicity	1
Datatype	token
Definition	The 'official' name of the monitoring unit

alternativeName	
Obligation	Optional
Multiplicity	unbounded
Datatype	token
Definition	This element is used to record alternative names by which the monitoring unit might be commonly known or names in alternative languages

description	
Obligation	Mandatory
Multiplicity	1
Datatype	string
Definition	An abstract/ summary describing the monitoring unit. Providing a short, detailed description will help users identify and understand the unit in the context of related monitoring or environmental domains. The more information you provide the easier it will be for an interested party to find out more information by linking to related websites, listing or linking to reports and other sources.

purposeofCollection	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	The main reasons why data is being collected.
Allowed values	See http://onto.nerc.ac.uk/EF/purposeOfCollection
Attributes	Xlink:href uri of a controlled vocabulary definition of the term
Example	... <ukeof:purposeofCollection xlink:href="http://onto.nerc.ac.uk/EF/strategicGoals">Strategic goals</ukeof:purposeofCollection> ...

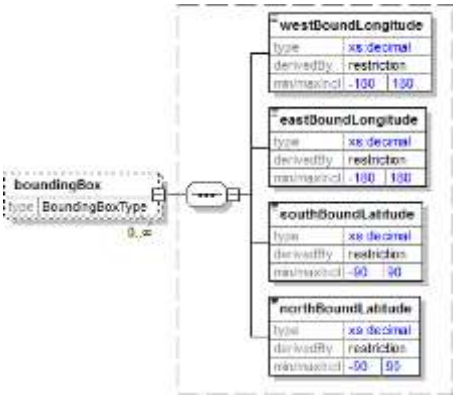
objectives	
Obligation	Optional
Multiplicity	1
Datatype	string
Definition	A detailed description of the main objectives/aims of the monitoring being undertaken

keyword	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Keywords/tags that help describe the monitoring. Where possible, the keywords should be taken from a controlled vocabulary or thesaurus. If a controlled vocabulary is used, the URI of the vocabulary term should be included as attributes of the keyword.
Example	... <ukeof:keyword xlink:href="http://www.eionet.europa.eu/gemet/concept/995">breeding bird</ukeof:keyword> ...
Example (free text)	... <ukeof:keyword>Puffin</ukeof:keyword> ...

parametersMeasured	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Measurable factors that are used to define the environment and determine its behaviour. Factors which are varied in an experiment (e.g. Temperature, pH, Atmospheric pressure). Where possible, the parameter should be taken from a controlled vocabulary or thesaurus. If a controlled vocabulary is used, the URI of the vocabulary term should be included as attributes of the element.
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term

Example	`...`
	`<ukeof:keyword xlink:href="http://vocabs.lter-europe.net/EnvThes/USLterCV_536">solar radiation</ukeof:keyword>`
	`...`

Example (free text)	`...`
	`<ukeof:keyword>Automatic weather station</ukeof:keyword>`
	`...`

boundingBox	
Obligation	Optional
Multiplicity	unbounded
Datatype	BoundingBoxType 
Definition	A set of geographical coordinates defining the smallest rectangular shape which totally encloses all of the referenced data.

Child elements	**westBoundLongitude** **Obligation** Mandatory **Multiplicity** 1 **Datatype** decimal **Definition** Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees **eastBoundLongitude** **Obligation** Mandatory **Multiplicity** 1 **Datatype** decimal **Definition** Eastern-most coordinate of the limit of the dataset extent **southBoundLongitude** **Obligation** Mandatory **Multiplicity** 1 **Datatype** decimal **Definition** Southern-most coordinate of the limit of the dataset extent **northBoundLongitude** **Obligation** Mandatory **Multiplicity** 1 **Datatype** decimal **Definition** Northern-most coordinate of the limit of the dataset extent

Example
(bounding box for Scotland)
	`...`
	`<ukeof:boundingBox>`
	`<ukeof:westBoundLongitude>-8.649</ukeof:westBoundLongitude>`
	`<ukeof:eastBoundLongitude>-0.729</ukeof:eastBoundLongitude>`
	`<ukeof:southBoundLatitude>54.634</ukeof:southBoundLatitude>`
	`<ukeof:northBoundLatitude>60.861</ukeof:northBoundLatitude>`
	`</ukeof:boundingBox>`
	`...`

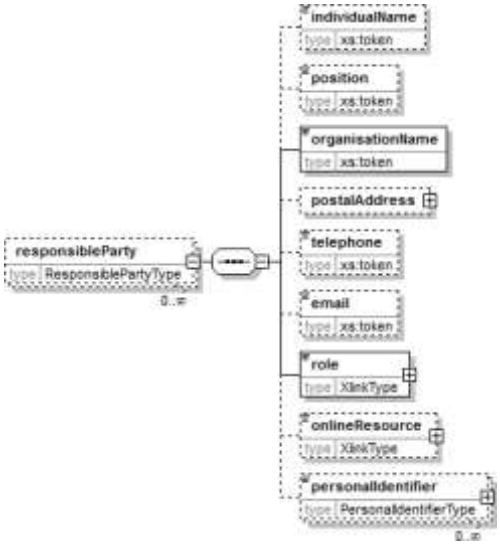
spatialResolution	
Obligation	Optional
Multiplicity	1
Datatype	decimal
Definition	The ground sample distance **IN METRES** – that is the centre-to-centre distance between adjacent samples on the earth's surface. For a single point, it is the degree of confidence in the point's location. For example, for a UK Ordnance Survey six-figure grid reference (e.g. SN666781) the spatial resolution would be 100m.
Notes	To simplify matters, UKEOF mandates that the ground sample distance must be entered in metres

topicCategory

Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	An ISO standard thematic classification to assist in grouping and search of available geographic data sets.
Allowed values	See http://onto.nerc.ac.uk/EF/topicCategory
Notes	This element has been included in the UKEOF schema to ensure future compatibility with the INSPIRE metadata regulation ([2.1]) and is not currently required by UKEOF

environmentalDomain	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	The environmental domain(s) in which the monitoring occurs or is relevant to
Allowed values	See http://onto.nerc.ac.uk/EF/environmentalDomain
Attributes	Xlink:href uri of a controlled vocabulary definition of the term
Example	... <ukeof:environmentalDomain xlink:href="http://onto.nerc.ac.uk/EF/builtEnvironment">Built environment</ukeof:environmentalDomain> ...

measurementRegime	
Obligation	Optional
Multiplicity	1
Datatype	XlinkType
Definition	An indication of how often data is collected (frequency of observations)
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term
Allowed values	See http://onto.nerc.ac.uk/EF/measurementRegime
Example	... <ukeof:measurementRegime xlink:href="http://onto.nerc.ac.uk/EF/annually">annually</ukeof:measurementRegime> ...

responsibleParty	
Obligation	Optional
Multiplicity	unbounded
Datatype	responsiblePartyType 
Definition	Organisations and individuals involved in the delivery and/or funding of the environmental monitoring
Child elements	**individualName** **Obligation** Optional **Multiplicity** 1 **Datatype** token **Definition** The name of the individual who is the point of contact for the delivery/funding of the monitoring. **position** **Obligation** Optional **Multiplicity** 1 **Datatype** token **Definition** The job title/position of the individual **organisationName** **Obligation** Mandatory

	Multiplicity	1
	Datatype	token
	Definition	The name of the organisation involved in the delivery/funding of the monitoring
	postalAddress	
	Obligation	Optional
	Multiplicity	1
	Datatype	-
	Definition	The postal address of the organisation. This element is itself composed of several child elements: • street • postalArea • administrativeArea *(e.g. a county/unitary authority area)* • country • postcode
	telephone	
	Obligation	Optional
	Multiplicity	1
	Datatype	token
	Definition	A telephone contact number for the organisation/individual
	email	
	Obligation	Optional
	Multiplicity	1
	Datatype	token
	Definition	Address of the electronic mailbox of the responsible organization or individual.
	Role	
	Obligation	Mandatory
	Multiplicity	1
	Datatype	-
	Definition	Function performed by the responsible party.
	Allowed values	See http://onto.nerc.ac.uk/EF/responsiblePartyRole
	onlineResource	
	Obligation	Optional
	Multiplicity	1
	Datatype	OnlineResourceType
	Definition	On-line information that can be used to find out more information or contact the individual/organisation. For example a website.
	personalIdentifier	
	Obligation	Optional
	Multiplicity	unbounded
	Datatype	PersonalIdentifierType
	Definition	A digital identifier that distinguishes an individual. For example an ORCID, ResearcherID or ISNI identifier

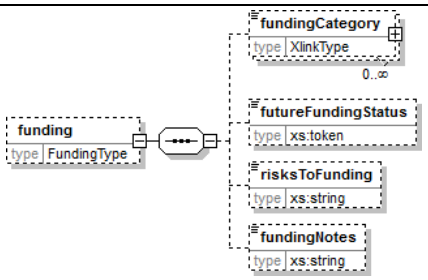
Example	... <ukeof:responsibleParty> <ukeof:individualName>Helen Beadman</ukeof:individualName> <ukeof:position>UKEOF Programme Manager</ukeof:position> <ukeof:organisationName>UKEOF</ukeof:organisationName> <ukeof:postalAddress> <ukeof:street>Polaris House, North Star Avenue</ukeof:street> <ukeof:administrativeArea>Swindon</ukeof:administrativeArea> <ukeof:country>United Kingdom</ukeof:country> <ukeof:postcode>SN2 1EU</ukeof:postcode> </ukeof:postalAddress> <ukeof:telephone>01793 411500</ukeof:telephone> <ukeof:email>office@ukeof.org.uk</ukeof:email> <ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/leadOrganisation">Lead organisation<ukeof:role> <ukeof:onlineResource xlink:href="http://www.ukeof.org" xlink:title="UKEOF website"/> <ukeof:personalIdentifier ukeof:schemeName="ORCID">0123-4568-4565-789</ukeof:personalIdentifier> </ukeof:responsibleParty> ...

supplementalInformation	
Obligation	Optional
Multiplicity	unbounded
Datatype	string
Definition	Free text elements in which you can add information that is useful but which may not be recorded elsewhere.

onlineResource	
Obligation	Optional
Multiplicity	unbound
Datatype	XlinkType
Definition	A website or other online resource which may help users discover more information about the monitoring resource.
Example	... <ukeof:onlineResource xlink:href="http://www.eof.org.uk" xlink:title="UKEOF" /> <ukeof:onlineResource xlink:href="http://www.ecn.ac.uk/" xlink:title="Environmental Change Network" /> ...

linkToData	
Obligation	Optional
Multiplicity	unbound
Datatype	XlinkType
Definition	A link to a dataset or page describing where users can obtain datasets related to this monitoring resource.

Example	... <ukeof:linkToData xlink:href="http://doi.org/10/q8h">Countryside Survey 1990 estimates of Broad Habitat areas in Great Britain</ukeof:linkToData> ...

funding	
Obligation	Optional
Multiplicity	1
Datatype	FundingType 
Definition	Describes the funding that the monitoring receives
Child elements	**fundingCategory** **Obligation** Optional **Multiplicity** unbounded **Datatype** XlinkType **Definition** The type of funding that the monitoring receives. **Allowed values** See http://onto.nerc.ac.uk/EF/fundingCategory **Attributes** Xlink:href - uri of a controlled vocabulary definition of the term **futureFundingStatus** **Obligation** Optional **Multiplicity** 1 **Datatype** token **Definition** How secure the funding for the programme/activity is for the future. Enter “Not secured”, “Secured” or “Unsure” **risksToFunding** **Obligation** Optional **Multiplicity** 1 **Datatype** token **Definition** The risks that may affect the funding of the monitoring (e.g. termination of funding, budget shortfall, funding is likely to be reduced). **fundingNotes** **Obligation** Optional **Multiplicity** 1 **Datatype** string **Definition** Brief notes to support costs and funding information provided e.g. breakdown of funding from various organisations, dates when funding may stop or will be reduced etc

Example	... <ukeof:funding> <ukeof:fundingCategory xlink:href="http://onto.nerc.ac.uk/EF/publicSectorFunding">Public sector funding</ukeof:fundingCategory> <ukeof:futureFundingStatus>Not secured</ukeof:futureFundingStatus> <ukeof:risksToFunding>Defra is likely to reduce funding substantially</ukeof:risksToFunding> <ukeof:fundingNotes>Defra fund 35%, NERC provide 65%</ukeof:fundingNotes> </ukeof:funding> ...

operationCosts - financialYearCost	
Obligation	Optional
Multiplicity	unbounded
Datatype	YearCostType
Definition	The costs of operating the monitoring in one financial year.
Child elements	**Cost (see Appendix B. Full economic cost guidelines)** **Obligation** Mandatory **Multiplicity** 1 **Datatype** string **Definition** Financial year (1st April - 31st March) cost should be given as an actual cost or an estimate to the nearest £10k. It should be provided at Full Economic Costs and include: • Pay costs of personnel • Capital items (platforms, equipment, instruments, laboratories) • Outsourced services (including sub-contracts for consultancy) • Maintenance costs, consumables • Travel and subsistence • Overheads • VAT if applicable and not refundable Contributions in kind (e.g. voluntary sector) should be recorded separately and NOT included in this current cost figure. See Annex A for FEC guidelines **inKindContributions (see Appendix C. Contributions in kind)** **Obligation** Optional **Multiplicity** 1 **Datatype** string **Definition** Contributions in kind received during the financial year (1st April - 31st March). The contribution should be an estimate or to the nearest £5k. The costs included here should be IN ADDITION to the cost above. **costNotes** **Obligation** Optional **Multiplicity** 1 **Datatype** string **Definition** The type of funding that the monitoring receives. **year** **Obligation** Mandatory **Multiplicity** 1 **Datatype** integer **Definition** Financial year to which the costs relate. 2013 = 2013-2014 financial year (i.e. 1st April 2013 to 31st Mar 2014)

Example	`...`
	`<ukeof:financialYearCost>`
	`<ukeof:cost>£1,200,000</ukeof:cost>`
	`<ukeof:inKindContributions>£10,000</ukeof:inKindContributions>`
	`<ukeof:costNotes>In kind contributions are staff time provided by Barclays Bank</ukeof:costNotes>`
	`<ukeof:year>2012</ukeof:year>`
	`</ukeof:financialYearCost>`
	`...`

operationCosts - annualisedCost	
Obligation	Optional
Multiplicity	unbounded
Datatype	CostType
Definition	The annual costs of operating the monitoring over the lifetime of the activity/programme. If of finite duration the annualised cost should be calculated as: total cost/number of years. If of indeterminate duration, provide an annualised cost based on the last 5 years of costs for the activity.
Child elements	**Cost (see Appendix B. Full economic cost guidelines)** **Obligation** Mandatory **Multiplicity** 1 **Datatype** string **Definition** The cost information should be presented as an actual cost or if actual costs are difficult to provide, then estimate to the nearest £10k. It should be provided at Full Economic Costs and include: • Pay costs of personnel • Capital items (platforms, equipment, instruments, laboratories) • Outsourced services (including sub-contracts for consultancy) • Maintenance costs, consumables • Travel and subsistence • Overheads • VAT if applicable and not refundable Contributions in kind (e.g. voluntary sector) should be recorded separately and NOT included in this current cost figure. See Annex A for FEC guidelines **inKindContributions (see Appendix C. Contributions in kind)** **Obligation** Optional **Multiplicity** 1 **Datatype** string **Definition** The contribution information should be presented as an actual contribution or if actual contributions are difficult to provide, then estimate to the nearest £10k. This field should record the contribution of the voluntary sector. **costNotes** **Obligation** Optional **Multiplicity** 1 **Datatype** string **Definition** The type of funding that the monitoring receives.

Example	`...`
	`<ukeof:annualisedCost>`
	`<ukeof:cost>£50,000</ukeof:cost>`
	`<ukeof:inKindContributions>£110,000</ukeof:inKindContributions>`
	`<ukeof:costNotes>Volunteer time from Wildlife Trust</ukeof:costNotes>`
	`</ukeof:annualisedCost >`
	`...`

coding
For Secretariat use only.

useLimitation	
Obligation	Optional
Multiplicity	unbound
Datatype	XlinkType
Definition	Restrictions on use of the data resource - limits as to what the user of the data may subsequently do with it. For example "*If you use this data you must cite it as follows: ...*"
Notes	This element has been included in the UKEOF schema to ensure future compatibility with the INSPIRE metadata regulation ([8.1]) and is not currently required by UKEOF

accessConstraint	
Obligation	Optional
Multiplicity	unbound
Datatype	XlinkType
Definition	Constraints applied to assure the protection of privacy or intellectual property, and any special restriction or limitations on obtaining the resource
Notes	This element has been included in the UKEOF schema to ensure future compatibility with the INSPIRE metadata regulation ([8.2]) and is not currently required by UKEOF

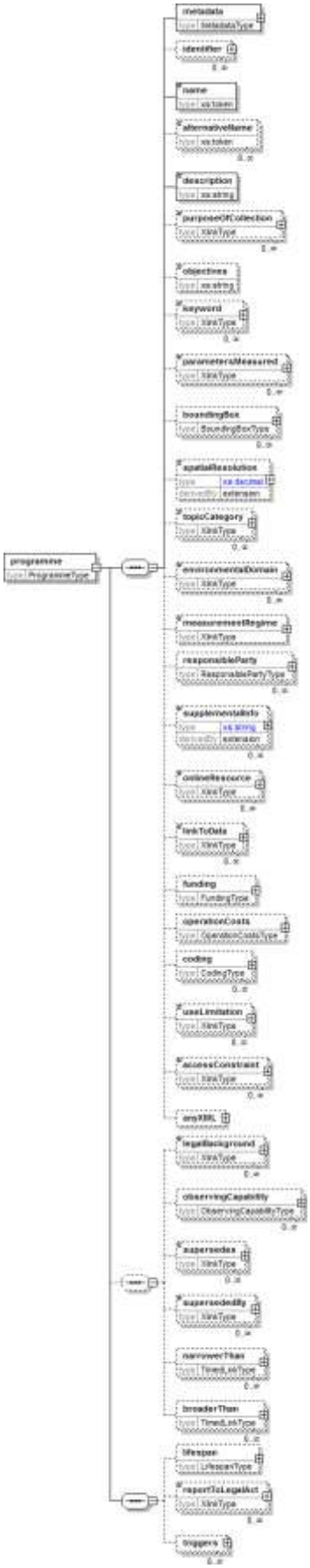
anyXML	
Obligation	Optional
Multiplicity	unbound
Datatype	any
Notes	This element has been included to allow other user communities to use and extend the UKEOF schema. It is not currently supported by the UKEOF catalogue application.

lifespan	
Obligation	Optional
Multiplicity	1
Datatype	LifespanType
Definition	The duration of the programme/activity
Child elements	**start** **Obligation** Mandatory **Multiplicity** 1 **Datatype** date **Definition** The date on which the programme activity started. Enter in the format YYYY-MM-DD. If a specific day is not known, enter 01 for the day (for example, for September 2010 enter *2010-09-01*). If a specific is not known, enter 01 for the month (for example, for 2012 enter *2012-01-01*). **end** **Obligation** Optional **Multiplicity** 1 **Datatype** date **Definition** If the activity/programme has ended, include the date on which it ended. If the monitoring is ongoing leave this element empty.

setUpFor	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Links to the environmental monitoring Programme for which this activity was established
Attributes	Xlink:href - uri of the programme
Example	... <ukeof:setUpFor xlink:href="http://catalogue.ukeof.org.uk/ 2497f6e6-5142-4f01-a49e-a0a5c927011b">National forest inventory</ukeof:setUpFor> ...

uses	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Links to the facility(ies) or network(s) which this activity uses
Attributes	Xlink:href - uri of the facility/network
Example	... <ukeof:uses xlink:href="http://catalogue.ukeof.org.uk/0e74d215-554d-4b1c-b6f2-87fc1221e562">Moor House</ukeof:uses> ...

Programme


programme
metadata
identifier
name
alternativeName
description
purposeOfCollection
objectives
keyword
parameterMeasured
boundingBox
spatialResolution
topicCategory
environmentalDomain
measurementRegime
responsibleParty
supplementalInfo
onlineResource
linkToData
funding
operationCosts
coding
useLimitation
accessConstraint
anyXML
legalBackground
observingCapability
supersedes
supersededBy
narrowerThan
broaderThan
lifespan
reportToLegalAct
triggers

The majority of elements in the Programme type are identical to those in the Activity type.

metadata *see page 8*

identifier *see page 9*

name *see page 9*

alternativeName *see page 9*

description *see page 9*

purposeofCollection *see page 10*

objectives *see page 10*

keyword *see page 10*

parametersMeasured *see page 11*

boundingBox *see page 11*

spatialResolution *see page 12*

topicCategory *see page 12*

environmentalDomain *see page 13*

measurementRegime *see page 14*

responsibleParty *see page 14*

supplementalInfo *see page 16*

onlineResource *see page 16*

linkToData *see page 16*

funding *see page 17*

operationCosts *see page 18*

coding *see page 21*

useLimitation *see page 21*

accessConstraint *see page 21*

anyXML *see page 21*

legalBackground	
Obligation	Optional
Multiplicity	unbounded
Datatype	Xlink:href - uri of the legal instrument
Definition	The legal context, in which the management and regulation of this programme is defined

Example	... <ukeof:legalBackground xlink:href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT">Water Framework Directive</ukeof:legalBackground> ...

observingCapability	
Obligation	Optional
Multiplicity	unbounded
Datatype	ObservingCapabilityType
Definition	Describes the sorts of measurements the programme is capable of recording.
Notes	This is for future use and is not currently implemented by UKEOF

supersedes	
Obligation	Optional
Multiplicity	unbounded
Datatype	xlink
Definition	Links to other environmental monitoring programmes which this programme supersedes.
Attributes	Xlink:href - uri of the programme which this programme supersedes
Example	... <ukeof:supersedes xlink:href="http://catalogue.ukeof.org.uk/id/98282b88-f477-4101-9457-30bca7ad64d3">Forest inventory and forecasting</ukeof:supersedes> ...
Notes	This is for future use and is not currently implemented by UKEOF

supersededBy	
Obligation	Optional
Multiplicity	unbounded
Datatype	xlink
Definition	Links to other environmental monitoring programmes which supersede this programme.
Attributes	Xlink:href - uri of the programme which supersedes this programme
Example	... <ukeof:supersededBy xlink:href="http://catalogue.ukeof.org.uk/id/67465f2e-9058-4693-8146-8f9496e695ac">Civil Hydrography Programme (CHP)</ukeof:supersededBy> ...
Notes	This is for future use and is not currently implemented by UKEOF

narrowerThan	
Obligation	Optional
Multiplicity	unbounded
Datatype	xlink
Definition	If a hierarchical relationship exists between this programme and other programmes, this element records links to “Parent” programmes
Attributes	Xlink:href - uri of the parent programme
Example	... <ukeof:narrowerThan xlink:href="http://catalogue.ukeof.org.uk/id/e23a13ef-ceae-469d-ab42-18e72efab049">Scottish SAF Biodiversity monitoring</ukeof:narrowerThan> ...
Notes	This is for future use and is not currently implemented by UKEOF

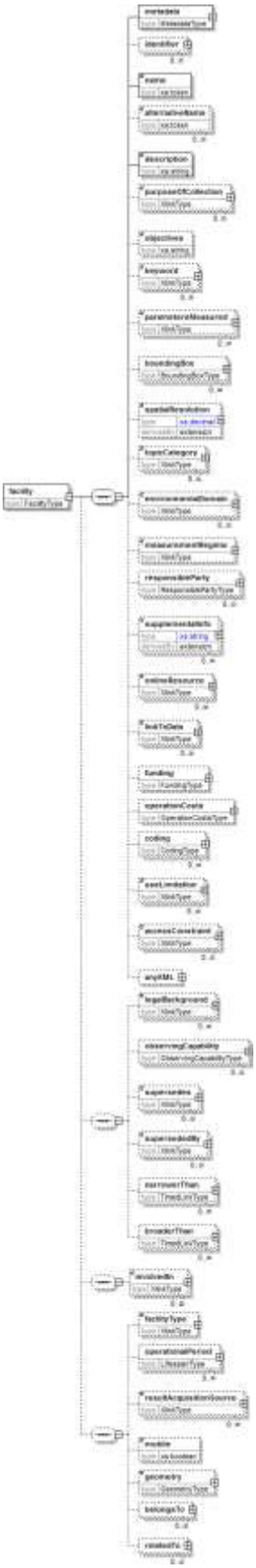
broaderThan	
Obligation	Optional
Multiplicity	unbounded
Datatype	xlink
Definition	If a hierarchical relationship exists between this programme and other programmes, this element records links to “Child” programmes
Attributes	Xlink:href - uri of the child programme
Example	... <ukeof:broaderThan xlink:href="http://catalogue.ukeof.org.uk/id/49f5177b-9b11-4cdf-8d2f-8f632027e85a"/>Seabird Monitoring Programme</ukeof:broaderThan> ...
Notes	This is for future use and is not currently implemented by UKEOF

lifespan	*see page 22*

reportToLegalAct	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Legislative drivers for which this programme was established. These may be national or international.
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term
Example	... <ukeof:legislation xlink:href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT">Water Framework Directive</ukeof:legislation> ...

triggers	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Links to the activity/activities which this programme uses
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term
Example	... <ukeof:triggers xlink:href="http://catalogue.ukeof.org.uk/id/2cb8077a-6989-4de4-9729-66ee1c3bbe9d">Dorset Heathland Restoration Experiment</ukeof:triggers> ...

Facility



The majority of elements in the Facility type are identical to those in the Programme type.

metadata	*see page 8*
identifier	*see page 9*
name	*see page 9*
alternativeName	*see page 9*
description	*see page 9*
purposeofCollection	*see page 10*
objectives	*see page 10*
keyword	*see page 10*
parametersMeasured	*see page 11*
boundingBox	*see page 11*
spatialResolution	*see page 12*
topicCategory	*see page 12*
environmentalDomain	*see page 13*
measurementRegime	*see page 14*
responsibleParty	*see page 14*
supplementalInfo	*see page 16*
onlineResource	*see page 16*
linkToData	*see page 16*
funding	*see page 17*
operationCosts	*see page 18*
coding	*see page 21*
useLimitation	*see page 21*
accessConstraint	*see page 21*
anyXML	*see page 21*
legalBackground	*see page 24*
observingCapability	*see page 25*
supersedes	*see page 25*
supersededBy	*see page 25*
narrowerThan	*see page 26*
broaderThan	*see page 26*

involvedIn	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Links to the environmental monitoring Activity in which the facility is involved
Attributes	Xlink:href - uri of the monitoring activity
Example	... <ukeof:involvedIn xlink:href="http://catalogue.ukeof.org.uk/id/282b2c90-9eee-11e3-a5e2-0800200c9a66">Otter survey</ukeof:involvedIn> ...

facilityType	
Obligation	Optional
Multiplicity	1
Datatype	XlinkType
Definition	Category of facility such as site, station or sensor.
Allowed values	See http://onto.nerc.ac.uk/EF/facilityType
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term
Example	... <ukeof:facilityType xlink:href="http://onto.nerc.ac.uk/EF/site">site</ukeof:facilityType> ...

operationalPeriod	
Obligation	Optional
Multiplicity	Unbounded
Datatype	LifespanType
Definition	The dates between which the facility was operational
Child elements	**start** **Obligation** Mandatory **Multiplicity** 1 **Datatype** date **Definition** The date on which the facility became operational. Enter in the format YYYY-MM-DD. If a specific day is not known, enter 01 for the day (for example, for September 2010 enter *2010-09-01*). If a specific is not known, enter 01 for the month (for example, for 2012 enter *2012-01-01*). **end** **Obligation** Optional **Multiplicity** 1 **Datatype** date **Definition** If the facility is no longer in use, include the date on which it ceased to be operational. If the monitoring is ongoing, leave this element empty.

Example	... <ukeof:operationalPeriod> <ukeof:start>1975-01-01</ukeof:start> </ukeof:operationalPeriod ...

resultAcquisitionSource	
Obligation	Optional
Multiplicity	Unbounded
Datatype	XlinkType
Definition	An indication of the relationship between the environmental monitoring facility and the sampled feature.
Attributes	Xlink:href - uri of a controlled vocabulary definition of the term
Allowed values	See http://onto.nerc.ac.uk/EF/resultAcquisitionSource
Example	... <ukeof:resultAcquisitionSource xlink:href="http://onto.nerc.ac.uk/EF/inSitu">in-situ</ukeof:resultAcquisitionSource> ...
Notes	This element has been included for compatibility with INSPIRE criteria.

mobile	
Obligation	Optional
Multiplicity	1
Datatype	Boolean
Definition	Indicates if the facility mobile (i.e. repositionable) True = the facility is mobile False = the facility is fixed
Example	... <ukeof:mobile>True</ukeof:mobile> ...
Notes	This element has been included for compatibility with INSPIRE criteria. While it is not required for UKEOF, it is mandatory for INSPIRE and so its completion is advised.

geometry	
Obligation	Mandatory
Multiplicity	1
Datatype	GeometryType
Definition	A textual representation of the geometry associated with the facility presented in well-known text (WKT).

Attributes	SRS - A URI describing the Spatial Reference System used. To simplify matters, UKEOF mandate that geometry is provided in the WGS 84 system (EPSG::4326). Therefore this value is fixed (`urn:ogc:def:crs:EPSG::4326`) representativePoint - Indicates if this is the actual geometry or merely an indicative location TRUE = this is an indicative location FALSE = this is the actual geometry
Notes	At present only POINTS and POLYGON geometries are acceptable.

Example 1 (point)	`...`
	`<ukeof:geometry ukeof:SRS="urn:ogc:def:crs:EPSG::4326" ukeof:representativePoint="true">POINT(-3.10646209829895 57.6213634141463)</ukeof:geometry>`
	`...`

Example 2 (polygon)	`...`
	`<ukeof:geometry ukeof:SRS="urn:ogc:def:crs:EPSG::4326" ukeof:representativePoint="false">POLYGON((1.528 52.667,1.53 52.665,1.53 52.666,1.535 52.666,1.531 52.667,1.528 52.667))</ukeof:geometry>`
	`...`

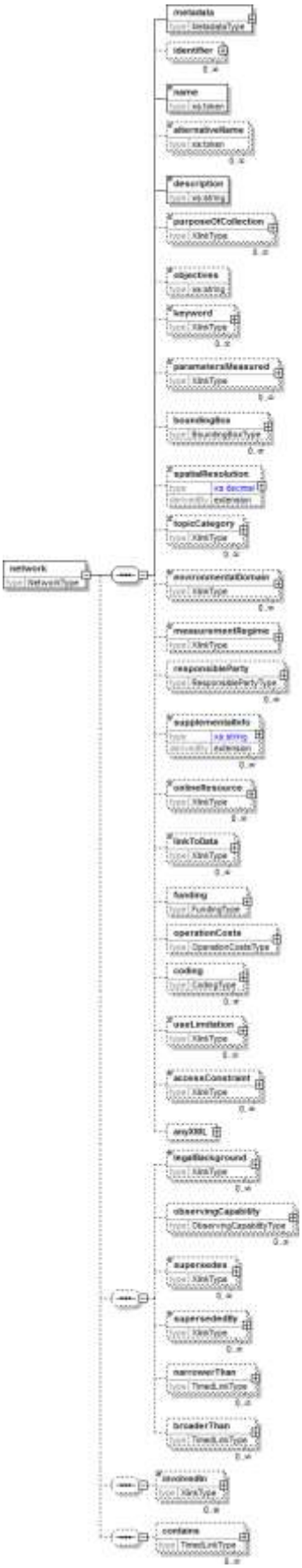
belongsTo	
Obligation	Optional
Multiplicity	Unbounded
Datatype	XlinkType
Definition	Links to the environmental monitoring Networks to which the facility belongs
Attributes	Xlink:href - uri of the monitoring network

Example	`...`
	`<ukeof:belongsTo xlink:href="http://catalogue.ukeof.org.uk/id/b0a36315-ed44-4a95-aff6-d1e73fced0c0">London Air Quality Network</ukeof:belongsTo>`
	`...`

relatedTo	
Obligation	Optional
Multiplicity	Unbounded
Datatype	XlinkType
Definition	Links to environmental monitoring Facilities to which the facility is related
Attributes	Xlink:href - uri of the monitoring facility

Example	`...`
	`<ukeof:relatedTo xlink:href="http://catalogue.ukeof.org.uk/id/032e9126-d79e-461b-9bb4-d13769831ec1">Snowdonia</ukeof:relatedTo>`
	`...`

Network


network
metadata
identifier
name
alternativeName
description
purposeOfCollection
objectives
keyword
parametersMeasured
boundingBox
spatialResolution
topicCategory
environmentalDomain
measurementRegime
responsibleParty
supplementalInfo
onlineResource
linkToData
funding
operationCosts
coding
useLimitation
accessConstraint
anyXML
legalBackground
observingCapability
supersedes
supersededBy
narrowerThan
broaderThan
isIndexedIn
contains

The majority of elements in the Network type are identical to those in the Facility type.

metadata *see page 8*

identifier *see page 9*

name *see page 9*

alternativeName *see page 9*

description *see page 9*

purposeofCollection *see page 10*

objectives *see page 10*

keyword *see page 10*

parametersMeasured *see page 11*

boundingBox *see page 11*

spatialResolution *see page 12*

topicCategory *see page 12*

environmentalDomain *see page 13*

measurementRegime *see page 14*

responsibleParty *see page 14*

supplementalInfo *see page 16*

onlineResource *see page 16*

linkToData *see page 16*

funding *see page 17*

operationCosts *see page 18*

coding *see page 21*

useLimitation *see page 21*

accessConstraint *see page 21*

anyXML *see page 21*

legalBackground *see page 24*

observingCapability *see page 25*

supersedes *see page 25*

supersededBy *see page 25*

narrowerThan *see page 26*

broaderThan *see page 26*

involvedIn *see page 30*

contains	
Obligation	Optional
Multiplicity	unbounded
Datatype	XlinkType
Definition	Links to environmental monitoring Facilities which the Network contains
Attributes	Xlink:href - uri of the monitoring facility
Example	... <ukeof:contains xlink:href="http://catalogue.ukeof.org.uk/id/032e9126-d79e-461b-9bb4-d13769831ec1">Snowdonia</ukeof:contains> ...

Examples

1. A facility:

```
<ukeof:facility xsi:schemaLocation="http://www.ukeof.org.uk/schema/1 https://catalogue-staging.ukeof.org.uk/schema/ukeof.1.0.0.xsd" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:ukeof="http://www.ukeof.org.uk/schema/1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
	<ukeof:metadata>
		<ukeof:fileIdentifier>01d56fb1-259c-42c6-bf3d-acf4558629c6</ukeof:fileIdentifier>
		<ukeof:selfUrl>https://catalogue-staging.ukeof.org.uk/id/01d56fb1-259c-42c6-bf3d-acf4558629c6</ukeof:selfUrl>
		<ukeof:author>
			<ukeof:individualName>Philip Trembath</ukeof:individualName>
			<ukeof:organisationName>Centre for Ecology & Hydrology</ukeof:organisationName>
			<ukeof:email>enquiries@ceh.ac.uk</ukeof:email>
			<ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/author">author</ukeof:role>
		</ukeof:author>
		<ukeof:authorDate>2014-02-19T13:38:51.680Z</ukeof:authorDate>
		<ukeof:publicationState>public</ukeof:publicationState>
	</ukeof:metadata>
	<ukeof:name>Windermere</ukeof:name>
	<ukeof:description>Windermere lies in the north-west corner of England in the English Lake District. The dominant geological structure of the Lake District is a dome of Paleozoic rocks formed by uplift in the Tertiary. This uplift produced a radial drainage pattern which was enhanced during the Pleistocene glaciation, with the major lakes occupying bedrock basins in steep-sided, flat-floored valleys. Windermere is the largest natural lake in England having a surface area of 14.8km2 at an altitude of only 40 m. The lake itself is divided by a shallow sill into two basins; the North Basin with a surface area of 8km2 and maximum depth of 64m and the South Basin with a surface area of 6.7km2 and maximum depth of 42m.  The North basin of Windermere has a catchment of 180km2 which drains into the lake via two main rivers, several small tarns (lakes) and several streams. The catchment is mainly hill land, grazed by sheep throughout the year but also used intensively for recreational purposes. The villages in the valleys are also major tourist destinations with consequent increases in the sewage input to the lake. Over the past 50 years levels of dissolved reactive phosphorus in the lake have more than doubled, reaching their highest levels in the 1980s. The effluent discharged into the North Basin of Windermere from the main sewage works is now phosphate stripped in an effort to reduce the nutrient loading to the lake.  The lake itself is a Site of Special Scientific Interest (SSSI), a source of potable water, a major recreational facility and a specialised fishery (for charr, Salvelinus alpinus).</ukeof:description>
	<ukeof:responsibleParty>
		<ukeof:organisationName>Centre for Ecology & Hydrology</ukeof:organisationName>
		<ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/leadOrganisation">Lead organisation</ukeof:role>
	</ukeof:responsibleParty>
	<ukeof:broaderThan xlink:href="https://catalogue-staging.ukeof.org.uk/id/1066fd66-010a-4aad-be07-cebf67de36be">https://catalogue-staging.ukeof.org.uk/id/1066fd66-010a-4aad-be07-cebf67de36be</ukeof:broaderThan>
	<ukeof:involvedIn xlink:href="https://catalogue-staging.ukeof.org.uk/id/22a11fa9-cdc4-4c21-8752-a34fb6b1f8d2">Environmental Change Network: freshwater ecology</ukeof:involvedIn>
	<ukeof:mobile>False</ukeof:mobile>
	<ukeof:geometry ukeof:SRS="urn:ogc:def:crs:EPSG::4326">POINT(-2.95257688889682 54.31395514540811)</ukeof:geometry>
</ukeof:facility>
```

2. A programme

```
<ukeof:programme xsi:schemaLocation="http://www.ukeof.org.uk/schema/1 https://catalogue-staging.ukeof.org.uk/schema/ukeof.1.0.0.xsd" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:ukeof="http://www.ukeof.org.uk/schema/1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
    <ukeof:metadata>
        <ukeof:fileIdentifier>b0d017ae-1a77-4f00-ba67-c36afbab82e4</ukeof:fileIdentifier>
        <ukeof:selfUrl>https://catalogue-staging.ukeof.org.uk/id/b0d017ae-1a77-4f00-ba67-c36afbab82e4</ukeof:selfUrl>
        <ukeof:author>
            <ukeof:individualName>Philip Trembath</ukeof:individualName>
            <ukeof:organisationName>Centre for Ecology & Hydrology</ukeof:organisationName>
            <ukeof:email>phtr@ceh.ac.uk</ukeof:email>
            <ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/author">Author</ukeof:role>
        </ukeof:author>
        <ukeof:authorDate>2014-02-27T17:05:08.541Z</ukeof:authorDate>
        <ukeof:publicationState>public</ukeof:publicationState>
    </ukeof:metadata>
    <ukeof:identifier ukeof:localIdentifier="1322283" ukeof:namespace="Envirobase"/>
    <ukeof:identifier ukeof:localIdentifier="476818" ukeof:namespace="UKEOF"/>
    <ukeof:name>Meteosat Second Generation (MSG) mission - Geostationary Satellite programme</ukeof:name>
    <ukeof:description>Part of the Met Office Space Programme, the UK contributes to EUMETSAT through the Met Office to provide environmental/meteorological satellite information critical to weather forecasting of severe weather, climate change and other environmental phenomena. Geostationary Satellites keep their position above the equator and offer constant information over the footprint on the earth's surface, atmospheric temperature and moisture profiles, etc. The MSG footprint covers the Atlantic &amp;amp; Europe; a follow-on Meteosat Third Generation (MTG) is planned to eventually replace MSG.</ukeof:description>
    <ukeof:purposeOfCollection xlink:href="http://onto.nerc.ac.uk/EF/advancingScience">Innovation/advancing science</ukeof:purposeOfCollection>
    <ukeof:purposeOfCollection xlink:href="http://onto.nerc.ac.uk/EF/modelling">Modelling</ukeof:purposeOfCollection>
    <ukeof:purposeOfCollection xlink:href="http://onto.nerc.ac.uk/EF/statuoryAdvice">Statuory advice</ukeof:purposeOfCollection>
    <ukeof:objectives>MSG satellites provide the primary source of imagery used by Met Office forecasters. They also provide motion vector wind information used with numerical weather prediction models. To provide satellite data in order to:- provide forecasters with vital imagery data, feed into the Met Office Numerical Weather Prediction models, monitor the climate</ukeof:objectives>
    <ukeof:keyword xlink:href="http://vocabs.lter-europe.net/EnvThes/USLterCV_398">ozone</ukeof:keyword>
    <ukeof:keyword xlink:href="http://www.eionet.europa.eu/gemet/concept/1491">cloud</ukeof:keyword>
    <ukeof:keyword>Wind fields</ukeof:keyword>
    <ukeof:keyword>Water vapour</ukeof:keyword>
    <ukeof:keyword>Cirrus cloud height</ukeof:keyword>
    <ukeof:keyword>Atmospheric instability</ukeof:keyword>
    <ukeof:keyword>surface</ukeof:keyword>
    <ukeof:boundingBox>
        <ukeof:westBoundLongitude>-8.649</ukeof:westBoundLongitude>
        <ukeof:eastBoundLongitude>1.7682</ukeof:eastBoundLongitude>
```

```
          <ukeof:southBoundLatitude>49.864</ukeof:southBoundLatitude>
          <ukeof:northBoundLatitude>60.861</ukeof:northBoundLatitude>
     </ukeof:boundingBox>
     <ukeof:spatialResolution ukeof:uom="urn:ogc:def:uom:EPSG::9001">10000</ukeof:spatialResolution>
     <ukeof:topicCategory
xlink:href="http://inspire.ec.europa.eu/codelist/TopicCategory/imageryBaseMapsEarthCover">Imagery /
Base Maps / Earth Cover</ukeof:topicCategory>
     <ukeof:environmentalDomain
xlink:href="http://onto.nerc.ac.uk/EF/atmosphere">Atmosphere</ukeof:environmentalDomain>
     <ukeof:responsibleParty>
          <ukeof:individualName>Ali Price</ukeof:individualName>
          <ukeof:organisationName>Met Office</ukeof:organisationName>
          <ukeof:postalAddress>
               <ukeof:street>FitzRoy Road</ukeof:street>
               <ukeof:postalArea>Exeter</ukeof:postalArea>
               <ukeof:administrativeArea>Devon</ukeof:administrativeArea>
               <ukeof:country>UK</ukeof:country>
               <ukeof:postcode>EX1 3PB</ukeof:postcode>
          </ukeof:postalAddress>
          <ukeof:telephone>01392 885680</ukeof:telephone>
          <ukeof:email>alastair.price@metoffice.gov.uk</ukeof:email>
          <ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/leadOrganisation">Lead
organisation</ukeof:role>
          <ukeof:onlineResource xlink:href="http://www.metoffice.gov.uk"/>
     </ukeof:responsibleParty>
     <ukeof:responsibleParty>
          <ukeof:organisationName>EUMETSAT</ukeof:organisationName>
          <ukeof:postalAddress>
               <ukeof:street>Eumetsat Allee 1</ukeof:street>
               <ukeof:postalArea>Darmstadt</ukeof:postalArea>
               <ukeof:country>Germany</ukeof:country>
               <ukeof:postcode>D-64295</ukeof:postcode>
          </ukeof:postalAddress>
          <ukeof:telephone>+49 6151 807 3660</ukeof:telephone>
          <ukeof:email>ops@eumetsat.int</ukeof:email>
          <ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/otherOrganisation">Other</ukeof:role>
          <ukeof:onlineResource
xlink:href="http://www.eumetsat.int">http://www.eumetsat.int</ukeof:onlineResource>
     </ukeof:responsibleParty>
     <ukeof:responsibleParty>
          <ukeof:organisationName>Ministry of Defence</ukeof:organisationName>
          <ukeof:role xlink:href="http://onto.nerc.ac.uk/EF/leadFunder">Lead funder</ukeof:role>
     </ukeof:responsibleParty>
     <ukeof:funding>
          <ukeof:fundingCategory
xlink:href="http://onto.nerc.ac.uk/EF/public">public</ukeof:fundingCategory>
     </ukeof:funding>
     <ukeof:lifespan>
          <ukeof:start>2002-01-01</ukeof:start>
     </ukeof:lifespan>
```

```
</ukeof:programme>
```

Appendix A. Controlled vocabularies

Controlled vocabularies are lists of authorised terms that are allowed to populate various elements of the catalogue.

For example, the Environmental Domain element, allows only the following values:

- *Atmosphere*
- *Biosphere*
- *Built environment*
- *Cryosphere*
- *Freshwater*
- *Groundwater*
- *Lithosphere*
- *Marine*
- *Socio-economic*

Controlled vocabularies for the UKEOF catalogue are maintained at http://onto.nerc.ac.uk/EF/codelist

Encoding controlled values

Each controlled vocabulary term has two aspects:

Label - Human-readable value of the term (e.g. "Built environment")

URI - A hyperlink (URL) or uniform resource name (URN) which uniquely identifies the term. URIs enable applications to navigate the data and ultimately allow the UKEOF catalogue to link to external data resources.

The label is mandatory, the URL is optional but it is highly recommended that you include it.

Encoding examples

```
<ukeof:keyword xlink:href="http://vocabs.lter-europe.net/EnvThes/USLterCV_536">
        solar radiation
</ukeof:keyword>
```

```
<ukeof:environmentalDomain xlink:href="http://onto.nerc.ac.uk/EF/builtEnvironment">
        Built environment
</ukeof:environmentalDomain>
```

Appendix B. Full economic cost guidelines

Organisations that do not have their own methods for estimating the size of their investments in observing our environment can use the following definitions which are in line with NERC and Defra standards.

Pay costs of personnel

This category should include the annual costs of personnel working directly on the activity, including salary, National Insurance and superannuation. Pay calculations on the basis of average pay costs for the grades of staff working on the activity are acceptable. If members of staff work part-time on the activity, then annual costs should be allocated pro rata, on the basis of 215 working days per year.

Capital items (platforms, equipment, instruments, laboratories)

This category covers the procurement of all capital items. Once procured the ongoing running and maintenance costs will fall under one of the other funding categories (either outsourced services, maintenance or overheads). Some illustrative examples of typical capital investments include:

- Replacement / major upgrade of building stock such as laboratories, bases and monitoring sites
- Replacement / major upgrade of ships and aircraft
- Major IT procurement exercises (e.g. high performance computing, cluster computers)
- Additions / replacements to the equipment pools
- Laboratory equipment
- Vehicles purchased for field based research.

Outsourced services (including sub-contracts for consultancy)

In some cases activities may be outsourced to outside agencies or the private sector.

Maintenance costs, consumables

Maintenance costs could include items such as running cost of scientific infrastructure (e.g. maintenance costs for ships, mariner's salary costs on the ships, servicing of equipment). In general these are costs **directly attributable to the observing activity**. For some organisations these cost may be included either as outsourced services or overheads. **The important issue is to include costs somewhere, if applicable and not to double count; rather than worry unduly about the cost category**.

Consumables are office and scientific laboratory supplies (e.g. glassware, chemicals) which are purchased from third parties and replaced regularly. Consumables may also include fuel for vehicles including ships and aircraft.

Travel and subsistence

These are annual travel and subsistence costs incurred by personnel working directly on the observing activity (i.e. the travel and subsistence costs associated with staff in the "pay of personnel" cost category).

Overheads

Overheads *may* cover the direct costs of the use of services and facilities that underpin the observing activities, if these are not including in the outsourced services and maintenance categories above.

Overheads *shall* include indirect costs which cannot readily be uniquely assigned to a particular observing activity, but nonetheless contribute to the overall costs of the organisation carrying out the observing activity. These may include:

- Financial services such as accounting, tendering, marketing
- Personnel services
- Estate costs
- General staff facilities such as health and safety, training, welfare
- Departmental services such as administration, library, secretarial, printing
- Staff management and cover for maternity and long term sickness benefit.

The indirect costs should be calculated for discrete areas of activity if appropriate (i.e. different costs for different sites) and allocated to activities on the basis of one or more cost drivers such as square metres (for attributing the costs of laboratory or other large facilities) or time of direct staff (for contributing all other indirect costs). Salary/pay costs should not be used as a driver for indirect costs.

For universities and public sector establishments, overheads represent part of the full economic costs of the observing activity proposal. Our investment in observing the environment should include full economic costs.

Ineligible costs

The following are excluded from eligible costs:

- interest charges;
- hire purchase interest and any associated service charges;
- profit earned by a subsidiary or by an associated undertaking on work subcontracted under the activity;

Contingency allowances expressed as an arbitrary percentage overall addition to eligible costs.

Appendix C. Contributions in kind

Contributions in kind arise from two sources:

1. An observing activity receives contributions from other organisations at no cost to the main observing activity. For example, the POL Coastal Observatory is funded mainly by NERC. NERC costs can be accurately recorded by staff running the Observatory. The Observatory also receives "contributions in kind" from other organisations such as CEFAS, University of Bangor, and University of Liverpool. NERC personnel can make an estimate for the value of contributions in kind but the entry will need to be checked for double counting and/or accuracy by ERFF staff once all the returns have been made.

2. Some activities, particularly in the biodiversity area, are carried out by members of the public or voluntary organisations. It is suggested that an attempt is made to calculate the total value of volunteer effort for each activity annually, either for the most recent year or averaged over all years since the activity commenced. JNCC currently uses calculations based on £35.00 per hour for skilled surveyors and £11.04 per hour (twice minimum wage) for less difficult surveys. A typical overhead of ~100% can be added. The calculation used to derive annual figures should be described:
    - number of volunteers per year (*N*),
    - time per volunteer per year in hours (*T*),
    - hourly rate used (*HR*),
    - overheads (*O*%) added).

    The total contribution per year is therefore:

$$N \times T \times HR \times \left(1 + \left(\frac{O\%}{100}\right)\right)$$