Designing URI Sets for Location.

A report from the Public Sector Information Domain of the CTO Council's cross Government Enterprise Architecture, and the UK Location Council.

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Change Control

Version	Date	Editor	Note
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0.1b	17/03/2010	Keith Mutrray, UKLP	INSPIRE references added
0.2	31/03/2010	Stuart Williams, Epimorphics	Restructuring...
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1.0	17/5/2011	Stuart Williams, Epimorphics	Minor updates and additional examples arising from pilot projects and review at LIIB 7. Removed rendition fields from spatial object URI patterns in response to Jeremy Tandy (Met Office). Added informative Annex IV contributed by Jeremy Tandy.

Contents

Introduction

1. This paper is a part of the family of policy and guidance documents associated with the cross-Government Enterprise Architecture (xGEA), and the Government ICT Strategy. It defines the design considerations and guidance by which UK public sector Uniform Resource Identifier (URI) sets should be developed and maintained, as applied to Location data.

2. This document offers guidelines for the assignment of linked-data URI for the publication of INSPIRE spatial-objects, associated linked-data vocabularies and for URI based thematic referencing of associated "real-world phenomena". The guidelines presented her represent a minor update to the original guidance in the light of experience gained by piloting their use.

3. The EU INSPIRE Directive calls for

   > "a common framework for the unique identification of spatial objects, to which identifiers under national systems can be mapped in order to ensure interoperability between them"

   This paper is focussed on the use of http: URI by the UK public sector to meet that INSPIRE objective. Further information about linking and location is available in "A guide to the benefits of Linked Data and the UK Location Strategy".

4. The CTO Council paper 'Designing URI Sets for the UK Public Sector'[1] establishes the role of URIs to "provide a common meaning and common identifier to refer to the same 'Thing'". This paper interprets those design considerations for **spatial-things** i.e. real-world phenomena that have spatial extent or position and which may be abstracted as **spatial-objects**. For example the region administered by a local authority is a **spatial-thing** different aspects of which, such as its shape and name, or its boundary and adjacencies may be modelled by multiple different **spatial-objects**,. For all generic guidance see "Designing URI Sets for the UK Public Sector".

5. The document will be of direct interest to:

   - Owners of 'Spatial Objects' in the UK public sector
   - Those with data that can be linked to 'Spatial Things'
   - Providers of spatial solutions to the UK public sector
   - and anyone wishing to use this data?

6. Spatial information is important to everyone and every organisation in some way. Naming both spatial-objects and the spatial-things which they describe/model with URIs provides a basis for linking spatial information with other types of information published on the web.

References

Reference	Date	Author
D2.5 Generic Conceptual Model	2010	EU, http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/D2.5_v3.3_vs_3.2.pdf
D2.7 Encoding of Spatial Data	2009	EU, http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/D2.7_v3.2_vs_3.1.pdf
Designing URI Sets for the UK Public Sector'	2009	UK, Govt http://www.cabinetoffice.gov.uk/cio/chief_technology_officer/public_sector_ia.aspx
Government ICT Strategy	2009	UK, Govt http://www.cabinetoffice.gov.uk/media/317444/ict_strategy4.pdf
Implementing Regulation	2009	EU, "...as regards spatial data sets and services" http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:323:0011:0102:EN:PDF
INSPIRE Directive	2007	EU,: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001:0014:EN:PDF
INSPIRE Glossary	2009	EU, http://inspire-registry.jrc.ec.europa.eu/registers/GLOSSARY
INSPIRE Registry	2009	EU, http://inspire-registry.jrc.ec.europa.eu/

[1] http://www.cabinetoffice.gov.uk/cio/chief_technology_officer/public_sector_ia.aspx

ISO 19101 Geographic information Reference model	2002	ISO, http://www.isotc211.org
W3C "WGS84 Geo Positioning: an RDF vocabulary"	2003	W3C, http://www.w3.org/2003/01/geo/wgs84_pos
A guide to the benefits of Linked Data and the UK Location Strategy"	2010	UK Location Programme http://location.defra.gov.uk/wp-content/uploads/2009/12/UKLP-Linked-Data-Guide-Final.pdf

Glossary

Term	Definition	Source
Spatial Object	an abstract representation of a real-world phenomenon related to a specific location or geographical area NOTE This INSPIRE term is synonymous with the ISO 19100 term "(geographic) feature", and distinct from ISO "spatial object", which specifically contains the positional information for a feature.	INSPIRE Glossary item 67
Spatial Thing	"Anything with spatial extent, i.e. size, shape, or position. e.g. people, places, bowling balls, as well as abstract areas like cubes." Spatial-Things are that subset of 'real-world phenomena' which relate to a location.	W3C "WGS84 Geo Positioning: an RDF vocabulary"
Unique Object Identifier	**identifier** associated with a **spatial object**	INSPIRE Glossary Item 77
Thematic Identifier	descriptive **unique object identifier** applied to **spatial objects** in a defined information **theme** EXAMPLE an administrative code for administrative area spatial objects in the administrative units theme, a parcel code for parcel spatial objects in a cadastral theme	INSPIRE Glossary item 73
Geographic Identifier	spatial reference in the form of a label or code that identifies a location [ISO 19112] EXAMPLE 1 Place names: Paris, Rhine, Mont Blanc EXAMPLE 2 Postal codes: 53115, 01009, SW1, IV19 1PZ	INSPIRE Glossary item 32
URI Set	a collection of reference data published using URIs, about a single concept, governed from a single source.	"Designing URI Sets for the UK Public Sector"
Web Representation	Web representation is typically carried in the entity body of an HTTP protocol message. It generally has an associate internet media-type[2].	

(see also <https://inspire-registry.jrc.ec.europa.eu/registers/GLOSSARY/items>)

[2] The word representation is used in multiple sense in this document. The term "web representation"is used for the narrow technical sense of the word as used in web architecture.

Abbreviations

Term	Definition	Source
URI	Uniform Resource Identifier	IETF RFC 3986

Spatial Things and Spatial Objects

7. The INSPIRE directive provides the following definition for spatial objects:

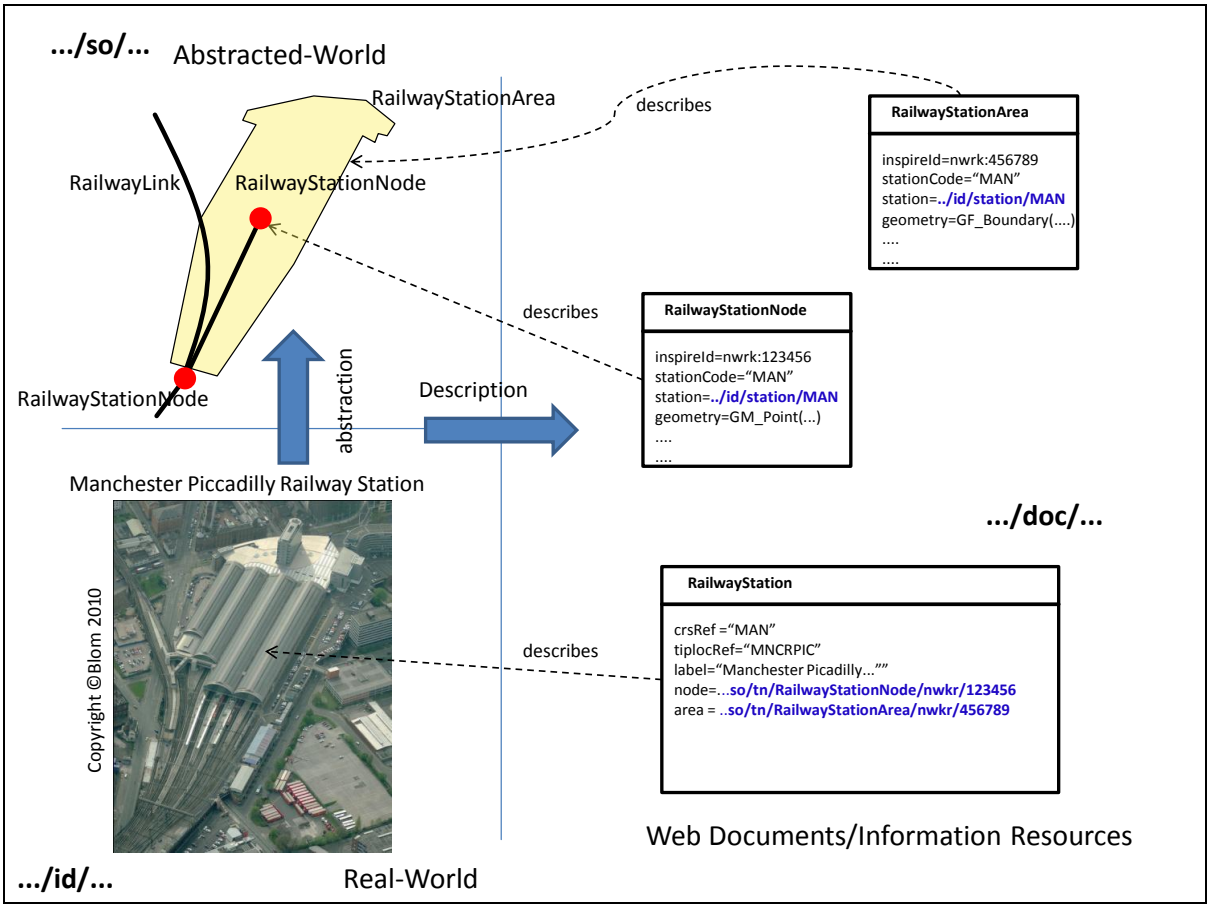
Spatial Object	an abstract representation of a real-world phenomenon related to a specific location or geographical area. (see also Spatial-Thing)

8. By this definition a spatial object provides an abstraction of one or more spatial-things such as: a parcel of land or the boundary to a parcel of land; the outline of a building; the connectivity and geographic coverage of the components of a road network. For any given real-world phenomenon there may be multiple spatial-objects that abstract that real-world phenomenon[3].

9. Under the EU INSPIRE directive, it becomes a requirement to provide for the unique and interoperable identification of spatial-objects. Within the UK it is recommend that this identification will be extended to include the use of HTTP URI for identifying spatial-objects which will be assigned in line with the guidelines for "Designing URI Sets for the UK Public Sector". These guidelines advocate a general pattern for URI introduced in the next section.

10. The following definition of spatial-thing from the W3C "WGS84 Geo Positioning: an RDF vocabulary" is adopted here as a definition for what is referred to by the phrase "real-world-phenomenon":

Spatial Thing	"Anything with spatial extent, i.e. size, shape, or position. e.g. people, places, bowling balls, as well as abstract areas like cubes."



[3] .see defn "homologous spatial-objects" in D2.5

11. The diagram above illustrates the abstraction of spatial-things as INSPIRE spatial-objects and then the description of both spatial-things and spatial-objects by information resources that may be serialised as documents in one or more formats.

12. Spatial-things can be material things, such as monuments, buildings or bridges, or non-material things such as the administrative boundaries; boundaries of cadastral parcels of land; routes within a transport network; or locations associated with observations and measurements.

13. Spatial-things, the spatial-objects which abstract them and the documents which describe both spatial-objects and spatial-things are distinct entities and are each assigned distinct HTTP URI identifiers when presented as linked data.

INSPIRE Identifiers

14. The INSPIRE "D2.5 Generic Conceptual Model" discusses three kinds of identifiers:

    - Unique Object Identifiers
    - Thematic Identifiers
    - Geographic Identifiers.

15. Unique Object Identifiers are used to identify spatial-objects;

16. Thematic References are typically made using coded values from managed codeset. They are used to associate a spatial-object with a spatial-thing designated by the coded value. e.g. 3 letter IATA or 4 letter ICAO codes are used to designate aerodromes, for example LHR for London's Heathrow Airport or SFO for San Francisco Airport.

17. Geographic Identifiers are used to make "spatial reference in the form of a label or code that identifies a location".

INSPIRE Unique Object Identifiers

18. Unique Object Identifiers are defined in section 9.8.3.1 of "D2.5 Generic Conceptual Model" and are composed of 3 syntactic components:

    - **namespace** – intended as a unique identifier prefix to enable delegated administration of local identifier within a framework of globally unique identifiers.

    - **localId** – a character string that is unique within a given **namespace** such that the combination of **namespace** name and **localId** form a globally unique spatial-object identifier (i.e. consistently identifies the same spatial-object).

    - **versionId** – an optional component that is used to distinguish between multiple versions of a spatial object designated by a **namespace/localId** combination. A **versionId** is unique within the scope of a given **namespace/localId** combination ie. within the scope of a given **namespace/localId**, a **versionId** consistently designates a single version of the spatial-object that corresponds to the given **namespace/localId**.

19. **namespace** and **localId** fields are character sequences that are restricted to alphanumeric characters ([a-z],[A-Z] and [0-9] plus '_', '.' and '-'. In particular they may not contain ':' or '/' which means that they can be used as segments in URI ('/' delimited) and URN (':' delimited) without confusion. There seem to be no character restrictions imposed on the **versionId** component.

Thematic Identifiers

20. INSPIRE "D2.5 Generic Conceptual Model" defines Thematic Identifiers as follows:

Thematic Identifier	descriptive **unique object identifier** applied to **spatial objects** in a defined information **theme** EXAMPLE an administrative code for administrative area spatial objects in the administrative units theme, a parcel code for parcel spatial objects in a cadastral theme

21. Thematic references typically arises as properties bearing values drawn from a controlled set of code for example, UK Post Codes or ONS Standard Names and Codes (SNAC) code lists. INSPIRE does not define a common datatype for

representing thematic identifiers. INPIRE Thematic references are expressed in theme specific ways – see Annex I: Thematic Referencing in INSPIRE below

22. Thematic referencing in INSPIRE occurs when a spatial-object refers to a spatial-thing by means of a coded property value.

Geographic Identifiers

23. INSPIRE "D2.5 Generic Conceptual Model" defines Geographic Identifiers as follows:

Geographic Identifier	spatial reference in the form of a label or code that identifies a location [ISO 19112] EXAMPLE 1 Place names: Paris, Rhine, Mont Blanc EXAMPLE 2 Postal codes: 53115, 01009, SW1, IV19 1PZ

24. Within INSPIRE Geographic Identifiers are carried as fields in spatial-objects and are used to refer to the location or places associated with a spatial-thing or a spatial-object.

Linked Data Identifiers, Reference Data and Datasets

25. The aim of this section is to elaborate on how reference data is used to establish an association between a URI and the thing that it is intended to refer to; and how having established such a relationship, that URI can then be used as a term for expressing more information about the given thing in other datasets.

26. A key part of the linked data endeavour is to minimise the proliferation of different identifiers for the same thing and to encourage the adoption of a small number of commonly used identifiers for those things. In this way, adopted URI become the terms in a language for making statements about the things they reference.

27. A crucial part of establishing what a given URI is intended to reference is to provide reference information (typically in to form of documents or information resources) which is accessible simply by dereferencing the given URI. Since the process of adopting the use of a given URI to refer to a given thing is a social process this reference information, although provided in machine readable form, needs to be sufficient for a community of people to be able to correctly determine what it is that the publisher of the reference information intends that the URI refer to. For example, sufficient for the community to establish that the URI http://transport.data.gov.uk/id/stations/MAN is intended by the publisher of the corresponding reference data to be used for making reference to Manchester Piccadilly Railway Station.

28. Whilst reference information of this kind is an important resource and itself forms a dataset; the establishment of a relationship between a URI and the thing that it names enables others to reuse that name in their datasets when they need to reference the same thing. Reference datasets may also act as an authoritative source of other information about their subjects beyond that strictly necessary to establish a naming.

29. For information resources such as reference documents and datasets, dereferencing their URI will generally provide a web representation of the information resource itself.

30. For material things (spatial-things) and abstract or conceptual things (spatial-objects) dereferencing their URI is expected to redirect to an information resource which describes the thing that was originally referenced. For example, dereferencing the URI of a railway station (a real railway station) is expected to redirect to an information resource that provides information about that railways station and may refer to other information resources that may contain more information about the railway

The path structure for Location URIs

31. The sections that follow describe a number of URI template patterns. The following table describes the fields used in those templates.
32.

URI Template Field	Description
{sector}	The name of the data.gov.uk **sector** under which a **concept** and its related reference data is governed. e.g. transport, education, environment.
{concept}	The **sector** specific **concept name** for the type of entities associated with a given **reference** designator. e.g. road, school, river
{reference}	A **reference** value used to discriminate between individual instances of a **concept**. Reference values are typically derived from a common codeset.
{version}	An optional field used to distinguish between distinct versions of either spatial-thing or their reference documents/objects. Note that versioning of things and their corresponding reference documents/objects are independent of each other. References made without a **{version}** refer to the most recent version at the time the reference is de-referenced (followed).
{theme}	A two letter code for the corresponding INSPIRE theme – see Annex II.
{class}	The INSPIRE conceptual model **class name** corresponding to the most specific (leaf-level) feature-type used in expressing a spatial-object or in abstracting a spatial-thing. By convention class names begin with an uppercase letter to distinguish them from property names.
{codeset}	An optional **codeset** name that indicates the codeset from which {reference} values are taken.
{rendition}	Optionally provides a way of identifying different possible document renderings of a spatial-object, e.g. alternative renderings may be available in other formats such, html, rdf, json or plain-text amongst others. When this field is omitted an appropriate rendering may be selected through content-negotiation or a default rendering may be supplied.
{namespace}	The namespace component of an INSPIRE Unique Object Identifier.
{localId}	The localId component of an INSPIRE Unique Object Identifier.
{versionId}	The versionId component of an INSPIRE Unique Object Identifier.
{authority}	A fully qualified domain name that serves as the authority field of an RFC3986 URI. Typically governance of the URI namespace based on the value of this field falls to or is delegated from the organisational entity responsible for the domain name assignment. {sector}.data.gov.uk represents a pattern of {authority} with common governance requirements delegated from data.gov.uk. It is expected that in the first instance governance of location.data.gov.uk will fall to the UK Location Programme.
{property}	A **property name** derived from the INSPIRE conceptual model and its application schema. By convention property names begin with a lowercase letter to distinguish them from class names.
{term}	A defined term in an ontology, concept schema or codelist, typically corresponds with {class} or {property} values.
{package}	A package name from an INSPIRE conceptual schema, used it situations where it is necessary to disambiguate URI for otherwise similarly named but distinct vocabulary terms.

Generic Guidance

33. The guidance paper, 'Designing URI Sets for the UK Public Sector', establishes a baseline generic pattern to URIs in a URI Set as:

URI Template	Description
http://{sector}.data.gov.uk/id/{concept}/{reference}[/{version}]	URI for 'Things'
http://{sector}.data.gov.uk/doc/{concept}/{reference}[/{version}]	URI for reference documents (aka Information Resources)
http://{sector}.data.gov.uk/def/{concept}/{term}	URI for Definitions (Class, Property, Concept)

URI for Spatial-Things

34. HTTP URI for spatial-things follow one of two patterns:

URI Template	Description
http://{sector}.data.gov.uk/id/{concept}/{reference}[/{version}]	Generic URI pattern for things in general including 'spatial-things'.
http://location.data.gov.uk/id/{theme}/{concept}[/{codeset}]/{reference}[/{version}]	URI pattern for derived thematic references.

The first pattern above is from the generic guidance. For example an existing URI sets for UK railway stations based on customer reservation codes for UK stations assigns the following URI for making reference to Manchester Piccadilly Railway Station:

http://transport.data.gov.uk/id/station/MAN

The second pattern allows for the creation of **location** sector URI for things that are referenced by INSPIRE thematic references. It is intended that references using URI of this form are generated during the transformation of INSPIRE thematic references and that equivalence with other URI used to name the same spatial-thing are expressed by **owl:sameAs** statements[4]. For example thematic references to Manchester Piccadilly Railway Station which is coded "MAN" for customer reservation purposes and "MNCRPIC" for timetabling and scheduling purposes give rise to the following URI:

http://location.data.gov.uk/id/tn/station/crs/MAN
http://location.data.gov.uk/id/tn/station/tiploc/MNCRPIC

When available, {sector}.data.gov.uk URI should be used in preference to URI conforming to the second pattern.

Example Spatial Thing URI	Description
http://statistics.data.gov.uk/id/local-education-authority-area/201	City of London LEA area
http://statistics.data.gov.uk/id/statistical-geography/E06000025	South-Gloucester Unitary Authority Area Statistical Unit
http://transport.data.gov.uk/id/road/M5	The M5 motorway.
http://reference.data.gov.uk/id/postcode/SO164GU	The SO16 4GU UK Postcode area.
http://land.data.gov.uk/id/title-plan/cph-de15-27	A UK cadastral parcel.
http://environment.data.gov.uk/id/bathing-water/ukc2102-03600	A Bathing Water under the EU bathing water directive

URI for INSPIRE Spatial Objects

35. INSPIRE spatial-objects with an assigned a Unique Object Identifier are assigned permanent a "location.data.gov.uk" URI of the following form:

URI Template	Description
http://location.data.gov.uk/so/{theme}/{class}/{namespace}/{localId}[/{versionId}]	URI for 'Spatial-Objects'

URI of this form are encouraged for use as shared spatial-object identifiers.

36. Compliance with the UK INSPIRE implementation will require deployment of spatial-objects with URI of the form above and that those URI dereference (either directly or indirectly via redirection or proxying) to deliver web representations of the corresponding spatial-object.

37. Each publishing authority may want or need to publish spatial-objects under its own authority, thereby retaining operational control over those that it regards itself as owning.

URI Template	Description
http://{authority}/so/{theme}/{class}/{namespace}/{localId}[/{versionId}]	URI for 'Spatial-Objects'

URI of the form above enables references made using "location.data.gov.uk"[5] spatial-object identifiers to be redirected or proxied to owning authority.

Individual INSPIRE namespaces assumed to be under the control of a single 'owning' authority so that redirections or proxied accesses can be accomplished by namespace based dispatch.

[4] It anticipated that 'sameAs' linked data services will be available for the expression of curated equivalence statements, although a confident publisher may also make them in line with the data that they publish.
[5] It is expect that the governance regime for "location.data.gov.uk" URI will be delegated from the COI/Cabinet Office to the UK Location Council. An update to "Designing URI Sets for the UK Public Sector" is expected to more fully address models of governance.

Example Spatial Object URI Data.gov.uk URI	Owning Authority URI	Description
http://location.data.gov.uk/so/tn/RailwayStationNode/nwkr/123456	http://data.networkrail.gov.uk/so/tn/RailwayStationNode/nwkr/123456	Network Rail published RailwayStationNode spatial-object for Manchester Piccadilly Railway Station.
http://location.data.gov.uk/so/tn/RailwayStationArea/nwkr/456789	http://data.networkrail.gov.uk/so/tn/RailwayStationArea/nwkr/456789	Network Rail published RailwayStationArea spatial-object for Manchester Piccadilly Railway Station.
http://location.data.gov.uk/so/au/AdministrativeBoundary/osgb/1234567890123456	http://data.ordnancesurvey.co.uk/so/au/AdministrativeBoundary/osgb/1234567890123456	A TOID based identifier from Ordnance Survey
http://location.data.gov.uk/so/ad/Address/00BH/123456789012	http://location.walthamforest.gov.uk/so/ad/Address/00BH/123456789012	A UPRN based address defined by Waltham Forest Borough Council using a local-authority code, 00BH,as an INSPIRE namespace name.
http://location.data.gov.uk/so/ef/SamplingPoint/bwsp.eaew/03600	http://data.environment-agency.gov.uk/so/ef/SamplingPoint/bwsp.eaew/03600	An Environment Agency bathing water sampling point.

Note that other redirection patterns are possible that may yield shorter URI at the owning authority, for example omitting some or all of the {theme}, {class} and {namespace} fields as being redundant under a given {authority} or introducing a longer static path segment after the {authority} field.

URI for Reference Data

38. As describe earlier, reference information plays a particular role in establishing a relationship between a URI and the thing (spatial-thing) that it names. Typically this involves a redirection when dereferencing the URI of a thing to reference information about that thing. These guidelines encourage the use of one of the following patterns for the provision of reference information (documents) about a spatial-thing.

URI Template	Description
http://{sector}.data.gov.uk/doc/{concept}/{reference}[/{version}][[.|/]{rendition}]	Spatial-Thing referenced document URI following the generic guidance.
http://location.data.gov.uk/doc/{theme}/{class}/{namespace}/{localId}[/{version}][[.|/]{rendition}]	Spatial-Object reference document URI.

39. Choosing a particular URI from the patterns above will depend on whether adequate reference data has already been published and popularised
    - Reference data may exist in a non-spatial object form under a URI conforming to the generic pattern
    - Reference data may have been published as an INSPIRE compliant spatial-object.

URI for INSPIRE derived Class and Property definitions[6]

40. The INSPIRE conceptual model defines a large number of geographic feature types and codelists as UML classes along with associated property definitions for associating class instances with each other and with simple values. It is expected that these existing UML expressions of the INSPIRE conceptual model will be the basis of corresponding RDFS or OWL ontologies to support linked data publication.

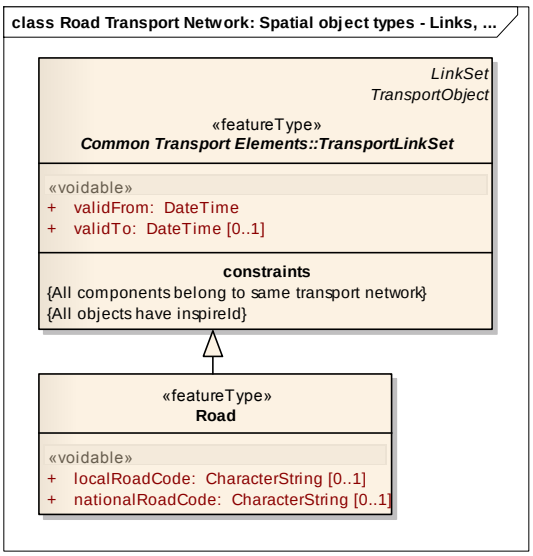
URI Template	Description
http://location.data.gov.uk/def/{theme}[/{package}][/{concept|class}][/{version}]/{property}	URI for a shared property (open domain)
http://location.data.gov.uk/def/{theme}[/{package}][/{concept|class}][/{version}]/{class}	URI for a class
http://location.data.gov.uk/def/{theme}[/{package}][/{concept|class}][/{version}]/{class}/{property}	URI for a property with a closed domain restricted

[6] These patterns are preliminary and may be updated based on further experience of deriving RDF/OWL vocabularies from INSPIRE conceptual schema.

	to the given class.

The optional {concept|class} component following {theme} in these patterns allows for finer grained management of vocabularies derived from INSPIRE conceptual models.

For example, the Road feature type for the conceptual model for INSPIRE transport theme gives rise to the following URI for class and property definitions:



URI	Description
http://location.data.gov.uk/def/tn/road/Road	**Road** featureType
http://location.data.gov.uk/def/tn/road/localRoadCode	**localRoadCode** property of a **Road** feature
http://location.data.gov.uk/def/tn/road/nationalRoadCode	**nationalRoadCode** property of a **Road** feature
http://location.data.gov.uk/def/inspire/validFrom	INSPIRE wide reusable **validFrom** property
http://location.data.gov.uk/def/inspire/validTo	INSPIRE wide reusable **validTo** property
http://location.data.gov.uk/def/inspire/inspireId	INSPIRE wide reusable **inspireId** property

Design Considerations

Choosing the right domain for Location URIs

41. The guidance paper, 'Designing URI Sets for the UK Public Sector', establishes data.gov.uk as the domain for URIs that are promoted for re-use; effectively building a government catalogue of reliable reference data.

42. Issuers of URIs Sets for spatial-things should choose the most pragmatic sub-domain of data.gov.uk that makes the best use of DNS to give access to the associated infrastructure.

43. The governance of the sub-domain is responsible for implementing a scheme to disambiguate identifiers in a URI set.

44. The guidance above provides permanent location.data.gov.uk URI for every spatial-object with that has an INSPIRE identifier from a UK administered namespace. Governance of the administration of INSPIRE namespaces is delegated to each EU member state. UK governance practices for have are yet to be determined.

45. The sub-domain of location.data.gov.uk is the most obvious for identifiers that are not specific to a sector.

Quality characteristics to publish for a URI set

46. The guidance paper, 'Designing URI Sets for the UK Public Sector', establishes a set of metadata that applies to all URIs in a set. Each of these should be adopted for Location URI Sets.

Characteristic	Generic Guidance	Interpretation for Location URIs
Concept definition	Either by • an Ontology URI that resolves to an machine readable definition • as human readable metadata	A definition of the class that the set provides Identifiers for.
Relationships to other URI sets	To highlight other associated URI sets	
Provenance	To describe the source and purpose of the reference data	
Official Status	To describe the range of statuses of the identifiers that that are contained in the set.	
Accuracy	To describe the closeness to the truth that the set attempts to achieve.	
Completeness	To describe the degree to which the Identifier URIs are a complete set against the definition of the concept.	
Timeliness	To describe the time-lag between a change to a 'Real-World Thing' being applied to the URIs in the scheme.	
License Terms	To describe the terms of use for the URI set.	
Intended Longevity	To provide a guarantee of persistence of the set.	
Intended Audience	To describe who may confidently use the set. This provides a means of marking the set as being promoted for re-use.	
Representations available	To describe the range of file formats of Representation URIs in the set.	

Annex I: Thematic Referencing in INSPIRE

The table below summarises the occurrences of thematic referencing apparent in the current draft Implementing Directive: "Implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services". Italicised text is used for entries that appear to be thematic references but that make no claim of being so.

INSPIRE Theme	INSPIRE Object Type	INSPIRE Object Property Name, Type and Description
Common	***Multiple***	***country: CountryCode***
Administrative Unit	**AdministrativeUnit**	**nationalCode:CharacterString "** Thematic identifier corresponding to the national administrative codes defined in each country."
	NUTSRegion	***NUTSCode: CharacterString*** *"Unique code of the territorial unit for statistics as defined in the framework of the Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003."*
Address	**Address AddressComponent**	**alternativeIdentifier: CharacterString** **"**External, thematic identifier of the address/address component spatial object, which enables interoperability with existing legacy systems or applications."
Cadastral Parcel	**BasicPropertyUnit CadastralParcel**	**nationalCadastralReference: CharacterString** Thematic identifier at national level, generally the full national code of the basic property unit. Must ensure the link to the national cadastral register or equivalent.
	CadastralZoning	**nationalCadastalZoningReference: CharacterString** "Thematic identifier at national level, generally the full national code of the cadastral zoning."
Transport Networks (Air)	***AerodromeNode***	***designatorIATA: CharacterString*** *"The three letter IATA designator of the aerodrome (airport/heliport)."*
	AerodromeNode	***locationIndicatorICAO: CharacterString*** *"The four letter ICAO location indicator of the aerodrome (airport/heliport), as listed in ICAO DOC 7910."*
	Multiple	***designator: CharacterString*** ***designator code values that designate things associated with Air Transport. Designation varies by Object Type.***
Transport Networks (Rail)	***RailwayLine***	***railwayLineCode: CharacterString*** *"A code assigned to a railway line which is unique within a Member State"*
	RailwayStationCode	***stationCode: CharacterString*** *"A unique code assigned to a railway station."*
Transport Networks (Road)	***ERoad***	***europeanRouteNumber: CharacterString*** *"Code, identifying the route in the international E-road network. The code always starts with a letter 'E', followed by a one-, two- or three-digit number."*
	Road	***localRoadCode: CharacterString*** *"Identification code assigned to the road by the local road authority."*
		nationalRoadCode: CharacterString *"The national number of the road."*
Hydrography	**HydroObject**	**hydroId: HydroIdentifier** **"**An identifier that is used to identify a hydrographic object in the real world. It provides a 'key' for implicitly associating different representations of the object." **HydroIdentifiers** are composed of "classificationScheme", "namespace" and "local-id" fields. The first two are used to successively scope the third.

Annex II: INSPIRE Two character Theme codes

Thematic Working Group	Theme Code
Coordinate reference systems	RS
Geographical grid systems	GG
Geographical names	GN
Administrative units	AU
Addresses	AD
Cadastral parcels	CP
Transport networks	TN
Hydrography	HY
Protected sites	PS
Elevation	EL
Land cover	LC
Orthoimagery	OI
Geology	GE
Statistical units	SU
Buildings	BU
Soil[7]	SO
Land use	LU
Human health and safety	HH
Utility and governmental services	US
Environmental monitoring facilities	EF
Production and industrial facilities	PF
Agricultural and aquacultural facilities	AF
Population distribution, demography	PD
Area management/restriction/regulation zones and reporting units	AM
Natural risk zones	NZ
Atmospheric conditions	AC
Meteorological geographical features	MF
Oceanographic geographical features	OF
Sea regions	SR
Bio-geographical regions	BR
Habitats and biotopes	HB
Species distribution	SD
Energy resources	ER
Mineral resources	MR

These codes currently are non-normative, but may be in the future.

[7] The presence of SO as the code for the soil theme may motivate a change way from the ../so/.. pattern for signalling the URI of a spatial-object.

Annex III Summary of URI Patterns

Spatial-Things

http://{sector}.data.gov.uk/id/{concept}/{reference}[/{version}]

http://location.data.gov.uk/id/{theme}/{concept}[/{codeset}]/{reference}[/{version}]

Spatial-Objects

http://location.data.gov.uk/so/{theme}/{class}/{namespace}/{localId}[/{versionId}]

http://{authority}/so/{theme}/{class}/{namespace}/{localId}[/{versionId}]

Reference Documents

http://{sector}.data.gov.uk/doc/{concept}/{reference}[/{version}][[.|/]{rendition}]

http://location.data.gov.uk/doc/{theme}/{class}/{namespace}/{localId}[/{versionId}][[.|/]{rendition}]

Definitions

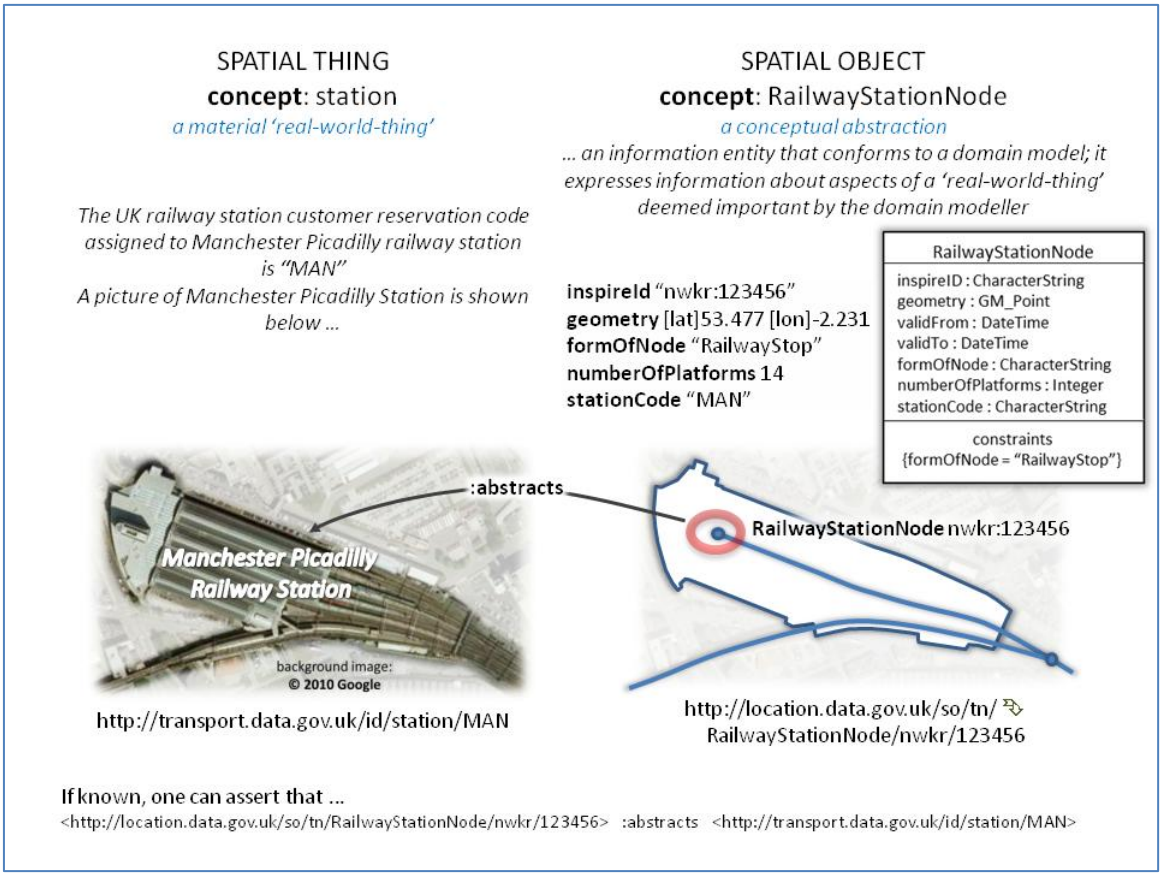
http://location.data.gov.uk/def/{theme}[/{package}][/({concept}|{class})]/[{version}]/{term}

Field origin: **data.gov.uk, inspire object ids**[8], **inspire conceptual structure**

[8] this meets the minimum namespace requirements of INSPIRE [to avoid clashes of unique object identifiers] and is extended by use of a `*.gov.uk` {authority} in the URI patterns to apply this consistently across the UK domain.

Annex IV A worked example (informative).

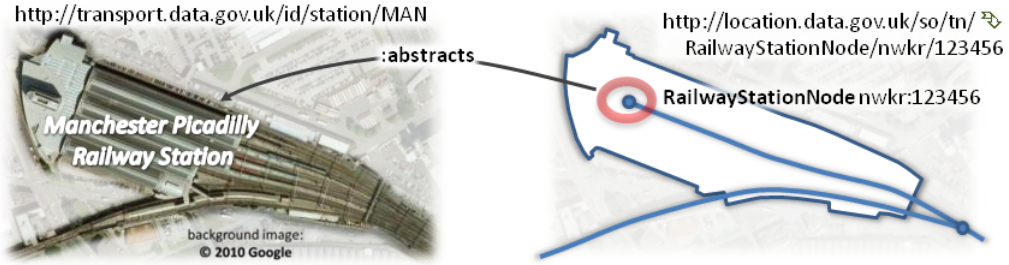
As an **illustrative** example the following panels provide a more detailed presentation of the identification and representation of Manchester Piccadilly railway station and one of its spatial-object abstractions. The URI and values used are purely for the purpose of illustration, although some of the terms used are drawn from published vocabularies and data.



SPATIAL THING
concept: station
a material 'real-world-thing'

SPATIAL OBJECT
concept: RailwayStationNode
a conceptual abstraction

Instances of both station and RailwayStationNode are 'things' – albeit one is a physical thing that can be touched and the other is abstract, only existing as information



dct:created "1842-05-08"^^xsd:date
... the real 'bricks & mortar' railway station opened to the public in 1842 as a terminus of the Manchester & Birmingham Railway

dct:created "2001-03-17"^^xsd:date
... a conceptual abstraction of Manchester Picadilly railway station created as part of a topological model of the UK rail network – circa 2001

The challenge is that it is not always clear whether assertions made about the **RailwayStationNode** instance (SPATIAL OBJECT, conceptual abstraction) relate to the *abstraction itself* or the **station** instance (SPATIAL THING, material 'real-world-thing') it *abstracts*!

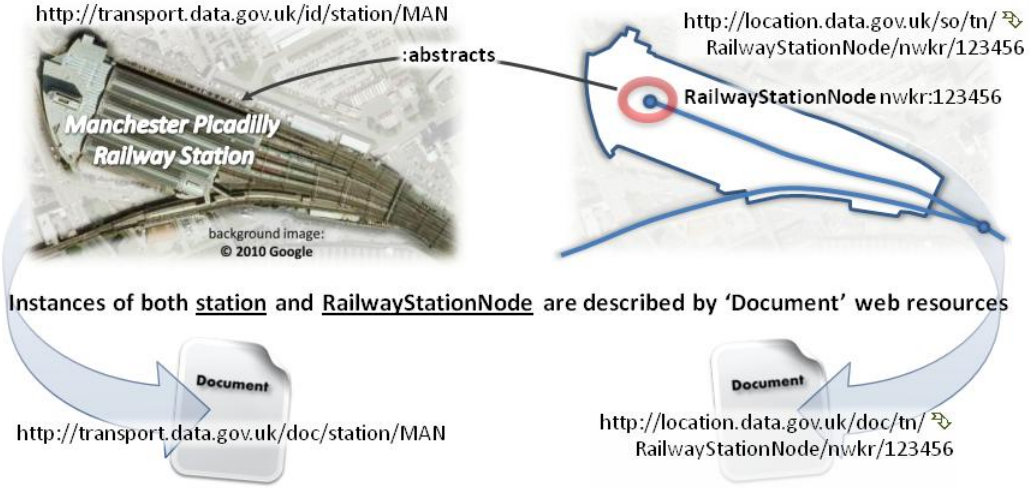
It is inferred that some of the assertions made about the **RailwayStationNode** instance also transfer to the material **station** instance – such as **geometry** and **numberOfPlatforms**. The **:abstracts** relationship indicates a transference of meaning of at least some of the property values from the **RailwayStationNode** conceptual model to the **station**.

However, both *material* (**station**) and *conceptual* (**RailwayStationNode**) things will have their own independent lifecycles – with different creators & creation dates etc.

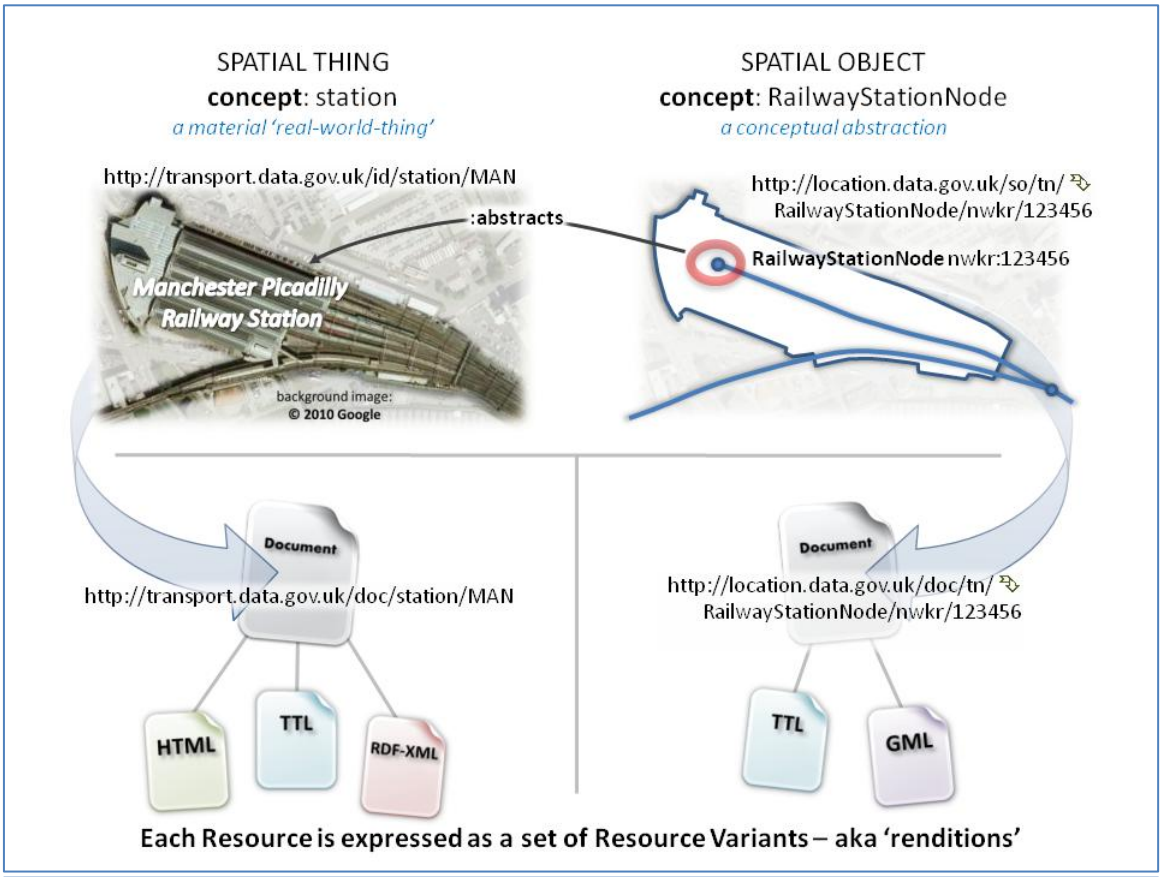
SPATIAL THING
concept: station
a material 'real-world-thing'

SPATIAL OBJECT
concept: RailwayStationNode
a conceptual abstraction

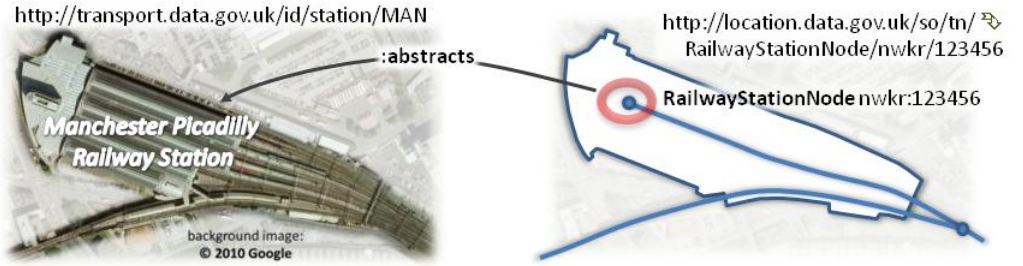
The station identified by "http://transport.data.gov.uk/id/station/MAN" cannot be returned in response to an HTTP request – it is a material object! Likewise, one cannot provide the RailwayStationNode abstraction itself – this is a conceptual entity.



Generally, a data publisher need not be concerned with the Document resource identity or representation – these web resources should be managed by underpinning infrastructure



Turtle examples …




```
<http://transport.data.gov.uk/id/station/MAN> a :station ;
   dct:created "1842-05-08"^^xsd:date ;
   dct:creator <http://dbpedia.org/resource/
      Manchester_and_Birmingham_Railway> ;
   rdfs:seeAlso <http://location.data.gov.uk/so/tn/RailwayStationNode/
      nwkr/123456> ;
   skos:prefLabel "Manchester Picadilly Railway Station" .

<http://transport.data.gov.uk/doc/station/MAN> rdf:type foaf:Document ;
   foaf:primaryTopic < http://transport.data.gov.uk/id/station/MAN > ;
   dct:hasFormat <http://transport.data.gov.uk/doc/station/MAN.html> ,
                 <http://transport.data.gov.uk/doc/station/MAN.ttl> ,
                 <http://transport.data.gov.uk/doc/station/MAN.rdf> .

...etc...
```

```
<http://location.data.gov.uk/so/tn/RailwayStationNode/
   nwkr/123456> a tn:RailwayStationNode ;
   :abstracts < http://transport.data.gov.uk/id/station/MAN> ;
   dct:created "2001-03-17"^^xsd:date ;
   dct:creator <http://dbpedia.org/resource/Network_Rail> ;
   inspire:inspireId "nwkr/123456" ;
   inspire:geometry [
      a gml:GM_Point ;
      gml:pos "53.477 -2.231" ;
      gml:srsName
         <http://www.opengis.net/def/crs/EPSG/0/4326> ] ;
   tn:formOfNode tn-fon:RailwayStop ;
   tn:numberOfPlatforms "14"^^xsd:integer ;
   tn:stationCode crs-code:MAN .

<http://location.data.gov.uk/doc/tn/RailwayStationNode/
   nwkr/123456> rdf:type foaf:Document ;
   foaf:primaryTopic <http://location.data.gov.uk/so/tn/
      RailwayStationNode/nwkr/123456> ;
   dct:hasFormat <http://location.data.gov.uk/doc/tn/
      RailwayStationNode/nwkr/123456.ttl> ,
                 <http://location.data.gov.uk/doc/tn/
      RailwayStationNode/nwkr/123456.gml> .

...etc...
```