

Title	A Linked Data approach to publishing 'Council Spending' data
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Change Control

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1	09/07/2010	Paul Davidson, Sedgemoor D.C. and LeGSB	Capturing the conclusions and material from a series of LeGSB workshops May to July 2010.	Draft

This is a draft version of this report, provided in this state to the workshop participants for feedback and suggested improvements. A list of things to do is in the 'next steps' section.

Introduction

The Local e-Government Standards Body¹ (LeGSB) held a series of workshops to explore the standards implications of *Local Linked Data*, and to propose some specific patterns, including publishing council spending data.

Date	Topic	Venue
24 th May 2010	Standards for Local Linked Data	Admiralty Arch, Central London
2 nd July 2010	A Linked Data approach to publishing spending data	22 Whitehall, Central London

This document captures the material and conclusions from the 2nd Workshop, '**A Linked Data approach to publishing spending data**'. See appendix 1 for a list of the organisations represented.

Aims of the workshop

The first workshop had covered the theory and applicability of Linked Data. This second workshop looked to apply that theory to the real scenario of publishing council spending data.

The workshop was attended by people representing organisations including

Local Authorities, data.gov.uk, Ordnance Survey, esd-Toolkit, Office of National Statistics, Local Government Association, Department for Communities and Local Government, SOCITM

... and set out to

- model council spending
- create a simple ontology that defines and relates the entities in the model
- propose existing and/or candidate URI Sets and Vocabularies (RDF/SKOS)
- take some existing council data and re-purpose as Linked Data (RDF)

... with the objectives to

- establish a replicable method to publishing Linked Data
- propose a candidate approach for the council spending scenario
- produce documentation to capture the design aims and considerations
- demonstrate the added value of providing and querying the data in this form
- illustrate how easy or hard it is to systematically publish data in this form
- provide material for inclusion in guidance to the sector on approaches to data publishing

¹ www.legsb.gov.uk

Background to Data Publishing

The 'Coalition Programme for Government'² makes a number of statements about publishing 'Public Data' ...

all data published by public bodies is published in an open and standardised format, so that it can be used easily and with minimal cost by third parties

So we will extend transparency to every area of public life.

Setting government data free will bring significant economic benefits

a new 'right to data' so that government-held datasets can be requested and used by the public, and then published on a regular basis."

so that citizens know how taxpayers' money is spent in their area

Coalition:our programme for government

... and picks out some specific sources of data that should be published in this way.

publishing government tenders in full online and free of charge.

to publish detailed local crime data statistics every month,

public bodies to publish online the job titles of every member of staff and the salaries and expenses of senior officials

we will publish government ICT contracts online

disclosure of all central government spending and contracts over £25,000"

all councils to publish meeting minutes and local service and performance data

require all councils to publish items of spending above £500, and to publish contracts and tender documents in full.

publish details of every UK project that receives over £25,000 of EU funds

detailed data about the performance of healthcare providers online

publish performance data on educational providers

Coalition:our programme for government

The workshop took the "all councils to publish items of spending above £500" requirement as a scenario to work up a linked data approach.

'Public Data' is defined as ...

"Public Data" is the objective, factual, non-personal data on which public services run and are assessed, and on which policy decisions are based, or which is collected or generated in the course of public service delivery."

Working definition of "Public Data at data.gov.uk

... by the Transparency Board³ which has also issued draft public data principles, including ...

Public data will be published in reusable, machine-readable form

Public data will be published using open standards, and following relevant recommendations of the World Wide Web Consortium.

² <http://programmeforgovernment.hmg.gov.uk/>

³ <http://data.gov.uk/blog/new-public-sector-transparency-board-and-public-data-transparency-principles>

Open, standardised formats are essential. However to increase reusability and the ability to compare data it also means openness and standardisation of the content as well as the format.

Public bodies should not require people to come to their websites to obtain information.

Release data quickly, and then re-publish it in linked data form

Extracts from Draft Public Data Principles

Background to Linked Data and where to find out more

The first workshop in the series focused on the theory and skills of Linked Data. In brief ...

Linked Data is

exposing, sharing, and connecting data via dereferenceable URIs on the Web.

http://en.wikipedia.org/wiki/Linked_data

Dereferenceable URIs are

a resource retrieval mechanism that uses any of the internet protocols (e.g. HTTP) to obtain a copy or representation of the resource it identifies.

http://en.wikipedia.org/wiki/Dereferenceable_Uniform_Resource_Identifier

LeGSB produced a paper in 2009, "Publishing Linked Data for UK Local Government"⁴, which gave some background to Linked Data ...

Linked Data (sometimes called 'Linked Open Data') refers to a method of publishing 'raw' information over the web in a style that enables and encourages others to join it up with other related information, to create new views and services. It is at the heart of the Semantic Web which proposes a step change from a web of documents, to a web of data. The step change is the ability to 'link' data rather than just discover related documents.

A Linked Data approach would publish each separate statement from a document or list, in a standard format that machines can interpret. Where a statement refers to a 'thing' that a separate source of information might also refer to, common reference data and definitions of terms can be used to 'link' the data.

Linked Data is published on the web for machines to read rather than humans, often using the RDF⁵ data model. RDF breaks a statement down into three parts (so that an RDF statement is known as a 'triple').

- *Subject*
- *Predicate*
- *Object*

So for example:

Subject	Predicate	Object
Curry Mallet Primary School	is located within	the District of South Somerset
South Somerset District Council	is located within	the County of Somerset
Curry Mallet Primary School	is a type of	Primary School
Primary Schools in Somerset	achieved	an average score of 4 for Key Stage 2 Mathematics for the School Year 2008/2009
Jim Smith	achieved	a score of 5 for Key Stage 2 Mathematics for the School Year 2008/2009.

⁴ <http://www.legsb.gov.uk/Publishing-Local-Linked-Data.aspx>

⁵ Resource Description Framework - <http://www.w3.org/RDF/>

The examples above are 'human-readable' but the actual RDF representation of this data is in a form that machines can interpret and inference from. Each part of a 'triple' is therefore represented by a 'universal identifier' rather than the actual text that you see above.

In Linked Data, Universal Identifiers are created as URI's⁶ (Uniform Resource Identifiers). For Linked Data to be effective, a series of sets of reference data needs to be established so that data can be linked to it.

Publishing Linked Data for UK Local Government

data.gov.uk contains material that gives further explanations of linked data, and how it applies to the public sector, including

<http://data.gov.uk/faq#q5>

The steps towards publishing Linked Data

The first workshop in the series, drew out generic steps to publish linked data. These were

- Modelling
 - Defining the resources in the data scenario and how they are related
- Define URI Sets
 - Assigning sources of identifiers to each resource in the model
- Choose or create RDF vocabularies
 - Re-use or create linked data definitions of each of the resources in the model
- Publish linked data
 - Take some existing data and publish it using a rendition of RDF using the definitions from the model
- Link to Other Sources
 - Find other information that links to the URI used in the data

Tools and Hosting

Colleagues from data.gov.uk introduced the workshop to an open source tool, 'Freebase Gridworks' that can be used to take data in a tabular form (e.g. csv or spreadsheet), and

- Prepare and cleanse it
- Publish it in a Linked Data form

... and used that tool throughout the workshop to manipulate and transform data.

data.gov.uk also want to help the sector to explore what can be done with free tools, or by renting a virtual server for (say) £10 per month. This requires a bit of 'know-how' that the Public Sector can either invest in itself or rely on its suppliers to deliver.

Preparing Data

Using a tool such as Gridworks, a set of data can be checked and corrected for

- Correct data typing (e.g. are all the dates in the right format, are all amounts numeric)
- Consistent use of names (e.g. "Childrens Services" – "Children's Services")
- Exceptions and Extremes (e.g. Are the top 10 payment values correct?)

⁶ URI – Uniform Resource Identifier – Defined at <http://tools.ietf.org/html/rfc3986>

- REDACT data that is personal or sensitive as directed by a local redaction policy.

Having identified data problems, it would be sensible to correct them in the source system so that similar problems do not recur.

There may also be opportunities to apply a redaction policy based on the data, e.g. Supplier Type.

These considerations apply to traditional data publishing as well as Linked Data, so the LeGSB workshop highlights these to those that are considering data quality for the sector.

Applying a Linked Data approach to the Council Spending Scenario

The Local Data Panel⁷ have issued background, advice, and guidance about the requirement to publish itemised Local Authority expenditure⁸.

Users will be interested in the core information held in the accounts system – such as expenditure code, amount paid, transaction date, beneficiary, and payment reference number. The expenditure code has to be explained and steps taken to help users identify the beneficiary

As a first stage, publish the raw data and any lookup table needed to interpret it in a spreadsheet as a CSV or XML file as soon as possible. This should be put on the council's website as a document for anyone to download. Or even published in a service such as Google Docs

There is not yet a national approach for publishing local authority expenditure data. This should not stop publication of data in its raw, machine-readable form. Observing such raw data being used is the only route to a national approach, should one be required

Publishing raw data will allow the panel and others to assess how that data could/should be presented to users. Sight of the data is worth a hundred meetings. Members of the panel will study the data, take part in the discussion and revise this advice.

As a second stage, informed by the discussion, the panel and users can then give feedback about publishing data (RDF, CSV, etc) in a way that can be consistent across all local authorities involving structured, regularly updated data published on the Web using open standards.

Guidance from the Local Data Panel

The Local Data Panel guidance goes on to cover topics including

- The scope and definition of the data
- Approaches to dealing with personal or sensitive content
- Promoting and Registering the data
- Timeliness of publication

The workshop took on board the guidance from the panel as it used the spending scenario to examine how to publish linked data.

Interpreting the guidance, there is likely to be a 2-stage approach to publishing council spending. The first stage is to extract the data from financial systems, into a tabular form (e.g. csv, spreadsheet), and make that available for download at the council web site, and registering the data at data.gov.uk. The advantages of this stage include

- Quick, easy, low cost
- Supports and encourages journalistic scrutiny

⁷ Local Data Panel - <http://data.gov.uk/blog/2897>

⁸ <http://data.gov.uk/blog/publishing-itemised-local-authority-expenditure-advice-comment>

- Enables innovators to demonstrate how the data might be used
- Gets Local Authorities used to the culture of releasing data
- Raises issues such as Licensing, Disclaimers, Redaction Policy etc

There are some limitations of this approach that the Linked Data style of publishing, would need to address, to demonstrate that it has value as a second stage of publishing.

- The filter (in this case £500) is set by the publisher, whereas the consumer may want a different, or no filter.
- The meaning of the columns and identifiers will not be consistent across Local Authorities. This becomes a problem if the data is to be compared or combined.
- A new script or programme will need to be written by each data extractor, for each council.
- Files are prepared periodically for download, rather than being queried in situ, using the most current data.

What could you do with payments data in Linked Data form?

Workshop participants have suggested some joining up of data to illustrate what would become possible ...

- You could run a query on a Local Authority to check what suppliers they are using. You could then link this same query into the ordnance survey to see what neighboring authorities they have and then check what suppliers they use. You could then link straight in to Companies' House to get more details on the companies.
- You could run a report on the CIPFA website and pick out all the different CIPFA classifications, you could then use this information to run reports on all the locals authorities and see what they are spending against these categories. The report could then be linked to National Statistics to compare the spending patterns of LA's with that of private companies.

Modelling - Defining the resources in the data scenario and how they are related

A number of Local Authorities had brought data to the workshop, from which a 'directed graph'⁹ was worked up. See Fig 1.

⁹ http://en.wikipedia.org/wiki/Directed_graph

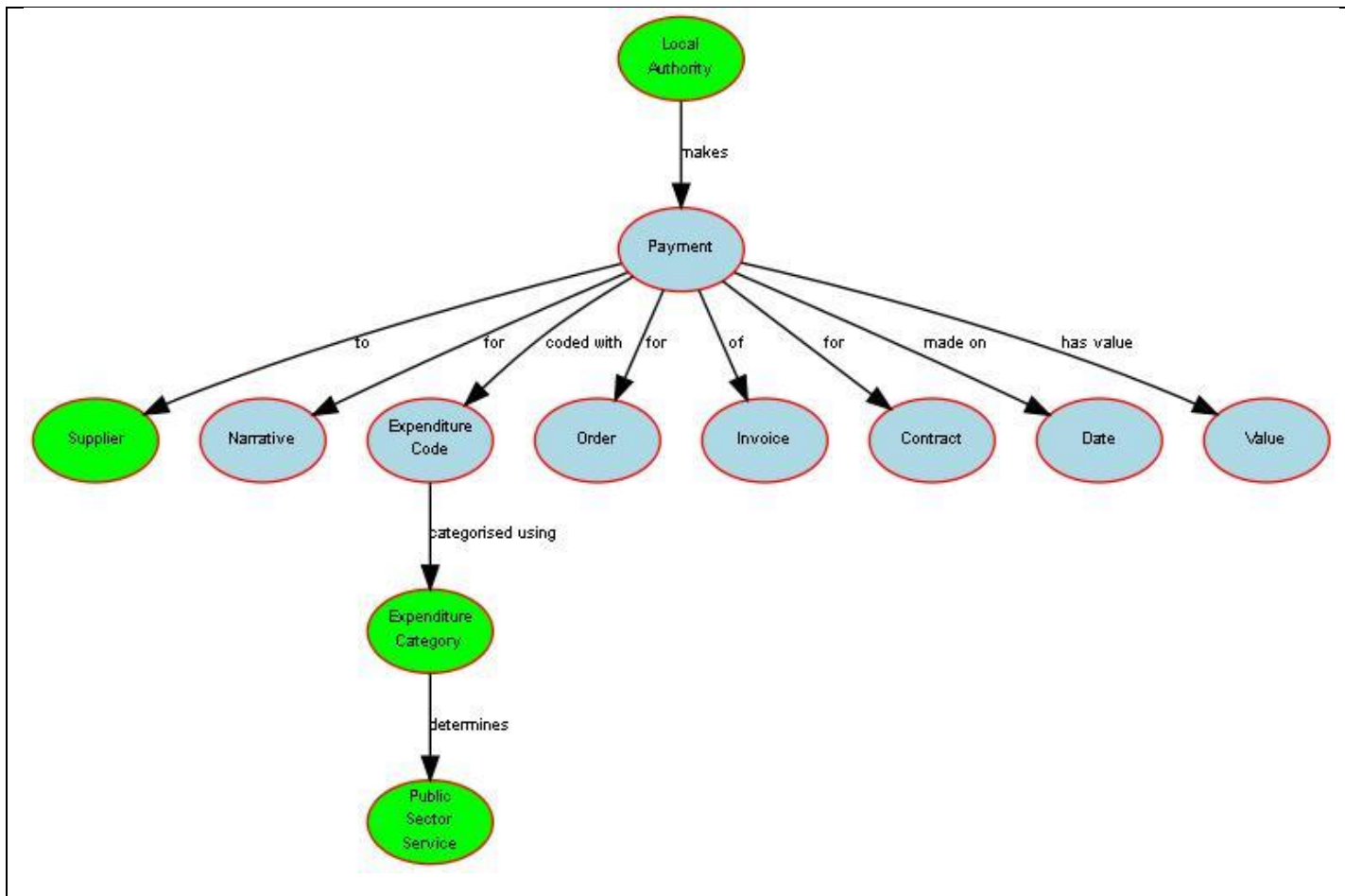


Fig1 – Model of council spending

legsb:LaPayments-rev2

The resources shown in green are those where other data on the web can be expected to be found about those resources, whereas those in blue will have meaning only within the individual Local Authority.

Not all Local Authority spending data examples contained all of these resources, and the linked data candidate solution will not require that all resources are present. However, where data is published referring to the model, it must conform to the definition of the resource in the model. For example, 'Value' may be defined as excluding VAT, in which case all data that refers to that resource definition must exclude VAT. If a piece of Local Authority data does not conform to the definition of a resource, it can still publish it as Linked Data but using a different, or local definition of that resource.

Define URI Sets - Assigning sources of identifiers to each resource in the model

Resource	Potential URIs
Local Authority	<p>data.gov.uk have published URIs for each Local Authority within the statistics sub domain, derived from the 'Standard Names and Codes'¹⁰ (SNAC) identifiers provided by the Office of National Statistics.</p> <p>http://statistics.data.gov.uk/def/administrative-geography/LocalAuthority</p> <p>an example of which is</p> <p>http://statistics.data.gov.uk/doc/local-authority/40UC for Sedgemoor District Council</p>

¹⁰ <http://www.ons.gov.uk/about-statistics/geography/products/geog-products-area/snac/index.html>

	<p>The ONS are moving to a new coding scheme (GSS Codes¹¹) in April 2011.</p> <p>There are other sources of identifiers for Local Authorities which could be published as URIs, and there are non-public sector URIs where further contextual data might be found – for example http://dbpedia.org/page/Sedgemoor</p> <p>It may be practical for each Local Authority to publish its own URI that names itself and resolves to its own data page. This then could use the organisation ontology commissioned by data.gov.uk</p> <p>http://www.epimorphics.com/public/vocabulary/org.html</p> <p>and provide further 'sameAs' links to other URIs for the same organisation.</p> <p>The workshop continued with the URIs from the statistics sub-domain of data.gov.uk, but the nature of Linked Data allows us to improve this later, if useful.</p>
Expenditure Code	<p>The expenditure analysis codes used, will be different in each Local Authority. These URIs can therefore be defined locally, and potentially within the linked data that contains the payments. That definition will include the textual description that is associated with the code.</p> <p>It would be possible for a Local Authority to separately publish its accounting codes as linked data, and use that to map them to other aggregated definitions.</p> <p>The workshop continued with the URIs defined locally within the linked data payments.</p>
Expenditure Category	<p>There are a number of nationally recognised categorisations of local authority expenditure and the linked data model would allow for many to be expressed alongside a single payment.</p> <p>Cipfa¹² provide both objective and subjective categories within their 'Best Value Accounting Code of Practice' (BVACOP), and Local Authority finance systems routinely map their expenditure codes to</p> <ul style="list-style-type: none"> • BVACOP Division • BVACOP subgroup <p>The BVACOP is not currently published in a machine readable form. LeGSB will work with Cipfa to explore how these categories can be made available in a Linked Data form and be referenced by URIs.</p> <p>The workshop continued with a made-up proxy to the Cipfa codes as URIs.</p>
Public Sector Service	<p>Some expenditure will be directly related to a service that the Local Authority provides.</p> <p>The esd-Toolkit¹³ manage the Local Government Service List (LGSL) and an EU Wide Services List providing URIs such as</p> <p>http://id.esd.org.uk/service/1120 for Planning - rights of way – maintenance.</p>

¹¹ <http://www.ons.gov.uk/about-statistics/geography/policy/coding-and-naming-for-statistical-geographies/index.html>

¹² <http://www.cipfa.org.uk/>

¹³ <http://www.esd.org.uk/>

	<p>Using URIs for the Public Sector Service might give access to performance, throughput, customer satisfaction data on the topic for the expenditure.</p> <p>LeGSB will work with esd-Toolkit and Cipfa to explore how Public Sector Service can be related to expenditure categories.</p>
Supplier	<p>A Local Authority will use an internal 'Creditor Reference' to identify organisations that it makes payments to. They may also have associated them with Supplier Categories, and Procurement Categories which may help in understanding the type of goods and services that are provided.</p> <p>The supplier may also be identified by a number of external sources, dependent upon the type of organisation, for instance</p> <ul style="list-style-type: none"> • Unique Tax Reference • Companies House Reference • VAT number • Local Authority SNAC code (if the payment is to another council) <p>The linked data approach would allow all of these to be used, if the sources of them have published them as URIs. Unfortunately, none of these are currently available as URI sets. LeGSB will work with data.gov.uk to encourage owners of identifiers for organisations to publish them as URIs.</p> <p>The workshop continued using the internal reference, and with made-up proxies to other sources of identifiers.</p>
Narrative	<p>The Payment will have been for particular goods and services. These will be described in a text form as an attribute of the payment, and no re-useable URI is appropriate.</p>
Order, Invoice, Contract	<p>A payment may link to</p> <ul style="list-style-type: none"> • An Invoice using an Invoice Number • An Order using an Order Number • A Contract using a Contract Reference <p>... and further detail and context might be found by examining the associated data.</p> <p>Rather than model those resources in with the 'payment' structure, they should be modelled separately so that the information about them can also be published, and payments can link to them via a URI.</p>
Date	<p>data.gov.uk now provide URIs for times, dates and intervals at reference.data.gov.uk, for example</p> <p>http://reference.data.gov.uk/id/day/2010-04-15</p>
Value	<p>As well as the numeric value of each payment, the value needs to express:</p> <p>Currency</p> <p>There is not currently a URI for GBP.</p> <p>LeGSB will work with data.gov.uk to establish currency URIs</p> <p>The workshop continued assuming an URI of</p>

<http://reference.data.gov.uk/def/currency/GBP>

VAT Included

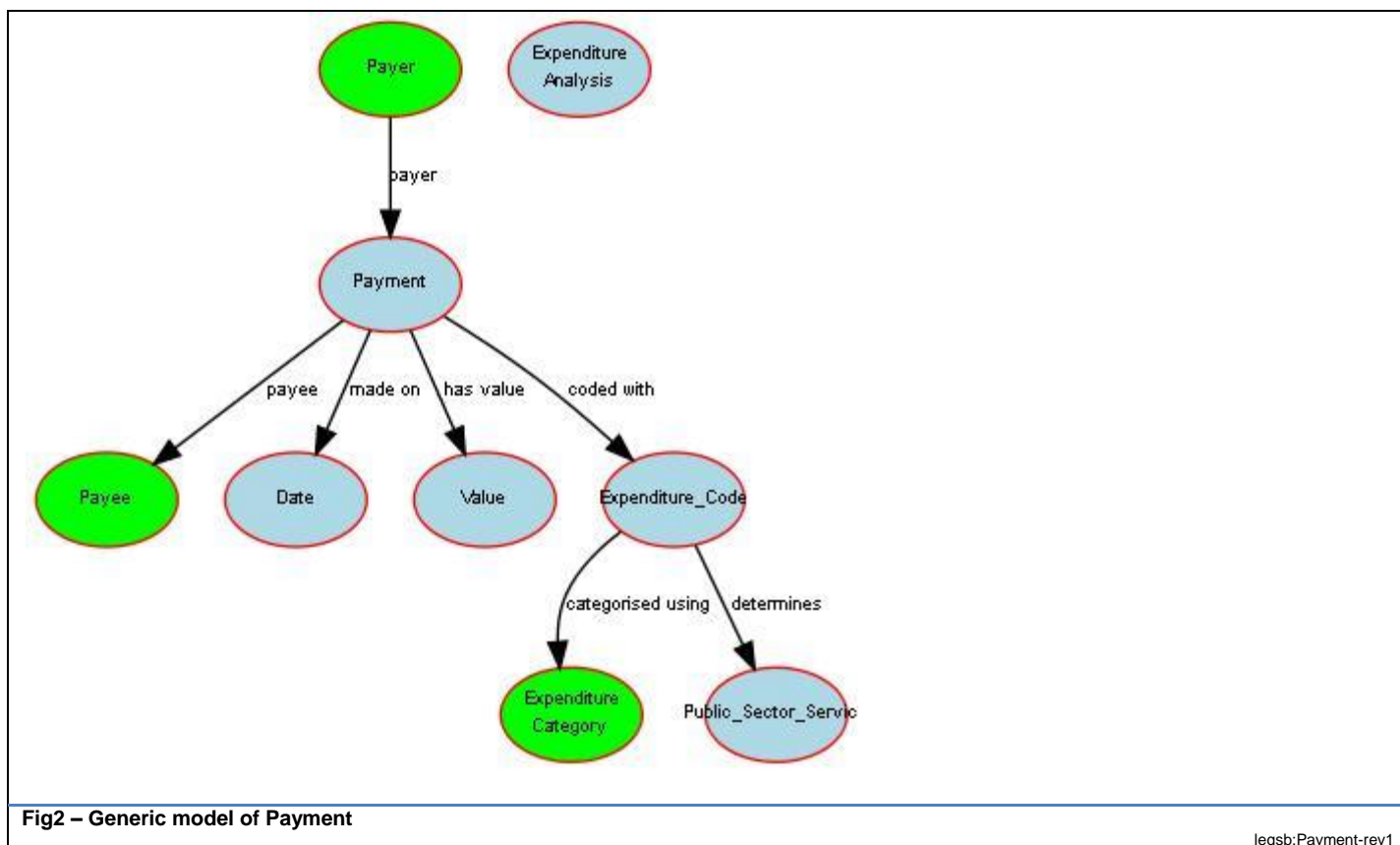
To indicate if the value includes VAT.

VAT Rate

To indicate the rate of VAT

Choose or create RDF vocabularies - Re-use or create linked data definitions of each of the resources in the model

It became apparent that the candidate solution would be more powerful if it were able to describe payments in a generic sense, rather than just for Local Authorities. In this way, more data might be published using the model, and consequently, more links established.



On 'Ontology'¹⁴ for Payment was created during the workshop using the turtle¹⁵ syntax.

```

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
  
```

¹⁴ Ontology - [http://en.wikipedia.org/wiki/Ontology_\(information_science\)](http://en.wikipedia.org/wiki/Ontology_(information_science))

¹⁵ Turtle - [http://en.wikipedia.org/wiki/Turtle_\(syntax\)](http://en.wikipedia.org/wiki/Turtle_(syntax))

```
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix org: <http://www.w3.org/ns/org#> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix interval: <http://reference.data.gov.uk/def/intervals/> .
@prefix payment: <http://finance.data.gov.uk/def/payment/> .

# Classes #

payment:Payment
  a rdfs:Class ;
  rdfs:label "Payment"@en .

payment:ExpenditureAnalysis
  a rdfs:Class ;
  rdfs:subClassOf skos:Concept ;
  rdfs:label "Expenditure Analysis"@en .

payment:CostCentre
  a rdfs:Class ;
  rdfs:subClassOf skos:Concept ;
  rdfs:label "Cost Centre"@en .

# Properties #

# Payment properties

payment:payer
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Payer"@en ;
  rdfs:domain payment:Payment .
# payer typically the local authority, think about linking
# based on SNAC code or possibly GSS

payment:payee
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Payee"@en ;
  rdfs:domain payment:Payment .
# payee typically the supplier to the LA, think about linking
# based on Companies house numbers or HMRC Tax references
# payee could also be another LA

payment:payeeRedacted
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:label "Payee Redacted"@en ;
  rdfs:domain payment:Payment ;
  rdfs:range xsd:boolean .

payment:narrative
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:label "Narrative"@en ;
  rdfs:comment "The goods or services that were supplied"@en ;
  rdfs:domain payment:Payment .

payment:expenditureAnalysis
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Expenditure Analysis"@en ;
  rdfs:domain payment:Payment ;
  rdfs:range payment:ExpenditureAnalysis .

payment:date
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Date"@en ;
  rdfs:domain payment:Payment ;
  rdfs:range interval:CalendarDay .

payment:value
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:label "Value"@en ;
  rdfs:domain payment:Payment ;
  rdfs:range xsd:decimal .

payment:currency
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Currency"@en ;
  rdfs:domain payment:Payment .

payment:includesVAT
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:label "Includes VAT"@en ;
```

```

rdfs:domain payment:Payment ;
rdfs:range xsd:boolean .

# Expenditure Analysis

payment:expenditureCode
  a rdf:Property , owl:DatatypeProperty ;
  rdfs:label "Expenditure Code"@en ;
  rdfs:subPropertyOf skos:notation ;
  rdfs:domain payment:ExpenditureAnalysis ;
  rdfs:range payment:ExpenditureCode .

payment:costCentre
  a rdf:Property , owl:ObjectProperty ;
  rdfs:label "Cost Centre"@en ;
  rdfs:domain payment:ExpenditureAnalysis ;
  rdfs:range payment:CostCentre .

## Datatypes

payment:ExpenditureCode
  a rdfs:Datatype ;
  rdfs:label "Expenditure Code"@en .

```

Fig3 - Payment ontology expressed using Turtle

Payment.ttl rev1

Publish linked data - Take some existing data and publish it using a rendition of RDF using the definitions from the model

Some example data had been created for the workshop, based on the sample data provided by some of the participating Local Authorities.

Trace Reference	Date Paid	Payee	Payee Reference	Amount (ex Vat) £	Narrative	Contract Reference	Ledger Code	Ledger Code Description	Fund Type
1001	15/04/2010	Nuts and Bolts Incorporated	500451	897.23	For supply of 50Kg of assorted Nuts and Bolts		1782-1003	General Stores.	Revenue
1002	15/04/2010	Leased Lines R Us	2457	1007.56	Quartlerly charges for Leased Communications Lines		2434-5678	It Infrastructure	Revenue
1004	15/04/2010	Clean Sweep limited	7072	1500	Cleaning services for the Town Hall - March 2010	CLN204	2456-8923	Town Hall Cleaning	Revenue
1005	15/04/2010	Big Truck Co.	23571	23456.18	Purchase of Waste Collection Truck		3456-1212	Waste Collection Fleet	Capital

Fig4 - Sample data used at the workshop from the fictional Utopia District Council

The first line of this data was then manually transformed into Linked Data that conformed to the Ontology.

```

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix org: <http://www.w3.org/ns/org#> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix interval: <http://reference.data.gov.uk/def/intervals/> .
@prefix payment: <http://finance.data.gov.uk/def/payment/> .
@prefix udc-supplier: <http://data.utopia.gov.uk/id/supplier/> .
@base <http://data.utopia.gov.uk/data/finance/sample/2010-07-02> .

<http://data.utopia.gov.uk/data/finance/sample/2010-07-02>
  rdfs:label "Data about payments from Sedgemoor District Council"@en ;
  dct:identifier "http://data.utopia.gov.uk/data/finance/sample/2010-07-02"^^xsd:anyURI ;
  dct:creator <http://statistics.data.gov.uk/id/local-authority/40UC> ;
  dct:created <http://reference.data.gov.uk/id/day/2010-07-02> .

<#1001>
  a payment:Payment ;
  rdfs:label "1001"@en ;
  payment:payer <http://statistics.data.gov.uk/id/local-authority/40UC> ;
  payment:payee <http://data.utopia.gov.uk/id/supplier/500451> ;
  payment:date <http://reference.data.gov.uk/id/day/2010-04-15> ;
  payment:value 897.23 ;

```

```

payment:includesVAT false ;
payment:currency <http://reference.data.gov.uk/def/currency/GBP> ;
payment:narrative "For supply of 50Kg of assorted Nuts and Bolts"@en ;
payment:expenditureAnalysis <http://data.utopia.gov.uk/id/account-code/1782-1003> .

<http://data.utopia.gov.uk/id/supplier/500451>
  a org:Organization ;
  skos:prefLabel "Nuts and Bolts Incorporated"@en ;
  skos:notation "500451"@en .

<http://data.utopia.gov.uk/id/account-code/1782-1003>
  a payment:ExpenditureAnalysis ;
  payment:expenditureCode "1782-1003"^^payment:ExpenditureCode ;
  skos:prefLabel "General Stores."@en .

```

Fig5 – Payment ontology expressed using Turtle

example.ttl rev1

Link to Other Sources - Find other information that links to the URI used in the data

The workshop spent some time considering the added value that publishing the data in this way might bring about.

Comparing and combining data between Local Authorities.

Payments data would now be published using consistent definitions of the terms used, and using reliable identifiers that either map to, or are present in similar data from other sources.

Bringing context to data

By using URIs for the Local Authority, it would be possible to find (for example)

- The length of 'A-Roads' in the area
- The average traffic flows
- Car Ownership
- Number of Mainline train stations

... which would make spending on Road Maintenance meaningful

Inviting ad-hoc queries and visualisations

Someone (who we have not met) might wonder if there is a correlation between political control of Local Authorities, and what they spend their money on. This is not a request that we were likely to have thought of as we issued our linked data, and Political Control does not feature in the model. However, so long as we have used URIs that are then used in other models for data, this kind of query can be encouraged – moving to a web of data.

Conclusions and Next Steps

A series of conclusions and corresponding actions were agreed at the workshop. These actions will be referred to the CLG/LGA family who will determine the right organisation to lead on each.

Conclusion	Actions
Some key reference data that will be required for this scenario are not currently in a Linked Data form.	Work with data.gov.uk and the stewards of each identified source of reference data towards publishing reliable URIs. In particular, <ul style="list-style-type: none"> • Cipfa as the custodians of the BVACOP • Proclass and EU Procurement Categories
The proposed Ontology pattern for 'payments' needs to be verified enhanced and proven.	Work with finance domain experts and data.gov.uk to refine the 'payment' ontology. Incorporate other data.gov.uk recommended patterns e.g. 'Provenance',

	'Licence', and other data set level metadata. Create Linked Data from the various Local Authorities that have participated.
Most Local Authorities are unlikely to want to take on this level of Linked Data expertise.	Create a standard form of spreadsheet that contains a script to convert its contents into Linked Data form, and offer this as an option to Local Authorities.
Use of data assurance and transformation tools is interesting, but may introduce an overhead when used for high volumes.	Work through data cleansing techniques, including fixing data inconsistencies at source. Ask data.gov.uk to capture their data cleansing and publishing presentation so that it can be shared.

Improving this document

- The models and linked data examples in this document need to be verified and refined.
- Where turtle code is shown, each line should be separately explained.

Topics for the next LeGSB Workshop

By the time of the next workshop, we will have

- Refined the 'payment' model and ontology
- Created URI Sets
- Transformed some real council payments data into Linked Data form.

We can then consider ...

- How to make this easy and flexible for Local Authorities
- How and where to host linked data
- How to query and join up linked data
- How to report and visualise linked data

Appendix A – Organisations represented at the LeGSB Workshop

Thanks to those individuals and organisations that participated in the workshop

- Sedgemoor District Council
- Local e-Government Standards Body (LeGSB)
- National Archives (data.gov.uk)
- Epimorphics
- Talis
- esd-toolkit
- Ordnance Survey
- Office of National Statistics
- Sunderland City Council
- London Borough of Redbridge
- London Borough of Brent
- Birmingham City Council
- Department for Communities and Local Government
- The Local Government Association
- SOCITM
- Hampshire County Council
- The Improvement and Development Agency
- Local Directgov
- Department for Education (representing the ICT Strategy)
- The Stationery Office