

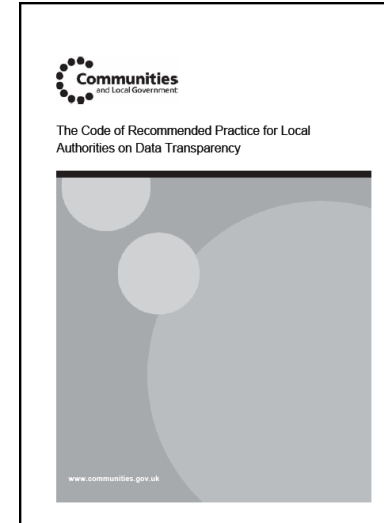
Concept of Linked Data

5* data for a local data ecosystem

Paul Davidson, CIO Sedgemoor District Council
21st October 2013
Local Open Data Breakthrough Programme Learning Day

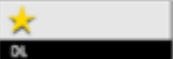


- Operating since 2006
- Funded by Central Government Departments – currently
 - Department for Communities and Local Government (*DCLG*)
 - Department for Work and Pensions (*DWP*)
 - Department for Business, Innovation and Skills (*BIS*).
- Mission
 - To promote Standards for Efficiency, Transformation, and Transparency of Local Services
- People
 - All personnel are employees of local authorities, and central government departments.
- Web Site
 - <http://www.legsb.gov.uk>



- expenditure over £500, (including costs, supplier and transaction information)
- senior employee salaries, names, budgets and responsibilities of staff paid over £58,200 - equivalent to the lowest Senior Civil Service pay band
- an organisational chart
- the 'pay multiple' - the ratio between the highest paid salary and the median average salary of the whole of the authority's workforce
- councillor allowances and expenses
- copies of contracts and tenders to businesses and to the voluntary community and social enterprise sector
- grants to the voluntary community and social enterprise sector should be clearly itemised and listed
- policies, performance, external audits and key inspections and key indicators on the authorities' fiscal and financial position
- the location of public land and building assets and key attribute information that is normally recorded on asset registers
- data of democratic running of the local authority including the constitution, election results, committee minutes, decision - making processes and records of decisions.



- Publication should be in open and machine-readable formats. The recommended 5 step journey to a fully open format is:
 - * Available on the web (whatever format) but with an open license
 - ** As for one star plus available as machine-readable structured data (e.g. Excel instead of image scan of a table)
 - *** As for two star plus use a non-proprietary format (e.g. CSV and XML)
 - **** All the above plus use open standards from the World Wide Web Consortium (such as RDF and SPARQL) and
 - ***** All the above plus link your data to other people's data to provide context.

Publishing up to step 3

| Star Rating ⁵ | In practice | Pros | Cons |
|---|---|---|--|
|  | <p>This is typically a static document, perhaps containing data as tables.</p> <p>Often this would be web page as html⁶, a document as pdf⁷, or an image.</p> | <ul style="list-style-type: none"> easy to produce; retains presentation and layout; | <ul style="list-style-type: none"> cannot further manipulate the data such as sorting, filtering, summing etc; cannot join or compare to other data, or earlier versions; |
|  | <p>This is typically data, such as a spreadsheet, published in the format of the tool that was used to extract it, such as xls⁸.</p> | <ul style="list-style-type: none"> no new tools or skills necessary; data can be downloaded and further processed and analysed. | <ul style="list-style-type: none"> assumes that the consumer has the same tool as the producer, or is able to use the format. very large data sets might not be attractive to download. |
|  | <p>This is typically 2* type data published using an open format, such as csv⁹ or xml¹⁰.</p> | <ul style="list-style-type: none"> there is typically a choice of open source tools available for each open format | <ul style="list-style-type: none"> Some conversion necessary. Where data has greater structure than a simple 2-dimensional table, many files may be necessary, which may become disconnected; The meaning and scope of columns and rows can be hard to express. |

| | | | |
|--|---|---|---|
|  | <p>This is explicitly about publishing data to the RDF¹¹ data model, and providing a query service using the SPARQL¹² language.</p> | <ul style="list-style-type: none"> • enables others to make statements over the web about individual lines of data; • can be queried over a data service so that a complete data set does not have to be downloaded; • gives precise definitions to the meaning of the data. | <ul style="list-style-type: none"> • requires a skill set that most local authorities do not have yet; • not suitable to provide directly to residents. • Requires some infrastructure |
|  | <p>This is Linked Data in the RDF model, that contains links to external datasets to describe the 'things' that the data refers to.</p> | <ul style="list-style-type: none"> • adds context; • can build into a 'data ecosystem'. • can enable 3rd parties to join data from many sources together to provide new targeted information services and insight. | <ul style="list-style-type: none"> • requires a 'spine' of core reference data to make links to. |

<http://legsb.i-network.org.uk/resources/publishinglocal5stardata/>

- What
 - Explains what linked data is
 - Uses three real examples to illustrate good-practice steps to produce linked data
 - Draws out ‘gaps’ in content and infrastructure
- Why
 - Feedback from local authorities tells us that, while many wish to publish data in a smarter, joined up way, that will benefit their residents, they have not been able to find relevant material that explains the practicalities of 5* data publishing.
 - At LGA events across England in March 2013, LeGSB presented the material in this guide to roomfuls of local authority practitioners, who then fed back that they would value it being turned into a proper guide, and were likely to take part in supporting web collaborations.

Looking for Links

Food Premises Inspections

| Context | Insight / Service | Data |
|--------------------|--|---|
| Operational | What is the rating of a particular food premises, | Inspection report and rating of an identified premises |
| Statistical | How are ratings and failures spread across premises types? | Types, Locations, Outcomes of Food Premises' inspections. |
| Analytical | How safe are our food outlets? | Correlation to health incidents. |
| Political | What is being done to make our food outlets safer? | Targeted training programmes. Risk Based inspections. |

Data can link when ...

- we agree what data means
 - Semantics
 - e.g. What is a Rating, a Site, a Location, a Council, a Contract, etc
- we agree what data is about
 - Identifiers
 - e.g. a Company, a Ward, etc
- Linked Data
 - Uses the web to give unique addresses to
 - definitions of what data elements mean
 - the 'things' that can occur in data.
- Datasets
 - can then use those web addresses

Identifiers for 'things'

- Companies
 - All UK companies are registered at *Companies House*
 - Each is given a Registration Number
 - Builds into a URI Set

- For example
<http://business.data.gov.uk/id/company/02050399>

- *URI*
 - Uniform Resource Identifier
 - a component of the World Wide Web
 - provide a means of uniquely naming a 'Thing'
 - A web address for a fact
 - Can be 'looked up' over the web to give
 - *html*
 - *data*

- Guidance
 - Designing *URI* Sets for the UK Public Sector
 - <https://www.gov.uk/government/publications/designing-uri-sets-for-the-uk-public-sector>

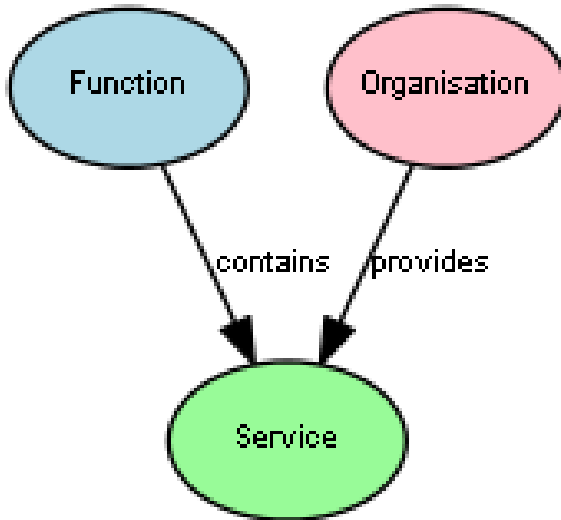
For human consumption

CompanyName ZENITH PRINT (UK) LIMITED
CompanyNumber 02050399
RegAddress
AddressLine1 ZENITH HOUSE
AddressLine2 MOY ROAD INDUSTRIAL ESTATE
PostTown TAFFS WELL
County CARDIFF
Postcode CF15 7QR
CompanyCategory Private Limited Company
CompanyStatus Active
CountryOfOrigin United Kingdom
IncorporationDate 28/08/1986
PreviousNames
CONDate 22/03/1996
CompanyName ZENITH TREFOREST PRESS LIMITED
PreviousNames
CONDate 22/04/1993
CompanyName ZENITH COLOUR PRINTING LIMITED
Accounts
AccountRefDay 31
AccountRefMonth 03
NextDueDate 31/12/2012
LastMadeUpDate 31/03/2011
AccountCategory TOTAL EXEMPTION SMALL
Returns
NextDueDate 28/01/2012
LastMadeUpDate 31/12/2010
Mortgages
NumMortCharges 6
NumMortOutstanding 2
NumMortPartSatisfied 0
NumMortSatisfied 4
SICCodes
SicText 9999 - Dormant Company

```
<?xml version="1.0" encoding="UTF-8"?>
<Result xmlns="http://www.companieshouse.gov.uk/terms/xxx">
- <primaryTopic href="http://business.data.gov.uk/id/company/02050399">
  <CompanyName>ZENITH PRINT (UK) LIMITED</CompanyName>
  <CompanyNumber>02050399</CompanyNumber>
- <RegAddress href="http://data.companieshouse.gov.uk/doc/company/02050399#RegAddress">
  <AddressLine1>ZENITH HOUSE</AddressLine1>
  <AddressLine2>MOY ROAD INDUSTRIAL ESTATE</AddressLine2>
  <PostTown>TAFFS WELL</PostTown>
  <County>CARDIFF</County>
  <Postcode>CF15 7QR</Postcode>
</RegAddress>
  <CompanyCategory>Private Limited Company</CompanyCategory>
  <CompanyStatus>Active</CompanyStatus>
  <CountryOfOrigin>United Kingdom</CountryOfOrigin>
  <IncorporationDate>1986-08-28</IncorporationDate>
- <PreviousNames href="http://data.companieshouse.gov.uk/doc/company/02050399#PreviousNames">
  <CONDate>1996-03-22</CONDate>
  <CompanyName>ZENITH TREFOREST PRESS LIMITED</CompanyName>
</PreviousNames>
- <Accounts href="http://data.companieshouse.gov.uk/doc/company/02050399#Accounts">
  <AccountRefDay>31</AccountRefDay>
  <AccountRefMonth>03</AccountRefMonth>
  <NextDueDate>2013-12-31</NextDueDate>
  <LastMadeUpDate>2012-03-31</LastMadeUpDate>
  <AccountCategory>TOTAL EXEMPTION SMALL</AccountCategory>
</Accounts>
```

```
<rdf:RDF xmlns:cs0="http://www.companieshouse.gov.uk/terms/" xmlns:foaf="http://xmlns.com/foaf/0.1/"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
  <rdf:Description rdf:about="http://data.companieshouse.gov.uk/doc/company/02050399#RegAddress">
    <cs0:PostTown>TAFFS WELL</cs0:PostTown>
    <cs0:County>CARDIFF</cs0:County>
    <cs0:Postcode>CF15 7QR</cs0:Postcode>
    <cs0:AddressLine1>ZENITH HOUSE</cs0:AddressLine1>
    <cs0:AddressLine2>MOY ROAD INDUSTRIAL ESTATE</cs0:AddressLine2>
  </rdf:Description>
  <rdf:Description rdf:about="http://data.companieshouse.gov.uk/doc/company/02050399">
    <foaf:primaryTopic rdf:resource="http://business.data.gov.uk/id/company/02050399"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://business.data.gov.uk/id/company/02050399">
    <cs0:Mortgages rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#Mortgages"/>
    <cs0:CompanyStatus>Active</cs0:CompanyStatus>
    <cs0:IncorporationDate>28/08/1986</cs0:IncorporationDate>
    <cs0:SICCodes rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#SICCodes"/>
    <cs0:CompanyName>ZENITH PRINT (UK) LIMITED</cs0:CompanyName>
    <cs0:CountryOfOrigin>United Kingdom</cs0:CountryOfOrigin>
    <cs0:PreviousNames rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#PreviousNames"/>
    <cs0:CompanyNumber>02050399</cs0:CompanyNumber>
    <cs0:Address rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#RegAddress"/>
    <cs0:CompanyCategory>Private Limited Company</cs0:CompanyCategory>
    <cs0>Returns rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#Returns"/>
    <cs0:Accounts rdf:resource="http://data.companieshouse.gov.uk/doc/company/02050399#Accounts"/>
  </rdf:Description>
```

Identifiers for Terms



Each concept is categorised by a list of terms, which cross-reference to other concepts.

<http://opendatacommunities.org/def/local-government/DistrictCouncil>

District Council

<http://id.esd.org.uk/service/524>

Household Waste Collection

Garden Waste Collection

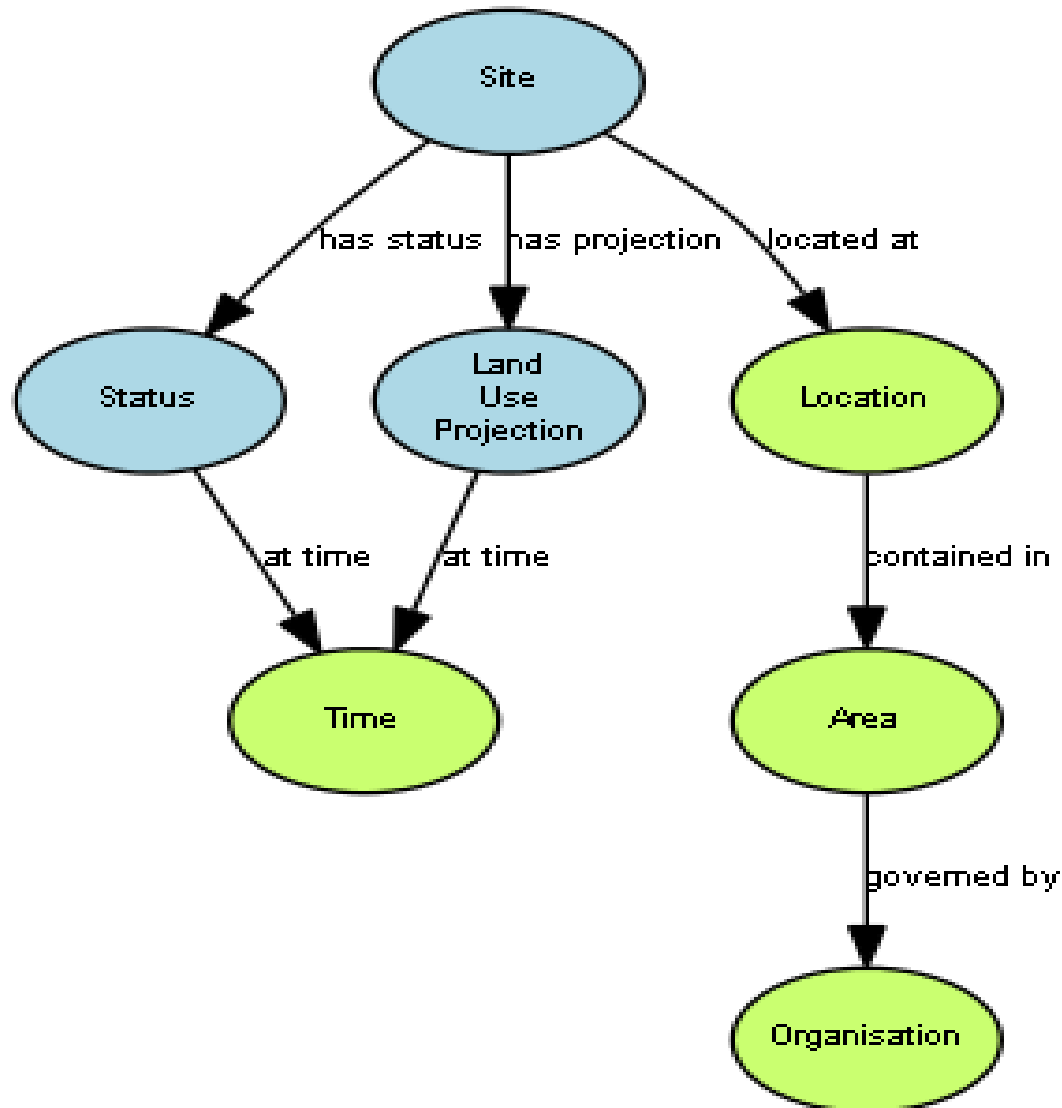
Waste Management

<http://id.esd.org.uk/function/38>

County Council

Waste Disposal Sites

- Model it



- Transform it

| | | |
|---|--|---|
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> | <http://linkeddata.hants.gov.uk/def/land-supply/LandSupplySite> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.ordnancesurvey.co.uk/ontology/BuildingsAndPlaces/v1.1/BuildingsAndPlaces.owl#hasAddress> | "URBAN PRIORITY AREA GOLDSMITH AVENUE/FAWCETT ROAD PORTSMOUTH" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://linkeddata.hants.gov.uk/def/land-supply/siteStatus> | "NOT STARTED" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://linkeddata.hants.gov.uk/def/land-supply/previouslyBuilt> | <http://linkeddata.hants.gov.uk/def/land-supply/concept/previously-bi |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://linkeddata.hants.gov.uk/def/land-supply/planningAuthority> | <http://opendatacommunities.org/id/unitary-authority/portsmouth> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://data.ordnancesurvey.co.uk/ontology/admingeo/district> | <http://data.ordnancesurvey.co.uk/id/7000000000037254> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.w3.org/2000/01/rdf-schema#label> | "Land supply site: Portsmouth, 0383" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.w3.org/2004/02/skos/core#notation> | "portsmouth-0383" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.w3.org/2003/01/geo/wgs84_pos#lat> | 50.795714 |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383> | <http://www.w3.org/2003/01/geo/wgs84_pos#long> | -1.075231 |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.w3.org/1999/02/22-rdf-syntax-ns#type> | <http://linkeddata.hants.gov.uk/def/land-supply/LandSupplySite> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.ordnancesurvey.co.uk/ontology/BuildingsAndPlaces/v1.1/BuildingsAndPlaces.owl#hasAddress> | "BOUNDARY HALL MULFORDS HILL TADLEY" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://linkeddata.hants.gov.uk/def/land-supply/siteStatus> | "NOT STARTED" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://linkeddata.hants.gov.uk/def/land-supply/previouslyBuilt> | <http://linkeddata.hants.gov.uk/def/land-supply/concept/previously-bi |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://linkeddata.hants.gov.uk/def/land-supply/planningAuthority> | <http://opendatacommunities.org/id/district-council/basingstoke> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://data.ordnancesurvey.co.uk/ontology/admingeo/district> | <http://data.ordnancesurvey.co.uk/id/7000000000017653> |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.w3.org/2000/01/rdf-schema#label> | "Land supply site: Basingstoke And Deane, 0337" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.w3.org/2004/02/skos/core#notation> | "basingstoke-0337" |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.w3.org/2003/01/geo/wgs84_pos#lat> | 51.358336 |
| <http://linkeddata.hants.gov.uk/id/land-supply/site/basingstoke/0337> | <http://www.w3.org/2003/01/geo/wgs84_pos#long> | -1.146852 |



Hampshire County Council – Land Supply Data

- Triples

<http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383>

<http://linkeddata.hants.gov.uk/def/land-supply/siteStatus>

"NOT STARTED"

- Triples

<http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383>

http://www.w3.org/2003/01/geo/wgs84_pos#lat

```
<rdf:Property rdf:about="http://www.w3.org/2003/01/geo/wgs84_pos#lat">  
<rdfs:domain rdf:resource="http://www.w3.org/2003/01/geo/wgs84_pos#SpatialThing" />  
<rdfs:label>latitude</rdfs:label>  
<rdfs:comment>The WGS84 latitude of a SpatialThing (decimal degrees).</rdfs:comment>  
</rdf:Property>
```

50.795714

- Triples

<http://linkeddata.hants.gov.uk/id/land-supply/site/portsmouth/0383>

<http://linkeddata.hants.gov.uk/def/land-supply/planningAuthority>

<http://opendatacommunities.org/id/unitary-authority/portsmouth>

OPEN DATA COMMUNITIES

Our data > Theme: Geography > Dataset: Local a... > Resource

resource

Portsmouth

uri

<http://opendatacommunities.org/id/unitary-authority/portsmouth>

| predicate | object |
|--|---|
| billing authority code | E1701 |
| government office region | South East |
| governs | The City of Portsmouth |
| GSS | E06000044 |
| has census code | 00MR |
| label | Portsmouth |
| Openly Local URL | http://openlylocal.com/councils/353-Portsmouth-City-Council |
| page | http://www.portsmouth.gov.uk/ |

- Publish it and Query it



Our data

SPARQL Query

SPARQL query

```
SELECT DISTINCT ?address ?status WHERE {  
  ?site  
<http://www.ordnancesurvey.co.uk/ontology/BuildingsAndPlaces/v1.1/BuildingsAndPlaces.owl#hasAddress> ?address .  
  ?site <http://linkeddata.hants.gov.uk/def/land-supply/siteStatus> ?status  
  FILTER ( ?status = "UNDER CONSTRUCTION" )  
}
```

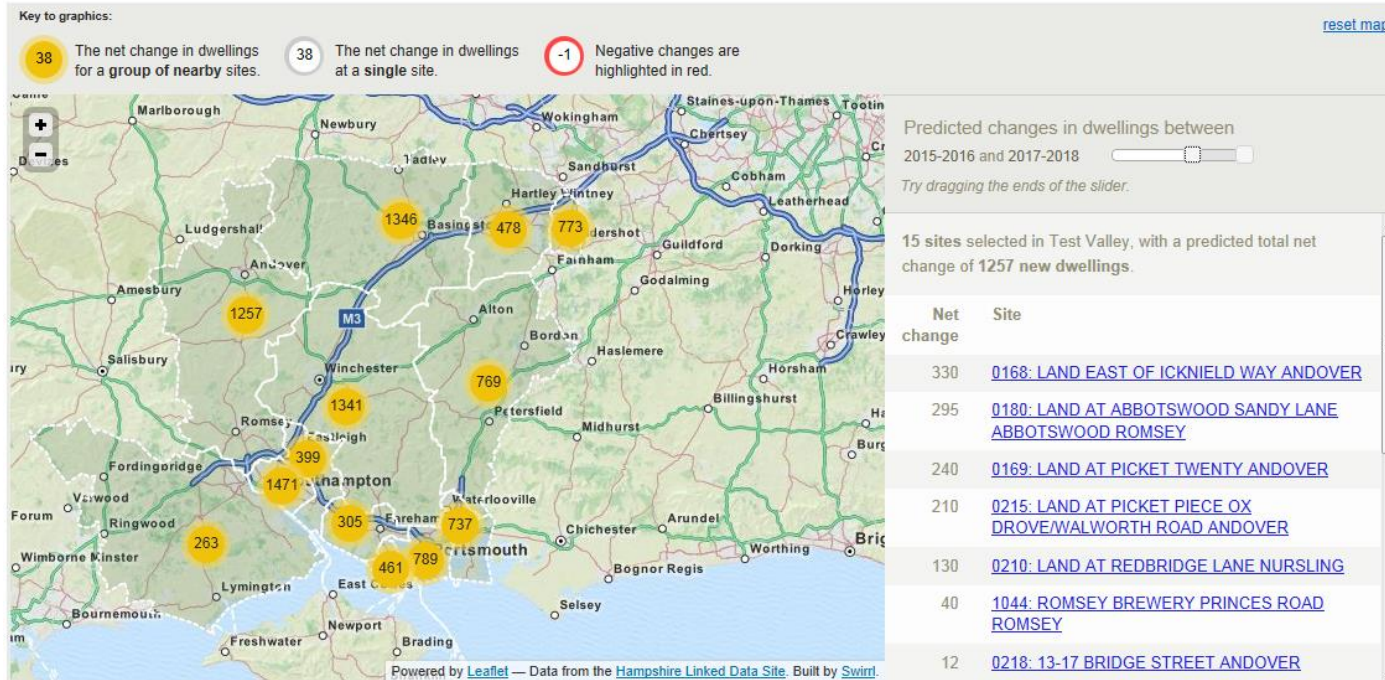
- Results

results

| address | status |
|--|----------------------|
| "LAND OPPOSITE RECREATION GROUND MARLANDS LANE WEST MEON" | "UNDER CONSTRUCTION" |
| "271-273 FARNBOROUGH ROAD FARNBOROUGH" | "UNDER CONSTRUCTION" |
| "20-26 COLLEGE STREET AND 29-35 RICHMOND STREET SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "THORNERS HOMES REGENTS PARK ROAD SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "CAR PARK AND REDUNDANT HIGHWAY WELLINGTON STREET SOUTHSEA PORTSMOUTH" | "UNDER CONSTRUCTION" |
| "49 THOROLD ROAD SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "ST FRANCIS OF ASSISI CHURCH MONTAGUE AVENUE SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "REAR OF FORMER BAPTIST CHURCH & THE LA HEATHFIELD ROAD PORTSMOUTH" | "UNDER CONSTRUCTION" |
| "AREAS 4 AND 7 HUNTS POND ROAD FAREHAM" | "UNDER CONSTRUCTION" |
| "THE BOURNE BOURNE FIELDS TWYFORD WINCHESTER" | "UNDER CONSTRUCTION" |
| "REGENERATION SCHEME FAROE/MALDIVE CLOSE BASINGSTOKE" | "UNDER CONSTRUCTION" |
| "LAND SOUTH OF WINCHESTER ROAD FOUR MARKS ALTON" | "UNDER CONSTRUCTION" |
| "FORMER RENAULT GARAGE 128 MILTON ROAD PORTSMOUTH" | "UNDER CONSTRUCTION" |
| "LINDEN 43 ANSTEY LANE ALTON" | "UNDER CONSTRUCTION" |
| "59 PROJECT HOUSE AVENUE ROAD PORTSWOOD SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "SAVOY BUILDINGS SOUTH PARADE SOUTHSEA PORTSMOUTH" | "UNDER CONSTRUCTION" |
| "LAND AT HAZEL COTTAGE CHASE ROAD LINDFORD BORDON" | "UNDER CONSTRUCTION" |
| "COLDEAST HOSPITAL COLDEAST WAY SARISBURY SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "121 VINE ROAD & 195-207 COXFORD ROAD SOUTHAMPTON" | "UNDER CONSTRUCTION" |
| "160-162 FAIR OAK ROAD BISHOPSTOKE" | "UNDER CONSTRUCTION" |

- Present it and Visualise it

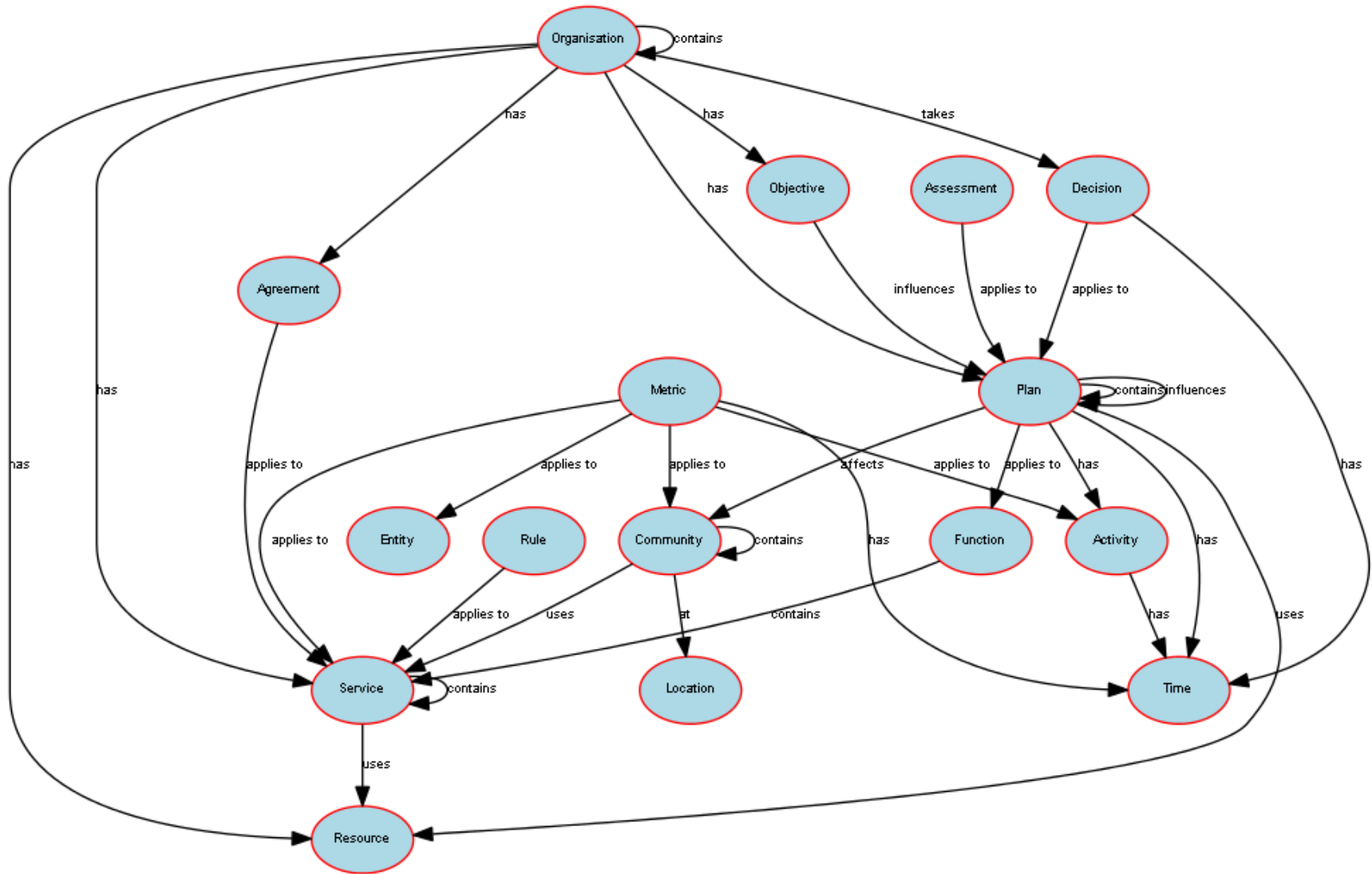
Hampshire Land Supply Browser



See <http://linkeddata.hants.gov.uk/land-supply-mapper/map.html>

Endpoint <http://linkeddata.hants.gov.uk/sparql>

An Ecosystem?



Thank you

- Paul Davidson
 - paul.davidson@sedgemoor.gov.uk
 - Director of Standards for the Local eGovernment Standards Body (LeGSB)
 - <http://www.legsb.gov.uk>