

Introduction to Linked Data

The RDF Data Model



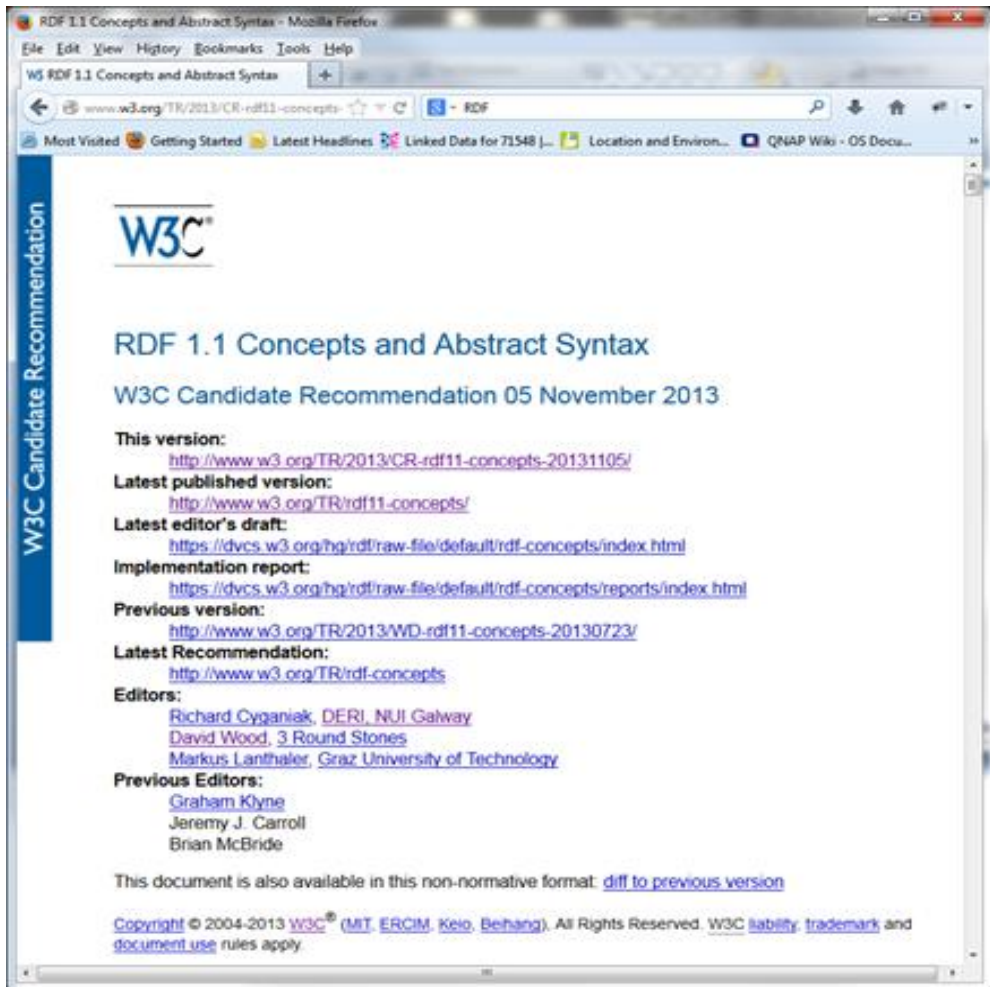
Linked Data ‘Manifesto’...

<http://www.w3.org/DesignIssues/LinkedData.html>

1. “Use URIs as names for things”
 - [ie. use web addresses to name all manner of things.]
2. “Use HTTP URIs so that people can look up those names.”
3. When someone looks up a URI, provide useful information, using standards (RDF)
 - **[ie. put information behind the name]**
4. “Include links to other URIs. so that they can discover more things.”



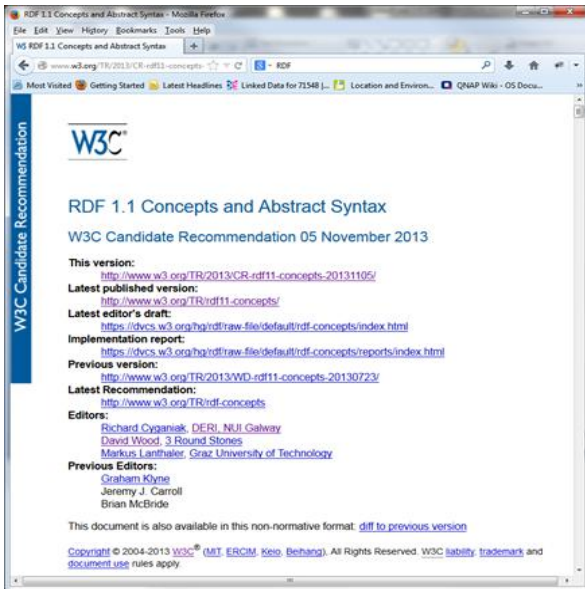
RDF: a way to represent data



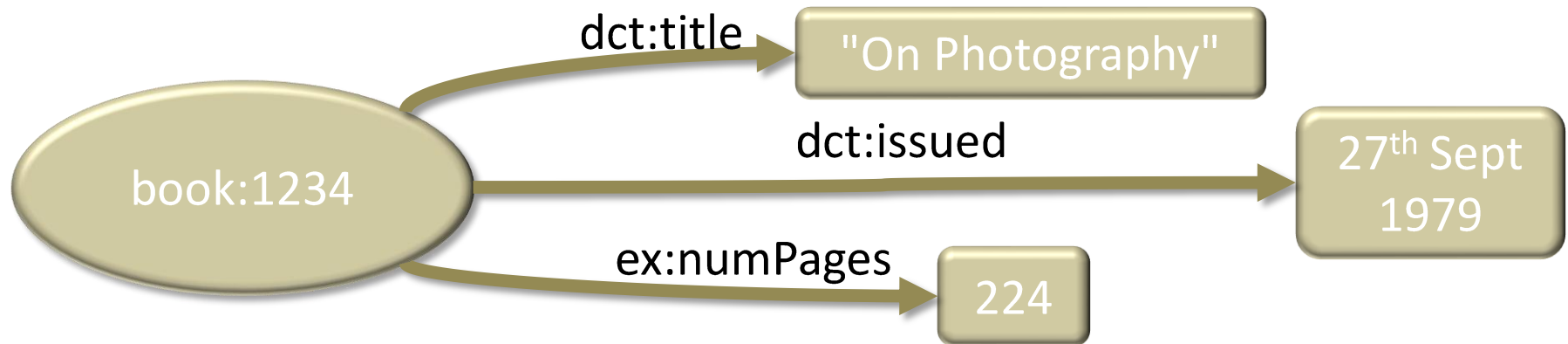
- Web "Standard"
- Designed to publish data on the web
- Good for linking data sets
- Good for data integration
- Flexible data model

RDF: 'Standards'

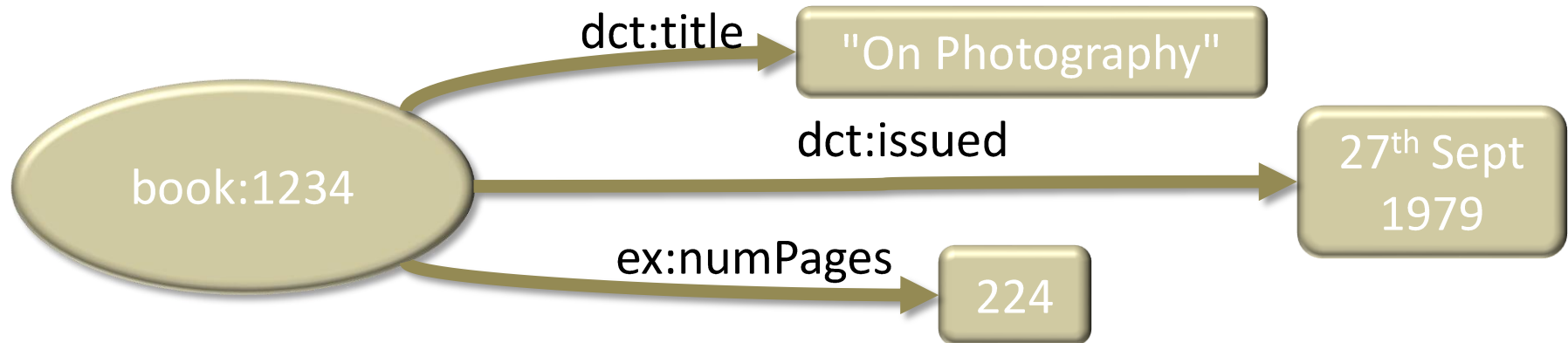
- RDF
 - abstract data model
- Syntaxes
 - various ways of writing RDF
 - TURTLE, N-TRIPLES, RDF/XML, ...
- RDFS
 - simple modelling
- OWL
 - richer modelling
- SPARQL
 - query language
- Reusable Vocabularies
 - DCTERMS, SKOS, ORG, CUBE, ...



Things and Attributes

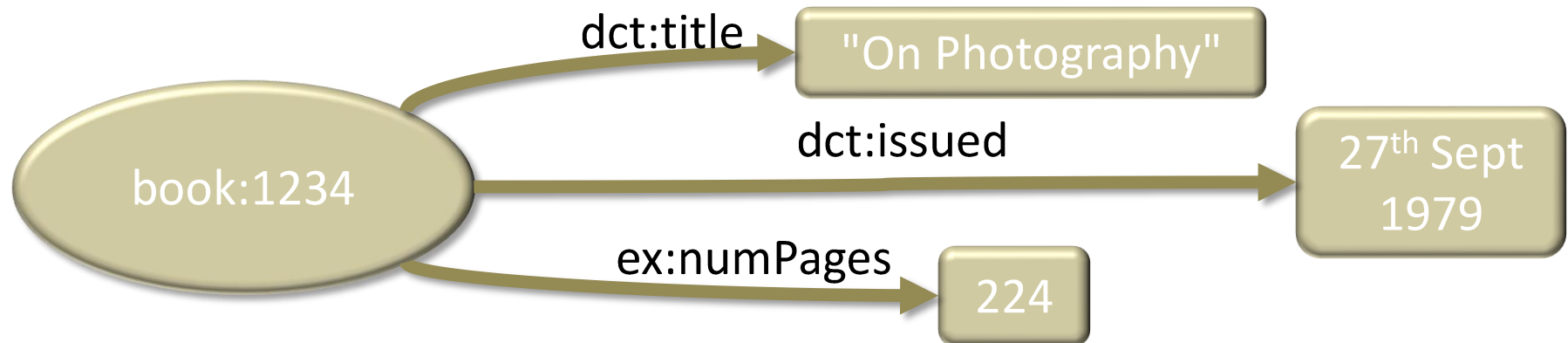


URI Short hand notation



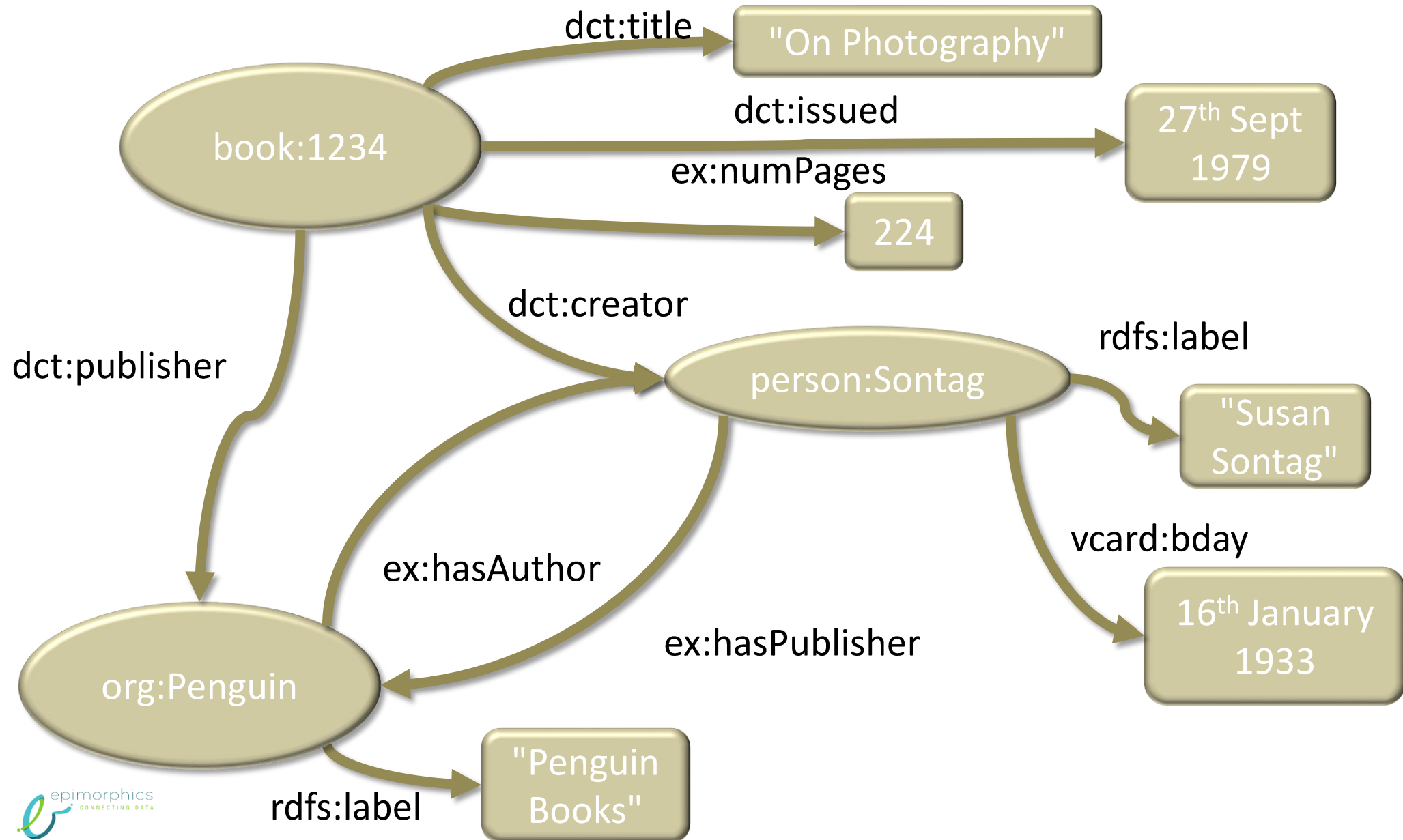
book:1234	≡	http://example.com/book/1234
dct:title	≡	http://purl.org/dc/terms/title
dct:issued	≡	http://purl.org/dc/terms/issued
ex:numPages	≡	http://example.net/ex/numPages

Where do the URIs come from



- We could make them up
- We could reuse URIs published by others
- For types and properties– use an existing one if its suitable
 - `dct:...` Dublin Core metadata vocabulary
 - `rdf:type` standard URI for indicating the type
 - `rdfs:label` standard URI for indicating a name

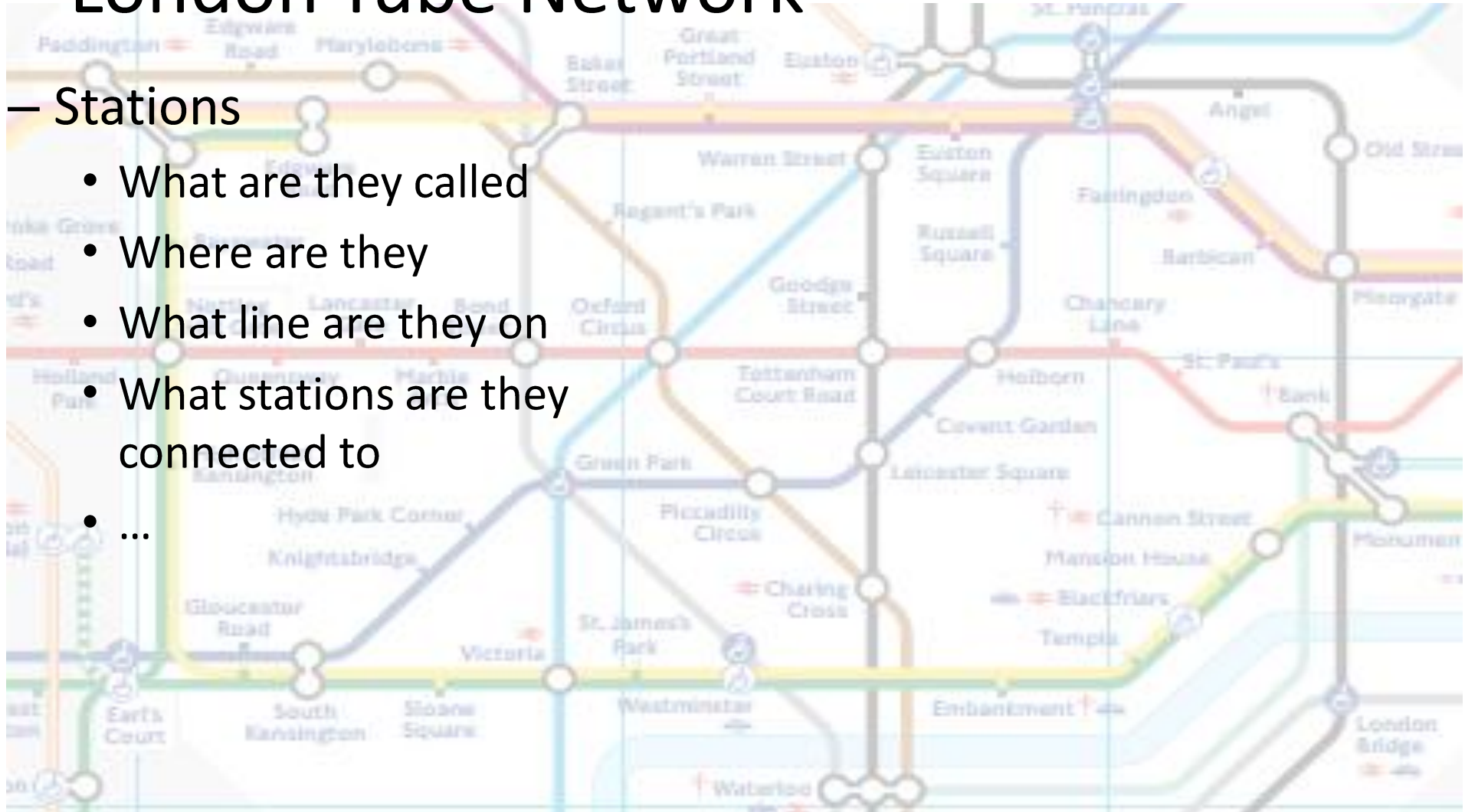
Relationships between things



Transport for London London Tube Network

– Stations

- What are they called
- Where are they
- What line are they on
- What stations are they connected to
- ...



Tourist Information Data about 'Points of Interest'

– Point of interest

- name
- What type
- Description
- Location
- Current exhibitions
- Opening times
- How to get there
- Disabled access
- ...

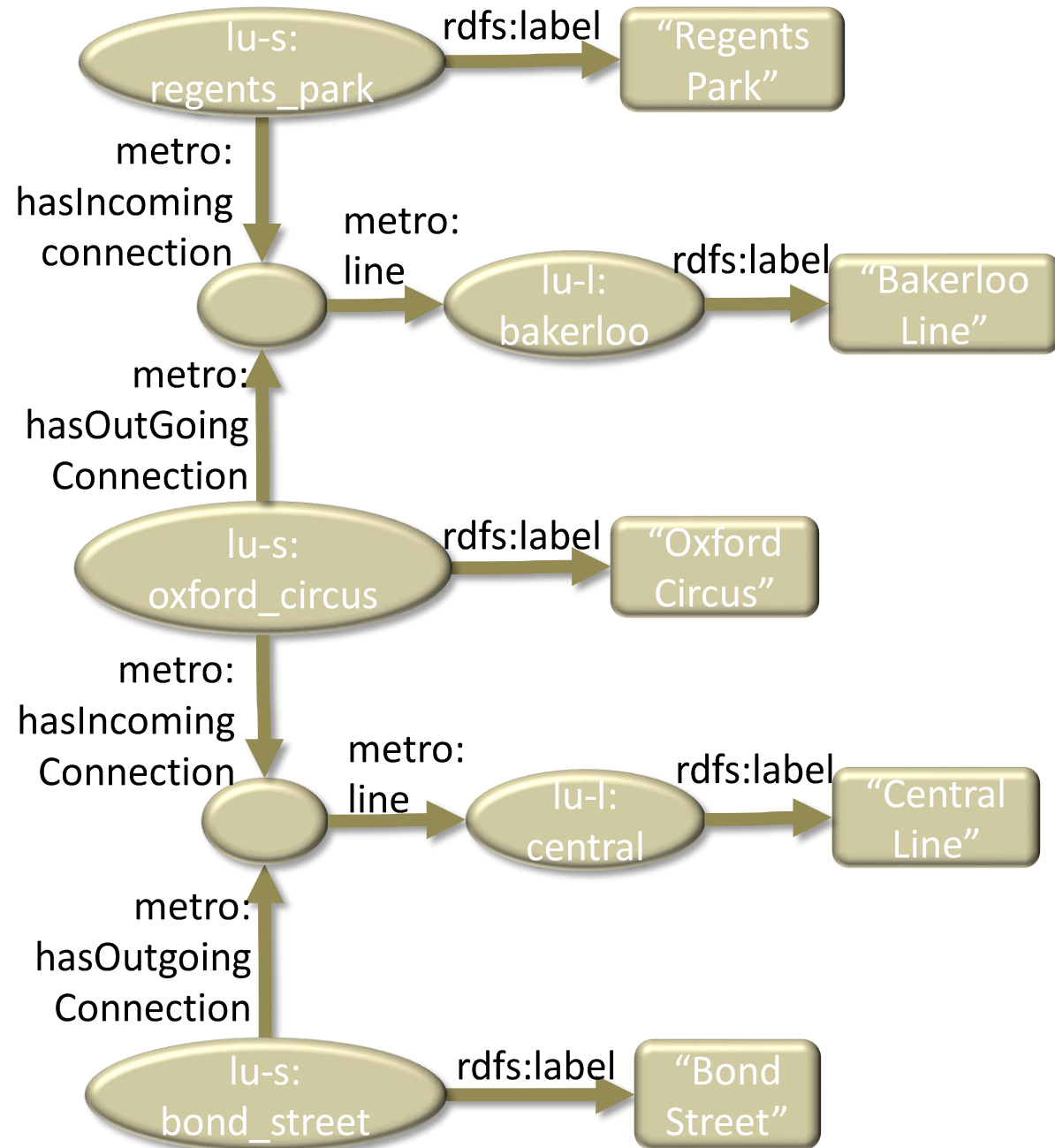
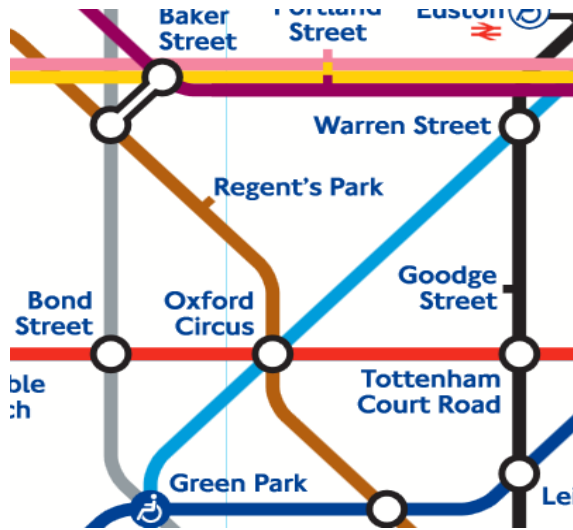
Inside the National Gallery, London



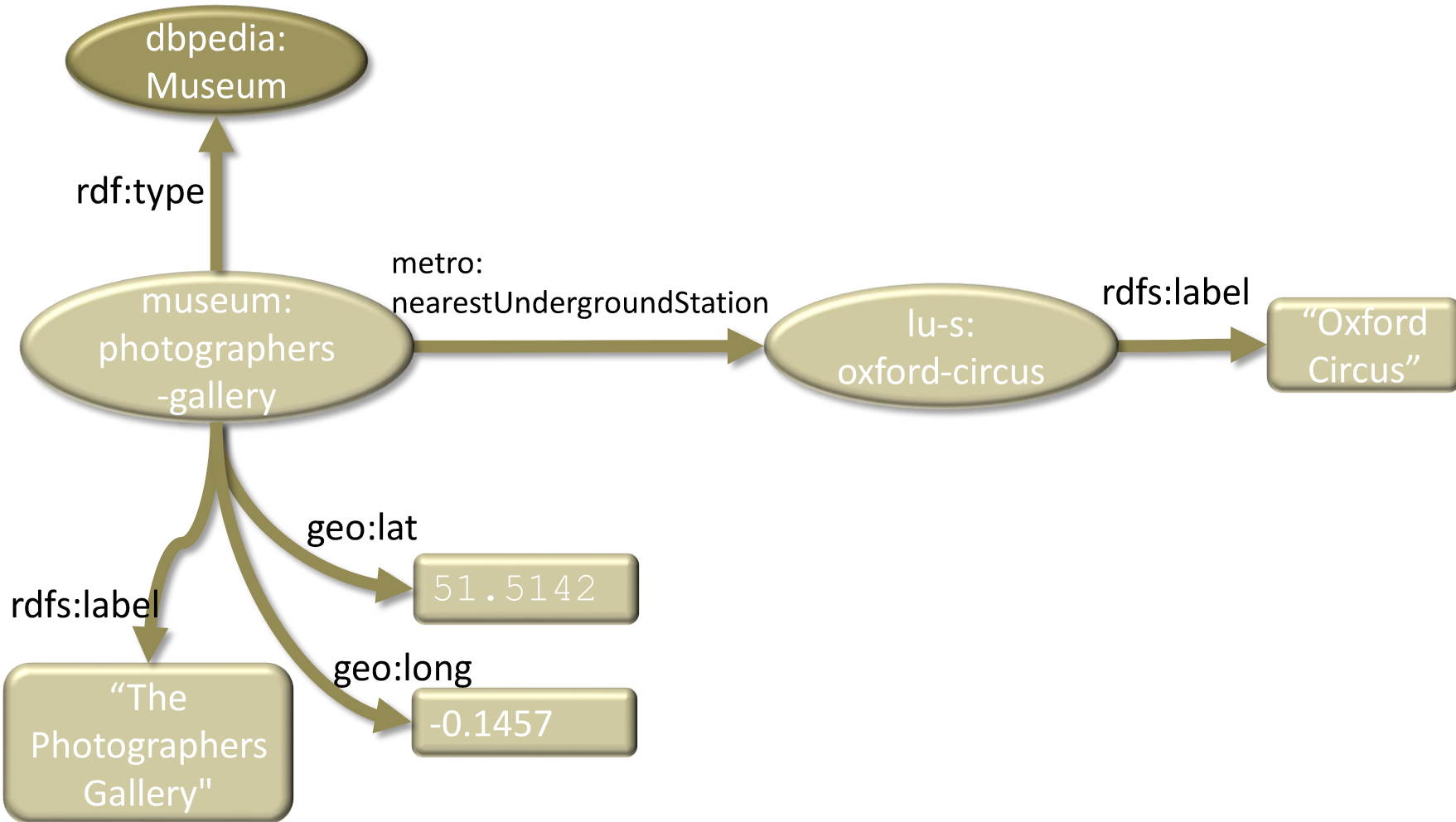
Exercise – 5 minutes

- As London Transport Draw a bubble and arc diagram for Tube station data
- Given London Transport have published their data, draw a bubble and arc diagram for the tourist information data

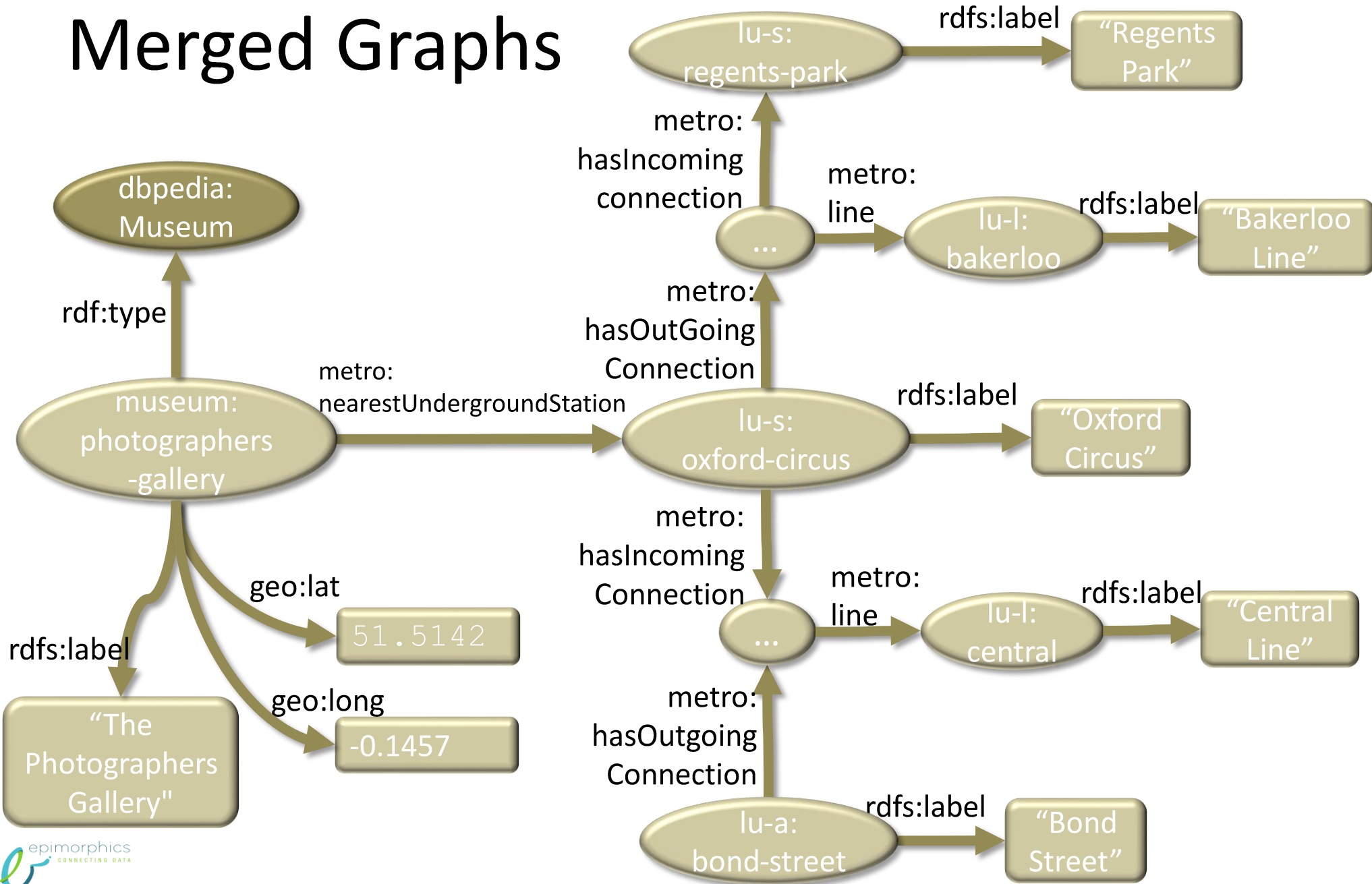
Partial Solution Tube Network



Partial Solution Points of Interest



Merged Graph

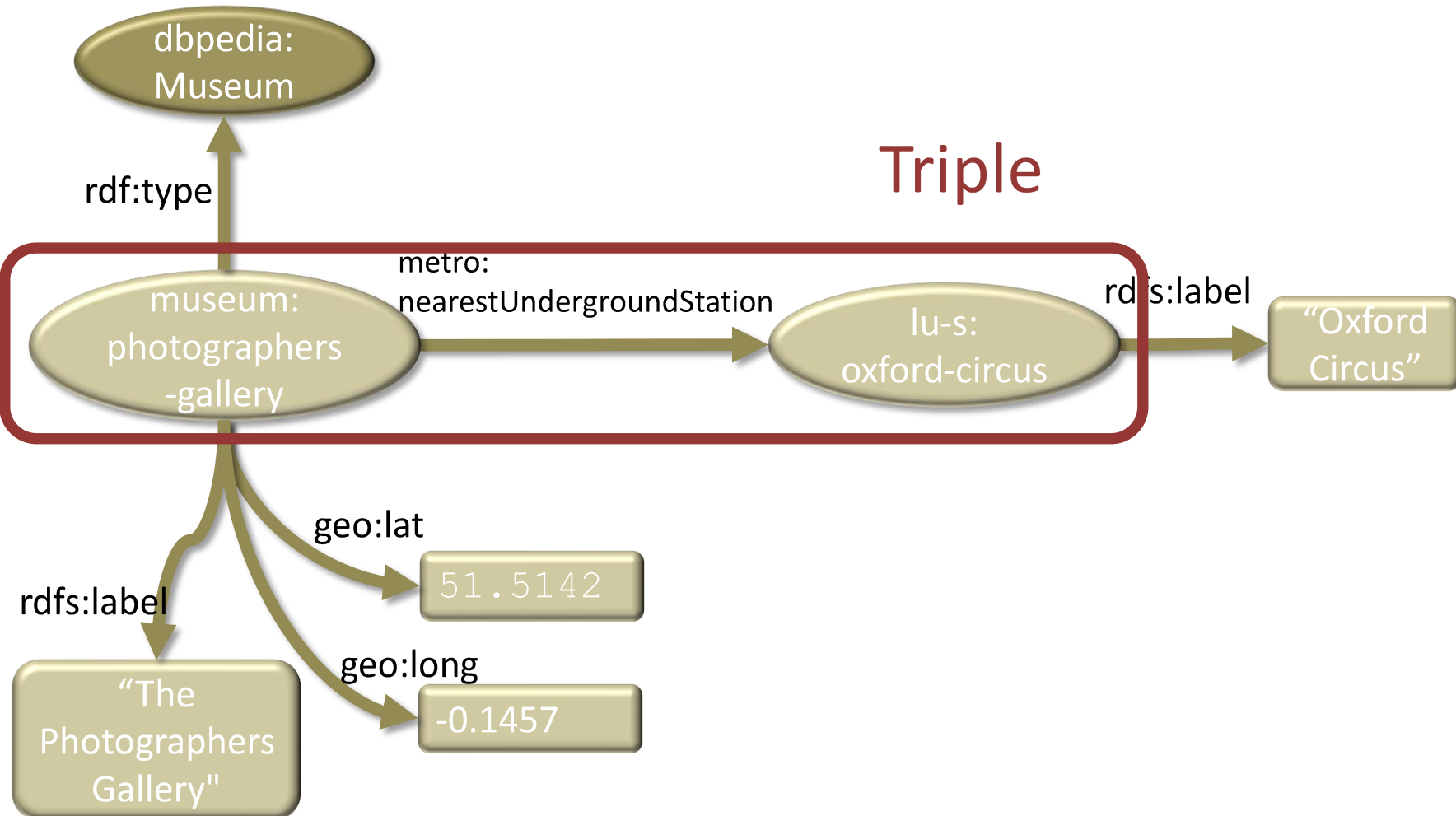


Two ways to exploit this feature

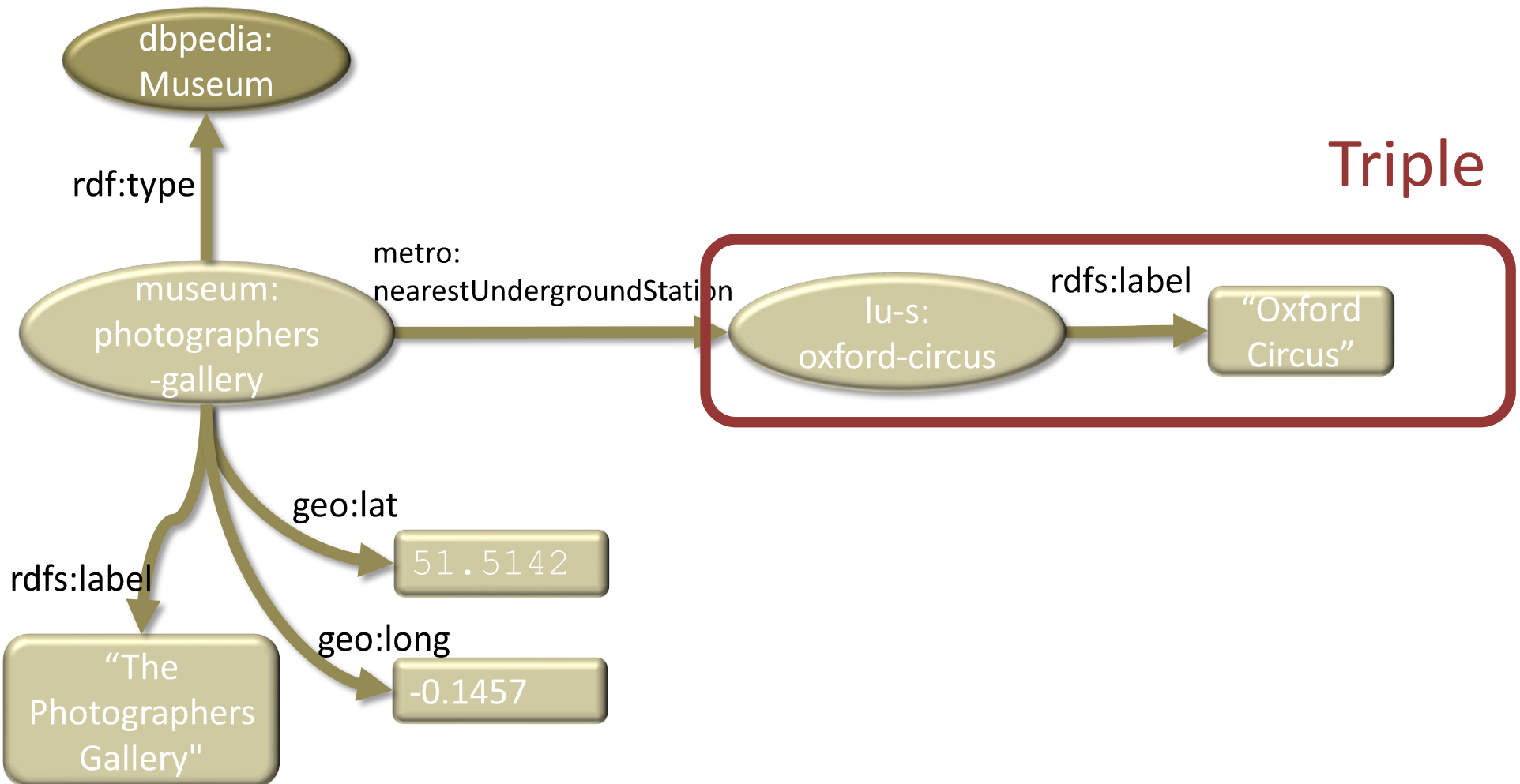
- **Data integration**
 - pull one set of data from London Transport into a store
 - pull another set of from tourist information into the same store
 - And two datasets just link up and integrate
 - Can be as simple as just concatenating two text files
- **Follow your nose**
 - pull some data from one data source
 - execute HTTP GET on the URIs you find in the data

A little terminology

Triple

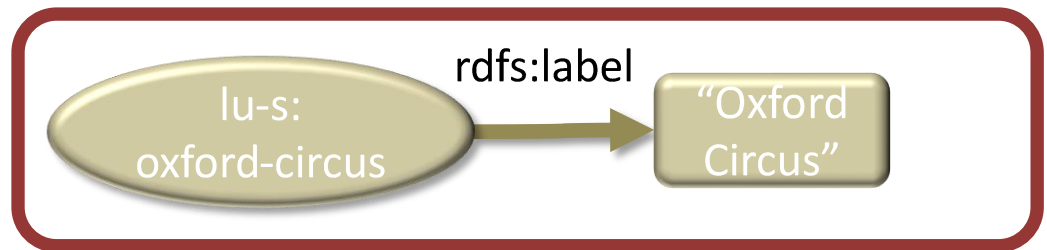


Another Triple



how would we write a triple down?

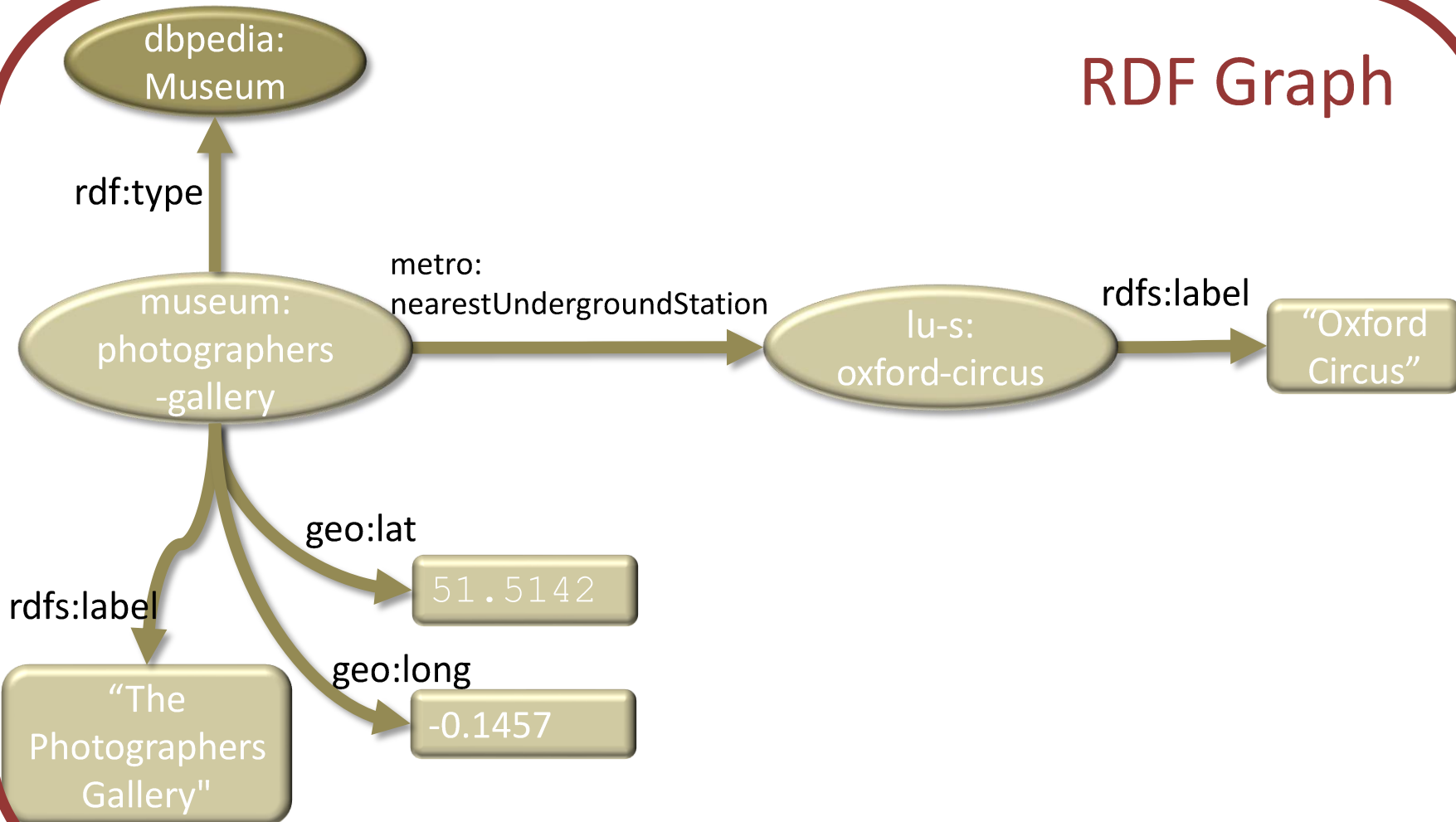
Triple



Subject	Predicate	Object
lu-s:oxford-circus	rdfs:label	“Oxford Circus”

RDF Graph

RDF Graph



How would we write a whole graph?

Subject	Predicate	Object
museum:photographers-gallery	rdfs:label	"Photographers Gallery
museum:photographers-gallery	geo:lat	51.5142
museum:photographers-gallery	geo:long	-0.1457
museum:photographer-gallery	rdf:type	dbpedia:Museum
museum:photographers-gallery	metro:nearestUndergroundStation	lu-s:oxford-circus
lu-s:oxford-circus	rdfs:label	"Oxford Circus"

```

museum:photographers-gallery      rdfs:label      "photographers
Gallery"
    ;
    ;
    ;
    ;
    .
lu-s:oxford-circus                rdfs:label      "oxford circus" .

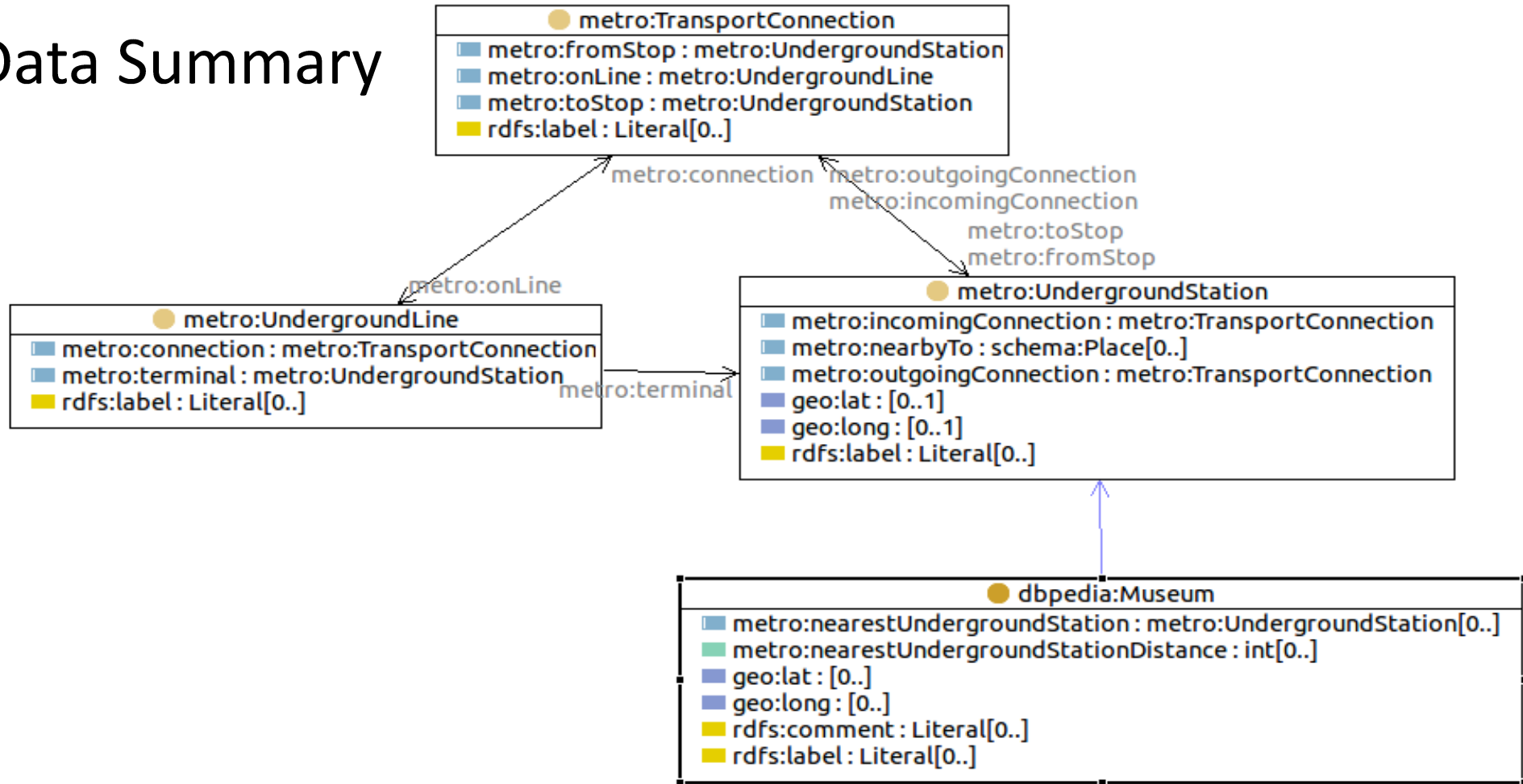
```



The Open World Assumption

- The RDF data model is an OPEN model
- You can always extend a graph
 - add new properties to a resource
 - add more resources
- When processing RDF, the general assumption is that there may be more data 'out there'
- List all the resources with a `dct:title` property?
 - you can't – you can list the ones in your database but there may be more
- In practice applications will often 'close the world'
 - i.e. assume that the data available is complete enough
 - e.g. do we have a customer called 'Klaus'?

Data Summary



plus also owl:sameAs link to DBPedia

http://training.epimorphics.com/transport/london-underground/station/russell_square

http://training.epimorphics.com/transport/london-underground/line/piccadilly_line

http://training.epimorphics.com/transport/london-underground/connection/piccadilly_line/acton_town/ealing_common

http://training.epimorphics.com/culture/london/museum/British_Museum

Questions?



www.epimorphics.com

