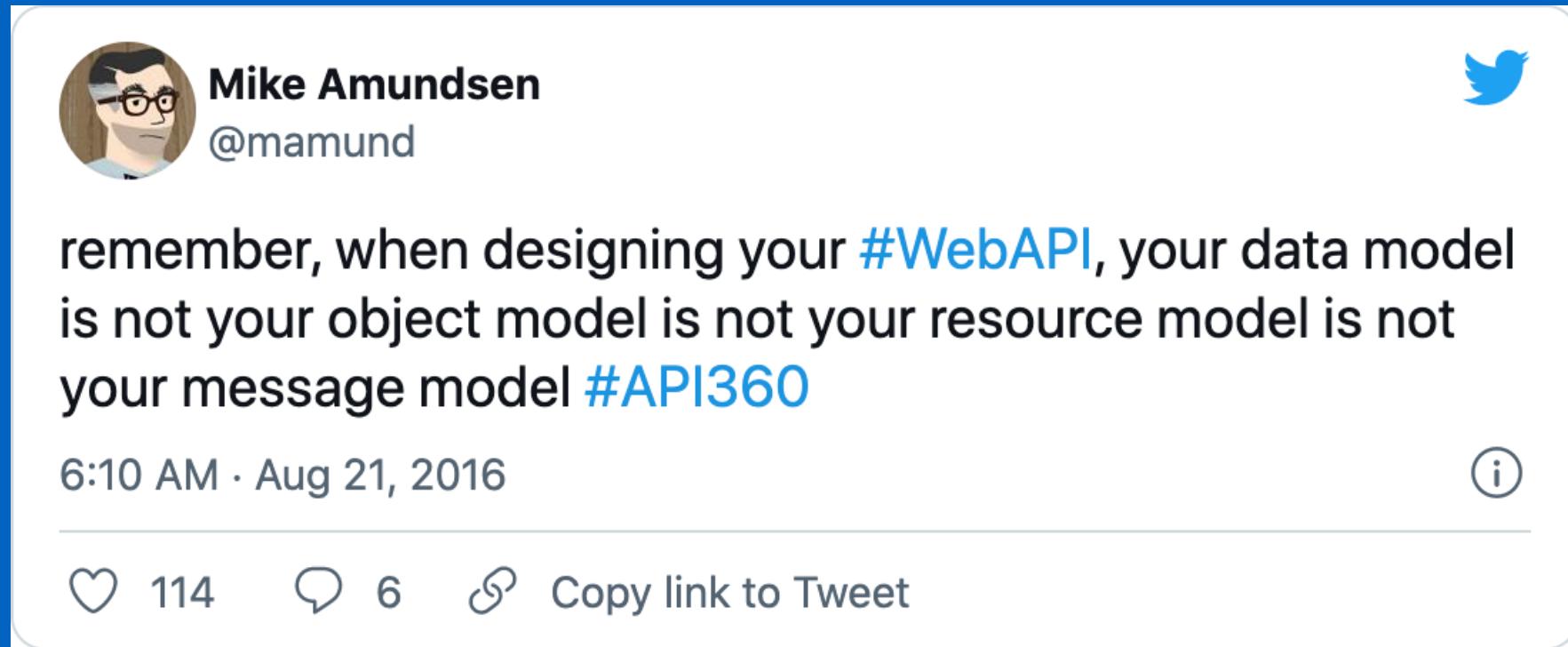


Your API is Your API is Your API

Or is it? Amundsen



A screenshot of a Twitter post by Mike Amundsen (@mamund). The post contains the following text:

remember, when designing your [#WebAPI](#), your data model
is not your object model is not your resource model is not
your message model [#API360](#)

The post was made at 6:10 AM · Aug 21, 2016. It has 114 likes, 6 replies, and a retweet icon. There is also a "Copy link to Tweet" button.

Amundsen <https://twitter.com/mamund/status/767212233759657984>

First, history

Where APIs come from?

Paul Baran's Networks Barabasi

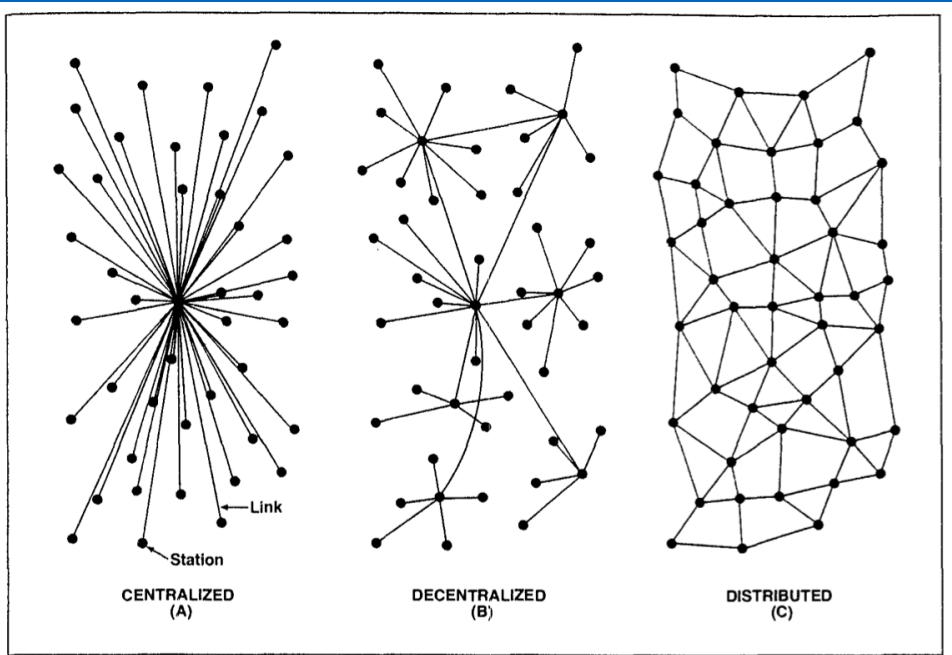


Figure 11.1 Paul Baran's Networks. In 1964, Paul Baran began thinking about the optimal structure of the Internet. He suggested that there were three possible architectures for such a network—centralized, decentralized, and distributed—and warned that both the centralized and decentralized structures that dominated communications systems of the time were too vulnerable to attack. Instead, he proposed that the Internet should be designed to have a distributed, mesh-like architecture. (Reproduced with permission of Paul Baran.)

Barabasi **Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life**

Fieding's Disseratation ^{Fielding}

Fielding's dissertation is not about how to build APIs on top of HTTP but rather about HTTP itself.

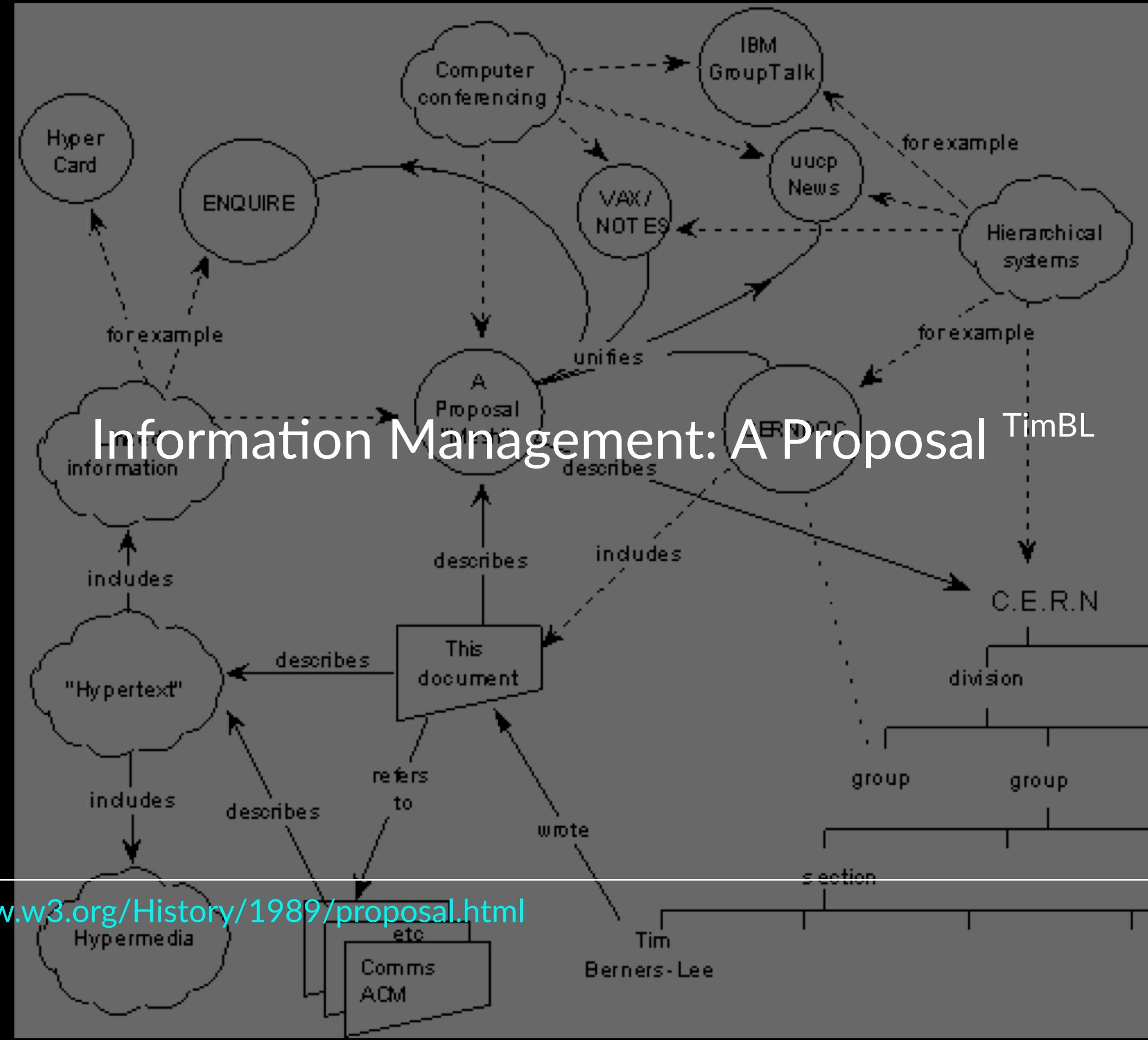
– *Sinclair Target* ^{Target}

Fielding Architectural Styles and the Design of Network-based Software Architectures

Target Roy Fielding's Misappropriated REST Dissertation

TimBL <https://www.w3.org/History/1989/proposal.html>

Tim
Berners-Lee



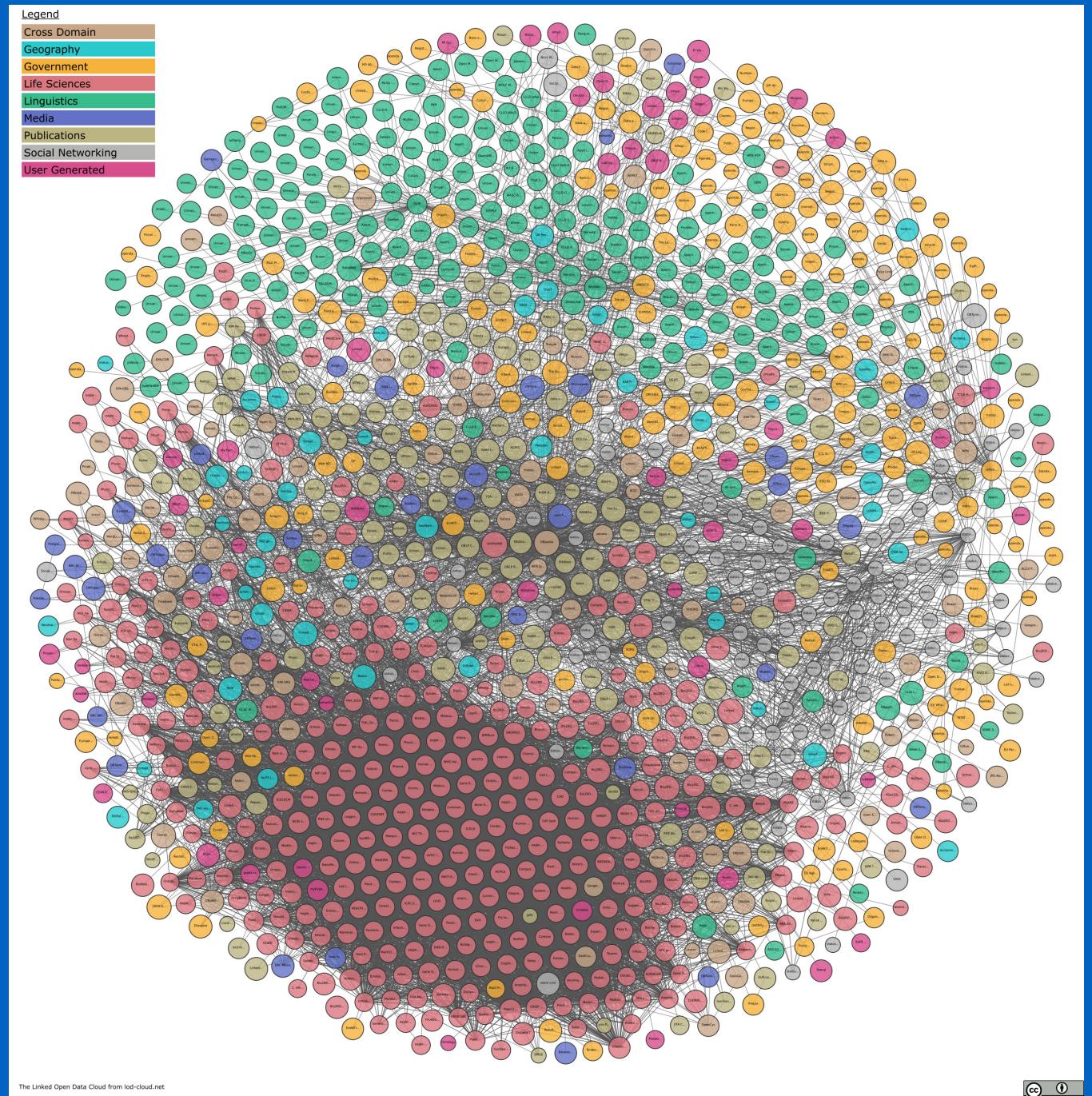
Everything is a resource
if you're brave enough

Linked Data

Linked Open Data Cloud (lod-cloud.net)

As of May 2020 the dataset contained
1301 datasets with **16283** links.

Grouped in **9** categories.



5-star Linked Data TimBL-LD



TimBL-LD <https://www.w3.org/DesignIssues/LinkedData.html>

So what are APIs?

Examples



Data as a resource

```
{  
  "@context": {  
    "bus": "https://bus.name/vocab#",  
    "dbo": "http://dbpedia.org/ontology/",  
    "schema": "http://schema.org/",  
    "skos": "http://www.w3.org/2004/02/skos/core#"  
  },  
  "@id": "/registration/2016/06/mza-warszawa",  
  "@type": "/api/Registration",  
  "bus:owner": {  
    "@id": "/company/mza-warszawa"  
  },  
  "bus:vehicle": {  
    "skos:prefLabel": "Solaris Urbino 12 CNG",  
    "schema:numberOfAxles": 2  
  },  
  "dbo:number": 4,  
  "skos:prefLabel": "Sample registration"  
}
```

A bus registration ^{reg}

- identified by an URI (**@id**)
- links to its type
(api/Registration)
- links to other resources
(company/mza-warszawa)
- uses unambiguous property names
(https://bus.name/vocab#vehicle)
- uses shared vocabulary terms
(prefLabel, numberOfAxles)

^{reg} <https://tinyurl.com/ahc9b2c>

Class as a resource



```
[{  
  "@context": {  
    "skos": "http://www.w3.org/2004/02/skos/core#",  
    "schema": "http://schema.org/",  
    "wikidata": "http://www.wikidata.org/entity/"  
  },  
  "@id": "/company/mza-warszawa",  
  "@type": "/api/Owner",  
  "skos:prefLabel": "Miejskie Zakłady Autobusowe",  
  "schema:location": { "@id": "wikidata:Q270" }  
}, {  
  "@context": {  
    "rdfs": "http://www.w3.org/2000/01/rdf-schema#",  
    "schema": "http://schema.org/"  
},  

```

Owner class class

- identified by URI
- uses shared vocabulary terms
**(rdfs:Class,
schema:Organization)**
- class hierarchy expressed as links
(rdfs:subClassOf)

class <https://tinyurl.com/3zrcv2sr>

Data model as a resource



```
{  
  "@context": {  
    "dbo": "http://dbpedia.org/ontology/",  
    "rdfs": "http://www.w3.org/2000/01/rdf-schema#",  
    "@vocab": "http://www.w3.org/ns/shacl#",  
    "xsd": "http://www.w3.org/2001/XMLSchema#"  
  },  
  "@id": "/api/Registration",  
  "@type": ["rdfs:Class", "NodeShape"],  
  "property": [{  
    "path": "skos:prefLabel",  
    "maxCount": 1  
  }, {  
    "path": "dbo:number",  
    "minCount": 1,  
    "maxCount": 1,  
    "datatype": "xsd:integer"  
  }]  
}
```

Shape of Registration resources shacl

- SHACL Shapes Constraint Language
 - W3C Vocabulary
 - <https://w3.org/tr/shacl>
 - Described graph data structures
 - Validation rules
 - Many other use cases
 - Easily extensible

shacl <https://tinyurl.com/v7vkeuj8>

Hypermedia as a resource



```
{  
  "@context": {  
    "@vocab": "http://www.w3.org/ns/hydra/core#",  
    "schema": "http://schema.org/",  
    "code": "https://code.described.at/"  
  },  
  "@id": "/api",  
  "@type": "ApiDocumentation",  
  "supportedClass": {  
    "@id": "/api/Registration",  
    "supportedOperation": {  
      "@id": "/api/Registration/Put",  
      "@type": "schema:UpdateAction",  
      "method": "PUT",  
      "expects": { "@id": "/api/Registration" },  
      "code:implementedBy": {  
        "@type": "code:EcmaScript",  
        "code:link": { "@id": "node:lib/registration/update.js" }  
      }  
    }  
  }  
}
```

Hydra W3C Community Group hydra

- describes APIs with RDF
- like OpenAPI but discovered at runtime
(HTTP Link header)
- provides possible state transitions (among other things)

hydra <https://tinyurl.com/24tku578>

Access Control as a resources



```
{  
  "@context": {  
    "@vocab": "http://www.w3.org/ns/auth/acl#"  
  },  
  "@id": "/api/auth/write-registrations",  
  "@type": "Authorization",  
  "agentGroup": {  
    "@id": "/group/data-owners"  
  },  
  "mode": { "@id": "Write" },  
  "accessToClass": {  
    "@id": "/api/Registration"  
  }  
}
```

Basic Access Control ontology ^{acl}

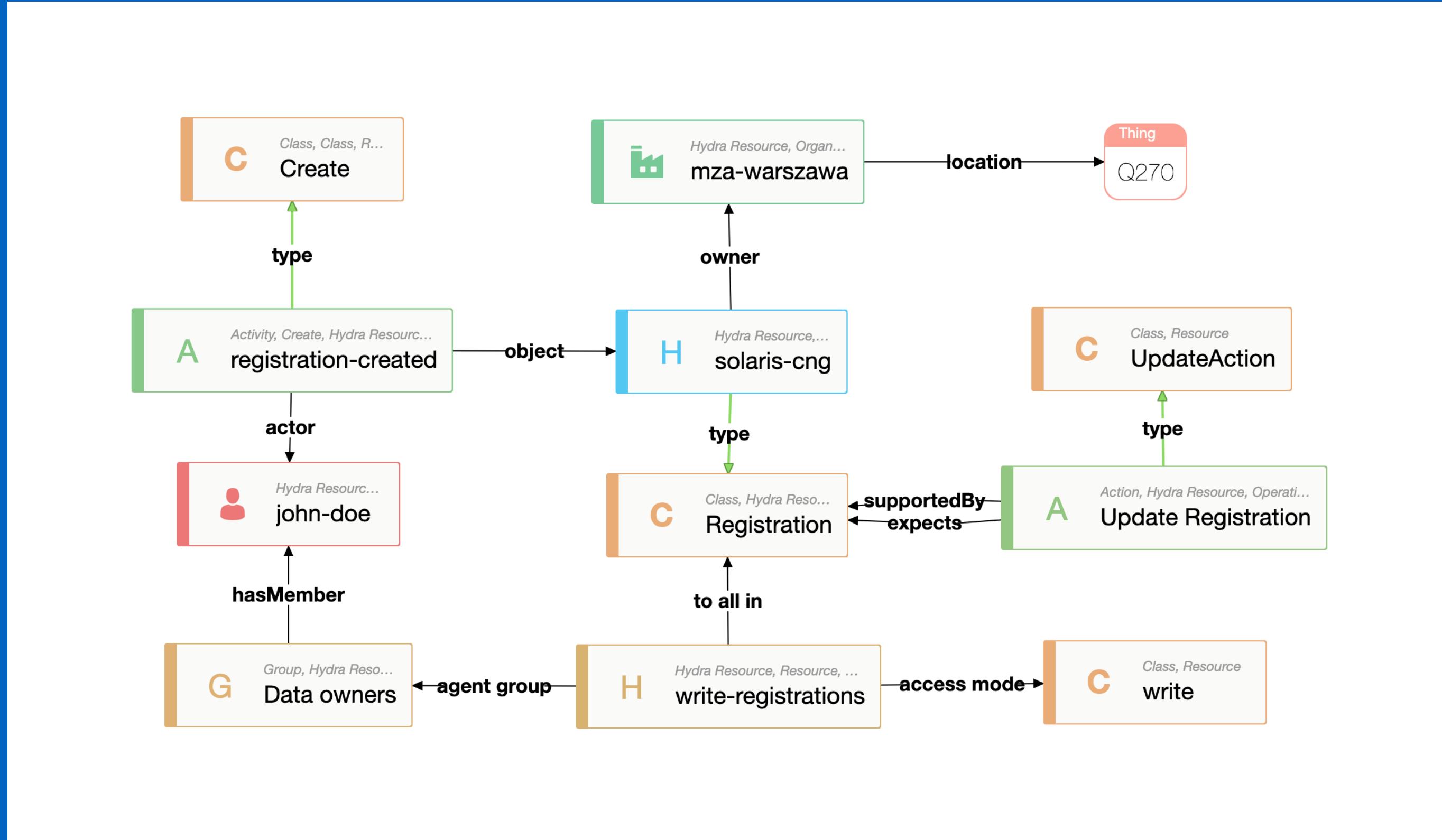
- Another shared vocabulary
- Started by Tim Berners-Lee
- Now part of SOLID Project

^{acl} <https://tinyurl.com/2ekfmhrb>

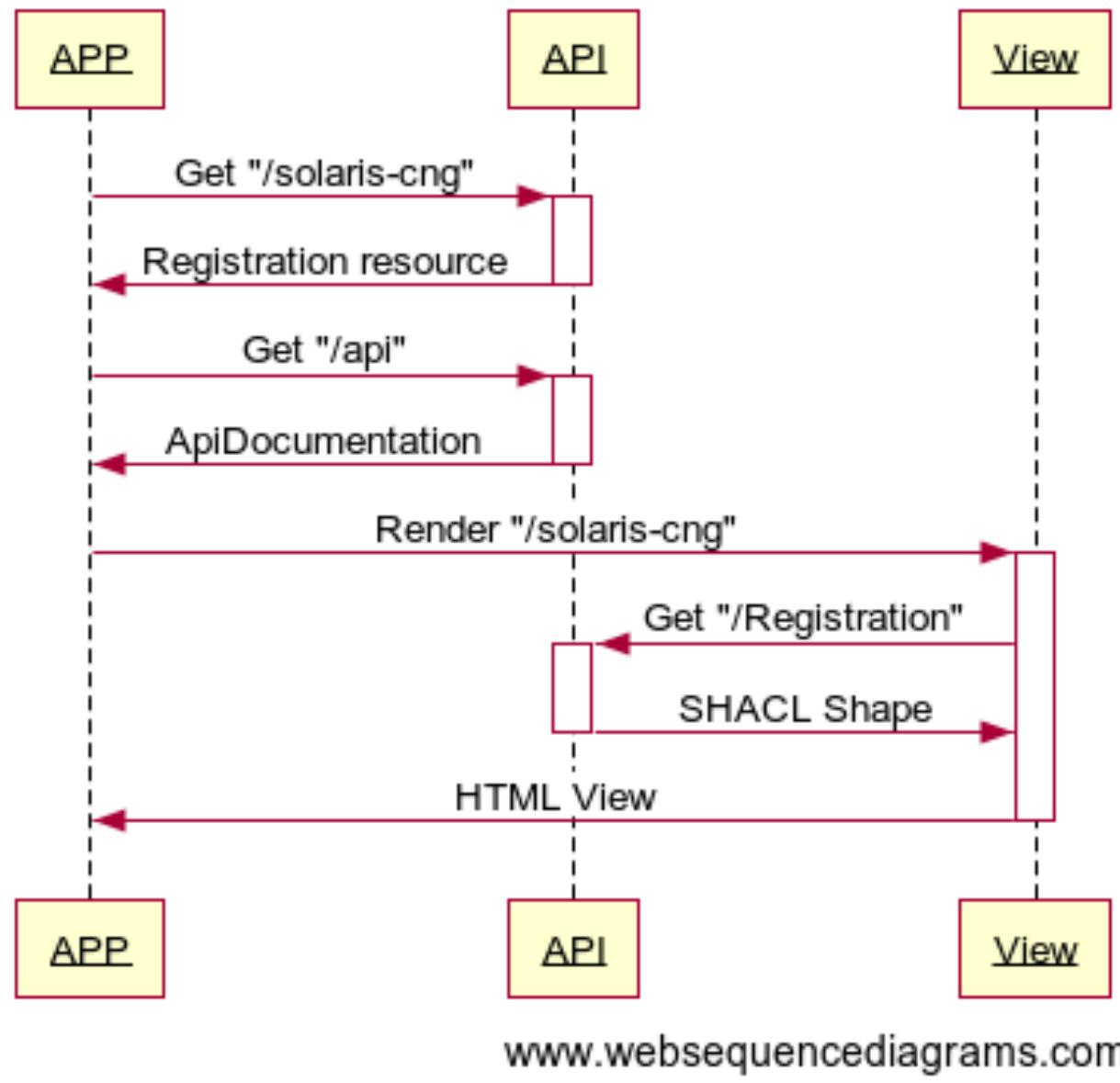
SaaS is dead. Long live...

Software as a Resource?

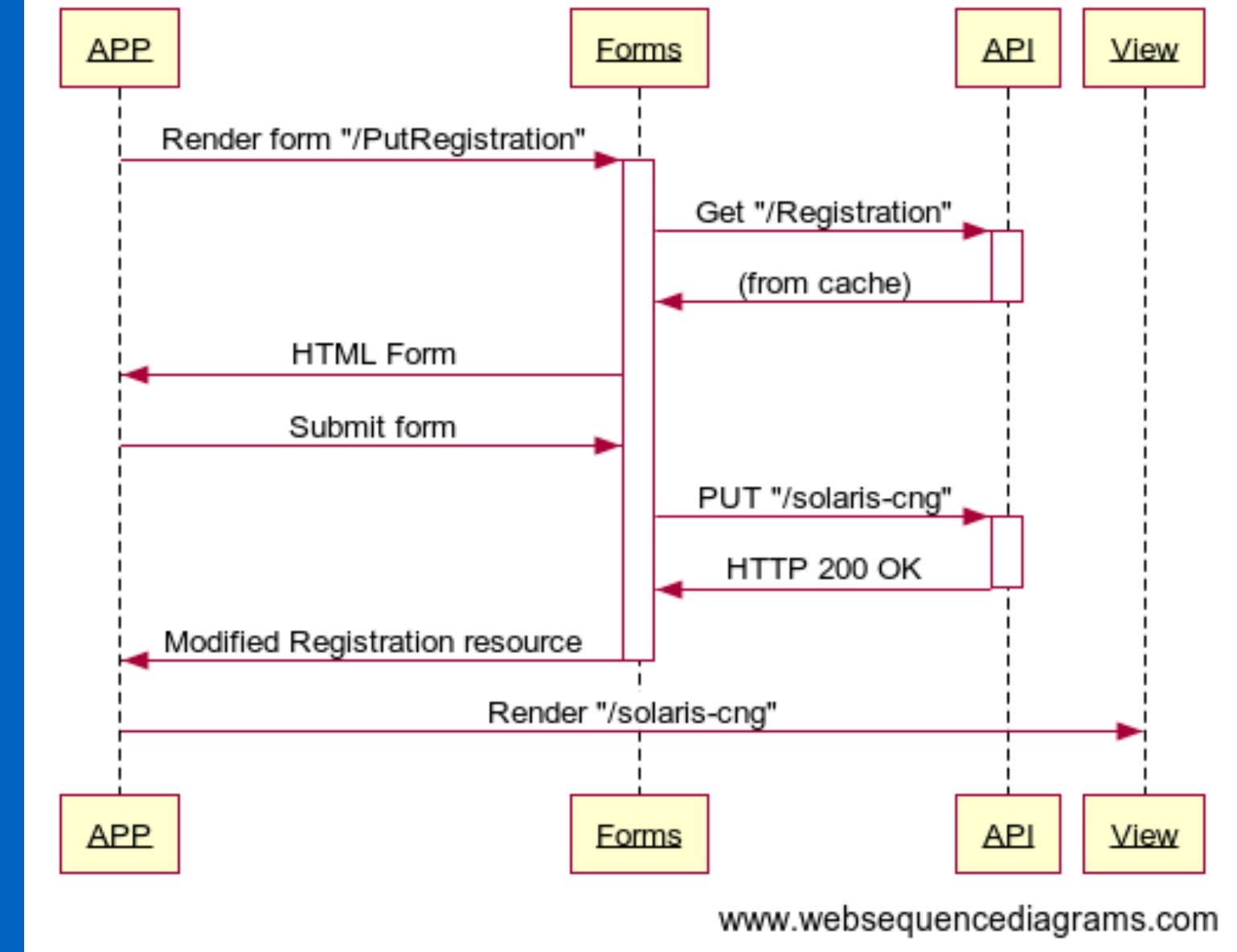
Resource as a Service?



Render View



Render Form





Why?

- Discoverability
- Evolvability
- Longevity

Data is self-describing and does not rely on an application for interpretation and meaning.

*– Data-Centric
Manifesto^{manifesto}*

manifesto <http://www.datacentricmanifesto.org>

Resources (no pun intended)

This presentation: tpluscode@github/presentations/nordic-apis-live-hypermedia

- Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life
- What does the history of the web tell us about its future?
- Roy Fielding's Misappropriated REST Dissertation
- Architectural Styles and the Design of Network-based Software Architectures
- Information Management: A proposal
- Linked Open Data Cloud
- Linked Data Stars
- Data-Centric Manifesto
- Resource Description Framework
- SKOS Simple Knowledge Organization System
- schema.org
- SHACL Shapes Constraint Language
- Wikidata
- Hydra W3C Community Group
- Basic Access Control ontology
- SOLID Project