

THE NON-EXISTING LOD CLOUD

AND HOW IT COULD FINALLY BE (RE-)CREATED

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About myself: proud member of the Pedantic Web group (ranting unsuccessfully about Linked Data Quality) since 2009 ...

Welcome to the Pedantic Web Group



[pe-dan-tic /pə'dæntɪk/](#)

overly concerned with formal rules and trivial points of learning

Your data is broken.

You publish RDF data on the web, and thereby contribute to our shared passion: the emerging global information space that we call the web of data. Thank you for that! Thank you for sharing your data!

But your data is broken. Syntax errors, unescaped characters, encoding problems, broken links, ambiguous identifiers, undefined vocabulary terms, mismatched semantics, unintended inferences: If you publish anything on the web of data, chances are that there is some problem.

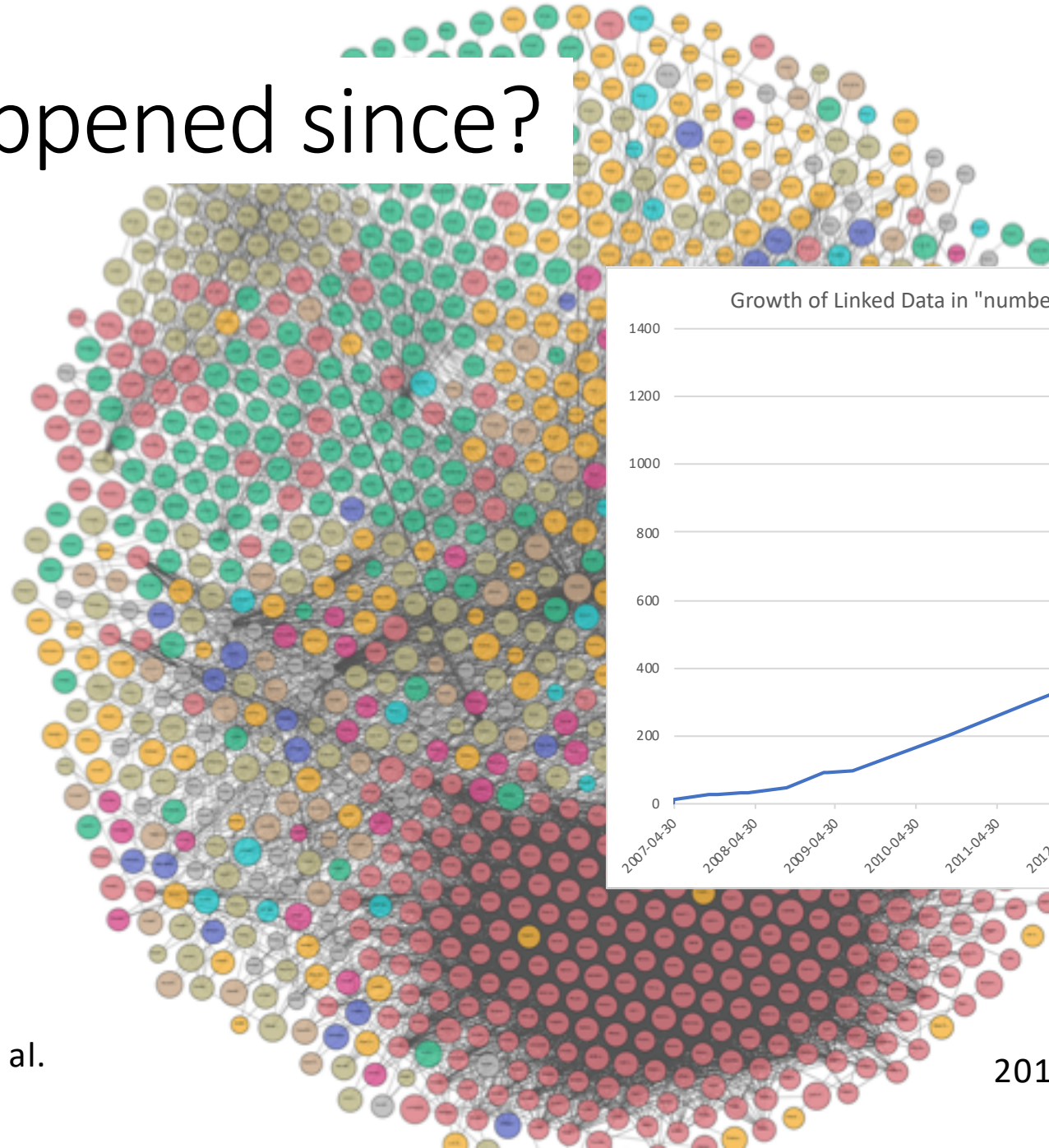
A presentation slide with a green background featuring a network diagram and the words "global", "knowledge", and "intelligent". The slide title is "Linked Broken Data?" by Dr Axel Polleres, Digital Enterprise Research Institute, National University of Ireland, Galway. It mentions joint work with Aidan Hogan, Andreas Harth, Renaud Delbru, Giovanni Tummarello, and Stefan Decker. Logos for DERI, OÉ Gaillimh NUI Galway, and SFI are visible. The slide footer includes "© Copyright 2009 Digital Enterprise Research Institute. All rights reserved." and "www.deri.ie".

Linked Data - The four holy commandments:

Linked Data Principles

- **LDP1:** use URIs as names for things
- **LDP2:** use HTTP URIs so those names can be dereferenced
- **LDP3:** return useful – RDF? – information upon dereferencing those URIs
- **LDP4:** include links using externally dereferenceable URIs.

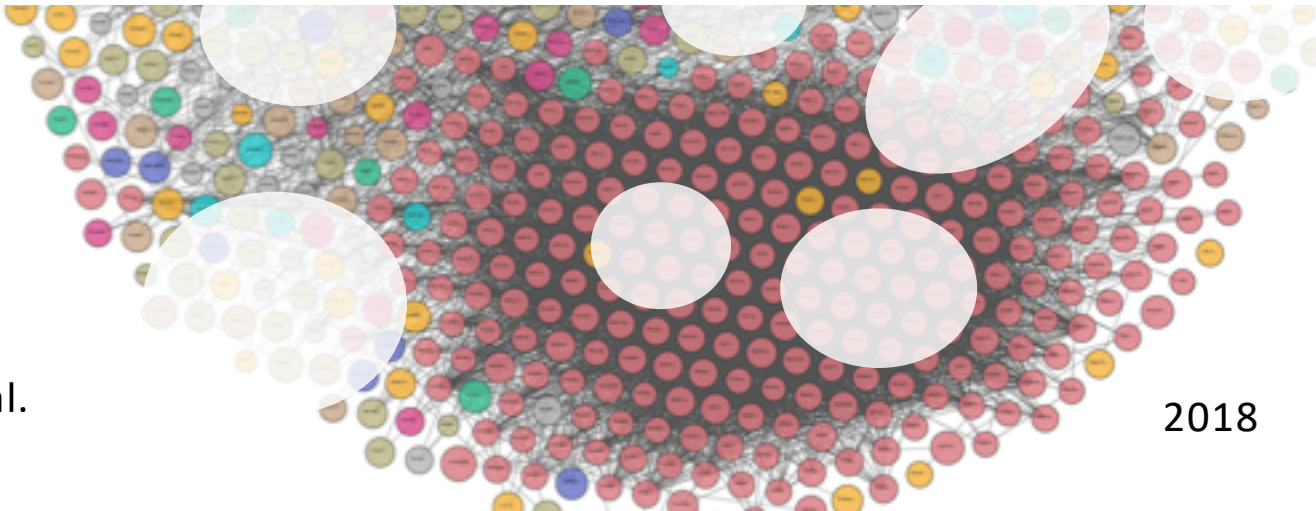
What happened since?



What **really** happened since?



Among the mentioned **5435** resource URLs in the 1281 "LOD"-tagged datasets on **old.datahub.io** there are **only 1917** resources URLs that could be dereferenced. Among all the datasets **only 646 dataset descriptions** contain such dereferenceable (not counting links to PDF, CSV, TSV files) resource URLs; i.e., **almost half, 635 dataset descriptions contain no dereferenceable resource URLs** that would point to data at all 😞



Not only our datasets, but also our services and tools disappear...

ソフトバンク光の転用について

ソフトバンク光の転用について

フレッツ光からソフトバンク光に転用を検討中の方は必見、実際の体験談を交えてわかりやすくそのしくみや手続きを紹介しします。何かと賛否が分かれるソフトバンク光への転用の現実を知ってスカッとしちゃいましょう

[トップページ](#) > ソフトバンク光の転用について

ソフトバンクのスマホを手に入れたのでついには自宅のネットもソフトバンク光に、なんて人は多いでしょう。スマホとのセット割でオトクに使えることはわかるんだけど、手続きのことや料金・回線速度や安定感、またサービス面やキャンペーンなども気になりますよね。

そんな訳で今回は、実際フレッツ光からソフトバンク光に転用した私（筆者：以下省略）自身の体験談を交えて、そのしくみやメリットデメリットを盛り込みながら転用へのモヤモヤをイッキに解決しちゃいます。

そもそもソフトバンク光に転用とは？

Still there is hope! Brave PhD candidates defend and “stitch” the Web of Data!

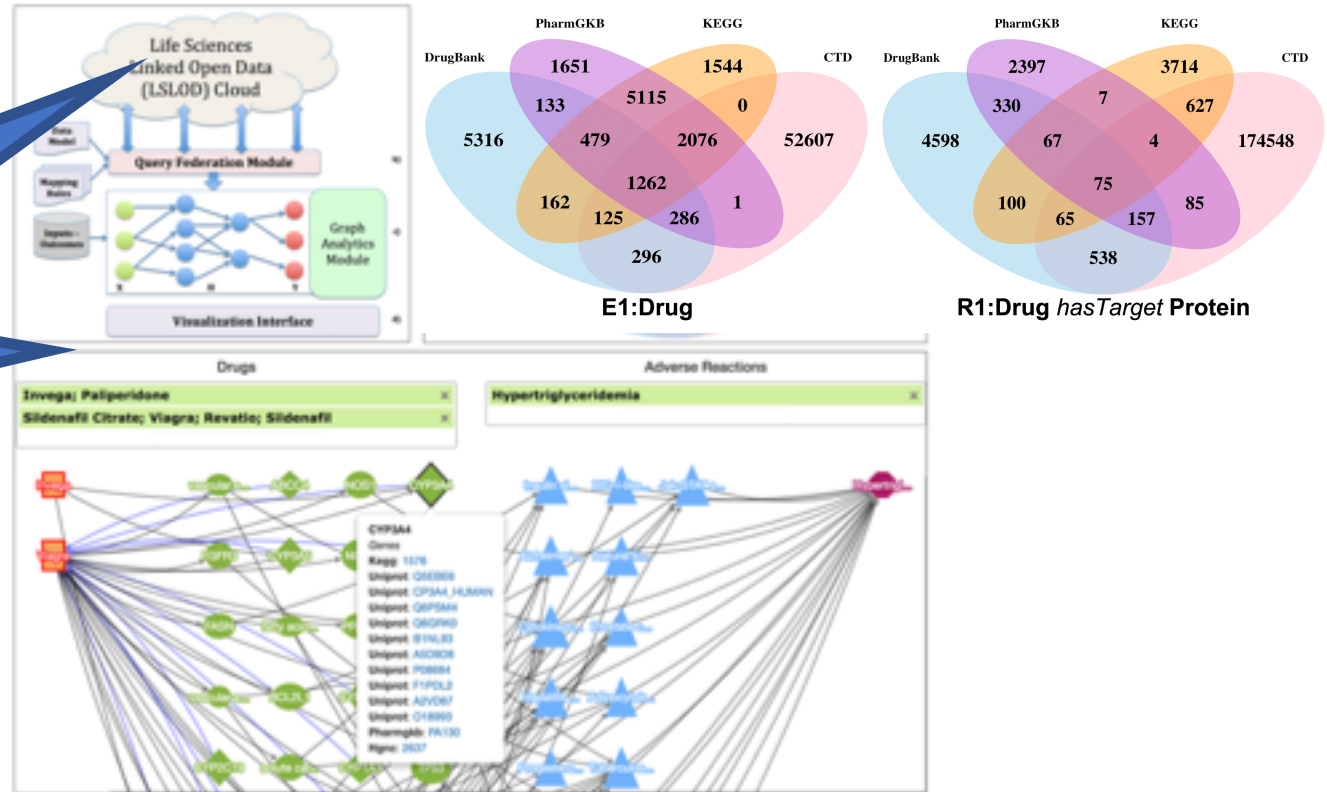


***Phlegra
Spiderman***



What did Maulik solve in his PhD?

Advances in Drug Repurposing through the integration of different LOD sources!

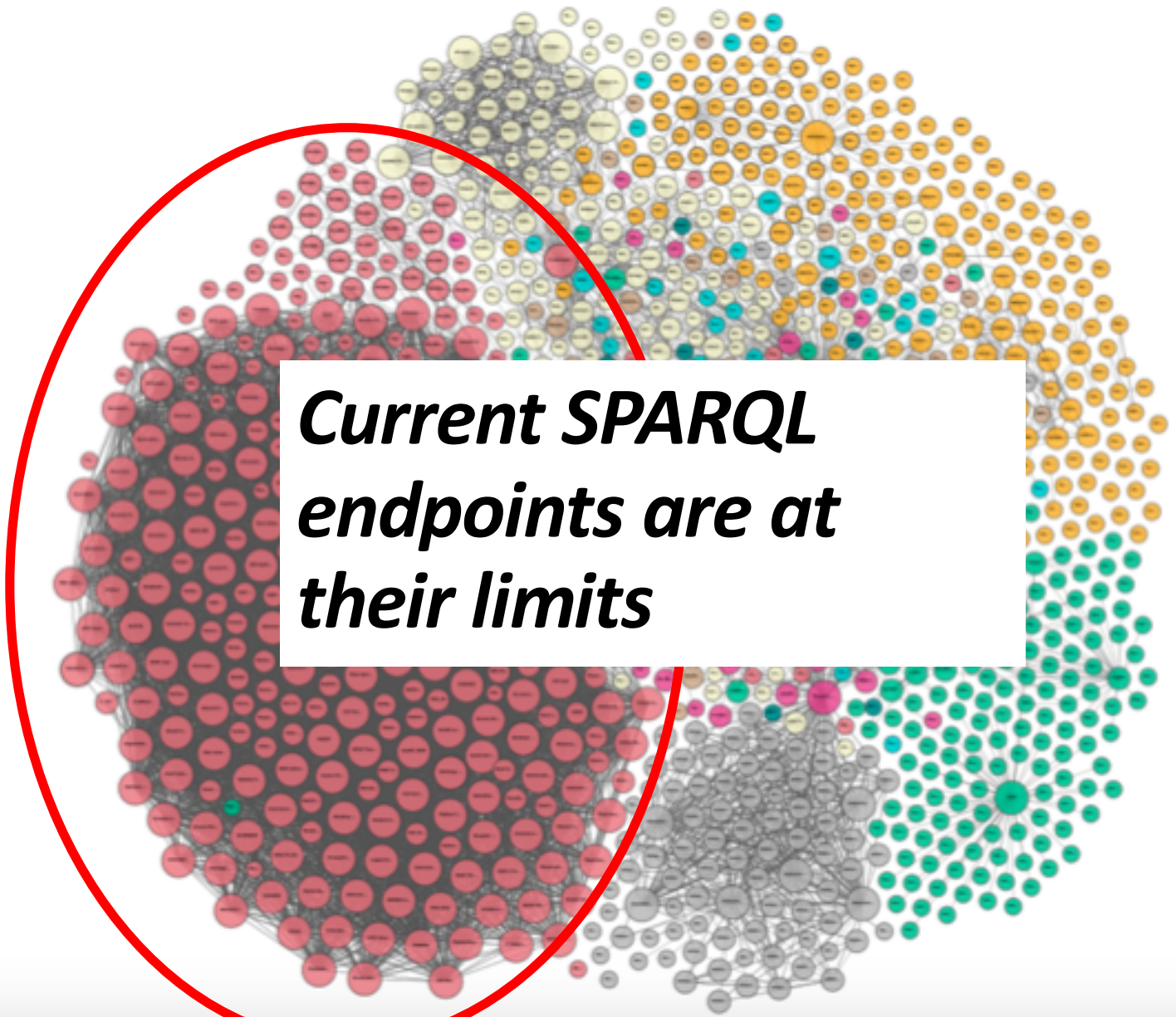


- **Good news:** Great use cases out there for Linked Data applications!
- **Bad news:** needs a superhero with a PHD to “stitch” & integrate the Web of data

Some concrete challenges...

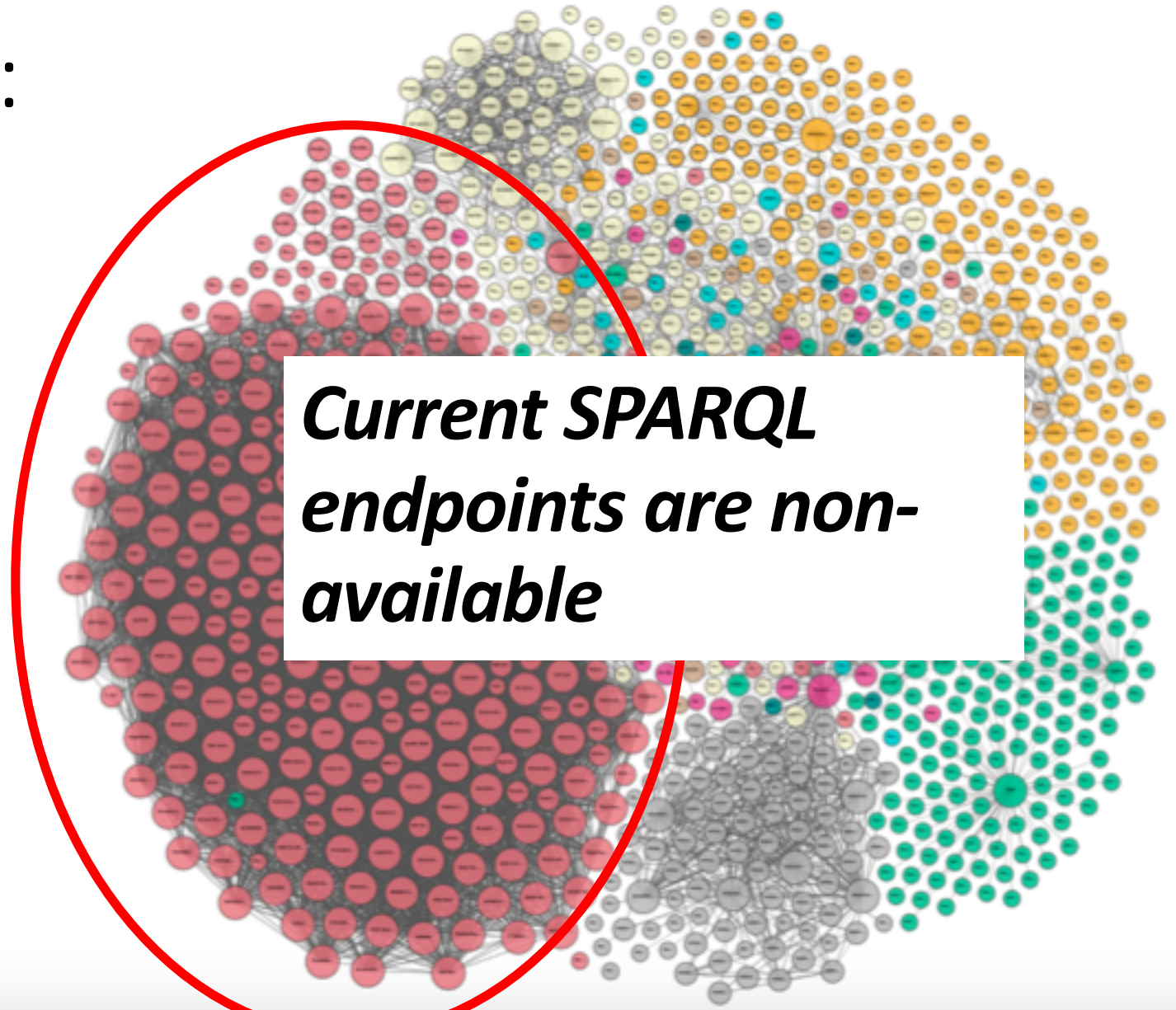
Current LOD Cloud:

- Challenge 1: Size
 - single datasets (e.g. Pubmed dump has 7b triples, Wikidata [ttl.gz dump](#) +30GB, 5.7b triples)
→ bigger than a significant rest of the LOD cloud (whole LOD-a-lot experiment 28b triples)
 - Current Triple stores scale probably up to ~20-30b?
 - But:
 - Provide significant bottlenecks in access (e.g. limits for timeouts in wikidata query-services)
 - Bio2RDF endpoint has only ~1b triples
 - Where's the rest??



Current LOD Cloud:

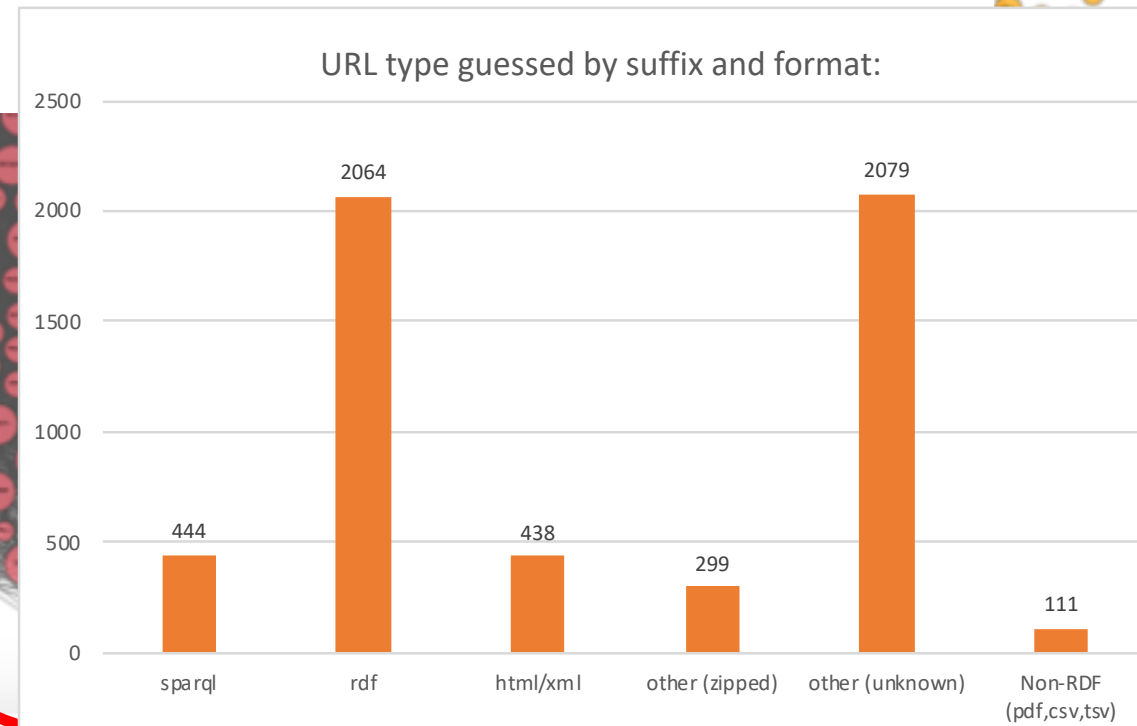
- Challenge 2: SPARQL endpoints availability and limit:
 - <http://pubchem.bio2rdf.org/sparql> is down
 - <http://pubmed.bio2rdf.org/sparql> redirects to
 - <http://download.bio2rdf.org/#/current/pubmed/>
 - cf. also: <http://sparqlles.ai.wu.ac.at/>
- Better try dumps?



Current LOD Cloud:

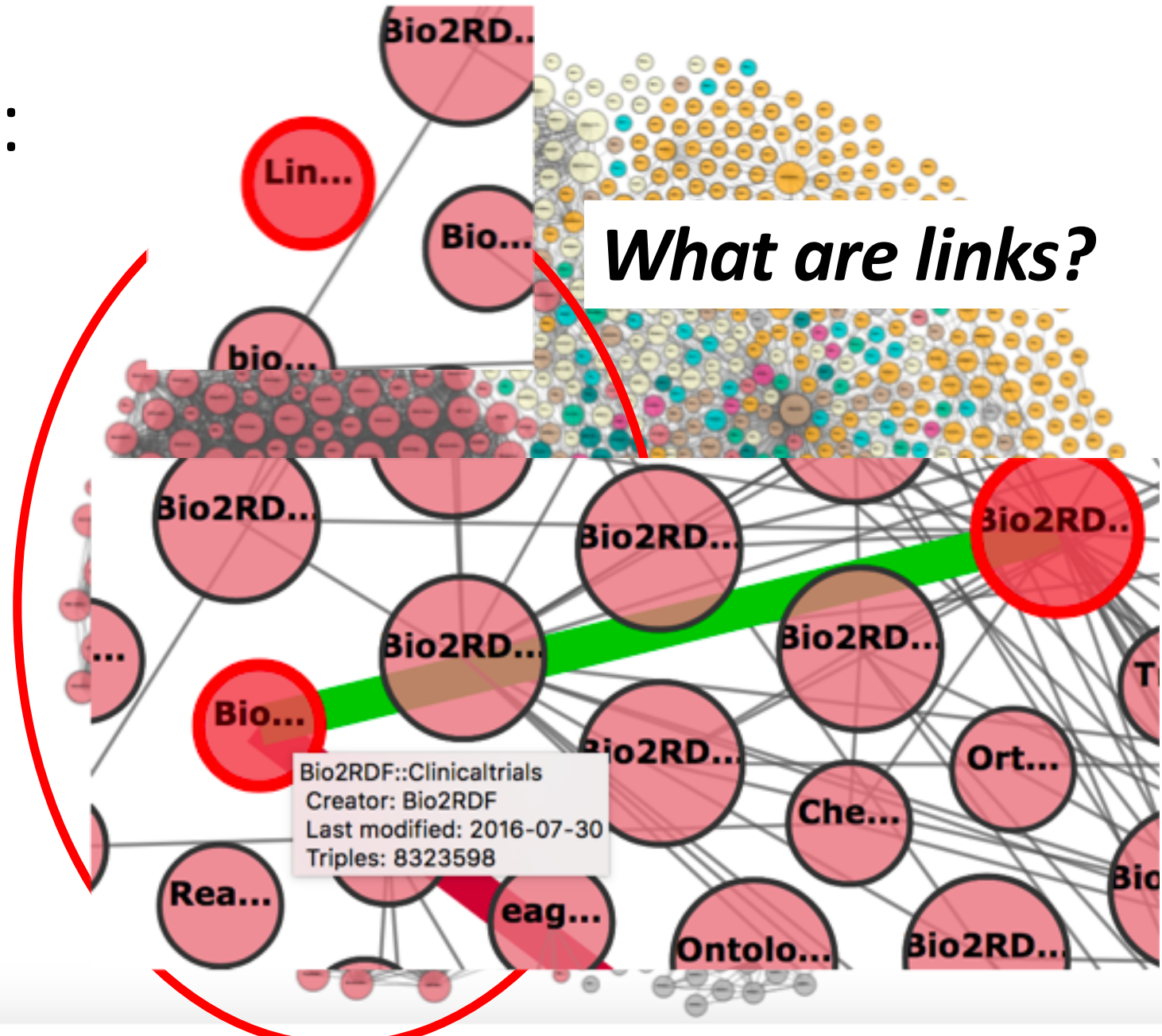
- Challenge 3: APIs not uniformly findable
 - Dumps not easily accessible
 - <http://download.bio2rdf.org/#/current/publicmed/>
 - Javascript page which can only be crawled with a headless browser
 - <https://www.ebi.ac.uk/rdf/datasets/#BulkDownloads> →
 - Bulk download links as result of [SPARQL queries](#) against VOID descriptions, e.g.
 - <ftp://ftp.ebi.ac.uk/pub/databases/RDF/biomodels/r31/biomodels-rdf.tar.bz2>
 - Various compressions used, etc.
 - SPARQL service description vocabulary does NOT have an attribute for pointing to alternative dumps or proper description of limitations imposed

Current SPARQL endpoints don't provide metadata nor point to accessible dumps and ... too many formats:



Current LOD Cloud:

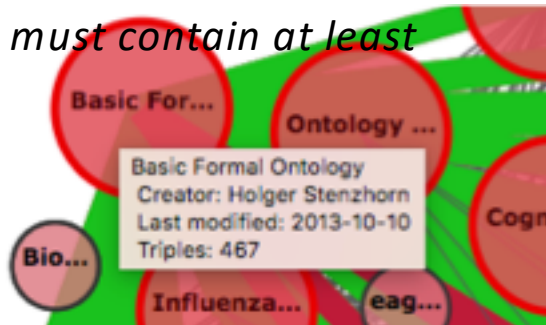
- Challenge 4: What do Links in LOD cloud actually mean?
 - What are in-links/out-links?
 - Computed from meta-data on datahub.io
 - But description is ambiguous:
 - **Definition**: “either your dataset must use URIs from the other dataset, or vice versam”
- What does it actually mean?
 - Ontology reuse?
 - Instance Links?
 - Joint reuse of entities from 3rd dataset?
 - Who does a namespace belong to?



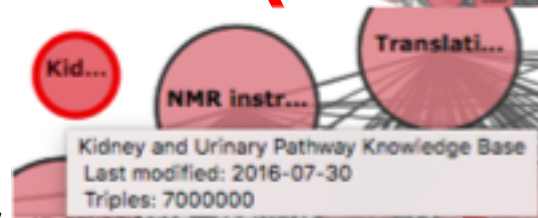
Current LOD Cloud:

- Challenge 5: Completeness/consistency
- Well known RDF datasets missing
 - E.g. EBI RDF not there (plus around 10 other well known Bio data bases), or even [wikidata not there](#) (sic!)
- Datasets no longer available or moved elsewhere... how do I find them?
- Lod-cloud.net not following their own guidelines:

- *“The dataset must contain at least 1000 triples.*



- *“This means, either your dataset must use URIs from the other dataset, or vice versam. We arbitrarily require at least 50 links.”*



How to deal with updates? New versions of datasets? Archives?

Conclusion:

The LOD cloud is as messy as my slides 😞

...

It is **NOT** a machine-readable entry-point to the Web of Linked Data

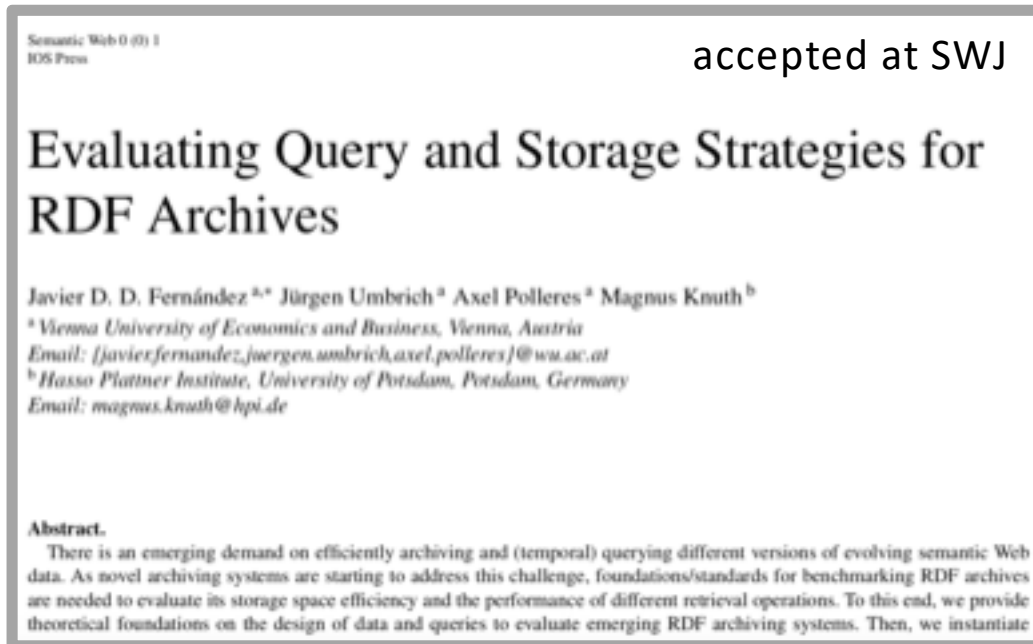
Some good starting point (but not yet a solution)

- HDT: “a swiss-army-knife for large RDF datasets”
 - Emerged from the PhD thesis of another Linked Data superhero
- Provides a **uniform compressed exchange format for dumps**
- Enables **Linked Data fragments endpoints**
 - (= of-the-box lightweight (“SPARQL light”) endpoints)
- Keeps **data and metadata together** and in sync (in header)
- Active developer & user community (some are in the room!)



Active Research and Development in HDT

- HDTQ: Enable quads & and versioning:



... allow to deal with versioned dataset dumps and integration of different datasets in one HDT.

Active Research and Development in HDT

SEMANTICS 2016

- k-shortest path queries:

Counting to k or how SPARQL 1.1 Property Paths Can Be Extended to Top- k Path Queries*

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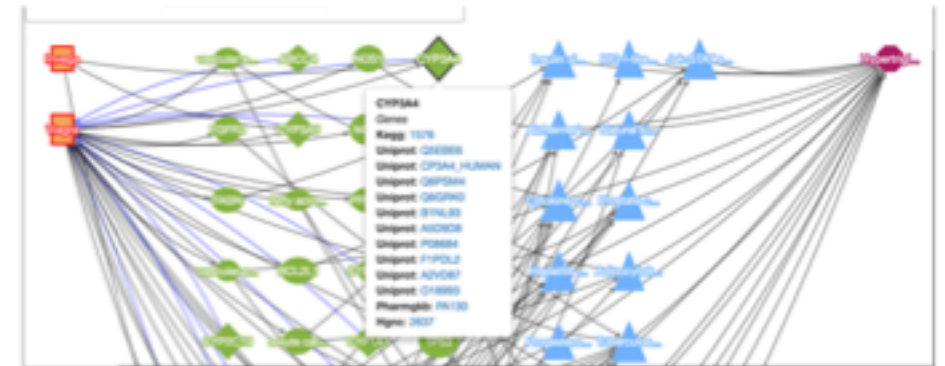
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ABSTRACT
While the volume of graph data available on the Web in RDF is steadily growing, SPARQL, as the standard query language for RDF still remains effectively unusable for the basic task of finding paths through the graph between selected nodes. Property Paths, as introduced in SPARQL 1.1 are useful for this purpose, as they

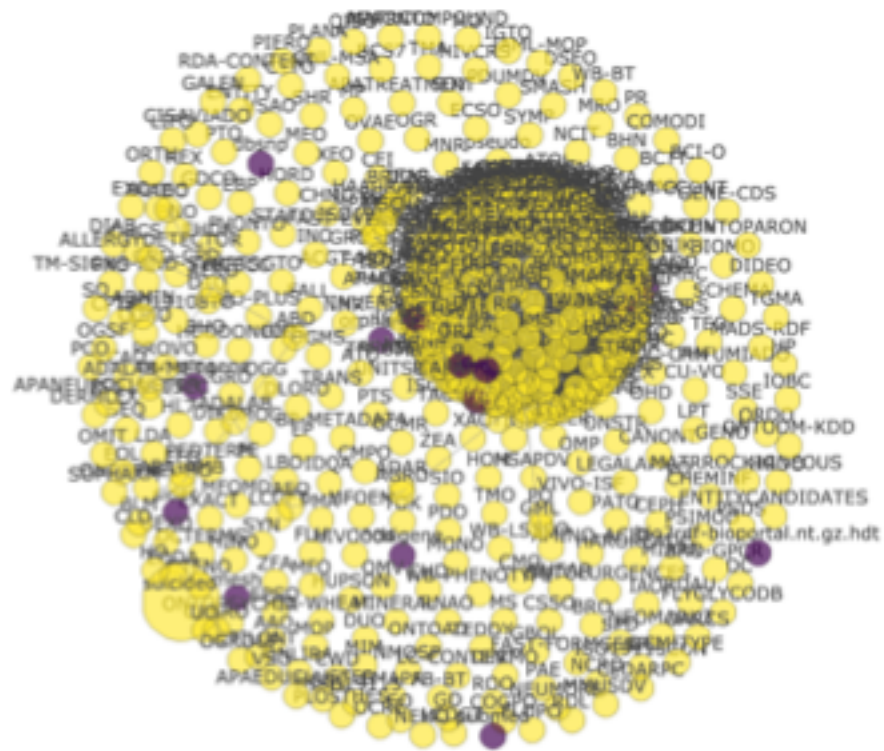
ACM Reference format:
Vadim Savenkov, Quaiser Mehmoed, Jürgen Umbrich, and Axel Polleres. 2017. Counting to k or how SPARQL 1.1 Property Paths Can Be Extended to Top- k Path Queries. In *Proceedings of Semantics2017*, Amsterdam, Netherlands, September 21–24, 2017, 7 pages.
DOI: 10.1145/3152218.3152239

... could eventually enable use cases like this:



Active Research and Development in HDT

- Work in progress: re-compute the Life Sciences LOD Cloud from a set of HDTs

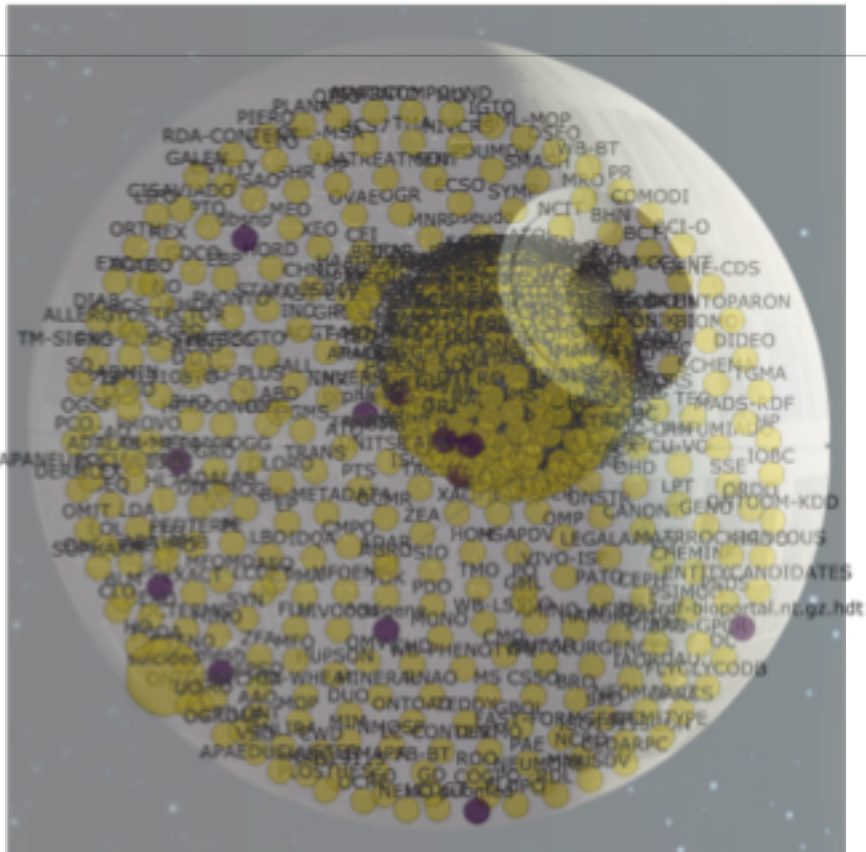


- Completely auto-created from “HDTized” Bioportal and Bio2RDF
- Idea:
 - Treat each dump-file as a dataset
 - Assign namespace authority of to datasets heuristically
 - Compute links numbers based on dataset dictionaries using HDT

- (at the moment, uses heuristics to “guess” ownership of namespaces)

Active Research and Development in HDT

- Work in progress: re-compute a LOD Cloud from a set of HDTs



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- Idea:
 - Treat each dump-file as a dataset
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The 5th element
and two routes ahead:

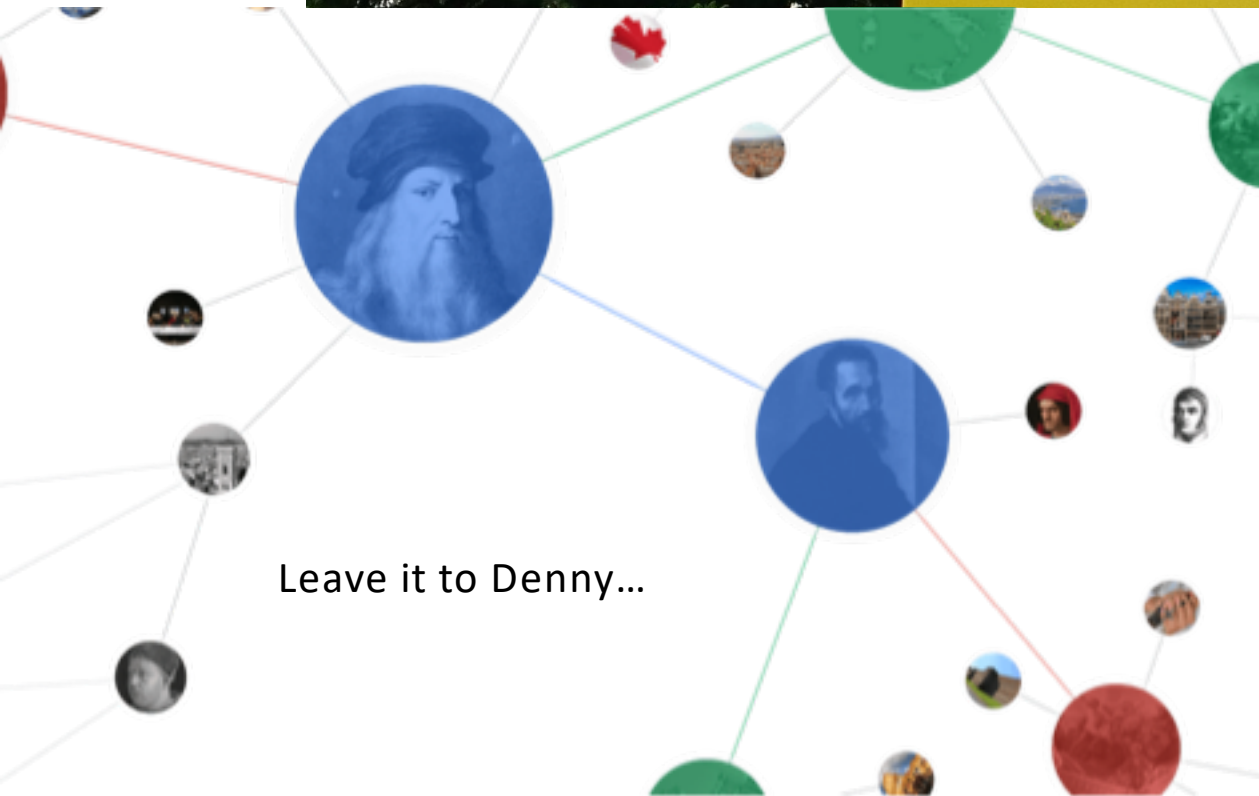


- **LDP5:** Publish your dataset as an **HDT dump**, including **VOID metadata** as part of its header and declaring (i) the **owned namespaces**, (ii) links to previous versions of the dataset, (iii) whenever you use namespaces owned by other datasets or ontologies – the **link to specific versions** of these other datasets.

?



?



Leave it to Denny...



... or work together?

Can only PhD superheroes integrate Linked Data?
Let's collaborate to make it easier for sheer mortals!



*Phlegra
Spiderman*

?



**Mr. LOD
Laundromat**



Captain HDT

More rants, starting points and a call for collaboration:

Thank you!

Didn't talk about:

- Linking with ML,
- Provenance,
- Quality monitoring, ...

A More Decentralized Vision for Linked Data

Axel Polleres^{1,2}, Maulik R. Kamdar¹, Javier D. Fernandez², Tania Tudorache¹, and Mark A. Musen¹

¹ Stanford University, CA, USA

² Vienna Univ. of Economics & Business / Complexity Science Hub Vienna, Austria

Abstract. In this *deliberately provocative* position paper, we claim that ten years into Linked Data there are still (too?) many unresolved challenges towards arriving at a truly machine-readable *and* decentralized Web of data. We take a deeper look at the biomedical domain—currently, one of the most promising “adopters” of Linked Data—if we believe the ever-present “LOD cloud” diagram.³ Herein, we try to highlight and exemplify key technical and non-technical challenges to the success of LOD, and we outline potential solution strategies. We hope that this paper will serve as a discussion basis for a fresh start towards more actionable, truly decentralized Linked Data, and as a call to the community to join forces.

Backup Slides:



Giovanni Tummarello Actually read it, thanks for the citations 😊 . I was excited to read about GO as possible example of success but disappointed in visiting the site, its pretty abandonware too.

Axel you guys cite problems, but IMO you dont mention the only one: *why* why should people do that.

Without a business reason (broad definition: fsomething that pays you back directly so that you feel compelled and justified - in your non grant non academic work - to do it today as opposed to do other things) nothing can move past the toying around - by people receiving grants to toy around.

(had posted too early previously 😊) now for the second part

Like · Reply · 2w · Edited



Axel Polleres more input, great... thanks! yes, as long as incentives are only acadmic fame, competition among research groups is one of the show-stoppers... this is there in the paper, in section 4.2 - implicitly, but we could maybe make it more explicit.

Like · Reply · 1m · Edited



Dan Brickley "We envisioned a decentralized network of ontologies on the Web that would enable smart agents to seamlessly talk to each other"

I think you mean "we took one useful feature of RDF/RDFS (fine grained vocabulary composition) and elevated it to a cult-... See more

Haha · Reply · 2w



Axel Polleres that would've been even too provocative for me to dare to write, while i like the wording :))

Like · Reply · 2w



Axel Polleres may i quote you on that?

Like · Reply · 2w



Dan Brickley Axel Polleres sure. it's in fair part my fault, [https://www.w3.org/2001/sw/RDFCore/Schema/200203/...](https://www.w3.org/2001/sw/RDFCore/Schema/200203/) advertised the feature.



W3.ORG
RDF Vocabulary Description Language 1.0: RDF Schema

Like · Reply · Remove Preview · 2w



Axel Polleres FWIW, added your quote in a revised submission, hope that's ok!

Like · Reply · 2w



Tobias Käfer Hi, a very nice overview 😊 although a bit biased towards the LOD cloud. How about all the Linked Data off the LOD cloud? For instance, the Linked Data Platform or the Web of Things?

Like · Reply · 1w

^ Hide 13 Replies



Jürgen Umbrich There exists something else than the lod cloud? And it is called Linked Data? 😊

Like · Reply · 1w



Tobias Käfer Impertinent, how dare people not to register their dataset 😊
Of course Linked Data not registered in the cloud is obvious, but at least the LDP deserves a name-drop I think.

Like · Reply · 1w



Jürgen Umbrich I am seriously confused with all the terminology.
Semantic Web was not about the web but about RDF and OWL, next Linked Data (principles) which is RDF on the Web, next decentralising the SW (again?) and now Linked Data needs decentralization..... See more

Like · Reply · 1w · Edited



Axel Polleres @Tobias, true, that is an aspect... in the paper, we focused on the4 LOD cloud, since it seems to be the single most cited entry point these days.... LDP would have been worth a mention, true, do you have any link that says something about adoption? I wonder how many of the LOD datasets (if any) adhere to the LDP interface. Good one!

Like · Reply · 1w



Axel Polleres p.s.: @Tobias Käfer, we emphasize that we do not mean to be exhaustive, but please, by all means, can you add this as a comment to Openreview? Then, I will try to include it later one!

Like · Reply · 1m · Edited



Dan Brickley "We promised (as a community) to revolu Social Networks in a way that every data subject owns their social network data in decentralized FOAF"

Actually the FOAF project never promised that. We promised to make a machine-readable ve... See more

Like · Reply · 2w



Axel Polleres i would say many understood it like that, at least as having the potential, which you seem to confirm? anyway, the paper is meant to raise discussion, and happy to reward this if it gets accepted to the workshop in the final version... comment appreciated!

Like · Reply · 2w



Dan Brickley Axel Polleres I think the early press - <https://www.theguardian.com/.../2004/feb/19/newmedia.media> - was reasonable, that it was more about better search over public data. The thing that killed that was that none of us had the tools to even deal with L... See more

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THEGUARDIAN.COM
Let's be Friendsters

Axel Polleres thanks for the pointer!!!

Like · Reply · 2w

Axel Polleres thanks for the pointer!!!

Like · Reply · 2w

Axel Polleres " It was more about better search over public data" ... pretty much what we're doing now 😊

Like · Reply · 2w

Dan Brickley Axel Polleres the voices of practical RDF were drowned out by a decade of over ontologizing

Like · Reply · 2w