

Lecture 5 - Knowledge Graph Applications

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**FIZ Karlsruhe**

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Knowledge Graphs

Lecture 5: Knowledge Graph Applications

5.1 Ontologies in Action

5.2 Knowledge Graphs

5.3 RDF and OWL Knowledge Graphs

5.4 Knowledge Graph Programming

5.5 Knowledge Graph Visualization

5.6 Knowledge Graph Analytics

How to get Information?

Find a solution for the following question:

- **When was the greenhouse effect discovered?**



Find a solution for the following question:

- **When was the greenhouse effect discovered?**

Google

When was the Greenhouse effect discovered?



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Tools

About 14.000.000 results (0,50 seconds)

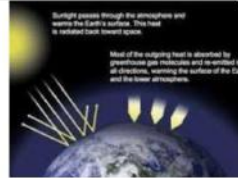
1896

The greenhouse effect was discovered more than 100 years ago

In **1896**, the world renowned Swedish scientist and Nobel Prize Winner Svante Arrhenius (**1859-1927**), described how CO₂ influences the climate. Jun 5, 2018

phys.org › Earth › Environment

80 years since the first calculations showed that the Earth was ...



About Featured Snippets Feedback

People also ask

Who first discovered greenhouse effect?



What is greenhouse effect and global warming?



What is the cause of greenhouse effect?



Feedback

en.wikipedia.org › wiki › Greenhouse_effect

Greenhouse effect - Wikipedia

The **greenhouse effect** is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without ...

[Runaway greenhouse effect](#) · [Anti-greenhouse effect](#) · [History of climate change](#)

www.lenntech.com › greenhouse-effect › global-warming-history

History of the greenhouse effect and global warming - Lenntech

History of the **greenhouse effect** and global warming. ... It was also **discovered** that water vapor absorbed totally different types of radiation than carbon dioxide.

Find a solution for the following question:

- **When was the greenhouse effect discovered?**




When was the Greenhouse effect discovered?

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7,540,000 Results Any time ▾



When was the greenhouse effect discovered?

The greenhouse effect is a natural process that is millions of years old. It plays a critical role in regulating the overall temperature of the Earth. The greenhouse effect was first discovered by **Joseph Fourier** in **1827**, experimentally verified by **John Tyndall** in **1861**, and quantified by **Svante Arrhenius** in 1896.4.



* The greenhouse effect was discovered by Joseph Fourier in 1827, first reliably experimentally verified by John Tyndall in 1861, and first explained quantitatively by Svante Arrhenius in 1896.
Image: slideshare.net

[What is the greenhouse effect? | What's Your Impact](https://whatsyourimpact.org/greenhouse-effect)
whatsyourimpact.org/greenhouse-effect

Was this helpful?  

PEOPLE ALSO ASK

What are the major causes of global warming? ▾

What are facts about the greenhouse effect? ▾

What is climate skeptics taught me about global warming? ▾

When did scientist discovered the ozone hole? ▾

Feedback

History of the greenhouse effect and global warming

<https://www.lenntech.com/greenhouse-effect/global-warming-history.htm> ▾

History of the greenhouse effect and global warming Svante Arrhenius (1859-1927) was a Swedish scientist that was the first to claim in 1896 that fossil fuel combustion may eventually result in ...

How to get Information?

Refine your information need and find out more:

- **What is the greenhouse effect?**

- Refine your information need:

- What is the greenhouse effect?

Knowledge Graph

- Facts (structured data)

Search Engine Indexes

- Web pages
- News articles
- Tweets

What is the Greenhouse effect?

7,380,000 Results Any time ▾

greenhouse effect
[grēnhous ə,fekt]

NOUN
the trapping of the sun's warmth in a planet's lower atmosphere, due to the greater transparency of the atmosphere to visible radiation from the sun than to infrared radiation emitted from the planet's surface.

See more translations ▾

Feedback

PEOPLE ALSO ASK

- Is the greenhouse effect always a bad thing? ▾
- What is the "greenhouse effect" and how does it work? ▾
- Why is the greenhouse effect essential for life on Earth? ▾
- What gases cause global warming? ▾

Feedback

What Is the Greenhouse Effect? | NASA Climate Kids
<https://climatekids.nasa.gov/greenhouse-effect>

◀ How Does The Greenhouse Effect Work? ▶ How Are Humans Impacting The Climate? ▶ What Reduces Global Warming? ▶

As you might expect from the name, the greenhouse effect works ... like a greenhouse! A greenhouse is a building with glass walls and a glass roof. Greenhouses are used to grow plants, such as tomatoes and tropical flowers. A greenhouse stays warm inside, even during the winter. In the daytime, sunlight shines into the greenhouse and warms the plants and air inside. At nighttime, it's colder outside, but the greenhouse stays pretty warm.

See more on climatekids.nasa.gov

Greenhouse effect - Wikipedia
https://en.wikipedia.org/wiki/Greenhouse_effect

◀ Overview History Description Details Greenhouse gases ▶

The greenhouse effect is the process by which radiation from a planet's atmosphere warms the planet's

Greenhouse Effect

The greenhouse effect is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere. Radiatively active gases (i.e., greenhouse gases) in a planet's atmosphere radiate energy in all directions. Part of this radiation is directed towards the surface, warming it. The intensity of the downward radiation – that is, the strength of the greenhouse effect – will depend on the atmosphere's temperature and on the amount of greenhouse gases that the atmosphere contains.

Wikipedia

Related people See all (5+)

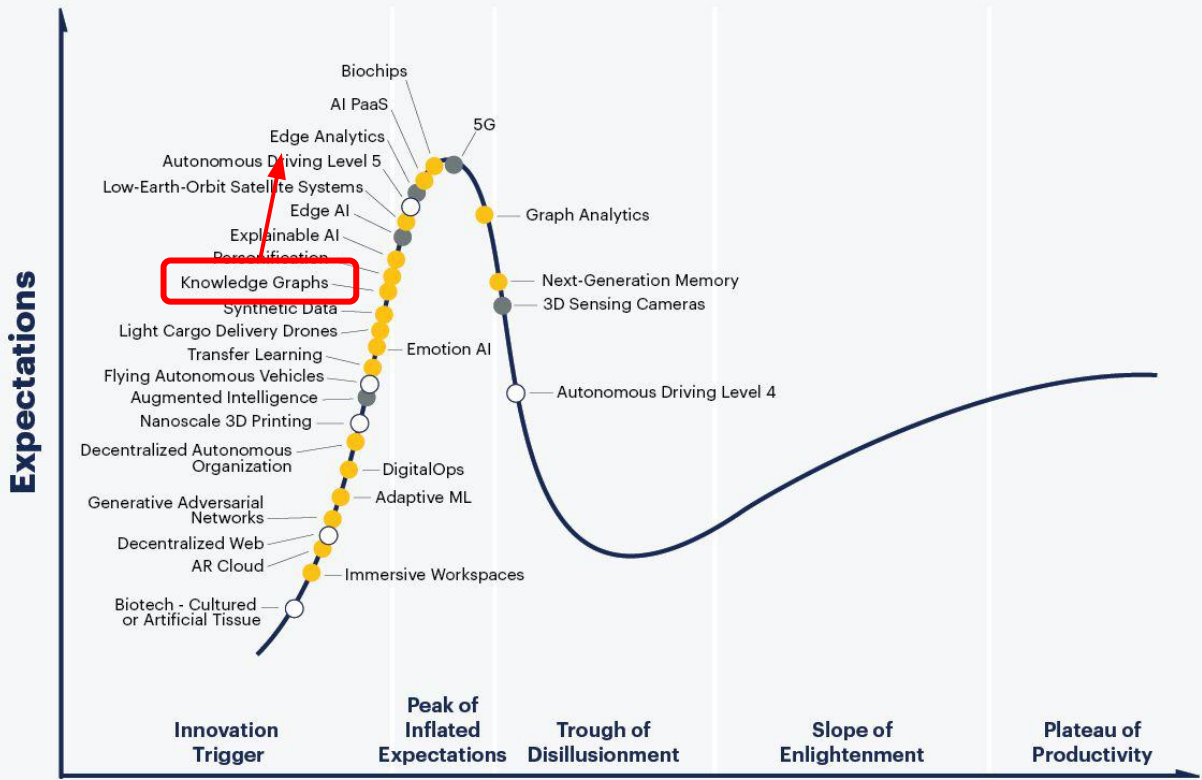
Joseph Fourier	Svante Arrhenius	John Tyndall	Veerabhadra Ramanathan	Stephen Schneider

People also search for See all (15+)

Greenhouse Gas	Global Warming	Climate Change	Carbon Dioxide in Earth's At...	Deforestati...

Data from **Wikipedia**
Suggest an edit

Gartner Hype Cycle for Emerging Technologies, 2019



Plateau will be reached:

- less than 2 years
- 2 to 5 years
- 5 to 10 years
- more than 10 years
- obsolete before plateau

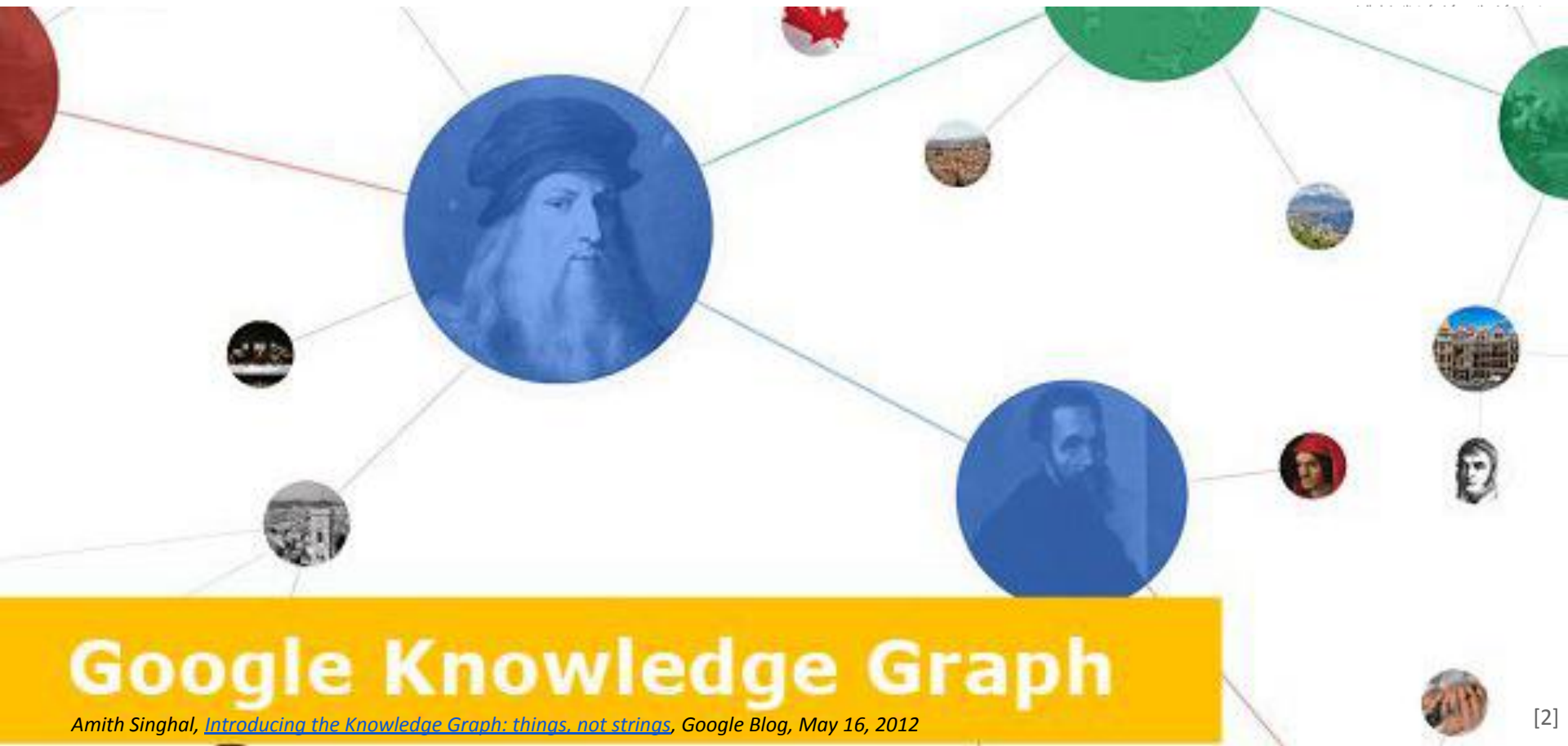
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gartner.com/SmarterWithGartner

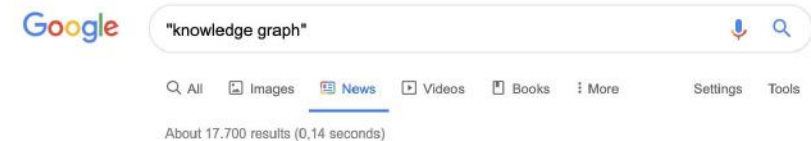
Source: Gartner
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[1]

Are Knowledge Graphs Relevant in Practice?



Are Knowledge Graphs Relevant in Practice?



What is a **knowledge graph** and how does one work?

TNW - 11 Jun 2019

Even though it probably affects our lives every single day, most of us have no idea what a "**knowledge graph**" is. Asking your favorite voice ...



Data.world joins forces with Capsenta to bring **knowledge graph** ...

ZDNet - 19 Jun 2019

In a nutshell, data.world uses the superpowers of **Knowledge Graph** (aka Linked Data, aka Semantic Web) technology to integrate datasets and ...

data.world acquires Capsenta to boost **knowledge graph** and data ...
GlobeNewswire (press release) - 19 Jun 2019

[View all](#)



Ontotext's GraphDB 8.10 Makes **Knowledge Graph** Experience Faster ...

PRNewswire (press release) - 13 Jun 2019

Get your GraphDB now and start developing your own **knowledge graph** for advanced search and analytics. About Ontotext. For over two ...

Ontotext's GraphDB 8.10 improves **knowledge graph** experience

KMWWorld Magazine - 12 Jun 2019

Ontotext has released the latest backward compatible update, 8.10, of its signature semantic graph database GraphDB. GraphDB 8.10 now ...



Franz launches AllegroGraph **Knowledge Graph** solution

KMWWorld Magazine - 12 Jun 2019

Franz, a provider of graph and document database technology for knowledge graphs, has announced the AllegroGraph **Knowledge Graph** ...

Franz Launches AllegroGraph **Knowledge Graph** Solution to Fulfill ...
PR Web (press release) - 12 Jun 2019

PR Web (press re...

[View all](#)



Top coverage

ZDNet

Data.world joins forces with Capsenta to bring **knowledge graph**-based data management to the enterprise

4 days ago



Built In Austin

Joining forces: Austin's data.world just acquired Capsenta

4 days ago



All coverage

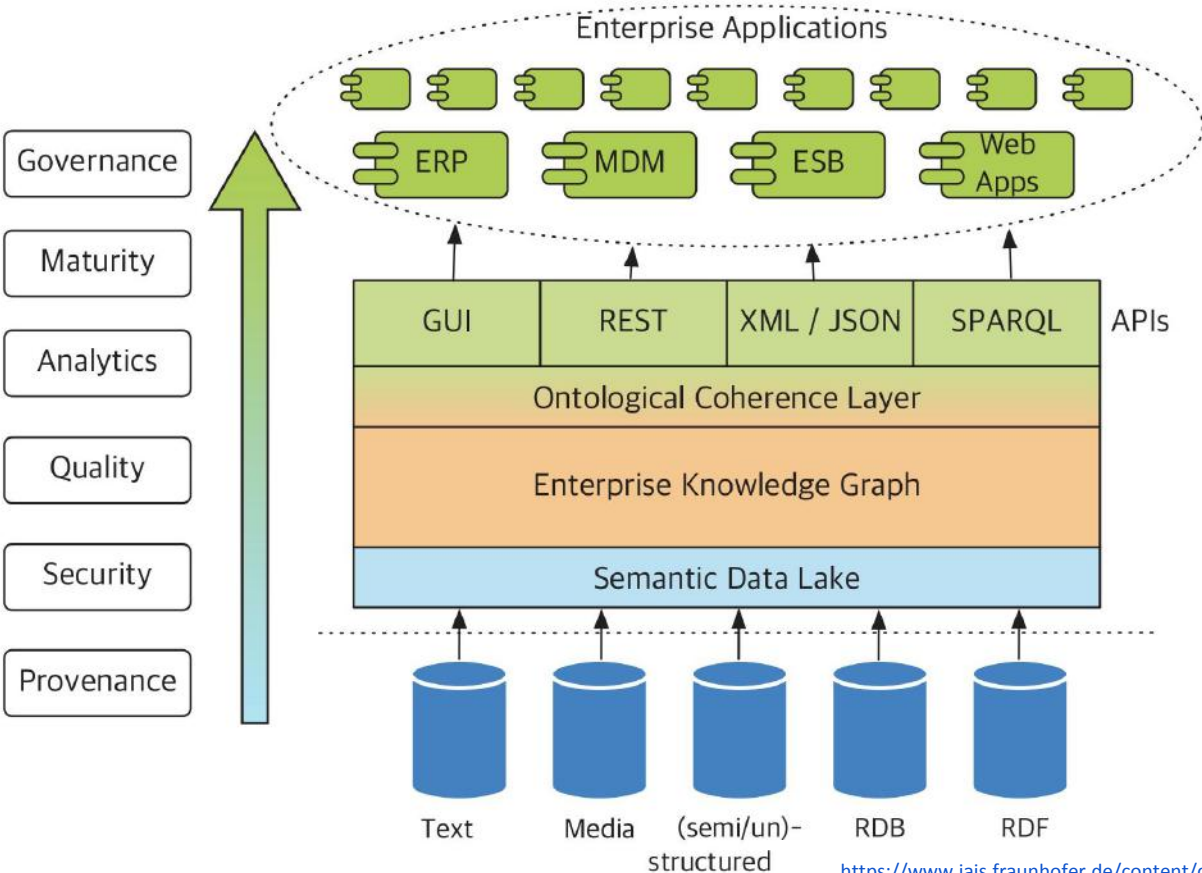
TechStartups.com

data.world acquires Capsenta to bring the power of **knowledge graphs** to companies with on-prem data

4 days ago



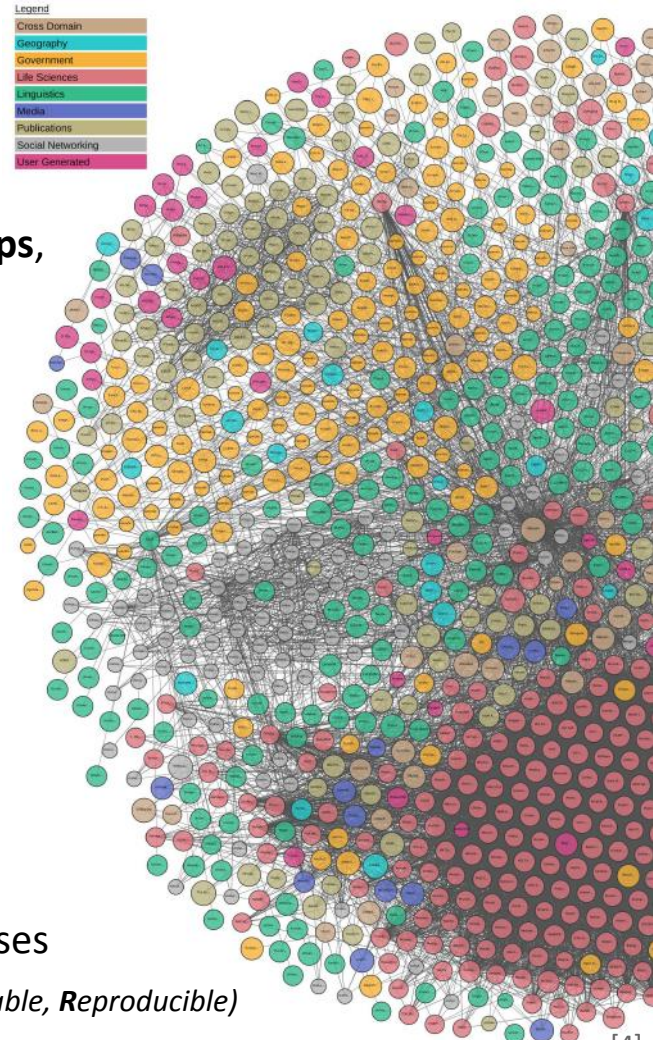
Enterprise Knowledge Graphs



[3]

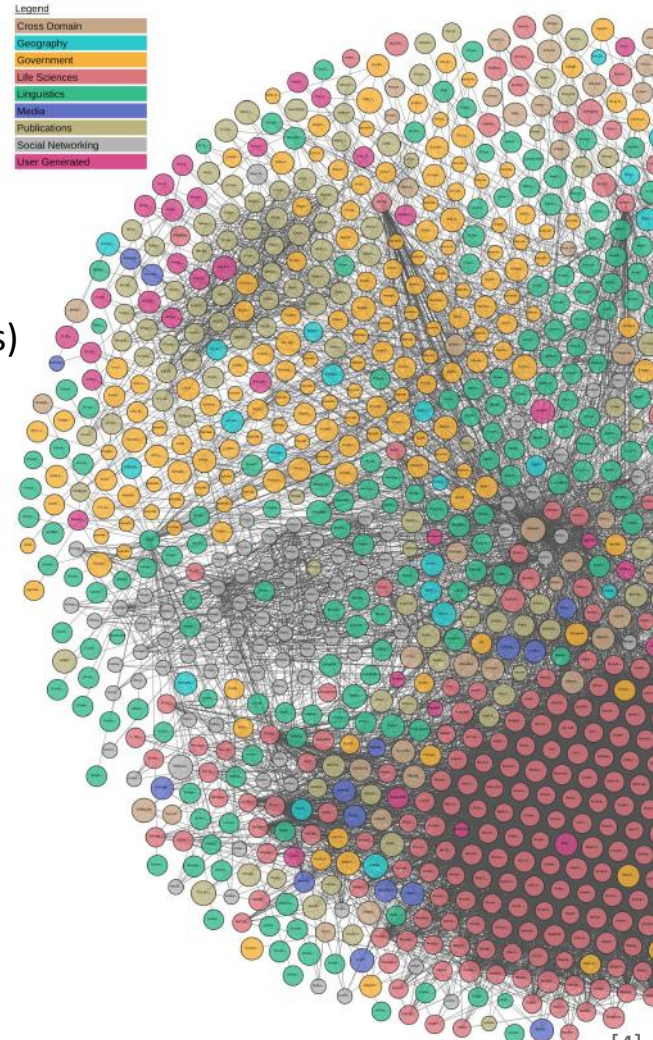
Knowledge Graphs - A Definition

- A **Graph** consisting of **concepts, classes, properties, relationships,** and **entity descriptions**
- Based on **formal knowledge representations** (RDF(S), OWL)
- Data can be **open** (e.g. DBpedia, WikiData), **private** (e.g. supply chain data), or **closed** (e.g. product models)
- Data can be **original, derived, or aggregated**
- We distinguish
 - **instance data** (ground truth),
 - **schema data** (vocabularies, ontologies)
 - **metadata** (e.g. provenance, versioning, licensing)
- **Taxonomies** are used to categorize entities
- **Links** exist between internal and external data
- Including **mappings** to data stored in other systems and databases
- *Fully compliant to **FAIR Data principles** (Findable, Accessible, Interoperable, Reproducible)*

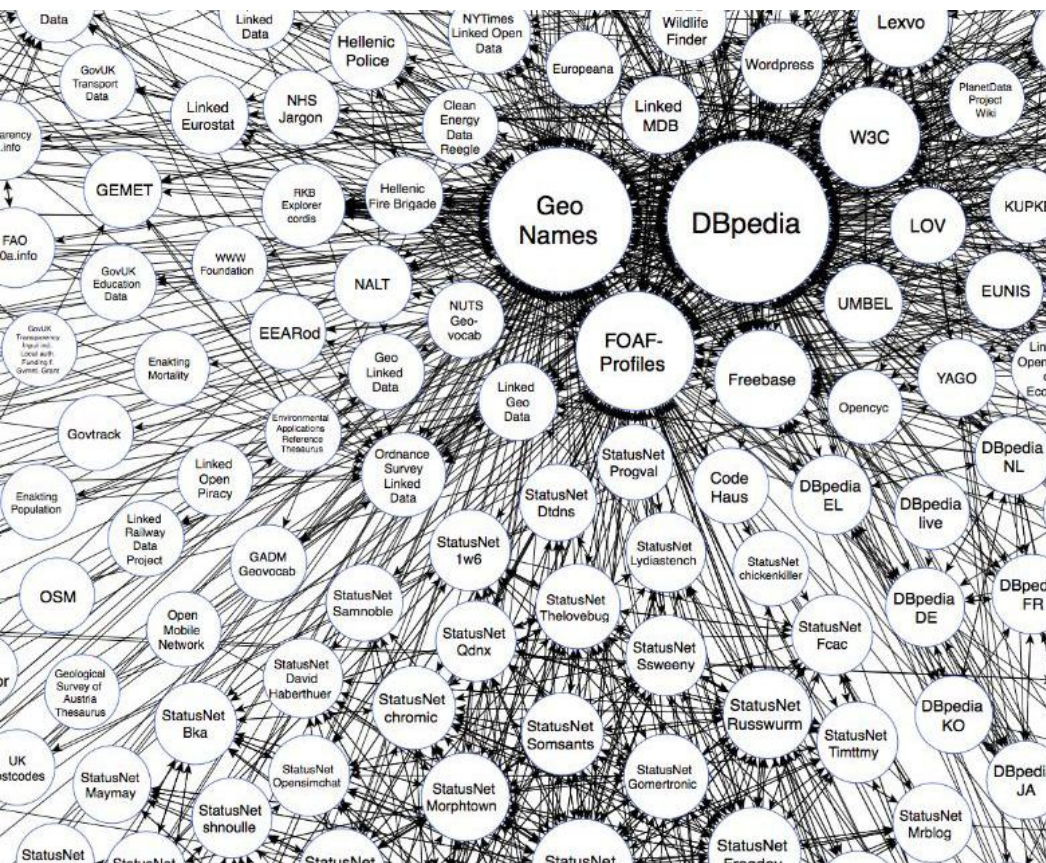


Knowledge Graphs - A Definition (continued)

- A Knowledge Graph is a data set that is:
 - **structured** (in the form of a specific data structure)
 - **normalised** (consisting of small units, such as vertices and edges)
 - **connected** (defined by the - possibly distant - connections between objects)
- Moreover, Knowledge Graphs are typically:
 - **explicit** (created purposefully with an intended meaning)
 - **declarative** (meaningful in itself, independent of a particular implementation or algorithm)
 - **annotated** (enriched with contextual information to record additional details and meta-data)
 - **non-hierarchical** (more than just a tree-structure)
 - **large** (millions rather than hundreds of elements)



The Web of Data - A Web of Knowledge Graphs

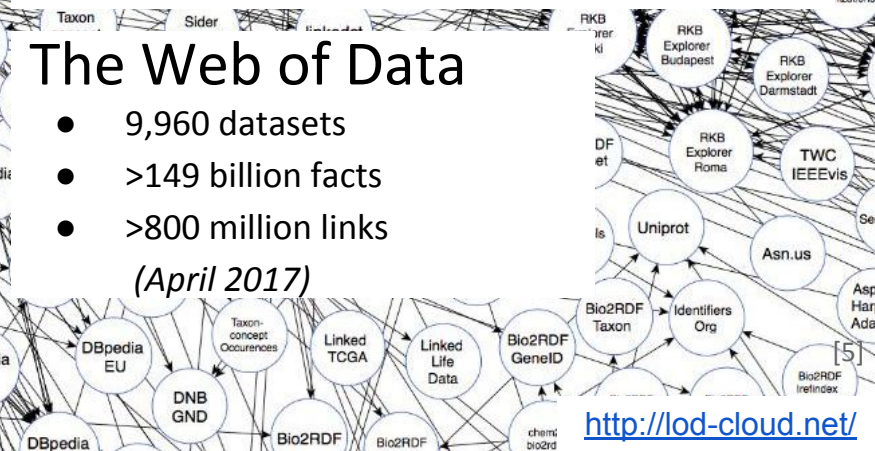


Linked Data

- Linked Open Data (LOD) denote publicly available (RDF) Data in the Web, identified via URI and accessible via HTTP. Linked data link to other data via URI.

The Web of Data

- 9,960 datasets
 - >149 billion facts
 - >800 million links
- (April 2017)

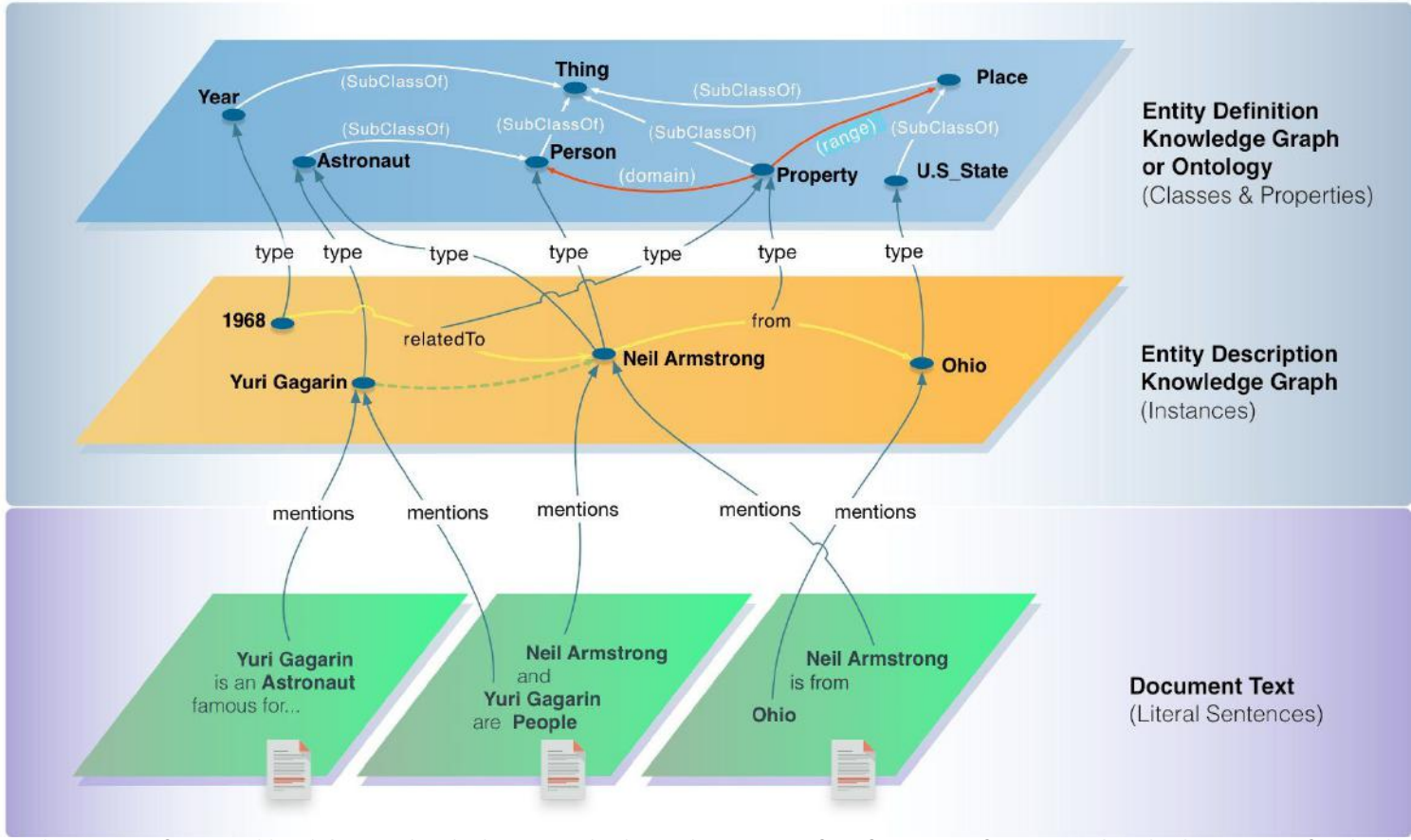


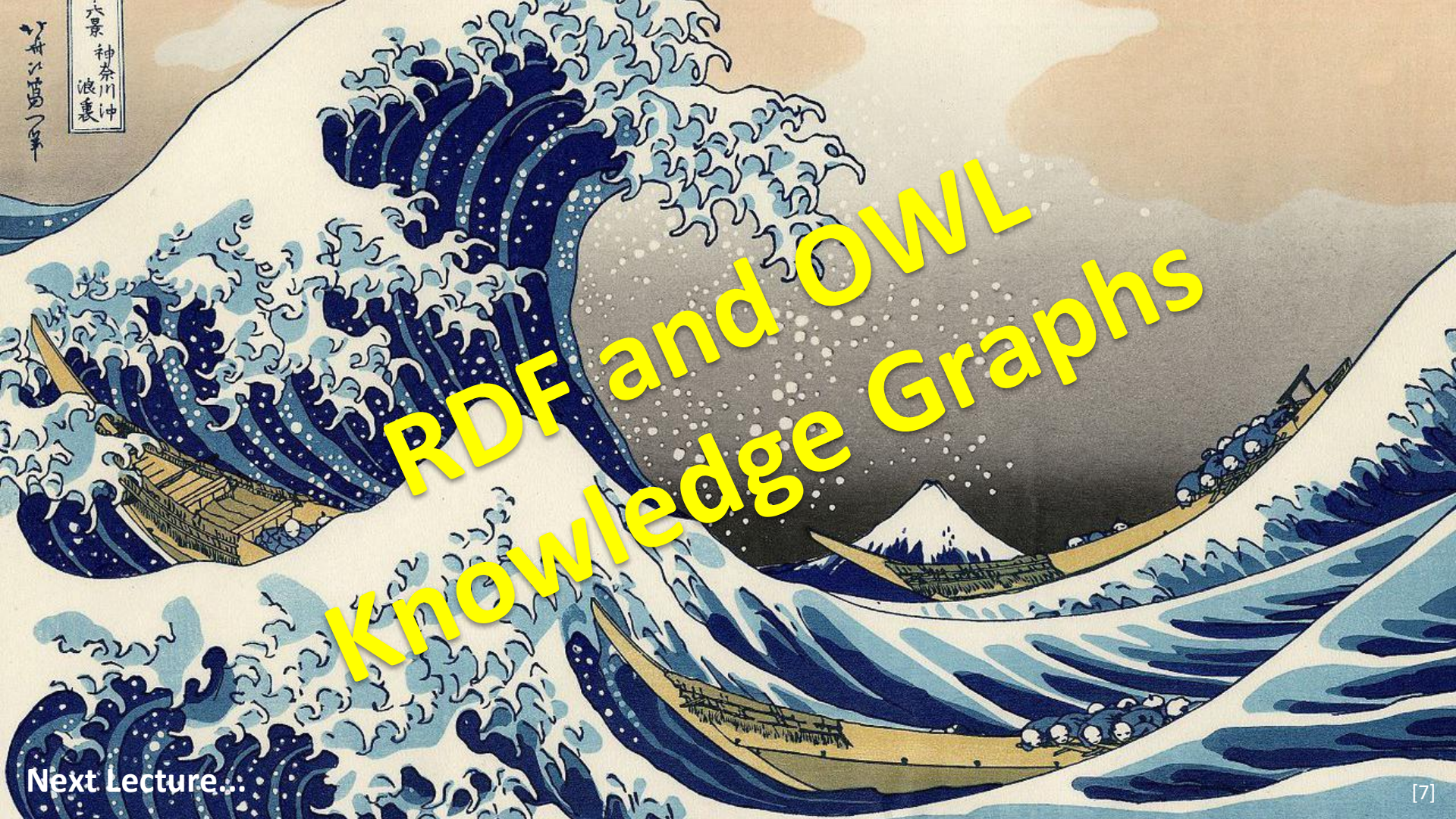
Knowledge Graph — for General Knowledge

HyperLink Artifacts

HyperData

HyperText





RDF and OWL Knowledge Graphs

Next Lecture...

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<https://www.blog.google/products/search/introducing-knowledge-graph-things-not/>
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