

Future Learning in an Advanced Decentralized Learning Ecosystem



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May 1, 2019

INTRO: PERSONAL LEARNING



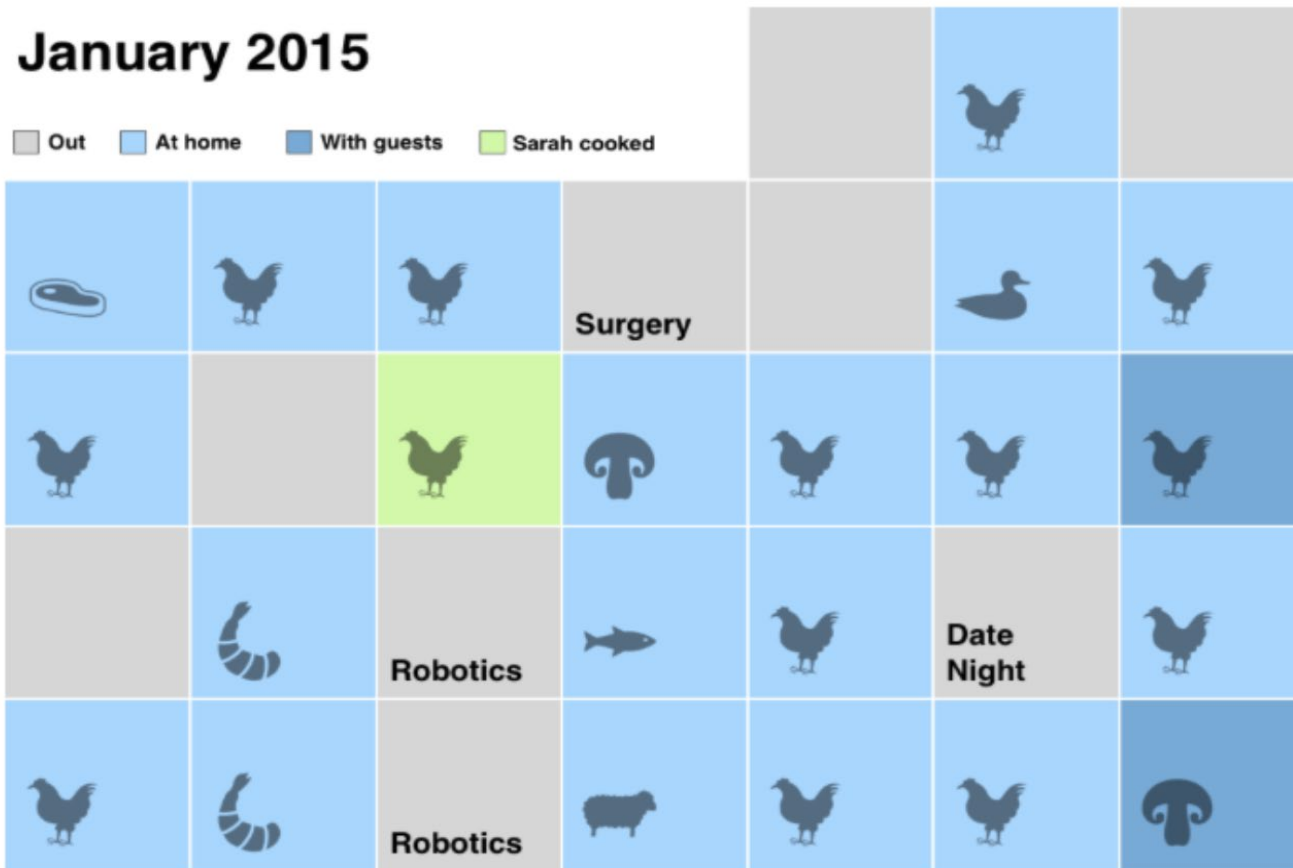
<https://giphy.com/gifs/cat-kitty-pet-TA6Fq1irTioFO>

High School Math ML Problem



- Here we have a case where a high school student has been given the problem of optimizing traffic flow in his school parking lot.
- When they're in traffic, it's not about what you want to teach them, it's about what they need to know; it's not about what you can do for them, it's about what they can do for themselves

Identity and Recognition



The quantified self
will give way to the
qualified self

<http://quantifiedself.com/reporter-app/>

Icons from The Noun Project: Chicken by Kate Vogel, Fish by Jens Tärning, Lamb by Unrecognized MJ, Mushroom by Alessandro Suraci, Shrimp by Krause, Steak by saakshi vyas

Old MacDonald had a calendar and on that calendar were lots and lots of chickens.

You're Not Stuck In Traffic, You Are Traffic



“a new generation of designers has emerged, concerned with designing strategies to subvert this “natural default-setting” in which each person understands themselves at the center of the world.”

Cedric Price



- Cedric Price: "Price was designing not for the uses he *wished to see*, but for all the uses *he couldn't imagine*.... As opposed to the 'user' of a building who is interacting with a smart thermostat, the participants in a building are engaged with one another."
- Or as I like to say, we built a trillion-dollar communication system, and people use it to send cat pictures, and that's the beauty of it.

<https://www.architectural-review.com/essays/reputations-pen-portraits-/cedric-price-1934-2003/10026650.article>

RESOURCES – EXPERIENCE - AGENCY



<https://giphy.com/gifs/cat-lazy-sleepy-papAALBn286ty>

Experience



We are beginning to *combine* experience and reflection

<https://www.epicgames.com/fortnite/en-US/home>

Content and Creation



Creation of the content is becoming a part of the content itself.

Livecaster

<https://intrsection.com/2017/04/8396/>

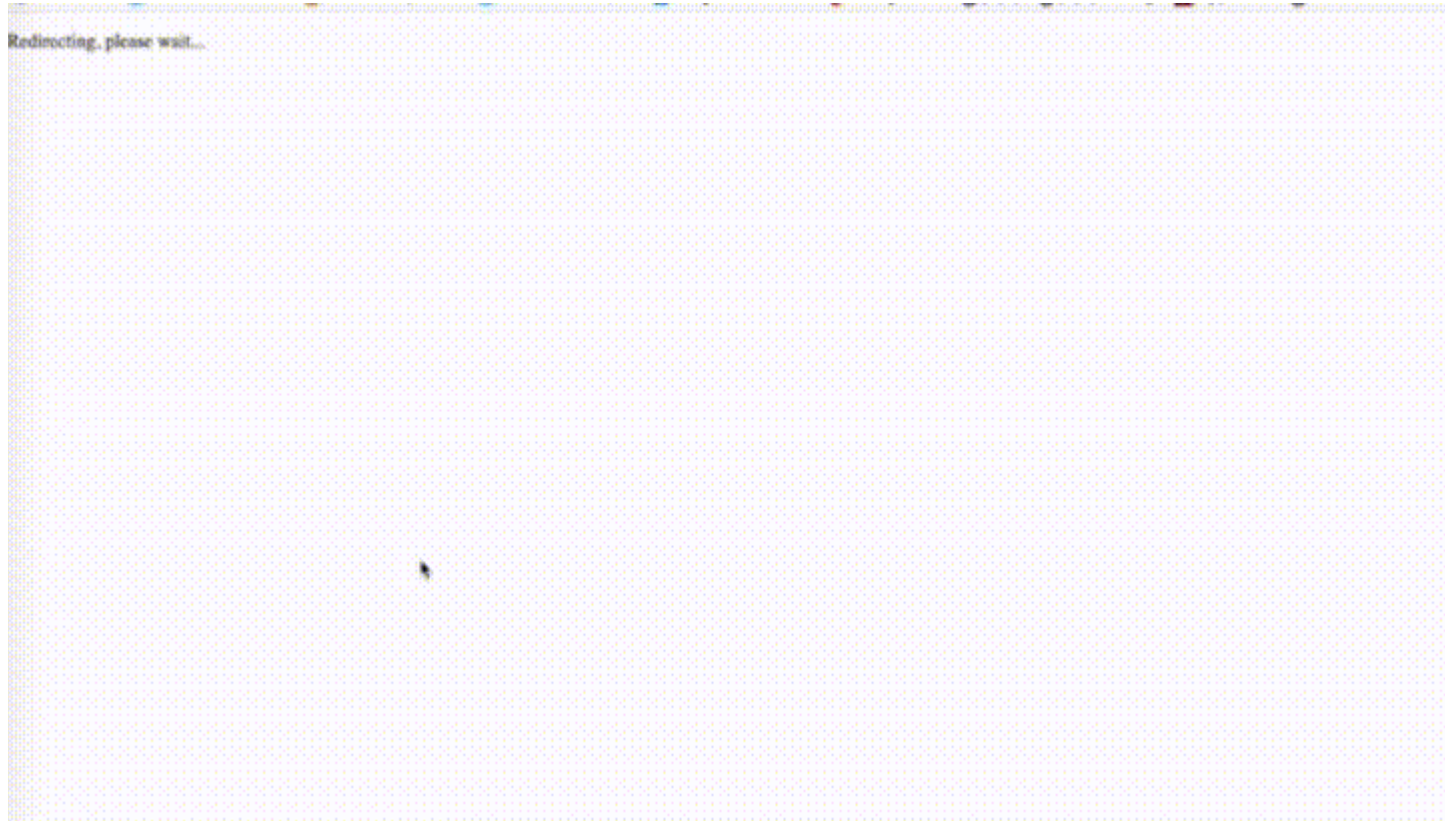
Twitch

<https://www.twitch.tv/>

Open Broadcaster

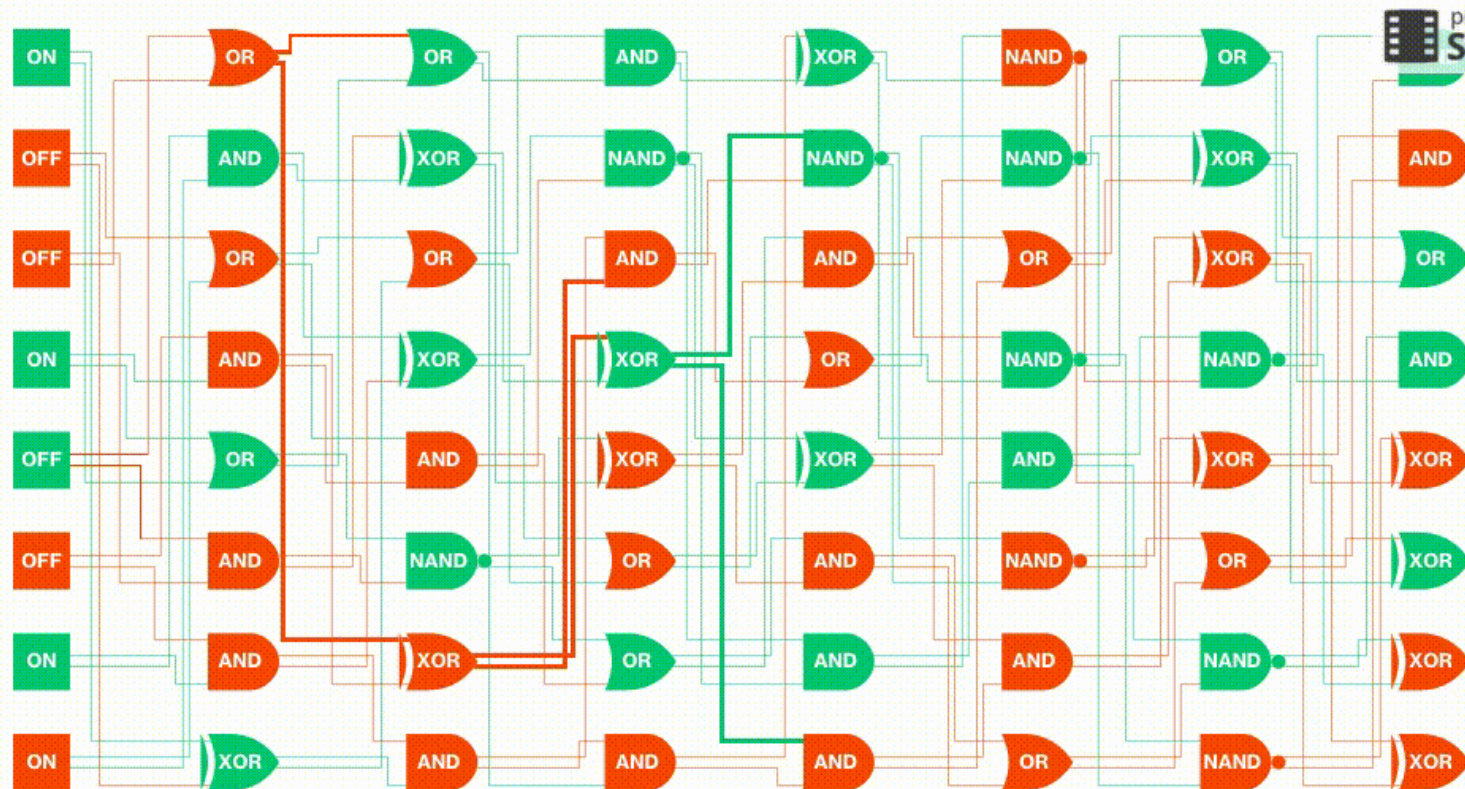
<https://obsproject.com/>

Connect LMS via LTI WordPress Plugin



- Workbench is a free and open source data journalism platform "that enables all stages of data journalism: getting data (including scraping), then cleaning, analyzing, visualizing, and sharing it."

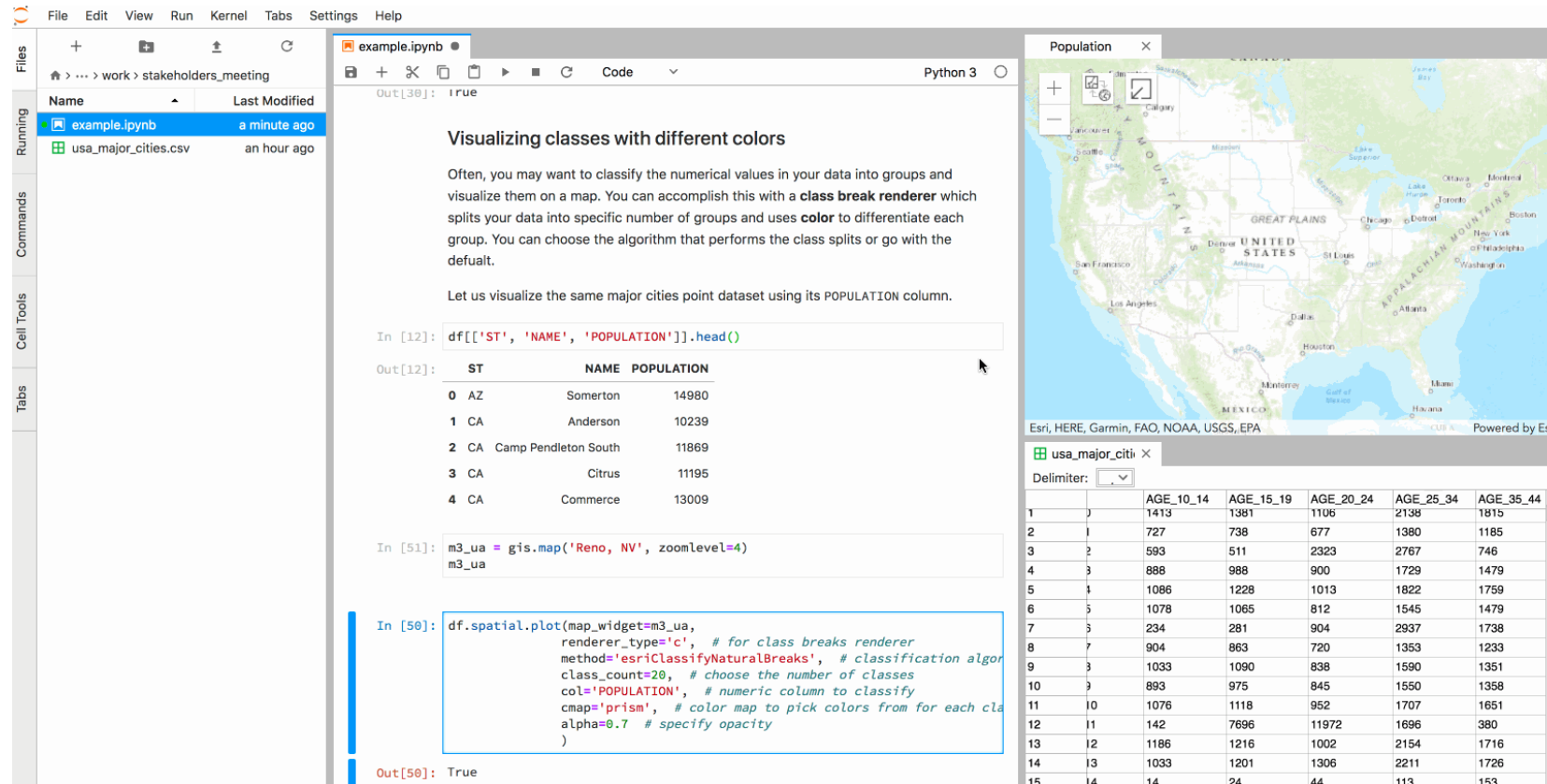
Creating and learning – code and outcome - combine in a single environment



This is simulated circuitry that can compute as you watch. The switches on the left turn the current on and off at random, and the logic gates direct the flow of the current.

<https://www.bloomberg.com/graphics/2015-paul-ford-what-is-code/>

New types of learning resources



The screenshot displays a Jupyter Notebook environment with the following components:

- Files Panel:** Shows a file named `example.ipynb` modified a minute ago and `usa_major_cities.csv` modified an hour ago.
- Code Cell:** Contains the following text and code:

```
Visualizing classes with different colors

Often, you may want to classify the numerical values in your data into groups and visualize them on a map. You can accomplish this with a class break renderer which splits your data into specific number of groups and uses color to differentiate each group. You can choose the algorithm that performs the class splits or go with the default.

Let us visualize the same major cities point dataset using its POPULATION column.

In [12]: df[['ST', 'NAME', 'POPULATION']].head()

Out[12]:
```

	ST	NAME	POPULATION
0	AZ	Somerton	14980
1	CA	Anderson	10239
2	CA	Camp Pendleton South	11869
3	CA	Citrus	11195
4	CA	Commerce	13009

```
In [51]: m3_ua = gis.map('Reno, NV', zoomlevel=4)
m3_ua

In [50]: df.spatial.plot(map_widget=m3_ua,
                        renderer_type='c', # for class breaks renderer
                        method='esriClassifyNaturalBreaks', # classification algorithm
                        class_count=20, # choose the number of classes
                        col='POPULATION', # numeric column to classify
                        cmap='prism', # color map to pick colors from for each class
                        alpha=0.7 # specify opacity
                        )

Out[50]: True
```
- Map View:** A map of the United States with a legend for 'Population' and a data table below it.
- Data Table:** A table with columns for age groups and population values.

Jupyter Notebook combines data and code in a document

JupyterLab Environment - work with code, data, and the Jupyter notebook format.

<https://jupyter.org/try> (Binder demo)

<https://www.dataquest.io/blog/jupyter-notebook-tips-tricks-shortcuts/>

Workbench

The screenshot shows the Workbench interface with a pink header bar containing the text "Introduction to Data Journalism" and "Per capita crime rates". Below the header, the source is identified as "U.S. Federal Bureau of Investigation". The interface displays a data table with 50 rows and 4 columns. The columns are labeled A, B, C, and D, with headers "State text", "Population number", "Violent crime number", and "Property crime number". The table lists data for 19 states from Alabama to Maine. On the left side, there are four workflow steps: 1. "Add from URL" with a dropdown menu set to "Only this workflow's columns" and an "Update" button. 2. "Concatenate workflow" with a dropdown menu set to "Select tabs to append" and an "Update" button. 3. "Concatenate tabs" with a dropdown menu set to "Add source column" and an "Update" button. 4. "Google Drive" with a "Connect account" button, a checked "Has header row" checkbox, and an "Update" button. At the bottom left, there is a "+ ADD STEP" button.

	A	B	C	D
	State text	Population number	Violent crime number	Property crime number
1	ALABAMA	4,874,747	25,551	144,160
2	ALASKA	739,795	6,133	26,204
3	ARIZONA	7,016,270	35,644	204,515
4	ARKANSAS	3,004,279	16,671	92,489
5	CALIFORNIA	39,536,653	177,627	987,114
6	COLORADO	5,607,154	20,638	151,483
7	CONNECTICUT	3,588,184	8,180	63,509
8	DELAWARE	961,939	4,361	23,477
9	FLORIDA	20,984,400	85,625	527,220
10	GEORGIA	10,429,379	37,258	298,298
11	HAWAII	1,427,538	3,577	40,392
12	IDAHO	1,716,943	3,888	28,079
13	ILLINOIS	12,802,023	56,180	257,497
14	INDIANA	6,666,818	26,598	161,132
15	IOWA	3,145,711	9,230	66,855
16	KANSAS	2,913,123	12,030	81,593
17	KENTUCKY	4,454,189	10,056	94,833
18	LOUISIANA	4,684,333	26,092	157,712
19	MAINE	1,335,907	1,617	20,133

Workbench is a free and open source data journalism platform "that enables all stages of data journalism: getting data (including scraping), then cleaning, analyzing, visualizing, and sharing it.

<https://github.com/CJWorkbench>

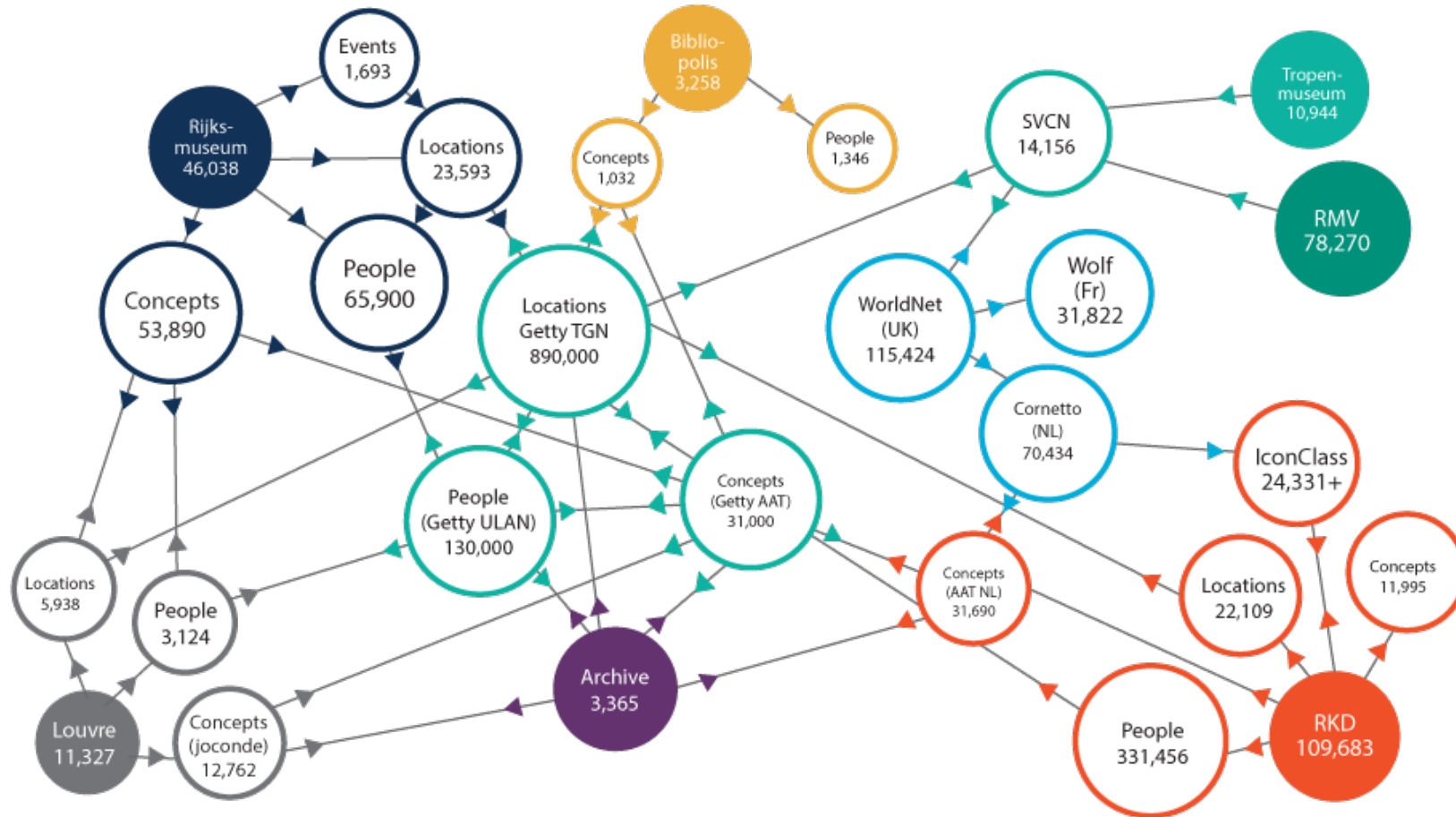
<https://app.workbenchdata.com/courses/intro-to-data-journalism>

DATA - CLOUD - AI



<https://giphy.com/gifs/cat-just-sleepy-DAmosupuFkPjG>

The Linked Open Data Cloud

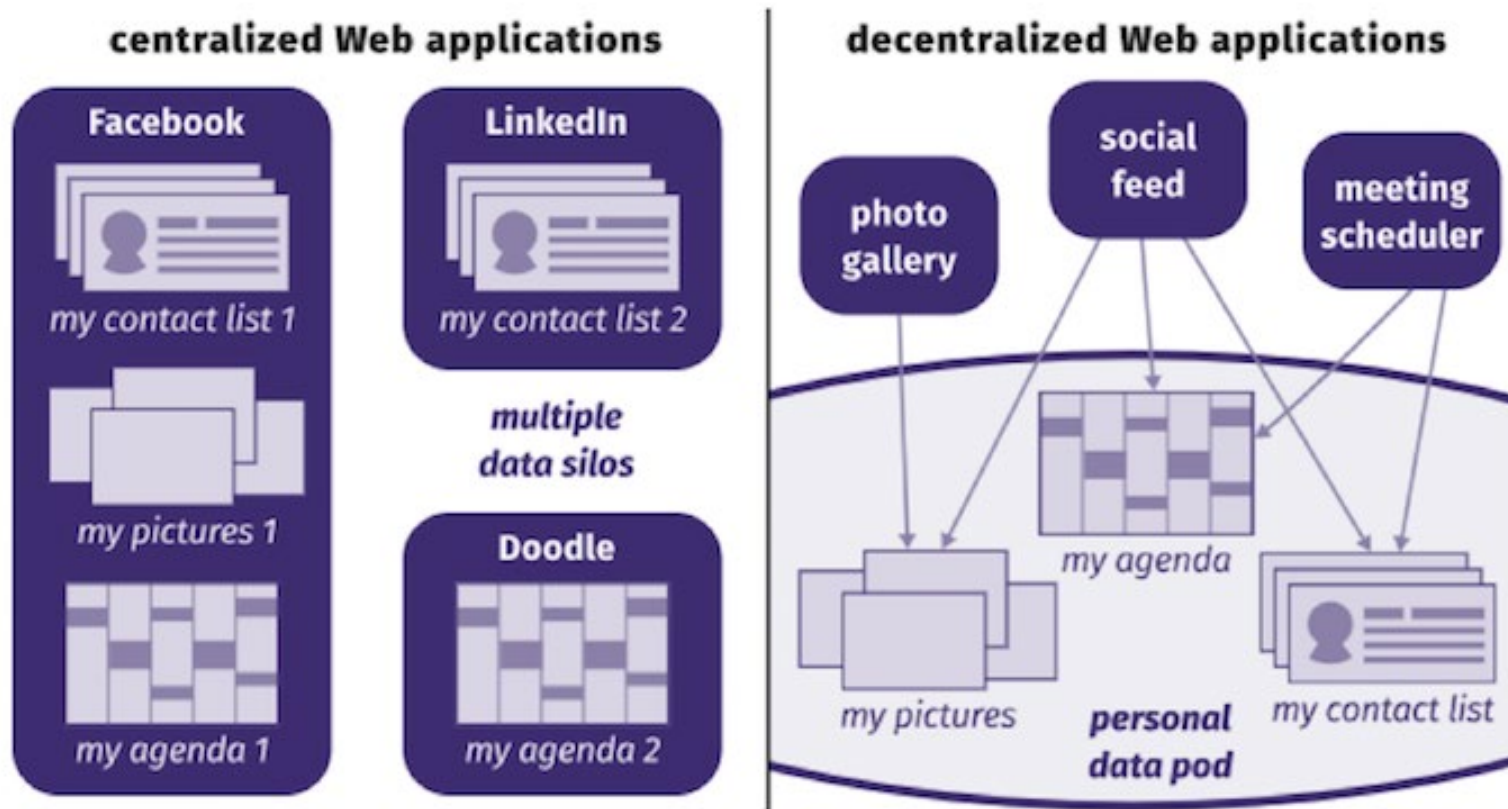


LinkedData is to spreadsheets and databases what the Web of hypertext documents is to word processor files.

<https://lod-cloud.net/>

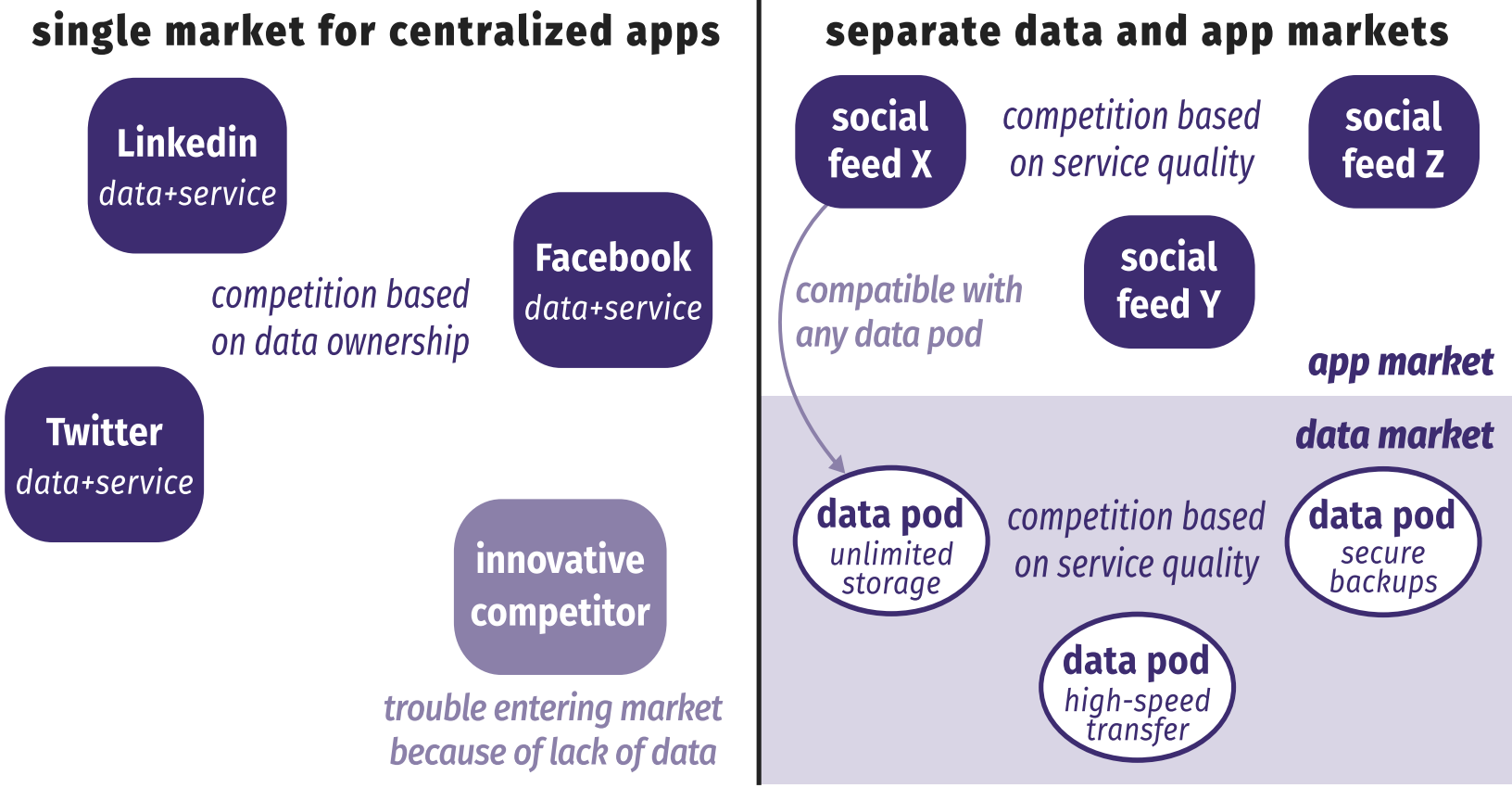
<https://ontotext.com/linked-open-data-cultural-heritage/>

Re-Decentralize the Web



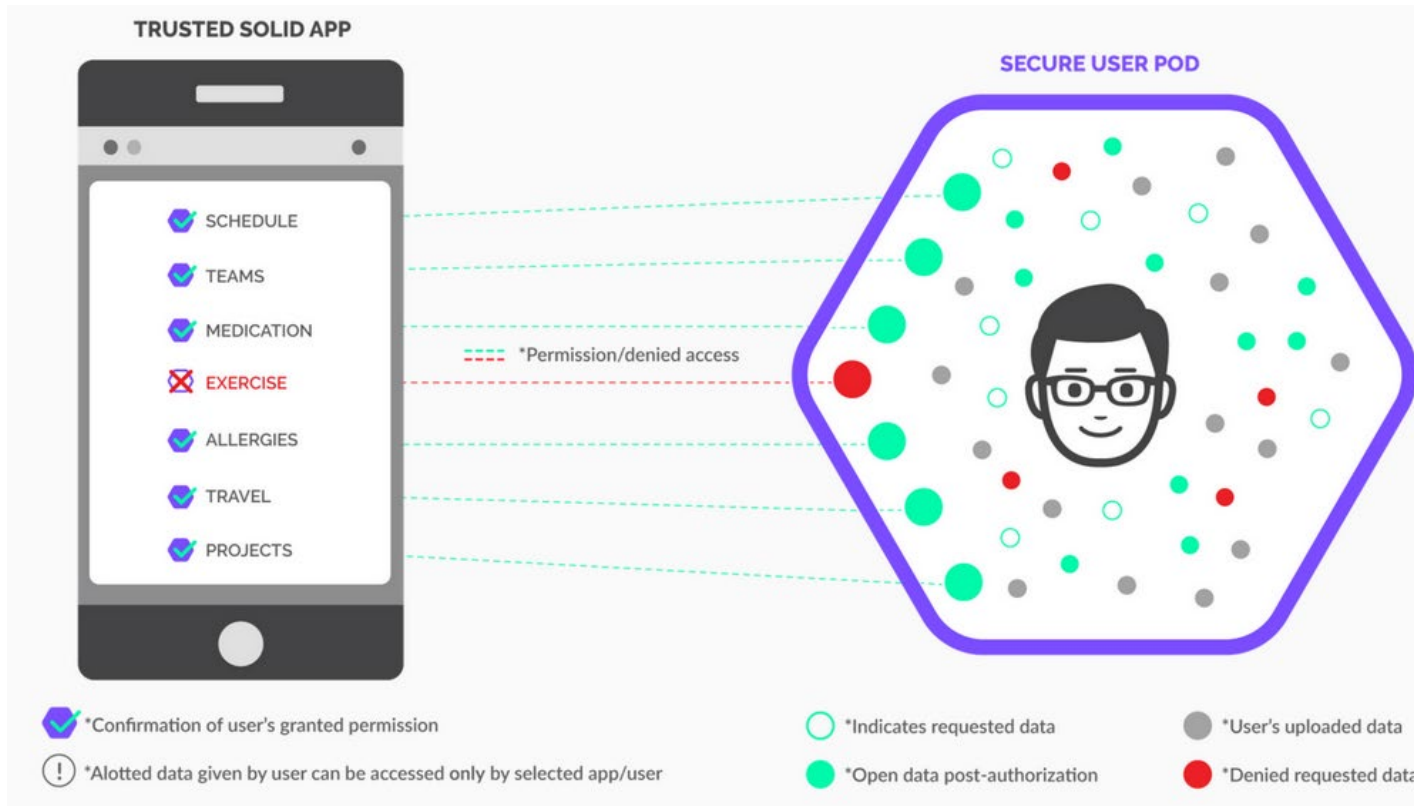
current Web apps combine *data* and *service*. Because of this coupling, our LinkedIn contacts cannot comment on our Facebook pictures, and an RSVP on a Facebook event will not be reflected in our Doodle calendar's availability. Decentralized applications, on the other hand, act as *views* on top of our data pod and those of others.

Decentralized Data and Service Providers



Centralized applications compete in a single market, based on data ownership. On a decentralized Web, data and service providers compete in different markets.

Decentralized Social Networks

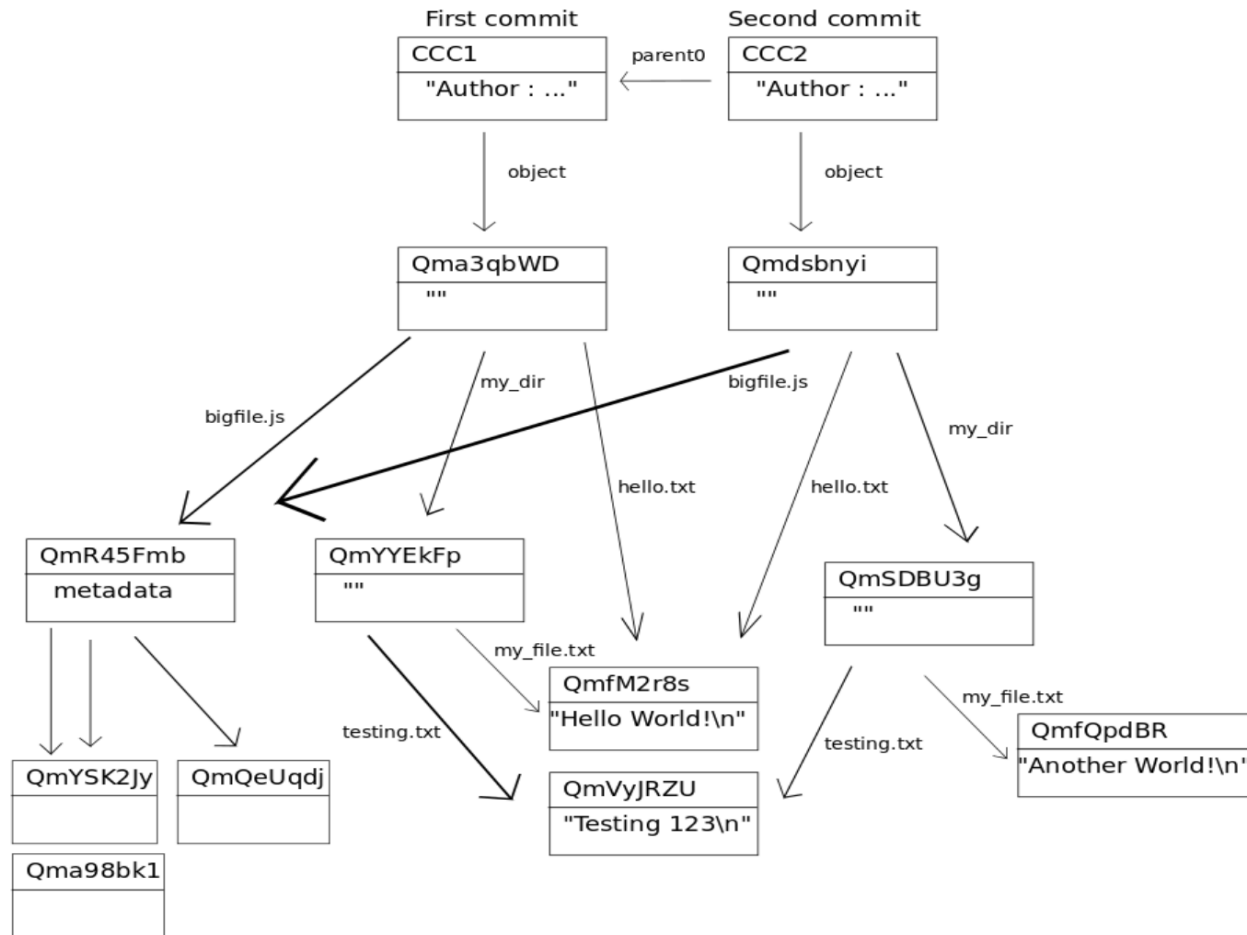


- Solid
- IndieWeb
- Mastodon
- MeFi
- ActivityPub

<https://www.w3.org/TR/activitypub/>

<https://solid.mit.edu/>

Web3



Web3 is to a large degree a reaction against centralization
Eg. IPFS, IPLD, dat://

<http://whatdoesthequantsay.com/2015/09/13/ipfs-introduction-by-example>

Linked AI Services



AI will be useful for creating resources, and will be accessible as a service we plug into

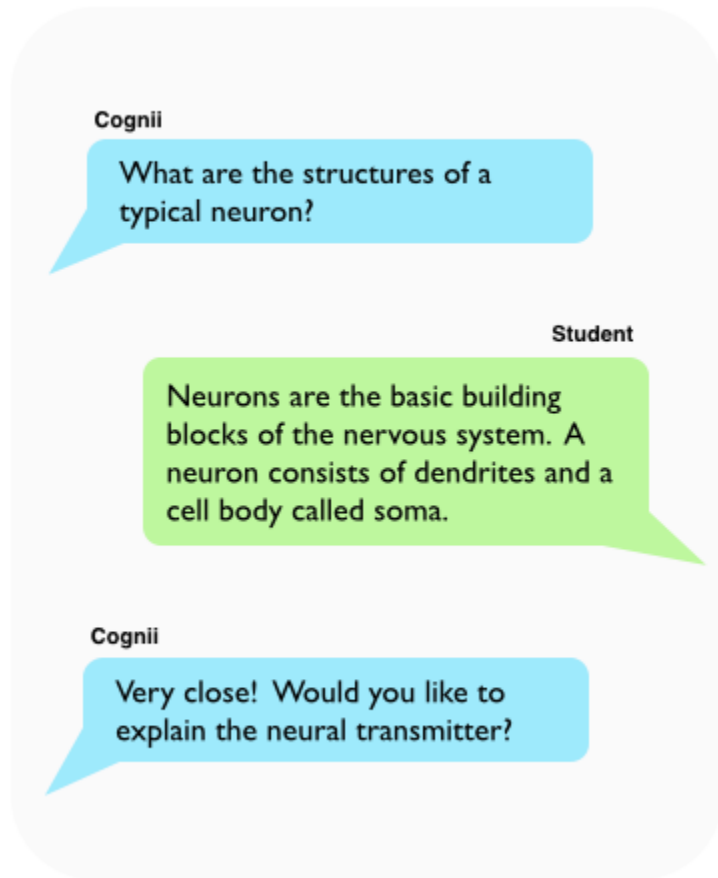
<https://hackernoon.com/understanding-artificial-intelligence-as-a-service-aias-780f2e3f663c>

AI-Generated Music



- MuseNet, " a deep neural network that can generate 4-minute musical compositions with 10 different instruments, and can combine styles from country to Mozart to the Beatles."
- [Relentless Doppelganger](#), the [Bot Prownies](#), who produce an almost-acceptable brand of punk. If you prefer guitar metal, [Coditany of Timeness](#) might be more to your taste. Not quite as successful is [Evolution 22](#) by Deep the Beatles. For something a little softer (and quite good) try [On the Edge](#), by AIVA. AIVA also does a nice [classical tune](#) or movie score. Need royalty-free music for your videos? Try [JukeDeck](#) (a little too house for my tastes). Taryn Southern, meanwhile, uses an AI to compose the music, then adds her own lyrics and vocals - her song [Break Free](#) is quite nice.

Cognii – SquirrelAI – Magpie – X5GON



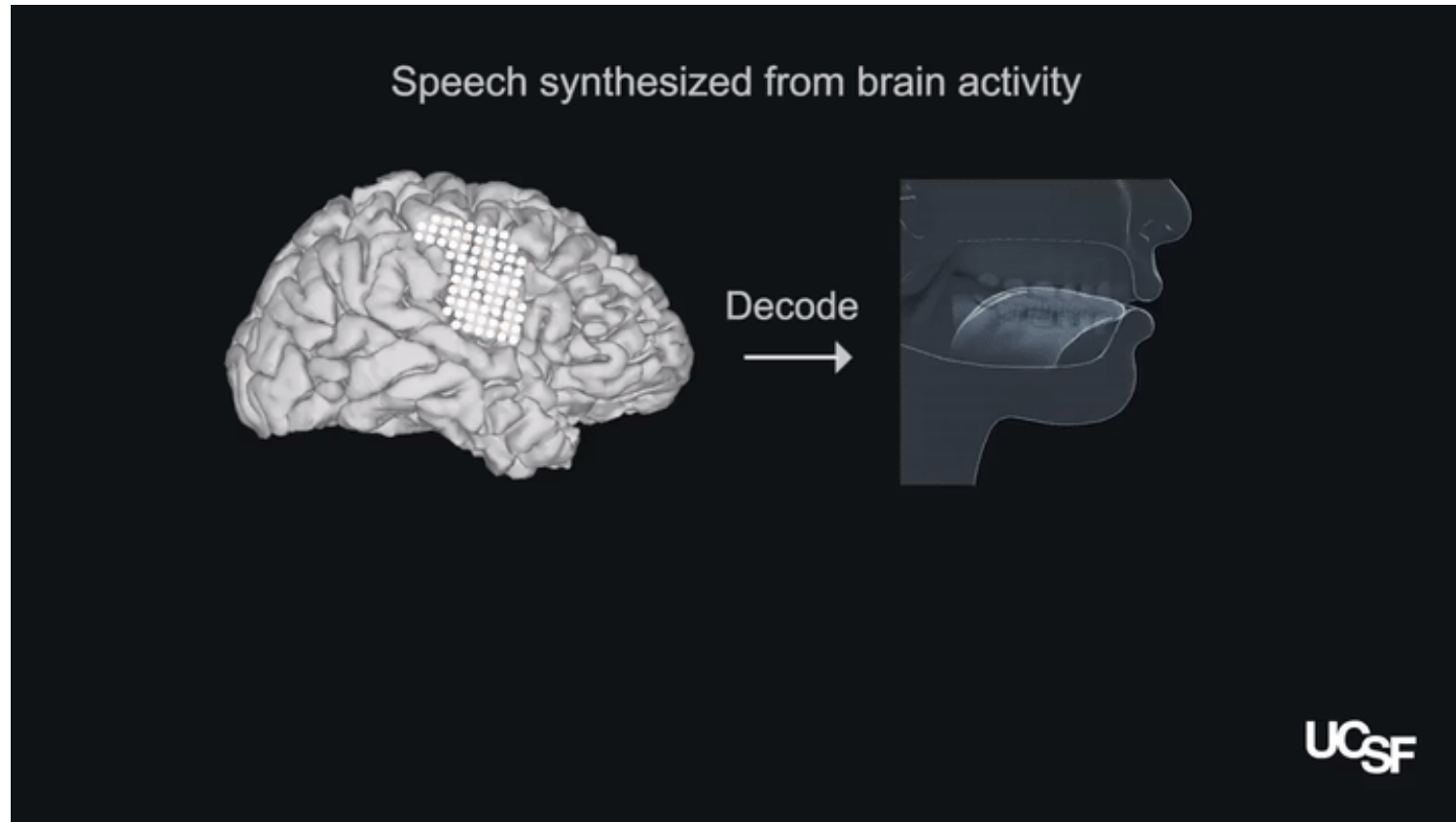
Cognii Virtual Learning Assistant engages a student in a chatbot-style learning conversation by prompting them to construct an answer, giving them instant formative assessment - <http://cognii.com/>

Squirrel AI - pure-play AI-powered adaptive education provider in China... provides personalized and high-quality K-12 after-school tutoring - <http://squirrelai.com/>

magpie recommends high-quality content and integrates with your learning systems - starts with a configurable chatbot conversation - prioritises most relevant content for each user. <https://learn.filtered.com/magpie>

X5GON.org – fully automated creation of OER courses - <https://www.x5gon.org/follow/oer/>

Brain Implant Can Say What You're Thinking



"it translates brain signals into movements of the vocal tract, including the jaw, larynx, lips, and tongue." These movements are then translated into speech.

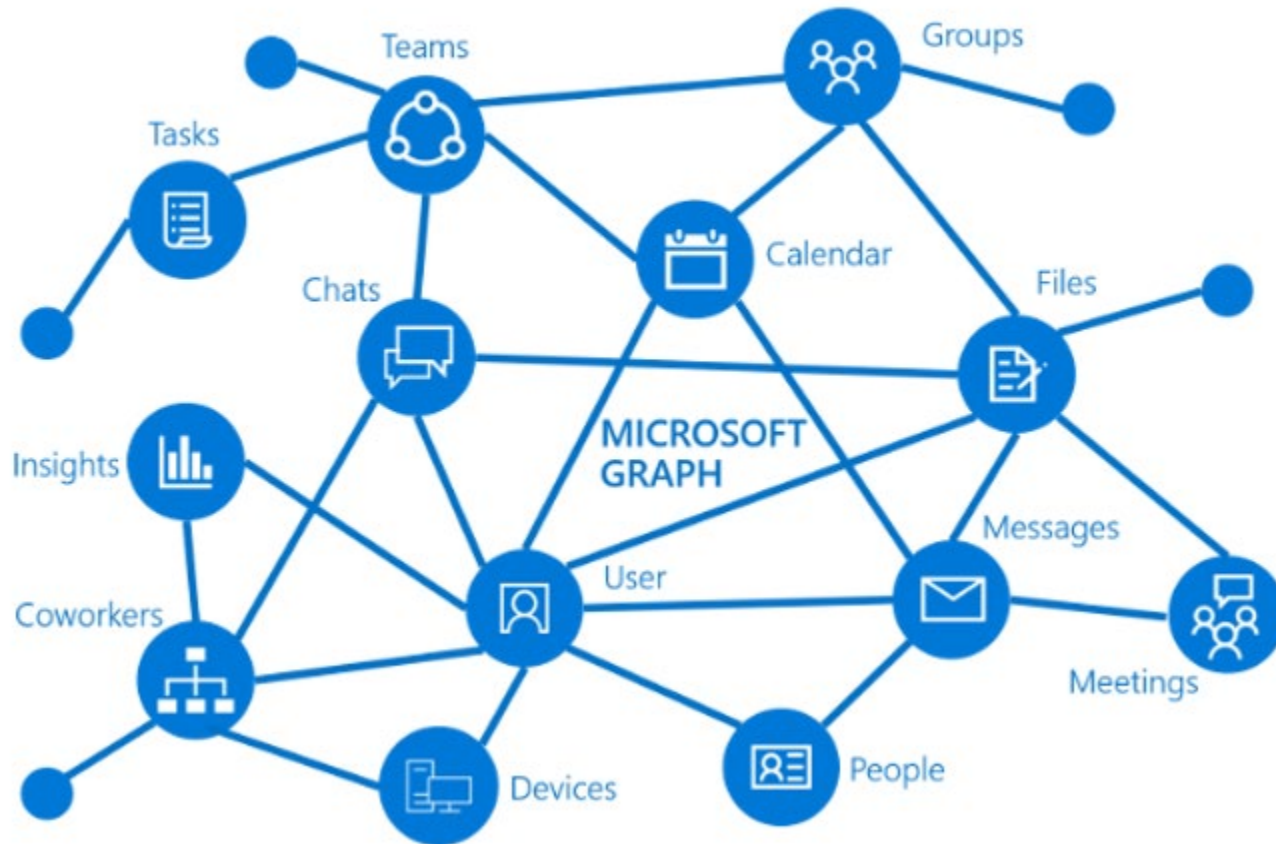
<https://spectrum.ieee.org/the-human-os/biomedical/devices/implant-translates-brain-activity-into-spoken-sentences>

GRAPH – COMMUNITY – AGENCY



<https://giphy.com/gifs/weekend-days-129NVCr1UfsGTS>

Graph as the conceptual basis for web3 networks

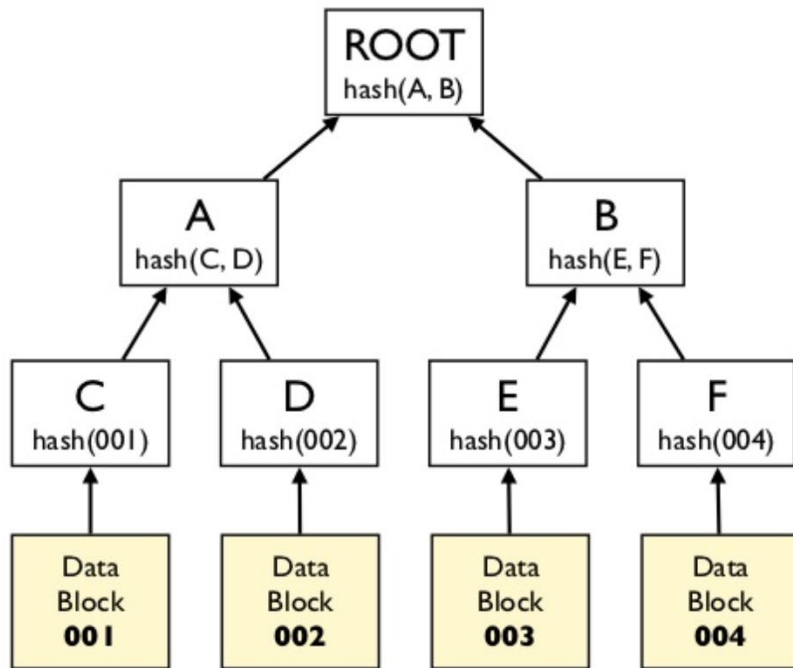


Graph connects all the resources across these services using relationships.

Graph Data Connect provides a way to interact with the data that's available through the Graph APIs.

From semantics to cryptography

Merkle Trees (Hash Trees)



Leaves: hashes of data blocks.

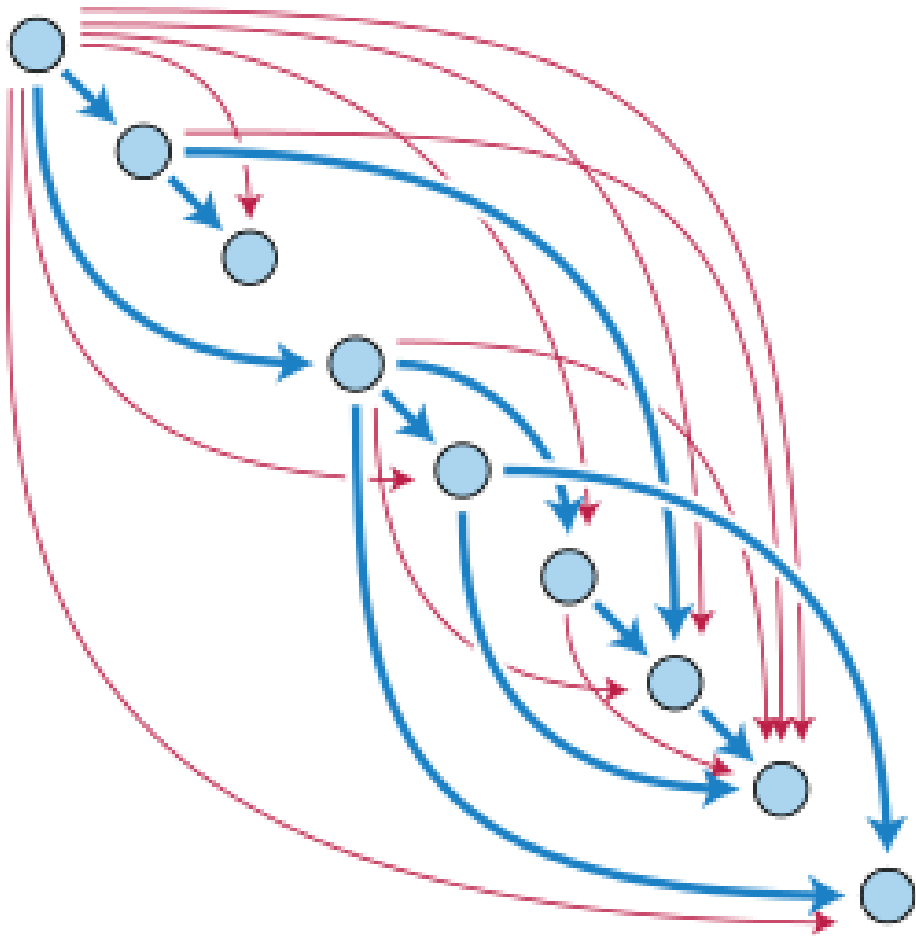
Nodes: hashes of their children.

Used to detect inconsistencies between replicas (anti-entropy) and to minimise the amount of transferred data

The transition: the Merkle graph

[https://www.slideshare.net/quipo/nosql-databases-why-what-and-when/91-Merkle Trees Hash Trees Leaves](https://www.slideshare.net/quipo/nosql-databases-why-what-and-when/91-Merkle-Trees-Hash-Trees-Leaves)

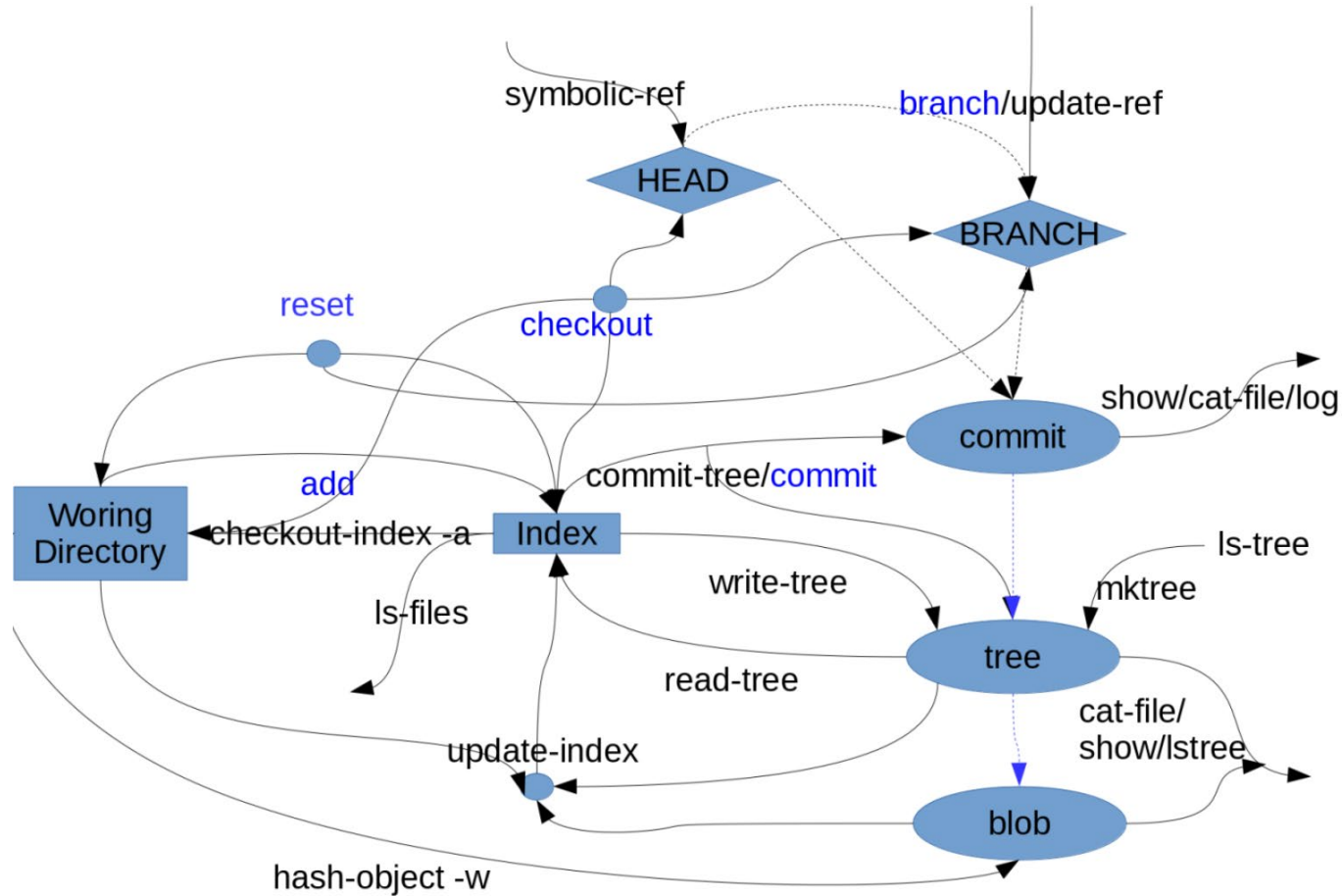
Directed Acyclic Graph (DAG)



Used to create collections of related data elements

https://en.wikipedia.org/wiki/Directed_acyclic_graph

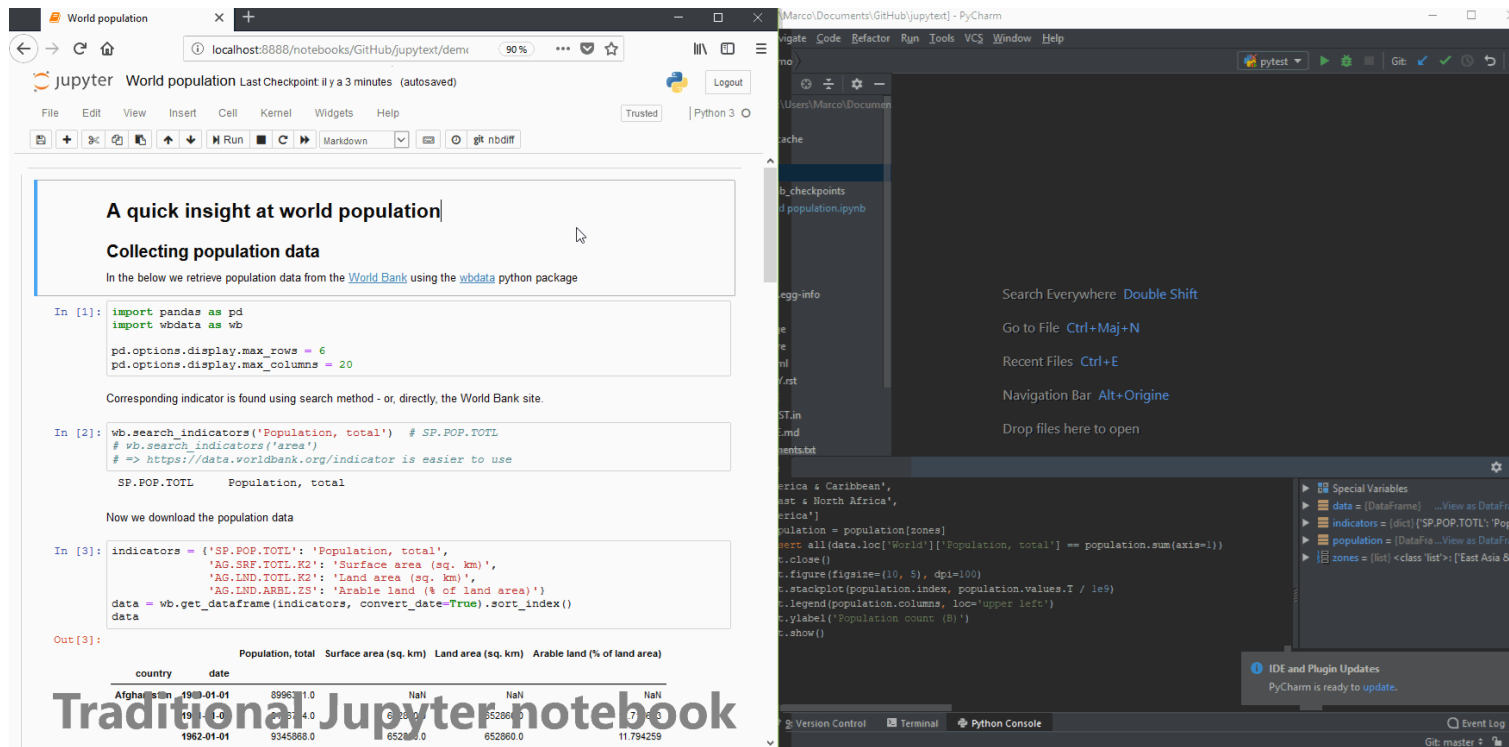
GitHub



Version control in a DAG

<https://lukeluo.blogspot.com/2014/06/git-as-i-understand-4-working.html>

JupyterText – Notebook plus version control



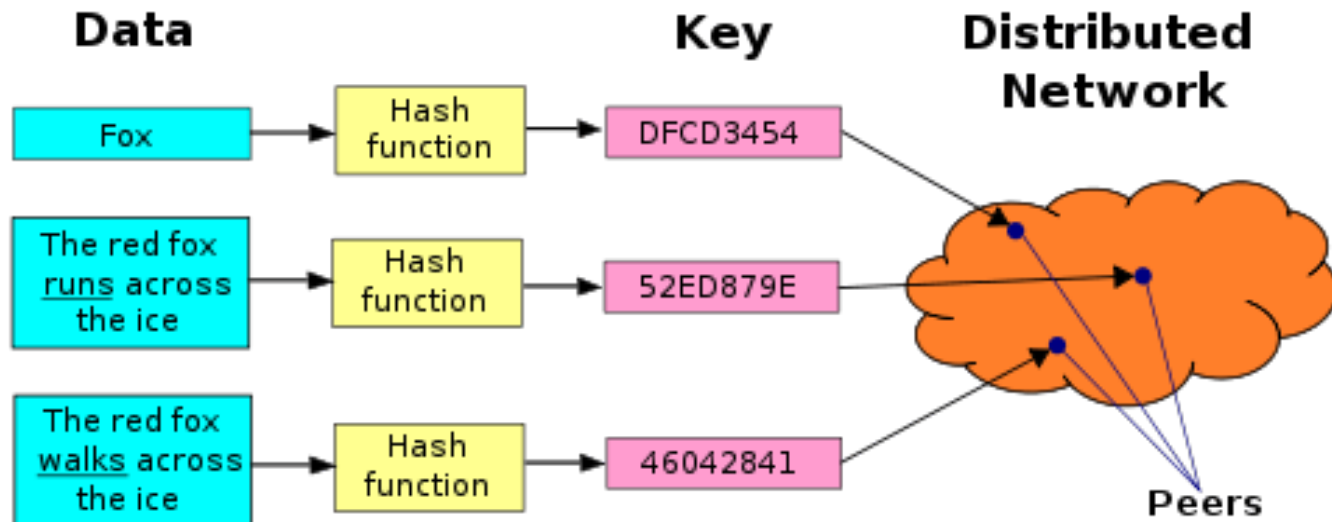
The image shows a JupyterText notebook interface on the left and a PyCharm IDE on the right. The notebook displays a title "A quick insight at world population" and a section "Collecting population data". It contains three code cells: the first imports pandas and wbddata; the second searches for population indicators; the third downloads the data. The output of the third cell is a table with columns: country, date, Population, total, Surface area (sq. km), Land area (sq. km), and Arable land (% of land area). The PyCharm IDE shows a file explorer with a file named "population.ipynb" and a code editor with Python code for data analysis and plotting.

Traditional Jupyter notebook

country	date	Population, total	Surface area (sq. km)	Land area (sq. km)	Arable land (% of land area)
Afghanistan	1980-01-01	8996311.0	NaT	NaT	NaT
Algeria	1980-01-01	1918542.0	238147.0	62817.0	26.36
Algeria	1982-01-01	9345868.0	652860.0	652860.0	11.794259

JupyterText saves two (synced) versions of your notebook. A .ipynb file and a .py file. (Other formats are possible as well.) Y

Content Addressable Networking

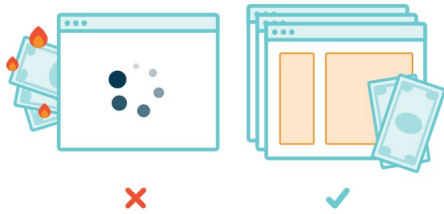


Locating data and resources by content has rather than location

Distributed Hash Table

https://ipfs.io/ipfs/QmXoyvizjW3WknFiJnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/Distributed_hash_table.htm
!

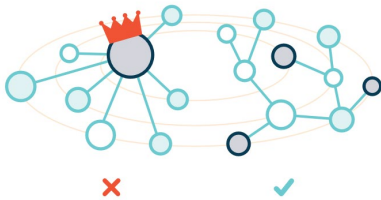
Resources



HTTP is inefficient and expensive



Humanity's history is deleted daily



The web's centralization limits opportunity



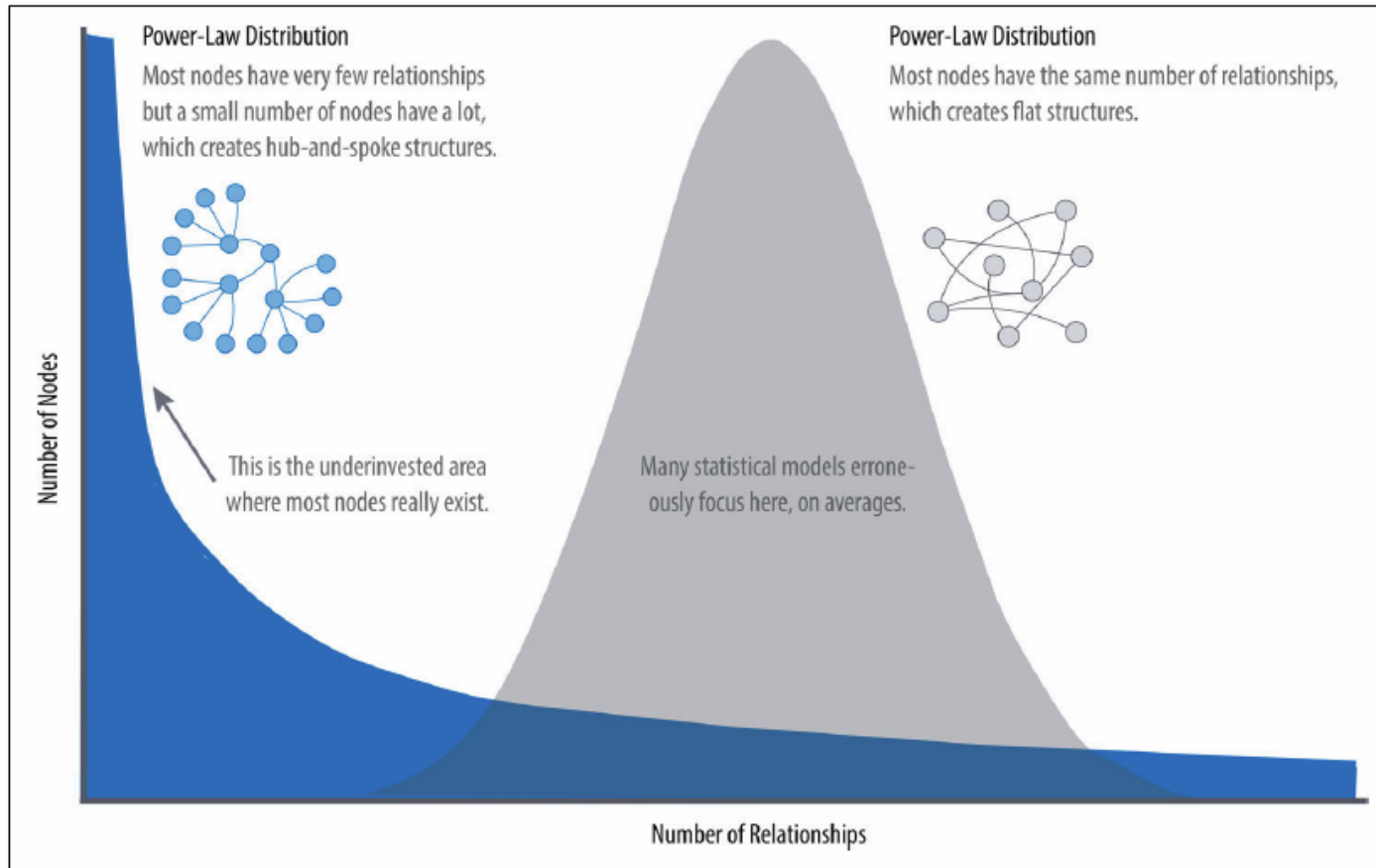
Our apps are addicted to the backbone

Content
Addressable
Resources for
Education

The new OER

<https://ipfs.io/>

Graph Algorithms



- Real-world networks have uneven distributions of nodes and relationships represented in the extreme by a power-law distribution. An average distribution assumes most nodes have the same number of relationships and results in a random network.

The types of questions graph analytics answer

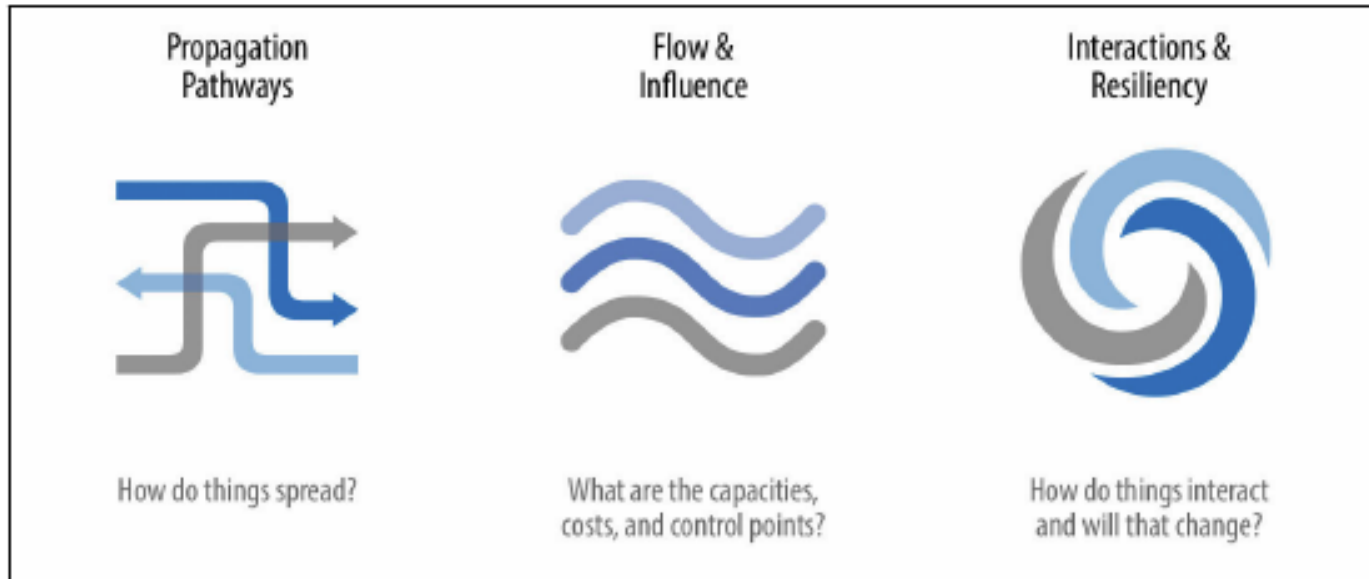
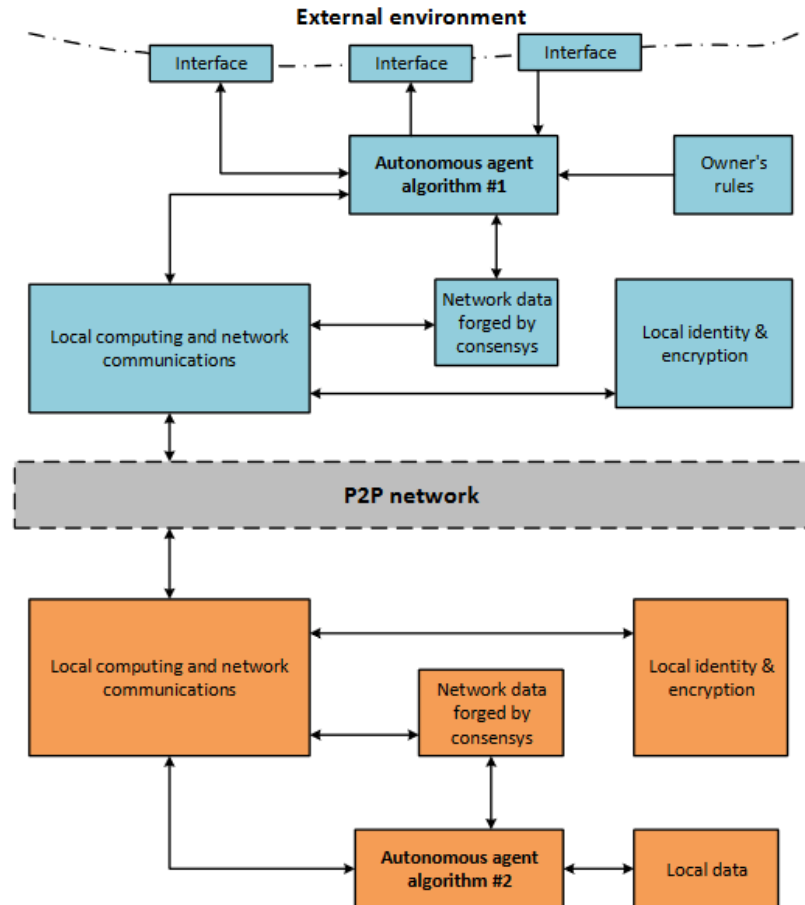


Figure 1-9. The types of questions graph analytics answer

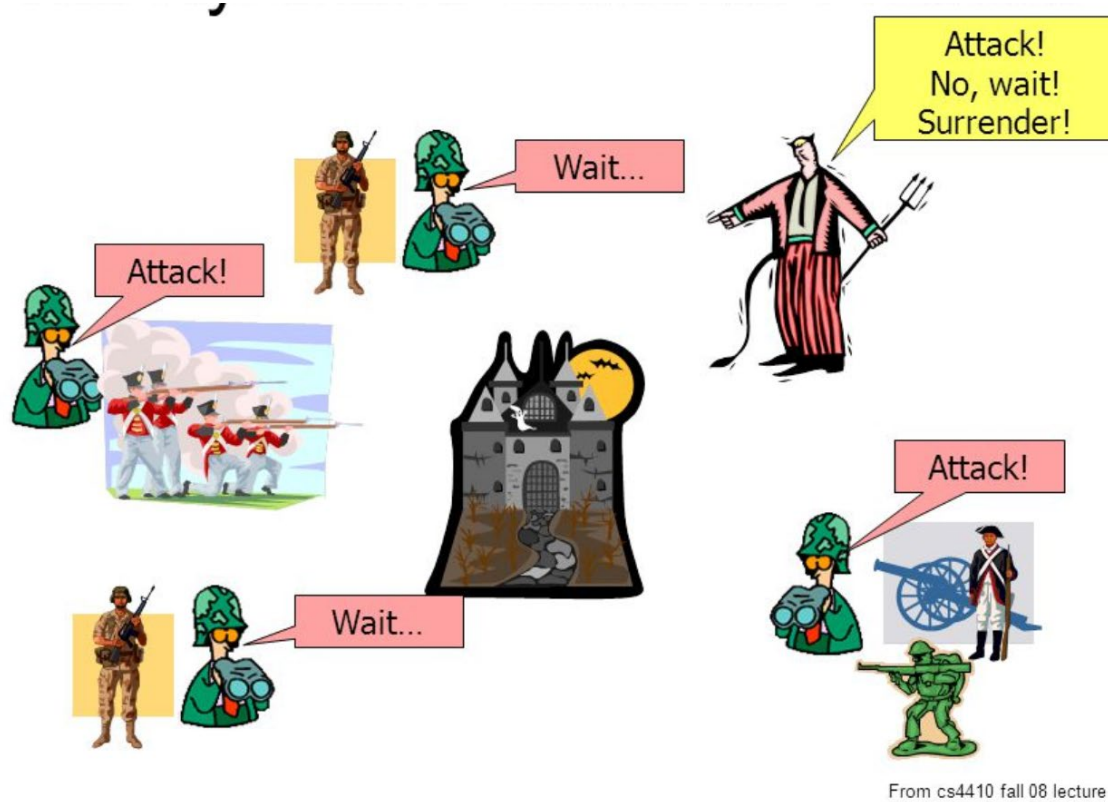
- Investigate the route of a disease or a cascading transport failure.
- Uncover the most vulnerable, or damaging, components in a network attack.
- Identify the least costly or fastest way to route information or resources.

Autonomous Agents Communication Scheme



- autonomous agents communication scheme. The arrows indicate transfer of any data. The dashed line shows the P2P network between agents.
- The dotted line shows external environment of the agent.
- (2) (PDF) Blockchain-based protocol of autonomous business activity for multi-agent systems consisting of UAVs. Available from: <https://www.researchgate.net/publication/325451400> Blockchain-based protocol of autonomous business activity for multi-agent systems consisting of UAVs [accessed Apr 28 2019].

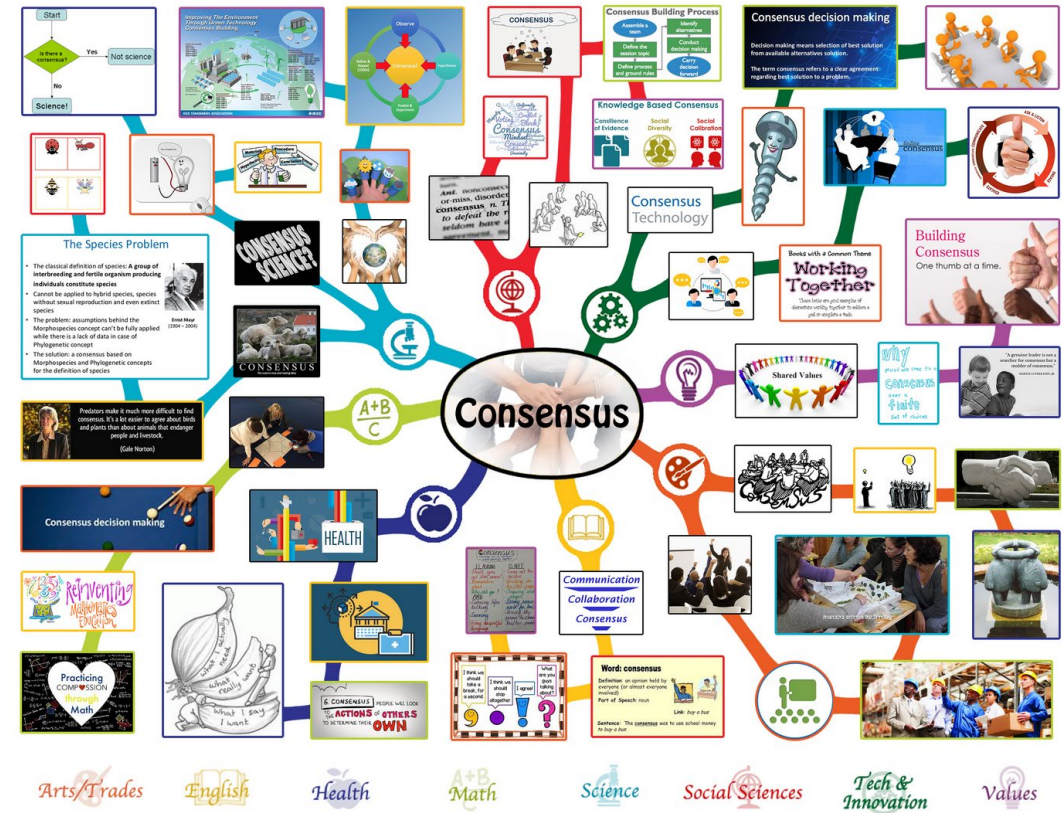
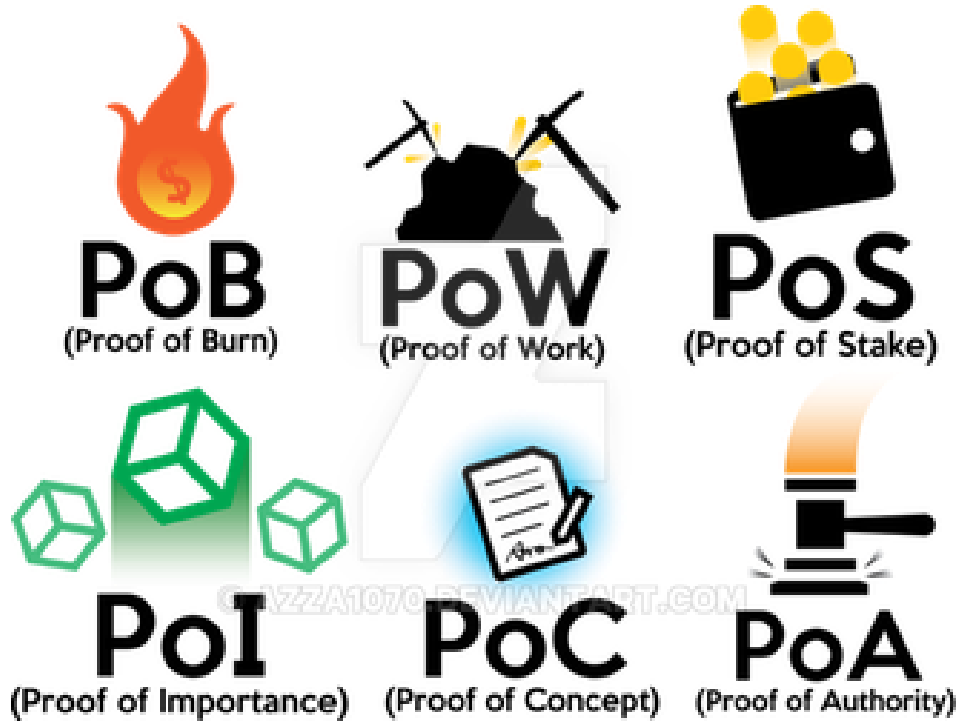
Community



The Byzantine Generals Problem

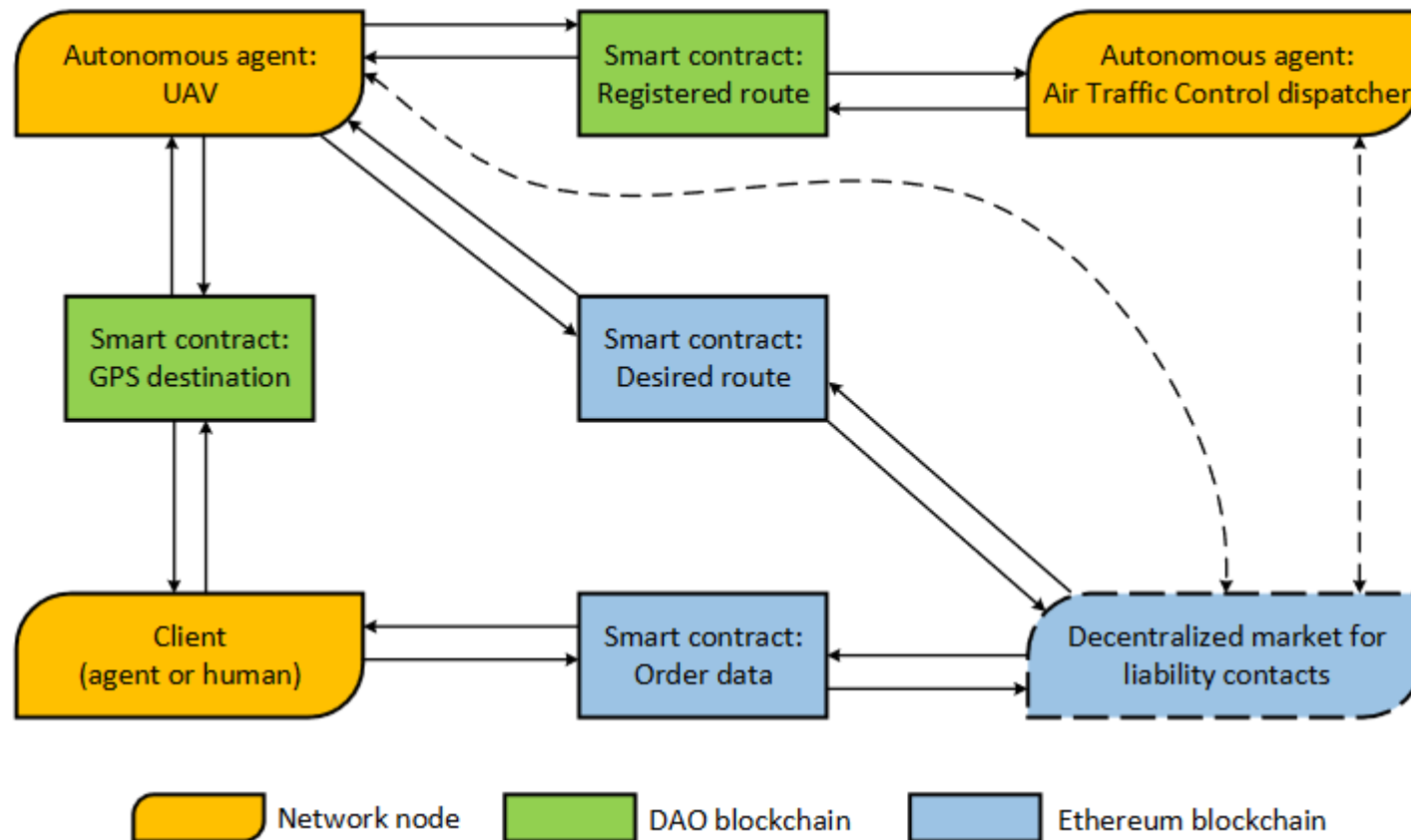
How to find the 'source of truth' in a world filled with bad actors and unknown quantities

Consensus



<https://www.deviantart.com/azza1070/art/Blockchain-Protocols-PoB-PoW-PoS-PoI-PoC-PoA-734159319>

Blockchain-based protocol for autonomous business activity



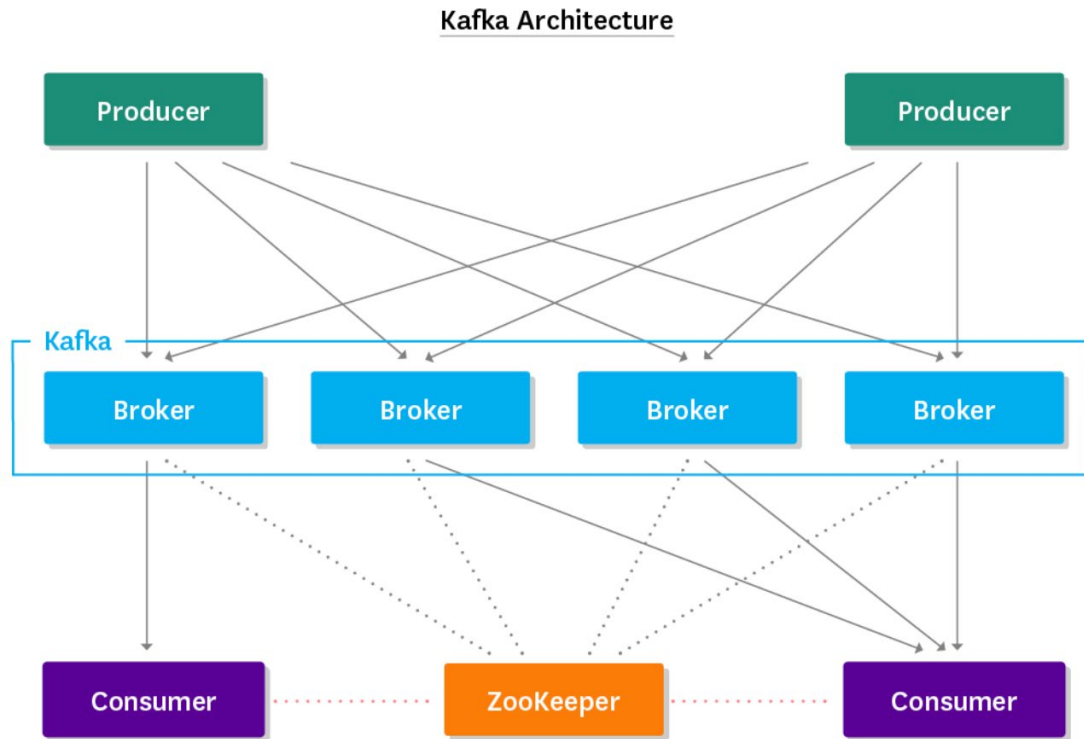
- Typical work scenario of Drone Employee. Dashed arrows indicate waiting of contract appearance. A set of all contracts in the network are integrated into decentralized market block.
- (2) (PDF) Blockchain-based protocol of autonomous business activity for multi-agent systems consisting of UAVs. Available from: https://www.researchgate.net/publication/325451400_Blockchain-based_protocol_of_autonomous_business_activity_for_multi-agent_systems_consisting_of_UAVs [accessed Apr 28 2019].
- Forget about artificial intelligence, extended intelligence is the future...
- Instead of thinking about machine intelligence in terms of humans vs machines, we should consider the system that integrates humans and machines – not artificial intelligence but extended intelligence.

PERSONAL LEARNING: REPRISE



<https://giphy.com/gifs/cat-kitty-meow-UZz8BikCqfYzK>

Identity



- Coordinates cluster membership
- Commit offset (v0.8)

We are the thread that runs through an otherwise disconnected set of data

<https://www.datadoghq.com/blog/monitoring-kafka-performance-metrics/>

Extended intelligence is the future



Joi Ito: design of systems as and by participants – that is more akin to the increase of a flourishing function, where flourishing is a measure of vigour and health rather than scale, money or power.

Rememeber...



<https://giphy.com/gifs/air-zzz-biscuits-9ociuoxbsNeE0>

Remember....
It's all just cat pictures