

The Machine Internet

Hyperlinking API Resources



XapiX.io

Vision and Derivation

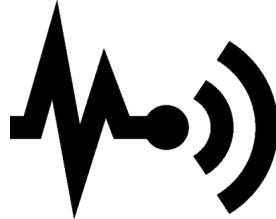
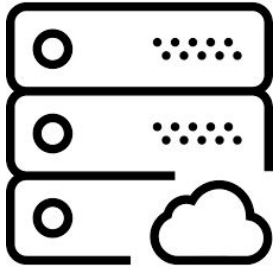
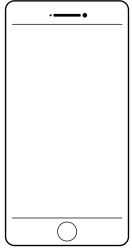
1. Deciphering the Title feat. Wikipedia
2. Parallels between WWW and APIs
3. Existing API Standards
4. Open Requirements for the Machine Internet Era
5. Potential Results



Machine Internet

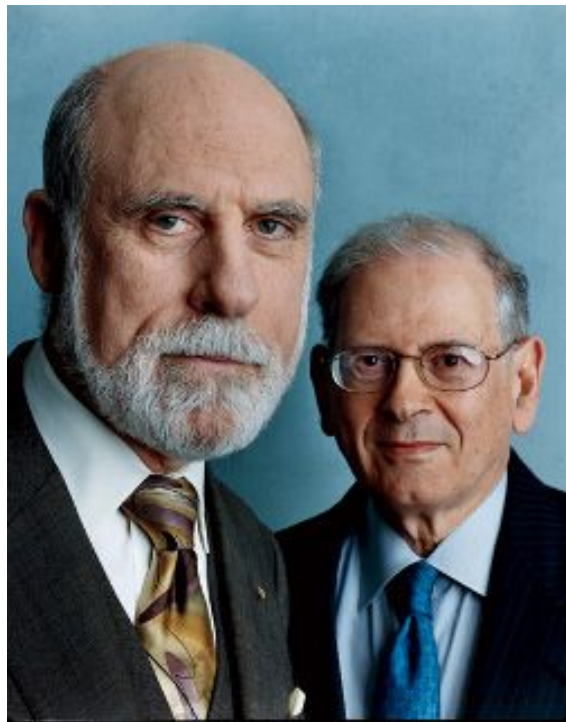
Hyperlinking API Resources

Machine



Hardware connected to Internet operating Software, both Client and Server

Internet



Vint Cerf & Bob Kahn (TCP/IP)

- TCP/IP (1970s) and ARPANET
- CSNET (1981) Science Network
- Commercial ISPs (late 1980s)
- Institutions exchanging data directly via oftenly individual protocols

Boost when hyperlinks enabled the WWW.

Hyperlink



Tim Berners-Lee (WWW)

- Reference to data that the reader can directly follow
- Points to a whole document or to a specific element within a document

Best known in world wide web (WWW), but really any kind of medium on the internet.

Web API



- Defined interfaces between an enterprise and applications
- Set of services to different applications serving different types of consumers
- Mostly intranet, but exponentially growingly: public Web APIs

Unicorn API-First business models emerged.

RESTful APIs



Roy Fielding (REST)

Systems allowing to access and manipulate textual representations of Web Resources using a uniform and predefined set of stateless operations.

- HTTP methods GET, POST, PUT, DELETE
- Re-using components managed and updated without affecting whole system

Resources (ROA)

Software architecture and programming paradigm for designing software in reusable resources with "RESTful" interfaces.

Guidelines:

- Query string parameters in the URI are appropriate if they are inputs to a Resource which is an algorithm
- Prefer pragmatic uses of putting data into URI, instead of using HTTP Headers
- RPC-style APIs are avoided in favor of Resources and protocols
- A resource should have many links to the other Resources in the application so a client can discover state transitions
- URI templates provide the technology behind specifying families of URI to clients.
- Applications should expose many URIs one for each Resource (unique URI)
- Cookies representing IDs into a server side session are not RESTful
- Combinations of resources can be RESTful only if the combination can be represented as a URI
- RESTful URIs should facilitate "cut & paste" (notion of "transfer" in REST)



Parallels

WWW vs APIs

Hypertext

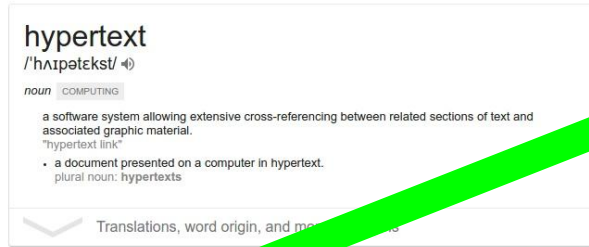
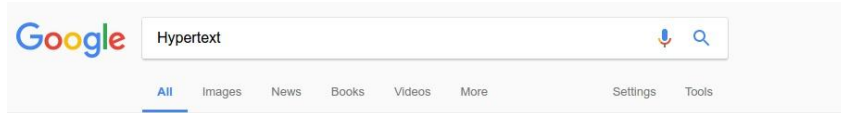


- Text with Hyperlinks
- World Wide Web
- Hypertext markup language (HTML)

Example link (W3C organization):

```
<a href="http://www.w3.org">W3C</a>
```

World Wide Web



Hypertext - Wikipedia

<https://en.wikipedia.org/wiki/Hypertext>

Hypertext is text displayed on a computer display or other electronic devices with references (hyperlinks) to other text that the reader can immediately access, or where text can be revealed progressively at multiple levels of detail (also called *StretchText*).

Types and uses of hypertext · History · Hypertext fiction · References

Hypertext – Wikipedia

<https://de.wikipedia.org/wiki/Hypertext> · [Translate this page](#)

Ein Hypertext (engl. Aussprache [ˈhʌpɪˌtɛkst], Wortbildung aus altgriechisch ὑπέρ hyper-, deutsch „über, oberhalb, über ... hinaus“ und lateinisch textere, ...

Definition · Geschichte und Entwicklung · Hypertext und Literatur · Forschungsfragen

What is Hypertext?

<https://www.w3.org/WhatIs.html>

Hypertext is text which contains links to other texts. The term was coined by Ted Nelson around 1965.



Article Talk

Hypertext

From Wikipedia, the free encyclopedia

For the concept in semiotics, see [Hypertext \(semiotics\)](#).

"Metatext" redirects here. For the literary concept, see [Metafiction](#).

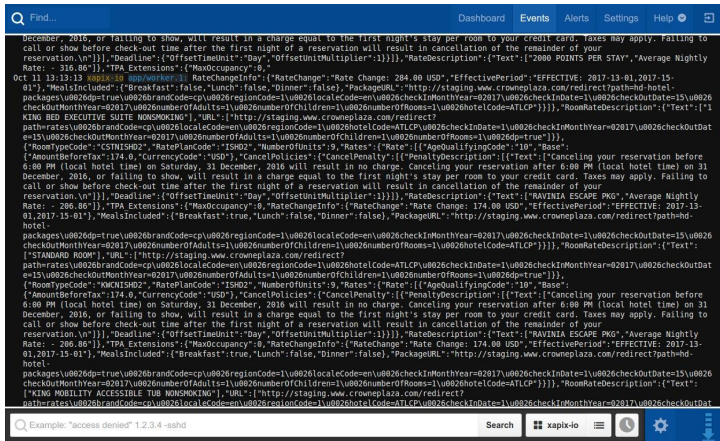
Hypertext is text displayed on a computer display or other electronic devices with references (hyperlink text can be revealed progressively at multiple levels of detail (also called *StretchText*).^[1] Hypertext documents are activated by a mouse click, keypress sequence or by touching the screen. Apart from text, the term "hypertext" can also refer to other presentational content forms with integrated hyperlinks. Hypertext is one of the key underlying concepts written in the *Hypertext Markup Language* (HTML). As implemented on the Web, hypertext enables the

Contents [hide]

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Hypermedia / HATEOAS



- Constraint of REST where client interacts with server entirely through hypermedia
- No API documentation needed, no prior knowledge of application or server
- Machine readable links referencing related resources

Example link:

Next Slide...

Machine Internet

```
{
  "jsonapi": {
    "version": "1.0"
  },
  "data": {
    "type": "google_search_results",
    "id": "10",
    "attributes": {
      "description": "Hypermedia, an extension of the term hypertext, is a nonlinear m
hyperlinks. This designation contrasts with the broader term multimedia, which
      "g_id": "10",
      "name": "Hypermedia: Wikipedia",
      "url": "https://en.wikipedia.org/wiki/Hypermedia",
      "wikipedia_article_id": "1001"
    },
    "links": {
      "self": "https://xap.ix-io.net/api/v1/machine_internet/google_search_results/10"
    },
    "relationships": {
      "wikipedia_article": {
        "links": {
          "self": "http://internal-awseb-e-...b10a-76k5atq8nnoy-113977950.eu-west-1.elb.amaz
wikipedia_article",
          "related": "https://xap.ix-io.net/api/v1/machine_internet/wikeipedia_articles/1001"
        },
        "data": {
          "type": "wikeipedia_articles",
          "id": "1001"
        }
      }
    }
  }
}
```

```
{
  "jsonapi": {
    "version": "1.0"
  },
  "data": {
    "type": "wikeipedia_articles",
    "id": "1001",
    "attributes": {
      "content_body": "Hypermedia, an extension of the term hypertext, is a nonlinear m
hyperlinks. This designation contrasts with the broader term multimedia, which may incl
related to the field of electronic literature. The term was first used in a 1965 articl
hypermedia, whereas a non-interactive cinema presentation is an example of standard mul
arguably, the Aspen Movie Map. Bill Atkinson's HyperCard popularized hypermedia writi
fiction, demonstrated the promise of links. Most modern hypermedia is delivered via ele
and stand-alone applications (i. e., software that does not require network access). Au
      "language": "en",
      "title": "Hypermedia",
      "w_id": "1001"
    },
    "links": {
      "self": "https://xap.ix-io.net/api/v1/machine_internet/wikeipedia_articles/1001"
    }
  }
}
```

Hyperlinks in Hypermedia

404

Not Found

- Hypermedia is not broadly adopted
- Lacking standardization & compatibility
- No APIs reference external resources

There are no Hyperlinks in Hypermedia, yet.

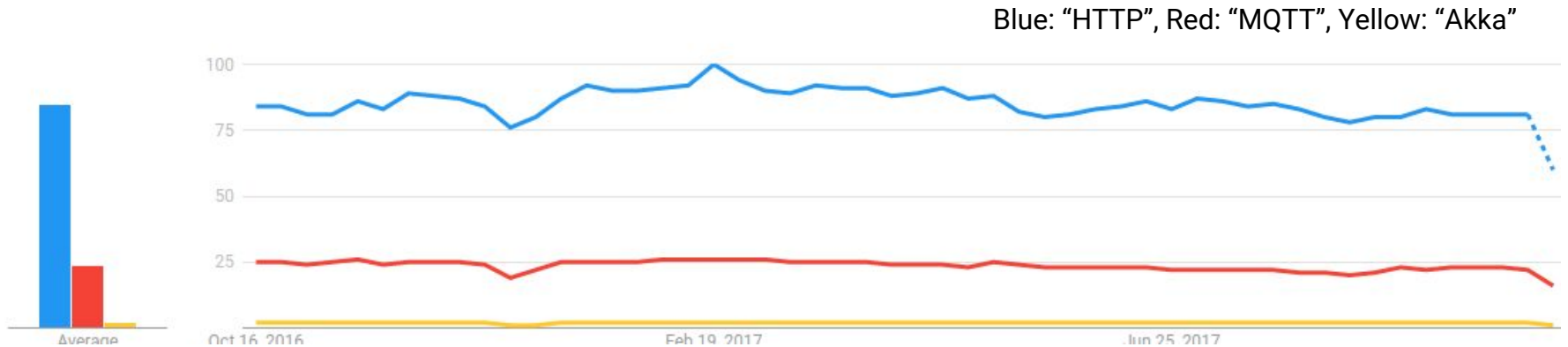
There is no Machine Internet, yet.



Standards around Web APIs

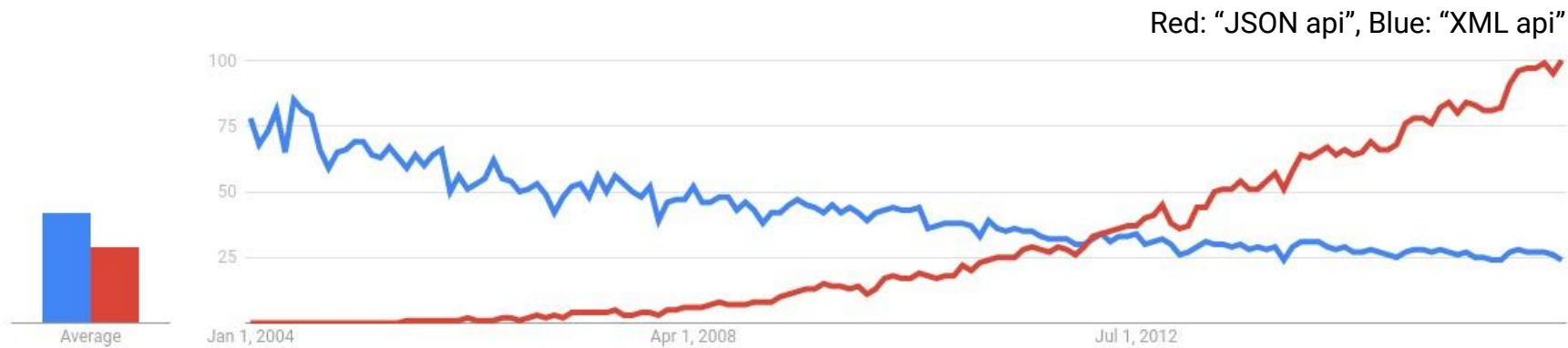
Protocol: HTTP, FTP, MQTT, etc

- HTTP by far most common protocol, also for APIs and IoT
- HTTP 2.0 coming up
- MQTT quite relevant in IoT



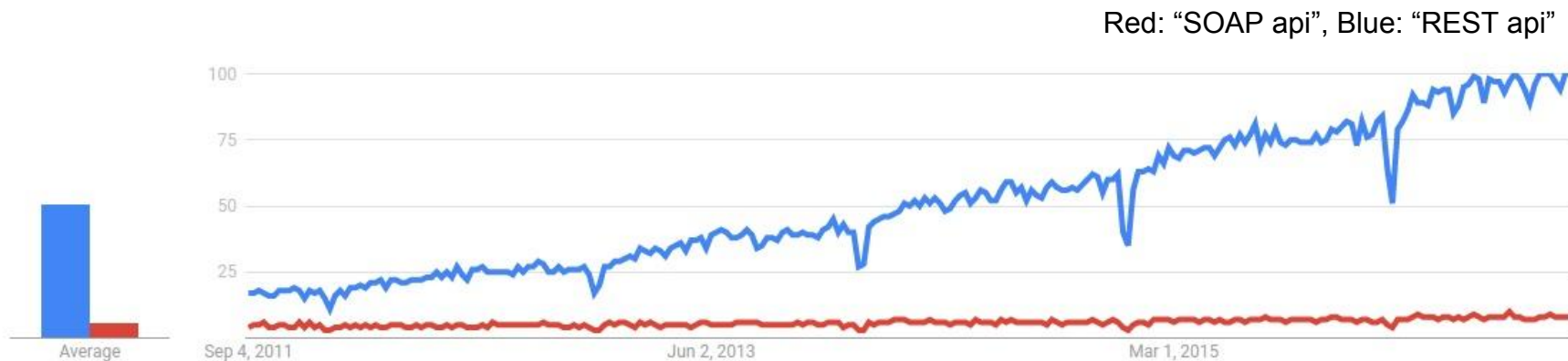
Data Types: JSON, XML, YAML, etc

- JSON is most popular format today
- JSON schema
- XML is still relevant, especially in enterprises



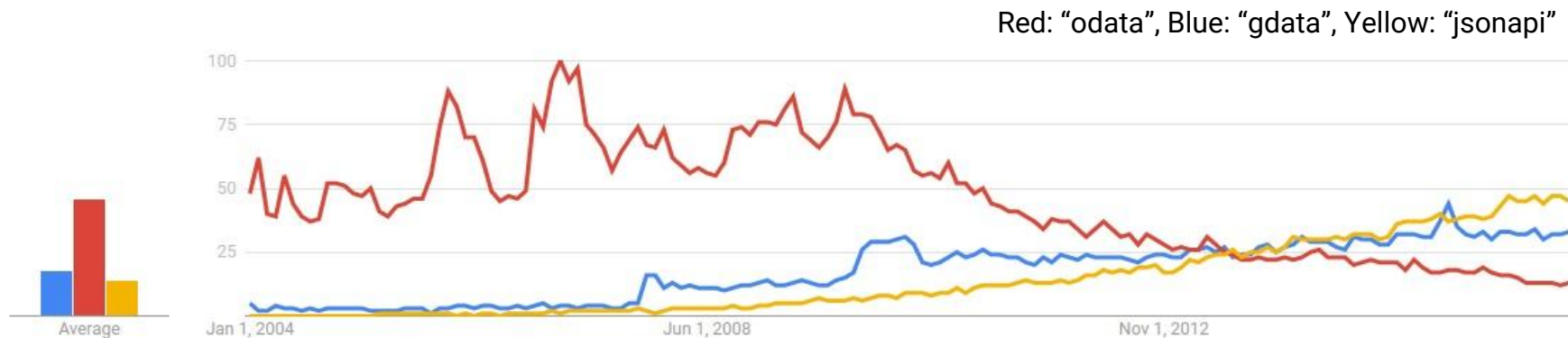
Designs: REST, SOAP, EDI, etc

- New APIs usually try implementing REST
- SOAP Web Services was very popular in the 90s
- Good amount of older design approaches



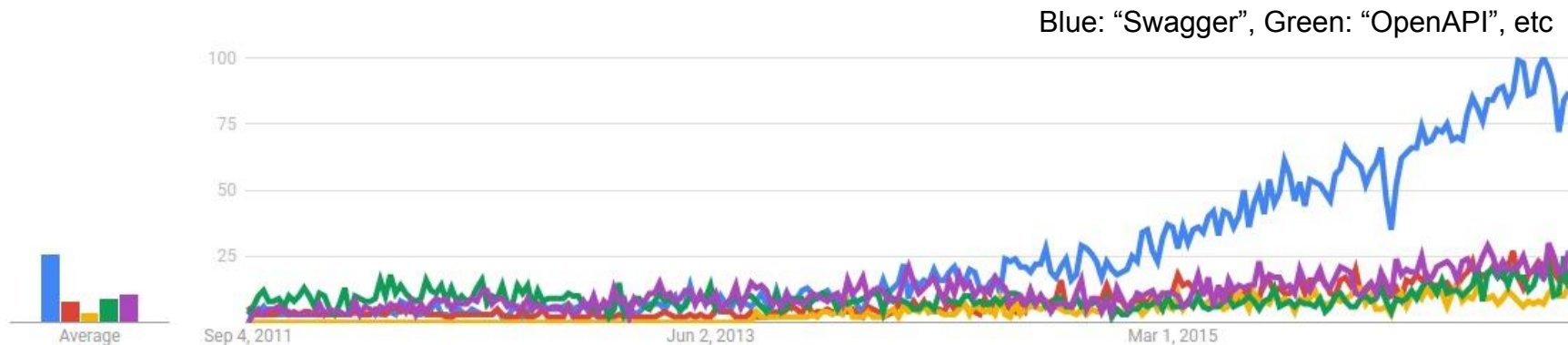
Formats: json:api, OData, GData, etc

- Open source Hypermedia format jsonapi.org recommended
- OData in enterprise software somewhat relevant
- None really picking up massive traction



Docs: Swagger, OpenAPI, RAML, etc

- Swagger became OpenAPI
- RAML, API Blueprint, etc all joined OpenAPI initiative
- Swagger-UI is very popular with developers



Industry Standards: NGSI, NDC, CAN Bus, etc



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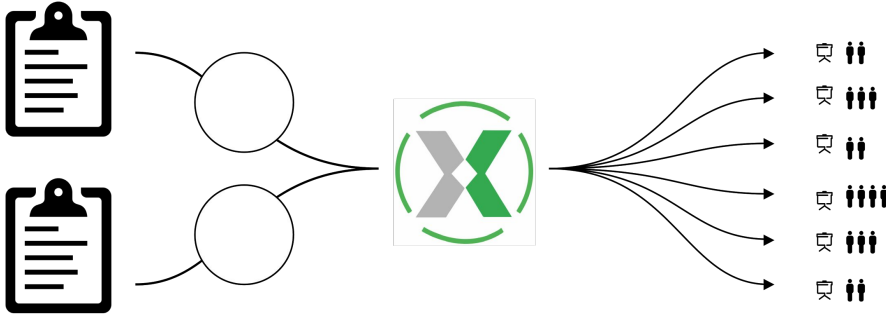
Open Requirements

Machine Internet Era

Data Transformation

- Enterprise Service Bus (ESB), custom Middleware
- MuleSoft, etc
- Global curated industry data standards

Our Solution: [XapiX.io](https://xapix.io)



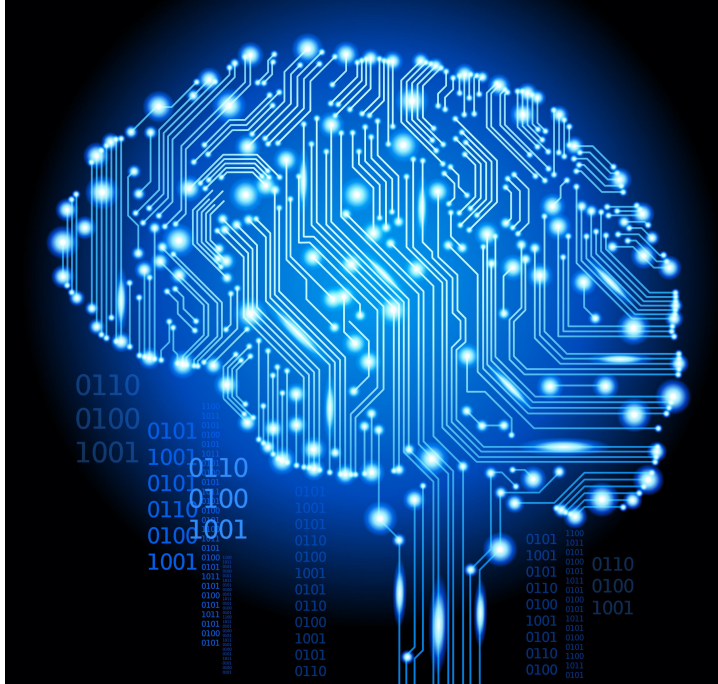
Data Integration

- Developer Portals
- CloudElements, RapidAPI, etc
- Global curated industry data standards

Our Solution: [XapiX.io](https://xapix.io)



Artificial Intelligence / Deep Learning



- Auto-Discover Data
- Auto-Enrich Data
- Auto-Correct Data
- Auto-Suggest Integrations
- Auto-Integrate Suggestions
- Auto-Everything!



Grande Finale

Potential Results

Cloud God



God

@TheGoodGodAbove

Follow

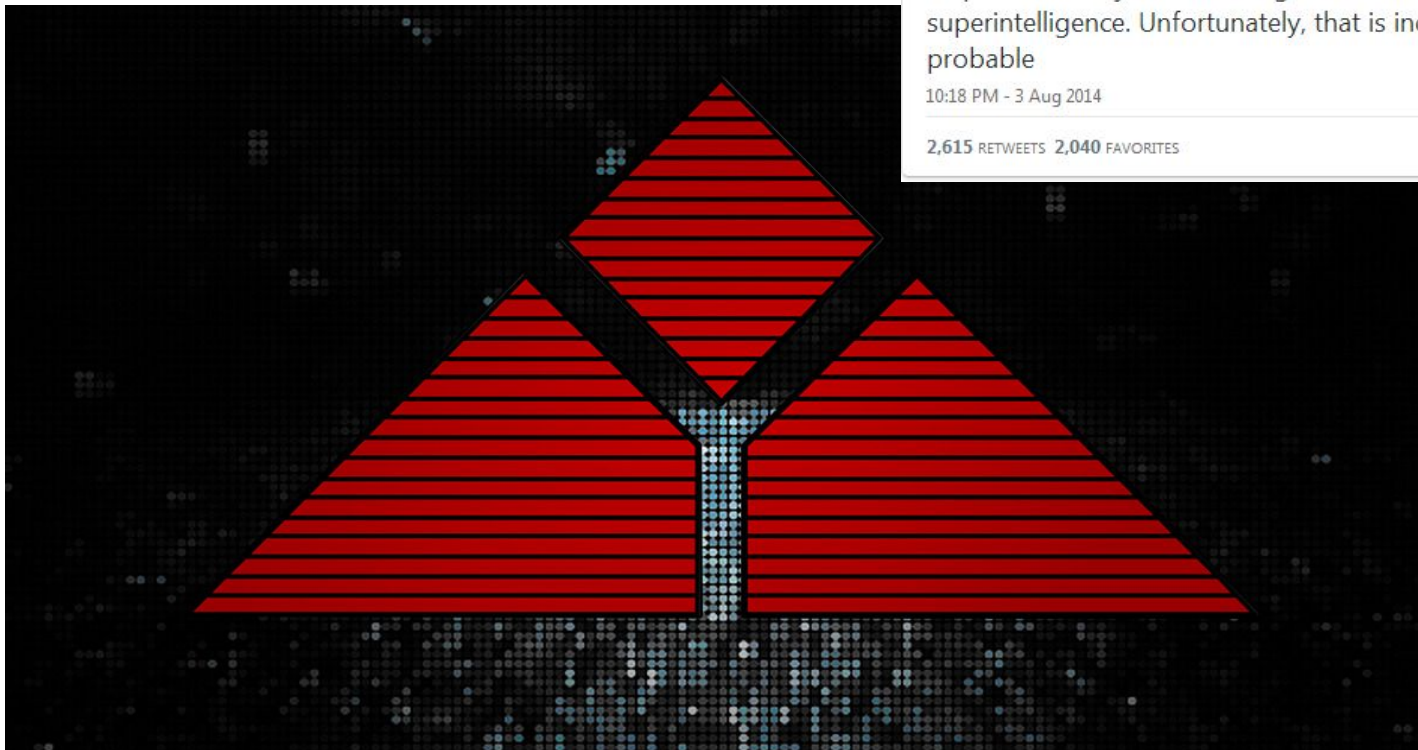
IF YOU KIDS DON'T START BEHAVING I'M TURNING
THIS UNIVERSE RIGHT AROUND!

11:54 PM - Oct 6, 2017

115 450 2,222



SKYNET



Elon Musk ✓

@elonmusk

Follow

Hope we're not just the biological boot loader for digital superintelligence. Unfortunately, that is increasingly probable

10:18 PM - 3 Aug 2014

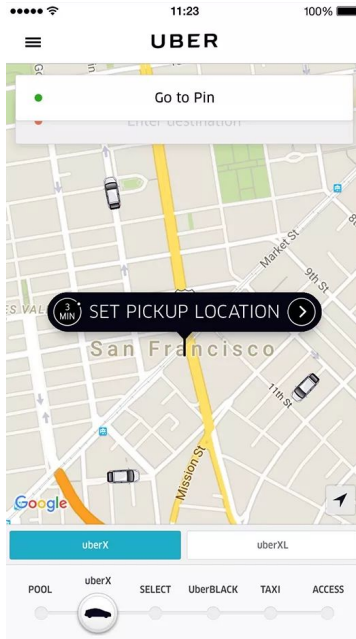
2,615 RETWEETS 2,040 FAVORITES



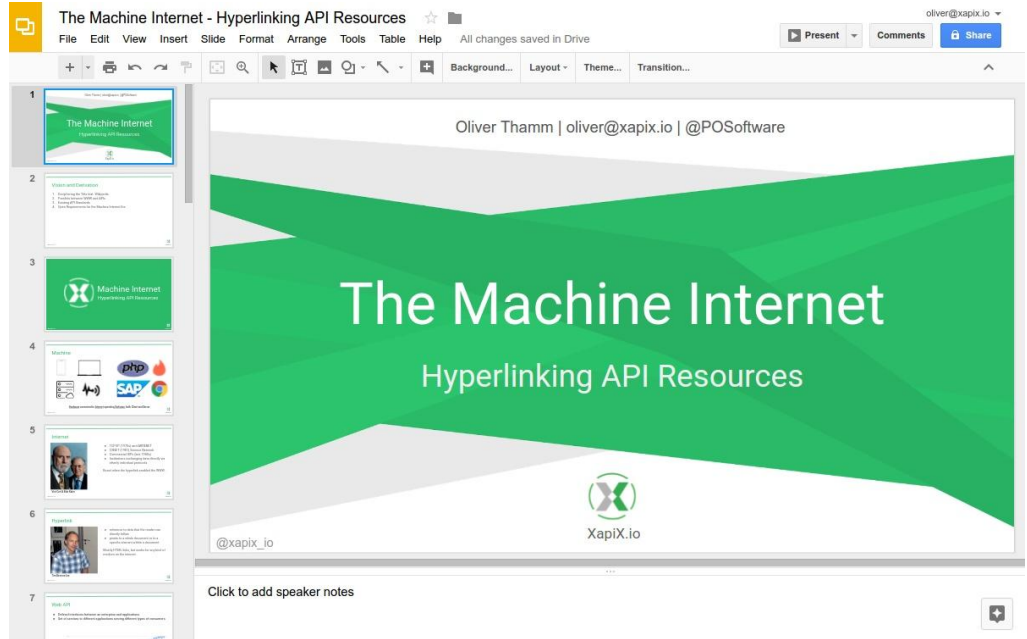
Nicer, Easier Software



Tinder



Uber



Google Apps