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## Web communities network mapping with Hyphe

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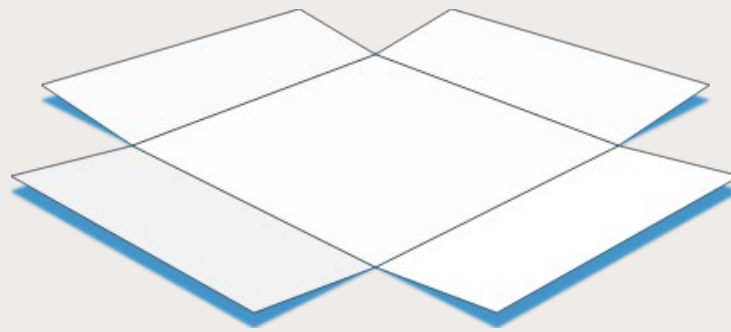
Submitted on 16 Dec 2022

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# Web communities network mapping with Hyphe

**NodeXL Academy '22**  
January 19<sup>th</sup> 2022

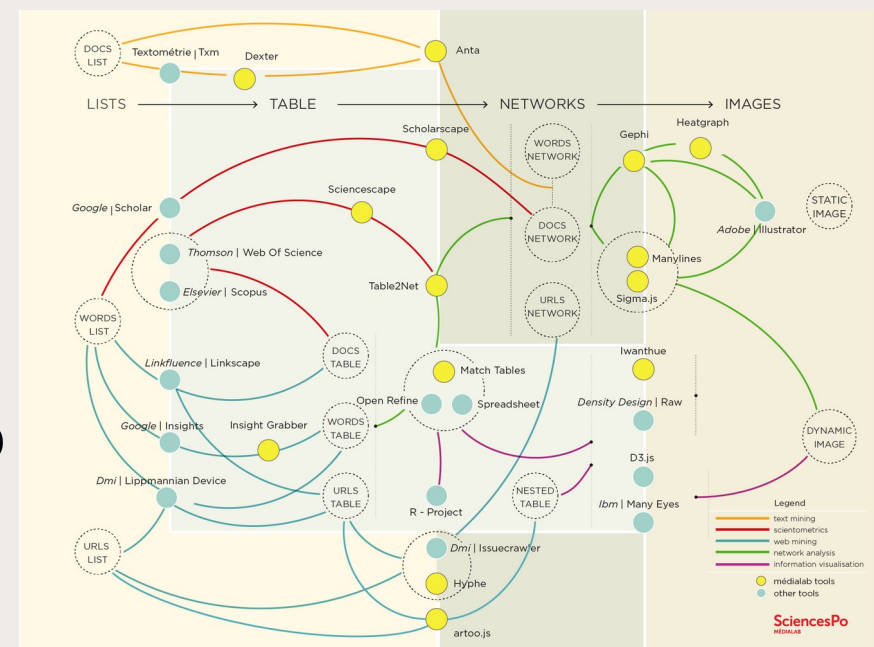
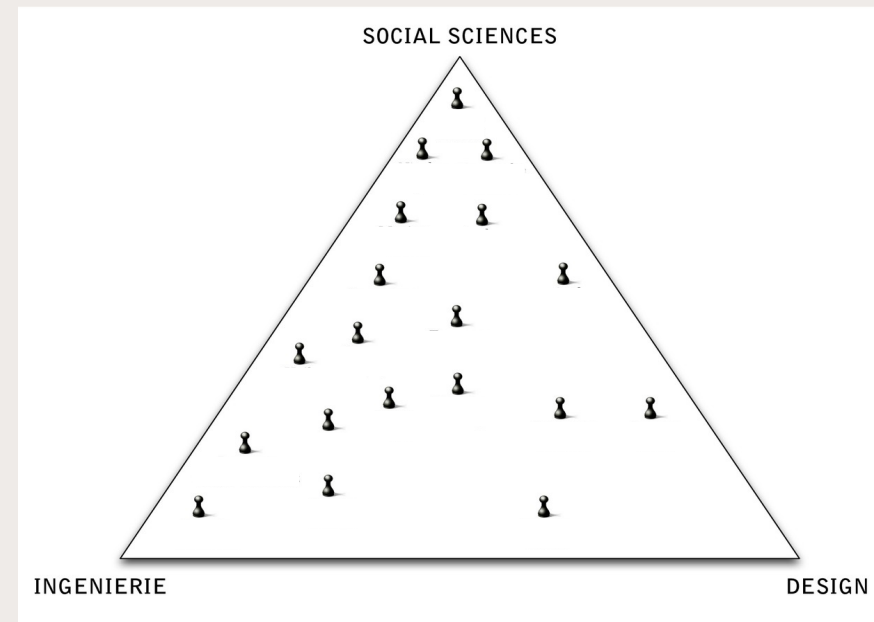
Benjamin Ooghe-Tabanou (@boogheta)  
Sciences Po médialab (@medialab\_ScPo)

**SciencesPo**  
MÉDIALAB

# médialab @ Sciences Po

<https://medialab.sciencespo.fr>

- Pluridisciplinary Research Lab created by Bruno Latour in May 2009, led by Dominique Cardon since 2017
- Social Sciences, Engineering & Design
- Articulate qualitative & quantitative methods through a digital approach
- Work with digital traces
- Deploy an ecosystem of tools  
<http://tools.medialab.sciences-po.fr>
- METAT: a monthly Open Support Workshop  
<https://www.sciencespo.fr/recherche/fr/content/metat-latelier-de-methodes>



# Bruno Latour, médialab founder



*« Google is nice,  
but we need  
something better »*

The Indian Express, 2011

# Webcrawlers? What is that?

« *Web crawling is the process of building a collection of webpages by starting with an initial set of URLs and recursively traversing the corresponding pages to find additional links.* »

Gabe Ignatow & Rada Mihalcea, in: *Text Mining: A Guidebook for the Social Sciences*

But why would anyone want to do that?

- create an index for a search engine (like... you know...)
- extract contents or structured data (like scraping)
- perform some text mining
- study network communities through hyperlinks

# Crawling the web for social sciences?

« **Hyperlink** » is at the core of the Web's architecture  
→ charged with meaning and structure



« The texts are **linked together** in a way that one can go from one concept to another to find the information one wants.

The network of links is called a **web**. [...]

The texts are known as **nodes**.

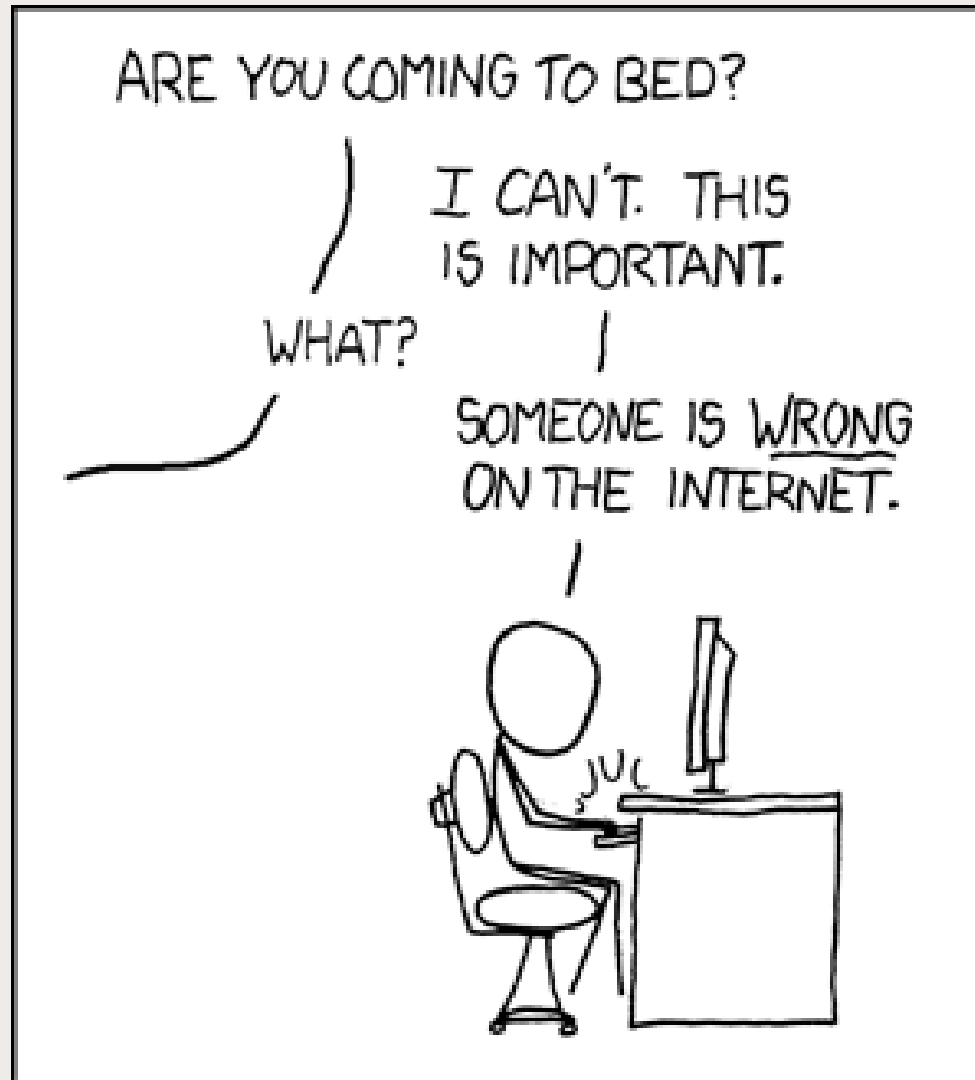
The process of proceeding from node to node is called **navigation**. »

Tim Berners-Lee, 1990, *WorldWideWeb: Proposal for a HyperText Project*

« A hyperlink is a **manifestation of intention**. **By linking** one page to another, one piece of text to another, **people intend** to do particular things. »

Ryfe, Mensing, & Kelley, 2016, *What is the meaning of a news link?*

# The Web: a place of controversies and debates

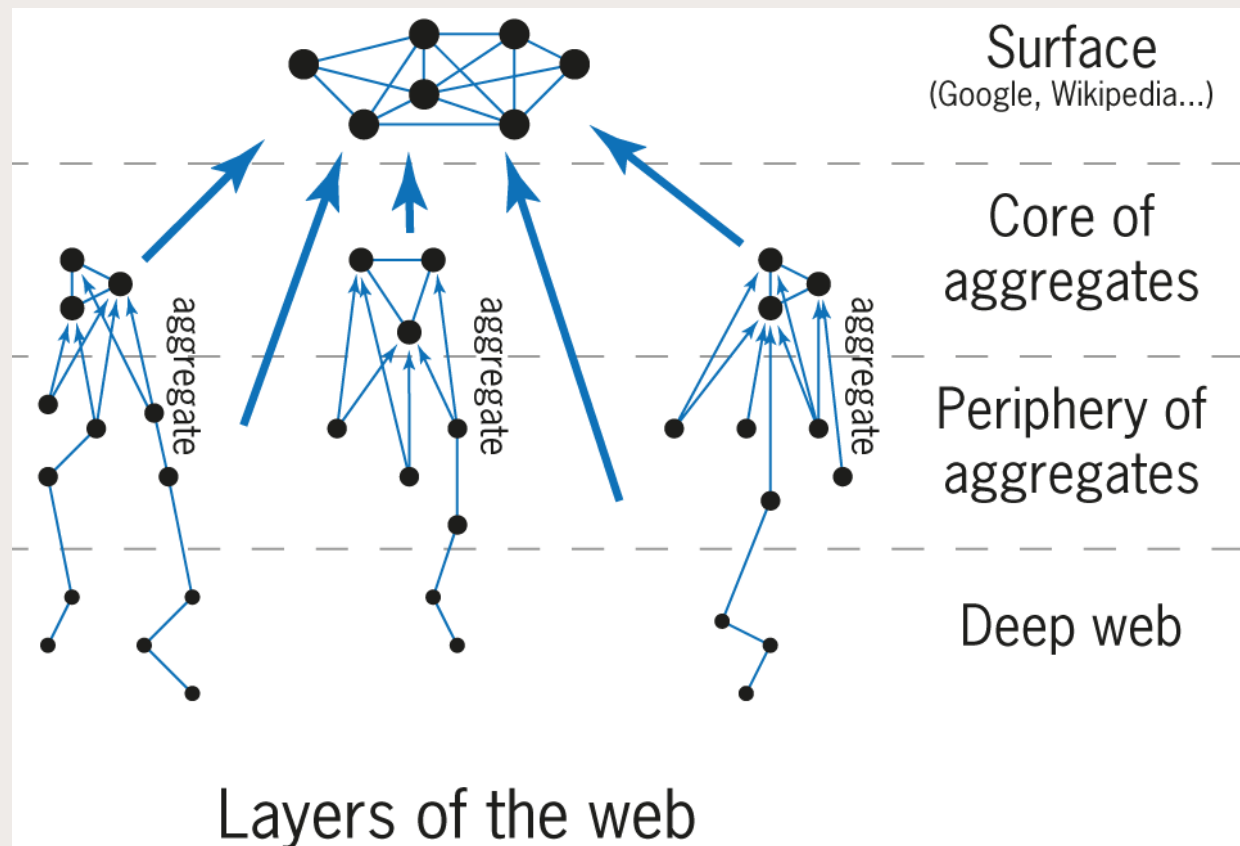


CC-BY-NC - Randall Munroe - XKCD

# A bottom-up hierarchy emerged from hyperlinks

« Matthew effect » : preferential attachment

→ new web pages tend to cite the already most cited ones



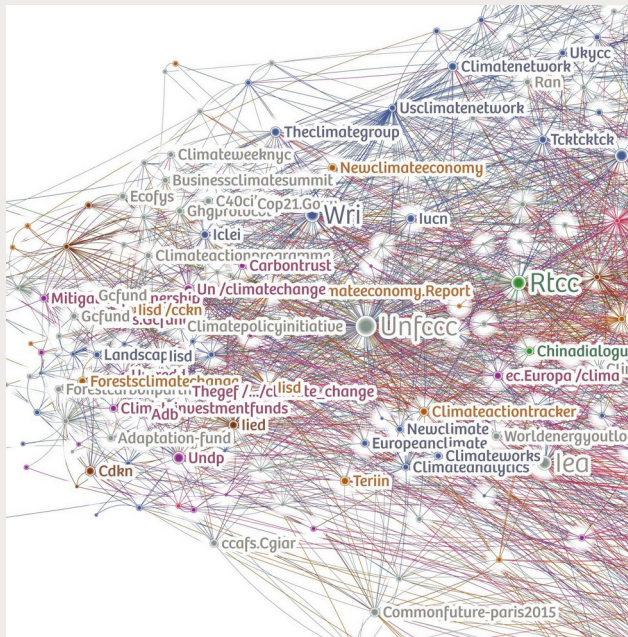


# Hyphe: a research directed crawler

<http://hyphe.medialab.sciences-po.fr/demo/>

Build your own web documents corpus  
to study social phenomena online

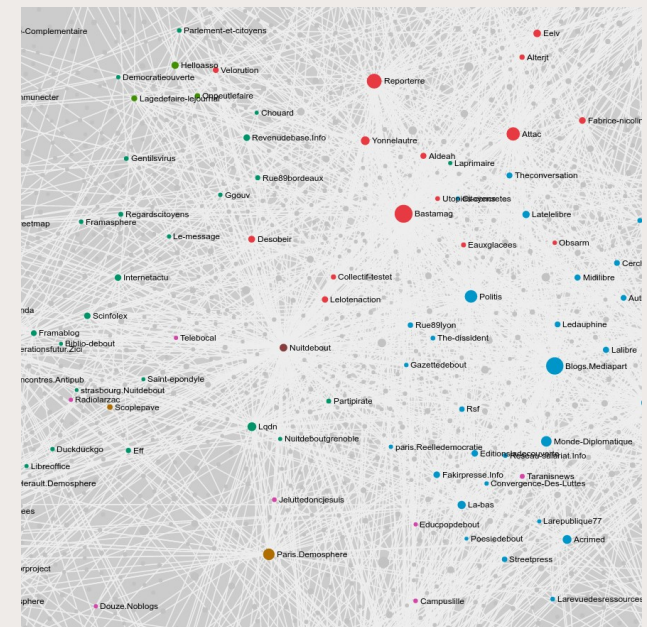
- gather « web actors »
- explore hyperlinks between them



<http://medialab.github.io/double-dating-data/>

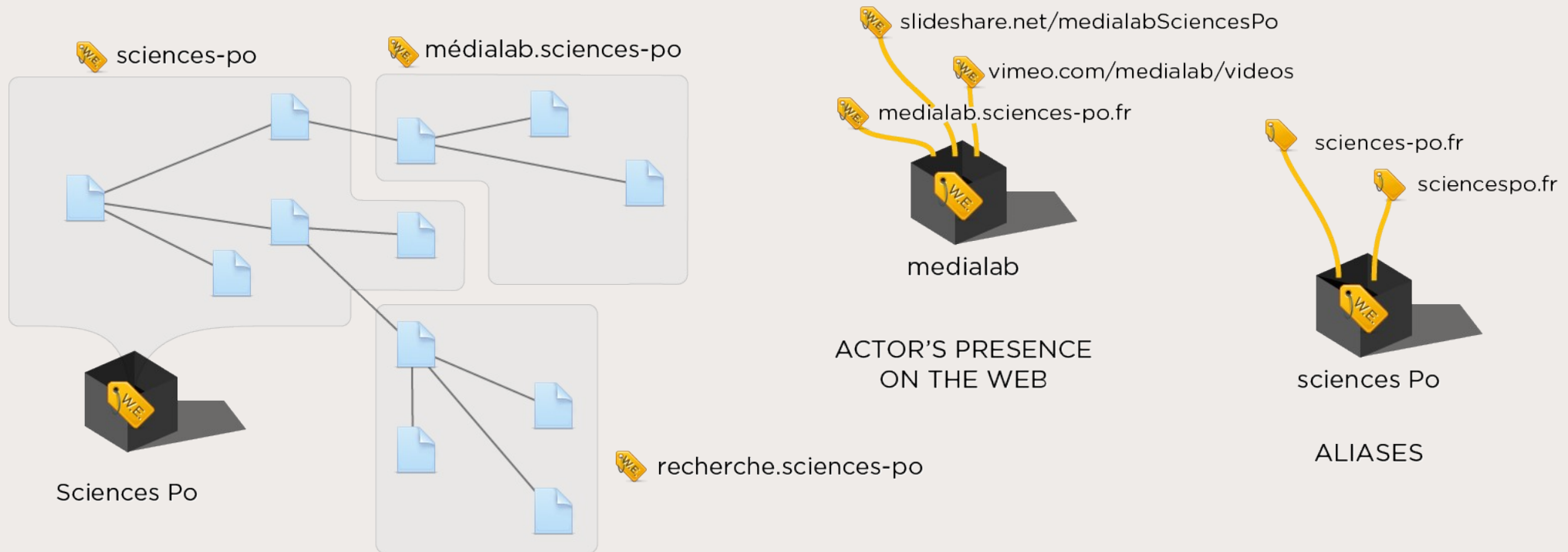
COP 21  
Vie privée  
Extrême droite  
Tissu associatif  
Produits laitiers  
Cellules souches  
Administrations culturelles

...



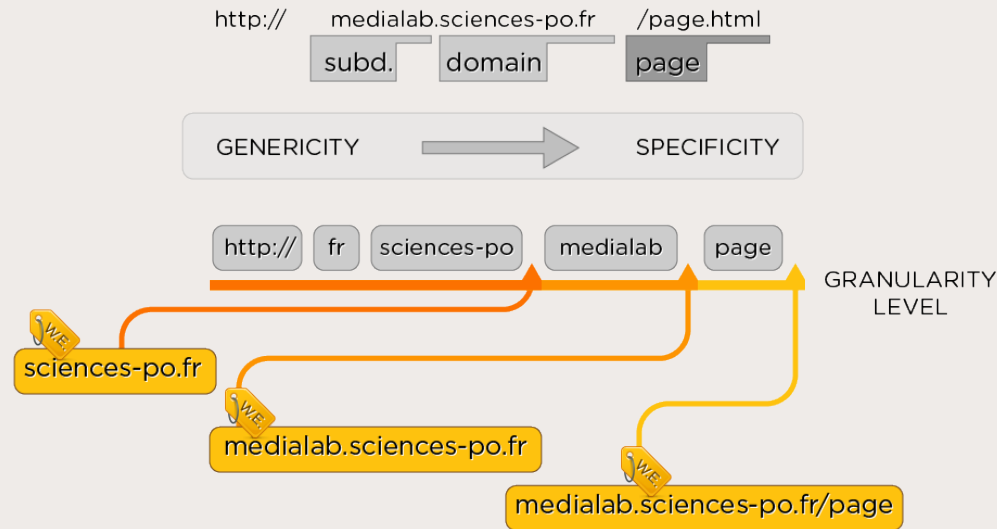
<http://utopies-concretes.org/>

# There is no such thing as a « website » !



→ « **WebEntities** » : bundles of webpages aggregating coherent actors to answer a specific research question  
= set of URL prefixes

# Finely delimit the web territories of actors



Manually setup prefix patterns to adjust the cursor of « WebEntities »

DEFINE WEB ENTITIES

Check the boundaries of each web entity before creating it

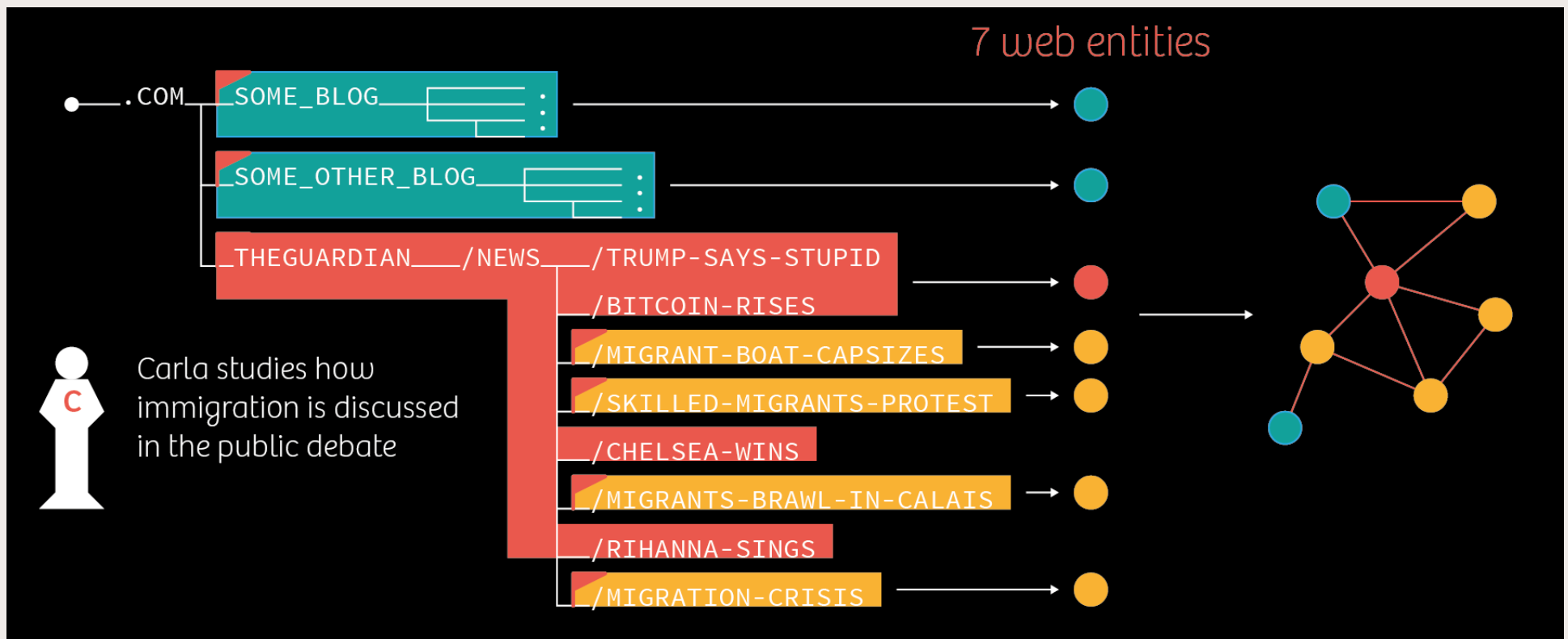
Move all sliders [TO THE LEFT](#) [TO THE RIGHT](#)

1	<a href="#">medialab.Sciences-Po.fr</a>	<a href="#">http</a> <a href="#">.fr</a> <a href="#">sciences-po</a> <a href="#">medialab.</a>
2	<a href="#">tools.medialab.Sciences-Po.fr</a>	<a href="#">http</a> <a href="#">.fr</a> <a href="#">sciences-po</a> <a href="#">medialab.</a> <a href="#">tools.</a>
3	<a href="#">Sciences-Po.fr</a>	<a href="#">https</a> <a href="#">.fr</a> <a href="#">sciences-po</a> <a href="#">www.</a>
4	<a href="#">Sciencespo.fr /bibliotheque</a>	<a href="#">http</a> <a href="#">.fr</a> <a href="#">sciencespo</a> <a href="#">www.</a> <a href="#">/bibliotheque</a>
5	<a href="#">Twitter.com /medialab_ScPo</a>	<a href="#">https</a> <a href="#">.com</a> <a href="#">twitter</a> <a href="#">/medialab_ScPo</a>

# Which data structure to manage hypertexts?

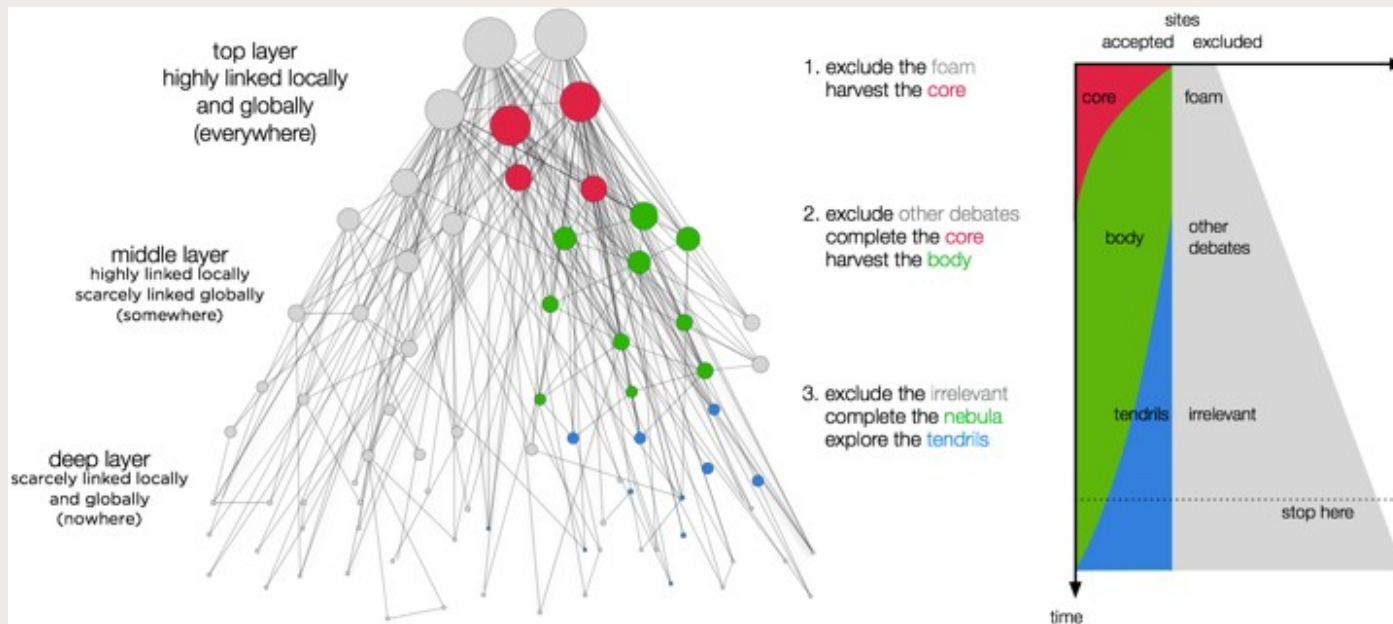
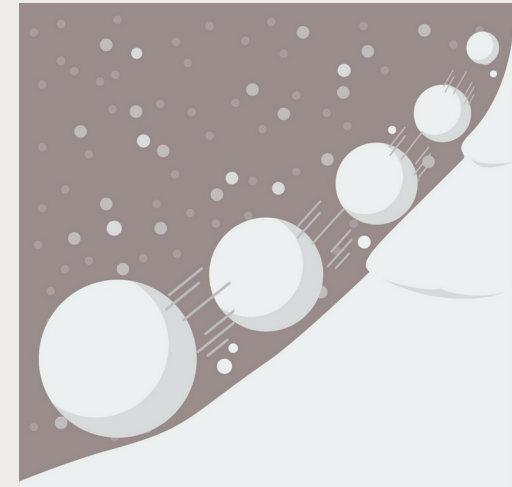
<https://medialab.github.io/hyphe-traph/fosdem2018/#/>

- **Tree** of urls
  - **Graph** of hyperlinks
  - Dynamic branches aggregates
- Hyphe's Traph



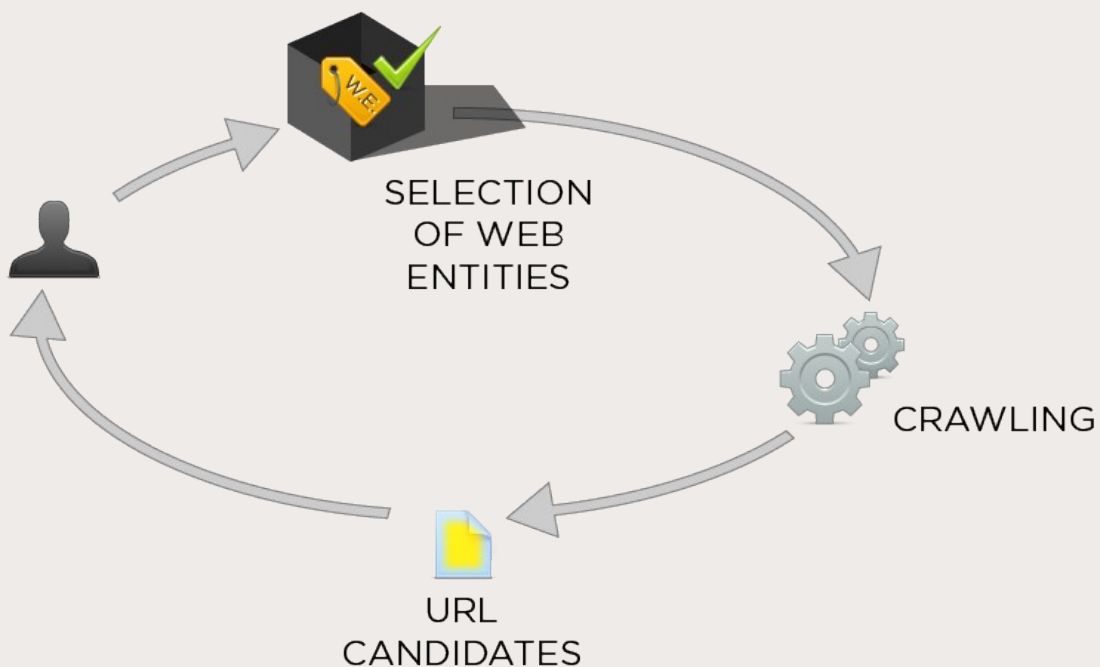
# Hyphe's crawling strategy: leverage hyperlinks

- Classical crawlers (**DMI's IssueCrawler**): Snowball
  - Top Layer attraction (Google, YouTube, Wikipedia...)
  - Topic drifts
- Hyphe:
  - crawl exclusively pages within the chosen WebEntities
  - sort discovered entities by degree of citation
  - humanly select new entities to include and crawl



# Web prospection loop: curating a corpus iteratively

- Step by step iterative expansion & curation of entities



- Human/Time cost
- How to know when to stop?  
→ hyperlink citations threshold

PROSPECT 4,890 DISCOVERED

Search  APPLY CHANGES CANCEL

Distribution of citations (log scale)

NAME	CITED ↑
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Google.fr	23
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Instagram.com	19
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Free.fr	16
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Wordpress.org	16
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Wp.com	13
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blogger.com	12
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Twitter.com /home	12
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Gravatar.com	11
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Legifrance.gouv.fr	10
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Wordpress.com	10
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Collectifmarianne.fr	9
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Collectifracine.fr	9

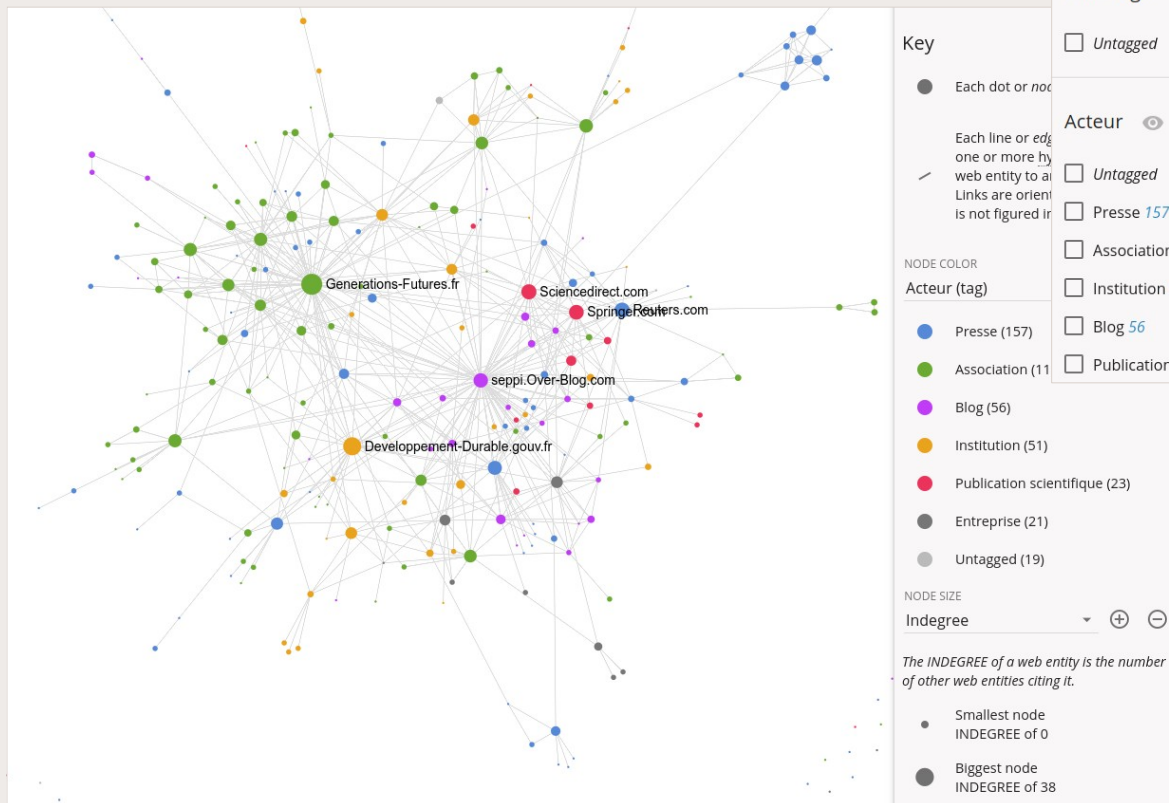
1 SET TO IN  
Collectifmarianne... X

1 SET TO UNDECIDED  
Legifrance.gouv.fr X

4 SET TO OUT  
Gravatar.com X  
Google.fr X

# Qualify the corpus entities (tagging)

- Free notes
- Categories



**TAGS**

Filter web entities (status /IN only). Tag one or a selection of web entities.

439 WEB ENTITIES

**TAG FILTERS** 439 WEB ENTITIES WEB ENTITIES NETWORK

Special filters

- Untagged
- Partially untagged
- Conflicts

Free Tags

- Untagged
- Acteur
- Untagged
- Presse 157
- Association 111
- Institution 51
- Blog 56
- Publication scientifique 23

Display a category Point de vue

Search

- Futura-Sciences.com /.../biologie-pesticide-9169 Neutre
- Lefigaro.fr /.../37002-20170627ARTFIG00002-pesticidepe-sti-sid-n-m-... Neutre
- Parents.fr /.../pesticides-et-grossesse-des-risques-confi... Contre les pesticides
- formulaires.Fondation-Nicolas-Hulot.org /.../stop\_pestic... Contre les pesticides
- Contrepoints.org /.../270496-pesticides-lintox-discours-bio Pour les pesticides
- Observatoire-Pesticides.gouv.fr Neutre
- Letemps.ch /.../toxicite-pesticides-tueurs-dabeilles-confirmee-terrain Neutre
- Sciencepresse.qc.ca /.../neonicotinoides-pesticides-tue... Contre les pesticides
- Notre-Planete.info /.../4613-liste-fruits-legumes-pesticides Neutre
- Lepoint.fr /.../pesticides-tueurs-d-abeilles-bayer-interpelle-par-un-mil... Neutre
- Consoglobe.com /abeilles-pesticides-bayer-cg Contre les pesticides

# HyBro: a web browser designed for corpus curation

<https://github.com/medialab/hyphe-browser/releases/>

The screenshot shows the HyBro web browser interface. The browser's address bar displays the URL <https://www.smfoundation.org/nodexl/nodexl-events/winter-school/>. The page content includes the Social Media Research Foundation logo, a navigation menu (Home, NodeXL, Licenses, Networks, Blog, Newsletter), and a large banner for the 'Winter School' event. Below the banner, there is a section titled 'NodeXL Academy Event: Social Media Research Winter School 2022' with a description of the event and a 'Subscribe to our Newsletter' form. The sidebar on the left contains various controls for corpus curation, including 'Statut de la webentité' (IN, UND, OUT) and 'Nom de la webentité' (NodeXL Winter School).

- « NaviCrawler » heritage : build a Hyphe web corpus while browsing
- « in-situ » prospection & tagging (digital field work)
- teach the web to students



# Many ways to use Hyphe

- Complete methodology includes:
  - sourcing, automatized collection, iterative corpus building
  - qualitative categorization, exploratory analysis,
  - network visualization, quantitative statistical analysis
- Diverse audiences:
  - Research: help social scientists work on digital fields
  - Pedagogy: teach students what the web is beyond Google & Facebook
- Possible small & large scale analyses:
  - a website's internal structure
  - a theme's ensemble of actors and their ties
  - a controversy's alliances & oppositions
  - etc.

# From above: clusters, opposition & affinity

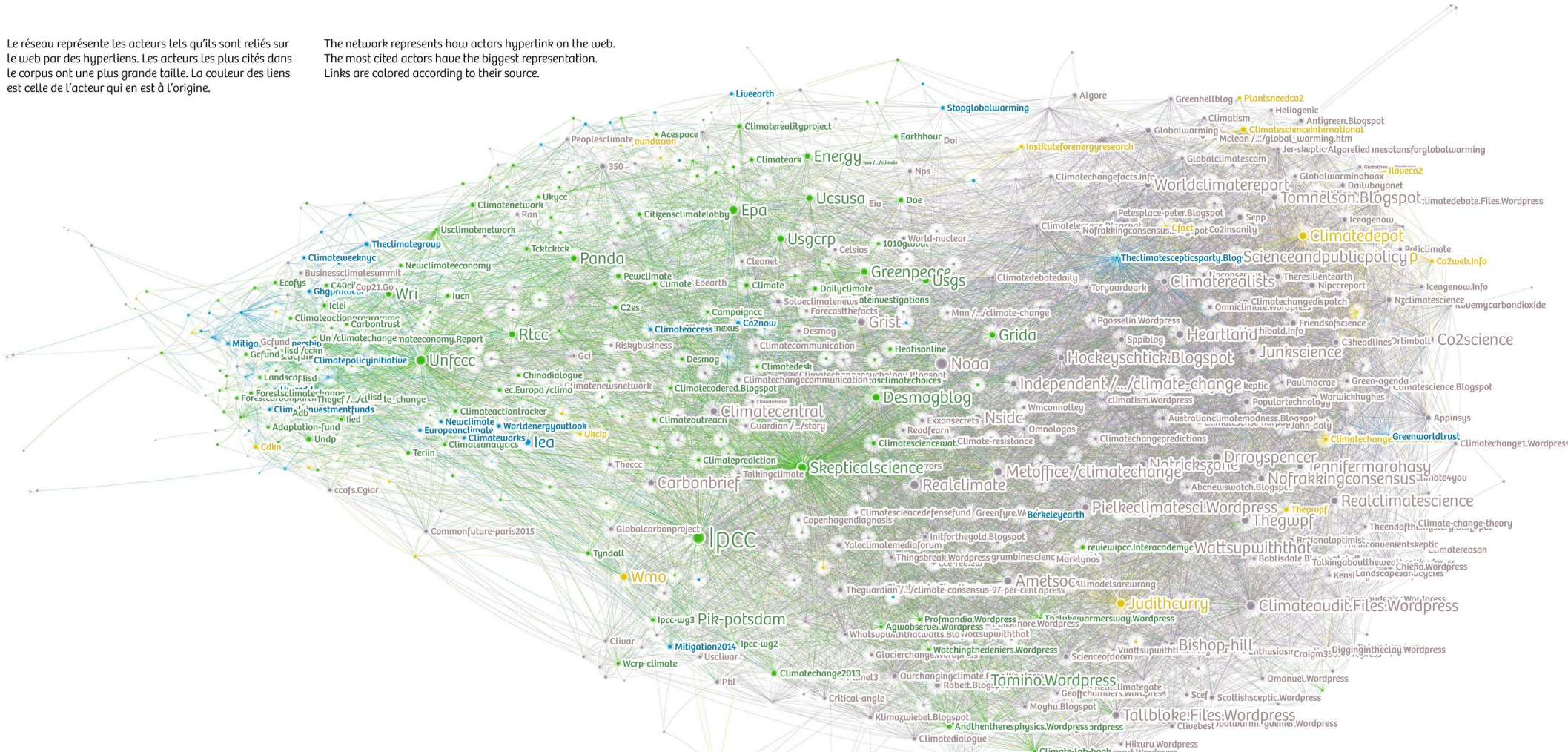
Corpus web sur le changement climatique : types d'activités soutenues

Web corpus on climate change: type of supported policy

Le réseau représente les acteurs tels qu'ils sont reliés sur le web par des hyperliens. Les acteurs les plus cités dans le corpus ont une plus grande taille. La couleur des liens est celle de l'acteur qui en est à l'origine.

The network represents how actors hyperlink on the web. The most cited actors have the biggest representation. Links are colored according to their source.

## Double Dating Data: Climate change on the web



TYPES D'ACTIVITES SOUTENUES / TYPE OF SUPPORTED POLICY



# From above: clusters, opposition & affinity

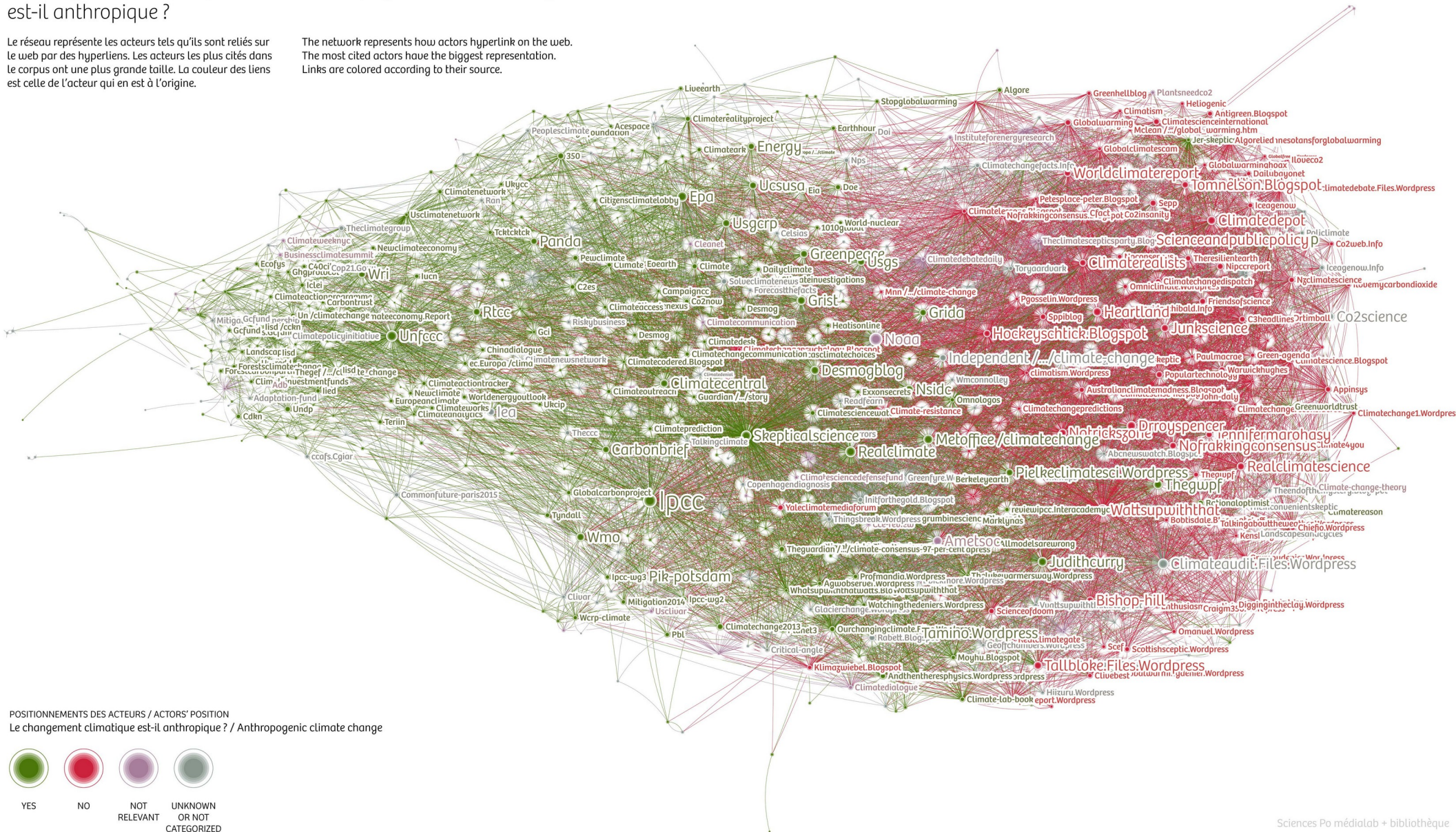
Corpus web sur le changement climatique : le changement climatique est-il anthropique ?

Le réseau représente les acteurs tels qu'ils sont reliés sur le web par des hyperliens. Les acteurs les plus cités dans le corpus ont une plus grande taille. La couleur des liens est celle de l'acteur qui en est à l'origine.

Web corpus on climate change: anthropogenic climate change

The network represents how actors hyperlink on the web. The most cited actors have the biggest representation. Links are colored according to their source.

Double Dating Data: Climate change on the web



# From within: explore webpages contents

PRIVACY WEB CORPUS

SciencesPo MÉDIALAB AXA Research Fund Data Innovation Lab

ABOUT

EXPLORE WEB ENTITIES

2,313 ENTITIES  
7,549 entities represented as a cloud

Search

Q Apple FBI backdoor

nakedsecurity.Sophos  
https://nakedsecurity.sophos.com/category/technologies/operating-s...  
developers would rather quit than give FBI a backdoor A lead developer for the Tor Project said

Helpnetsecurity  
https://www.helpnetsecurity.com/tag/backdoor/  
encryption backdoors a bad idea March 4, 2016 backdoor cybercriminals encryption Apple and the FBI

nakedsecurity.Sophos  
https://nakedsecurity.sophos.com/2016/03/23/tor-project-says-devel...  
developers would rather quit than give FBI a backdoor 23 Mar 2016 1 Apple , iOS , Law & order , Privacy

nakedsecurity.Sophos  
https://nakedsecurity.sophos.com/2016/03/23/tor-project-says-devel...  
developers would rather quit than give FBI a backdoor 23 Mar 2016 1 Apple , iOS , Law & order , Privacy

Sidstamm  
http://blog.sidstamm.com/2016\_02\_01\_archive.html  
their phones vulnerable is not the right approach. The current public discourse on the Apple vs. FBI "open

Laquadrature  
https://mediakit.laquadrature.net/view.php?full=1&id=2374  
20160219[AC] LCP Chiffrement Apple FBI Download : MP4 , WebM , How to embed ?

Laquadrature  
https://mediakit.laquadrature.net/view.php?id=2374  
20160219[AC] LCP Chiffrement Apple FBI Download : MP4 , WebM , How to embed ?

Laquadrature  
https://mediakit.laquadrature.net/view.php?full=1&id=2374  
20160219[AC] LCP Chiffrement Apple FBI Download : MP4 , WebM , How to embed ?

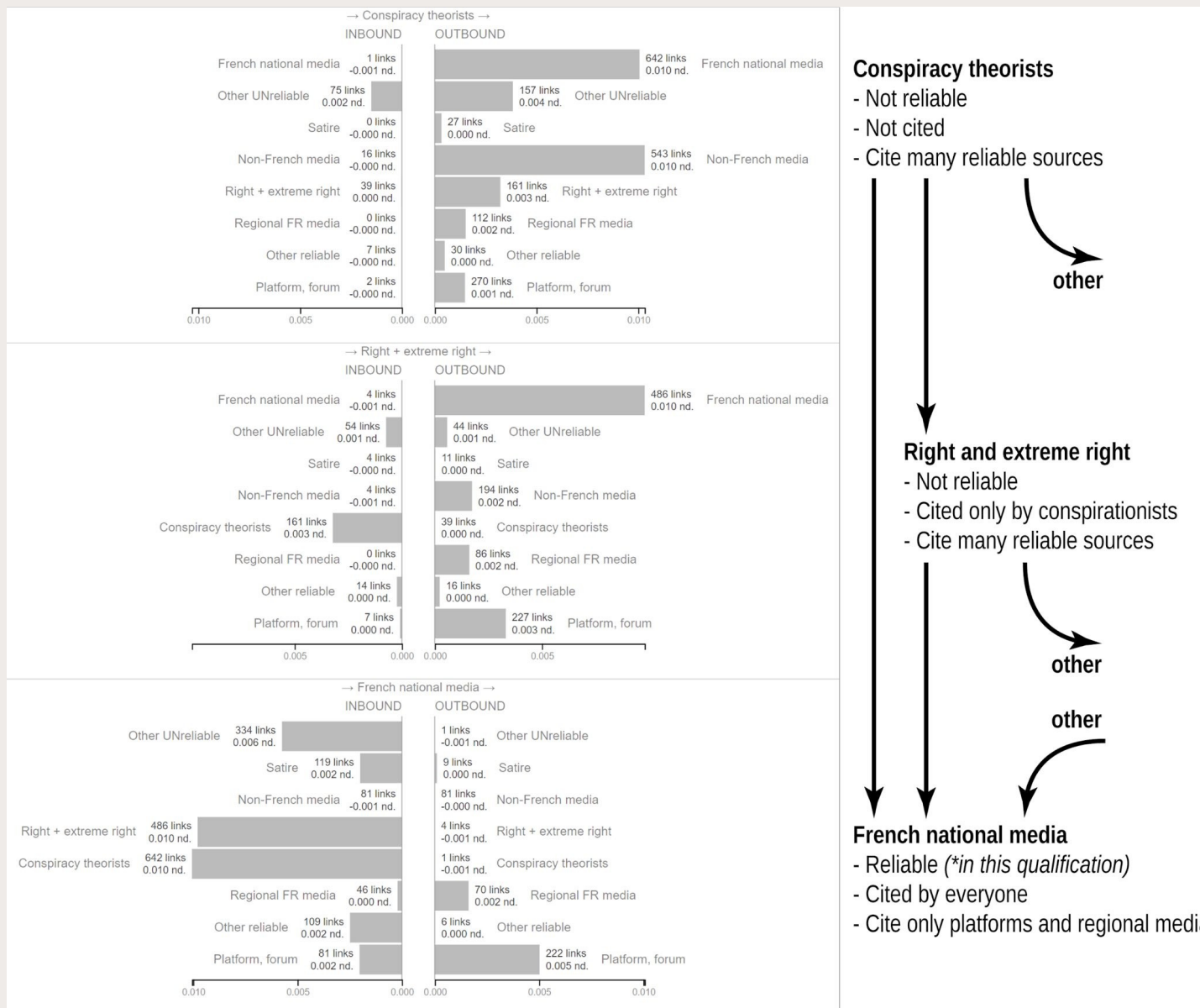
Topics

- Surveillance FR
- Business & Media
- Surveillance US
- Cybersecurity
- Big data & Analytics
- Data Regulation FR
- Cookies & Tracking
- Telec Operators FR
- Card and ID fraud

EXPLORE TOPICS

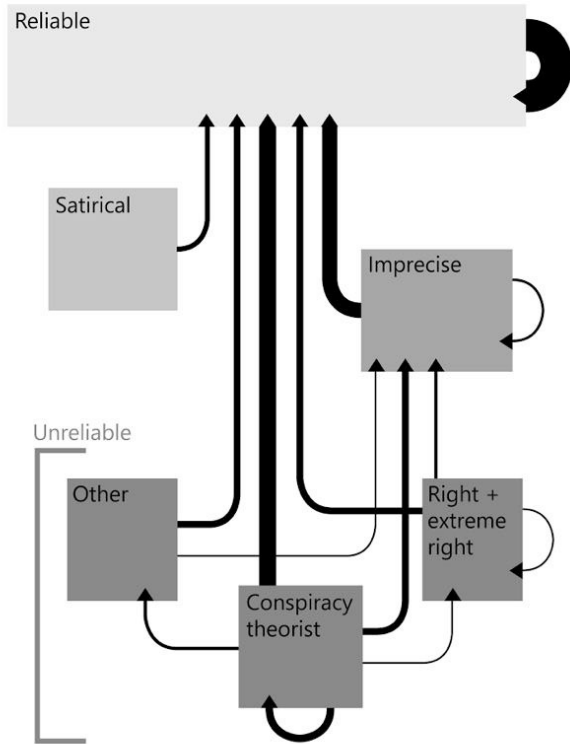
Privacy Web Corpus Datascape

# From the sides: a hierarchy of directed hyperlinks



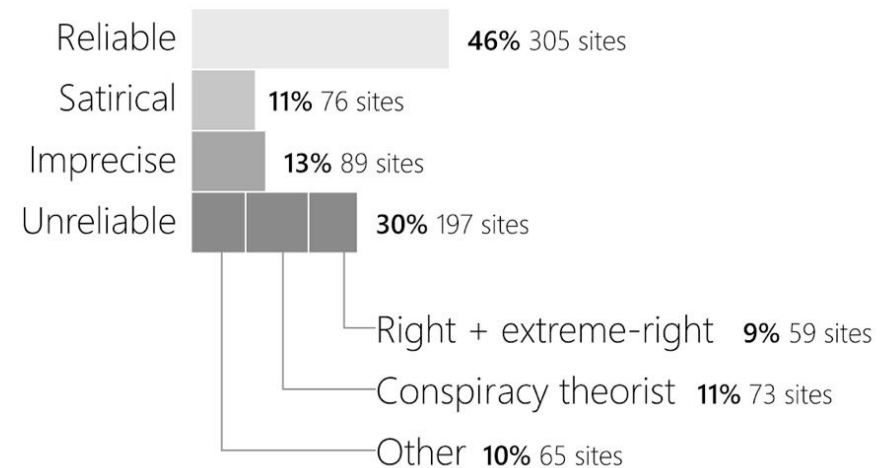
Visual Network Exploration for Data Journalists

# Hyperlinks directionality: a bottom-up hierarchy

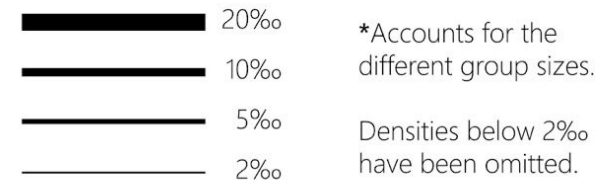


Most hyperlinks stem from the unreliable and aim at the reliable resources

Each bloc's surface is proportional to the count of websites. The color code is the same as the "Décodex".

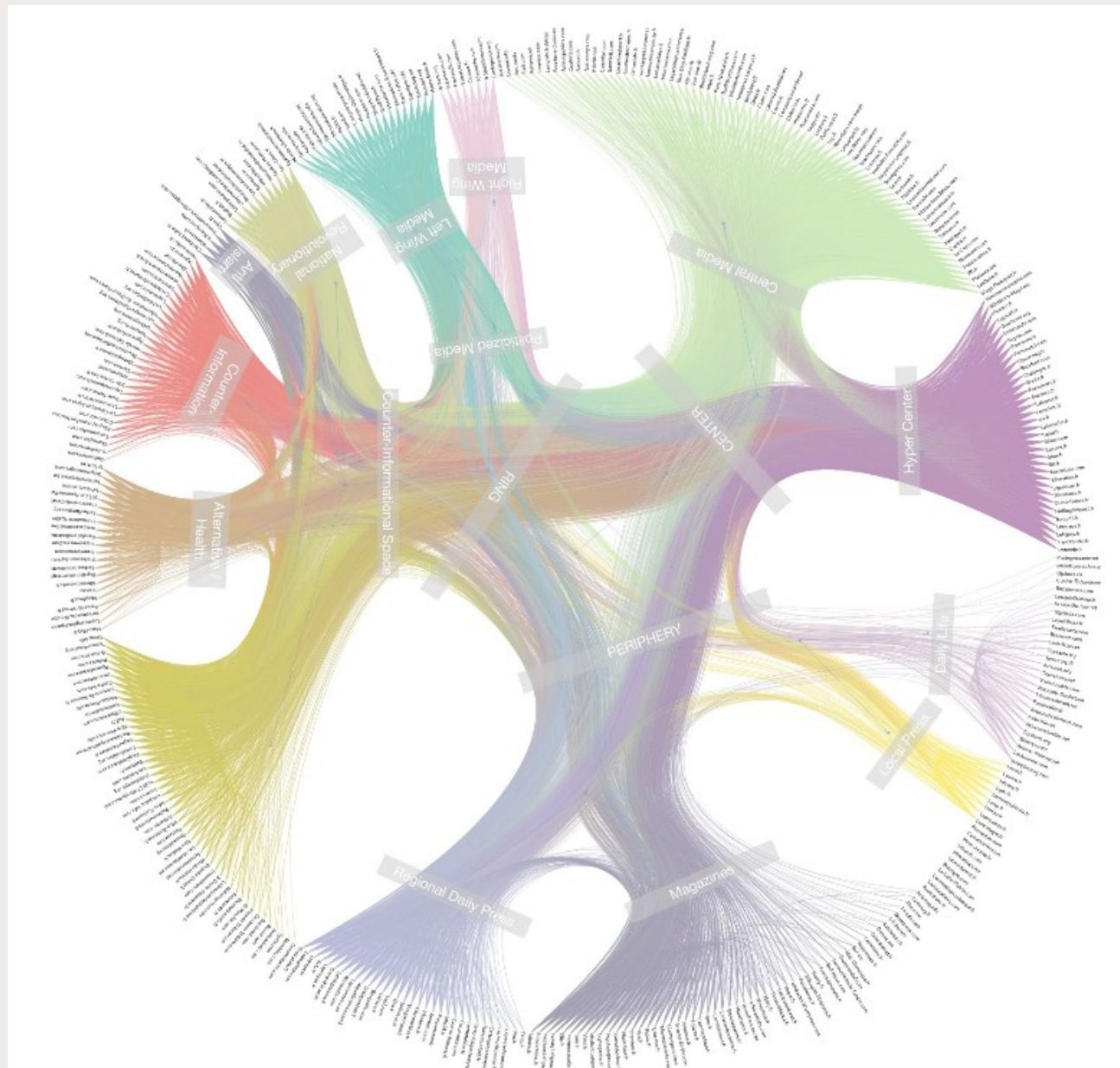


The thickness is proportional to the normalized link density\*



Visual Network Exploration for Data Journalists

# Explore polarization dynamics



Unfolding the multi-layered structure of the French Mediascape

# Bibliography

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- Ooghe-Tabanou B., Girard P., Jacomy M., Plique G. (2018), **Hyperlink is not dead!**, ACM Proceedings of the 2nd International Conference on Web Studies (WS.2 2018) Paris.  
<http://hyphe.medialab.sciences-po.fr/docs/20181004-ACM-WebStudies-HyperlinkIsNotDead.pdf>



# Now let's play!

---

<https://hyphe.medialab.sciences-po.fr/demo/>

<https://github.com/medialab/hyphe>

## Any question first?

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