Computational fact-checking: Problems, state of the art and perspectives

Ioana Manolescu

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Extraction et Gestion de Connaissances, Metz, 2019

MOTIVATION

Bad memories: Romania, 1989

Bad memories: Romania, 1989

Ceauşescu re-elected at the 14th congress!

Bad memories: Romania, 1989

Ceauşescu re-elected at the 14th congress!

He had held power since 1965.

Bad memories: Romania, 1989

Bad memories: Romania, 1985

Things get better

… kind of

Democratic societies crucially need the press

- To debate and express dissent

- To analyze, confim or refute public statements

Fact-checking

(Data) journalism

- To expose and explain society functioning

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Fact-checking

(Data) journalism

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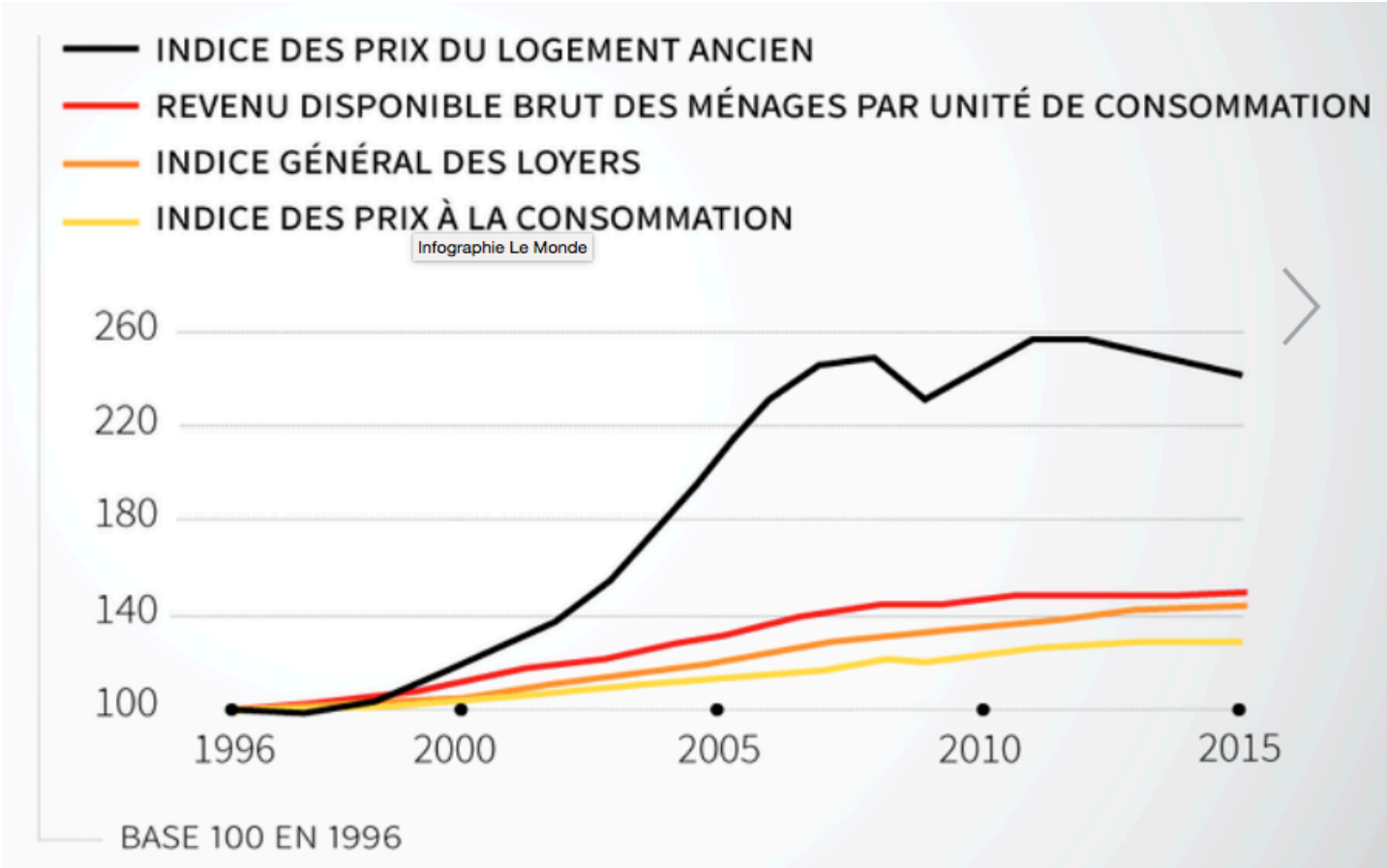
DATA JOURNALISM AND JOURNALISTIC FACT-CHECKING

Data journalism

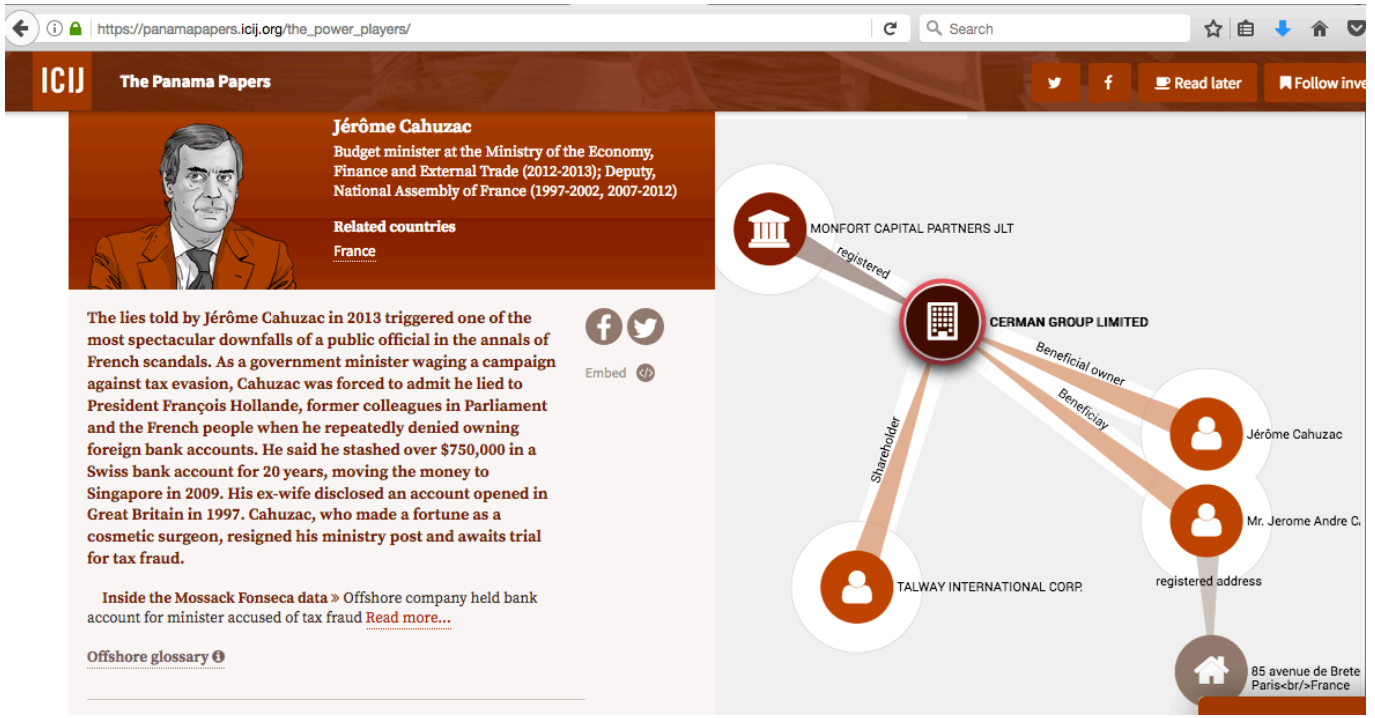
Investigative journalism based on **complex and/or large data**



http://abonnes.lemonde.fr/les-decodeurs/portfolio/2017/04/18/les-fractures-francaises-1-5-le-logement-les-raisons-de-la-crise_5112859_4355770.html

Data journalism

Panama Papers (International Consortium of Investigative Journalism, ICIJ)



Fact-checking (since 1930 approx.)

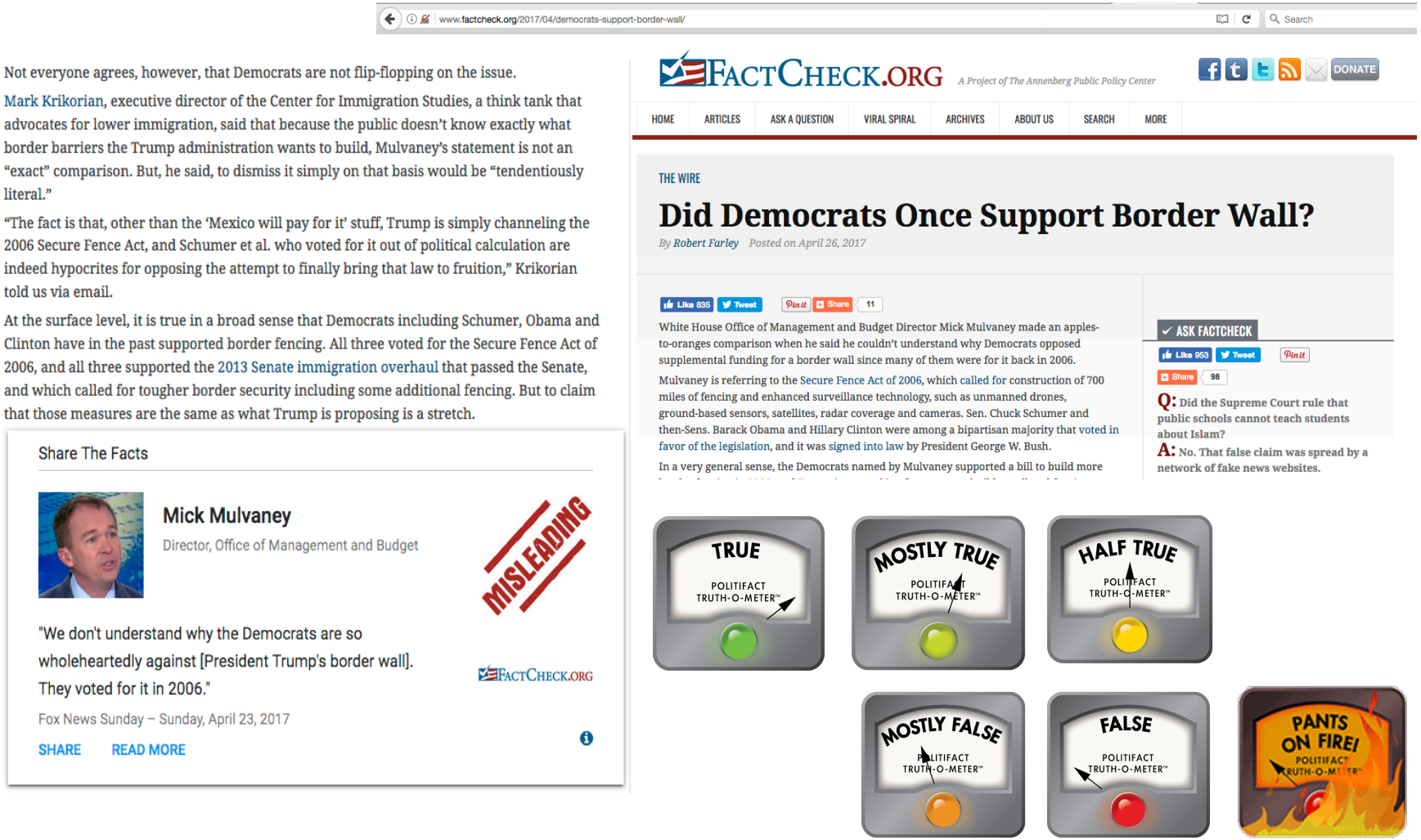
Fact-checking: verification of facts mentioned in media content

- To protect media reputation and avoid legal action

"The day I became a fact-checker at The New Yorker,
I received one set of red pencils […]
for underlining **passages on page proofs of articles that might contain checkable facts.** […]
confirmed **with the help of reference books** from the magazine's library"

http://www.nytimes.com/2010/08/22/magazine/22FOB-medium-t.html

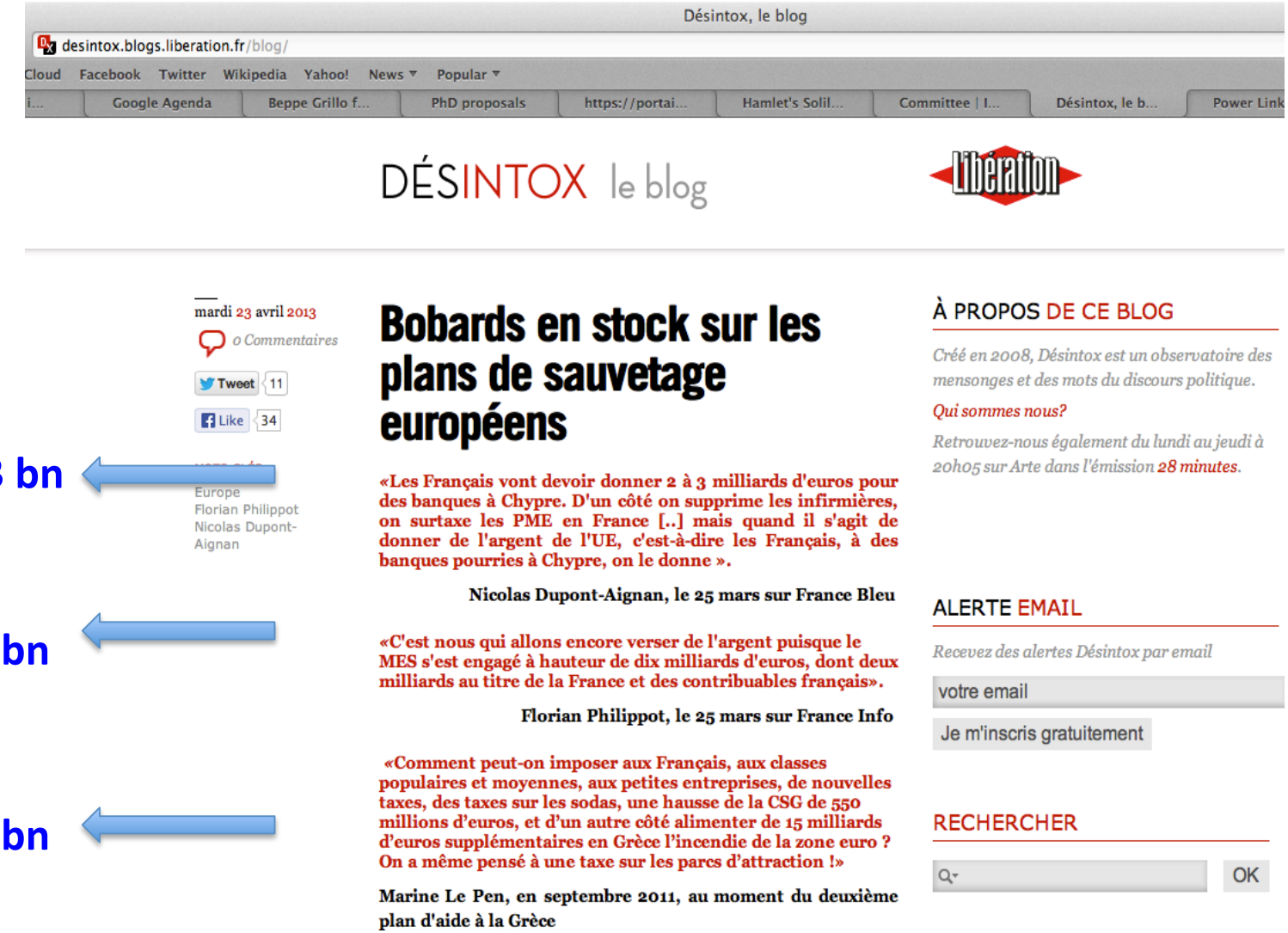
Fact-checking (2012 – ongoing)



It's not just checking

- Most aspects of modern reality are complex
- Explaining can be as important and useful as checking
  - Helps also analyze the future

Libération *Désintox*: cost of saving Cyprus



$2-3 bn

$10 bn

$15 bn

Saving Cyprus: how much does it cost?

The article reads:

- The money is not given but lent
- The European Mechanism of Stability will lend $9bn
- Out of which France contributes 20% (approximately $2bn)

However, things are complicated because:

- The initial contribution of France to the EMS ($16 bn) **counts** toward French public debt
- The remainder contribution ($124) **is not**

INTOX En période de rigueur budgétaire, les plan de sauvegarde successifs offrent depuis trois ans un boulevard aux détracteurs de l'euro et de l'Europe. Nicolas Dupont-Aignan et Florian Philippot ont ainsi, de concert, dénoncé récemment les milliards déversés à Chypre au moment où les Français se serrent la ceintures. *«Les Français vont devoir donner 2 à 3 milliards d'euros pour des banques à Chypre. D'un côté on supprime les infirmières, on surtaxe les PME en France [...] mais quand il s'agit de donner de l'argent de l'UE , c'est-à-dire des Français, à des banques pourries à Chypre, on le donne»*, dénonçait Nicolas Dupont-Aignan. En version Florian Philippot, cela donne : *«C'est nous qui allons encore verser de l'argent puisque le MES s'est engagé à hauteur de 10 milliards d'euros, dont 2 milliards au titre de la France et des contribuables français»*. Un propos qui fait écho -notamment- à celui entendu quelque deux ans avant, dans la bouche de Marine Le Pen, au sujet cette fois du plan d'aide à la Grèce : *«Comment peut-on imposer aux Français, aux classes populaires et moyennes, aux petites entreprises, de nouvelles taxes, des taxes sur les sodas, une hausse de la CSG de 550 millions d'euros, et d'un autre côté alimenter de 15 milliards d'euros supplémentaires en Grèce l'incendie de la zone euro ?»*

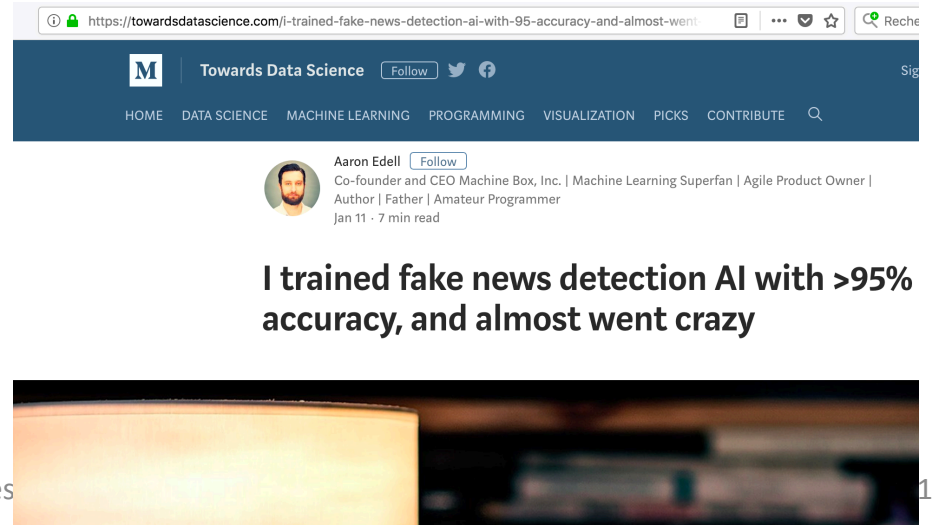
DÉSINTOX Quel impact ont donc les plans de sauvetage successifs de l'Euro? Et le dernier en date, en direction de Chypre, va-t-il contraindre les Français à allonger 2 milliards d'euros?

Do we need to understand?

"Populism is telling people that there are simple answers to complex problems"

Fact checking vs. fake news detection

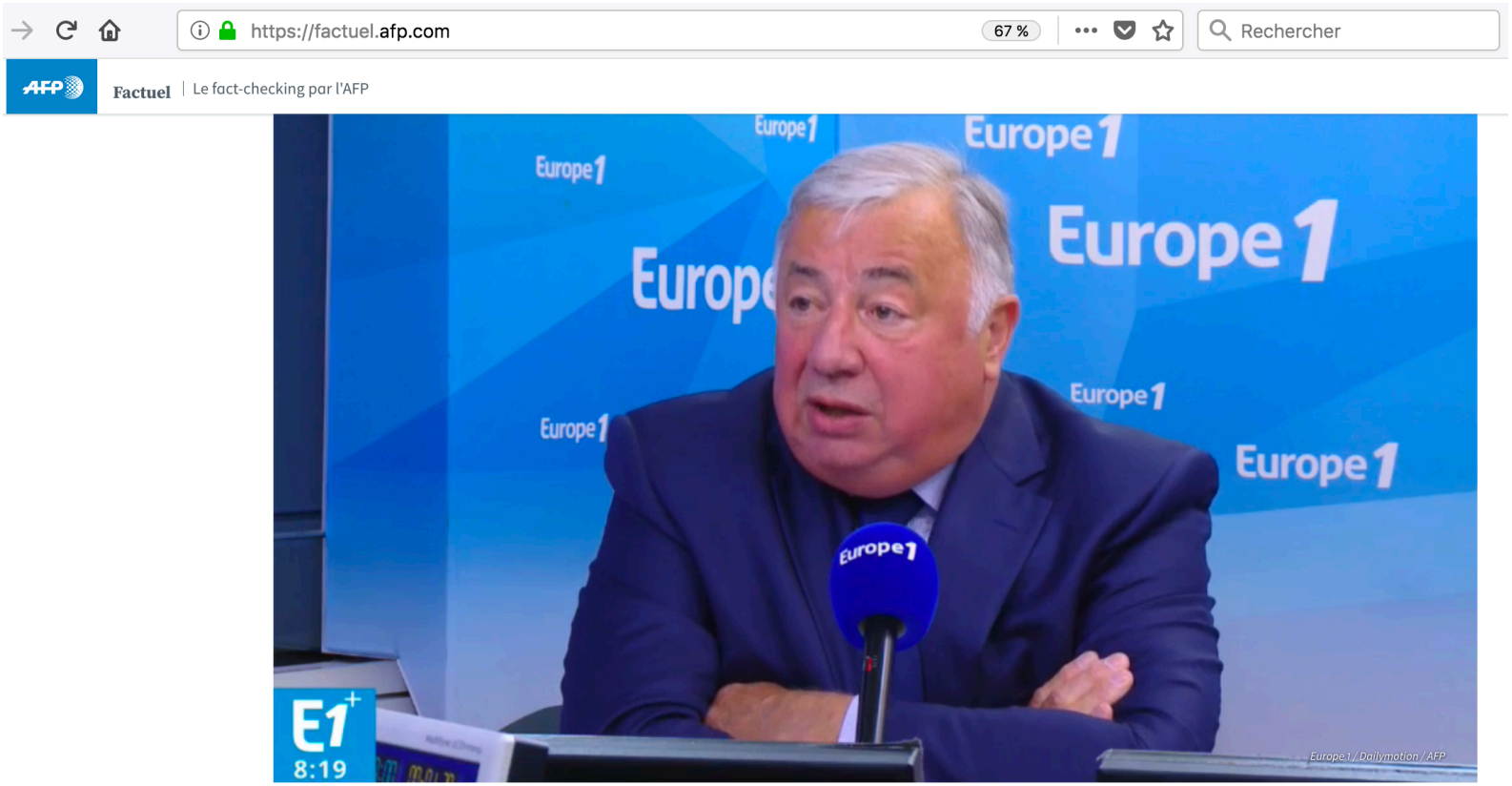
- Fact checking is based on some **background information source**
  - **Truth commonly agreed upon**
- Fake news detection may or may not use a source
- E.g., text classifier (true, fake) trained with major news agency / fake content (often virulent style)



Most common fact-checking scenarios

- "What is the **value** of **metric X** in **space Y** at **time T**"?
  - X=youth unemployment, Y=Germany, T=2018
  - X=illegal immigrants, Y=Italy, T=[2015-2018]
  - X=budget for research, Y=France, T=2019
  - X=average montly wages, Y=China, T=2018
- Comparison patterns
  - X1 against X2; Y1 against Y2; T1 against T2; temporal trend etc.

Most common fact-checking scenarios



Deuxième trimestre mis à part, la France n'a pas la "croissance la plus faible de la zone euro"

Most common fact-checking scenarios

- "What did X say about Y [at time T]"?

s.lemonde.fr/les-decodeurs/article/2015/11/09/les-arguments-perimes-de-la-gauche-parisienne-contre-valerie-pecresse_4805

Les arguments périmés de la gauche parisienne contre Valérie Pécresse

Le camp Bartolone a ressorti une déclaration de 2012 de la candidate de droite sur le mariage gay, faisant mine d'oublier qu'elle a, depuis, changé de position sur le sujet.

Le Monde.fr | 09.11.2015 à 15h11 • Mis à jour le 10.11.2015 à 11h53 |

Par **Samuel Laurent**

Réagir Ajouter Partager (677) Tweeter

L'offensive est-elle concertée ? Spontanée ? Lundi 9 novembre, les socialistes franciliens et leurs soutiens font circuler sur les réseaux sociaux un article visant Valérie Pécresse, tête de liste Les Républicains en Ile-de-France : elle souhaiterait « démarier » les couples homosexuels.

- "Is X related [in sense S] to Y?"

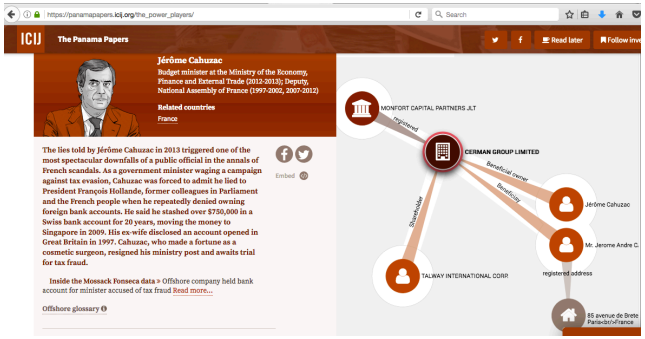
FRANCE — ENQUÊTE

Nicolas Sarkozy a bien servi les intérêts de Kadhafi. Voici les preuves

4 AVR. 2018 | PAR FABRICE ARFI ET KARL LASKE

Nicolas Sarkozy et Mouammar Kadhafi devant la maison du second bombarbée par les Américains. © Reuters

Contrairement à ce qu'il a affirmé devant les juges puis dans les médias, Nicolas Sarkozy, actuellement mis en examen pour corruption dans l'affaire des financements libyens, a objectivement servi les intérêts du régime de Kadhafi entre 2005 et 2011. La preuve en cinq actes.



A CONTENT MANAGEMENT PERSPECTIVE

Lines of past and current research

1. **Model fact-checking** through a data and information management perspective
2. Identify **existing tools and techniques** which could be directly applied
   – In a special journalistic context (see next)
3. Devise **new models, tools and techniques** for fact-checking and data journalism problems

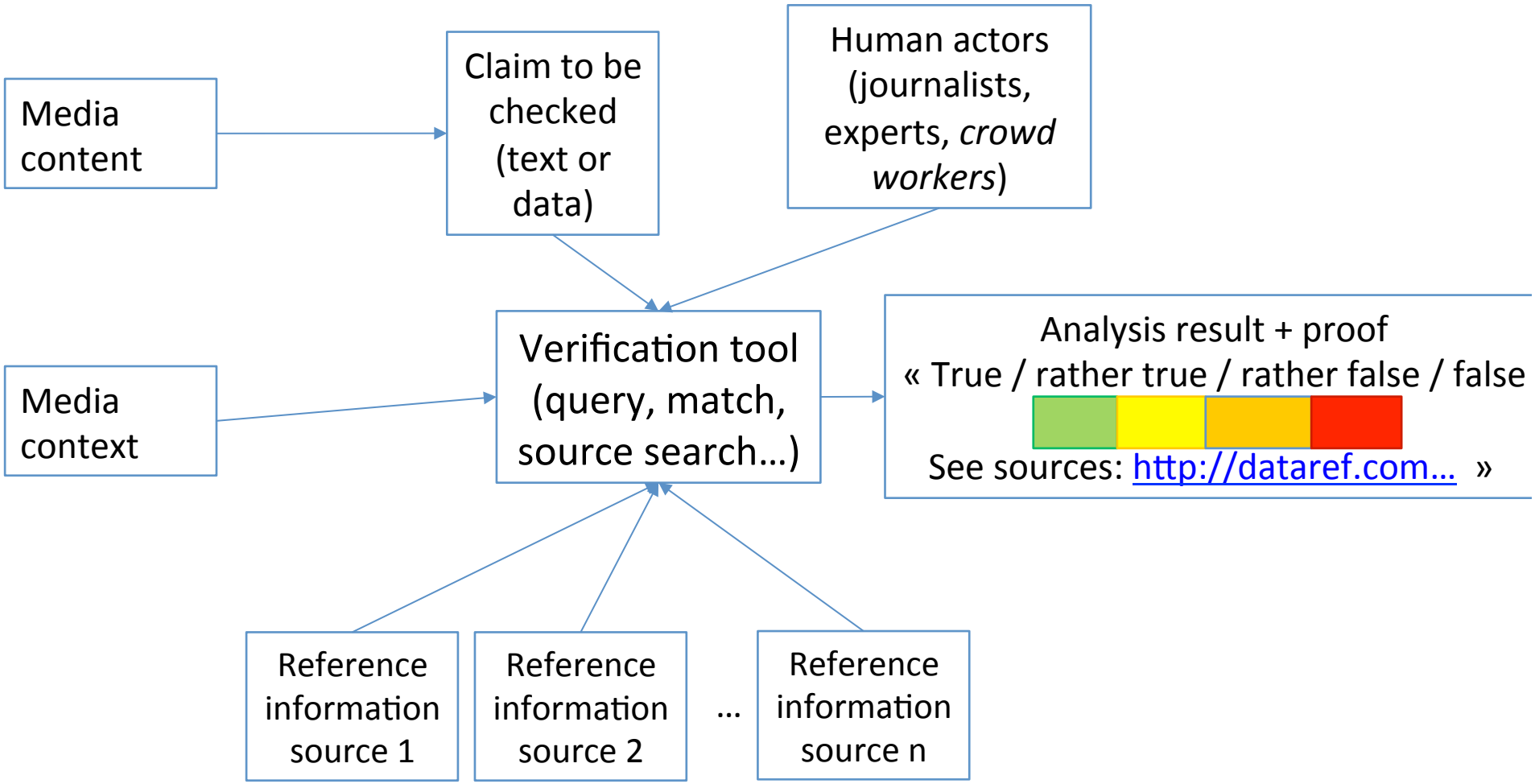
Projects and collaborations

- **Google Award** (2015) with X. Tannier (LIMSI)
- **ANR ContentCheck** (2016-2019) with X. Tannier (Sorbonne Université), S. Cazalens, P. Lamarre, J.-M. Petit, M. Plantevit (U. Lyon), F. Goasdoué (U. Rennes 1), Les Décodeurs (Le Monde)

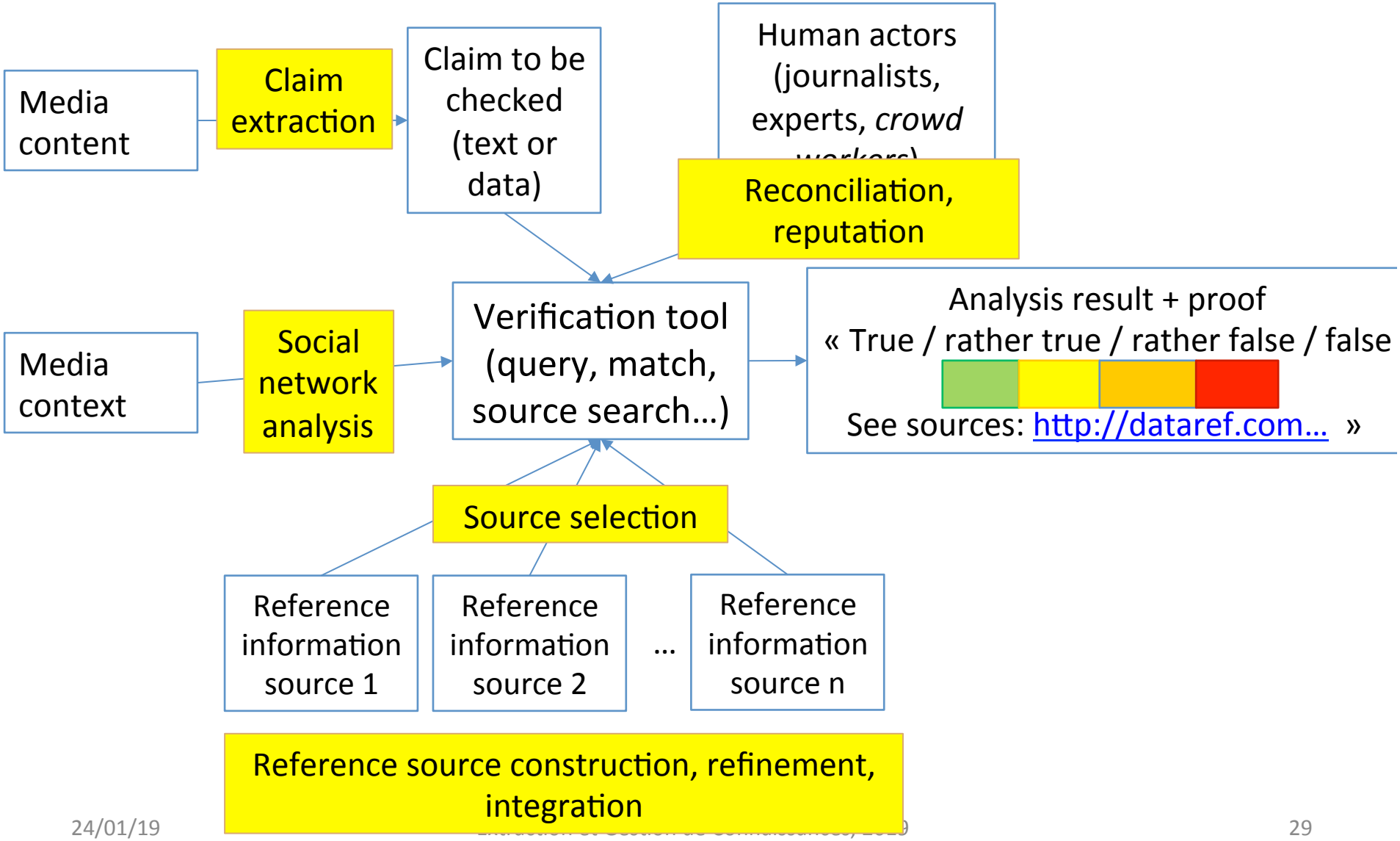
http://contentcheck.inria.fr

- **Inria Associated Team WebClaimExplain** with AIST Japan (Julien Leblay)
- **Collaborations** with H. Galhardas (Technical U. Lisbon), former PhD S. Zampetakis and others

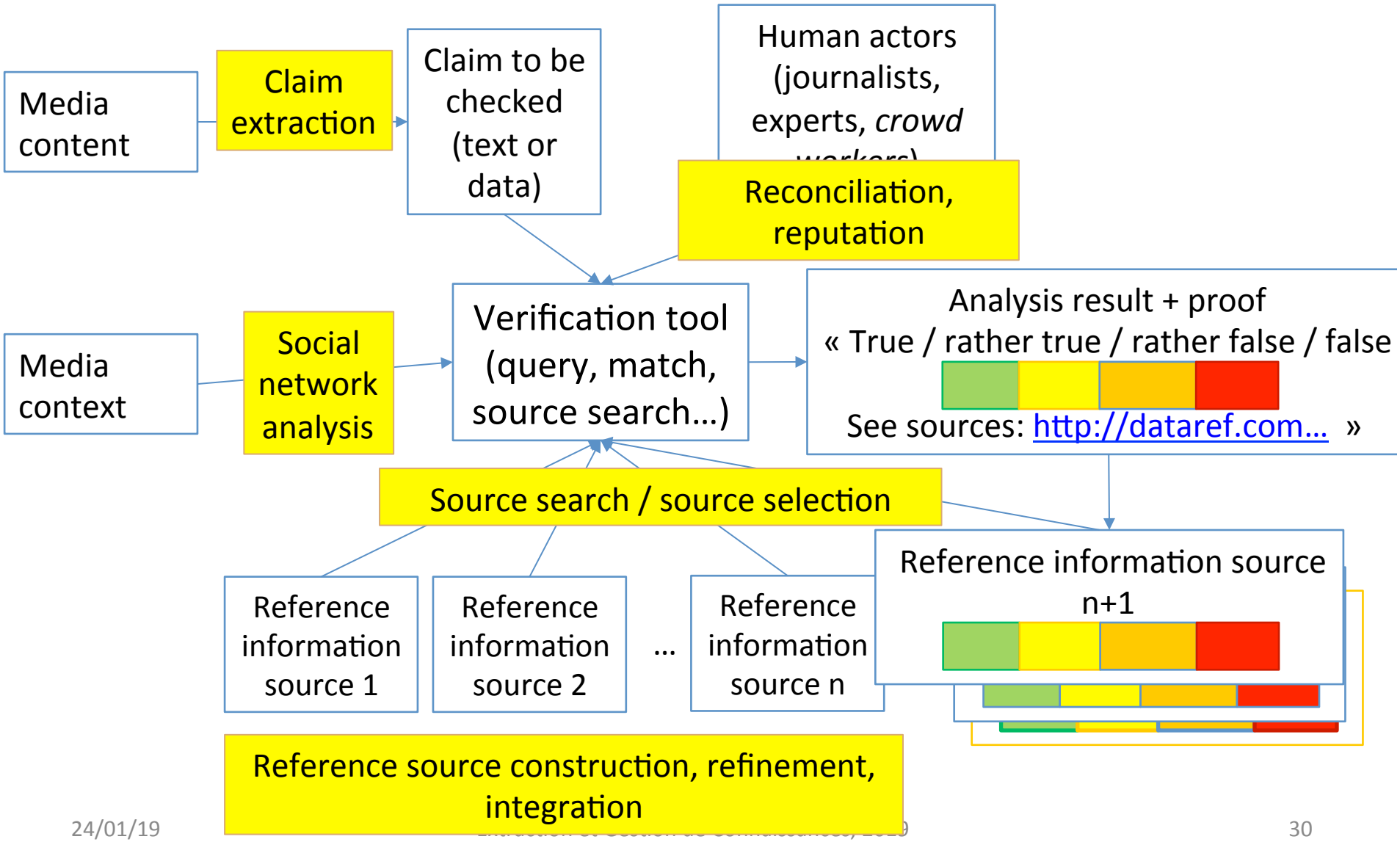
Fact-checking as a content management problem



Fact-checking as a content management problem

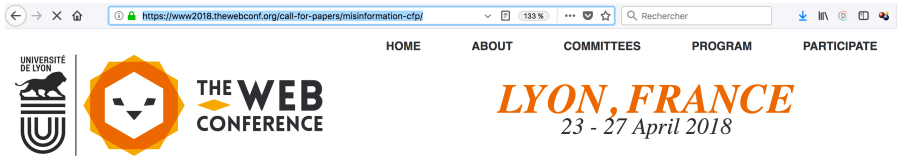


Fact-checking as a content management problem



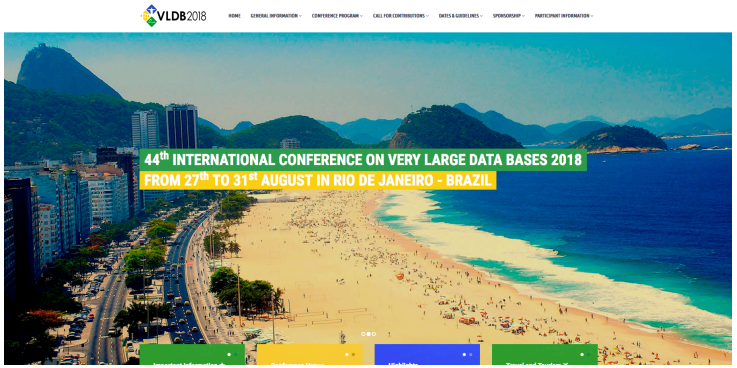
Fact-checking as a content management problem

[WWW2018] "A Content Management Perspective on Fact-Checking", S. Cazalens, J. Leblay, I. Manolescu, X. Tannier (fact-checking track)



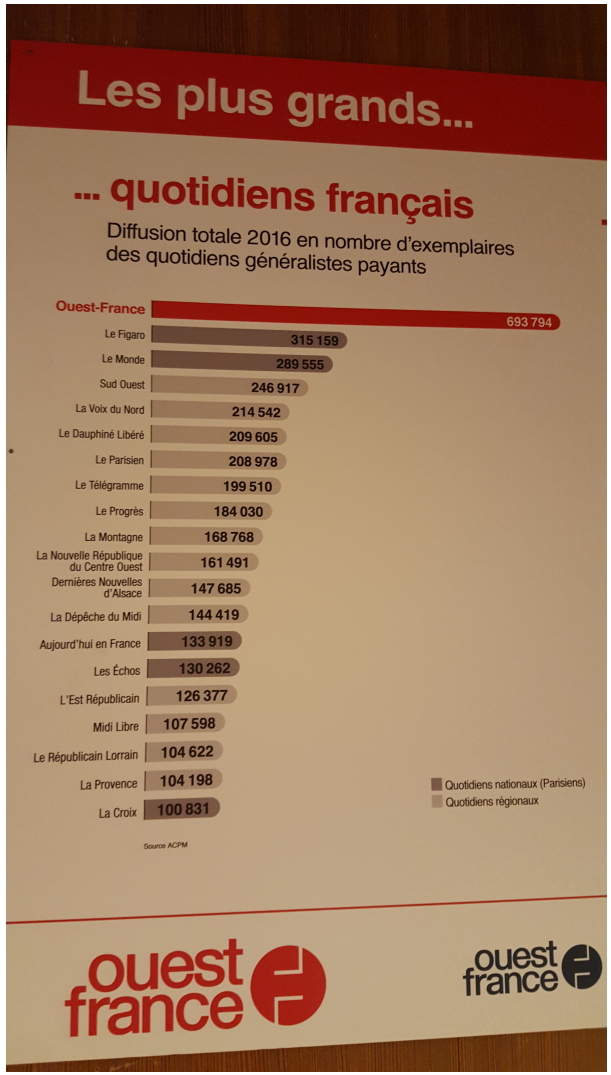
[WWW2018 tutorial] "Computational fact-checking: problems, state of the art, and perspectives", J. Leblay, I. Manolescu, X. Tannier

[VLDB2018 tutorial] "Computational fact-checking: a content management perspective", S. Cazalens, J. Leblay, P. Lamarre, I. Manolescu, X. Tannier



Which existing technologies can be used?

- **Database queries?**
  - Journalists do not, generally, build databases.
  - "Not part of our job"
  - Persisting data is novel to some
  - SQL not user-friendly
  - Not always helped by journal information systems
- Remarkable exception: Ouest France



Which existing technologies can be used?

- **Database queries?**
  - Journalists do not, generally, build databases.
  - "Not part of our job"
- **Curse of the coverage**: they need to cover (almost) any topic
- **Curse of noteworthiness**: write about hot topics of today (or tomorrow)
- They work under **strong time pressure**

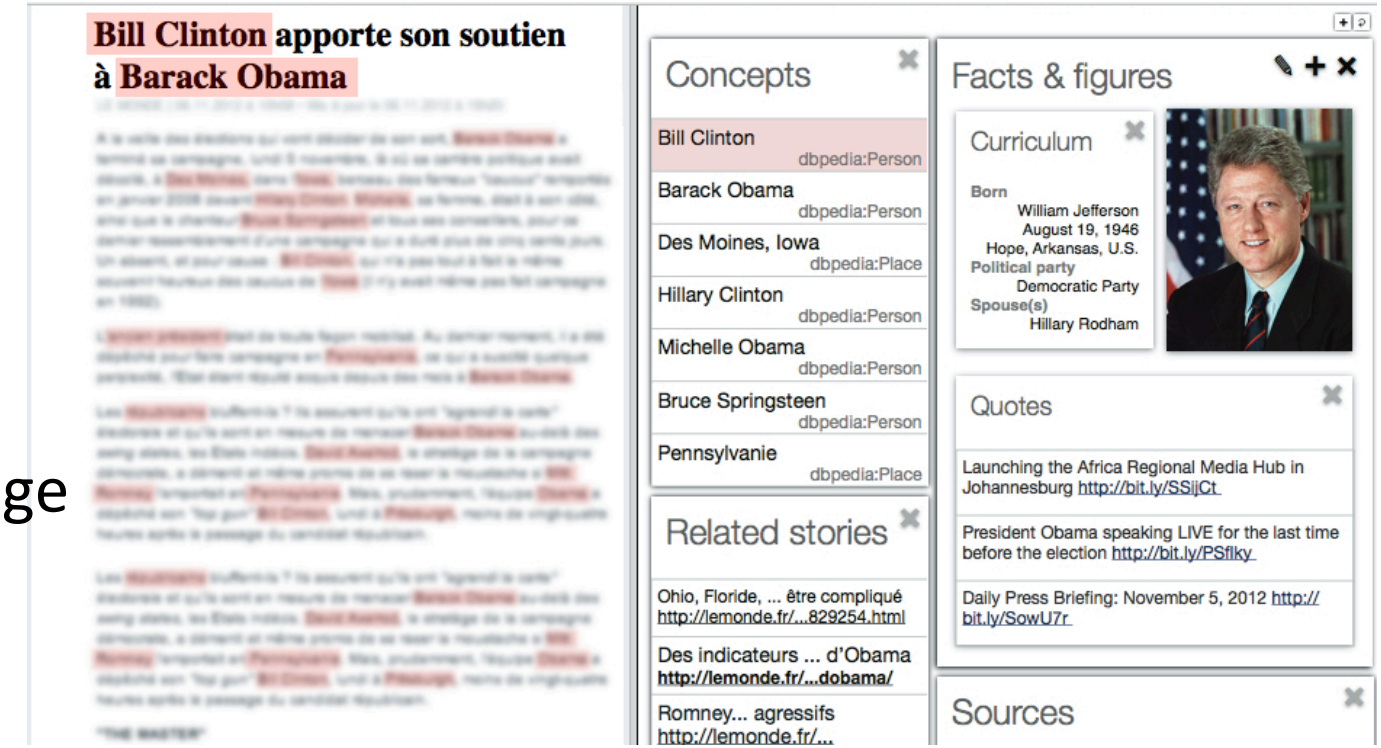
Which existing technologies can be used?

- **IR/NLP?**
  - Better options
- The outcome of fact-check has to be explainable
    - Not (only) "an ML algorithm said so"
    - But they don't like to train ML systems, either.
- Extremely picky on data sources
  - "Many Web sources claim it" is not an option

Automatic source selection: FactMinder

[SIGMOD2013demo] F. Goasdoué, K. Karanasos, Y. Katsis, J. Leblay, I. Manolescu, S. Zampetakis: "Fact-checking and analyzing the Web"

- Plug-in
- Brings relevant data from document and knowledge bases



- « Second screen »

Improving access to reference data sources

[BDA2018] T. D. Cao, I. Manolescu, X. Tannier. "Extracting Linked Data from statistic spreadsheets" (WebDB 2018, SBD 2017)

"Créations d'entreprises en France en 2015" → we return:

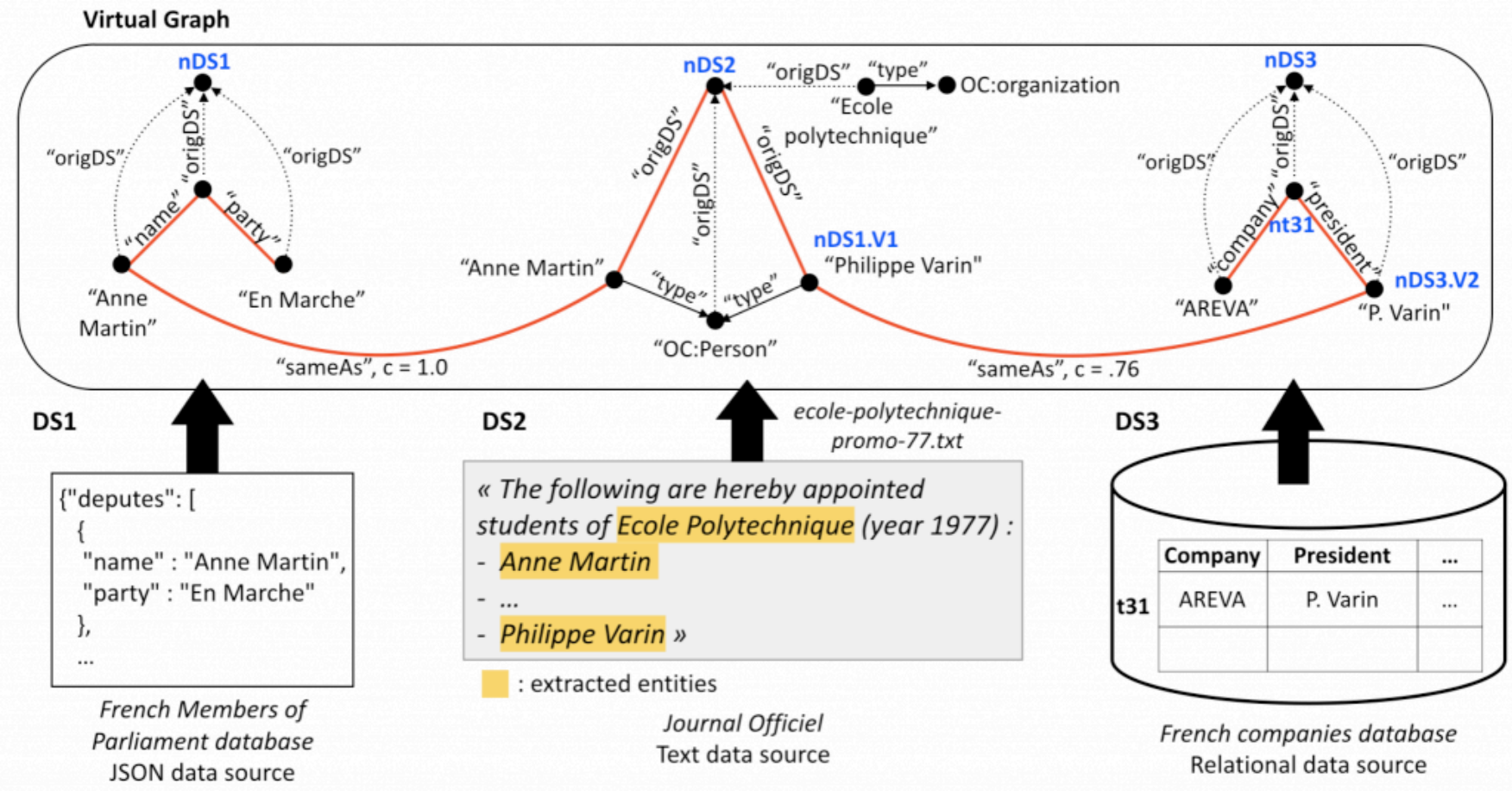
Créations d'entreprises dans quelques pays de l'Union européenne en 2015

en %

Pays	Taux de création
Allemagne	7,1
Belgique	6,2
Espagne	9,5
France (1)	**9,5**
Italie	7,5
Pays-Bas	10,1
Portugal	15,7
République tchèque	8,2
Royaume-Uni	14,3

Keyword search across heterogeneous sources

[VLDB2018demo] C. Chanial, R. Dziri, H. Galhardas, J. Leblay, M. Le Nguyen and I. Manolescu: "ConnectionLens: Finding Connections Across Heterogeneous Data Sources"



A data model for facts, statement and beliefs

With F. Goasdoué and L. Duroyon (U. Rennes 1)

Modeling who said what when

- "On Jan 22, 2017, Le Canard Enchaîné **wrote** that François Fillon **had stated** on Jan 21 that Penelope worked for the NA from 2002 to 2008."
- What has one actor heard of?
- Who knew this at that time?
- Who reversed their position on a topic?

Summary of our work

- Automatically find most relevant reference data for a claim
  - RDF dump of full INSEE statistics
  - Table-aware full text search on the resulting graphs
  - Identifying statistic mentions in text (submitted)
- Identify connections between entities across heterogeneous content: ConnectionLens
- Modelling temporal facts, beliefs and statements

STATUS AND ROADMAP

Status

- Any **question answering framework** which can be plugged on trusted data sources is useful
  - Usually no time nor skills to integrate the data
- No IT infrastructure can be counted upon
  - More "a jumble of tools"
- ML promisses a lot but delivery is hard(er)
  - Also: journalists ambivalence
- Strong and increasingly IT-literate community
  - E.g. https://www.poynter.org/channels/fact-checking

Roadmap: computer science research

- DB, KR, IR, NLP
- In its most general statement, fact-checking supposes perfect NLP → study **sub-problems**!
- In fact-checking journalism, **human writers** chose topics, angle, style...
  - "A story wrapped around a query"
- Vision: build "**perfect data machines**" and give them to talented writers

A vision of journalistic dataspaces

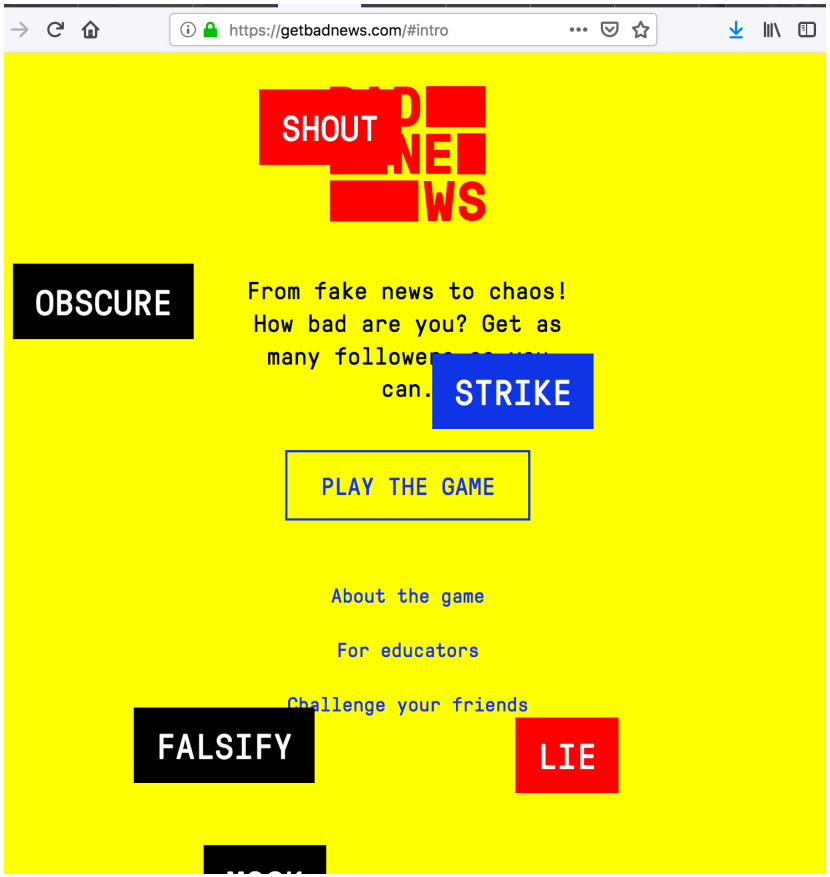
- "Dataspaces": Franklin, Halevy and Maier, SIGMOD Record 2005
- Ingest data of any nature: structured (relational), semistructured (JSON, XML, [social] graphs), unstructured (text), KB...
- Storage, indexing
- Search across the data
  - Dong and Halevy [SIGMOD 2017]: kwd search, result can come from any data source
  - Bonaque, Cautis, Goasdoué, Manolescu **[EDBT2016]**: document search with social score component
  - ConnectionLens: find answers in any combination of data sources; "ad-hoc linked data"

Requirements for journalistic dataspaces

- Time
  - Of data acquisition
  - Of events described in the data
- Provenance
  - Authorship metadata
  - Annotation by users
  - Access control based on provenance and annotations
- Capacity to "derive" content (à la views)
- (Semi-automatic) semantic annotation and classification
- Social connections analysis
- Friendly interfaces
- Scalability

Roadmap: society

- Educate: the general audience, journalists, other social scientists
  - "Fake news creation" games, e.g. http://getbadnews.com



Roadmap: society

- Educate: the general audience, journalists, other social scientists
  - Education to media and the internet in schools

In France, School Lessons Ask: Which Twitter Post Should You Trust?

Is this worth it?

"Some people will never be convinced"

- "Facts have a liberal bias" (Paul Krugman) https://www.nytimes.com/2017/12/08/opinion/facts-have-a-well-known- liberal-bias.html
- "Scientists and humanity scholars believe in a constructed, logical discourse, and believe **humans yield to reason**. Businesspeople **know this is not true**, in general. Businesspeople have thus an advantage in winning political competitions." George Lakoff, former Berkeley professor https://georgelakoff.com/2016/11/22/a-minority-president-why-the-polls-failed-and-what-the-majority-can-do/
- Conspiracy theory adepts believe two obviously contradicting theories [Wood et al., 2012]

THANK YOU / QUESTIONS?

HTTP://CONTENTCHECK.INRIA.FR/