Technologies et Protection de votre vie privée sur Internet

Nataliia Bielova

joint work with Claude Castelluccia, Imane Fouad, Gabor Gulyas, Arnaud Legout, Tamara Rezk, Natasa Sarafijanovic-Djukic, Doliere Francis Some

nataliia.bielova@inria.fr

@nataliabielova

13 novembre 2017

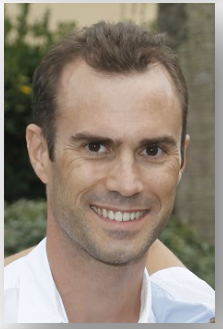
Who am I?

- Nataliia Bielova, PhD 2011
- **Research scientist** (CR) at **INDES** team

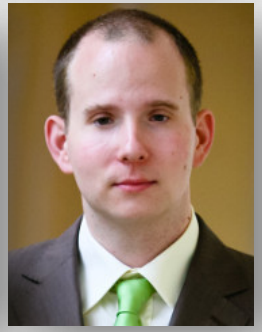
  French National Institute in **computer science** and automation
- Interests:
  - Privacy protection
  - Web Tracking technologies
  - Discrimination on the Web
  - ePrivacy Regulation (EU privacy law)

Joint work with my colleagues

Pixel tracking measurement



Browser extensions and Web logins experiment



Server-side protection for Web developers

Back in 1993…

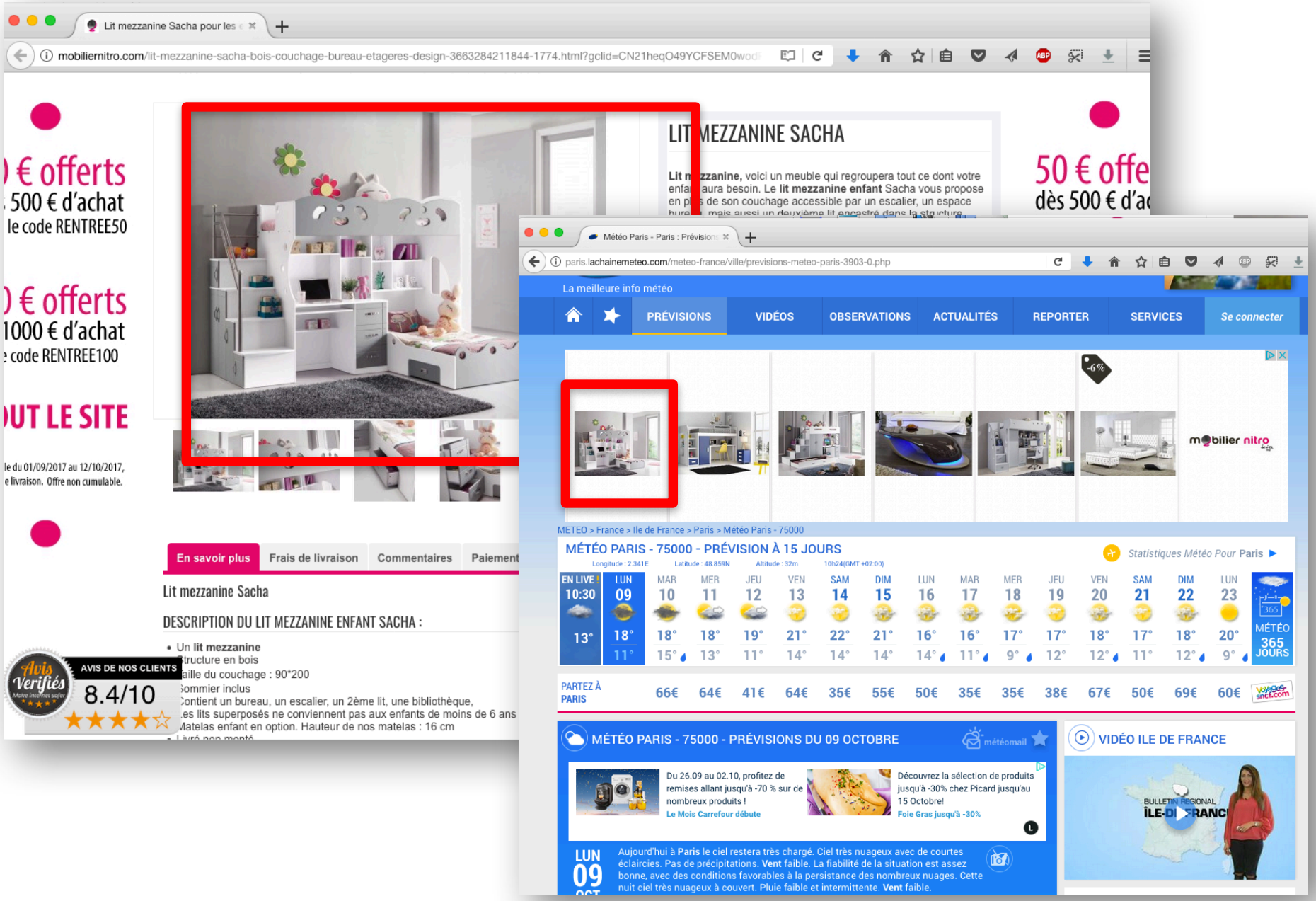
"On the Internet, nobody knows you're a dog."

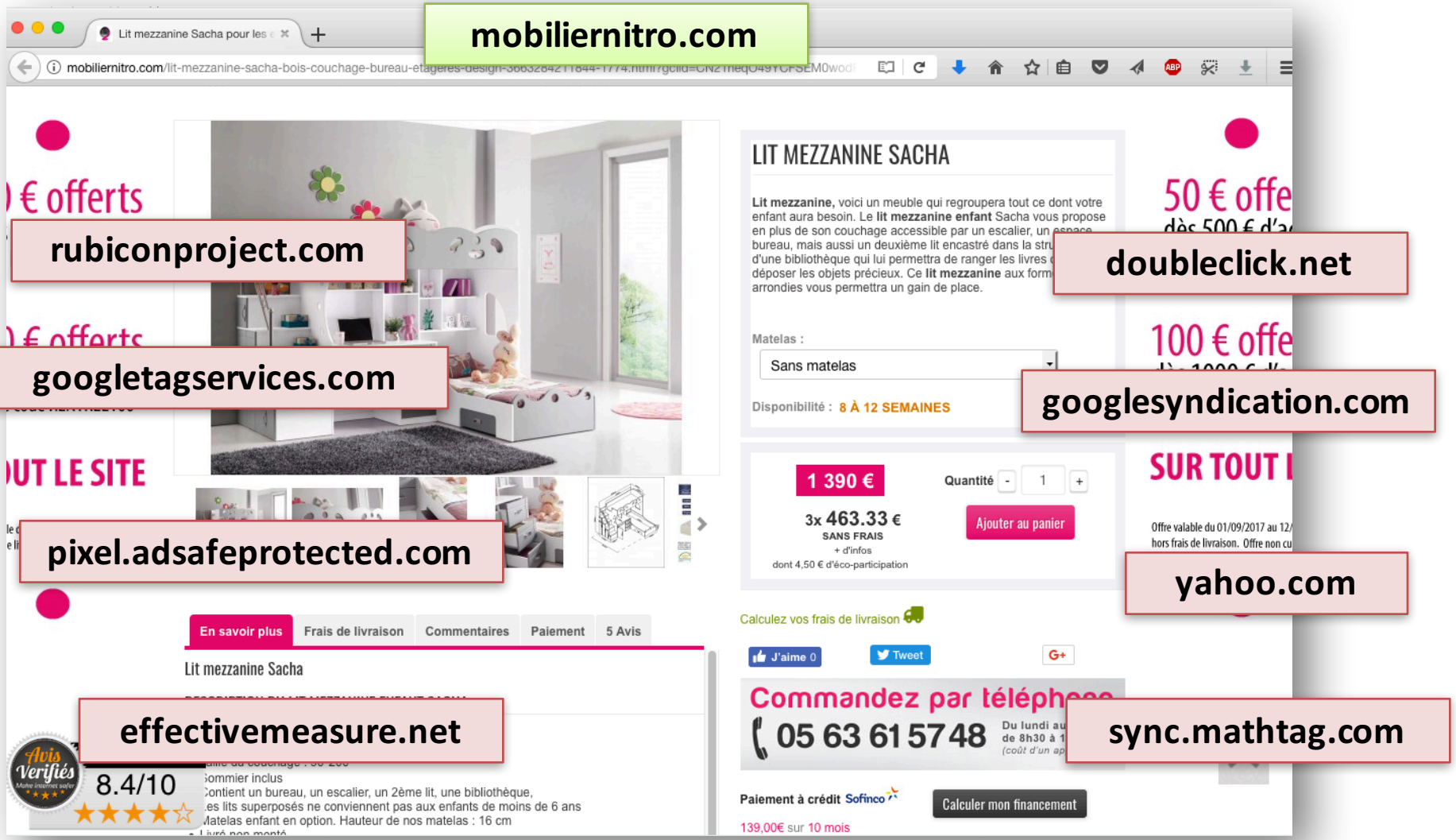
©The New Yorker Collection 1993 Peter Steiner
From cartoonbank.com. All rights reserved.

Today…

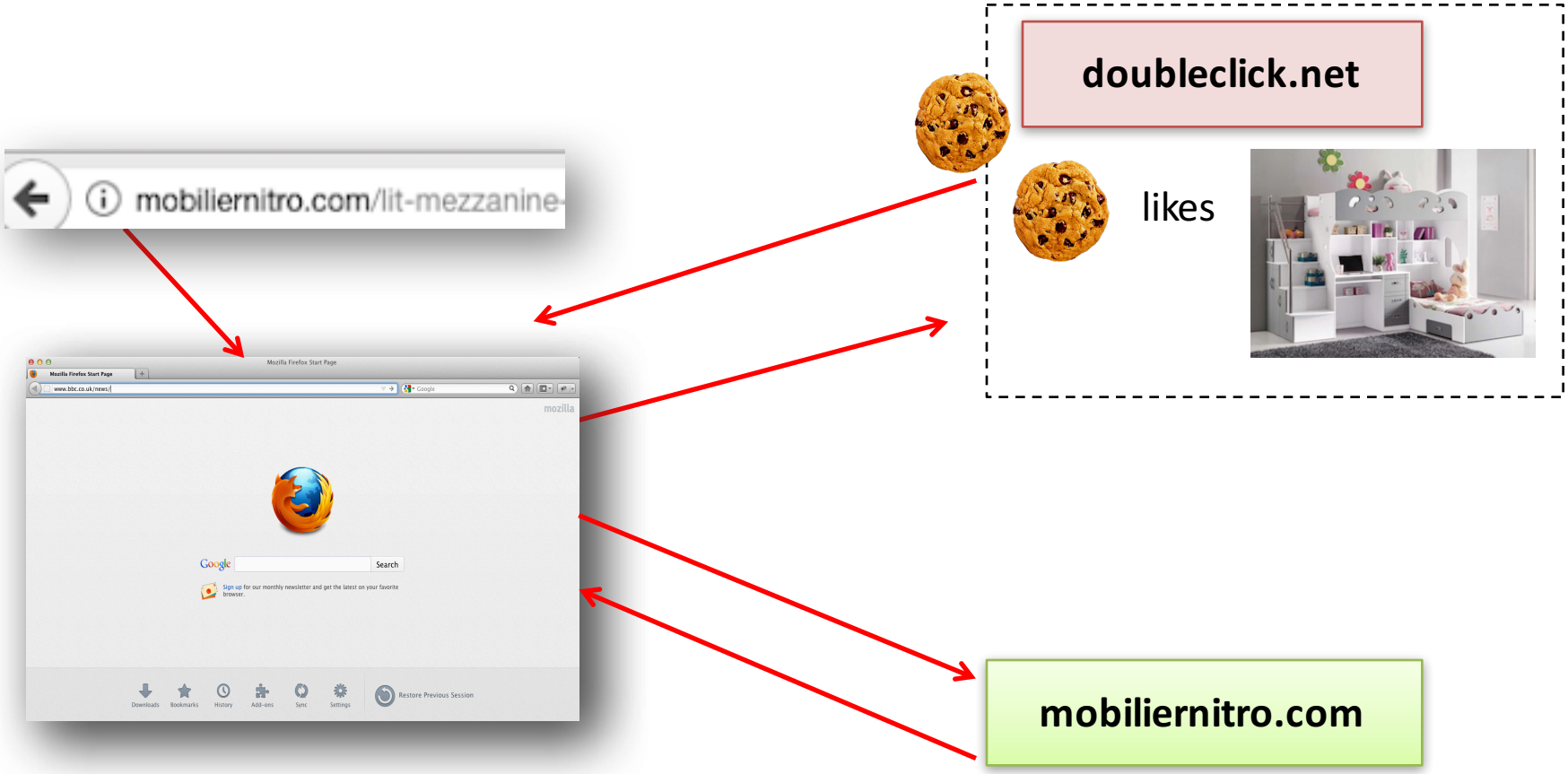
It's the Internet! Of course they know you're a dog. They also know your favorite brand of pet food and the name of the cute poodle at the park that you have a crush on!

©The New Yorker Collection 1993 Peter Steiner
From cartoonbank.com. All rights reserved.

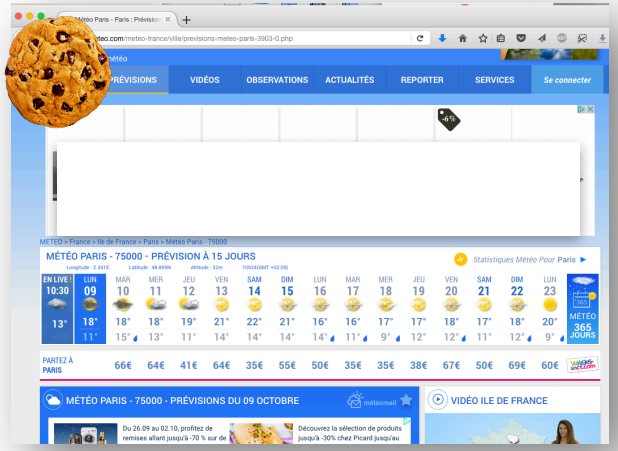

Lit mezzanine Sacha pour les
mobiliernitro.com/lit-mezzanine-sacha-bois-couchage-bureau-etageres-design-3663284211844-1774.html?gclid=CN21heqO49YCFSEM0wod
€ offerts
500 € d'achat
le code RENTREE50
€ offerts
1000 € d'achat
code RENTREE100
UT LE SITE
le du 01/09/2017 au 12/10/2017,
livraison. Offre non cumulable.
LIT MEZZANINE SACHA
Lit mezzanine, voici un meuble qui regroupera tout ce dont votre enfant aura besoin. Le lit mezzanine enfant Sacha vous propose
50 € offe
dès 500 € d'a
En savoir plus
Frais de livraison
Commentaires
Paiement
Lit mezzanine Sacha
DESCRIPTION DU LIT MEZZANINE ENFANT SACHA :
Un lit mezzanine
structure en bois
aille du couchage : 90*200
Sommier inclus
Contient un bureau, un escalier, un 2ème lit, une bibliothèque,
es lits superposés ne conviennent pas aux enfants de moins de 6 ans
Matelas enfant en option. Hauteur de nos matelas : 16 cm
AVIS DE NOS CLIENTS
8.4/10
Avis Vérifiés
Météo Paris - Paris : Prévisions
paris.lachainemeteo.com/meteo-france/ville/previsions-meteo-paris-3903-0.php
La meilleure info météo
PRÉVISIONS
VIDÉOS
OBSERVATIONS
ACTUALITÉS
REPORTER
SERVICES
Se connecter
-6%
mobilier nitro
METEO > France > Ile de France > Paris > Météo Paris - 75000
MÉTÉO PARIS - 75000 - PRÉVISION À 15 JOURS
Statistiques Météo Pour Paris
EN LIVE ! 10:30 13°
LUN 09 18° 11°
MAR 10 18° 15°
MER 11 18° 13°
JEU 12 19° 11°
VEN 13 21° 14°
SAM 14 22° 14°
DIM 15 21° 14°
LUN 16 16° 14°
MAR 17 16° 11°
MER 18 17° 9°
JEU 19 17° 12°
VEN 20 18° 12°
SAM 21 17° 11°
DIM 22 18° 12°
LUN 23 20° 9°
MÉTÉO 365 JOURS
PARTEZ À PARIS
66€ 64€ 41€ 64€ 35€ 55€ 50€ 35€ 35€ 38€ 67€ 50€ 69€ 60€
MÉTÉO PARIS - 75000 - PRÉVISIONS DU 09 OCTOBRE
météomail
Du 26.09 au 02.10, profitez de remises allant jusqu'à -70 % sur de nombreux produits !
Le Mois Carrefour débute
Découvrez la sélection de produits jusqu'à -30% chez Picard jusqu'au 15 Octobre!
Foie Gras jusqu'à -30%
LUN 09
Aujourd'hui à Paris le ciel restera très chargé. Ciel très nuageux avec de courtes éclaircies. Pas de précipitations. Vent faible. La fiabilité de la situation est assez bonne, avec des conditions favorables à la persistance des nombreux nuages. Cette nuit ciel très nuageux à couvert. Pluie faible et intermittente. Vent faible.
VIDÉO ILE DE FRANCE
BULLETIN REGIONAL
ÎLE-DE-FRANCE


mobiliernitro.com
rubiconproject.com
doubleclick.net
googletagservices.com
googlesyndication.com
pixel.adsafeprotected.com
yahoo.com
effectivemeasure.net
sync.mathtag.com
LIT MEZZANINE SACHA
Lit mezzanine, voici un meuble qui regroupera tout ce dont votre enfant aura besoin. Le lit mezzanine enfant Sacha vous propose en plus de son couchage accessible par un escalier, un
bureau, mais aussi un deuxième lit encastré dans la stru
d'une bibliothèque qui lui permettra de ranger les livres
déposer les objets précieux. Ce lit mezzanine aux form
arrondies vous permettra un gain de place.
Matelas :
Sans matelas
Disponibilité : 8 À 12 SEMAINES
1 390 €
Quantité
3x 463.33 €
SANS FRAIS
+ d'infos
dont 4,50 € d'éco-participation
Ajouter au panier
Calculez vos frais de livraison
J'aime 0
Tweet
G+
05 63 61 57 48
Paiement à crédit Sofinco
Calculer mon financement
139,00€ sur 10 mois
En savoir plus
Frais de livraison
Commentaires
Paiement
5 Avis
Lit mezzanine Sacha
8.4/10
50 € offe
100 € offe
SUR TOUT
Offre valable du 01/09/2017 au 12/
hors frais de livraison. Offre non cu

Web Tracking



Web Tracking

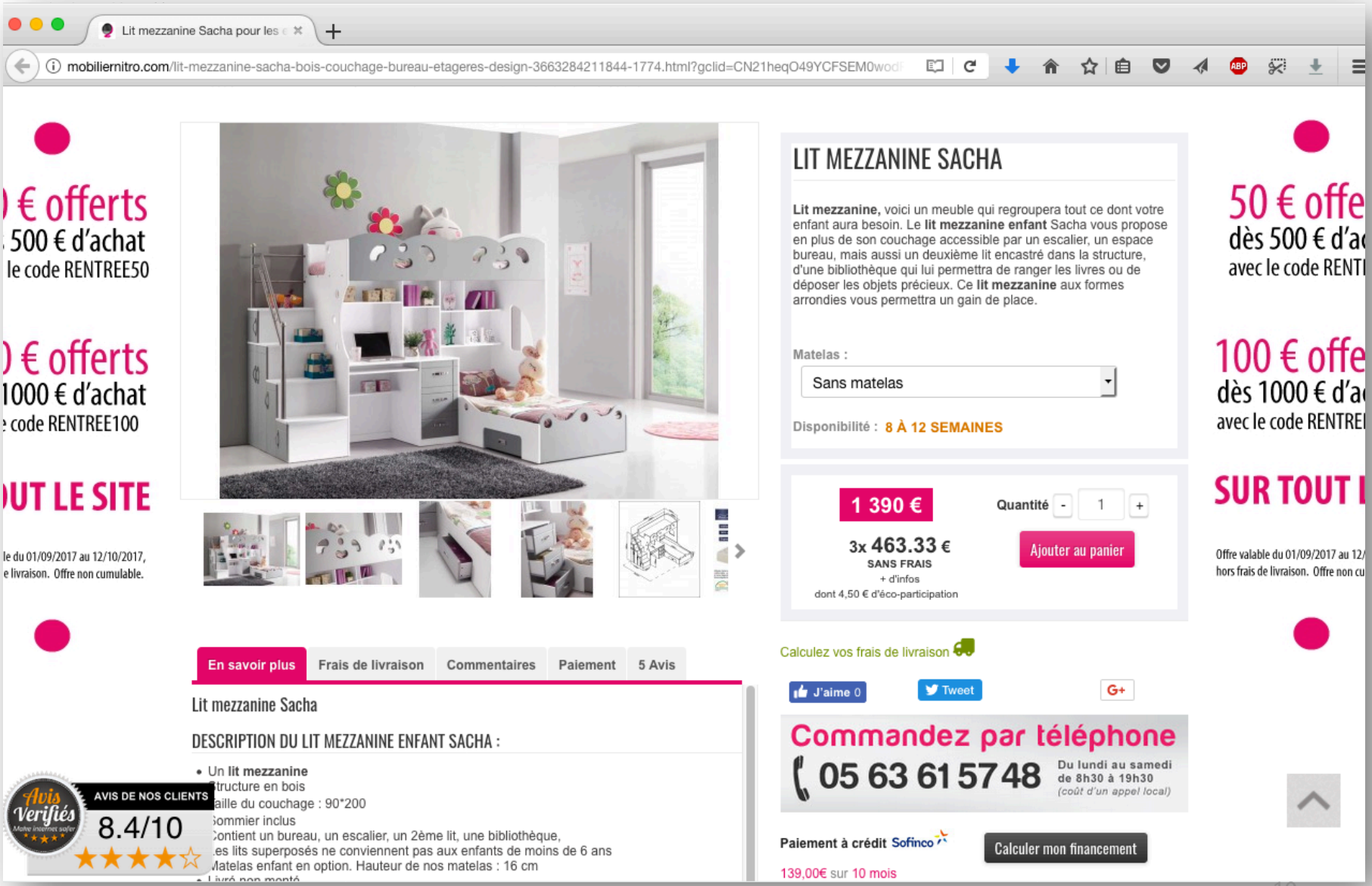


doubleclick.net

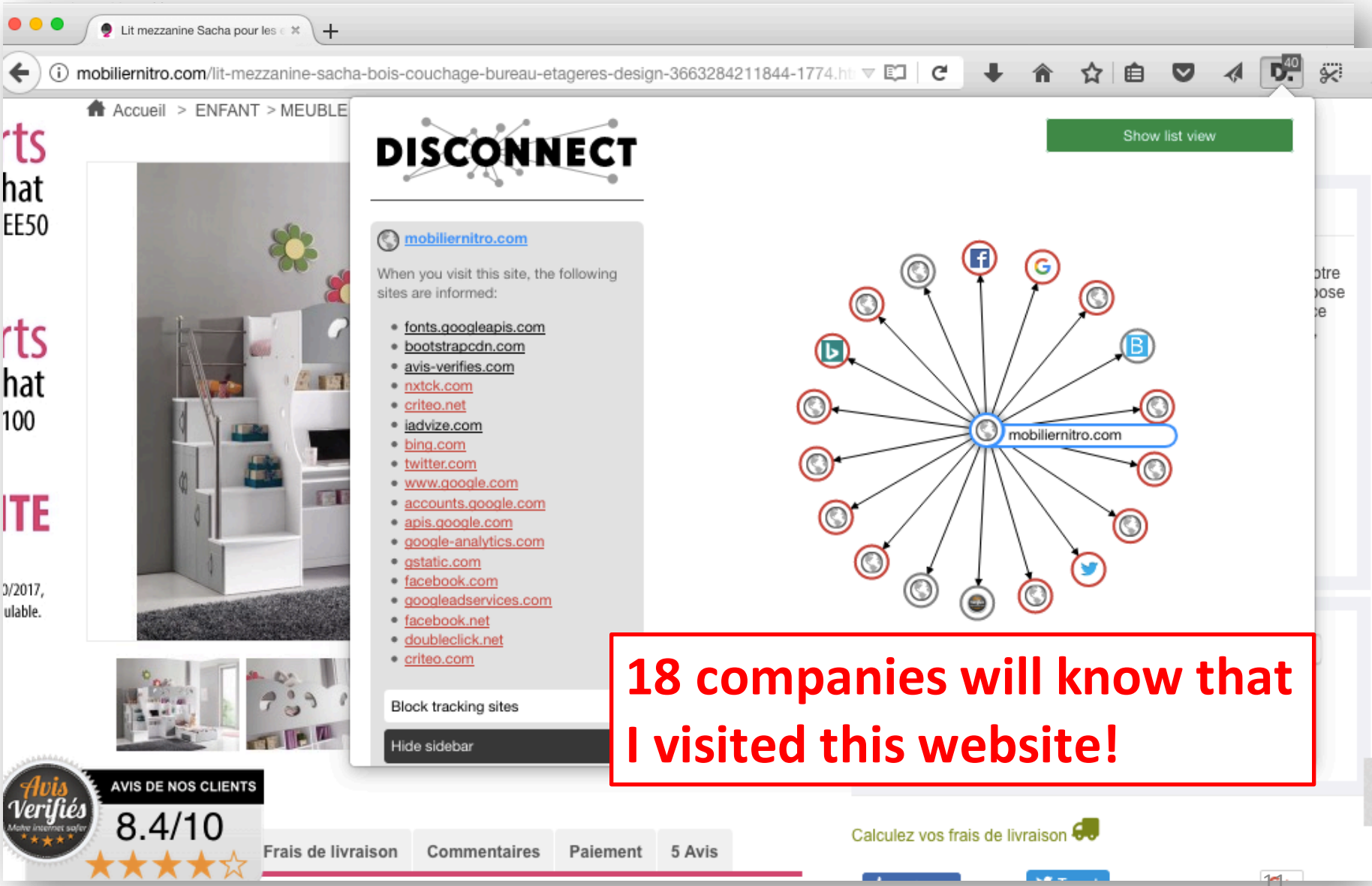
likes

paris.lachainmeteo.com

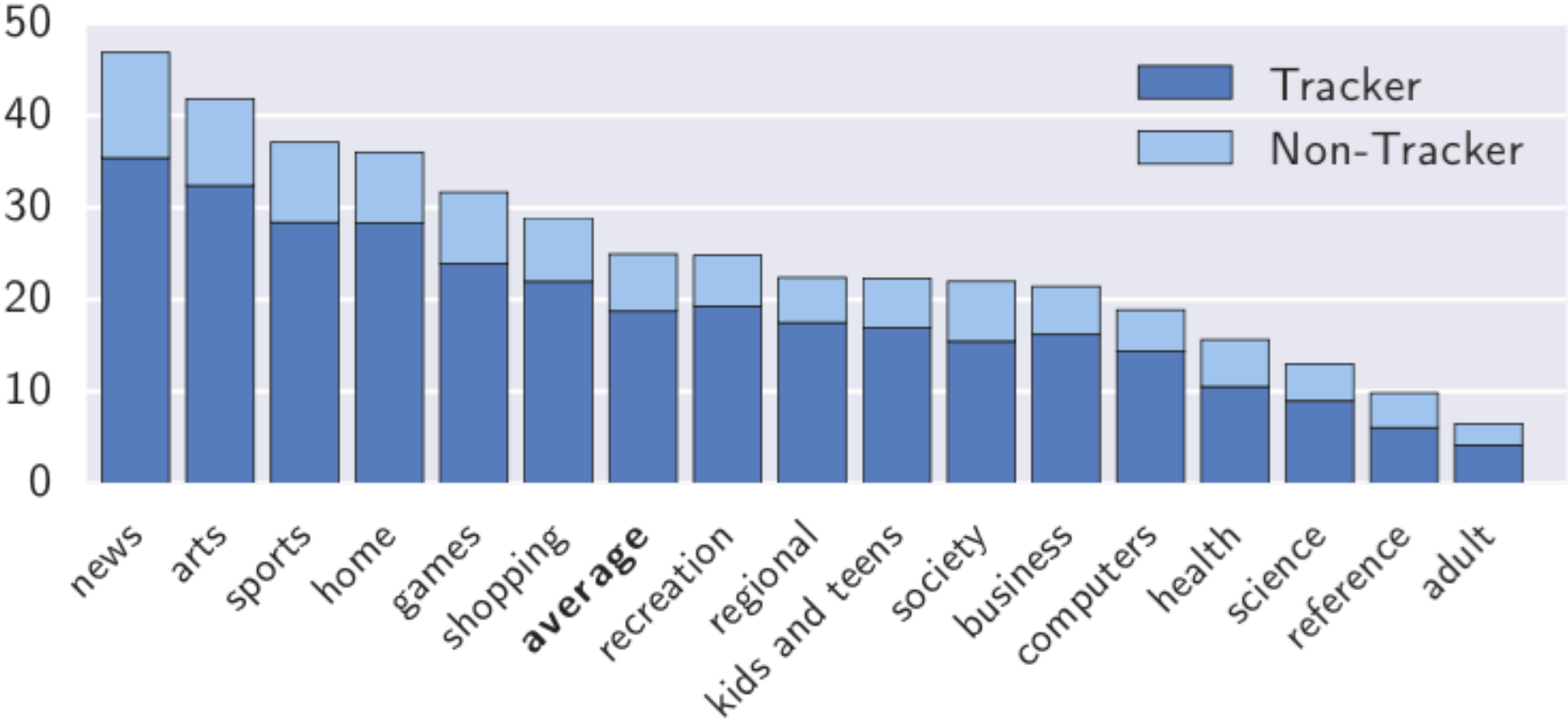
How many trackers per website?



How many trackers per website?



How many trackers per website?



Englehardt & Narayanan. Online Tracking: A 1-million-site Measurement and Analysis. CCS 2016

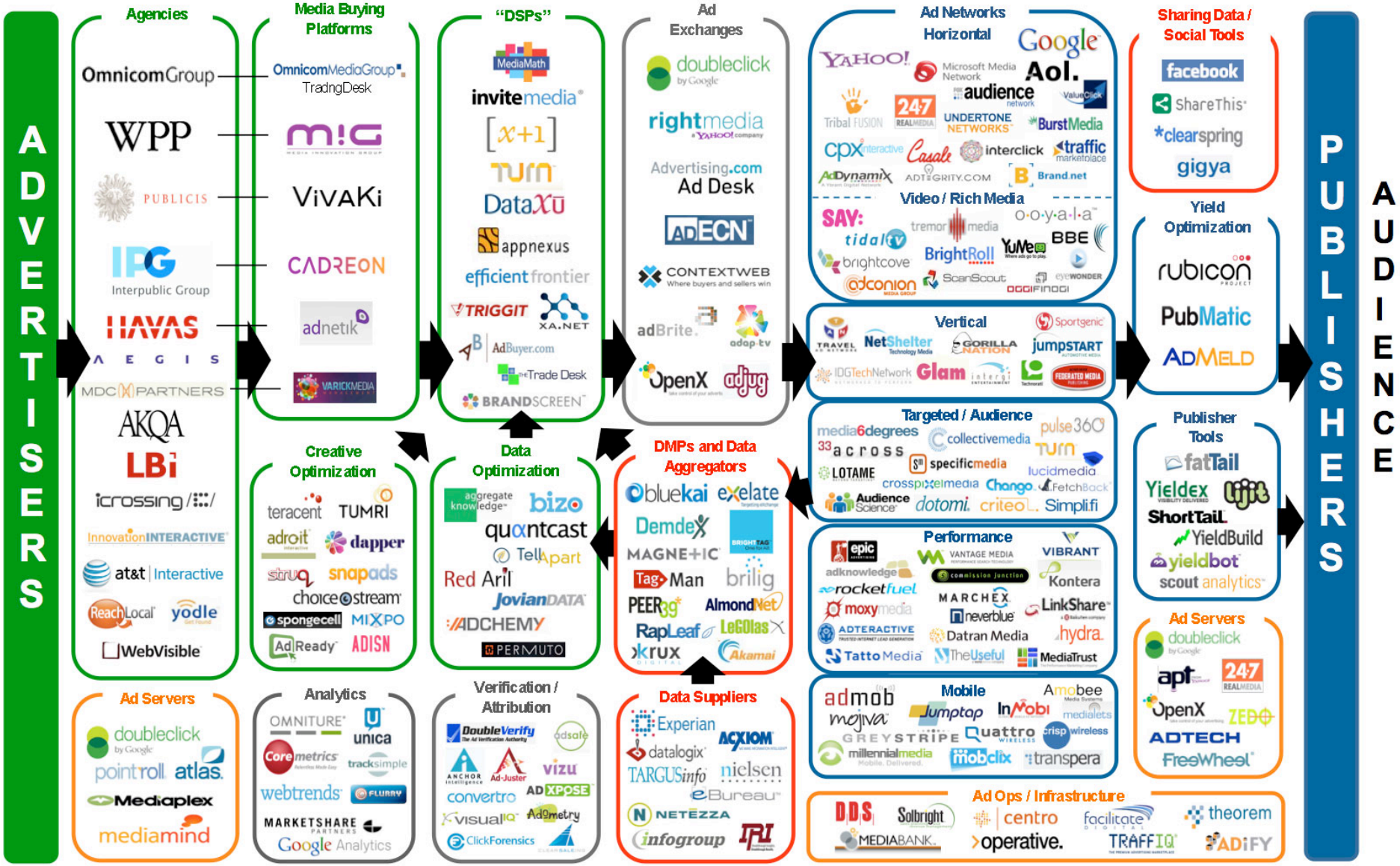
Pourquoi sommes-nous suivis sur les sites d'actualités?

“L'activité principale du plaignant consiste à diffuser des annonces à ses visiteurs. **Le contenu journalistique est juste un moyen d'amener les lecteurs à voir les publicités.”**

Axel Springer’s lawyer, 2015

Axel Springer SE est le plus important groupe de presse en Europe

Display Advertising Technology Landscape



© LUMA Partners LLC 2010

VIDEO LUMAscape

Denotes acquired company

Denotes shuttered company

© LUMA Partners LLC 2017

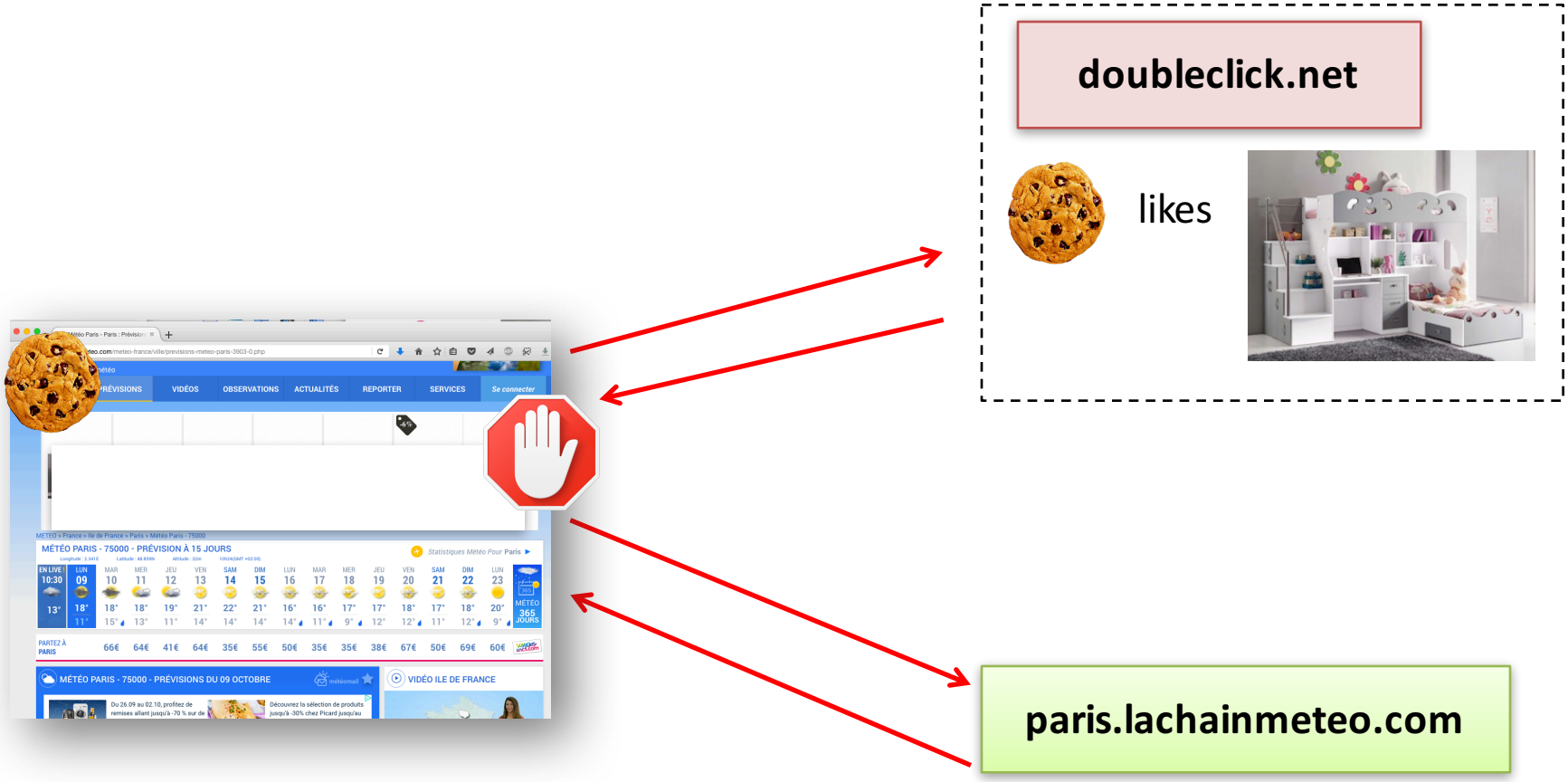
Collecting data

- websites visited
- buttons pressed
- ads viewed

Displaying ads

- take data from trackers
- find relevant ads
- display ads to the users

Blocking ads does block tracking



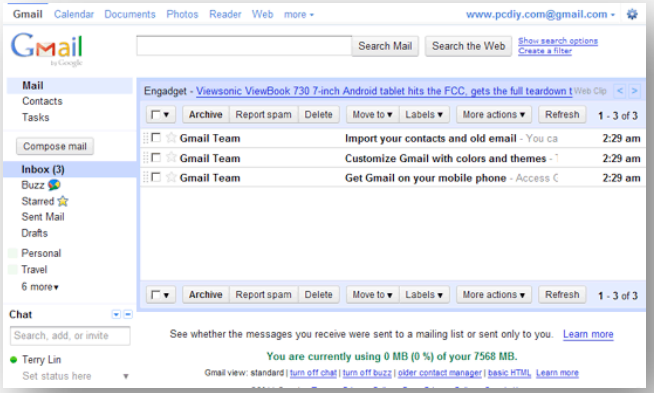
AdBlock

Web Tracking Technologies

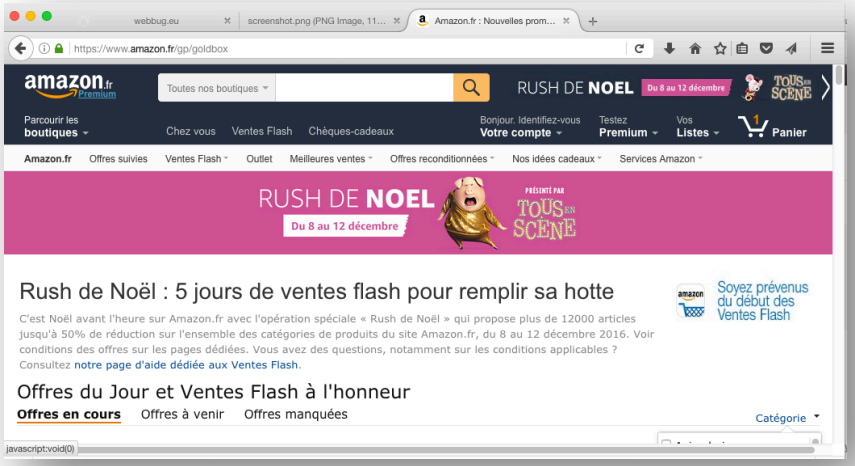
TRACKING VIA COOKIES

What’s the original use of cookies?

- Keep the session through different windows/tabs

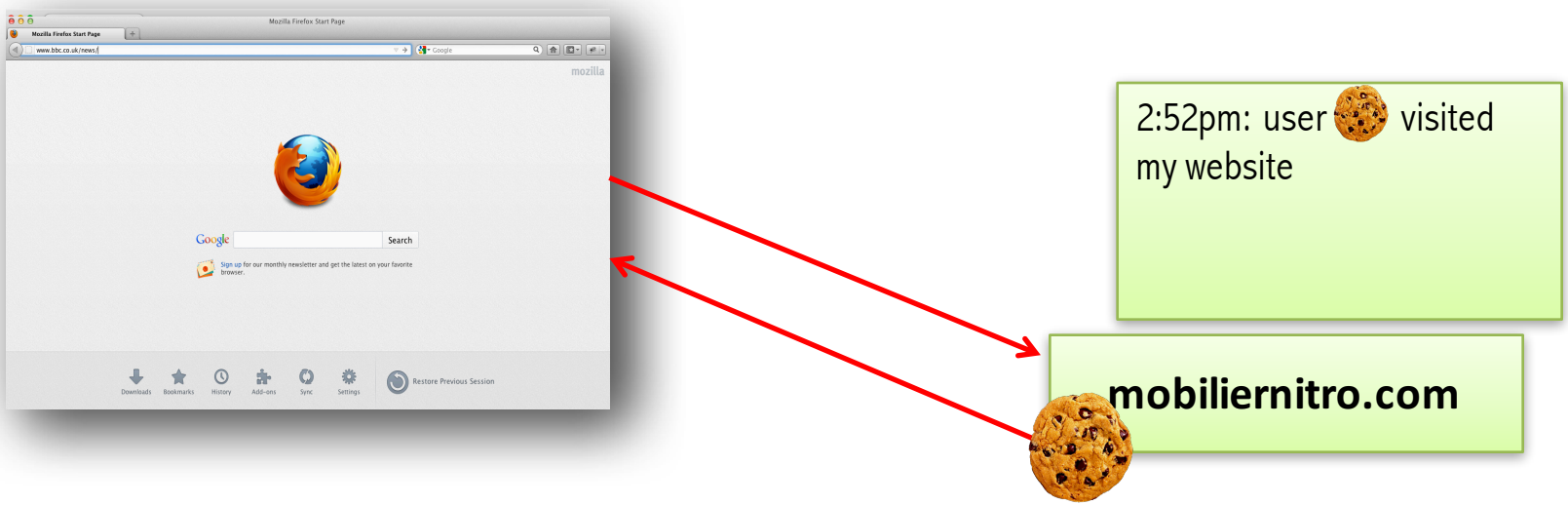


- Shopping basket



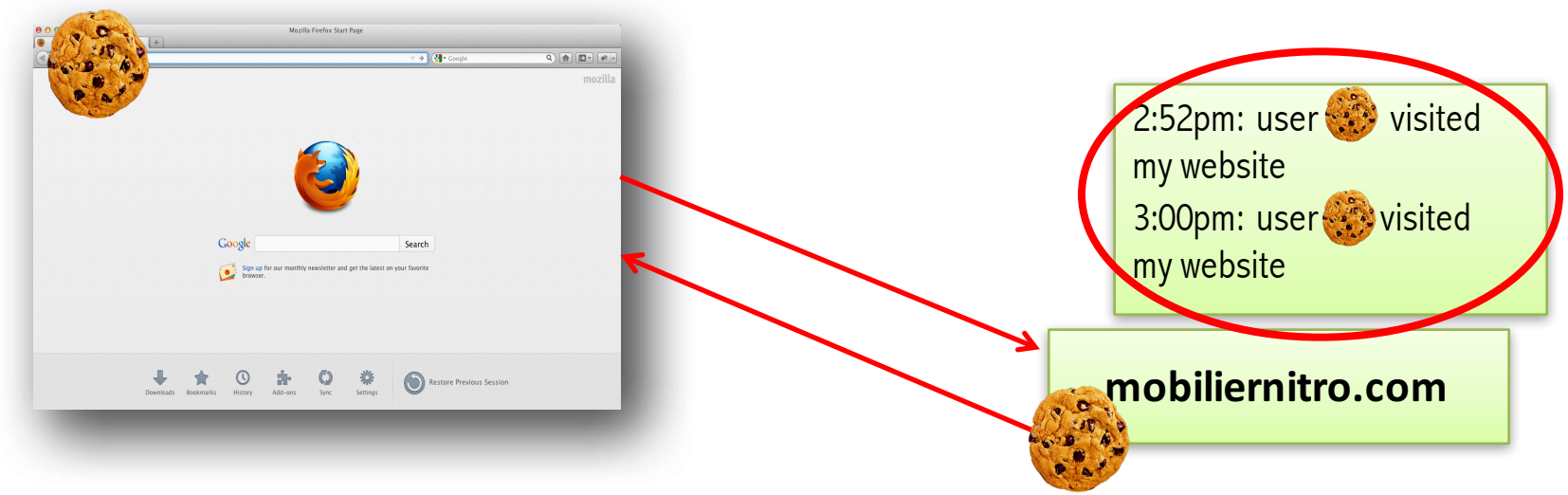
Within-Site Tracking

First-party cookies are used to **track repeat visits** to the same site.



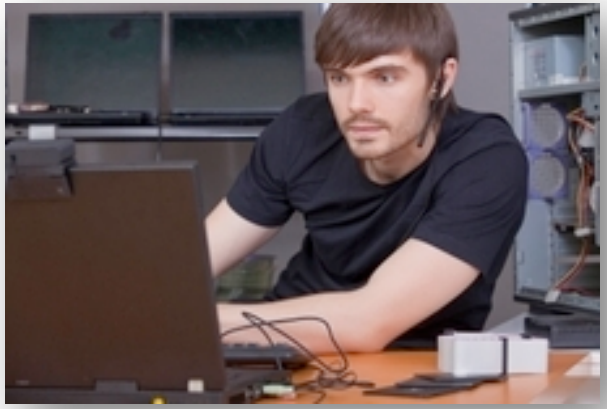
Within-Site Tracking

First-party cookies are used to **track repeat visits** to the same site.

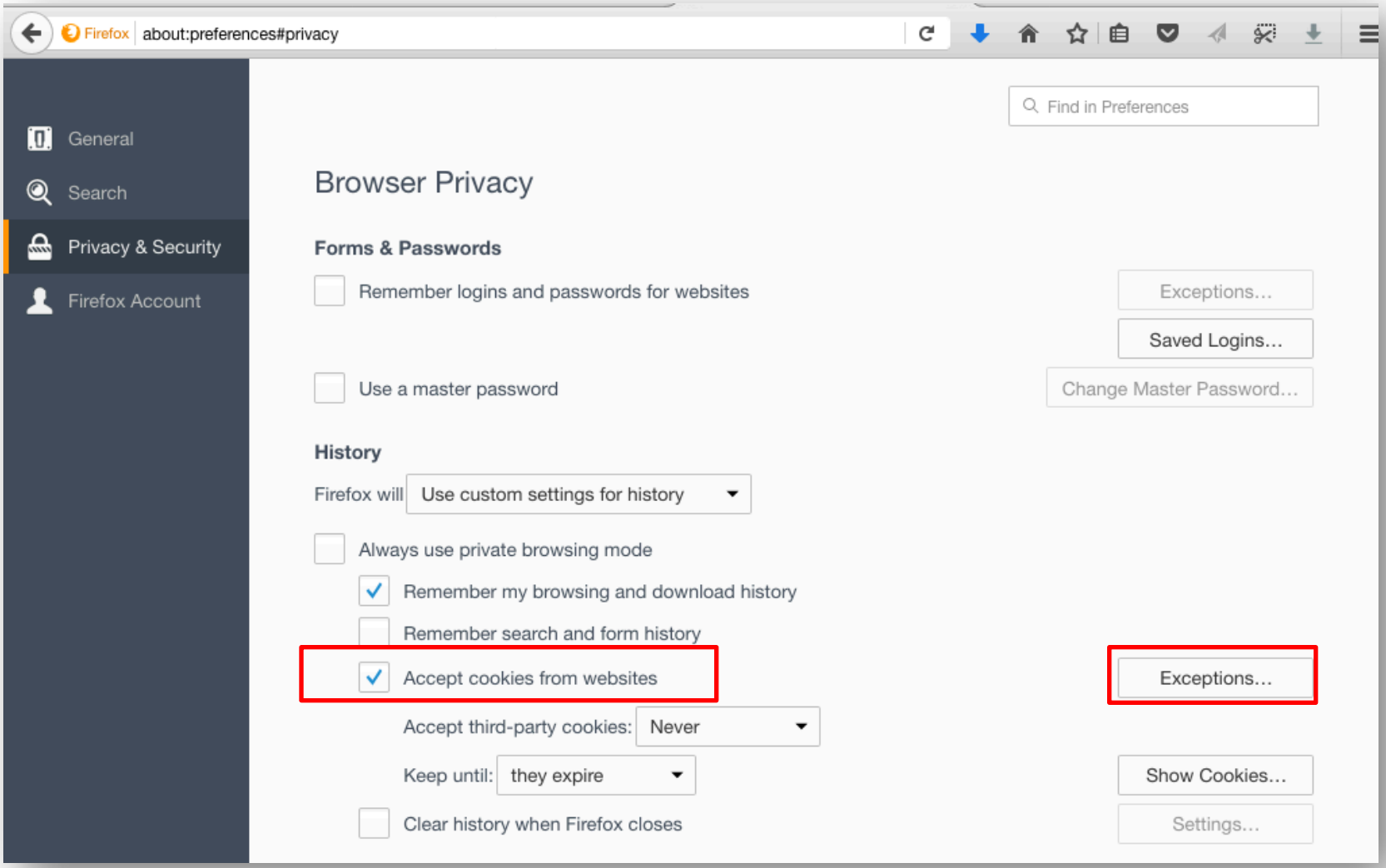


First-party cookies have more benefits

- Website owners can evaluate
  - website statistics
  - popularity of certain pages
  - popularity of links
  - selected and copied phrases

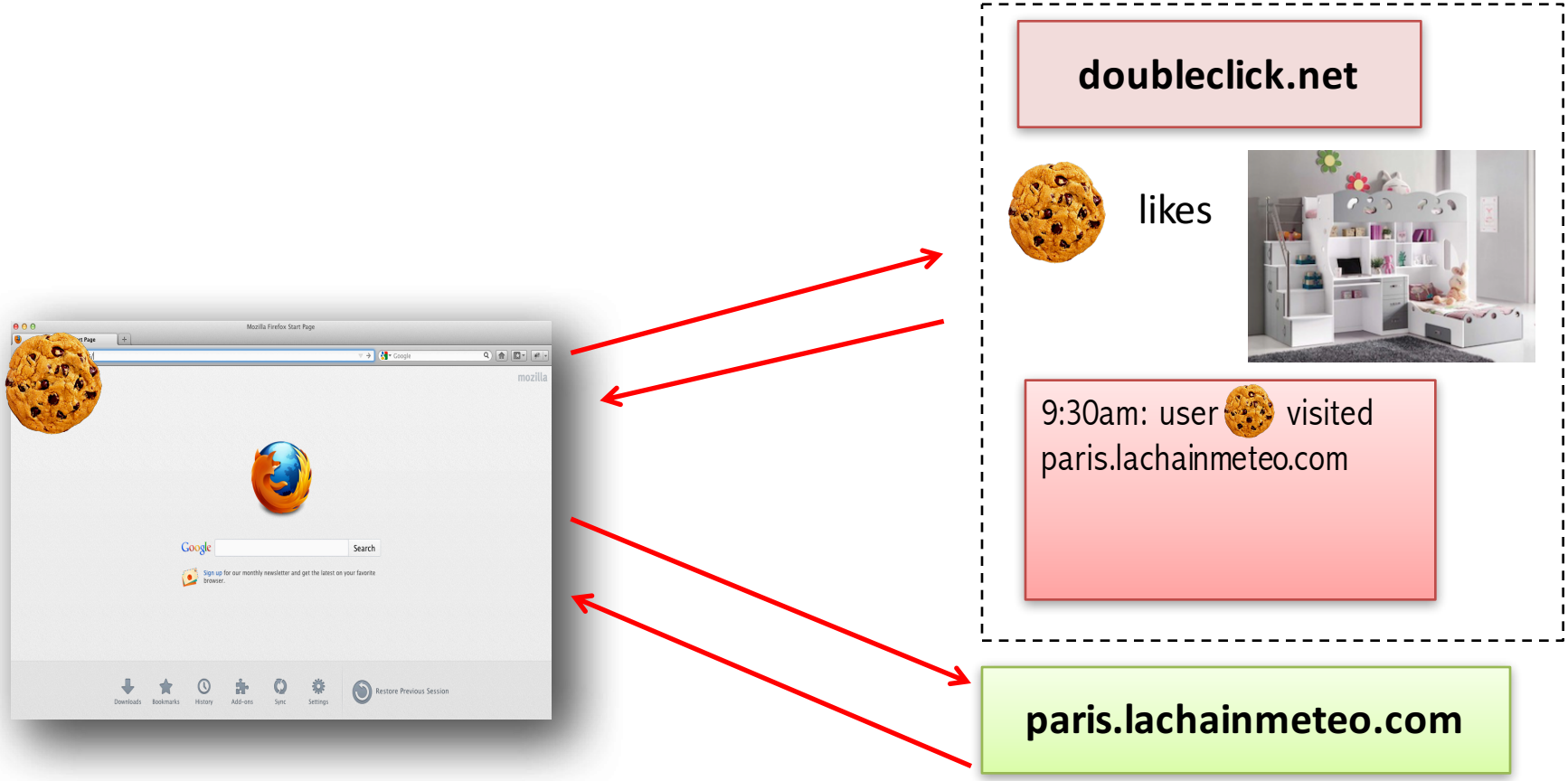


First-party cookie setting



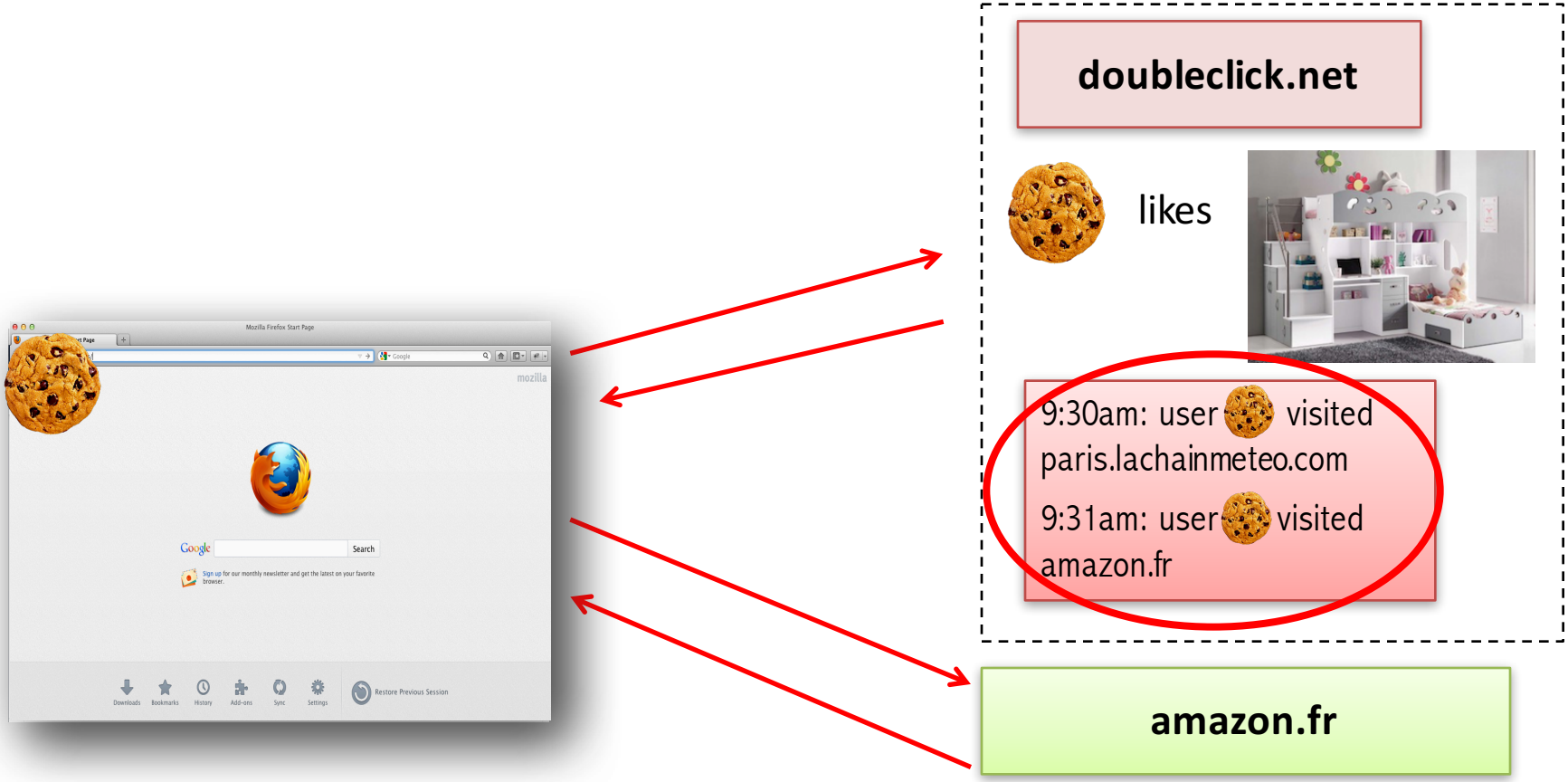
Cross-site Tracking

Third-party cookies are used to track users **across sites and collect their browsing history**.

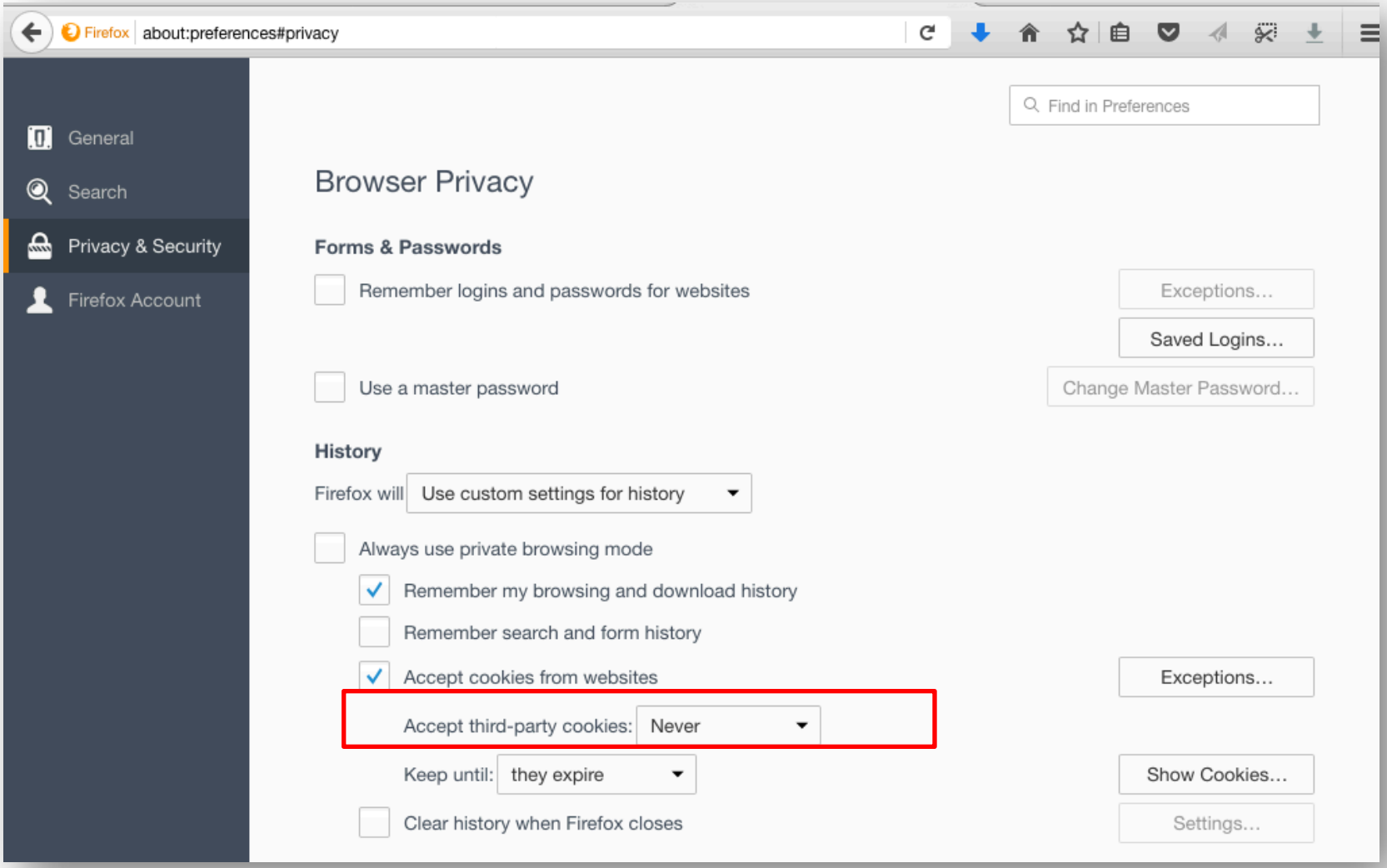


Cross-site Tracking

Third-party cookies are used to track users **across sites and collect their browsing history**.



Third-party cookies blocking



Facebook

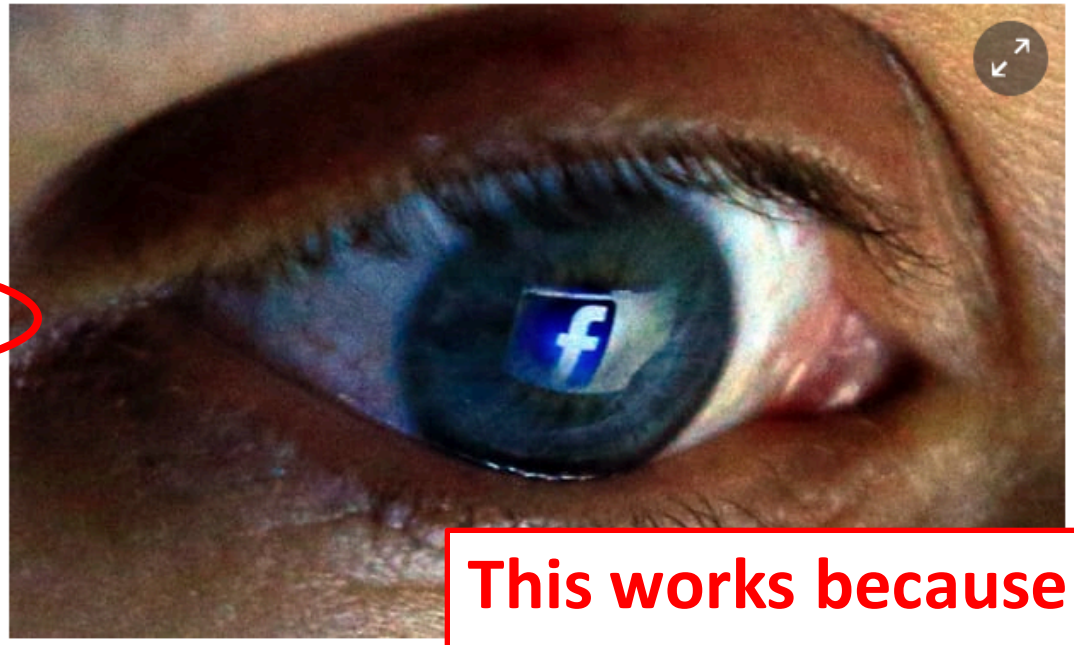
Belgian court orders Facebook to stop tracking non-members

Judge threatens social network with fines of €250,000 a day over 'datr' cookie, which records visits to many websites whether or not user has Facebook account

This article is 1 year old

Agence France-Presse in Brussels

Tuesday 10 November 2015 00.38 GMT



Facebook has been ordered to stop tracking

This works because of third-party cookies!

A Belgian court on Monday gave Facebook 48 hours to stop tracking internet users who do not have accounts with the social network or risk fines of up to €250,000 a day.

Facebook said it would appeal against the order, which followed a case lodged by Belgium's privacy watchdog in June saying the US company indiscriminately tracks internet users when they visit pages on the site or click "like" or "share", even if they are not members.

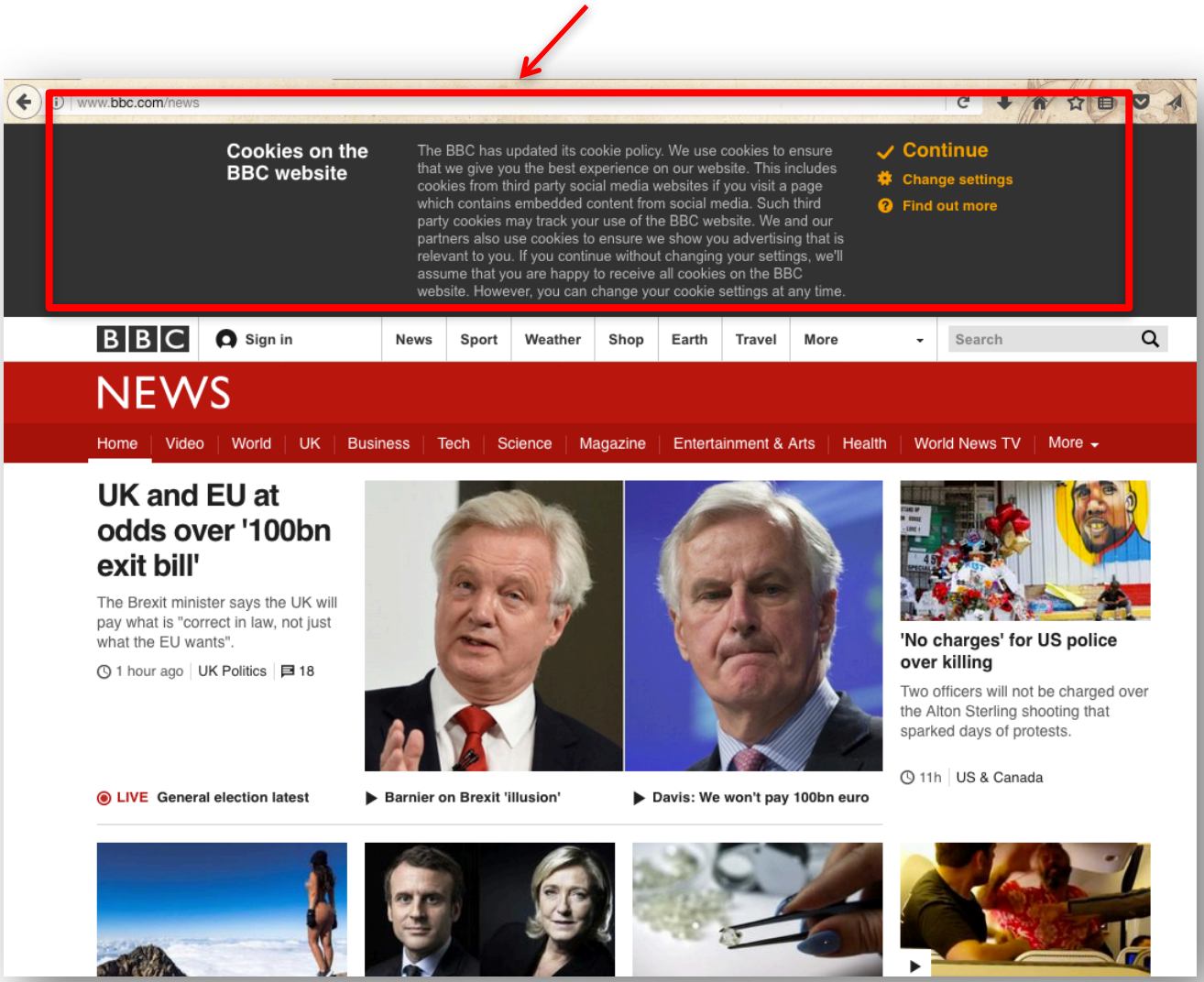
Want to include “like” buttons but not to track users?

http://panzi.github.io/SocialSharePrivacy/

Why should I care not to track my users?

- Current law:
  - **ePrivacy** directive 2009 (known as “cookie law”)

thanks to ePrivacy directive 2009



Why should I care not to track my users?

- EU privacy regulations updated by May 2018
  - **GDPR** (General Data Protection Regulation)
  - **ePrivacy** Regulation (known as "cookie law")

- Companies will become **liable** for inclusion of third parties that track their users

- **Fines**: **20M euro or 4% global annual turnover** (whatever is bigger) **per violation**!

Alternative tracking

- What if you could track users without the need of cookies?

- **Web-based device fingerprinting**
  - Some properties of your browser can be used to track you
  - These attributes, when combined, create a quite unique fingerprint of your system

Courtesy of Nick Nikiforakis

Browser fingerprinting

Panopticlick

How Unique – and Trackable – Is Your Browser?

- A project of the Electronic Frontier Foundation
- Analyzed 470,161 fingerprints collected in early 2010
- Each fingerprint is composed of 7 attributes (HTTP headers + JS)

94.2% of unique fingerprints → Tracking is possible

Courtesy of Pierre Laperdrix

Example of a browser fingerprint

Attribute	Value
User agent	Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:55.0) Gecko/20100101 Firefox/55.0
HTTP headers	text/html, application/xhtml+xml, application/xml;q=0.9,*/*;q=0.8 gzip, deflate, br en-US,en;q=0.5
Plugins	Plugin 0: QuickTime Plug-in 7.6.6; libtotem-narrowspace-plugin.so; Plugin 1: Shockwave Flash; Shockwave Flash 26.0 r0; libflashplayer.so.
Fonts	Century Schoolbook, Source Sans Pro Light, DejaVu Sans Mono, Bitstream Vera Serif, URW Palladio L, Bitstream Vera Sans Mono, Bitstream Vera Sans, ...
Platform	Linux x86_64
Screen resolution	1920x1080x24
Timezone	-480 (UTC+8)
OS	Linux 3.14.3-200.fc20.x86 32-bit
WebGL vendor	NVIDIA Corporation
WebGL renderer	GeForce GTX 650 Ti/PCIe/SSE2
Canvas	Cwm fjordbank glyphs vext quiz, 😀 Cwm fjordbank glyphs vext quiz, 😀

Courtesy of Pierre Laperdrix

Very hard to opt-out

- Even if
  - you delete all the cookies
  - you clean all the storages (HTML5, Flash)
  - you use browser private mode

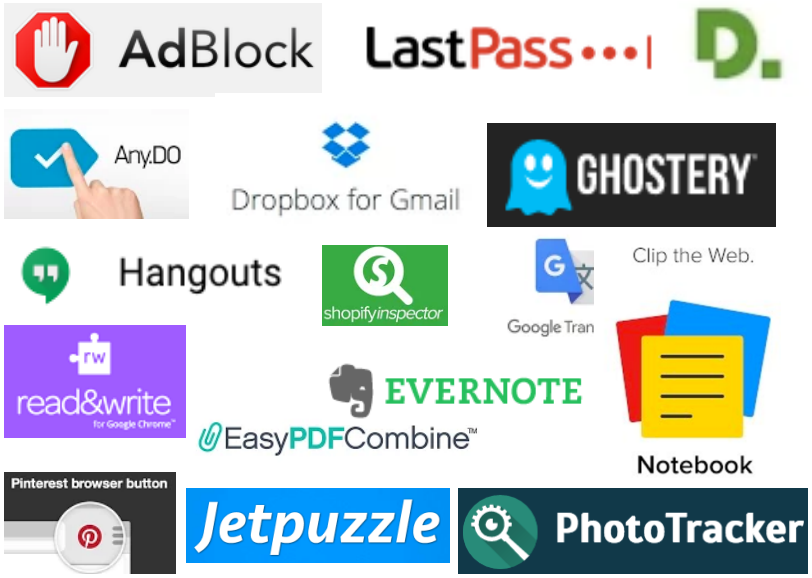
…your fingerprint remains the same!

Courtesy of Nick Nikiforakis

How unique is your browser? https://extensions.inrialpes.fr

- Browser extension detection
- ~13 000 extensions

- Websites a user is logged in
- 58 websites



How unique is your browser?

https://extensions.inrialpes.fr

Browser Extension and Login-Leak Experiment

When you browse the web, small beacons (trackers) are spying on your online activities. Even though such trackers are invisible, they collect information about you such as which pages you visit, which buttons clicked, and what text you typed. This information is often used to show you targeted advertisements and may require you to pay a higher price during online shopping depending on the collected information.

Did you know websites can track you by your browser extensions and web logins?

Recent studies show that you can be tracked based on your web browser properties. In this experiment, we demonstrate that you can also be tracked by

- your browser extensions (such as AdBlock, Pinterest, or Ghostery), and
- the websites you have logged in (such as Facebook, Gmail, or Twitter).

You can learn more here about how these detection techniques work.

In the experiment, we will collect your browser fingerprint, together with the browser extensions installed and a list of websites you have logged in. We only collect anonymous data during the experiment (see our Privacy Policy), we will securely store the data on an Inria server, use it only for research purpose and not share it with anyone outside of Inria. You can also read the frequently asked questions here.

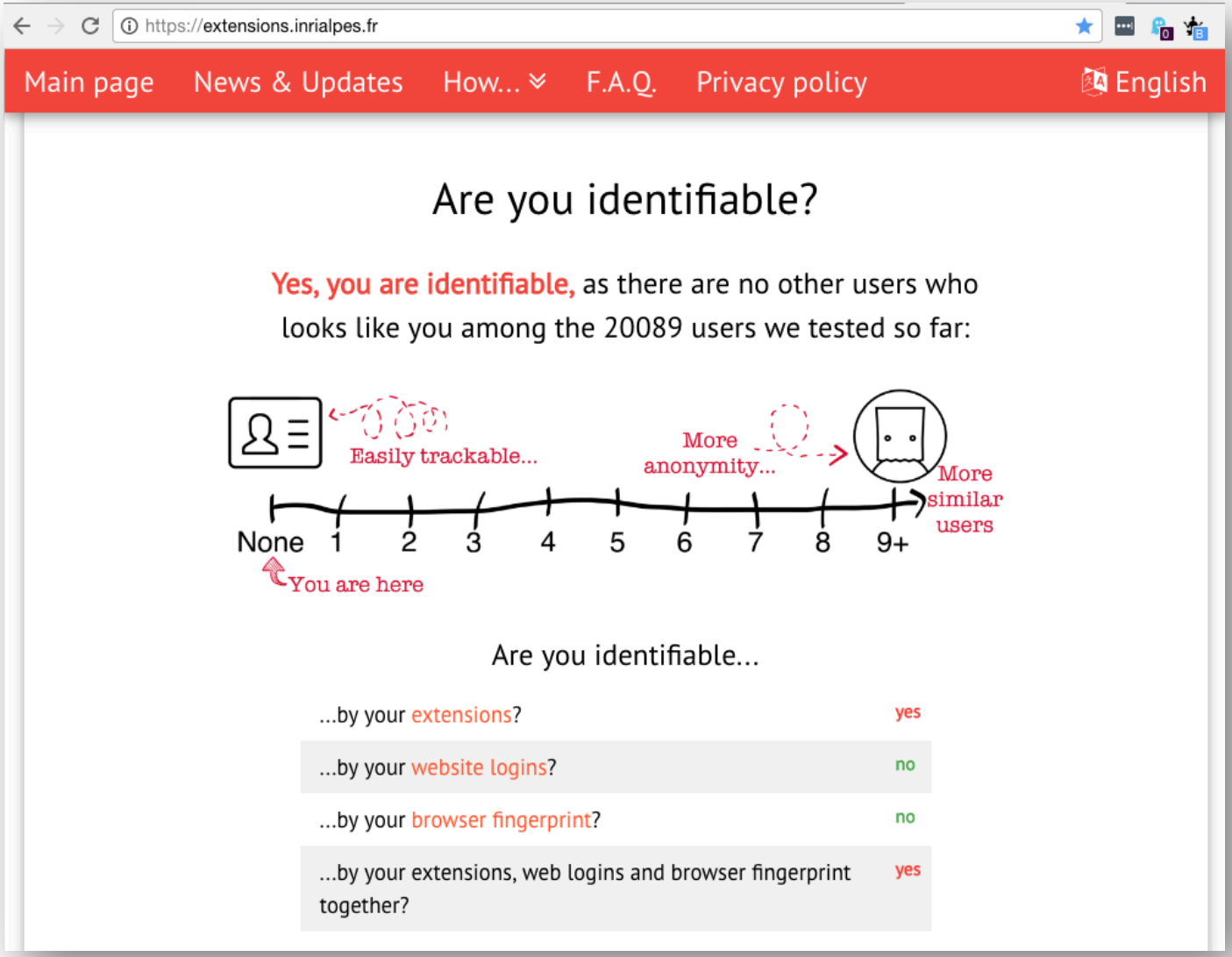
ur browser will silently visit these sites.

(we would like to see whether our dataset is biased)

egular computer user. I don't want to declare.

20 000 users have already tested!

I agree, test my browser!

How unique is your browser?

https://extensions.inrialpes.fr