

Aspetos Socio Profissionais da Informática (Informatics and Society)

The Impact of Communication Technologies in Human Interaction and Some New Social and Ethical Problems

Part 2 - Tracking & Its Implications

Departamento de Informática da
FCT/UNL

Review from last session

Lecture Outline (Part 1)

- The Impact of Digital Communications
- Spam Ethical Analysis
- Impacts of the Web
- Free speech and censorship

Made (partially) with the help of a half a dozen slides from CS 6431 slides by Vitaly Shmatikov and some slides made available by book publisher Pearson Education to instructors adopting book by Michael J. Quinn "Ethics for the Information Age", as basic bibliography

Lecture Outline (Part 2)

- What is privacy and why is important
- What is behavioural tracking and targeting and why it is prevalent in the Internet
- The social, economical, ethical and political impact of tracking
- Social Networks - a blessing or a curse
- Conclusions

Digital Communications

- In the beginning it was email
- Than came spam
- The major impact of the web: huge increase of access to information and interaction
- Than came spam pornography, censorship, hate discourse, terrorism, disinformation, ...
- A brave new world: social networks and the danger of the virtual other

Major Impacts of the Web

- **PROS**

- A wonderful new way to access information
- A marvellous new way to access systems, applications
- A marvellous new way to interact with people
- A marvellous machine for publishing content

- **CONS**

- Some known problems become worst due to scale, price and reach (e.g. child pornography, censorship, free speech)
- An highly effective machinery against privacy
- An highly effective machinery to spread misinformation
- A brave new world of false interactions and the reign of avatars of all kinds

Why the web is different?

Spam vs Behavioural Tracking on the Web

- Why not do the same that radio and television did before ?
- Web services become fueled by publicity.
- Google took the lead
- The answer: no need to send spam, we know what the target wants
- Behavioural Tracking = "Rastreamento Comportamental"

Internet - The Brave New World (New Yorker 1993)



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

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A Naive Vision of the Internet

While Today



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

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- On the Internet they know you're a dog
- If you publish many posts and likes, Facebook will know you better than your psychiatrist
- It will know
 - The name of your owner
 - Your preferred can food
 - When she takes you for a walk
 - In which trees you prefer to pee, ...

Privacy Origins

- It is a very old, complex and also subjective concept
- It was born with urban life, commerce and “republics and democracies” at the same time as contracts, policies and laws, to protect citizens from each other, specially from public “powers” or the “most powerful”
- Inexistent in small villages
- Publilius Syrus (Roman writer of first century): “The one who reveals publicly your privacy, cannot be your friend”
- It continuously evolves, specially these days

Why Privacy ?

- Physical privacy: to protect your home from strangers
- To protect you from public powers abuses (police, ...)
- To protect you from discrimination (race, religion, opinions, ...)
- To refrain others of using their knowledge about you at their own advantage in contracts, negotiations, relationships, ...
- It can have serious consequences in the relationships with individuals that may want to hurt you
- It can have a serious consequences for the power (im)balances between citizens and consumers on the one hand, and governments, corporations and other organizations that have access to their data, on the other.

Tracking People

- Happens when someone records information on a person without his consent
- For example: following, during weeks and months, all his or her steps in the city, ..., taking note of all his or her scheduling and people met
- With the advent of the Internet, it become possible to perform it by automatic digital means
- With the goal of increasing the power imbalance of corporations, states, police, etc. taking all possible advantage in their relations with you

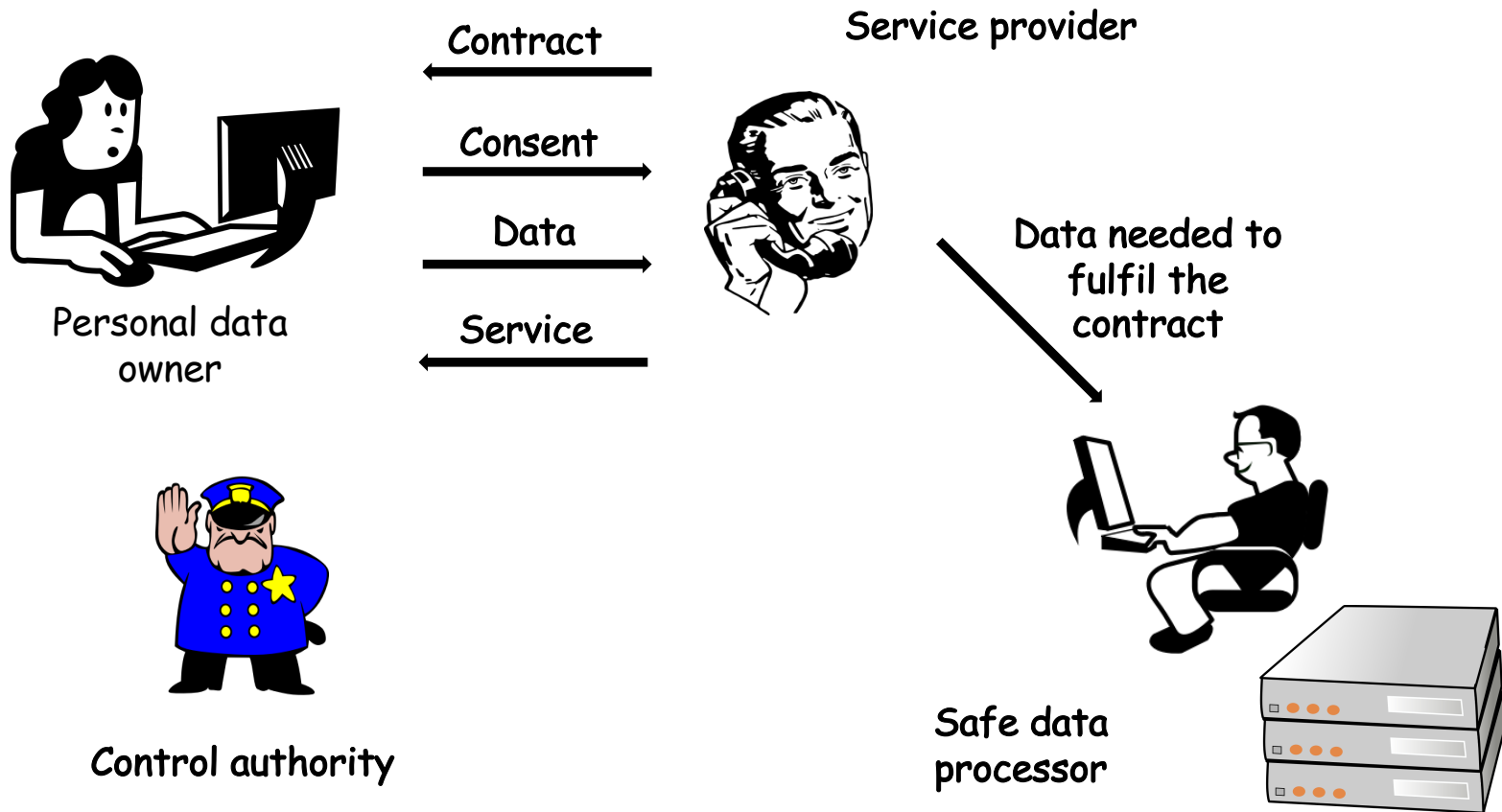
Behavioural Tracking & Targeting

- Getting information on users in order to deduce their behavior
- The most popular application is behavioural targeting for advertisement
- Optimistic view: tell you about something they know you are interested in
- Not so optimistic view: convince you to buy what you do not need, make a price specially tailored to you, evaluate the risk of making business with you in health or insurance, convince you of something, ...

Your Privacy Rights are Protected by ...

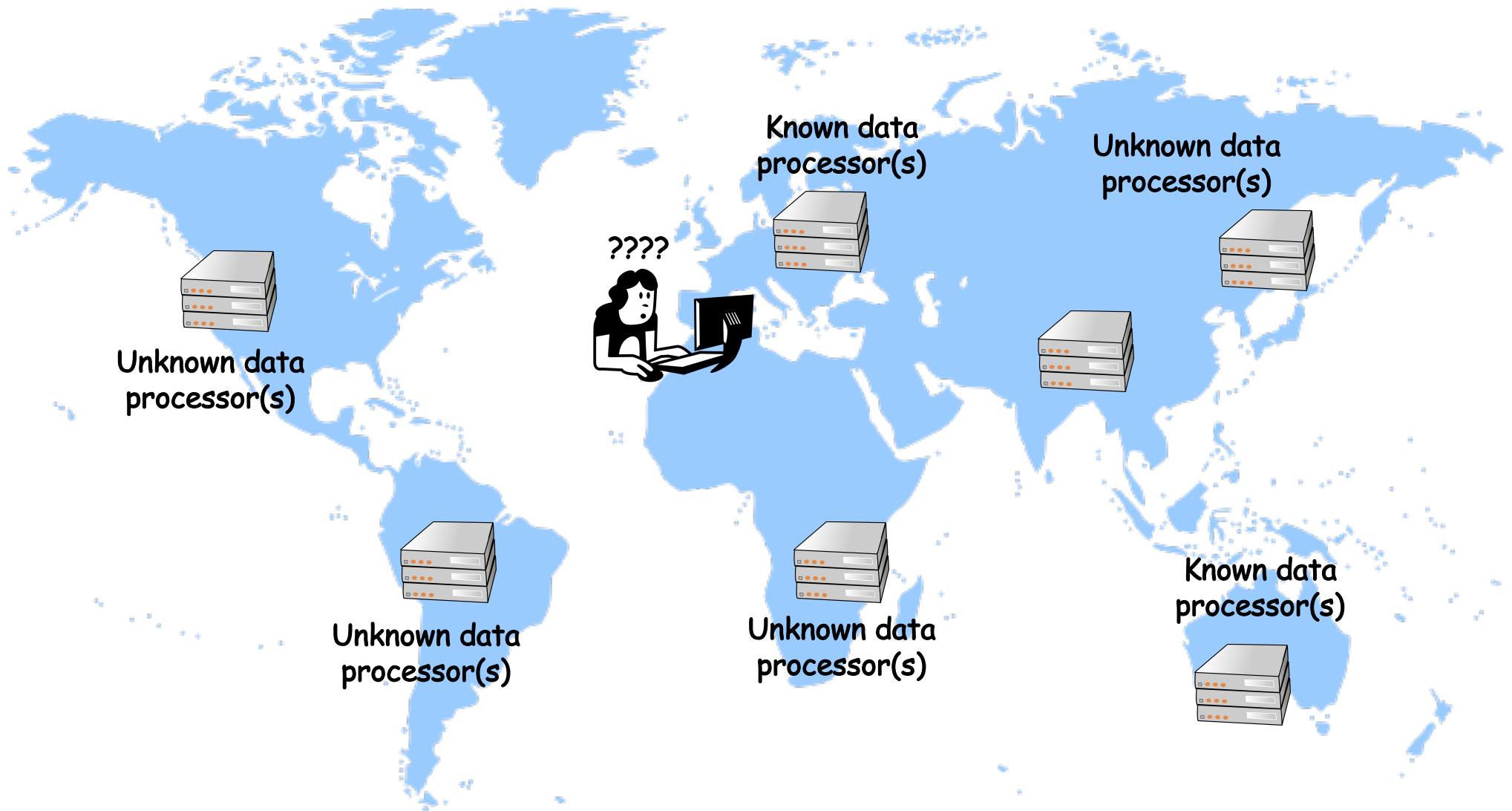
- Article 12 of United Nations Declaration of Human Rights
- Article 8 of the European Convention on Human Rights
- Artigo 35º da Constituição da República Portuguesa
- Lei de proteção de dados - Lei n.º 67/98 de 26 de Outubro
- Regulation EU 2016/67 - General Data Protection Regulation (GDPR)

The Theory



A business relationship must be based on contracts, mutually and freely accepted

The Practice



In the Web Tracking Is Pervasive

Tens to hundreds

independent tracking mechanisms in an
average top-50 website

There is a contract?

Did I sign the contract?

Do I understand the contract?

Is it possible for me to not sign it?

Tracking Mechanisms

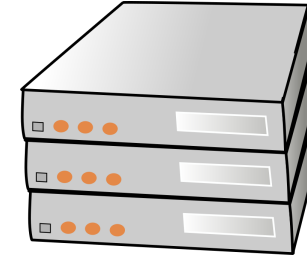
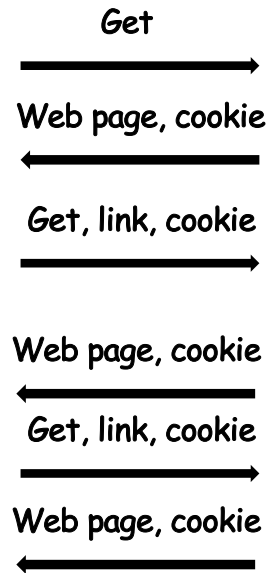
- Device, browser user agent, IP, IP geolocation information
- HTTP referer
- Cookies of all sorts (and sticky cookies which are hard to erase: e.g. super cookies, flash cookies)
- Third party cookies (and identification cookies)
- Browser fingerprinting (works even without cookies)
- Social media tracking scripts
- Selling your identity
- and so on ...

Tracking via Cookies

Cookie: value set by Web server, automatically sent by the browser on subsequent requests to same(ish) origin

- Link two sessions at same site
- Link sessions between different sites (third-party cookies)
- Can be combined with user-identifying information

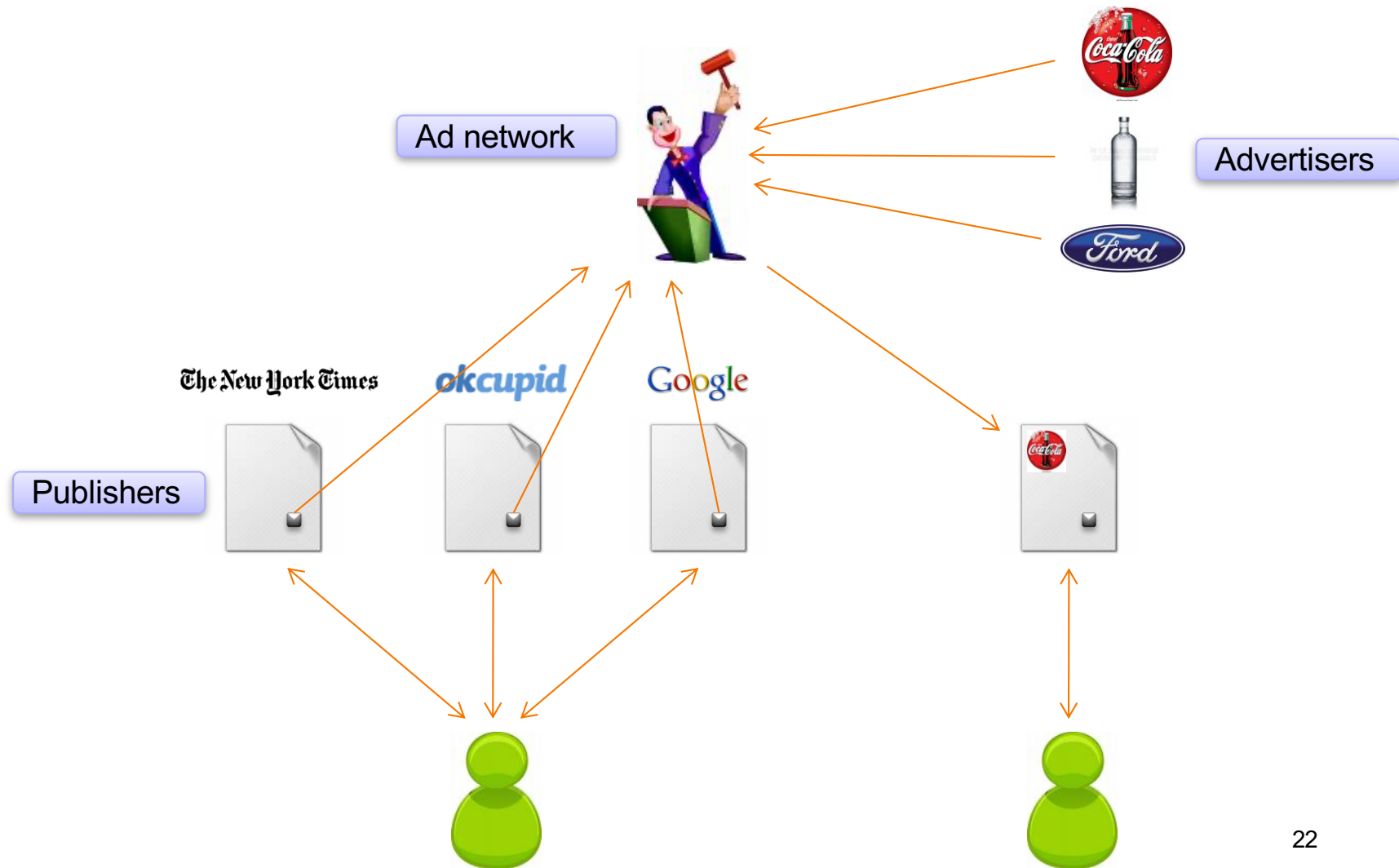
Accessing a Web Page



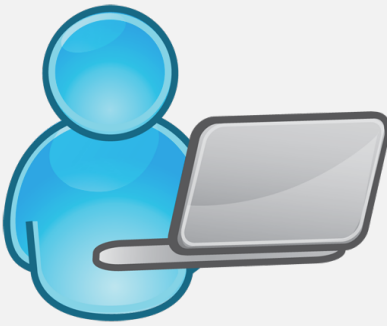
.....

Site	Links in the page	Total number of cookies
abola.pt	253	63
wikipedia.org	10	31
cmjornal.pt	352	539
google.com	36	35

Tracking by Intermediates



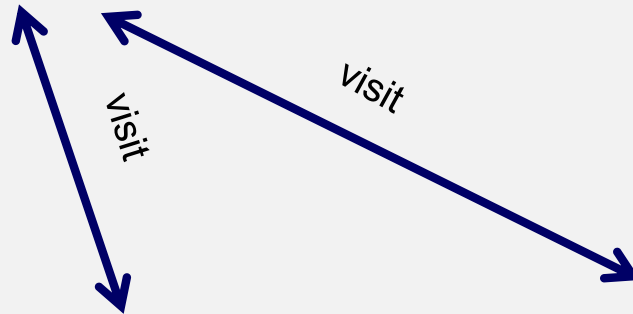
User



Referer : http://online.wsj.com/
Cookie : id = 12345

Referer : http://www.cnn.com/
Cookie : id = 12345

Tracker
(e.g. Doubleclick)



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Jobs Growth Jumps as Economy Gains Steam

Americans gained jobs at the fastest pace in more than two years last month and the unemployment rate plunged to 6.3%, a sign the economy has rebounded from a winter rut. 47 min ago

5 Takeaways on Jobs Report

Hilsenrath: Data Won't Alter Fed Path

The Labor Department's April jobs report tells several different stories about the state of the labor market and for now likely leaves the Federal Reserve's policy settings unchanged.

Economists React: 'Strong on its Face'

Why the Unemployment Rate Fell So Much

U.S. Stocks Waver

Berkshire Heir Apparent: Buffett's Eldest Son

Howard Buffett, a farmer, philanthropist and volunteer deputy sheriff, is slated to take over for his father as Berkshire Hathaway's next chairman. 3 min ago

Obama: U.S., Berlin United on Ukraine

President Obama said the U.S. and Germany are united in imposing costs on Russia over Ukraine, though they continue to pursue a diplomatic solution. 17 min ago

Ukraine Launches Military Operation

Live Updates | Photos | Video

Up to 2,300 Buried in Afghan Landslides

Markets

Overview U.S. Europe Asia FX Rates Futures

	LAST	CHG	%CHG	RANGE: 1 DAY
DJIA	16509.30	-49.57	0.30%	4140
Nasdaq	4122.59	-4.87	0.12%	
FTSE 100	6822.42	+13.55	0.20%	4192
Nikkei 225	14457.51	-27.62	0.19%	1316
Crude Oil	99.85	+0.43	0.43%	10a 12p 2p
Gold	1301.70	+18.30	1.43%	5/2/14 2:00 PM EDT

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Police: Teen planned school massacre

Cops tipped by customer at storage facility

A 17-year-old planned to kill his family, start a diversionary fire, set off bombs at a school, kill the resource officer and then shoot students, authorities in Waseca, Minnesota, said. FULL STORY

What should schools monitor?

SAVE UP TO \$35 on WEEKLY & WEEKEND Rentals

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Watch CNN

BOMB OILED

DAVE CULLEN

THE LATEST

- Cops from 'Alaska State Troopers' killed
- See huge landslide gulp city street
- Ukraine military: 2 copters shot down
- Hundreds feared dead in landslides

Not all Cookies are Intrusive

- Performance and Authentication
- Strictly necessary (e.g. you previously clicked to accept cookies)
- Functionality
- Analytics (web analytics or web demography)
- Targeting, advertising, identification,

Site	Type of used cookies
Sapo.pt, iol.pt, abola.pt, dn.pt, amazon.com, ...	Performance, Analytics, Strictly Necessary, Targeting, Advertising, ...
Linkdedin.com	Performance, Analytics, Strictly Necessary, Targeting, Advertising, ...
Wikipedia.org, stackoverflow.com	Performance, Functionality, Analytics, Strictly Necessary
Facebook.com	Performance, Analytics, Strictly Necessary
Google.com, portaldasfinancas.pt, github.com	Performance, Analytics

“Don’t Worry, It’s All Anonymous”

- Is it?
- What’s the difference between
 - “anonymous” (and anonymization)
 - “pseudonymous”
 - “identified”
- Q: which technology changed data collection from anonymous to pseudonymous?
- A:
- Take a look at: <https://panopticklick.eff.org/>

How Websites Get Your Real Identity

Third party is sometimes the second party

Leakage of identifiers

GET `http://ad.doubleclick.net/adj/...`

Referer: `http://submit.SPORTS.com/...?email=jdoe@email.com`

Cookie: `id=35c192bcfe0000b1...`

Security bugs

Third party buys your identity

The Third Party Belongs to the Second Party

The most powerful tech companies of the western world own:

	Owns (among many others)
Apple	Many but related to software, music, AI, education, speech, ...
Amazon	Imdb.com, alexa.com, ..., robotics, food, tv, ...
Facebook	WhatsApp, Instagram, Messenger, Drop.io,
Google / Alphabet	Youtube, Android, reCaptcha, AdWords, AdSense, Wallet, Chrome
Microsoft	Linkedin, Skype, Hotmail, Mojang (games), ...

This makes easier to put lots of information together

Can you correlate business model with the type of owned companies?

Consent Policy

- This site uses cookies, do you consent?
- Our privacy policy is (at most 20 pages ...) do you consent?
- One problem — the stated policy is not accurate
- Another problem — does the user understands what is exactly written in the 20 pages?
- Yet another problem — does the user has an (paid) alternative

Site %	Type of explanation presented in the Policy Page
56.4%	A generic explanation of what are cookies without any explanation on how they are really used by the site
27.3%	No policy page or just a reference to the use of cookies
12.7%	Policy page refers some of the cookies used and make some references to third parties
3.6%	?
Universe (100%)	The top 50 most popular sites according to the Alex index

Highest Third Party Presence

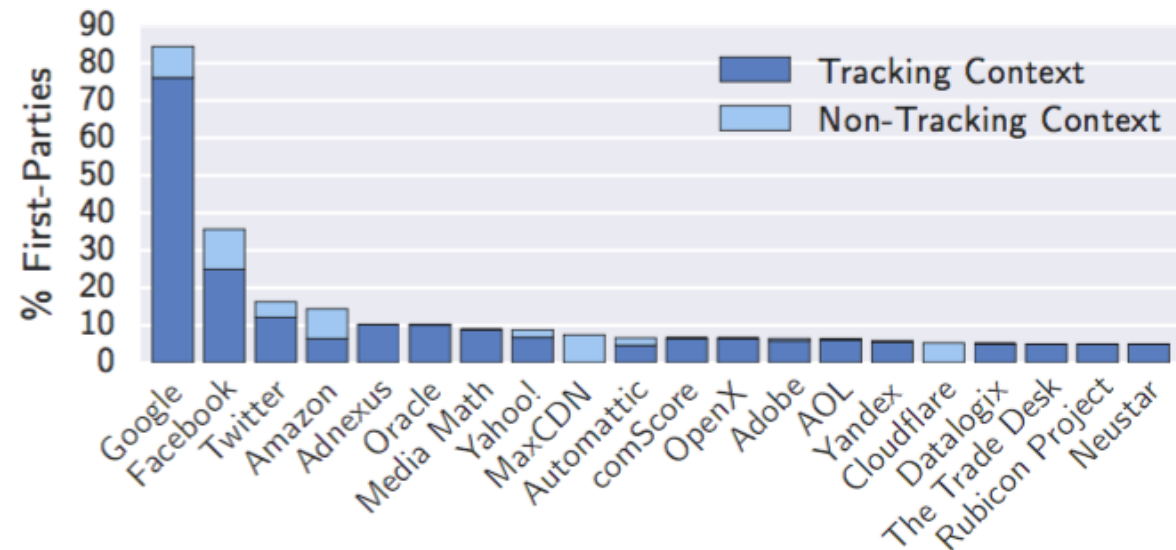


Figure 3: Organizations with the highest third-party presence on the top 1 million sites. Not all third parties are classified as trackers, and in fact the same third party can be classified differently depending on the context. (Section 4).

Steven Englehardt and Arvind Narayanan, "Online Tracking: A 1-million-site Measurement and Analysis," in *ACM CCS 2016*

Third Party by Category

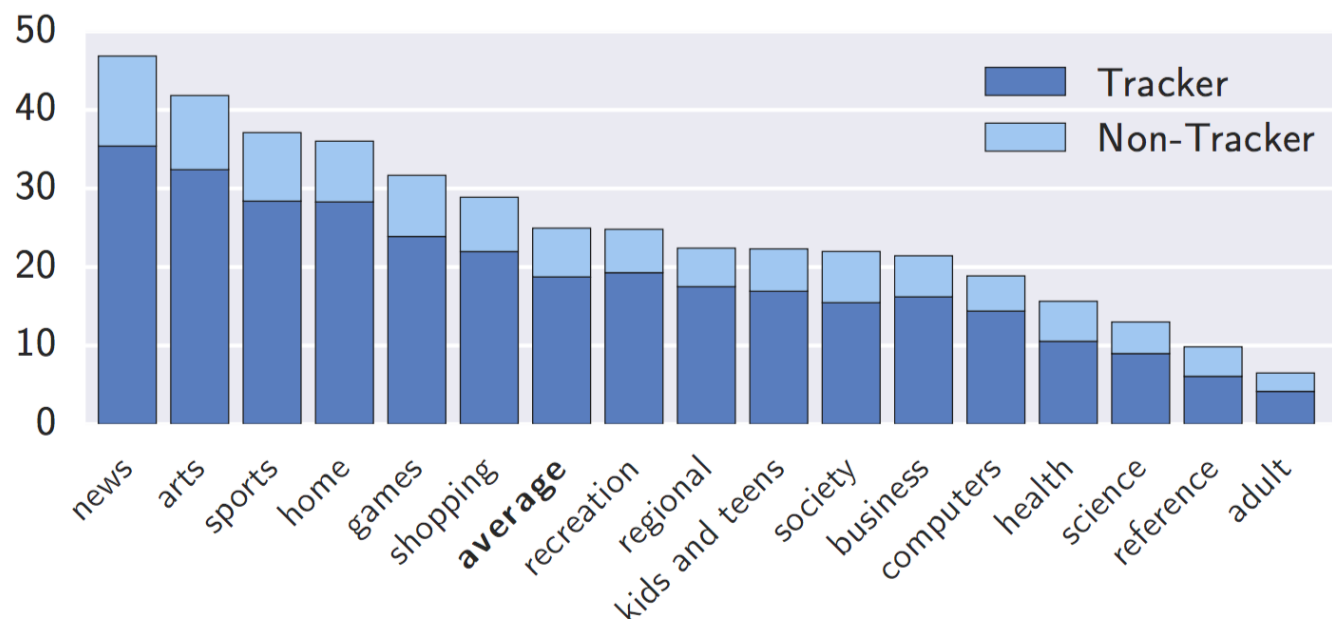


Figure 6: Average # of third parties in each Alexa category.

Steven Englehardt and Arvind Narayanan, "Online Tracking: A 1-million-site Measurement and Analysis," in *ACM CCS 2016*

The Click Economy

- The new scarce good: users attention since it gives me the opportunity to sell them something
- Income is proportional to the time spent in my site, therefore tracking and targeting is the way to increase income
- I may sell targeted advertisements to my customers
- I also may sell data about my users to allow my customers to better target their potential customers with the right message
- Business model
 - I will give you free service, if you give me your data
 - Then I will monetize your data
- An new industry moto
 - First collect data, value will follow
 - More data is more income

Targeting and Propaganda

- Political or opinion making propaganda is used since long time ago using messengers, newspapers, radio, television, ...
- Can tracking be used to enhance propaganda?
- Yes, when the products you sell are articles, opinions, “friends opinions”, unverified facts, ...
- Besides, it is easy to replace users by “avatars with opinions” (bots)
- Facebook is accused of selling millions of its users profiles to enhance behaviour tracking by its costumers — the goal of a public company is to maximize its stockholders profits, isn't it?

Some Additional Final Remarks

- New technologies often spread as “brave new world wonders” (e.g. the “Arab Spring”)
- Then some become “nightmares” (e.g. the “Arab Spring backfire”)
- Then public discussion, ethics considerations, regulations and the law make them “usable”
- This cycle needs “human-scale time”
- Is everything happening too quickly?

Conclusion

- Targeting is an essential process for advertising, propaganda, opinion making, ... optimization
- The web allows extremely powerful mechanisms to support targeting
- This situation is eroding users privacy and user perception of privacy
- It also is having devastating effects in traditional media economic viability and in the formation of public opinion