



Online tracking Technologies

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L-, R-, C-, and S-identifiability

- Look-up identifiability

 There is a register that links the identifier to the named individual (civil identity)

 Names, telephone numbers, passport numbers, social security numbers, and IP addresses
- Recognition identifiability
- Individual can be recognised, but not linked to civil identity
 Cloak-room tokens, cookies
 Classification identifiability

- Individual can be classified to belong to predetermined group/profile Not typically issued to a user only used in "backoffice"

- Session identifiability
 Individual can be recognised, but only during lifetime of a "session"
 Session cookie

R.E. Leenes Do They Know Me? Deconstructing Identifiability, University of Ottawa Law & Technology Journal, Vol. 4, Nos. 1-2, p. 135, 2007 www.pilab.nl

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I. PC's/browsers

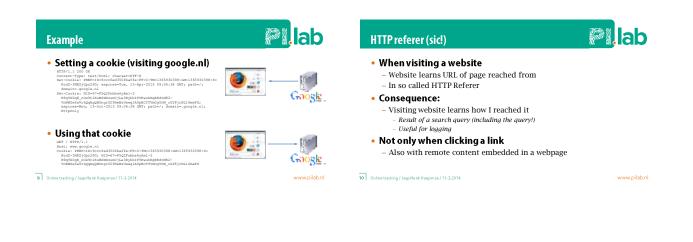
- Cookies
- Fingerprinting
- IP address

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Cookies	ab.	Cookies	lab
 HTTP is stateless So how to maintain a session? Logged-in user Shopping cart Cookies solve this Name / value pairs Set by website Stored and sent by browser Different browsers have different cookies 		 Fields The name of the cookie The value of the cookie The expiry of the cookie The path the cookie is good for The domain the cookie is good for The need for a secure connection to use the cookie Whether or not the cookie can be accessed through other means than HTTP (i.e. JavaScript) 	
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Consequ	ence	ab
• 3rd pa cookie	rty collects all pages visite id	ed linked to unique
• Social	olugins	
int 50 × 10		

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Tracking with first party	cookies 🔊 🔝
	Websites can redirect visitors to othersites – HTTP Redirect (302)
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Browser-based defences

- Extensive browser support for cookies

 Empty cookie jar
 - Block cookies
 - Disallow third party cookes
- Plugins for cookies, scripts, and web bugs
 - Ghostery

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- NoScript



Non-browser based

IP address

- Source (i.e. uour IP address) included in all Internet packets
- Can be inspected by website

Not very precise

- Roaming users change IP address
- Home users may have dynamic IP address
- Note: MAC address only used inside within LAN

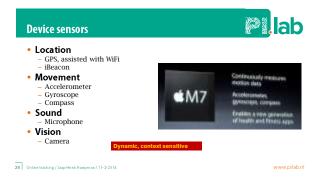
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Brightest Flashlight app

- Device ID
- Location
- Shared with third parties





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Tracking in the physical world	lab 🖉	III. Advanced	la l
 Based on device networks WiFi BlueTooth even GSM Broadcast unique number, even in stand 	lby	 Cross-device tracking Distinguish multiple users 	
• Hard to prevent – Switch off Bluetooth and Wifi? GSM? (E.g. "Air	plane mode")		
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Cross device tracking	ab. lab	Distinguishing multiple users	iab
Determine that a cellphone, work computer computer and tablet belong to the same per		 Behaviour analysis Precise enough to distinguish multiple users on single 	
User initiated (request to continue on m – Send special link from web to mobile of user Account based	obile)	device	

- Signing in to Google/Facebook etc on each device
 Limited with current more restricted device identifiers
- Behaviour based

- Statistical analysis of browsing/apppatterns

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Discussion



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[Monty Python's Argument Clinic sketch] www.pilab.nl