Biometrics: is that really you?
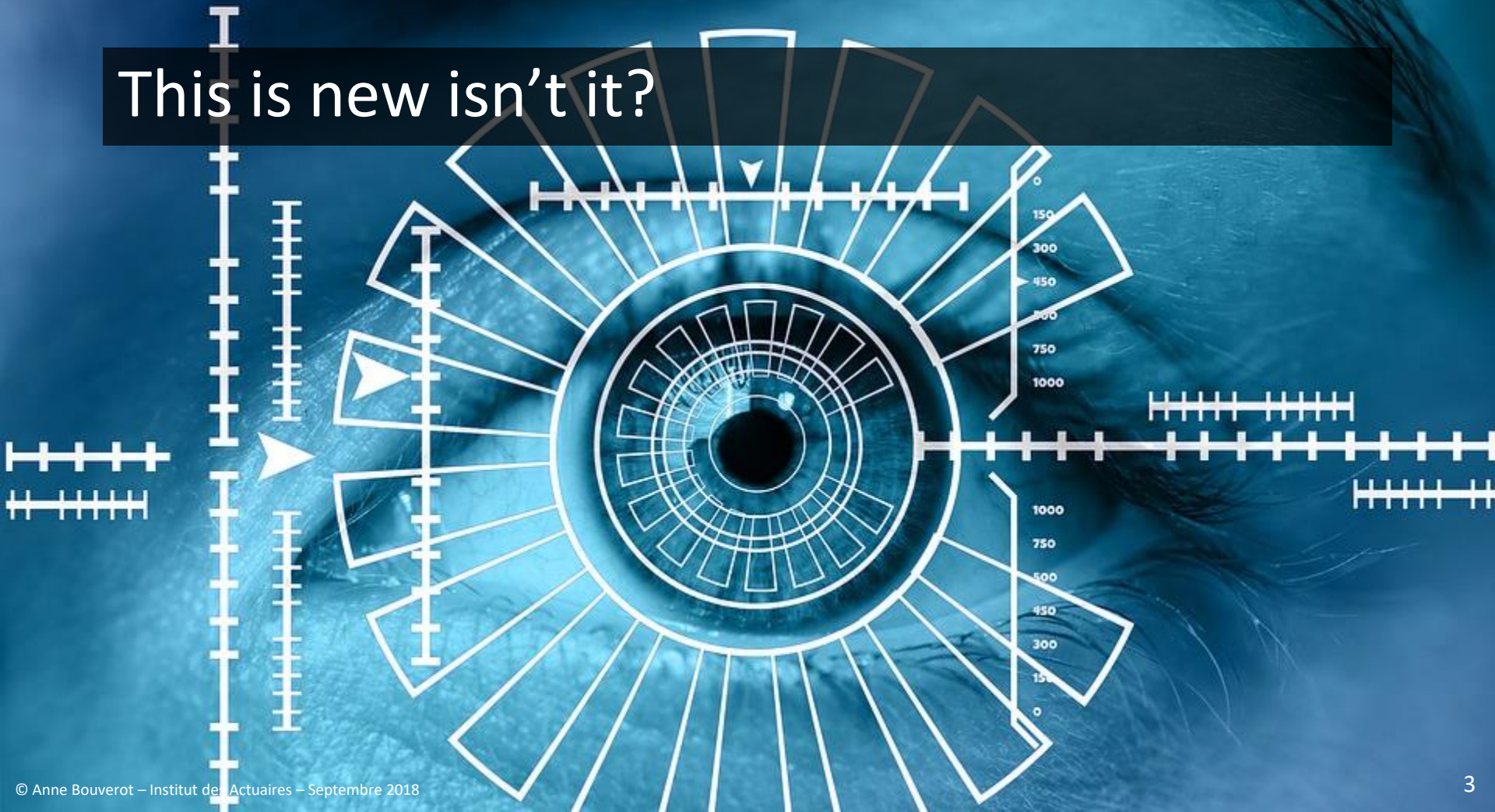
Opportunities and Risks

Dr Anne Bouverot
Board member Capgemini, Edenred, Cellnex
Former CEO of Morpho and DG of GSMA

Biometrics - What is it?

01_ Biometrics is the technical term for body measurements and calculations

02_ Distinctive, unique characteristics, often with limited evolution over time

03_ Universal (all humans)
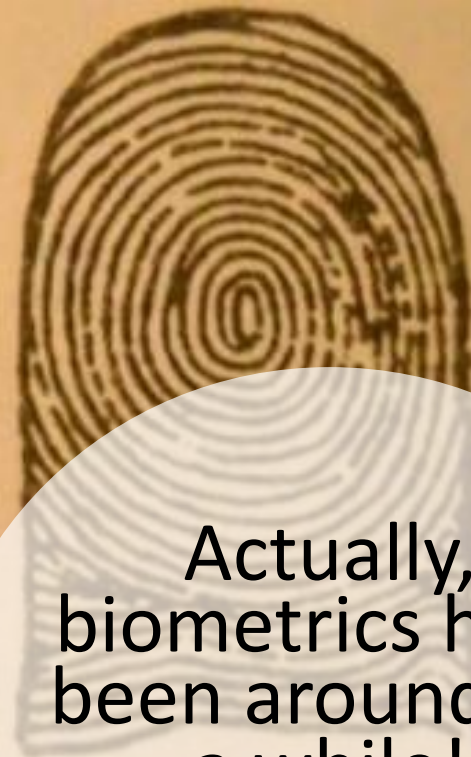
This is new isn't it?
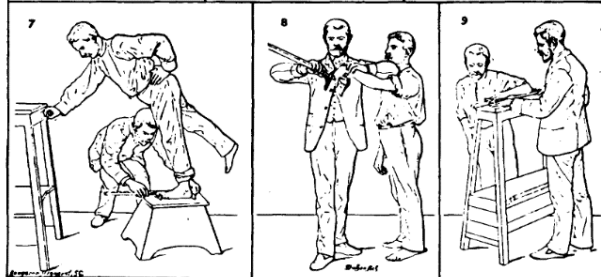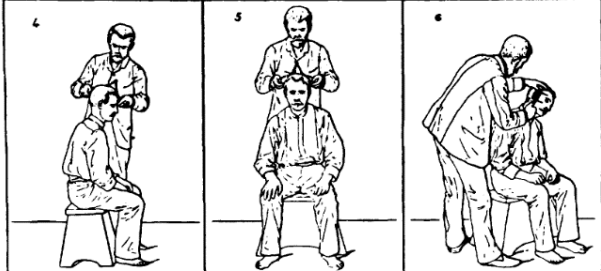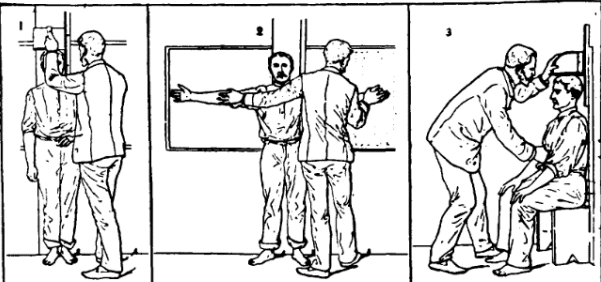
示列於下

囊形紋　弧形紋　X形紋

Actually, biometrics have been around for a while!

Chinese records from the Qin Dynasty (221-206 BC) include details about using handprints as evidence during burglary investigations.
© A. Sutherland, AncientPages.com
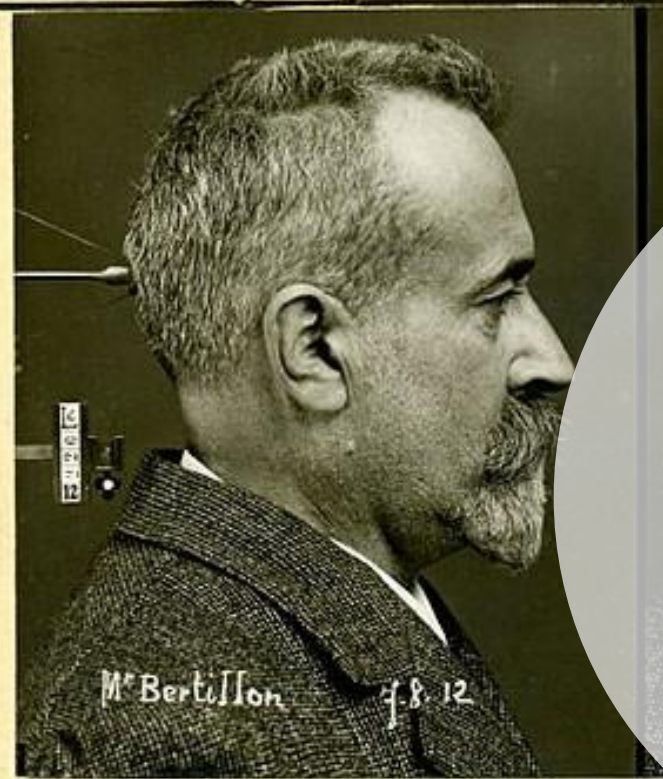
FICHE ANTHROPOMÉTRIQUE

1. Taille. — 2. Envergure. — 3. Buste. —
4. Longueur de la tête. — 5. Largeur de la tête. — 6. Oreille droite. —
7. Pied gauche. — 8. Médius gauche. — 9. Coudée gauche.

Age app.   Age déclaré 59   Né en 18.
Taille 1=78.0   Tête { long.r 19.4   Pied g. 27.4   n.o de cl. 3   Cheveux ch m gr
              { larg.r 16.8   Médius g. 11.9   aur.le r m m   Barbe d.
Enverg. 1=81 { zyg.a 14.7   Auric.r g. 9.9   pér. and v m   Teint P.n 9   S..
Buste 0=95.2 Oreille dr. 6.7   Coudée g. 47.9   partés   Main dr.
                                                          Main g.

M. Bertillon   7.8.12

Main droite

Alphonse Bertillon : Body parts measurements

Fiche anthropométrique de Bertillon par lui-même,1912, Collections historiques du Service Régional d'Identité Judiciaire de Paris © Wikipedia / Identification anthropométrique, 1893, © Alphonse Bertillon

William James Herschel (1833-1917)
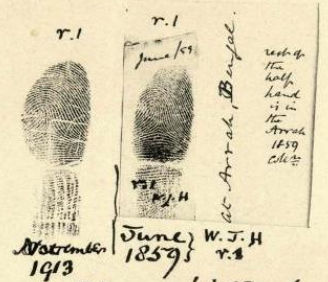
Fingerprint patterns

Arch

Loop
(Right Loop)
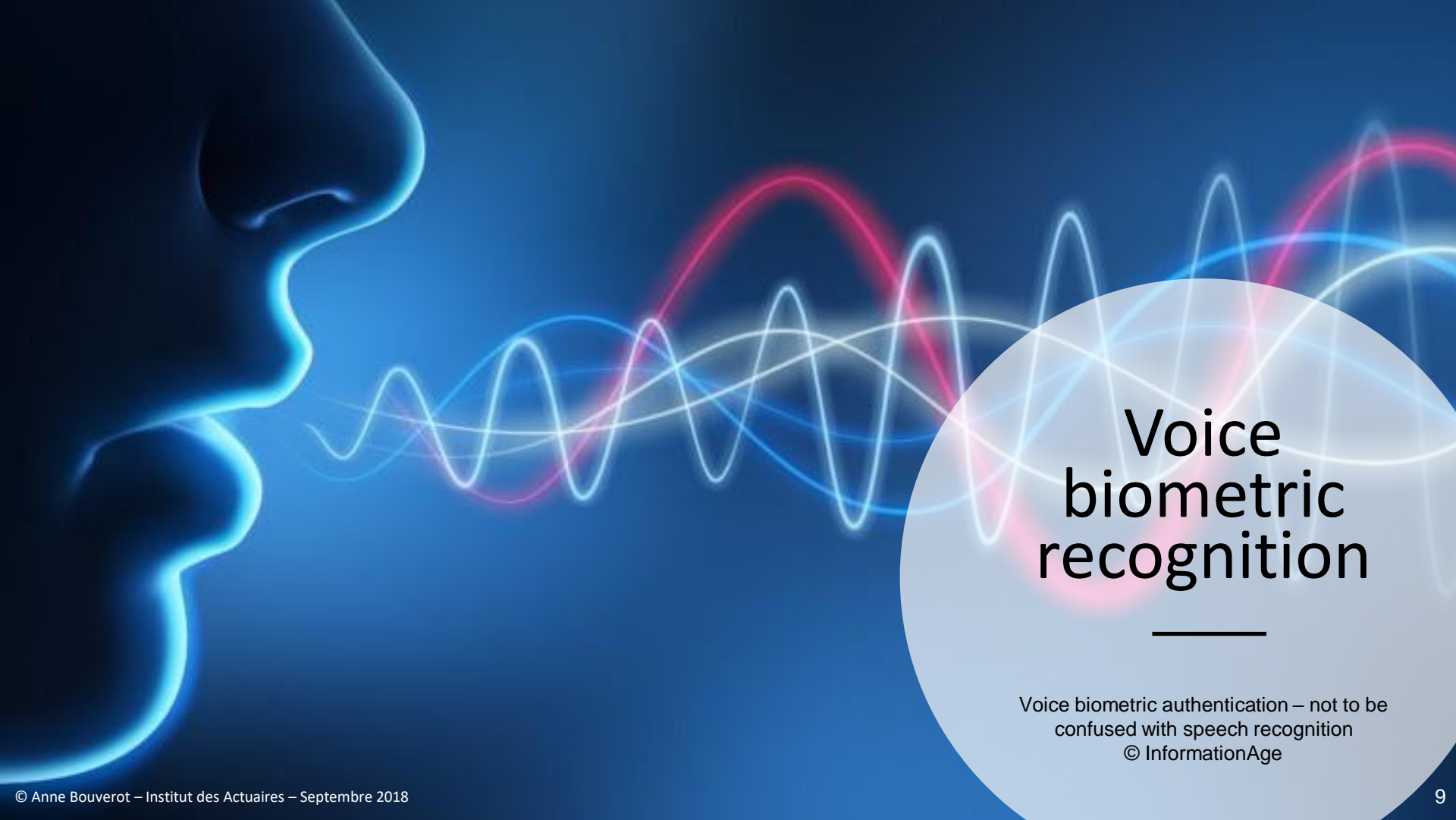
Whorl

Fingerprint pattern recognition

Source: Yahoo Finance

Voice biometric recognition

———

Voice biometric authentication – not to be confused with speech recognition
© InformationAge

Face recognition

———

The unique characteristics you look for are things like: relative position, size, shape of the eyes, nose, cheekbones, jaw…
© Fortinet

Deep neural networks learn feature representation

Computer vision and deep learning
© RSIP Vision Blog

input layer   hidden layer 1   hidden layer 2   hidden layer 3   output layer

11
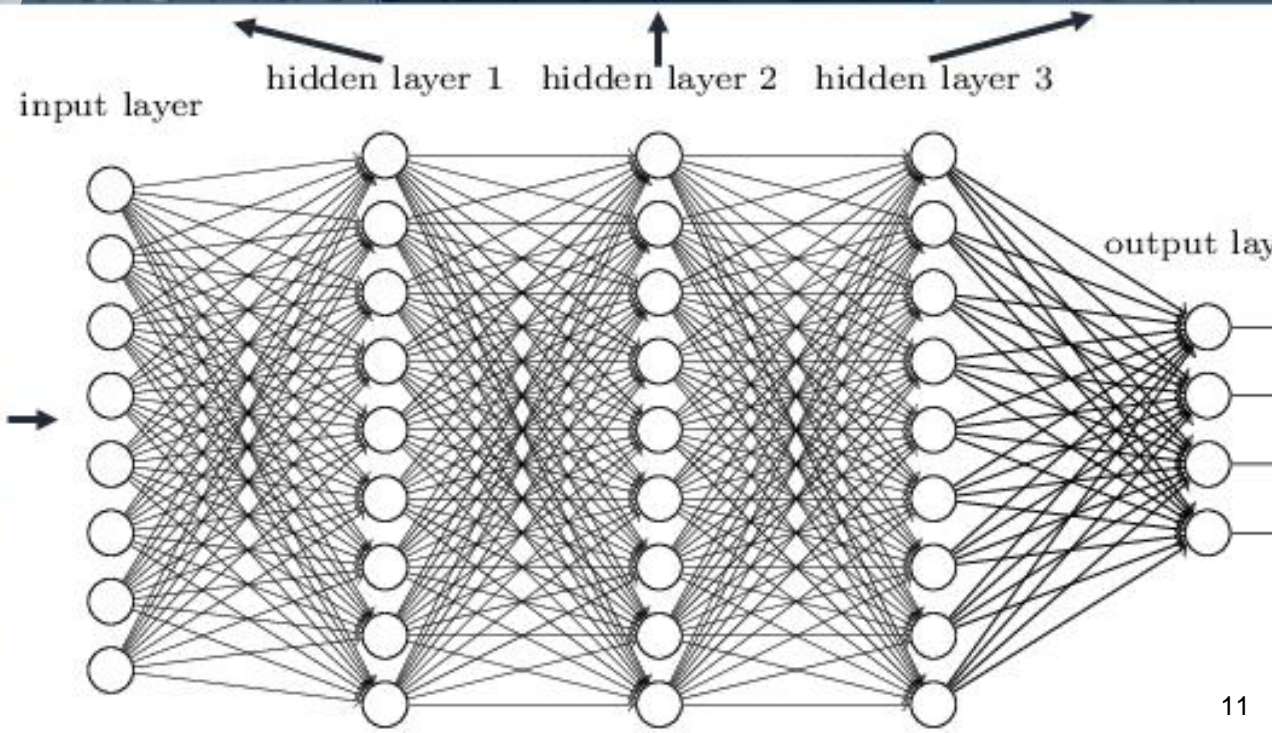
Behavioral biometrics – unique personal patterns

- x,y position
- Pressure
- Time
- Curvature
- Pen Incl.
- Acceleration

© GitHub

Your Behavior leaves Traces in the Digital World

"This only happens if you have 'location services' switched on in your phone"
© Mobile PC Guys
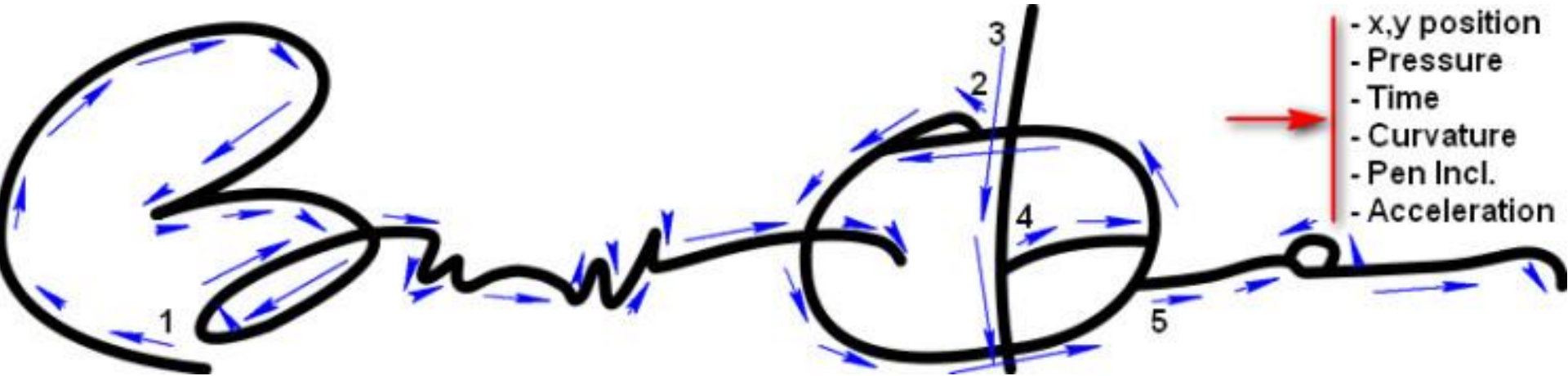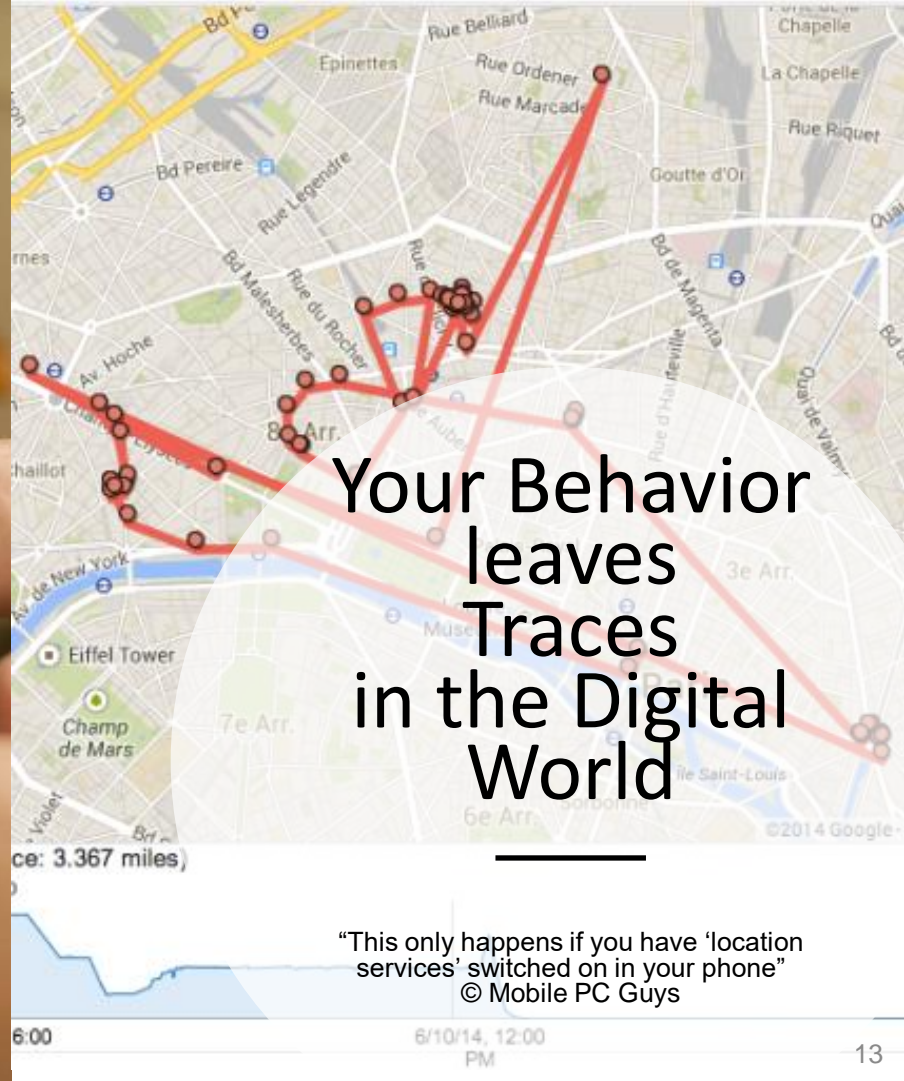
Let's look at a few use cases

ČESKÁ REPUBLIKA OBČANSKÝ PRŮKAZ

CZECH REPUBLIC IDENTIFICATION CARD

ČÍSLO DOKLADU / DOCUMENT NO. 99800398

PŘÍJMENÍ / SURNAME **SPECIMEN**

JMÉNO / GIVEN NAMES **VZOR**

DATUM NAROZENÍ / DATE OF BIRTH
08.10.1981

POHLAVÍ / SEX
F

MÍSTO NAROZENÍ / PLACE OF BIRTH
ŘÍČANY
okr. PRAHA–VÝCHOD

STÁTNÍ OBČANSTVÍ / NATIONALITY
ČESKÁ REPUBLIKA

PODPIS DRŽITELE / HOLDER'S SIGNATURE

DATUM VYDÁNÍ / DATE OF ISSUE
10.01.2012

PLATNOST DO / DATE OF EXPIRY
10.01.2022

Citizen Identification

Czech Identity Card
© Wikipedia

Border Control

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US Border Control has been reinforced
since September 2001
© Wikipedia

Criminal Identification
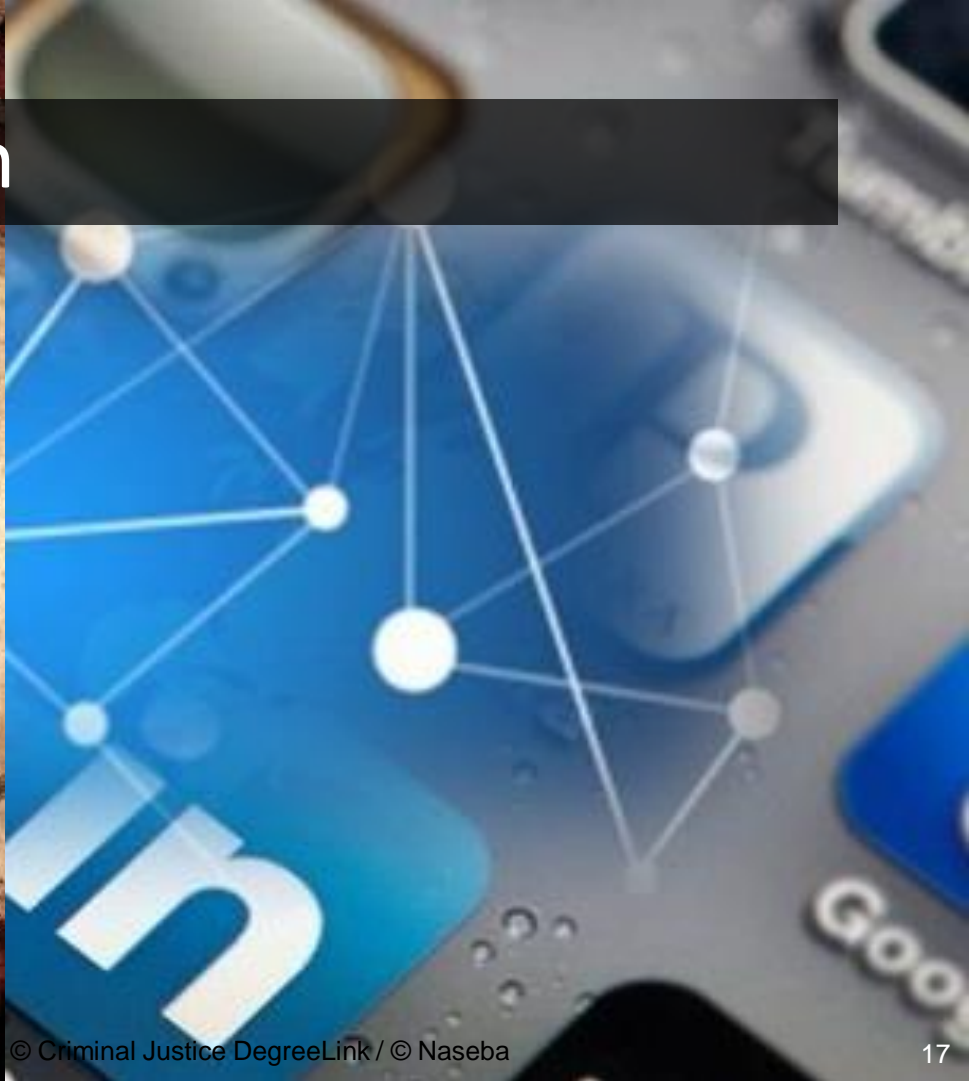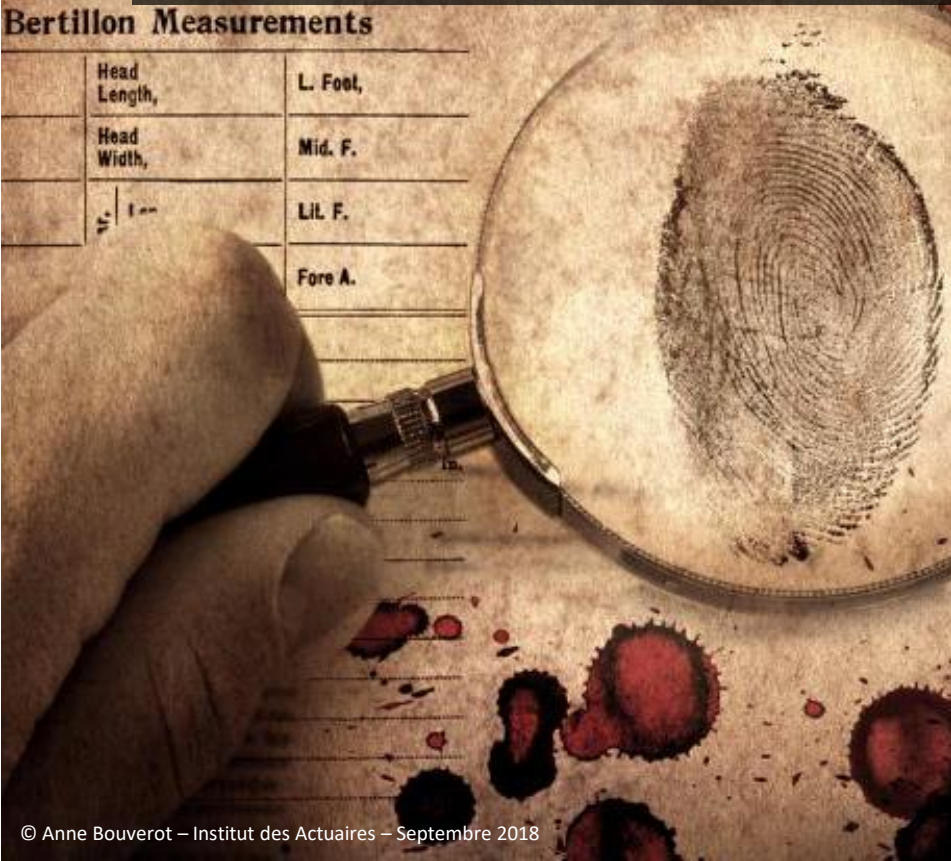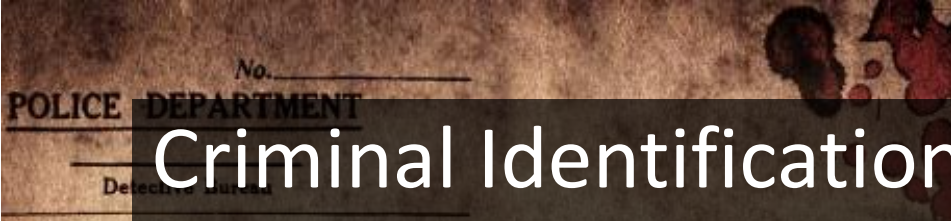
Biometric-enabled ATM

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Fingerprint used instead of pin code
© Wikimedia Commons

Alibaba "Smile to Pay"

——

Alibaba launches 'smile to pay' facial recognition system at KFC in China Sept 2017, © CNBC

Amazon Go
"Just Walk Out"

Amazon Go shop in Seattle, January 2018
© SounderBruce Wikimedia Commons

On the way to autonomous cars

Continental puts face and fingerprint recognition in cars at CES 2017
© CNET Magazine

Biometrics-enabled wearables for Health

———

BioSerenity's Neuronaut teeshirt uses biometric sensors to capture brain, heart and muscle activity for the diagnosis and monitoring of epilepsy © Santé Digitale

And of course, animation movies!

————

Face motion capture
© KINNETIC

Risks and Implications

guten Tag, mein Name ist
Dr. von der Leyen

ecially processed area

2D images
Silicone nose
3D printed frame
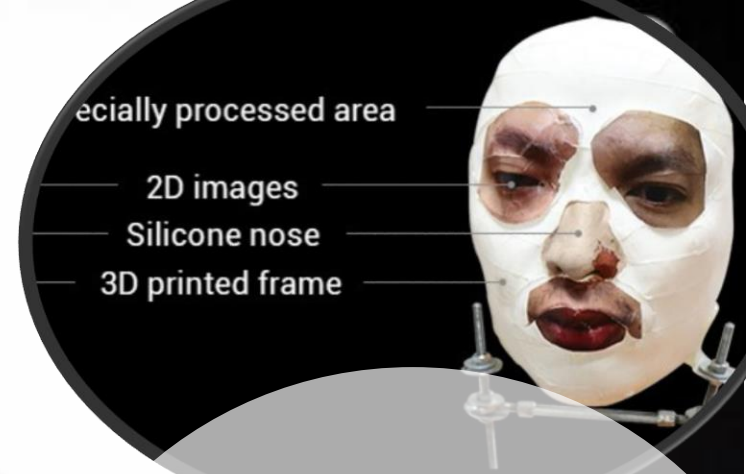
Hackers can get very creative

_____

A member of the Chaos Computer Club shows that it is possible to reproduce someone's fingerprint, using just a photo , 2014 © Extremetech
Security researchers say they used a $150 mask to break the Face ID facial recognition system, 2017
© Arstechnica

Multi-factor authentication

01_ Something **I know** like a password

02_ Something **I have** like a phone or a card

03_ Something **I am** eg biometrics

Biometrics is personal data

———

© Privacy by Nick Youngson
BlueDiamondGallery

Security Cameras

CCTV Camera, North Ireland
© Kenneth Allen Wikimedia Commons
Street cameras for Video surveillance
© China Daily

P
Mon-Sat
8.30 am-6.30 pm
60 mins
No return
within 2 hours

CCTV MONITORING
AND RECORDING
IN THIS AREA

towards a safe and secure environment for all

Omagh Safer Streets Ltd.
Tell (028) 9266 4153
For Correspondence:
P.O. Box 63, Omagh. BT78 1YG

2011-03-14 09:16:27
DeviceNo=SD02052A

车辆逆行

General Data Protection Regulation (GDPR)

- Replaced the 1998 Data Protection Act on 25 May 2018

- Consent of personal data and right to be forgotten for European citizens, even if company outside EU

- Notification of data breach within 72 hours

- Fine up to 4% of annual worldwide turnover

Algorithmic and Data Biases

Gender Classifier	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest Gap
Microsoft	94.0%	79.2%	100%	98.3%	20.8%
FACE++	99.3%	65.5%	99.2%	94.0%	33.8%
IBM	88.0%	65.3%	99.7%	92.9%	34.4%

MIT project « Gender Shades »
Joy Buolamwini
©gendershades.org

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Global Heatmap ⌃

Heatmap Color

| Hot | Blue | Gray | Red |

Activity Type

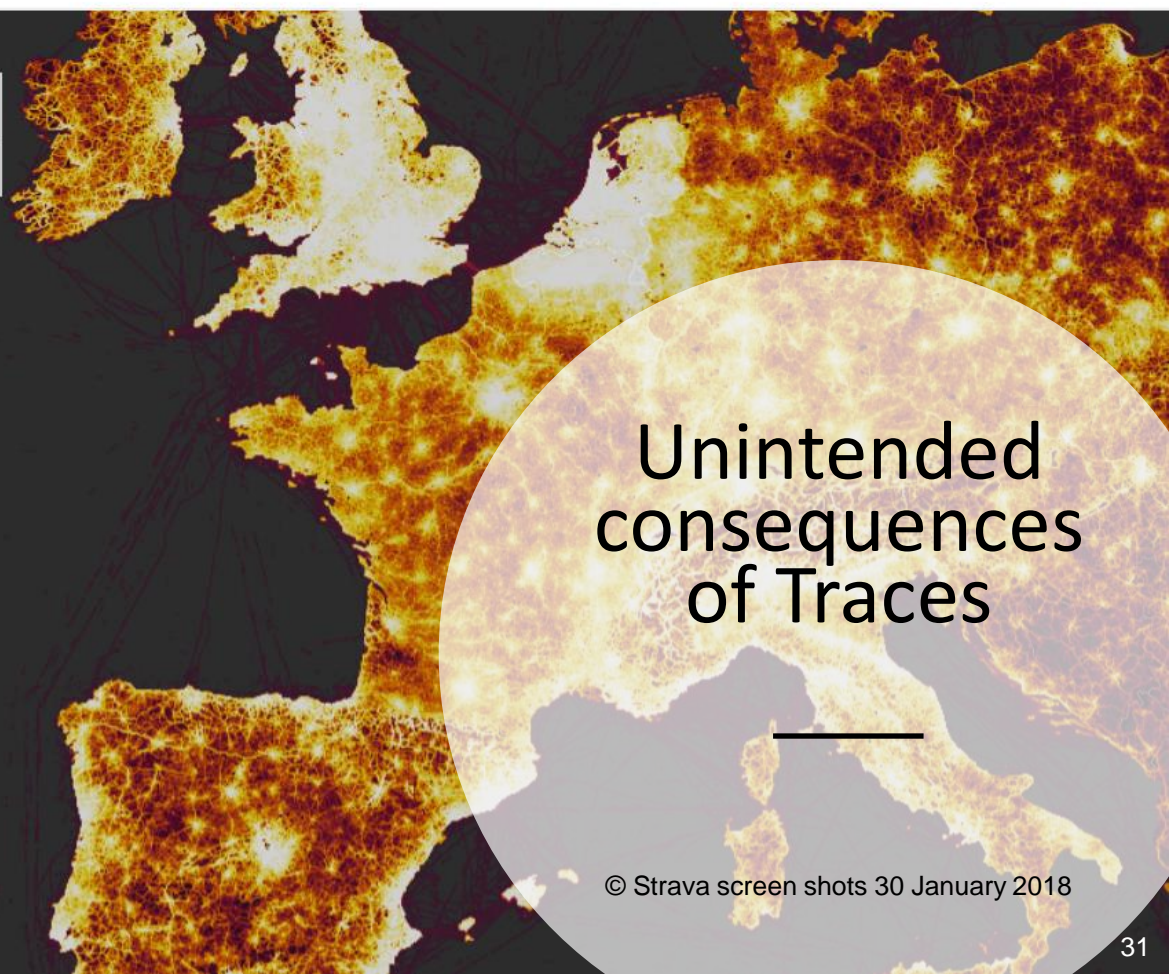| All | 🚴 | 👟 | 〰 | ❄ |

Heat Opacity

| 0% | 40% | 60% | 80% | 100% |

Layers

| Map | Labels | Satellite |

1 billion+ activities uploaded to Strava.
Learn how the heatmap was made.

Unintended
consequences
of Traces

———

© Strava screen shots 30 January 2018

A few takeaways

- **Fact :** Biometrics are increasingly used all over the world, in our physical lives and increasingly in our digital lives

- **Benefits :** They enable easier (« seamless ») access to many services and increased security

- **Risks :** of fraud, to privacy and to personal freedom need to be wtached for, carefully managed and regulated !

Thank you for your attention!