Experimental restaurant of the Future

-Towards Intelligent Social Interaction Detection

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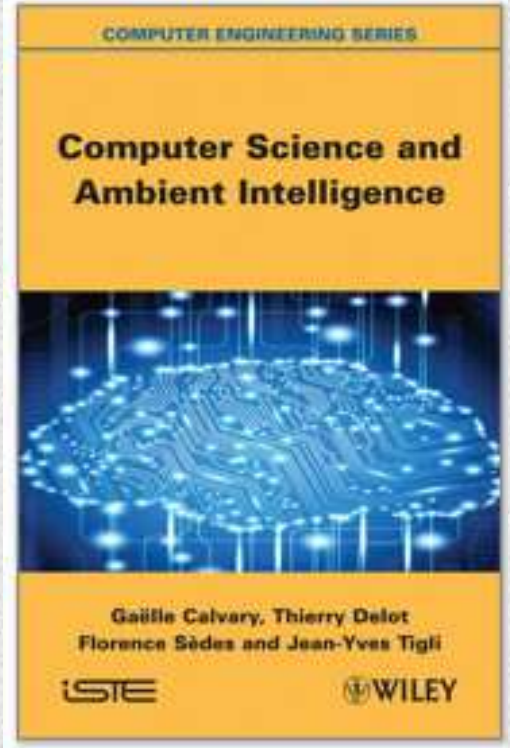
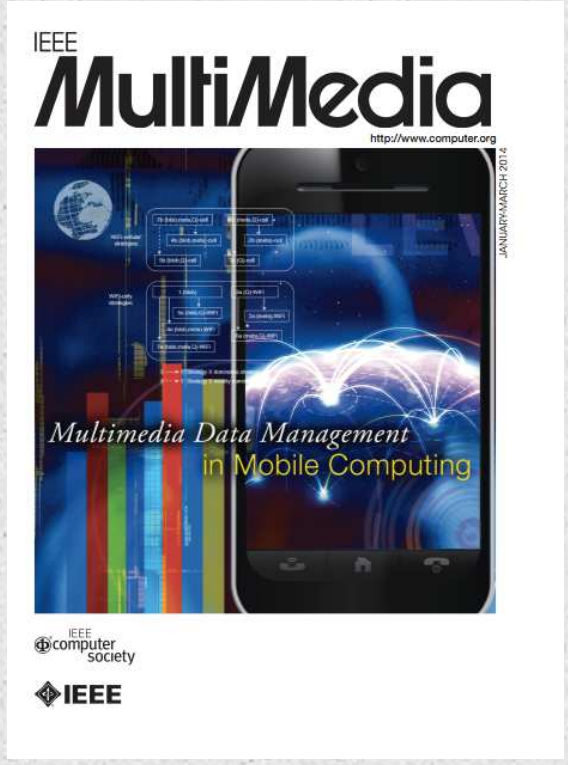
IRIT, Institut de Recherche en Informatique

Toulouse (France)

Information Systems and Database modelling



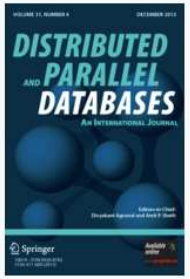


Security – Privacy
Videosurveillance
(CCTV – Forensic)

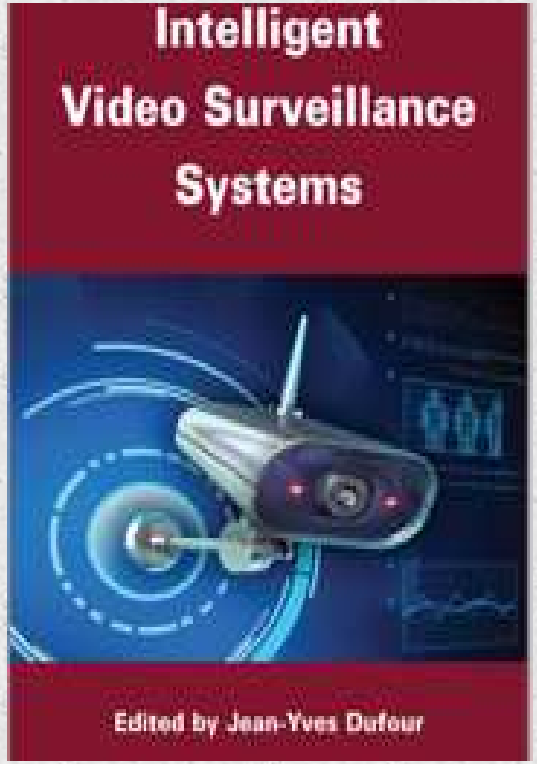
IMMoA 2013

3rd International Workshop on Information Management in Mobile Applications in conjunction with VLDB 2013

Special Issue on Large-Scale Data Management for Mobile Applicati



Journal:	Distributed and Parallel Databases, Springer
Submission Deadline:	Extended: February, 2014
Expected Publication:	2014
Guest Editors:	Thierry Delot University of Valenciennes & Inria Lille, Franc Sandra Geisler RWTH Aachen University, Germany Sergio Ilarri University of Zaragoza Christoph Quix Fraunhofer FIT



Food in the Age of Data:

new challenge(s) for computer science?

Let's analyse the context…

« … new generation of scientific equipment »

… scientific equipment?

… new generation!

Let's analyse the context…

« … restaurant of the future »

… future ? => computer!

… what about restaurant and computers?

Recent trends in « computerised restau »?

- Food in the Age of Data…
- Computational Gastronomy…
- Computer-Curated Culinary Creations…

Recent trends

- 8th Computer Cooking Contest – Sept. 2015
  An event of ICCBR 2015, Frankfurt, Germany
  http://www.computercookingcontest.net/

- 7th International Workshop on Cooking and Eating Activities (CEA2015) (Japanese)

in conjunction with IEEE Int. Conf. on Multimedia and Expo Torino, July 3, 2015

Recent trends

- Computational Gastronomy - Food in the Age of Data

  Royal Society International Scientific Seminar

- Network analysis and data mining in food science: the emergence of computational gastronomy

  Sebastien Ahnert, Cambridge

Improbable research

- Flavor Pairing in Medieval European Cuisine: A Study in Cooking with Dirty Data

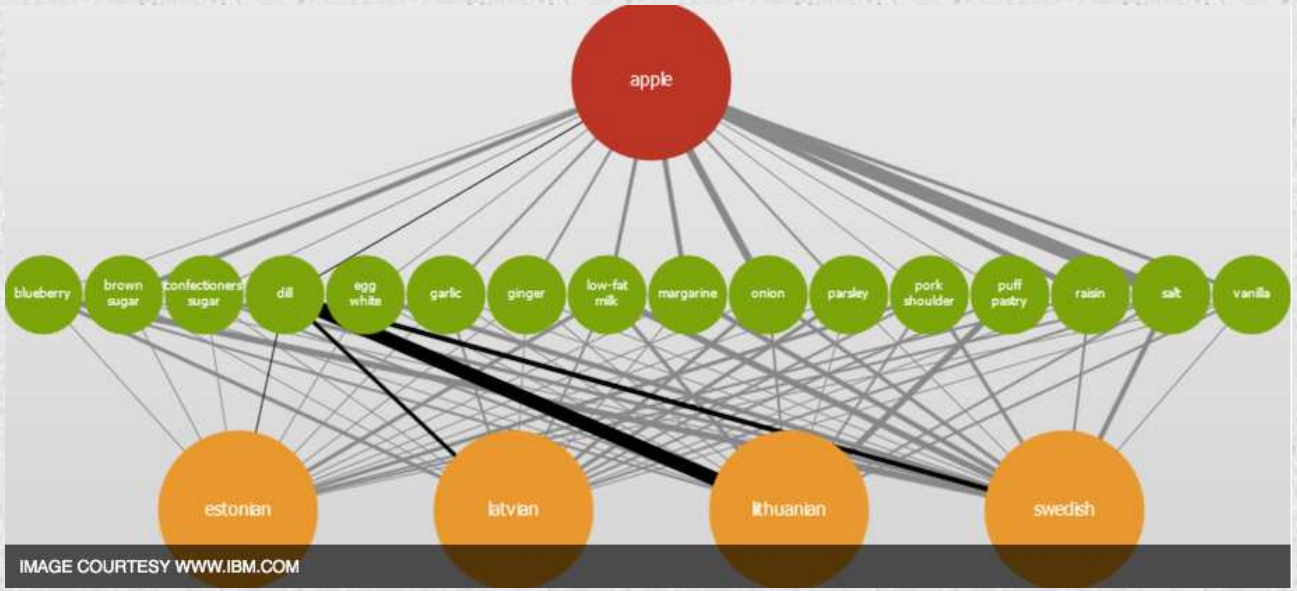
International Joint Conference on Artificial Intelligence Workshops, Beijing, China, August 2013.

Dr. Kush Varshney, Professor Lav Varshney have authored a series of papers on the theme of computational gastronomy

Co-authored with Jun Wang, also at IBM, and Daniel Myers at Medieval Cookery.

Recent trends

- IBM's Chef Watson



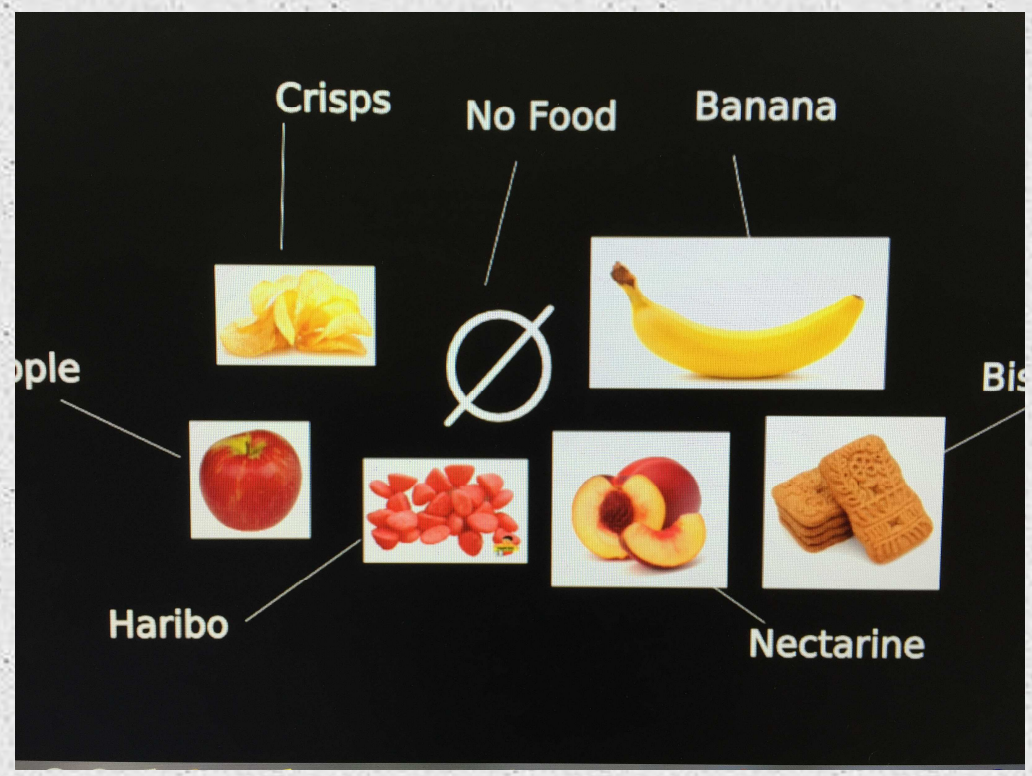
Social media

- Resolving local cuisines for tourists with multi-source social media contents

Multimedia Systems, July 2016, Volume 22, Issue 4, pp 443-453

Multi-source social media content Location-aware aggregation Local cuisines

Speech + food



…sub-title?

which contribution for the data science to the study of food behaviour and nutrition?

… and vice-versa?…

The context

How to « interpret » Man-Man Interaction?

- Advanced applications that embody *more and more intelligence* as such, aim to provide *innovative services* and enable *various* users to be *better known, informed* and make *safer* and 'smarter' use of devices.
- Spatial and temporal features
- Context
- Culture
- Personality, individual features (explicit / implicit)

Internet of Things (IoT): Intelligent devices (interconnected, smart)

- Wireless communications
- Embedded devices
- Sensing technologies
- Bluetooth detection (travel time, estimation)
- Video detection (non intrusive?)

« *things are talking to things* »

Data vs. data

da·ta *noun plural but singular or plural in construction, often attributive* \'dā-tə, 'da- *also* 'dä-\

: facts or information used usually to calculate, analyze, or plan something

: information that is produced or stored by a computer

Full Definition of DATA

1 : factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation <the *data* is plentiful and easily available — H. A. Gleason, Jr.> <comprehensive *data* on economic growth have been published — N. H. Jacoby>

2 : information output by a sensing device or organ that includes both useful and irrelevant or redundant information and must be processed to be meaningful

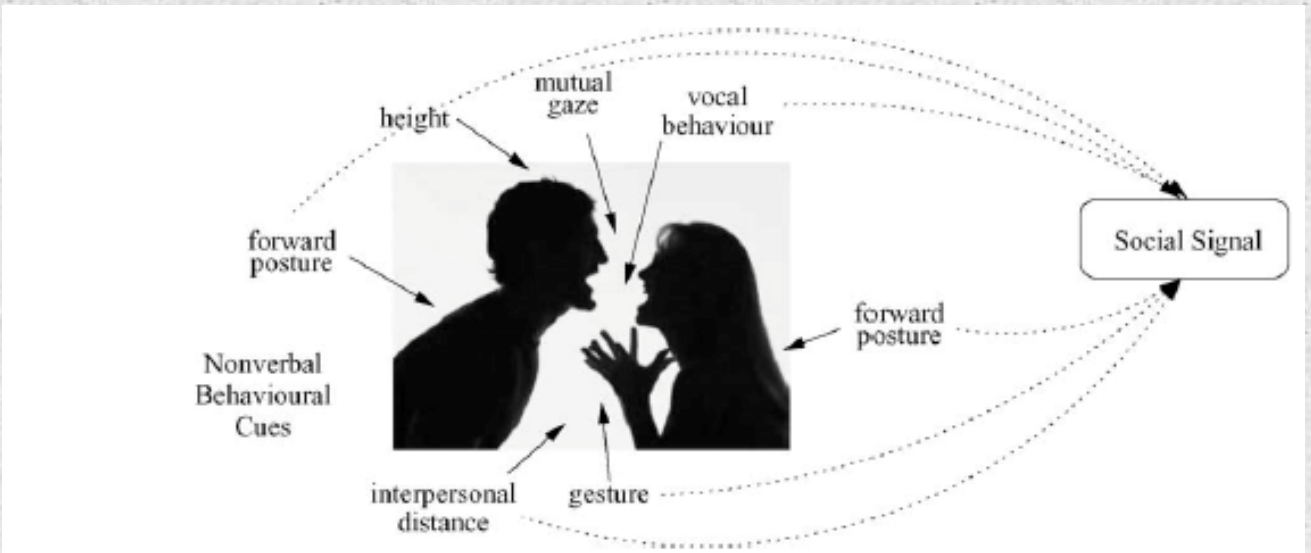
3 : information in numerical form that can be digitally transmitted or processed

Internet of Things (IoT): Intelligent devices (interconnected, smart)

- Irrelevant, incomplete, uncertain, noisy, redundant,…
- Big Data
  - Variety
  - Volume
  - Veracity
  - Velocity
- Privacy

Social Interaction Detection

Social Interaction Detection



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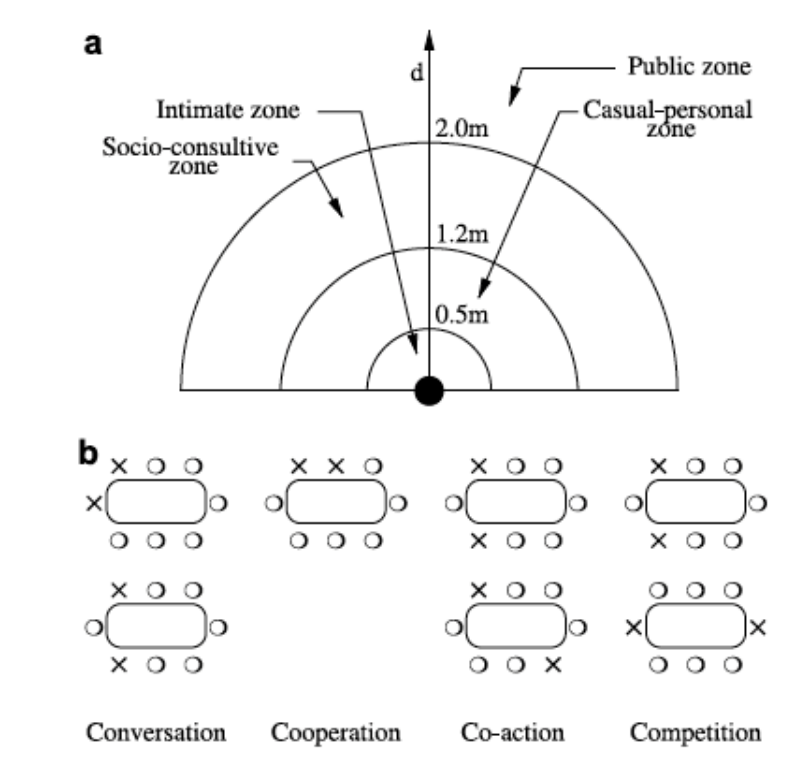
Alessandro Vinciarelli, Maja Pantic, Hervé Bourlard

Social Interaction Detection

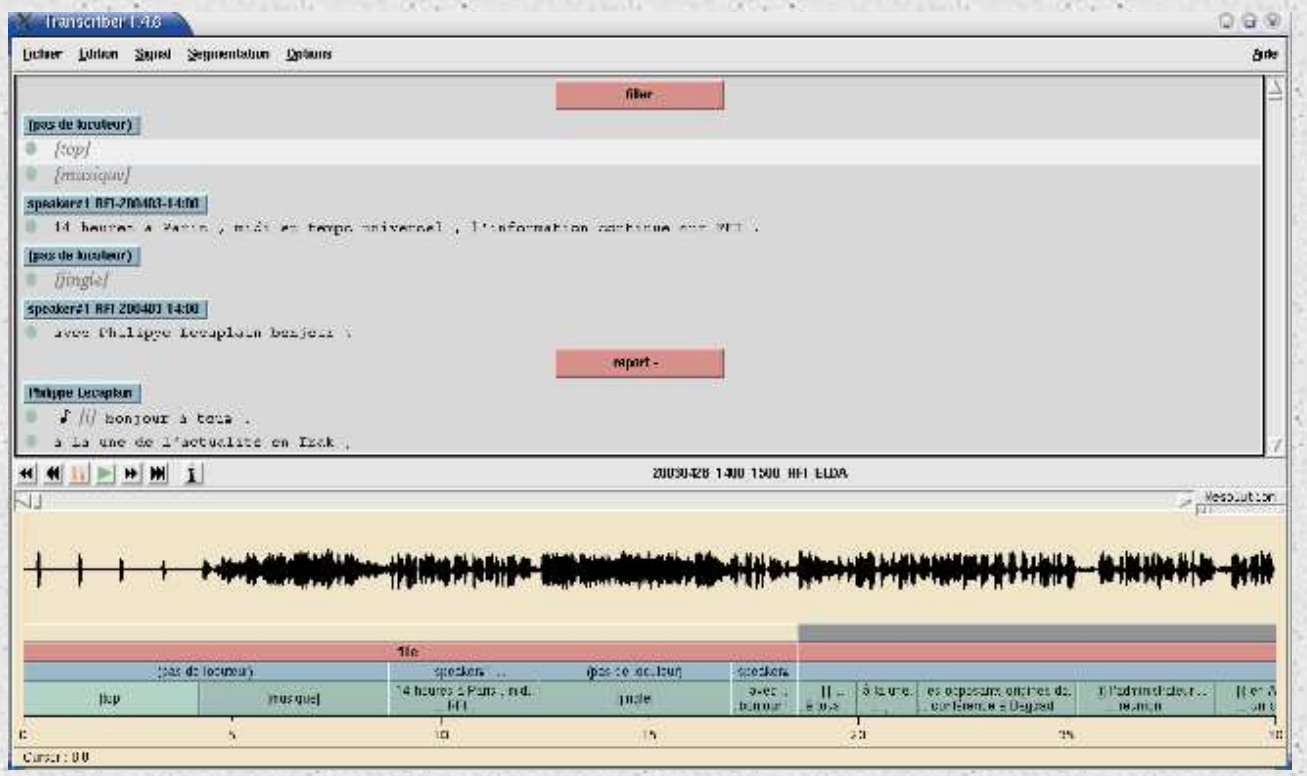
Postural congruence.

Social Interaction Detection



Space and seating

Social Interaction Detection



Speech, stop words, silence, onomatopeias,...

©Transcriber: ***transcriber***.fr.softonic.com/

Social Interaction Detection

Table 1
The table shows the behavioural cues associated to some of the most important social behaviours as well as the technologies involved in their automatic detection.

Social cues	Example social behaviours							Tech.		
	Emotion	Personality	Status	Dominance	Persuasion	Regulation	Rapport	Speech analysis	Computer vision	Biometry
Physical appearance										
Height			√	√					√	√
Attractiveness		√	√	√	√		√		√	√
Body shape		√		√					√	√
Gesture and posture										
Hand gestures	√	√			√	√	√		√	√
Posture	√	√	√	√	√	√	√		√	√
Walking		√	√	√					√	√
Face and eyes behaviour										
Facial expressions	√	√	√	√	√	√	√		√	√
Gaze behaviour	√	√	√	√	√	√	√		√	
Focus of attention	√	√	√	√	√	√	√		√	
Vocal behaviour										
Prosody	√	√		√	√		√	√		
Turn taking	√	√	√	√		√	√	√		
Vocal outbursts	√	√		√	√	√	√	√		
Silence	√		√				√	√		
Space and environment										
Distance	√	√	√		√		√		√	
Seating arrangement				√	√		√		√	

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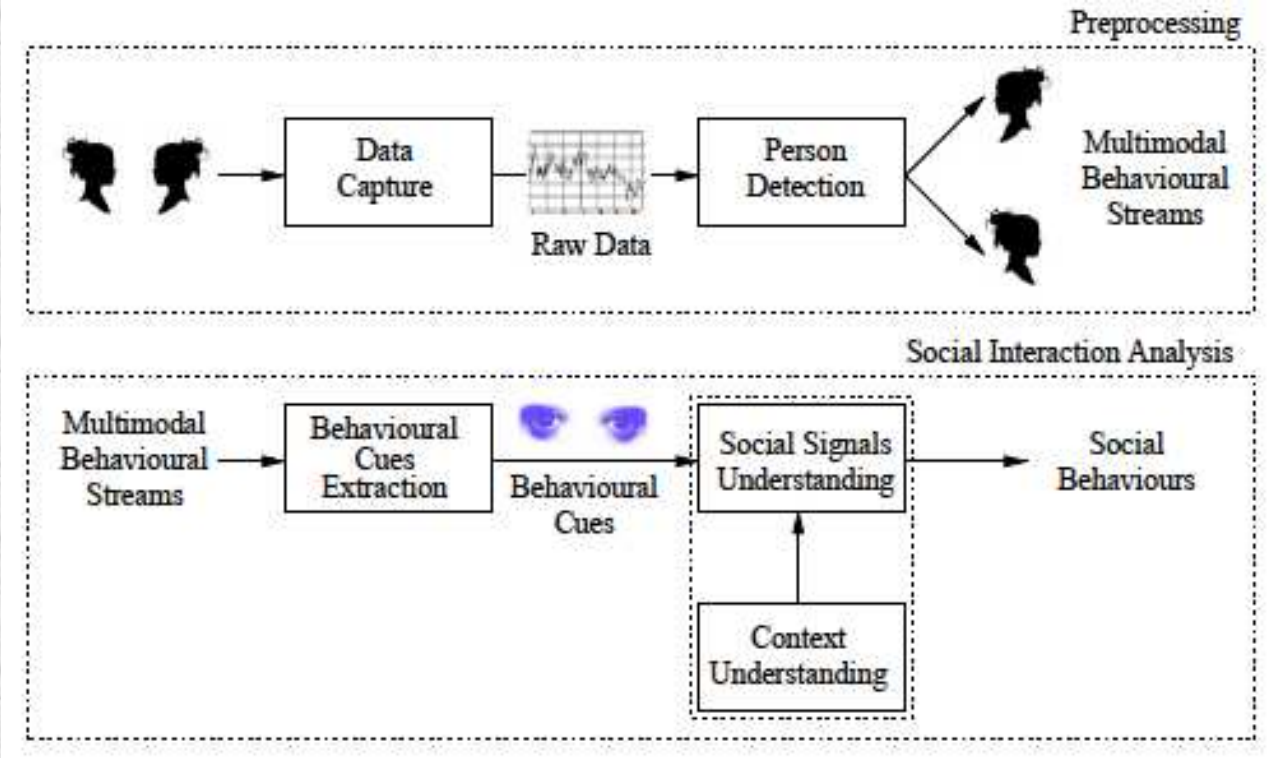
Social Interaction Detection



Machine analysis of social signals and behaviours: a general scheme.

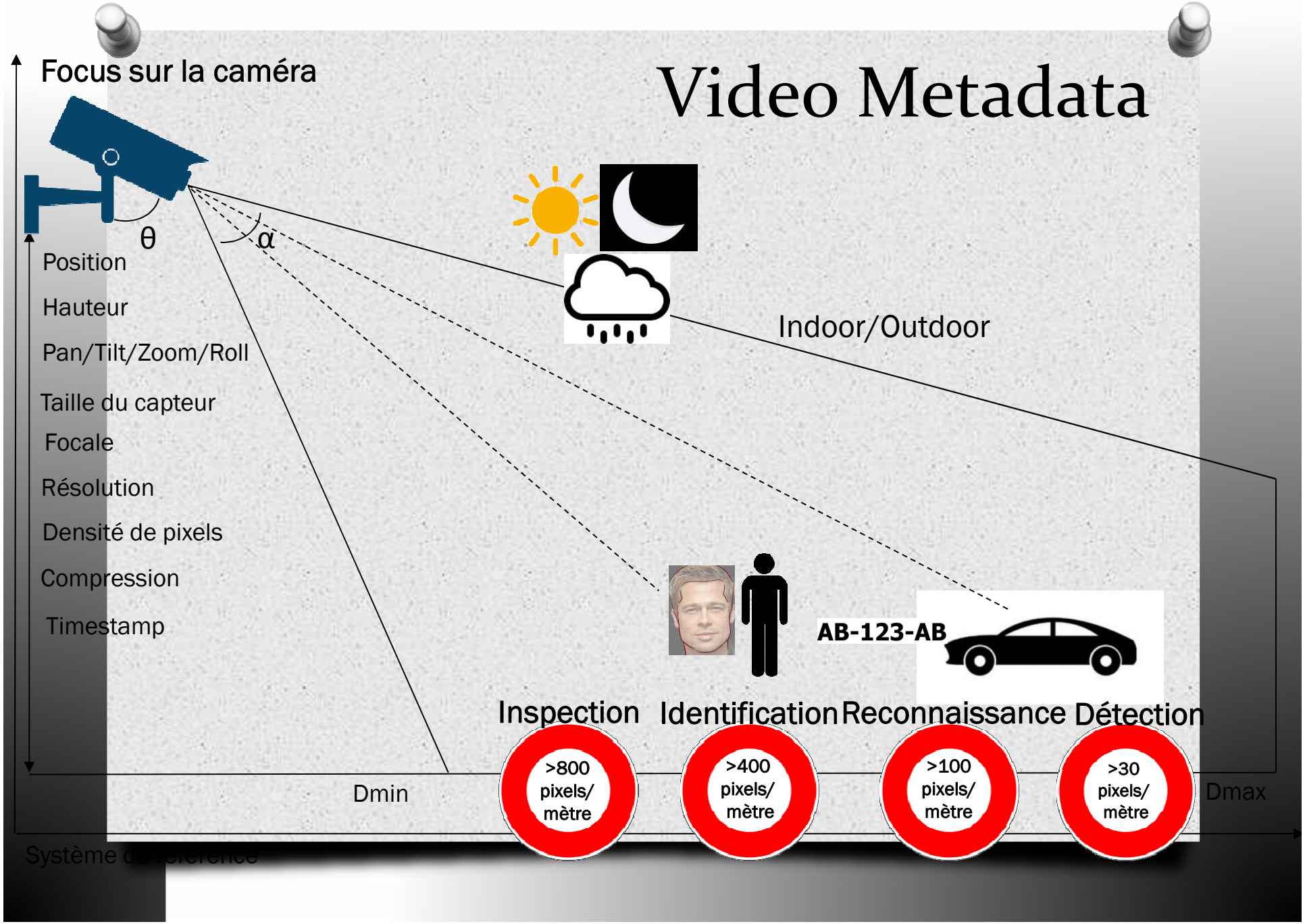
Social Interaction Detection…

… but *analysis, interpretation, recognition, identification*?

⇒Robustness?

⇒How to «replay» experiment?

Video Metadata



Towards Intelligent Social Interaction Detection…

- How analysing, mining, eliciting data, crowdsourcing, video, social networks, etc. can help us to observe new insights on our fooding habits and choices?

- « In vivo » capture and observation…
- … for an *intelligent* social interaction detection and analysis!

=> no *predefined* scenario

Towards Intelligent Social Interaction Detection…

- Context
- Social issues
- Behaviour patterns (and counterexamples*)
- Indexes: - sentiment / emotion / …
  - distance / seats /…
  - word / silence / music / …

  as we consider multimodality-cross modality

* think about Droopy…

Towards intelligent social interaction detection… What is relevant ?

Big Data : Volume, Variety, Values, Veracity,…

⇒Storage issues / Online analysis / …

⇒Metadata: ex. <X ; expr ; $time_i$; $time_j$>

e.g. « X, smiling from this time t_{start} to this time t_{end} »

How to model it?

=> Metadata

e.g. « X smiling from this time t_{start} to this time t_{end} »

… an so?

=>How to prevent from misinterpretation?

⇒Context

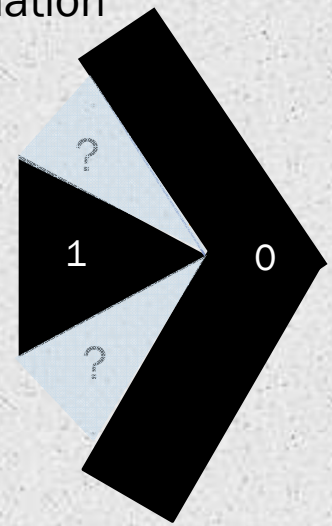
Where? Whom? Why? What?… How?

ITS applications

- Metadata
- Multimodality
-
- a platform = a social media ecosystem
- multimodal features = multilayer modeling

Not so boolean… fuzzy logic

Taking into account temporal and spatial approximation
[Sedes and Alboody, 2010]



Composite pathway: indoor-outdoor, camera changing, « hole » bridging,…

Big Data…

- "Big data" refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze. This definition is intentionally subjective and incorporates a moving definition of how big a dataset needs to be in order to be considered big data—i.e., we don't define big data in terms of being larger than a certain number of terabytes (thousands of gigabytes). We assume that, as technology advances over time, the size of datasets that qualify as big data will also increase. Also note that ***the definition can vary by sector***, depending on what kinds of software tools are commonly available and what sizes of datasets are common in a particular industry. With those caveats, big data in many sectors today will range from a few dozen terabytes to multiple petabytes (thousands of terabytes).

  McKinsey Global Institute

Big Data…

=> big storage

=> big analytics

according to the context, the industry, the custom/usage

=> the revolution of opening data…

Opening Data more and more…

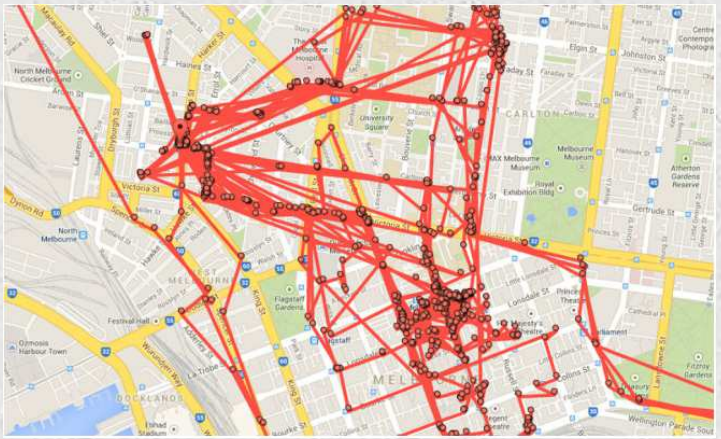
Open data => Scalability / Variety

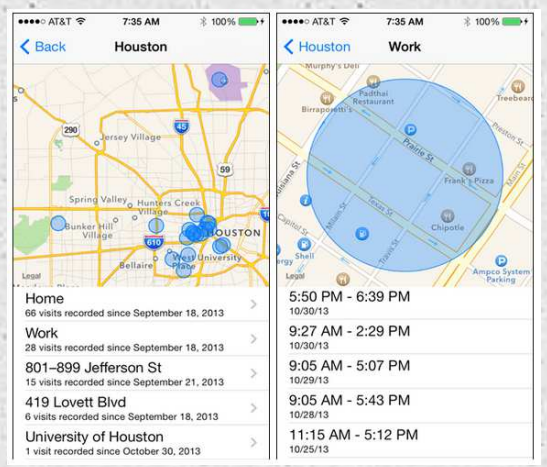
Public datasets related to :

- restaurant ranking
- product characteristics
- recipes
- statistics
- connected cookies (made in Toulouse)

User support?

ex.: mobile location tracking



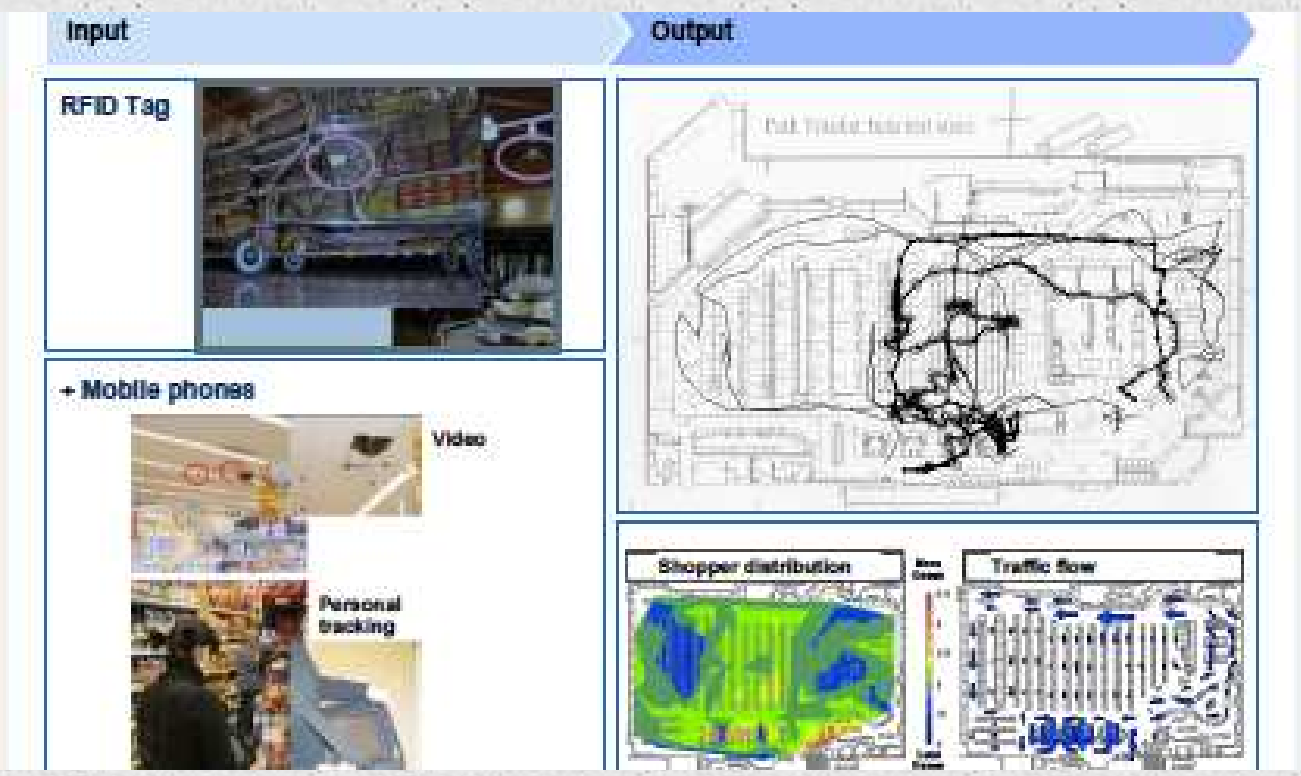


https://maps.google.com/locationhistory/

http://blog.chron.com/techblog/2013/10/your-iphone-knows-where-youve-been-puts-it-on-a-map/

User support:

How does location tracking work?



Main problem : Variety

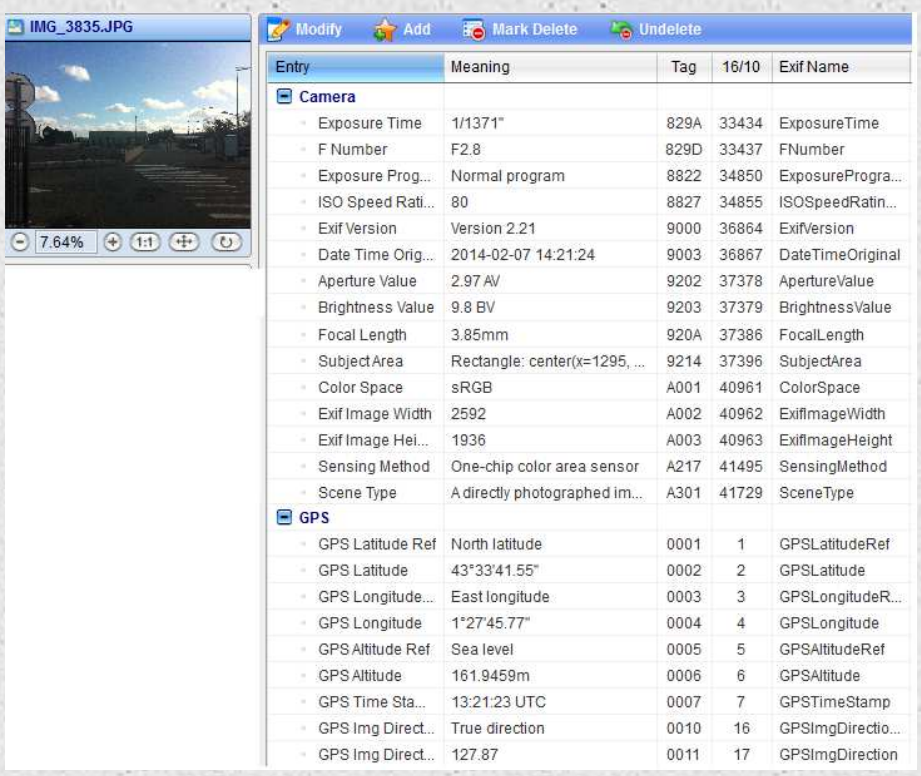
"The Achile's heel in BigData" (Michael Stonebraker, MIT)

Sensor data : incredible source(s) of data
→ new applications

Sensor data : positions, movement, annotations, metadata, direction…

How to integrate data coming from hundreds of sources in many different formats (or without any)?

What can help?....



Entry	Meaning	Tag	16/10	Exif Name
Camera				
Exposure Time	1/1371"	829A	33434	ExposureTime
F Number	F2.8	829D	33437	FNumber
Exposure Prog...	Normal program	8822	34850	ExposurePrograa...
ISO Speed Rati...	80	8827	34855	ISOSpeedRatin...
Exif Version	Version 2.21	9000	36864	ExifVersion
Date Time Orig...	2014-02-07 14:21:24	9003	36867	DateTimeOriginal
Aperture Value	2.97 AV	9202	37378	ApertureValue
Brightness Value	9.8 BV	9203	37379	BrightnessValue
Focal Length	3.85mm	920A	37386	FocalLength
Subject Area	Rectangle: center(x=1295, ...	9214	37396	SubjectArea
Color Space	sRGB	A001	40961	ColorSpace
Exif Image Width	2592	A002	40962	ExifImageWidth
Exif Image Hei...	1936	A003	40963	ExifImageHeight
Sensing Method	One-chip color area sensor	A217	41495	SensingMethod
Scene Type	A directly photographed im...	A301	41729	SceneType
GPS				
GPS Latitude Ref	North latitude	0001	1	GPSLatitudeRef
GPS Latitude	43°33'41.55"	0002	2	GPSLatitude
GPS Longitude...	East longitude	0003	3	GPSLongitudeR...
GPS Longitude	1°27'45.77"	0004	4	GPSLongitude
GPS Altitude Ref	Sea level	0005	5	GPSAltitudeRef
GPS Altitude	161.9459m	0006	6	GPSAltitude
GPS Time Sta...	13:21:23 UTC	0007	7	GPSTimeStamp
GPS Img Direct...	True direction	0010	16	GPSImgDirectio...
GPS Img Direct...	127.87	0011	17	GPSImgDirection

Multimedia Metadata

- Metadata = data about data
- Instead of doing an *exhaustive* analysis of the content, how can i use context information (geolocation, social information, device characteristics, data popularity, freshness, image quality, rights) to extract usefull knowledge?
  - Social Network
  - Video capture
  - Sensors

Metadata Standards

- Provides export interoperability profiles which constitutes the “exchange format” and minimum technical requirements that ensure that the contents exported from one system are compatible with the systems that will use the data

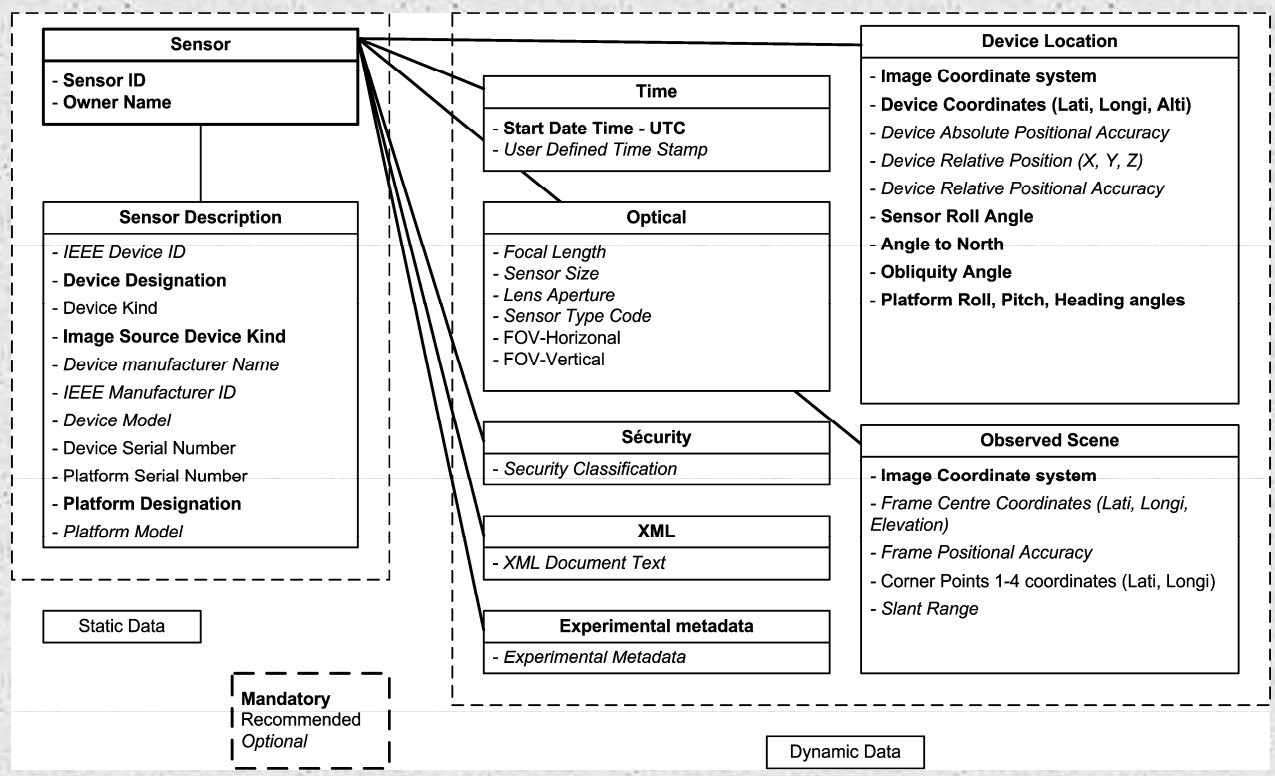
- Example : ISO22311 :

  enables interoperability between video surveillance systems

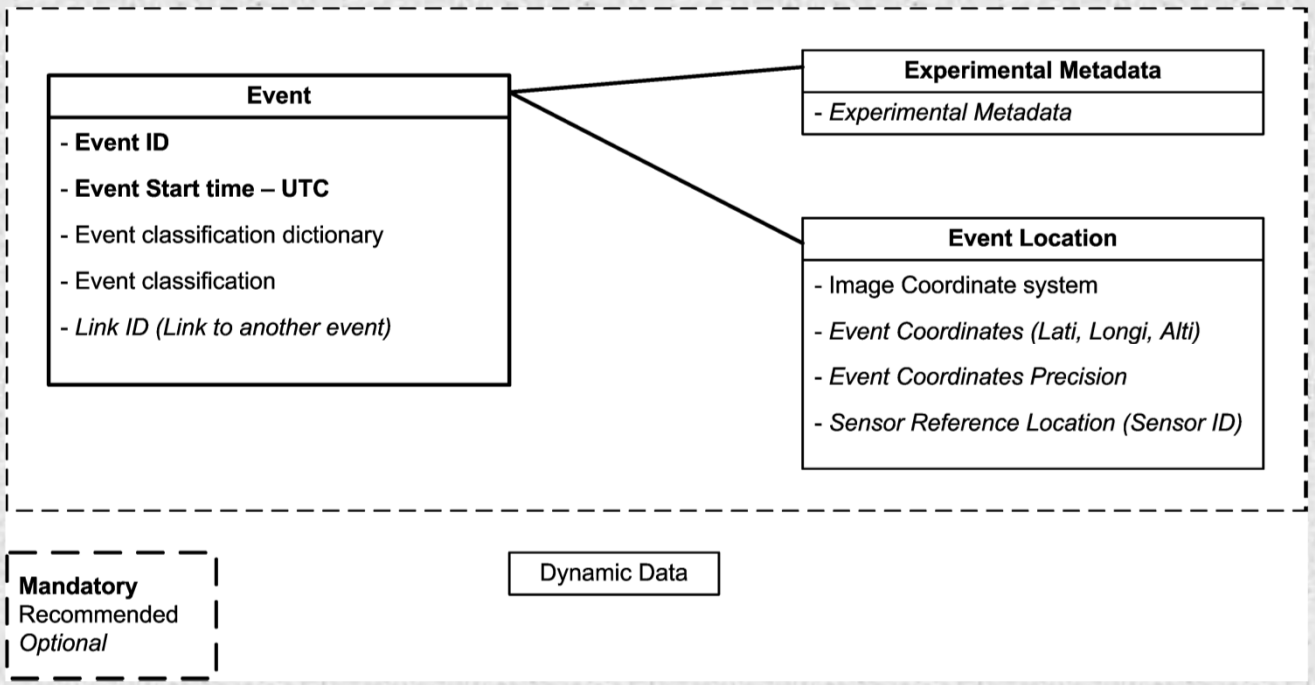
  defines an export format for data (video content) and metadata produced by videosurveillance systems

  comprises elements that concern : Video, Audio, Metadata (Static (localisation, camera identifier, etc.), Dynamic (date, time, pan, tilt, zoom, identification results, etc.), Container structure to integrate the before mentioned, Data security and integrity, Provisions for privacy.

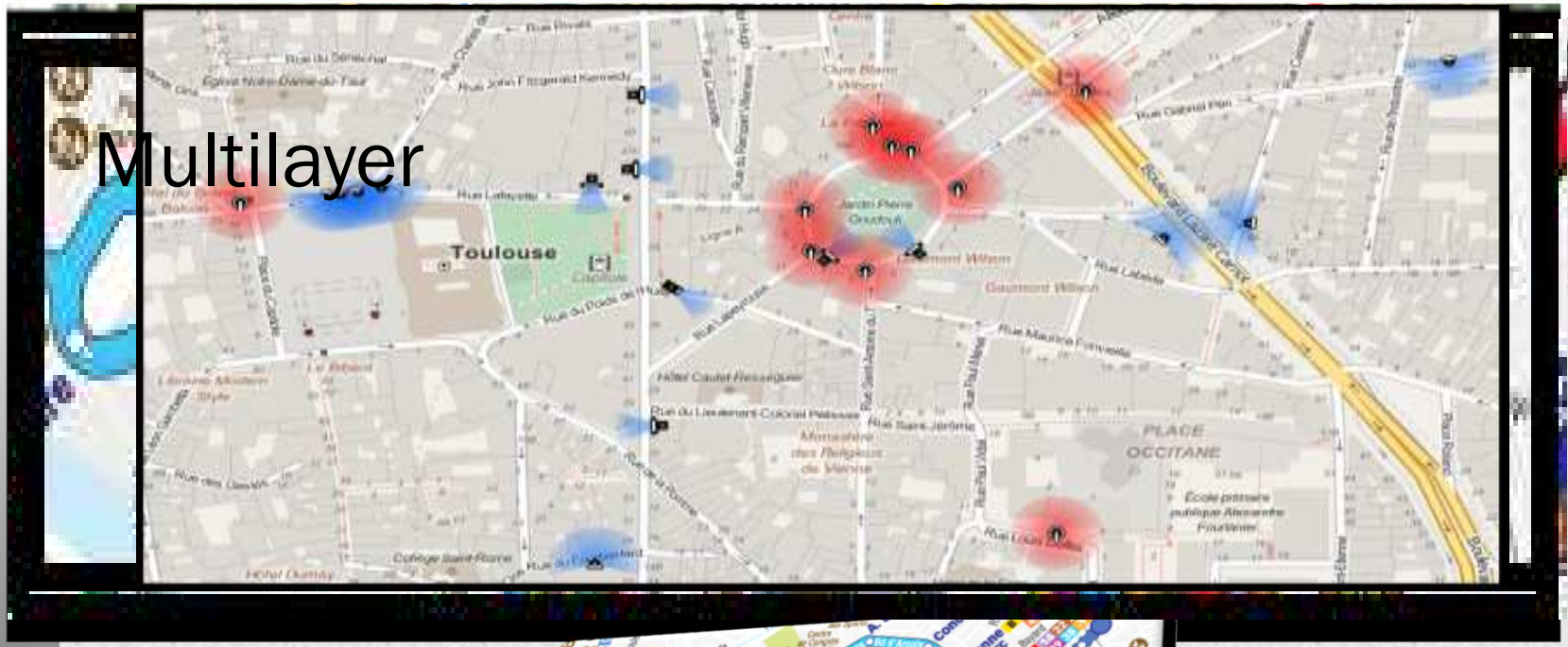
Metadata Dictionaries



Metadata Dictionaries



Multilayer

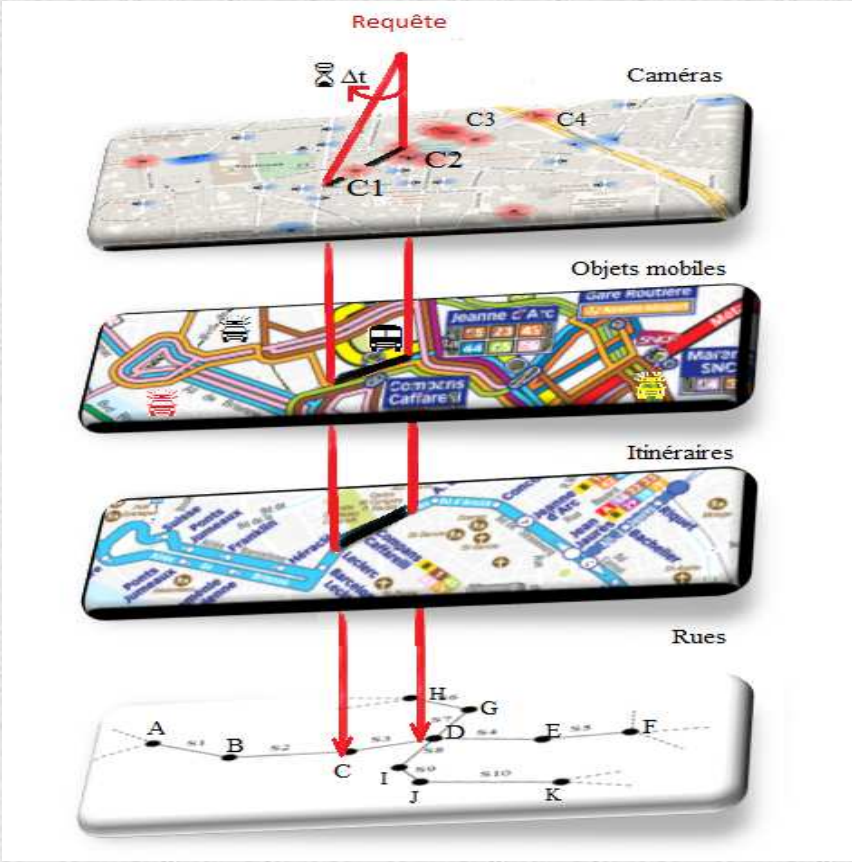

Toulouse
PLACE OCCITANE

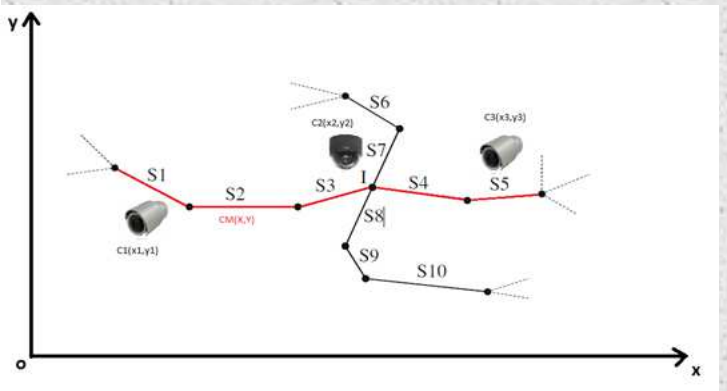
Suisse
Ponts Jumeaux
Franklin
Héraclès
Compans Caffarelli
Leclerc
Jeanne d'Arc
Jean Jaurès
Bachelier
Riquet

Gare Routière
Jeanne d'Arc
Compans Caffarelli
SNCF

Jumeaux
Garonne
Toulouse
Carmes
Patte d'Oie

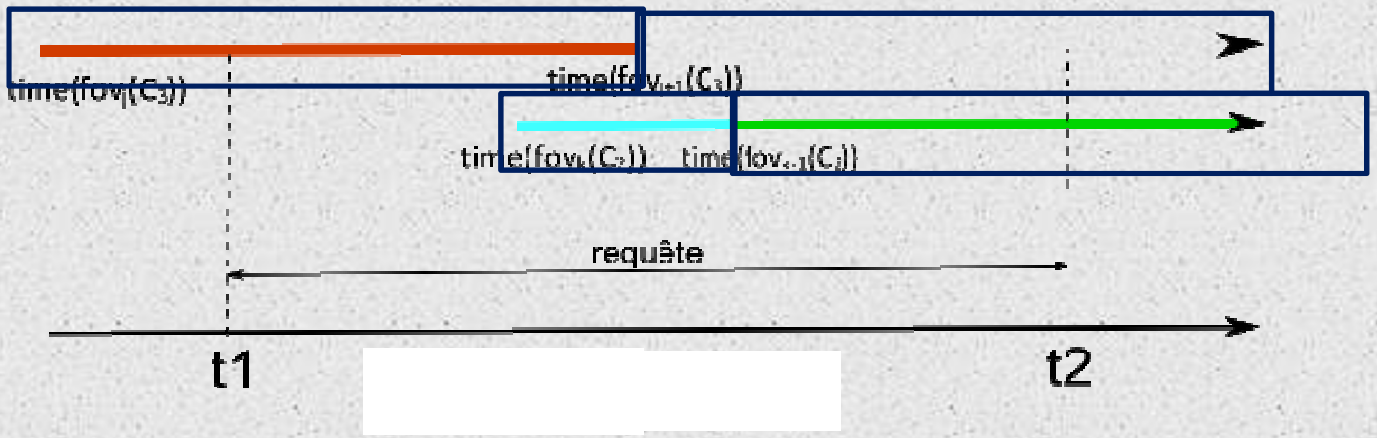
Multilayer modelling and querying from metadata



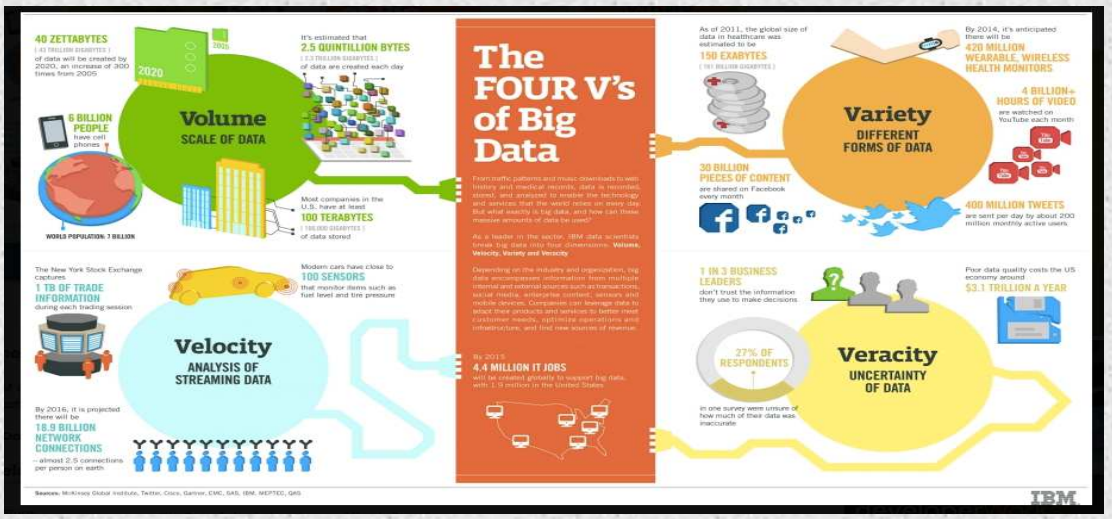


Scene analysis as a hybrid query

- 1st layer: speech metadata
- 2nd layer: video streamline annotated facial
- 3rd layer: characters position



Crowd / Social: one more V?



Confidence => Volonteer

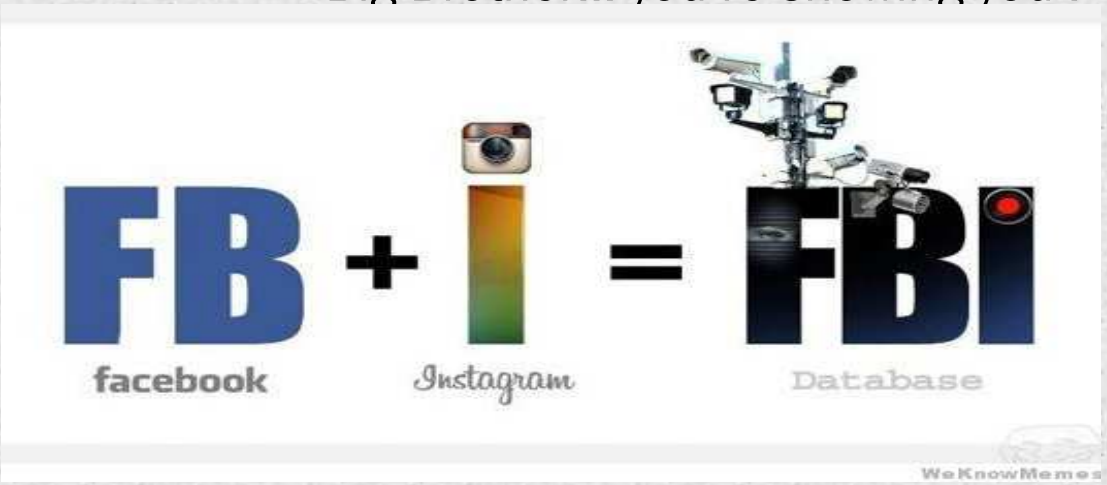
«user's engagement» / « involvement »

e.g. improved patient/user engagement in health and care

Privacy

- ethic, rights, etc.
- privacy issues… no Big Brother?

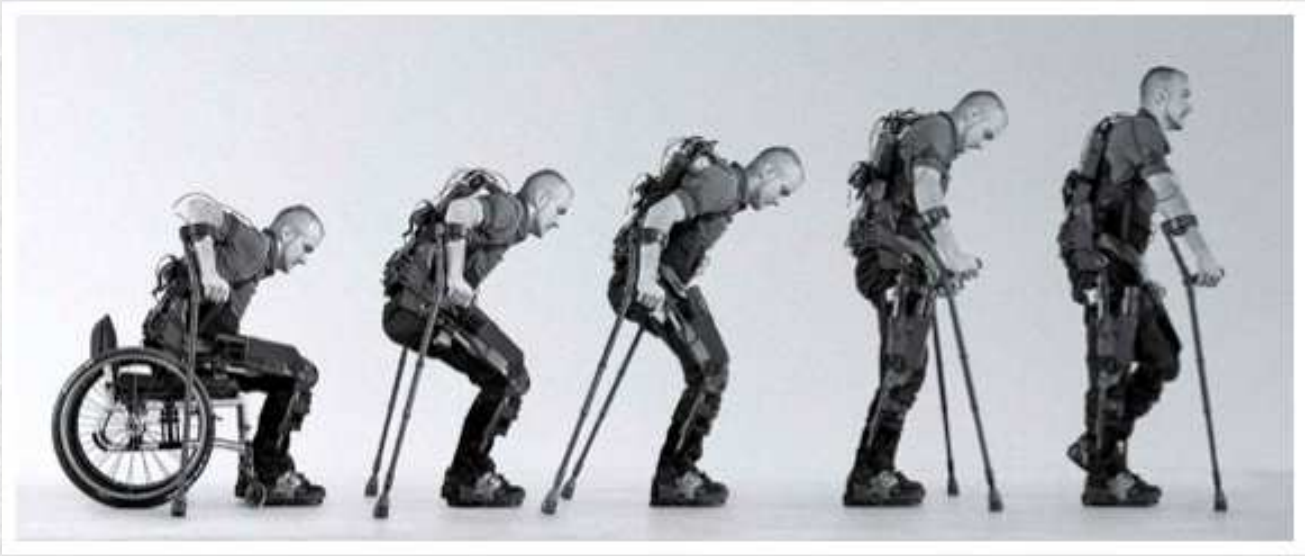
Big Brother… you're showing you !



Intelligent and smart

smart materials => autonomy

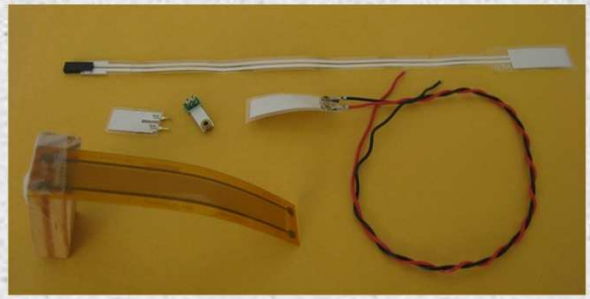
wearable computers (exosquelettes)



« That's one small step for (a) man, one giant leap for mankind.»

Energy: the key issue!

[IRIT, Toulouse + RMC, Kingston, Ontario]



… towards a new generation of scientific equipement ?

such a platform must be seen as

a social media ecosystem

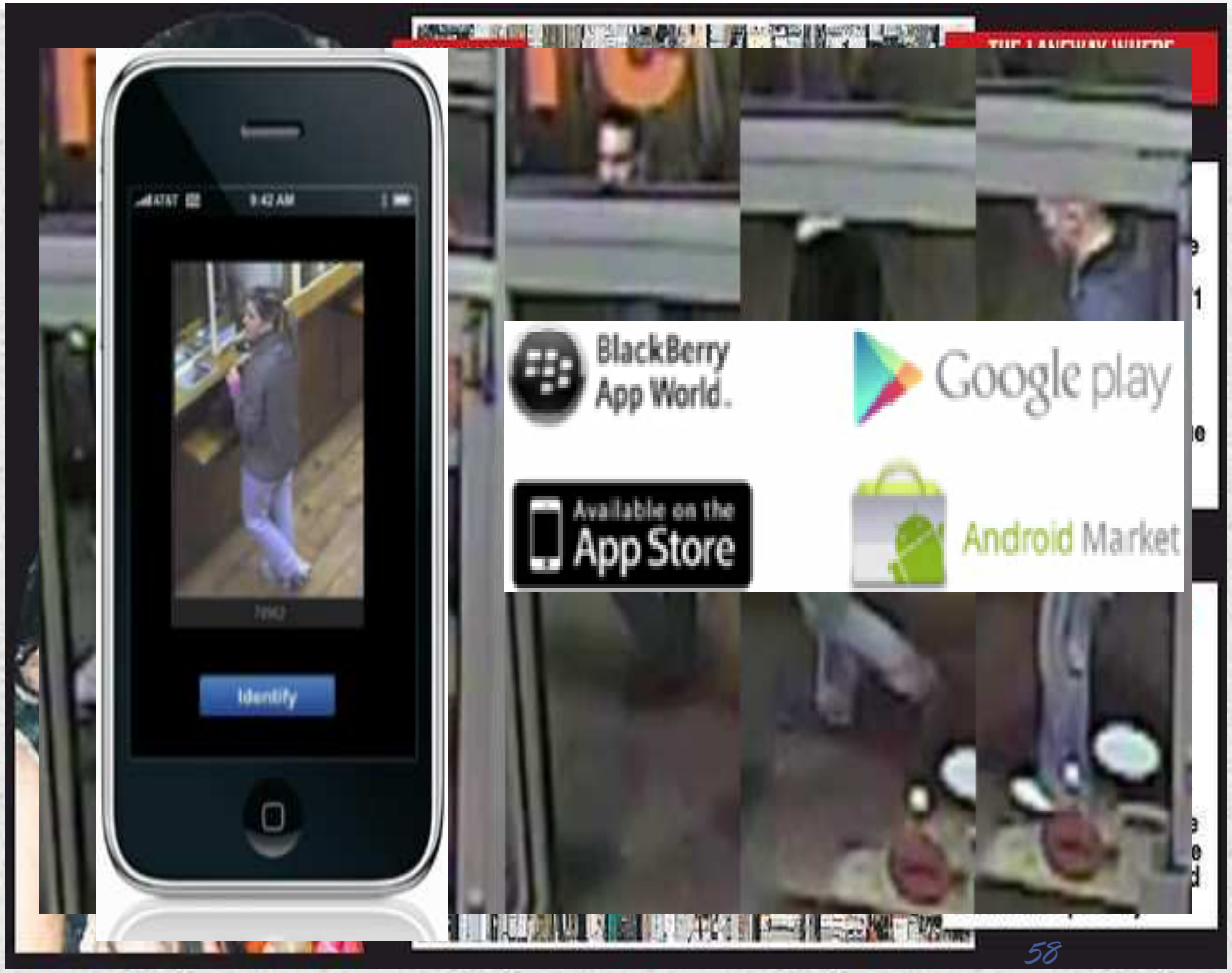
…a social media ecosystem

Veni, vidi… video!

Not forgetting…

- Safe and sustainable
- Energy minimising
- Ethic development (no Big Brother…)
- Privacy
- Security

- … and women;-)!



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http://www.news.com.au/national-news/victoria/one-of-six-people-seen-on-crucial-cctv-comes-forward-as-police-probe-abduction-theory-on-missing-jill-meagher-and-plea-for-witnesses/story-fndo4cq1-1226482146903

http://www.facewatch.co.uk/cms/pages/apps