WHY IS THIS IMPORTANT?

NEW EU LEGISLATION: IN THE NEAR FUTURE THE MINIMUM FINE FOR BREACH OF THE ACT ON PROCESSING OF PERSONAL DATA WILL BE:
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FOR COMPANIES:
2 PERCENT OF GLOBAL ANNUAL TURNOVER!
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FOR PUBLIC ORGANIZATION

KRYSTIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY
WHY IS THIS IMPORTANT?

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FOR COMPANIES:
2 PERCENT OF GLOBAL ANNUAL TURNOVER!

FOR PUBLIC ORGANIZATION
1 MILLION EURO!
# The New Datascape for Transport Research

**“Past” datascape**
- Low volumes and rates
- Intermittent collection
- Explicit sampling & design
- Costly to collect
- Limited sectoral scope
- Collection is human led
- Centralised collection
- Data holdings fragmented
- Little commercial exploitation

**“Future” datascape**
- Very high volumes and rates
- Continuous collection
- Naturalistic sampling
- Low marginal collection cost
- Scope includes many sectors
- Mostly automated & passive
- Distributed collection
- Greater integration of data
- Significant commercial use

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**Kristian Hegner Reinau** – Associate Professor – Department of Civil Engineering

**The Faculty of Engineering and Science**

**Aalborg University**

**Trafik Dage 2015**
DEFINING BIG DATA

THREE V’S - VOLUME, VELOCITY AND VARIETY (MADDEN 2012)

“... DATA IS NOT THE “STOCK” IN A DATA WAREHOUSE BUT A CONTINUOUS FLOW. THIS REPRESENTS A SUBSTANTIAL CHANGE FROM THE PAST, WHEN DATA ANALYSTS PERFORMED MULTIPLE ANALYSES TO FIND MEANING IN A FIXED SUPPLY OF DATA. TODAY, RATHER THAN LOOKING AT DATA TO ASSESS WHAT OCCURRED IN THE PAST, ORGANIZATIONS NEED TO THINK IN TERMS OF CONTINUOUS FLOWS AND PROCESSES.” (DAVENPORT, BARTH, & BEAN 2012, P. 44)
CHALLENGES OF BIG DATA

TECHNICAL CHALLENGES:
• THE LITERATURE ON HOW TO ADDRESS THESE ISSUES IS GROWING.

ORGANIZATIONAL CHALLENGES:
• ORGANIZATIONAL LITERATURE DEALS WITH HOW KNOWLEDGE SHARING RELATIONS BETWEEN RESEARCH, PRIVATE AND PUBLIC ORGANIZATIONS CAN BE DEVELOPED.

LEGAL AND PRIVACY CHALLENGES:
• PRIVACY IS A WIDER ISSUES THAN THE WORD OF THE LAW.
• EMERGING CONSENSUS IN THE LITERATURE THAT IT IS A CHALLENGE, BUT PRACTICALLY NO SERIOUS DISCUSSION IN THE TRANSPORT ABOUT HOW TO DEAL WITH THIS.
• A GUIDELINE FOR HOS TO DEAL WITH THESE ISSUES IS NEEDED.
• THE DATA PROTECTION LEGISLATION IS CHANGING ON EU LEVEL, IN THE FUTURE FINES FOR BREACHING PRIVACY LAWS WILL BE VERY SUBSTANTIAL!

KRIStIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY
1. HOW CAN DATA FROM DIFFERENT SOURCES, SUCH AS FACEBOOK, GOOGLE, TWITTER, GOVERNMENT AGENCIES, BE COMBINED? (REDMOND 2012)

2. HOW CAN DATA BE TRANSFERRED AND STORED? (KIRON 2012; FERGUSON 2012)

3. HOW CAN DATA BE MANAGED? (MADDEN 2012)

4. WHAT KINDS OF ANALYSIS SHOULD BE DONE ON THE DATA AND WHAT TOOLS ARE AVAILABLE? (BATTY 2012; CHESHIRE & BATTY 2012; REDMOND 2012)
ORGANIZATIONAL CHALLENGES OF BIG DATA

COMPANIES CREATE DATA TO GENERATE KNOWLEDGE, WHICH CAN GIVE A COMPETITIVE ADVANTAGE, WHICH CAN BE TURNED INTO A PROFIT!

... BIG DATA IS NOT GOING TO BE FREE, NEITHER TO RESEARCH, NOR TO PUBLIC ORGANIZATIONS

MORE FOCUS NEED TO BE PLACED ON BUSINESS MODELS BEHIND BIG DATA WITHIN THE TRANSPORT FIELD (ARMOOGUM, ET. AL., 2014)
LEGAL CHALLENGES OF BIG DATA

Legislators attempt to adapt the legislation to the technological development by increasing the level of protection of natural persons whose private spheres are affected by this development by protecting the personal data being processed (The Data Protection Directive) as well as protecting the processing of and access to data on natural persons’ terminal equipment, including computers, smartphones, tablets etc. which are used to connect to the internet (The E-Privacy Directive).

KRISTIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY
RESEARCH QUESTION

WHAT GUIDELINES SHOULD BE FOLLOWED WHEN WORKING WITH BIG DATA WITHIN THE TRANSPORT FIELD TO SATISFY LEGAL DEMANDS AND PUBLIC PRIVACY DEMANDS, WHEN THE LAW IS LAGGING BEHIND THE TECHNOLOGICAL DEVELOPMENT, WHEN THE INTERPRETATION OF PRIVACY LAWS CAN CHANGE AND WHEN THE PUBLIC OPINION REGARDING TRACKING AND PRIVACY IS ALSO CHANGING?
BEST PRACTICE IN RELATION TO TRACKING TECHNOLOGIES

DESPITE THE EMERGENCE OF MANY NEW TRACKING TECHNOLOGIES IN RECENT YEARS THERE IS LIMITED CONSENSUS IN THE LITERATURE ON TRACKING.

(ARMOOGUM, ET. AL. 2014) PROVIDES AN OVERVIEW OF CURRENT TRACKING TECHNOLOGIES UTILIZED IN THE TRANSPORT FIELD.

(REINAU, ET. AL, 2014) PROVIDES A FIRST MODEL FOR BEST PRACTICE ABOUT HOW TO DESIGN AND CONDUCT GPS TRACKING.

TO DEVELOP KNOWLEDGE ABOUT HOW TO NAVIGATE THE LEGAL AND PRIVACY ISSUES THAT ARISES WHEN BIG DATA IS USED IN THE TRANSPORT FIELD WE CONDUCT A CASE STUDY.
CASE STUDY

METHODOLOGY

A TALKING PIG CASE (SIGGELKOW 2007): BLIP SYSTEMS

- COMPANY FOUNDED IN 2003 SPECIALIZED IN BLUETOOTH AND LATER WIFI TRACKING, SUPPLYING TRACKING SOLUTION TO CUSTOMERS ALL OVER THE WORLD.

- FIRST COMPANY WITHIN THE TRANSPORT INDUSTRY IN DENMARK TO BE DRAGGED THROUGH A DISCUSSION ABOUT THE LEGAL STATUS OF ITS TRACKING TECHNOLOGY

- FIRST COMPANY IN DENMARK TO ENTER THE MEDIA IN A DISCUSSION ABOUT SURVEILLANCE AND TRACKING OF CITIZENS.
CASE STUDY METHODOLOGY

DATA FORMING THE BASIS FOR THE CASE STUDY

• TWO INTERVIEWS OF THE CEO IN BLIP SYSTEMS

• STUDY OF MEDIA ARTICLES, REPORTS AND OTHER PUBLISHED MATERIAL DEALING WITH BLIP SYSTEMS (MORE THAN 350 MEDIA ARTICLES MENTIONING BLIP SYSTEM ANALYZED)

• STUDY OF SCIENTIFIC PUBLICATIONS UTILIZING DATA COLLECTED USING BLIP SYSTEMS SOLUTIONS

• ANALYSIS OF LAWS RELATING TO THE CASE, I.E. THE DATA PROTECTION LEGISLATION, INCLUDING THE ACT ON PROCESSING OF PERSONAL DATA.
BLIP SYSTEMS A/S TODAY

LOCATED IN VESTER HASSING, NORTHERN JUTLAND
ANNUAL NET PROFIT 2014: 10 MILLION DKR
NUMBER OF EMPLOYEES: 10-19
WWW.PROFF.DK 2015

FOUNDED IN 2003 AS MANAGEMENT BUYOUT OF BLUETOOTH ACTIVITIES WITHIN L.M. ERICSSON DENMARK

BLIP SYSTEMS TRACKING SOLUTION IS USED IN INTER-URBAN TRAFFIC MONITORING, PORTS, TRAIN STATIONS, SKI RESORTS, AMUSEMENT PARKS AROUND THE WORLD, AND IN MORE THAN 23 INTERNATIONAL AIRPORTS, INCLUDING JFK, AMSTERDAM, DUBAI, DUBLIN, TORONTO, BARCELONA, AUCKLAND, CINCINNATI, BRUSSELS, MANCHESTER, MILANO, COPENHAGEN, HELSINKI AND OSLO.

KRISTIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY
BLUETOOTH AND WIFI TRACKING

Sensor coverage

Journey time at sensor is not affected

Increase in journey time between sensors indicates queue

Increase in journey time at sensor indicates queue

(www.blipsystems.com 2015)
IN 2003 IT WAS NOT CLEAR WHAT LAWS BLUETOOTH TRACKING FELL UNDER, SINCE IT WAS A COMPLETELY NEW TECHNOLOGY.

THE CHOICE FACED BY BLIP SYSTEMS MANAGEMENT:
- UTILIZE THE LEGAL VACUUM, AND MAKE AS MUCH MONEY AS POSSIBLY AS FAST AS POSSIBLE.
- LOOK AT THE LEGAL CONSTRAINTS IN SIMILAR FIELDS, AND TRY TO FOLLOW THESE.

BLIP SYSTEMS DECIDED TO LOOK AT VIDEO SURVEILLANCE AND THUS THE PERSON DATA LAW AND TRY TO DESIGN THEIR SYSTEM SO THAT IT WOULD COMPLY WITH THIS LAW.
IS IT ACCEPTABLE?

THE EUROPEAN LAW GRADUALLY MADE ADVERTISING USING BLUETOOTH DIFFICULT IN EUROPEAN COUNTRIES, BUT IT IS STILL USED ON OTHER PARTS OF THE WORLD.


BLIP SYSTEMS IMAGE IS CLOSELY LINKED TO THE USE OF THE SYSTEMS!
IS IT ACCEPTABLE?
THE AFRICAN CHURCH EXAMPLE

AN AFRICAN CUSTOMER APPROACHED BLIP SYSTEMS WITH THE INTENT TO BUY A SYSTEM WHICH COULD SEND ADVERTISING TO BLUETOOTH PHONES IN THE VICINITY OF THE SENSORS, AND LOCATE IT IN A CHURCH.

BLIP SYSTEMS DECLINED THE COOPERATION: LOGIC, WHEN PEOPLE ARE IN A CHURCH, THEY DON’T EXPECT ADDS FOR GROCERY THINGS ETC.

GENERAL PRINCIPLE, ADDS SHOULD BE OF A TYPE THAT FITS THE SITUATION WHERE THE RESPONDENT RECEIVES THEM (WE SEE HERE A NOTION OF PROPORTIONALITY)
IS IT ACCEPTABLE: THE AIRPORT TOILET EXAMPLE

AN AIRPORT APPROACHED BLIP SYSTEMS WITH THE INTENT TO BUY A SYSTEM WHICH COULD NOT ONLY TRACK CUSTOMERS AROUND THE AIRPORT, BUT ALSO TRACK THE SPECIFIC GENDER, BY ADDING SENSOR TO THE TOILETS.

BLIP SYSTEMS DECLINED: LOGIC, TRACKING PEOPLE IN THE TOILET COULD BE CROSSING A BOUNDARY OF WHAT PEOPLE IS WILLING TO ACCEPT FOR A BETTER AIRPORT EXPERIENCE.

GENERAL PRINCIPLE: THE TRACKED RESPONDENTS SHOULD GET A VALUE WHICH IS PROPORTIONAL TO THE LOSS OF PRIVACY EXPERIENCED!
BUSINESS IN BLIP SYSTEMS PROCEEDED AS USUAL, UNTIL THE 26TH OF JANUARY 2015, WHEN THE CEO SUDDENLY STARTED TO RECEIVE A LOT OF PHONE CALLS ABOUT AN NEW ARTICLE IN THE MEDIA VERSION2:

Udbredt system til trafikovervågning er ulovligt

En række kommuner laver intelligent trafikovervågning ved at aflæse de unikke MAC-adresser fra smartphones. Men metoden er ulovlig uden samtykke, oplyser Erhvervsstyrelsen.

Magnus Boye | Mandag, 26. januar 2015 - 6:29 | 28

Intelligente trafikstyringssystemer er i høj kurs hos kommuner, der implementerer systemer til at forhindre trafikknuder og guide bilister til den hurtigste vej gennem byen. Trafikken overvåges ved at osnpanne MAC-adresser fra bilisternes smartphones gennem...
THE COOKIE CASE
ATTENTION!

THE STORY QUICKLY SPREAD TO OTHER MEDIA

A A L B O R G  U N I V E R S I T Y

A A L B O R G  U N I V E R S I T Y

ACCORDING TO THE DANISH BUSINESS AUTHORITY, THE PURPOSE OF THE REGULATION ON THE STORING OF INFORMATION OR GAINING ACCESS TO INFORMATION ALREADY STORED IN THE USER’S DEVICE IS TO PREVENT UNAUTHORISED TRACKING AND MONITORING OF THE USERS.

DEVICES THAT CONNECT TO ELECTRONIC COMMUNICATIONS NETWORKS ARE A PART OF THE PRIVATE SPHERE OF THE USERS, AND THUS REQUIRE PROTECTION.
ACCORDINGLY, IT IS POSSIBLE TO IDENTIFY A USER THROUGH HIS/HER DEVICE, AS ADDRESSES, BROWSING HISTORY, SETTINGS ETC. EFFECTIVELY LINK THE DEVICE TO A SPECIFIC USER, CAUSING THIS USER TO BE IDENTIFIED. IF THE DEVICE CANNOT BE IDENTIFIED, IT IS NOT POSSIBLE TO LINK THE DEVICE TO A SPECIFIC USER. AS THE USER CANNOT BE IDENTIFIED, THE USER’S PRIVATE SPHERE WILL NOT BE VIOLATED.

IT IS THE OPINION OF THE DANISH BUSINESS AUTHORITY THAT IF A USER’S PRIVATE SPHERE IS NOT VIOLATED, AS A SYSTEM DOES NOT ENABLE THE IDENTIFICATION AND MONITORING OF THE USER, THE PROVISIONS OF THE E-PRIVACY DIRECTIVE ON INFORMATION AND CONSENT ARE NOT APPLICABLE, AS THERE IS NO PURPOSE OF PROTECTION IN RELATION TO THE COLLECTION OR STORAGE OF INFORMATION ON THE USER’S DEVICE.
THE LEGAL FRAMEWORK

According to the Danish Business Authority, the traffic monitoring system does not enable an identification of the device and of the user of the device.

Therefore, the traffic monitoring system is subject neither to the requirement of providing information nor to the requirement for consent under Article 5 (3) of the EPrivacy Directive and Article 3 (1) of the Cookie Order,

as the collected data does not enable tracking or monitoring the behaviour of a user in a way that violates his/her private sphere.

Kristian Hegner Reinau – Associate Professor – Department of Civil Engineering
The Faculty of Engineering and Science
Aalborg University
THE KEY ISSUE

THE DANISH BUSINESS AUTHORITY HAS, IN ITS ASSESSMENT, TAKEN INTO CONSIDERATION THAT THE TRAFFIC MONITORING SYSTEM DOES NOT ENABLE ANY CONTACT OR COMMUNICATION BETWEEN THE DEVELOPER OR OWNER OF THE SYSTEM AND THE USERS OF THE DEVICES BEING REGISTERED. THIS RENDERS IT IMPOSSIBLE FOR THE COMPANY BEHIND THE TRAFFIC MONITORING SYSTEM TO INFORM THE USERS AND OBTAIN THEIR CONSENT.

FURTHER, THE DANISH BUSINESS AUTHORITY HAS TAKEN INTO CONSIDERATION THAT MAC ADDRESSES WHICH ARE RECORDED ARE IMMEDIATELY HASHED AND ENCRYPTED AND THAT THIS RENDERS IT IMPOSSIBLE TO DERIVE THE ORIGINAL MAC ADDRESS VIA MEANS LIKELY REASONABLY TO BE USED FOR IDENTIFICATION (EITHER BY THE CONTROLLER OR BY ANY THIRD PARTY).
THE KEY ISSUE

As the algorithm calculating the MAC addresses is changed randomly each 24 hours, the monitoring and tracking of the anonymised MAC address is not possible. It is the assessment of the Danish Business Authority that this method of anonymising data is efficient and renders it impossible to identify the device subsequent to the anonymisation.

Accordingly, it is the opinion of the Danish Business Authority that the collection and recording of MAC addresses via the traffic monitoring system is not subject to the requirement of providing information or the requirement for consent under Article 3 (1) of the Cookie Order.
GUIDELINE
NO “QUICK AND DIRTY BUSINESS”

THE FIRST GUIDELINE TO DRAW FROM THE STORY, IS THAT THE REASON WHY THE COOKIE STORY ENDED WITH AN APPROVAL OF THE SYSTEM WAS, THAT THE SYSTEM HAD BEEN DESIGNED IN THE WAY IT WAS WITH ENCRYPTION OF MAC ADDRESSES AND CHANGES OF THE ENCRYPTION, SO THAT THE DETECTED MAC ADDRESS COULD NOT BE IDENTIFIED OR TRACKED FOR MORE THAN 24 HOURS, NEITHER BY BLIP SYSTEMS OR 3RD PARTIES.

HAD BLIP SYSTEMS CHOSEN THE “QUICK AND DIRTY” BUSINESS APPROACH AND SIMPLY LOGGED MAC ADDRESSES WITHOUT ANY FURTHER ATTEMPTS TO ANONYMISING THEM, THE OUTCOME WOULD MOST LIKELY HAVE BEEN DIFFERENT.
GUIDELINE
PROPORTIONALITY

THE SECOND GUIDELINE TO DRAW FROM THE STORY, ALONG WITH THE LEGAL LITERATURE DEALING WITH PERSONAL PRIVACY, IS ABOUT PROPORTIONALITY.

THERE NEED TO BE A PROPORTIONALITY BETWEEN THE AMOUNT OF PRIVACY THE PERSON TRACKED LOSES COMPARED TO THE VALUE THE PERSON TRACKED GETS FROM THE TRACKING.

IMPORTANTLY, THE FOCUS IS ON THE TRACKED PERSON, NOT THE CUSTOMER PAYING FOR THE TRACKING (AIRPORT EXAMPLE)
LOOKING BACK ONE LESSON LEARNED FROM THE POINT OF VIEW OF THE CEO OF BLIP SYSTEM WAS THAT SPECIALIZED LEGAL ADVICE COULD MAYBE HAVE MADE THE PROCESS FASTER.

THE LAWYER HANDLING THE CASE FROM BLIP SYSTEM WAS THE LAWYER USED IN NORMAL BUSINESS ISSUES ALSO, AND IT COULD HAVE BEEN GOOD TO HAVE A LAWYER SPECIALIZED IN THE PRIVACY LAWS.
IMPLICATIONS FOR RESEARCH

More focus on legal issues is seriously needed in practice in tracking research, often the legal issues is not treated explicitly, and the legal basis for the tracking done is almost never described.

Researchers need to think explicitly about the benefits for the respondents tracked. A review of more than 1,000 publications dealing with GPS tracking shows that at most rewards to respondents is treated in a perspective of what is needed to motivate/push the respondent to supply data, there is no significant discussion of the proportionality.

Kristian Hegner Reinau – Associate Professor – Department of Civil Engineering
The Faculty of Engineering and Science
Aalborg University
CONCLUSION

THREE GUIDELINES TO FOLLOW WHEN WORKING WITH TRACKING IN PRIVATE COMPANIES, PUBLIC ORGANIZATIONS OR RESEARCH:

1. THERE IS NO ROOM FOR QUICK AND DIRTY BUSINESS, BE CAREFUL IN DESIGNING THE TRACKING SYSTEM TO SECURE THE PRIVACY OF THE RESPONDENT, ALL THE WAY FROM THE SENSOR IN THE FIELD TO THE FINAL ANALYSIS.

2. THERE NEED TO BE A PROPORTIONALITY BETWEEN THE AMOUNT OF PRIVACY THE PERSON TRACKED LOOSES COMPARED TO THE VALUE THE PERSON TRACKED GETS FROM THE TRACKING. NOTE, IT IS NOT VALUE FOR THE CUSTOMER PAYING THE TRACKING OR GAINING FROM IT, IT IS THE TRACKED PERSON!

3. GET SPECIALIZED LEGAL KNOWLEDGE ON THE PRIVACY ISSUES FROM THE BEGINNING. THE COMPLEX MERGER OF DIFFERENT TECHNOLOGIES AND LAWS IN THE FIELD MAKES IT NECESSARY.

KRISTIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY
FIN!

KRISTIAN HEGNER REINAU – ASSOCIATE PROFESSOR – DEPARTMENT OF CIVIL ENGINEERING
THE FACULTY OF ENGINEERING AND SCIENCE
AALBORG UNIVERSITY

TRAFIK DAGE 2015