



Social Mining &
Big Data Ecosystem
H2020 - www.sobigdata.eu
September 2015- August 2019

GARR Conference – 16th November 2017

@SoBigData (<https://twitter.com/SoBigData>)

<https://www.facebook.com/SoBigData>



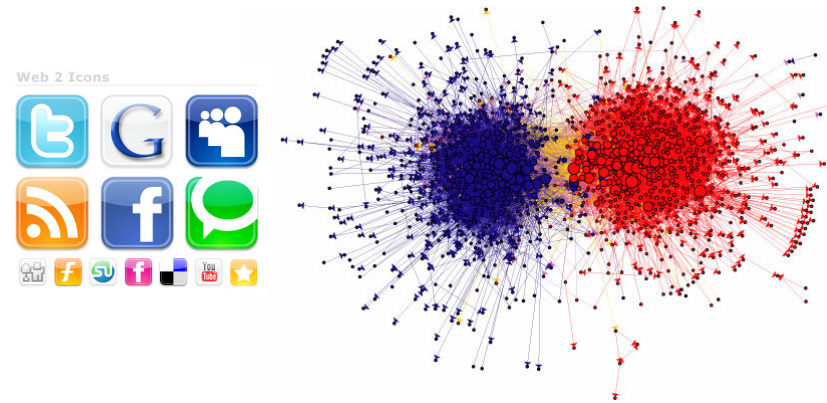
SOBIGDATA VISION AND VALUES

Big data “proxies” of social life

Shopping patterns & lifestyle



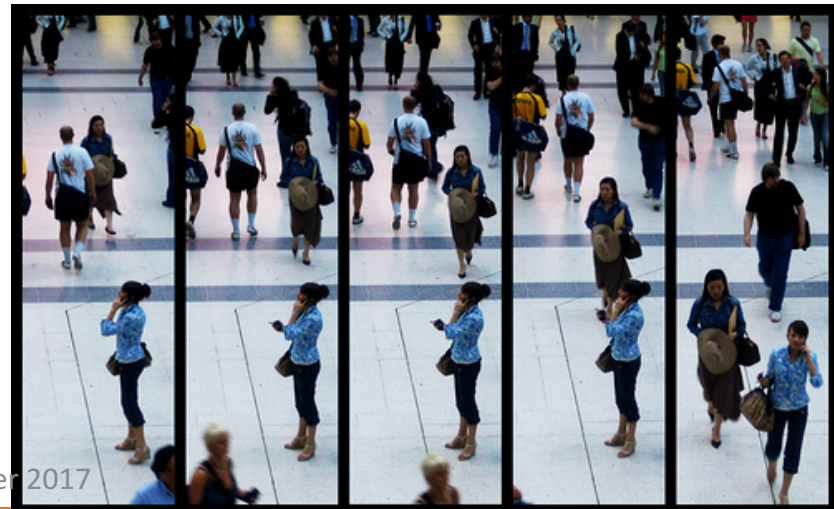
Relationships & social ties



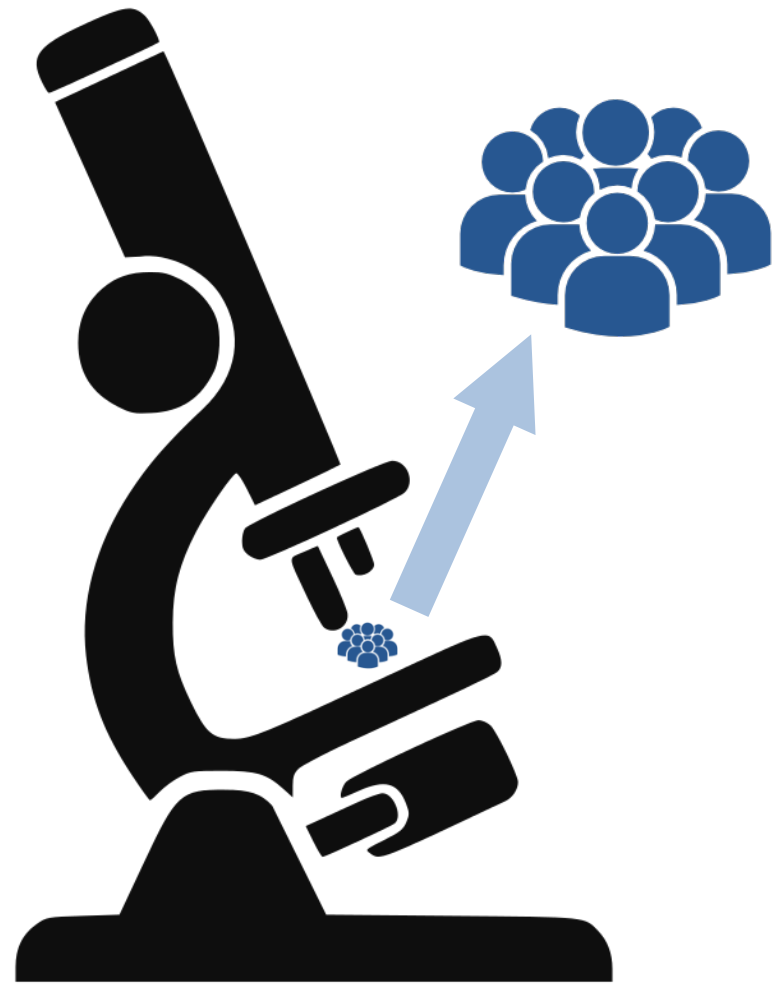
Desires, opinions, sentiments



Movements

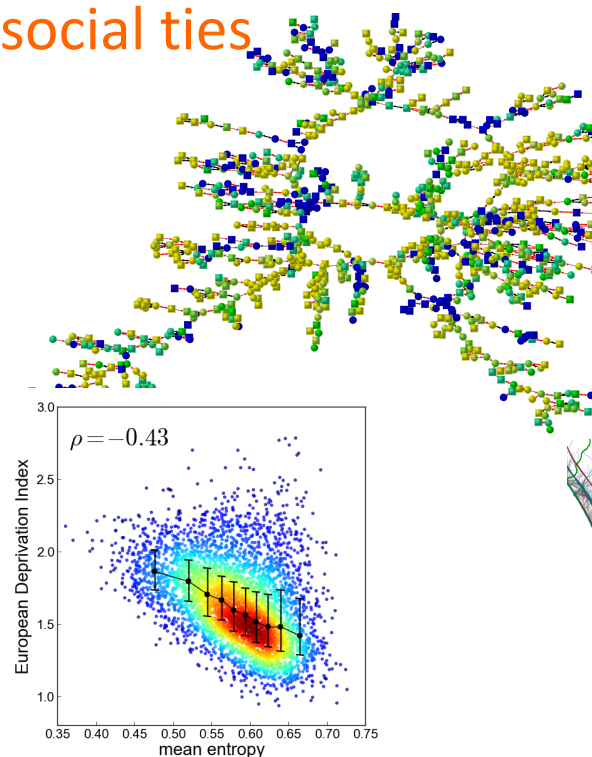
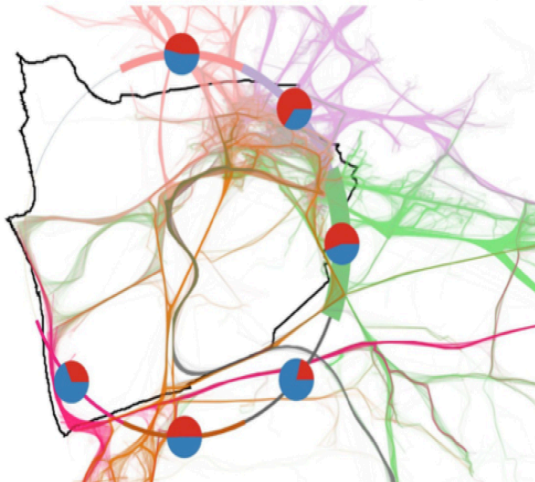


Social mining: making sense of big data to understand society

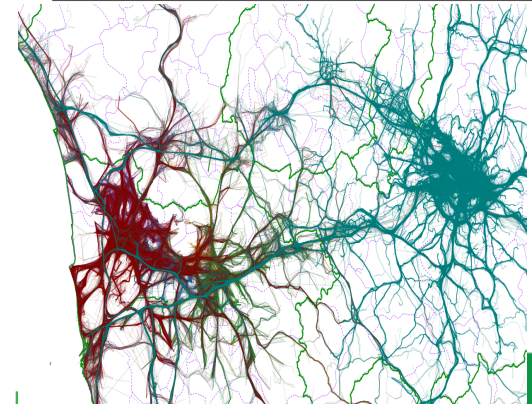
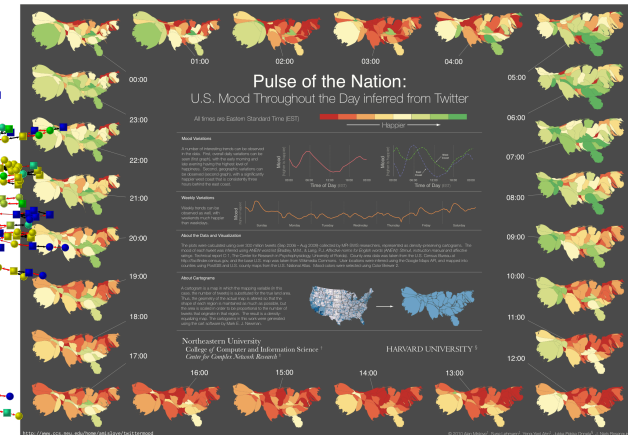


What is Social Mining

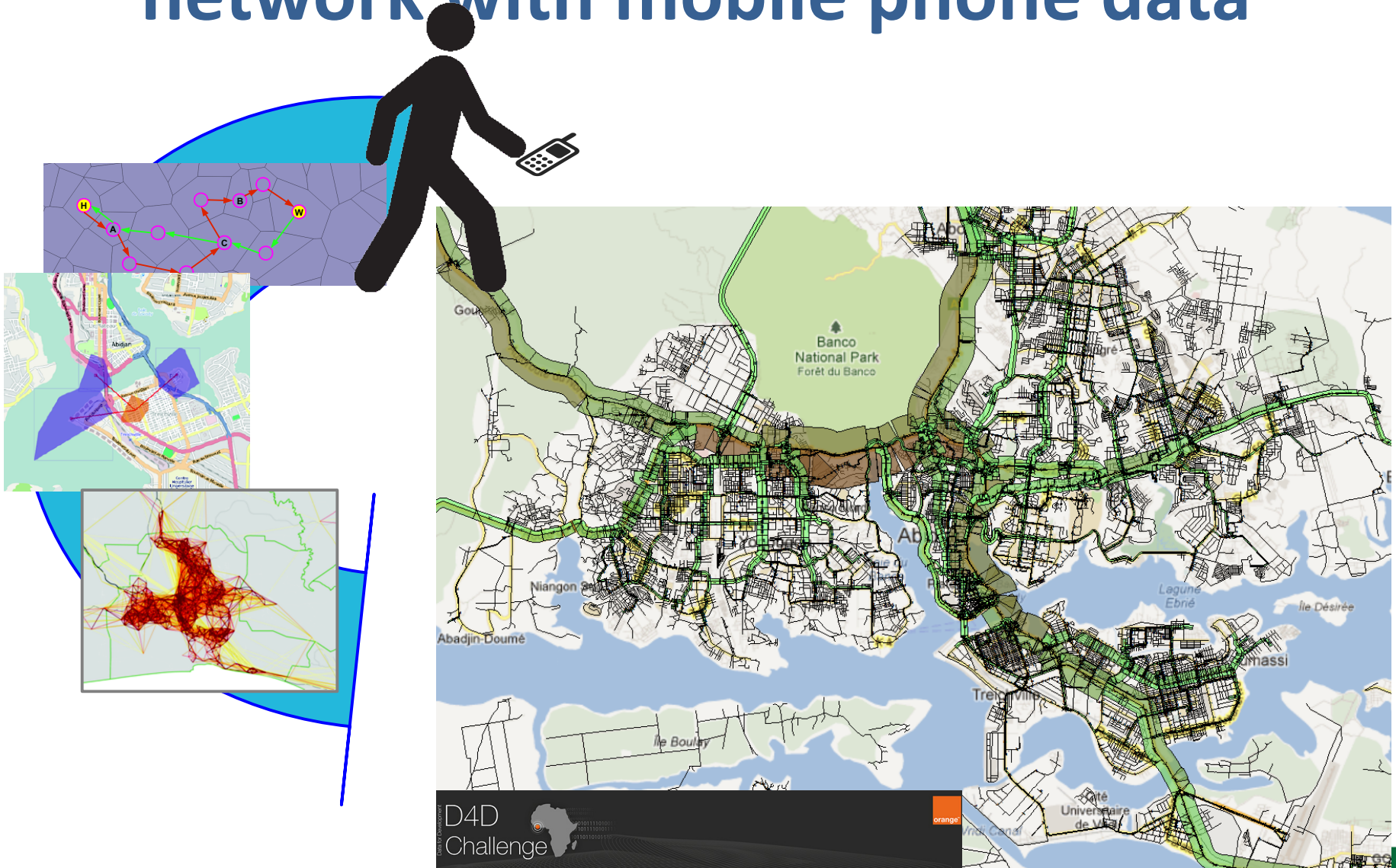
- Automated discovering patterns and models of human behaviour across the various social dimensions that have big data “proxies”
 - desires and opinions
 - relationships and social ties
 - life-styles
 - mobility



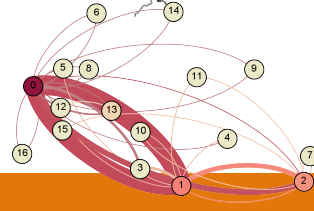
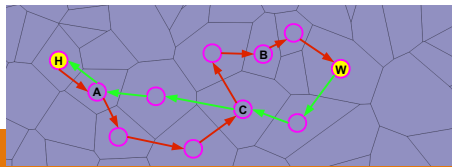
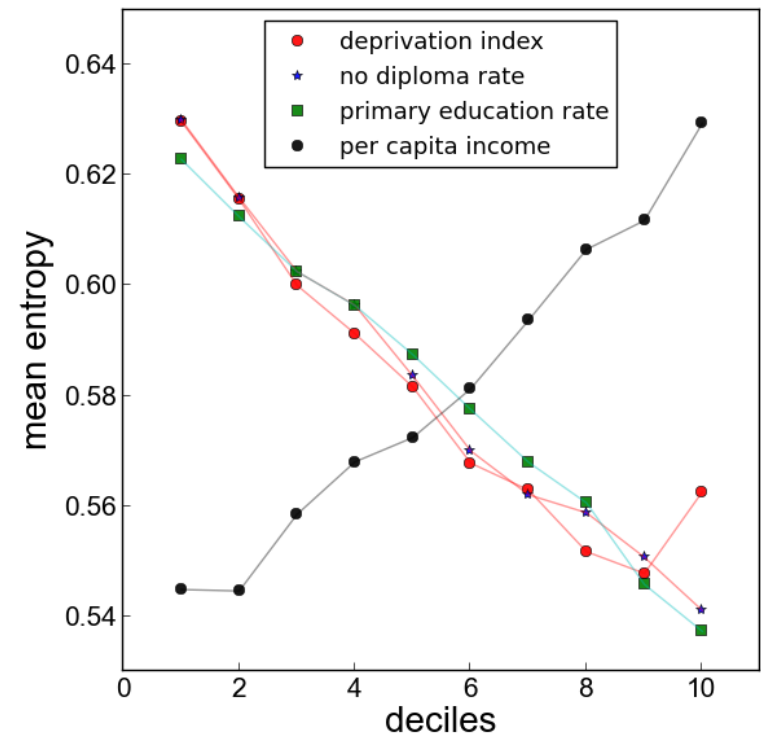
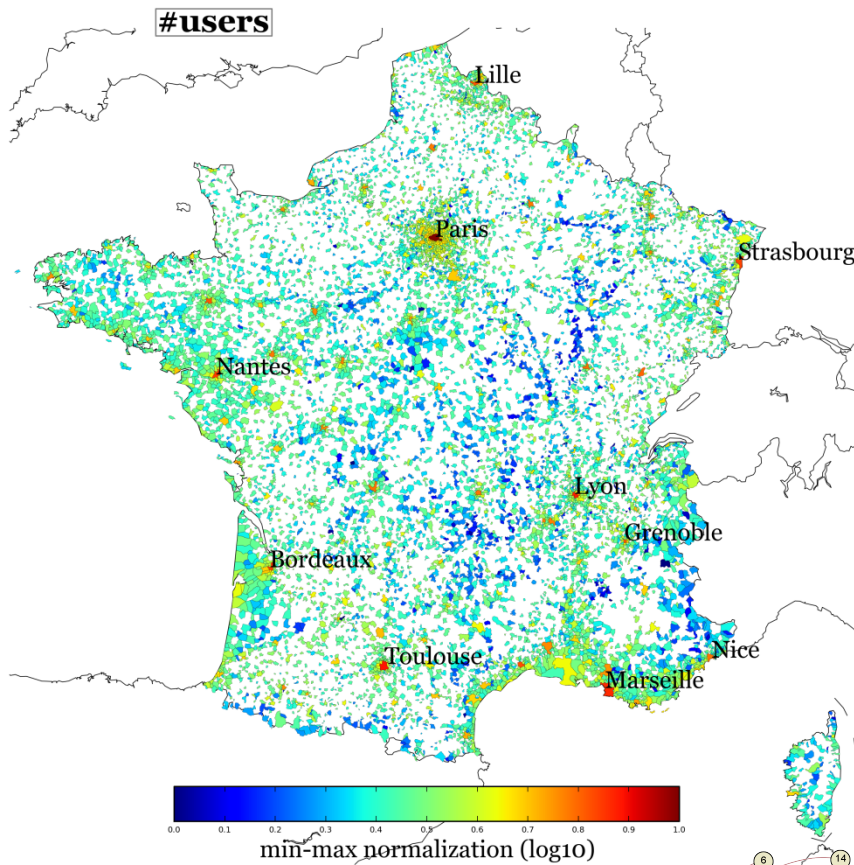
GARR – 16th November 2017



Estimating traffic fluxes on road network with mobile phone data



Estimating Country well-being with mobility Diversity



$$d_i^{(n)} = \sum_{j=1}^{|V|} \frac{1}{k_j} M_{ij} p_j^{(n-1)} \forall i$$

$$p_j^{(n)} = \sum_{i=1}^{|U|} \frac{1}{k_i} M_{ij} d_i^{(n-1)} \forall j$$

Social Sensing

Real-time crisis mapping

TABLE 6. Results of evaluating our system's ability to detect areas damaged by the Emilia earthquake.

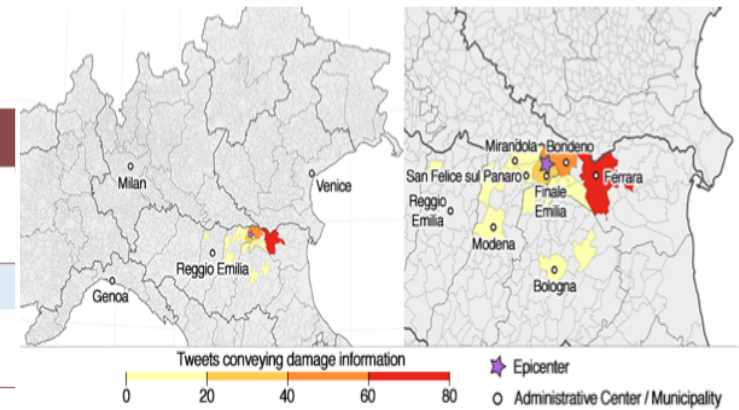
Task	Evaluation metrics					
	Precision	Recall	Specificity	Accuracy	F-measure	MCC*
Detect all damaged areas	0.895	0.202	0.992	0.797	0.330	0.365
Detect areas that suffered significant damage	0.867	0.813	0.992	0.982	0.839	0.830

*MCC: Matthews correlation coefficient

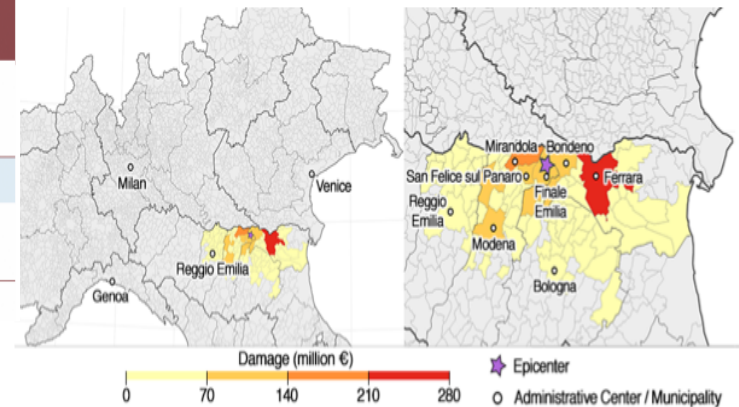
TABLE 7. Results of evaluating our system's ability to detect areas damaged by the Sardegna flood.

Task	Evaluation metrics					
	Precision	Recall	Specificity	Accuracy	F-measure	MCC*
Detection of all damaged areas	0.640	0.410	0.973	0.915	0.500	0.470
Detection of areas that suffered significant damage	0.500	0.643	0.973	0.960	0.563	0.545

*MCC: Matthews correlation coefficient

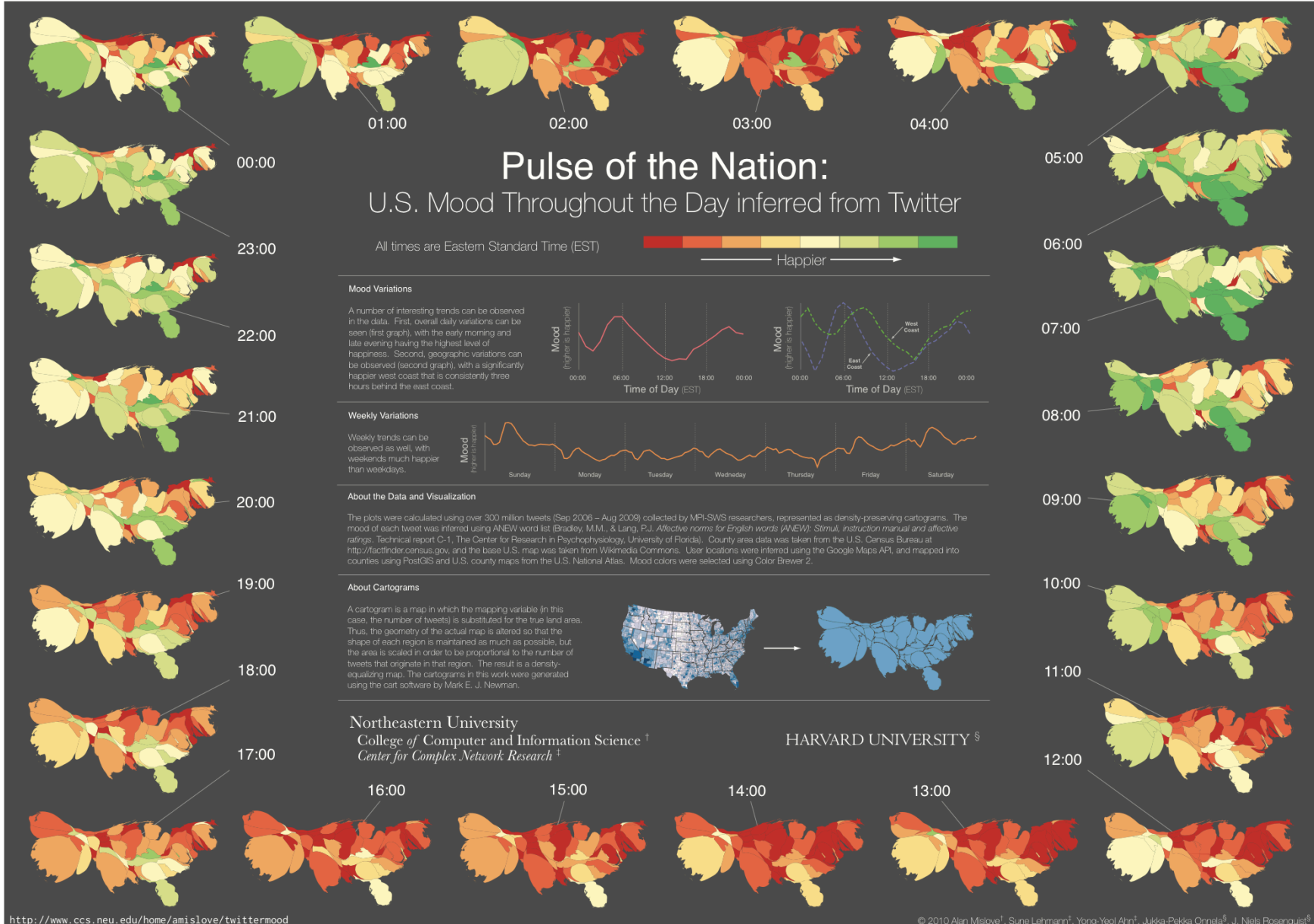


Overview and detail of the crisis map generated by our system.



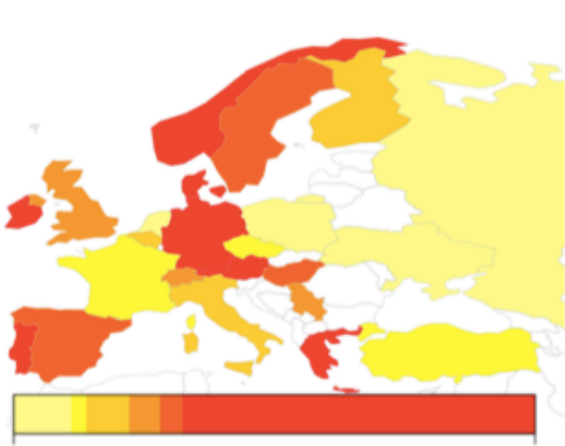
Overview and detail of the authoritative post-event damage assessment map. Authoritative data about the economic losses are provided by Emilia Romagna regional district (<http://www.openricostruzione.it>).

Measuring happiness with twitter data

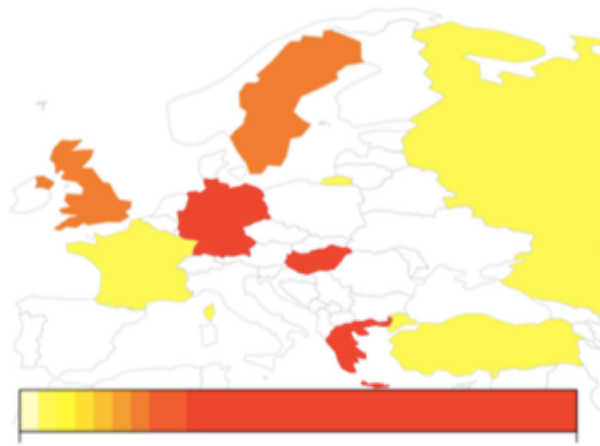


Sentiment Analysis

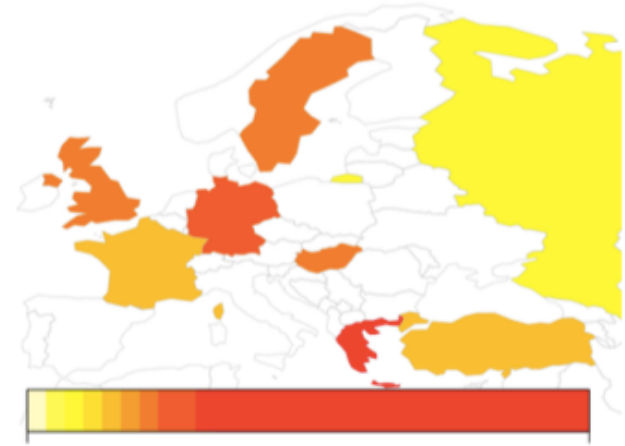
- Internal and external perception by country
 - Index ρ - the ratio between pro refugees users and against refugees users
 - Red means a higher predominance of positive sentiment higher ρ



-
+ (a) Overall.



-
+ (b) Internal perception.



-
+ (c) External perception.

LONGER IN

NHS

IMMIGRATION

HOW BRITAIN TALKED BREXIT

ECONOMY

LAW

SOVEREIGN



3 Million Brexit Tweets Reveal Leave Voters Talked About Immigration More Than Anything Else

Groundbreaking analysis shows immigration, not sovereignty or the NHS, dominated the conversation – and making British judges responsible for British law was a key theme for Leave supporters.



James Ball

BuzzFeed Special
Correspondent



Chris Applegate

Editorial Developer, UK

posted on Dec. 9, 2016, at 2:03 p.m.



https://www.buzzfeed.com/jamesball/3-million-brexit-tweets-reveal-leave-voters-talked-about-imm?utm_term=.jmDQE9JNR#.fuOOrb145



What's special in social mining?

- Any **data science experiment** is composed by:
 - data acquiring (open data, crowdsourcing, crowdsensing,)
 - model building (data mining, machine learning, network science, ...and very complex validation phase),
 - creation of an exploration scenario (what-if analysis) (different validation setting),
-similar to many other data-driven science process,...**but data are produced by humans**



What is needed

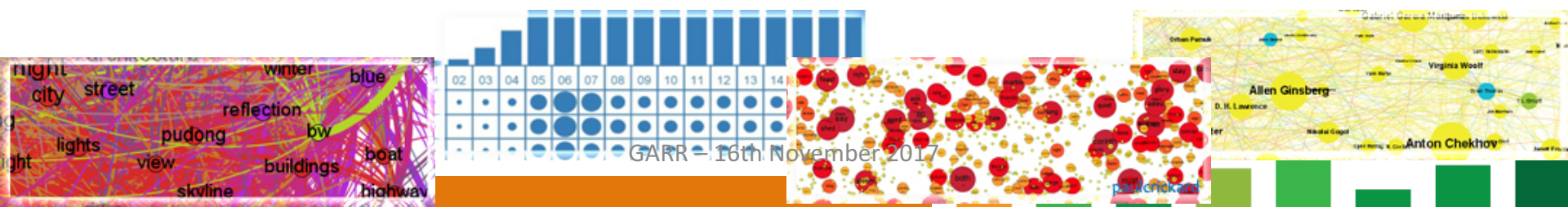
- responsibility and trust
 - **FACT**: Fairness, Accuracy, Confidentiality and Transparency
- harness social mining for scientific advancement and for the social good
 - **FAIR**: Findable, Accessible, Interoperable, Reproducible
- **responsible open data science**



SoBigData GOAL is...



TO CONSTRUCT THE **Multidisciplinary European Infrastructure on Big Data and Social Data Mining (the Social Mining CERN)** providing an integrated ecosystem **for ethic-sensitive scientific discoveries** and advanced applications of social data mining on the various dimensions of social life, as recorded by “big data”.





The pillars for reaching the goal

- **an ever-growing, distributed data ecosystem for procurement, access and curation of big social data, within an ethic-sensitive context, based on**
 - innovative strategies for acquiring social big data for research purposes,
 - using both opportunistic means offered by social sensing technologies and
 - participatory means based on user involvement as prosumers of social data and knowledge.



The pillars for reaching the goal

- **an ever-growing, distributed platform of interoperable, social data mining methods and associated skills:**
 - tools, methodologies and services for mining, analysing, and visualising complex and massive datasets,
 - harnessing the techno-legal barriers to the ethically safe deployment of big data for social mining.



The pillars for reaching the goal

- **Building the Social Mining community of scientific, industrial, and other stakeholders (e.g. policy makers),**



The path to achieve the goals

- **Integrate European national infrastructures and centres of excellence in big data analytics, social mining and data science**
 - 1. Text and Social Media Mining (TSMM)***
 - 2. Social Network Analysis (SNA)***
 - 3. Human Mobility Analytics (HMA)***
 - 4. Web Analytics (WA)***
 - 5. Visual Analytics (VA)***
 - 6. Social Data (SD)***

Integrating national research Infrastructures

GATE⁰¹¹ *general architecture
for text engineering*

LIVINGARCHIVE
Lectives

SoBigData
Euro Lab on Big Data Analytics
& Social Mining



 **TARTU ÜLIKOOL**

 **L3S Research Center**

 **Fraunhofer**



The Consortium



The
University
Of
Sheffield.



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STUDIES
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KING'S
College
LONDON



SCUOLA
NORMALE
SUPERIORE



Aalto University

ETH *Zürich*



TU Delft Delft
University of
Technology



The path to achieve the goals

- **Grant access (both virtual and trans-national on-site) to the SoBigData RI to multi-disciplinary scientists, innovators, public bodies, citizen organizations, SMEs, as well as data science students at any level of education.**
- **joint research, and extensive networking and innovation actions**

Big Data Ecosystem

- Open Data
- Restricted Data
- Virtual Collections

Social Mining

- Text & Social Media Mining
- Social Network Analysis
- Human Mobility Analytics
- Web Analytics
- Visual Analytics
- Social Data

Ethical and Legal Framework



Virtual Access

E-infrastructure



Transnational Access

Open calls
Exploratory projects



Networking

Training
Dissemination
Innovation Accelerator

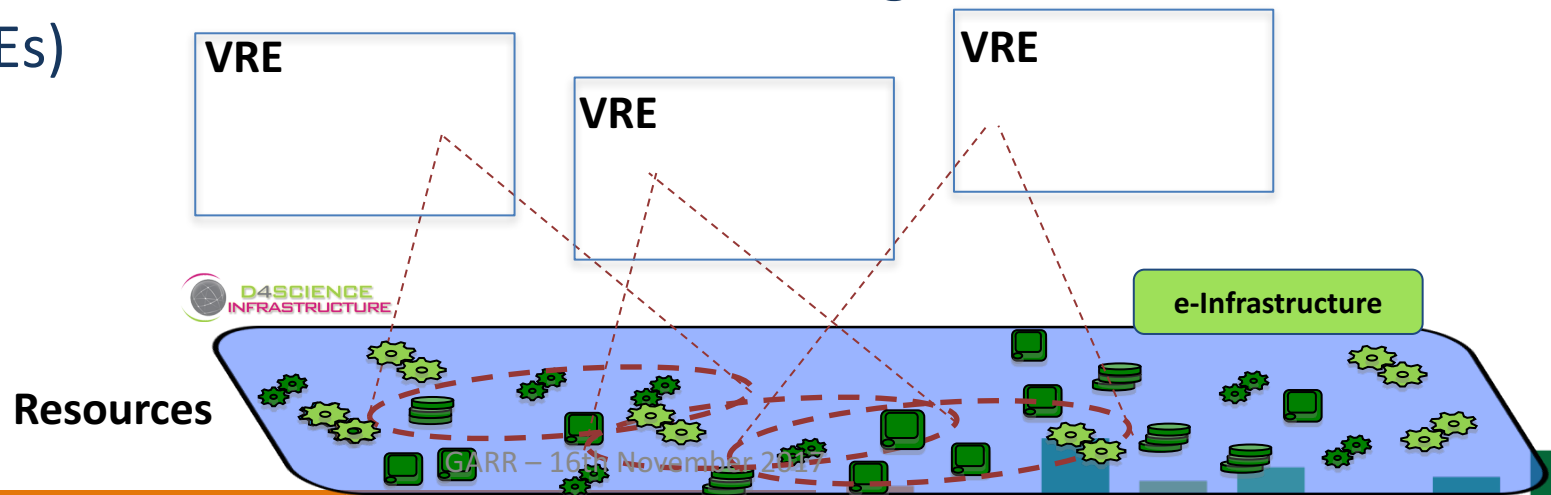


Lines of actions of the RI

- Overcome data and methods fragmentation
- Attract critical mass of users
- Multidisciplinary community Building
- Creating a new generation of DataScientists
- Improve SME competitiveness

SoBigData e-infrastructure

- It is powered by the **D4Science platform**
 - Used as a production system by other communities
 - Users: +3600 (SoBigData is 16.5%, fast growing), Computing: 1500 cores, Storage: 400 TB)
- Supports basic services
 - **Authentication, Authorization, Accounting framework**
 - **Resource Catalogue**
 - **Virtual Research Environments management framework (VREs)**



SoBigData VREs

[Exploratories](#)[Access](#)[Training](#)[Dissemination](#)[Consortium](#)[EU Project](#)[Blog](#)

Virtual Access

[Home » Access](#)

The Virtual Access offers online services for big data and social mining research. A web front-end comprising of a catalogue of SoBigData resources (**data** and **services**) and a set of SoBigData **Virtual Research Environments** (VREs).

VREs are web-based working environments equipped with a number of applications, enabling scientists to have access to the set of data, services, and algorithms needed to perform their investigation in a **collaborative way**.



Go to the **SoBigData LAB** to perform your experiments



Go to VRE **Exploratories** to see the thematic environments of SoBigData



Go to the **Catalogue** to have a list of our methods and datasets



Go to SoBigData **Virtual Research Environments - VREs**

- City of Citizens
- Societal Debates
- Wellbeing
- Migration
- Sport Science

- Tag-me
- Smaph

SoBigData Lab and Catalogue VREs

The screenshot shows the 'DataMiner' interface within the 'City of Citizens' portal. The top navigation bar includes 'City of Citizens', 'Administration', 'Members', 'Catalogue', and 'Story 1: Investigating City Mobility'. The 'DataMiner' section has a 'go back' button and tabs for 'Operators', 'Operator', and 'Computations Execution'. Under 'Operators', there are two modules: 'Stat Val' (statistical validation of BIPARTITE WEIGHTED network) and 'Trajectory Builder' (A module to build trajectories from raw GPS observation using several constraints). The 'Operator' tab is active, showing a 'Tools' section with 'Remove All Operators' and a 'Parameters' section with various input fields for building trajectories from raw GPS observations.

The screenshot shows the 'Carpooling' page in the 'SoBigData Catalogue'. The breadcrumb trail is '/ Organisations / SoBigData Catalogue / Carpooling'. The page has tabs for 'Product', 'Groups', 'Activity Stream', and 'Manage'. It shows 'Followers: 0' and a 'Follow' button. The 'Organisation' section features the SoBigData logo and text: 'SoBigData Catalogue', 'SoBigData is the European Research Infrastructure for Big Data and Social Mining. For more details about the EU Project you can visit the Project Site: <http://www.sobigdata.eu/> read more'. The 'Data and Resources' section lists 'CarPooling' and 'CarPooling - source code', each with an 'Explore' button. A blue arrow points from the 'CarPooling - source code' button to the 'Engine' label.

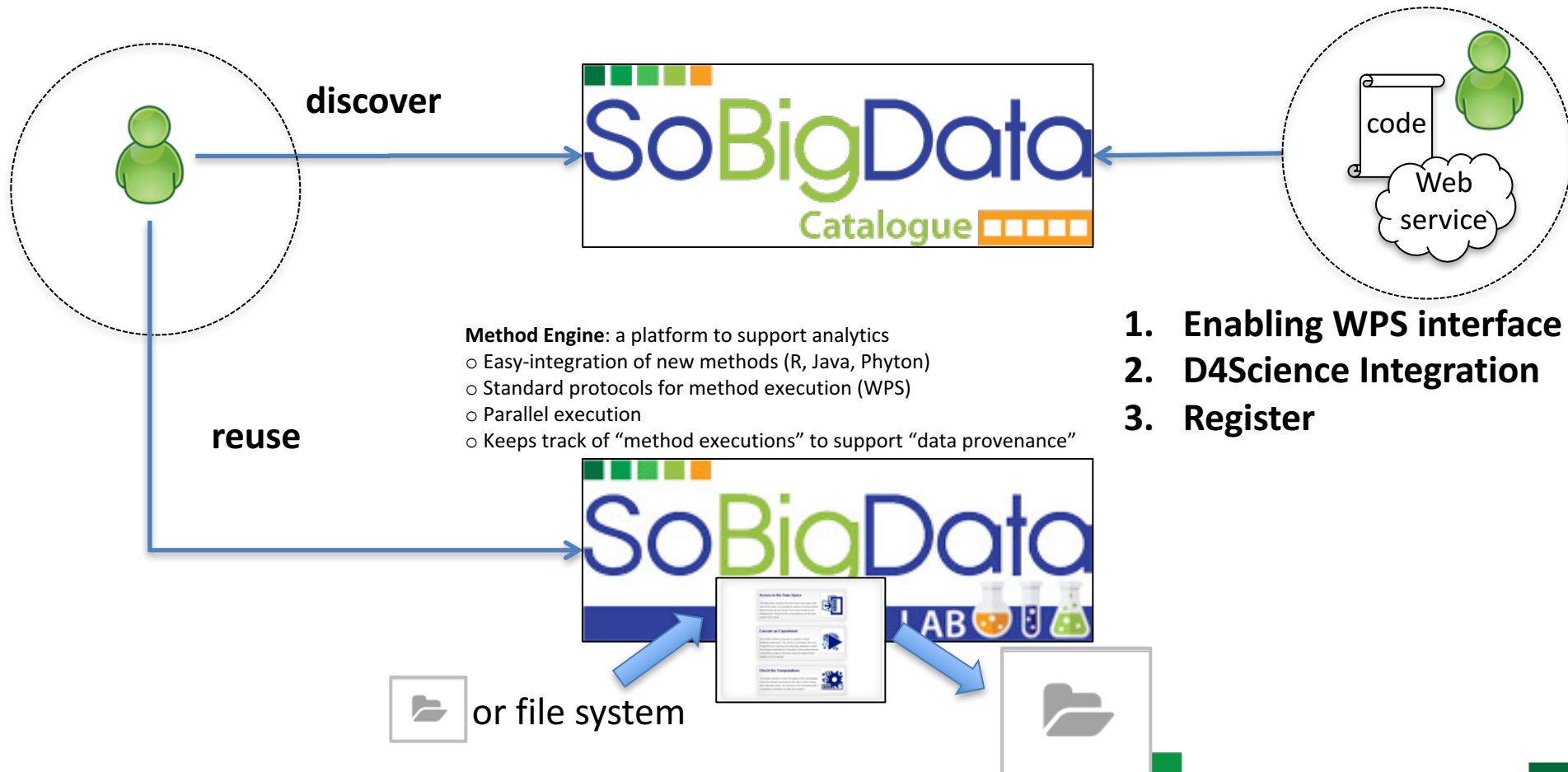
Engine

Methods as Software: patterns of sharing and reuse

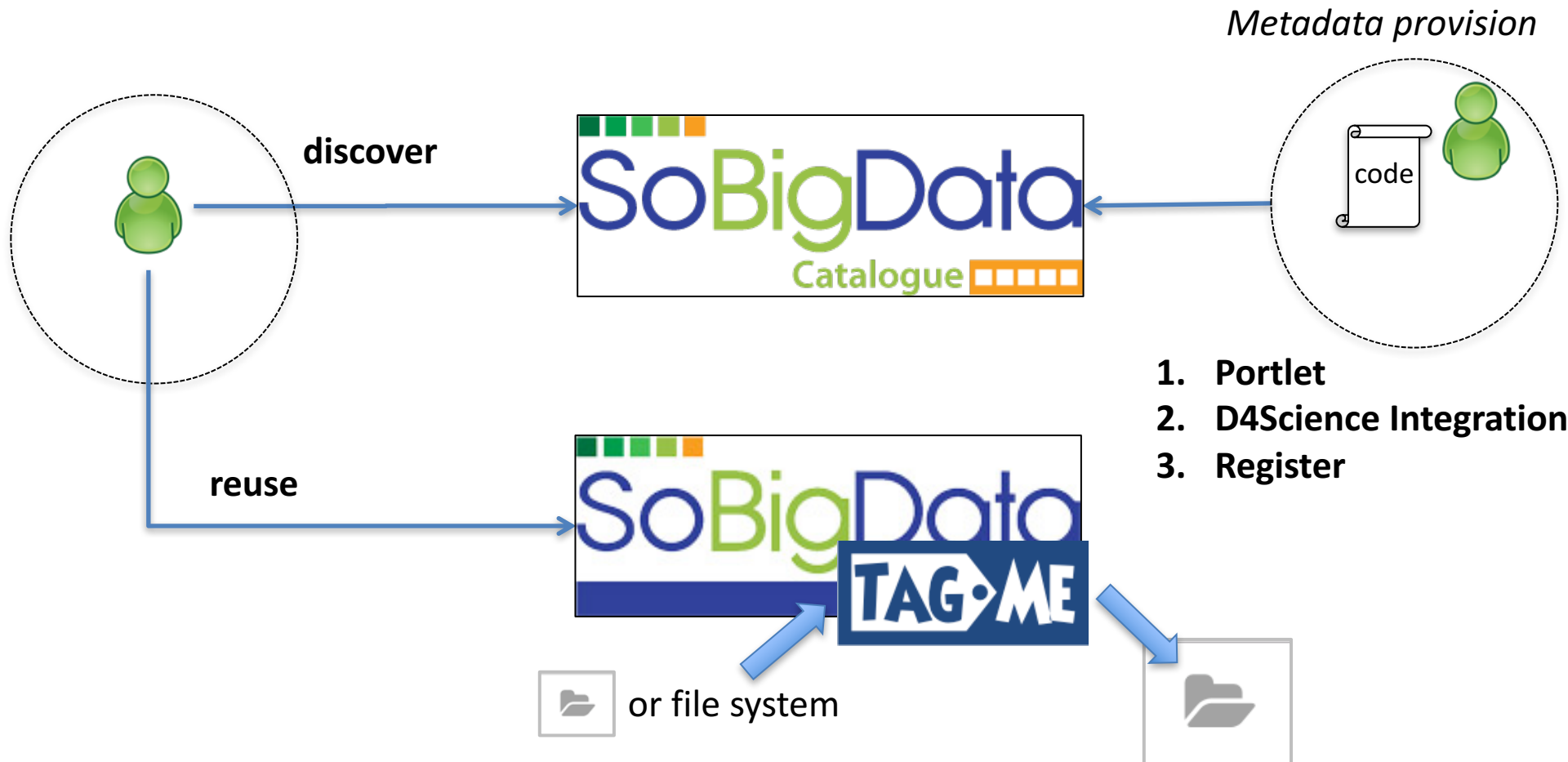


Method as a Service: patterns of sharing and reuse

Metadata provision



Web application: patterns of sharing and reuse



Application VRE

[TagMe](#)[Members](#)[Demo](#)[TagMe API Documentation](#)

TAGME is a powerful tool that is able to identify *on-the-fly* meaningful short-phrases (called "spots") in an unstructured text and link them to a pertinent [Wikipedia page](#) in a fast and effective way. This annotation process has implications which go far beyond the enrichment of the text with explanatory links because it concerns with the *contextualization* and, in some way, the *understanding* of the text.

Try **TAGME** now!

You can play with the demo interface below or check the documentation to the TAGME RESTful API we are currently supporting.

Currently **TAGME** is available in English, German and in Italian and it is based on Wikipedia snapshots of April, 2016.

NEWS! TAGME is now hosted by the D4Science infrastructure. Check the RESTful API page for details.

Developed by [Paolo Ferragina](#) and Ugo Scaiella at [A³ Lab](#)
[Dipartimento di Informatica](#), [University of Pisa](#).

Input Text

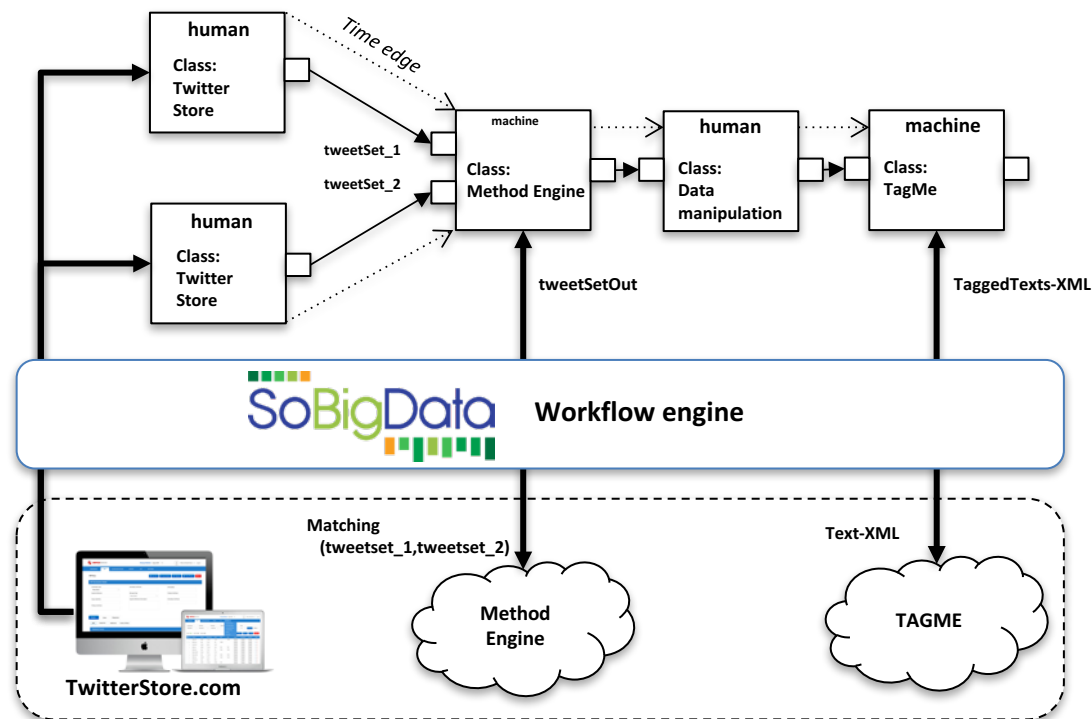
Italiano English Deutsche

On this day 24 years ago Maradona scored his infamous "Hand of God" goal against England

Many links

(Hybrid) Workflow Language

- **Issue:** **repeatability is limited to individual methods as a service**
- **Goals:** Workflow language to model and share scientific processes to enable their repeatability
- **Challenges:** enabling repeatability by modeling combinations of manual and autonomic steps





Exploratories

f t in

SoBigData

Exploratories Access Training Dissemination Consortium EU Project Blog

Economic Performance

Migration Studies

Well-being

Social Network

Human Mobility

City of Citizens

Societal Debates

Political Debates

Personal

Explore

the jungle of big data

go discovering social data in an ethical way

SoBigData

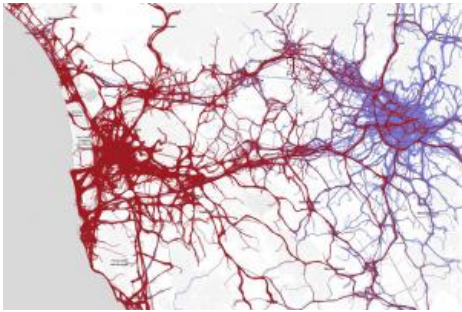
Progress indicator: 1 of 5 dots



Exploratories

Virtual Research Environments tailored
on specific domains where
Social Mining is applied

- Promotes results sharing among scientists and communities
- Promotes the use of RI through Virtual and Transnational Access

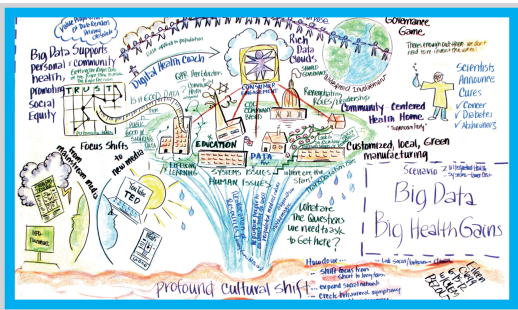
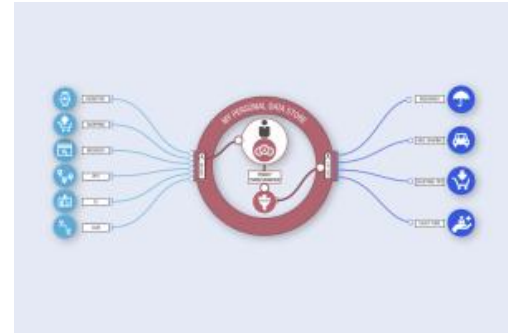


City of Citizens

This exploratory tells stories about cities and people living in it. We describe those territories by means of data, statistics and models.

Well-being & Economic Performance

Can Big Data help us to understand relationships between economy and daily life habits? We use data of purchases in supermarkets and investigate people's behavior.



Societal Debates

We study public debates on social media and newspaper. We can identify themes, following the discussions around them and tracking them through time and space.

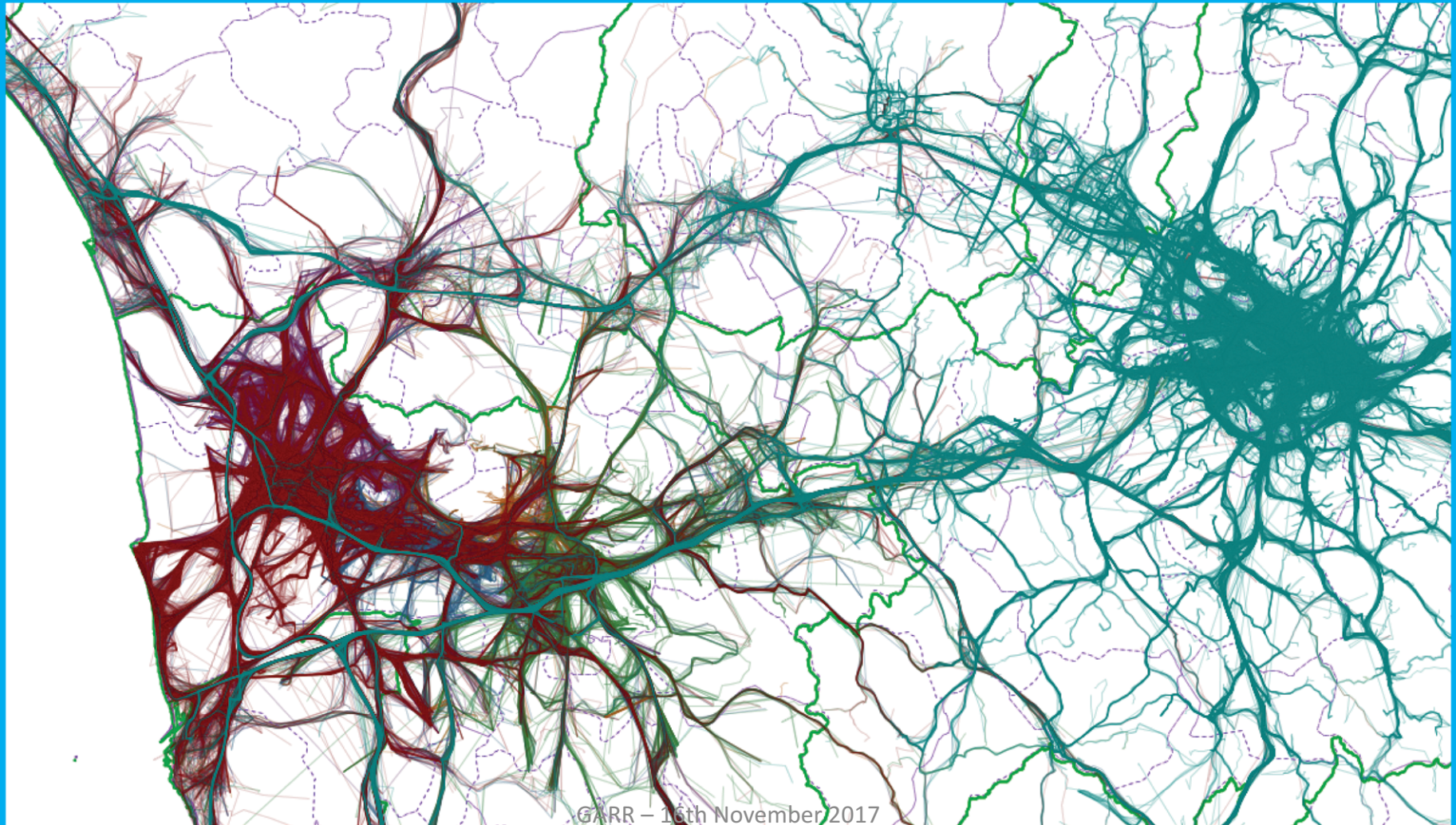
Migration Studies

Could Big Data help to understand the migration phenomenon? We try to answer to some questions about migrations in Europe and in the world.





Exploratory: **Big Data for City of Citizens**

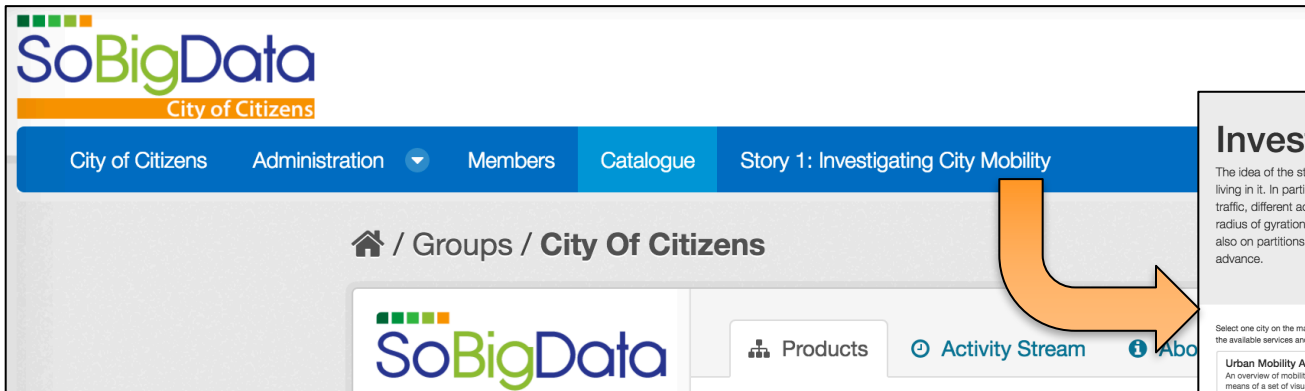


Datasets	Methods & Tools	Workflows	Thematic Clusters	People	Contact
Method		Partner	SoBigData RI - Integration		
Urban Profiles		AALTO	Service hosted, Download		
Urban Mobility Atlas		CNR	Web Service		
Trajectory Builder		CNR	Service hosted, Download		
Borders		CNR			
Sociometer		CNR	Download		
Trip Builder		CNR	Web Page		
Car Pooling		CNR	Service hosted, Download		
MyWay		CNR	Service hosted, Download		
Privacy Risk		CNR	Service hosted, Download		
O/D Matrix		CNR	Web Service		
Mobility Profiles		CNR	Service hosted, Download		
Exploration of Time		FRH	Download		
Statistical Validation		SNS			

Living the story in SoBigData Virtual Research Environment

(only alpha version available - final service will be available in September 2016)

Exploratory VREs



Investigating City Mobility

The idea of the story is to produce a comprehensive set of analyses able to produce an overview of the city and the people living in it. In particular the city will be described by a set of basic and complex statistics such as: Incoming and outgoing traffic, different access points, distribution in space and time of the traffic, systematic vs occasional traffic, distribution of the radius of gyration and distribution of different types of users in the city. Those statistics will be generated on different cities but also on partitions of city area according to the usage of it. A predictive tool will be used to forecast the traffic 20 minute in advance.

Select one city on the map to visualize the available services and applications

Urban Mobility Atlas
An overview of mobility of a city by means of a set of visual indicators

Trip Builder

A tool to generate personalized tours of the city. Useful for the users and city managers who want to build tourist guides according to specific preferences.

Car Pooling

Analyzing Users behaviour allow this tool to produce recommendation for a car pooling service as well as indicating the potential impact of the service in a city

Carpooling Network Analysis

Analyzing carpooling network it is possible to discover the existence of drivers/passengers micro-communities

Mobility Profiles

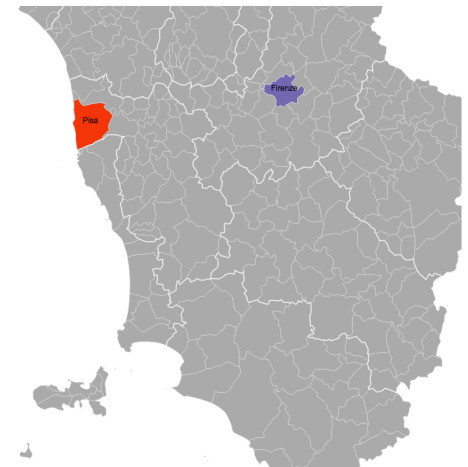
Understanding the systematic behavior of the user is the key to enable proactive services and analyze the traffic of a city using a new perspective.

Exploration of time use

A tool to estimate the direct significant personal places and identify them as home, work or place of social activities based on temporal patterns of a person's presence in these places.

Trajectory Prediction

Predicting the near future of a user mobility to several services and tool use the micro-mobility concept to create a collaborative environment for mobility



The frontal page shows the workflows, the tools and examples on how to use them in real cases. Each tool is also connected to the catalogue in order to let the user download or access to it.

Home / Organisations / SoBigData Catalogue / MyWay - Trajectory Prediction

MyWay - Trajectory Prediction

Product Groups Activity Stream

Followers 0

Organisation

SoBigData Catalogue

SoBigData is the European Research Infrastructure for Big Data and Social Mining. For more details about the EU Project you can visit the Project Site: <http://www.scbigdata.eu/read more>

SoBigData Catalogue

Additional Info

Field	Value
Author	Trasarti Roberto
Maintainer	Trasarti Roberto
Version	1
Last Updated	6 dicembre 2016, 14:53 (UTC+01:00)
Created	16 novembre 2016, 10:12 (UTC+01:00)
Accessibility	Both
AccessibilityMode	Download
Basic rights	Download
CreationDate	2016-11-01
Creator	Trasarti, Roberto, roberto.trasarti@isti.cnr.it
Field/Scope of use	Non-commercial research only
Owner	Trasarti, Roberto, roberto.trasarti@isti.cnr.it

Trajectory Prediction - Methodology and Application on Pisa users

Mobility Profiles as basic concept

MyWay, a prediction system which exploits the individual systematic behavior modeled by mobility profiles to predict human movements. The idea behind MyWay is the possibility for each user to use its own mobility profile to predict his movements, and in case it is not enough accesses to the collective knowledge. This additional source of information is compared by the mobility profiles of other users allowing their only their models instead of raw trajectory data revealing their detailed movement. In the figure we can see a set of mobility profiles of different users (each one is represented by a different color).

The resulting three predictors are shown above, for each predictor a different color is used: individual history, the individual profile and the individual predictor (red) are inside the user PMDS, while the collective predictor (blue) is outside and therefore handled by a third party that orchestrates the users' information as well as the hybrid predictor (green). The third party, usually called coordinator, has the responsibility of the storage and management of the users' profiles. In the case of the hybrid predictor, the coordinator stores all the mobility profiles of the users (which are compressed and encrypted) and receives the query for the predictor only in the case of a specific user fails. The hybrid strategy results in a more efficient and accurate predictor of a specific user fails.

Predicting trajectories

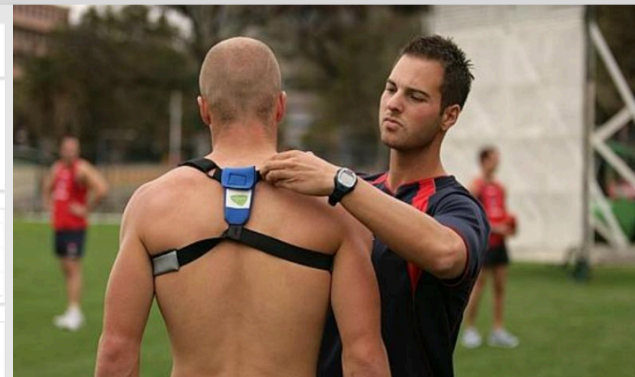
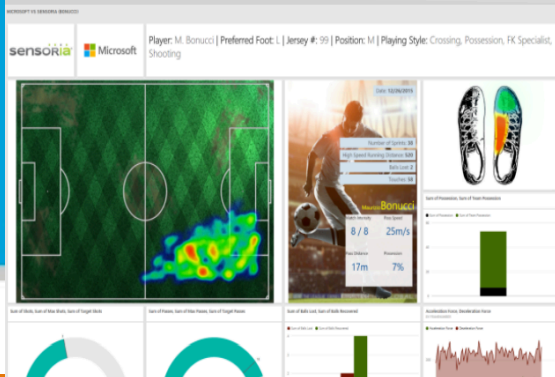
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Big Data for Sport Science



SoBigData

Data Science for sports analytics



Ethics and trust



Legal and Ethical framework

Define and implement the legal and ethical framework of the SoBigData RI, in accordance with the European and national legislations

Monitor of research


Monitor the compliance of experiments and research protocols with the framework

Privacy-by-design

The development of big data analytics and social mining tools with value-Sensitive Design and privacy-by-design methodologies




The ethics of SoBigData

- Gathering large quantities of data may have serious consequences:
 - consequences range from personal harm,
 - to issues of autonomy, injustice and inequality.
 - SoBigData adheres to a *value-sensitive design* approach:
 - design solutions to overcome ethical dilemma's, in this case those between **the utility of the data gathered vs. the protection of the individuals subject to the research.**
- 

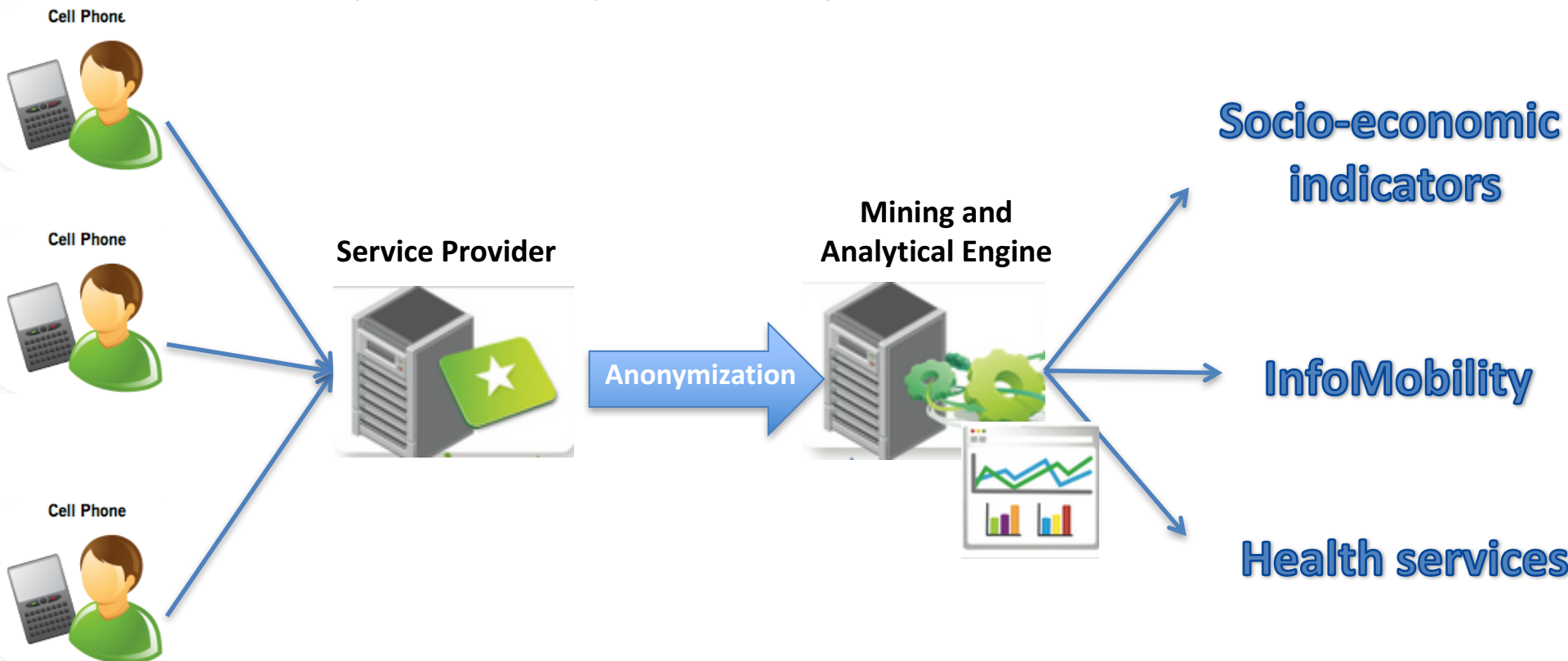


The ethics of SoBigData

- How do we create an infrastructure in which such methods can be disseminated and improved upon?
 - Data Management Plan plays a key role:
 - Each data has its privacy requirements and fact checks and responsibility
 - Anonymization techniques are part of the research
 - Researchers will be trained in applying the necessary procedural safeguards
- 

Privacy-by-design in big data analytics and social mining


Anna Monreale^{1,2*}, Salvatore Rinzivillo², Francesca Pratesi^{1,2}, Fosca Giannotti² and Dino Pedreschi¹





Educating the responsible data scientists

Based on a cooperation between ethicists and computer

1. A **M**assive **O**nline **O**pen **C**ourse (MOOC) which instructs all prospective researchers about the legal and ethical dangers of big data research and the steps they can take to minimise these;
 2. A set of workflows that outline the steps researchers can take when designing their approach;
 3. Information pop-ups which redirect researchers to state-of-the-art ethical methods.
- 



SoBigData.eu Members Activity Tracker Wiki Twitter Monitor Stat. Algorithm Importer

Statistics

Your Stats in SoBigData.eu



ACTIVITY

GOT

👤 0 🍌 0 💬 0 🍌 0 💬 0

Top Topics

#wp2
#review

Recent Documents

- 📄 Invitation to a Project Rev...
- 📄 main.pdf
- 📄 icwsm_main.pdf
- 📄 icdm_main.pdf
- 📄 WP9 NDLib.pptx

Show all ...

Authorisation Options

Personal Token

About Personal Token

The personal token has to be used for any programmatic interaction with the services you perform to satisfy your needs.

Ethical Big Data Research

At SoBigData, we aim to promote *ethical big data research*. Big data research is ethical when it attempts to maximise the societal benefits of research, while minimising the harms.

This means:

- being clear about the research **purpose**,
- gaining data subjects' **consent**,
- being **transparent** about how data is being processed
- **minimising** potentially sensitive personal data.

We strive to create an environment in which researchers develop, share and improve methodologies for ethical big data research. Our research infrastructure partners you with researchers dealing with the same problems and allows you to share methodologies compliant with legal requirements.

View supplementary
material



About



SoBigData proposes to create the Social Mining & Big Data Ecosystem: a research infrastructure (RI) providing an integrated ecosystem for ethic-sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life, as recorded by 'big data'. Building on several established national infrastructures, SoBigData will open ...

[See more](#)

[Other options ...](#)

VRE Managers and Groups

[View Managers](#)

Groups in this VRE:

[Production-Support](#)

Invite Members

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Report an issue



Statistics

Your Stats in SoBigData.eu



ACTIVITY GOT
0 0 0 0 0 0

Top Topics

#wp2
#review

Recent Documents

- Invitation to a Project Rev...
- main.pdf
- icwsm_main.pdf
- icdm_main.pdf
- WP9 NDLib.pptx

Show all ...

Authorisation Options

Personal Token

About Personal Token

The personal token has to be used for any programmatic interaction with the services you perform to satisfy your needs.

Data Protection Law in the EU

At present, the centerpiece of the European data protection legislation is the Data Protection Directive (DPD) and implementing national laws. From 25 May 2018 a new legal instrument - the General Data Protection Regulation (**GDPR**) – will be directly applicable in all Member States.

[View 95/46/EC Dir.](#)

[View GDPR](#)

Personal data are “any information relating to an identified or identifiable natural person ('data subject') [...]” (GDPR - Article 4(1))

Sensitive data are [...]



About



SoBigData proposes to create the Social Mining & Big Data Ecosystem: a research infrastructure (RI) providing an integrated ecosystem for ethic-sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life, as recorded by 'big data'. Building on several established national infrastructures, SoBigData will open ...

[See more](#)

[Other options ...](#)

VRE Managers and Groups

[View Managers](#)

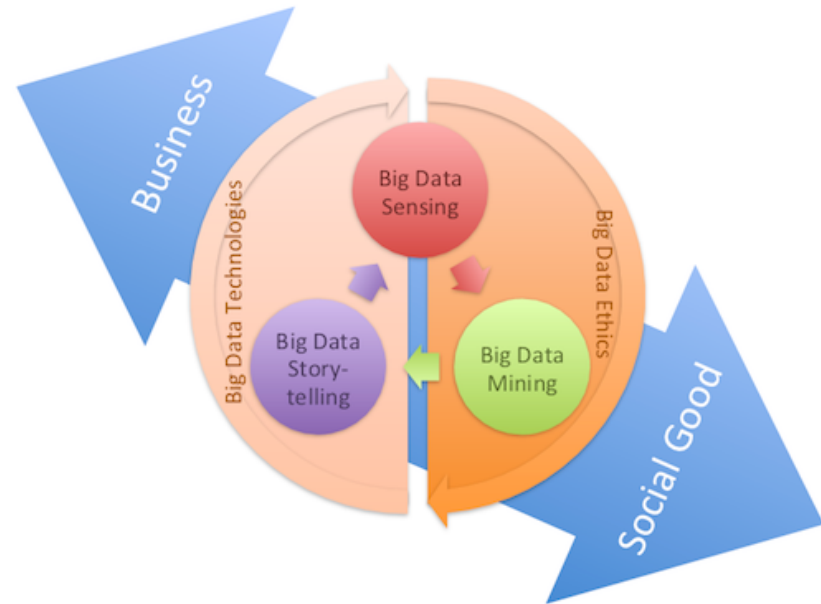
Groups in this VRE:

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Creating a new generation of data scientists



10 events and 537
trainees



Datathons

- Zurich and Delft : young startupperes (40 participants)
- London: journalists
- Tartu: social scientist (220 participants)
- Pisa: High School students
 - II level Master Bigdata Analytics (4th edition)
 - Master degree in data science (since 2004)
- Summer School
- Phd programme in Data Science in Pisa

Tuscan Big Data Challenge

1° october | 15 november 2016



SoBigData
Euro Lab on Big Data Analytics
& Social Mining

An initiative devoted to **Tuscan** enterprises interested in exploring the potential of **big data** in improving the production processes, their market or their interaction with customers and suppliers.

The Tuscan Data Challenge gives opportunity to all the Tuscan companies, that usually do not use their **data**, to enter the world of Big Data and exploit its potential.

Who is Involved



Tuscan Big Data Challenge 2016

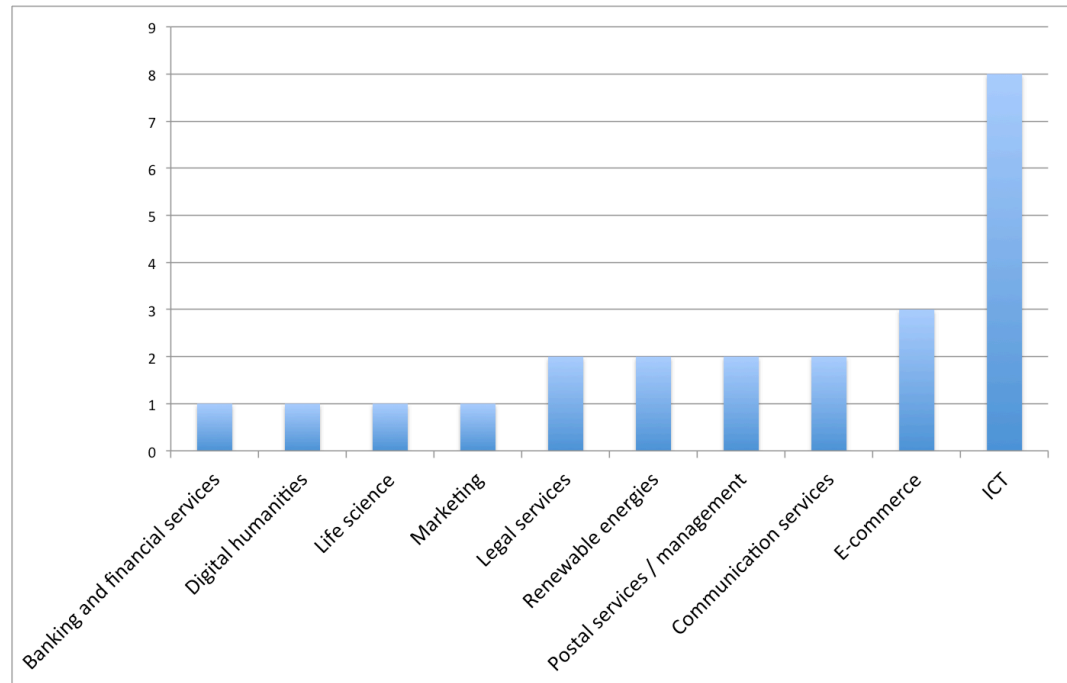
Results in Short

Participants: 23 Tuscan SMEs

Selected: 9

Type:

- Legal services
- Banking and financial services
- E-commerce
- ICT
- Renewable energies
- Postal services
- Digital humanities
- Life science
- Communication services
- Marketing





SoBigData TRANSNATIONAL ACCESS

Transnational Access supports **short term scientific mission** (between 2 weeks and 2 months) of researchers or teams at one of the installations of SoBigData that will provide **big data computing platforms, big social data resources**, and cutting-edge **computational methods**:

- Interact with the local experts, discuss research questions
Run experiments on non-public datasets and algorithms
Present results at workshops/seminars
- **to enable** multi-disciplinary social mining experiments with the Research Infrastructure **assets: big data sets, analytical tools, services and skills.**

Site: <http://www.sobigdata.eu/access/transnational>

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L3S - Thomas Risse <risse@L3S.de>

AALTO UNIVERSITY - Michael Mathioudakis <michael.mathioudakis@aalto.fi>

Nervousnet - Iza Moise <izabela.moise@gess.ethz.ch>



Installations

SoBigData
Euro Lab on Big Data Analytics
& Social Mining

GATE 2012
general architecture
for text engineering

Fraunhofer
IGD

L3S Research Center

A!
Aalto University



nervousnet

KEY DATES

Theme-driven exploratory calls:

Publish Call for Proposals: **mid October 2017**

Proposal Submission deadline: **mid November 2017**

Applicant Notification: **December 2017**

Visits period: **January – June 2018**



www.sobigdata.eu



SoBigData



SoBigData



SoBigData.eu receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 654024

GAIR - 10th November 2017



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- **Share and make findable your data science results**
- **Become part of the scientific network**
- **<http://www.sobigdata.eu/join-us>**