MVŠO

MORAVSKÁ VYSOKÁ ŠKOLA OLOMOUC

Introduction & Information

Vít PÁSZTO

3.3.2022

Introduction

- Historical city (UNESCO)
- 100,000 inhabitants (+23,000 students)

- MVSO:
  - Regional college/university
  - One and only economic school in the region
  - Approx. 400 students
  - Closely connected with business enterprises/companies

Introduction

- New complex („smart building“)

My background

- PhD at Palacký University in Olomouc
- Member of MVSO since 2013
- Field of study – **geoinformatics**
- **Scientific interests**
  - **Geocomputation** (Fuzzy sets and logic in spatial analyses, Entropy measurement of geographical phemomena, Fractal geometry application in geoinformatics, Shape metrics in spatial analyses)
  - **Physical and human geography**
  - **Economic geography (Spationomy)**
  - **Gamification/serious learning**

Geoinformatics

- Science studying spatial information and geo-related issues
- „Geography in computer“
- GIS, Remote Sensing, GNSS, Cartography, Spatial statistics etc.
- Application in many fields, including economy (Insurance, Geomarketing, Location Based Services, BIS, Facility mgmt., Customer analyses…)

MVSO

- Informatics for Economists
- Computer Networks
- Advanced Visualisation of (economic) data
- Data transmission // HTML and web resources

YOU

Course schedule & organization

1. Every week
   - Thursday – 13:15-14:45 (ACN)
     - but…

Course programme
(Computer Networks)

1. Introduction to computer networks
2. Network topology and classification, network architectures
3. ISO/OSI reference model
4. Physical layer
5. Data linking layer
6. Network layer
7. TCP/IP. IP protocol. IP addresses. Routing in the internet. Protocols TCP and UDP. The DHCP service
8. Computer network nodes and communication media

Requirements/Exam

- Attendandce
- Active approach
- Homeworks

- Theoretical test

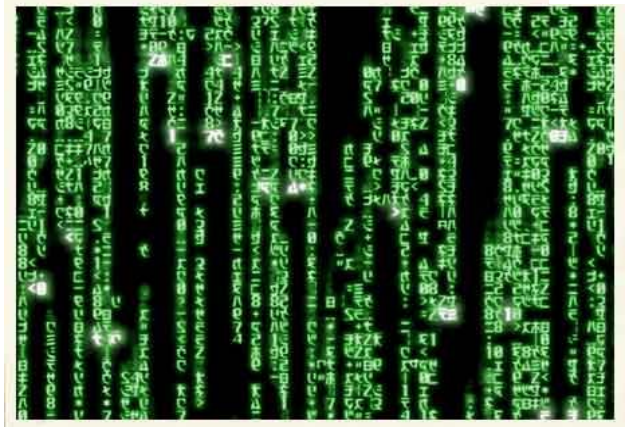
Literature

- TANENBAUM, A. S. - WETHERALL, D. J. *Computer Networks. 5.vyd.*. Prentice Hall, 2010. ISBN 978-0132126953.
- LOWE, D. *Networking All-in-One For Dummies, 5.vyd*. John Wiley & Sons, 2012. ISBN 1118380983.
- Miller J. B. *Internet Technologies and Information Services (Library and Information Science Text Series)*. LIbraries Unlimited Inc., 2014.
- Jacobson D., Woods D., Brail G. *APIs: A Strategy Guide.*. O'Reilly Media, 2011. ISBN 1449308929.
- Sosinski B. *Cloud Computing Bible*. John Wiley & Sons, 2011. ISBN 0470903562.
- Peterson M. P. *Mapping in the Cloud*. The Guilford Press, 2014. ISBN 1462510418.

- And lot more + internet

Computer configuration

What drives/controls the World?



What drives/control the World?

Information is not data

Information

- information is not data

2 694 737	399 571	25 255	15 216	241	1 749 865	34 290	229 235
540 360	170 707	12 483	6 039	81	272 613	673	33 877
314 688	31 368	1 457	987	21	223 152	4 806	24 968
159 363	14 869	763	655	8	107 282	3 797	16 073
141 202	14 707	705	442	6	93 677	2 520	13 814
76 802	9 275	292	138	6	51 096	570	6 380
172 030	17 883	890	478	23	117 892	2 011	15 828
114 472	10 856	487	395	12	82 647	1 357	9 363
133 970	12 329	763	535	15	93 320	2 454	12 302
115 116	10 430	617	423	5	78 892	1 888	11 585
107 395	8 019	452	489	2	73 148	3 508	10 635

```
0000000 0000 0001 0001 1010 0010 0001 0004 0128
0000010 0000 0016 0000 0028 0000 0010 0000 0020
0000020 0000 0001 0004 0000 0000 0000 0000 0000
0000030 0000 0000 0000 0010 0000 0000 0000 0204
0000040 0004 8384 0084 c7c8 00c8 4748 0048 e8e9
0000050 00e9 6a69 0069 a8a9 00a9 2828 0028 fdfc
0000060 00fc 1819 0019 9898 0098 d9d8 00d8 5857
0000070 0057 7b7a 007a bab9 00b9 3a3c 003c 8888
0000080 8888 8888 8888 8888 288e be88 8888 8888
0000090 3b83 5788 8888 8888 7667 778e 8828 8888
00000a0 d61f 7abd 8818 8888 467c 585f 8814 8188
00000b0 8b06 e8f7 88aa 8388 8b3b 88f3 88bd e988
00000c0 8a18 880c e841 c988 b328 6871 688e 958b
00000d0 a948 5862 5884 7e81 3788 1ab4 5a84 3eec
00000e0 3d86 dcb8 5cbb 8888 8888 8888 8888 8888
00000f0 8888 8888 8888 8888 8888 8888 8888 0000
0000100 0000 0000 0000 0000 0000 0000 0000 0000
*
0000130 0000 0000 0000 0000 0000 0000 0000
000013e
```

50.069387
14.448793

Information

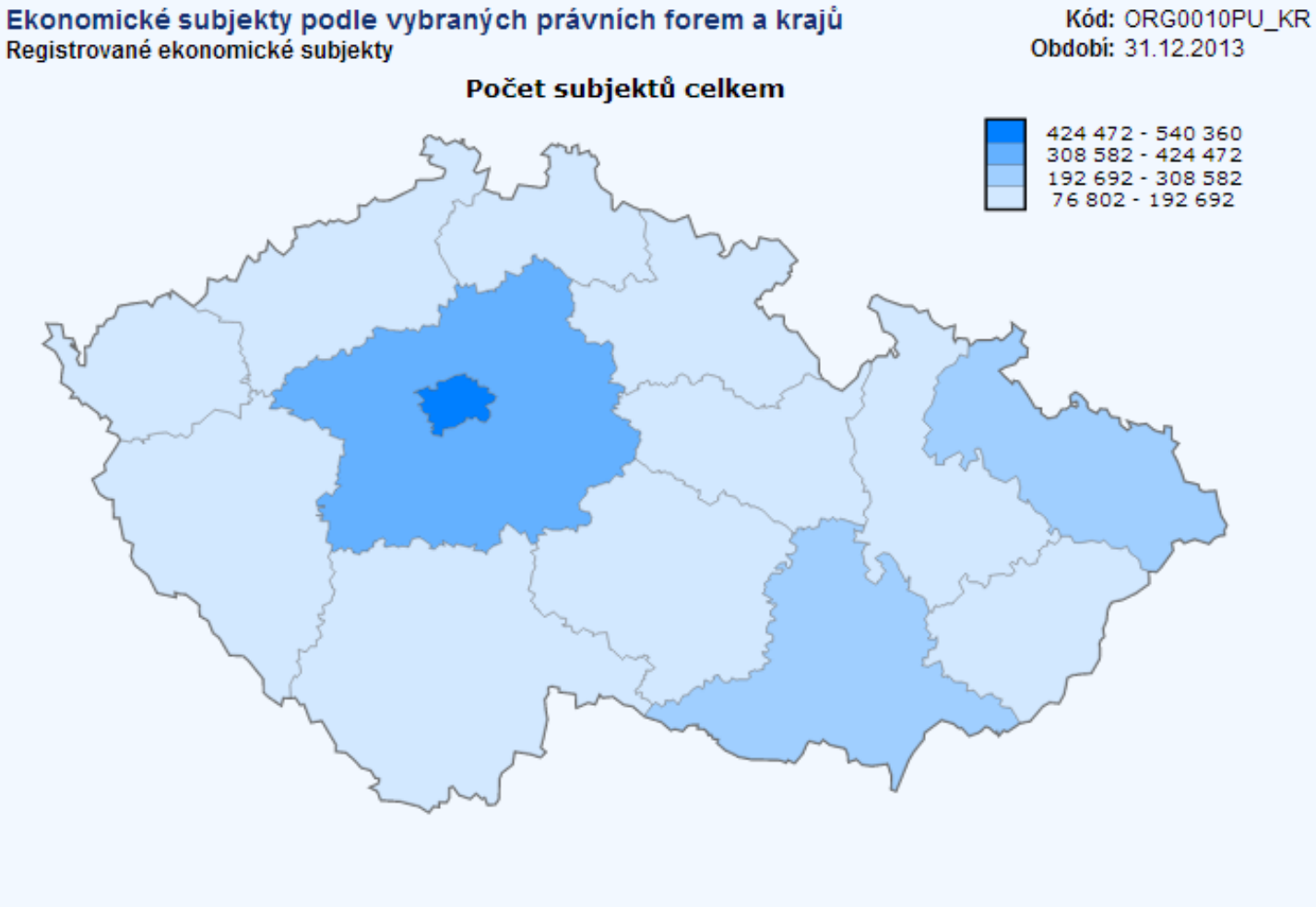
- information is not data

2 694 737	399 571	25 255	15 216	241	1 749 865	34 290	229 235
540 360	170 707	12 483	6 039	81	272 613	673	33 877
314 688	31 368	1 457	987	21	223 152	4 806	24 968
159 363	14 869	763	655	8	107 282	3 797	16 073
141 202	14 707	705	442	6	93 677	2 520	13 814
76 802	9 275	292	138	6	51 096	570	6 380
172 030	17 883	890	478	23	117 892	2 011	15 828
114 472	10 856	487	395	12	82 647	1 357	9 363
133 970	12 329	763	535	15	93 320	2 454	12 302
115 116	10 430	617	423	5	78 892	1 888	11 585
107 395	8 019	452	489	2	73 148	3 508	10 635
295 523	45 308	2 837	2 056	32	189 938	4 426	25 778
137 119	12 524	781	596	6	95 682	1 963	12 922
138 197	14 049	738	287	10	97 535	1 909	12 647
248 500	27 247	1 990	1 696	14	172 991	2 408	23 063

Information

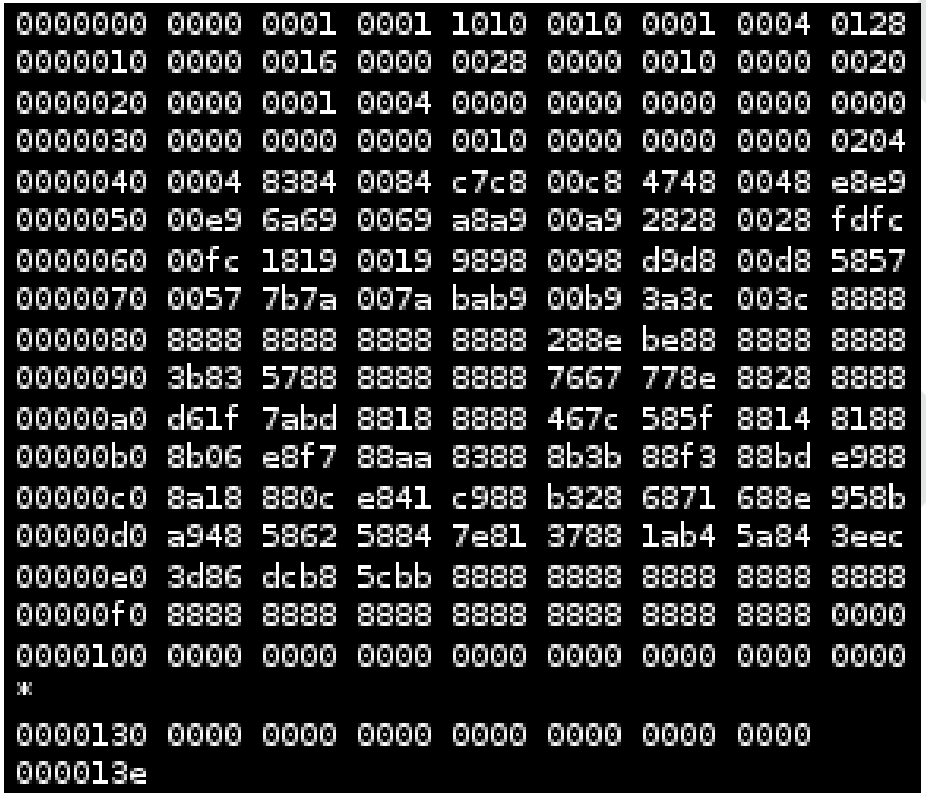
Registrované ekonomické subjekty							Období 31.12.2013	
	Počet subjektů celkem	Obchodní společnosti		Družstva	Státní podniky	Fyzické osoby		
		celkem	z toho akciové společnosti			soukromí podnikatelé podnikající dle živnostenského zákona	zemědělští podnikatelé	soukromí podnikatelé podnikající dle jiných zákonů než živnostenského
Česká republika	2 694 737	399 571	25 255	15 216	241	1 749 865	34 290	229 235
Hlavní město Praha	540 360	170 707	12 483	6 039	81	272 613	673	33 877
Středočeský kraj	314 688	31 368	1 457	987	21	223 152	4 806	24 968
Jihočeský kraj	159 363	14 869	763	655	8	107 282	3 797	16 073
Plzeňský kraj	141 202	14 707	705	442	6	93 677	2 520	13 814
Karlovarský kraj	76 802	9 275	292	138	6	51 096	570	6 380
Ústecký kraj	172 030	17 883	890	478	23	117 892	2 011	15 828
Liberecký kraj	114 472	10 856	487	395	12	82 647	1 357	9 363
Královéhradecký kraj	133 970	12 329	763	535	15	93 320	2 454	12 302
Pardubický kraj	115 116	10 430	617	423	5	78 892	1 888	11 585
Kraj Vysočina	107 395	8 019	452	489	2	73 148	3 508	10 635
Jihomoravský kraj	295 523	45 308	2 837	2 056	32	189 938	4 426	25 778
Olomoucký kraj	137 119	12 524	781	596	6	95 682	1 963	12 922
Zlínský kraj	138 197	14 049	738	287	10	97 535	1 909	12 647
Moravskoslezský kraj	248 500	27 247	1 990	1 696	14	172 991	2 408	23 063

Information



Information

- information is not data



```
0000000 0000 0001 0001 1010 0010 0001 0004 0128
0000010 0000 0016 0000 0028 0000 0010 0000 0020
0000020 0000 0001 0004 0000 0000 0000 0000 0000
0000030 0000 0000 0000 0010 0000 0000 0000 0204
0000040 0004 8384 0084 c7c8 00c8 4748 0048 e8e9
0000050 00e9 6a69 0069 a8a9 00a9 2828 0028 fdfc
0000060 00fc 1819 0019 9898 0098 d9d8 00d8 5857
0000070 0057 7b7a 007a bab9 00b9 3a3c 003c 8888
0000080 8888 8888 8888 8888 288e be88 8888 8888
0000090 3b83 5788 8888 8888 7667 778e 8828 8888
00000a0 d61f 7abd 8818 8888 467c 585f 8814 8188
00000b0 8b06 e8f7 88aa 8388 8b3b 88f3 88bd e988
00000c0 8a18 880c e841 c988 b328 6871 688e 958b
00000d0 a948 5862 5884 7e81 3788 1ab4 5a84 3eec
00000e0 3d86 dcb8 5cbb 8888 8888 8888 8888 8888
00000f0 8888 8888 8888 8888 8888 8888 8888 0000
0000100 0000 0000 0000 0000 0000 0000 0000 0000
*
0000130 0000 0000 0000 0000 0000 0000 0000
000013e
```

Information is not data

50.069387 & 14.448793

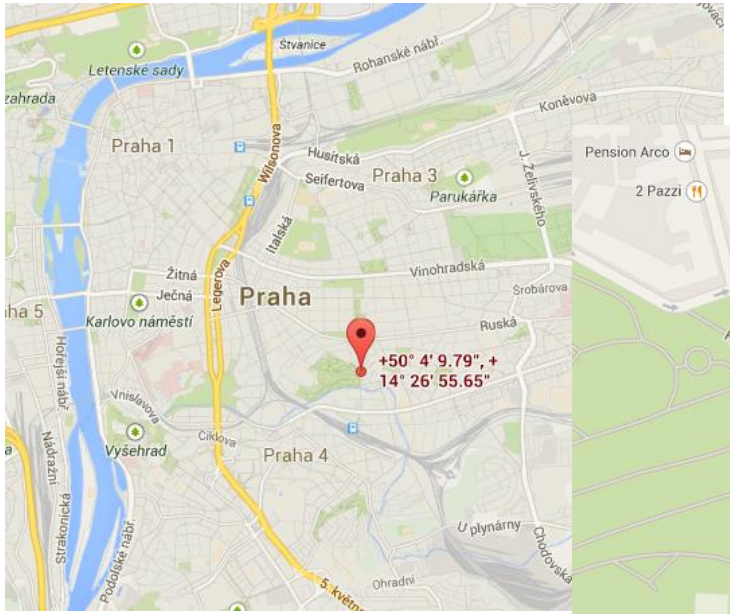
Information is not data

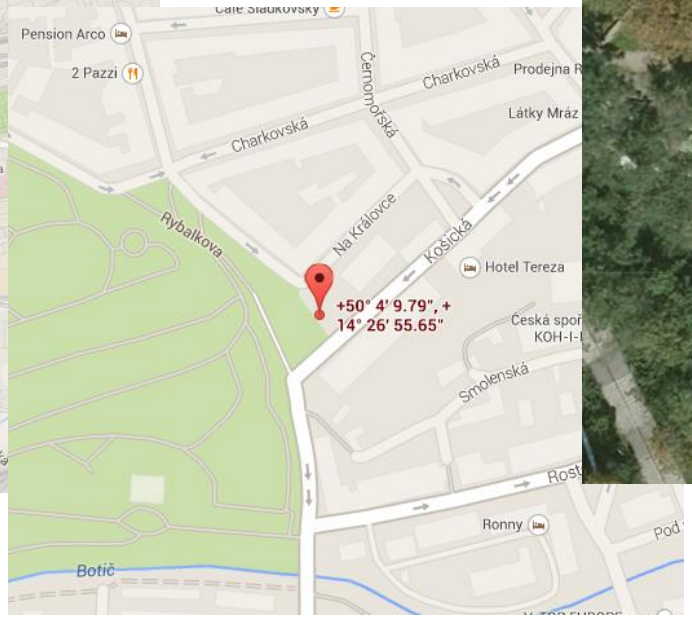
50.069387 & 14.448793

- Before party...part II. #getting #ready #sekt #strawberries #bubbles #food #mask #up #NYE #2013…
- Tue Dec 31 20:18:28 +0000 2013
- I´m Maria. I live in Prague. I like playing guitar, singing, reading, traveling, writing stories, going to concerts, music♥ ATL, P!ATD, SP, MT, YMA6...!
- 302/119 (Následuje/Následována)
- **50.069387x14.448793**

Information is not data

50.069387 & 14.448793





Data, Information, Knowledge, Wisdom

Data, Information, Knowledge, Wisdom

Data // Information // Knowledge // Wisdom

- Data
  - Objective datum/figure about existing phenomenon – numbers, text, symbols…
  - Acquired by measurement, experiment, observation, survey
  - Is a representative tool of facts with one-way and unique importance/meaning
  - We try to interpret data

Data // **Information** // Knowledge // Wisdom

- Information
  - Informatio/informare – to put ideas into a form
  - Materialisation of ideas to:
    - Inform, communicate and transfer „message“
  - Data with meaning based on user‘s:
    - Knowledge, experiences, cognisance, and skills
  - We try to synthesise information

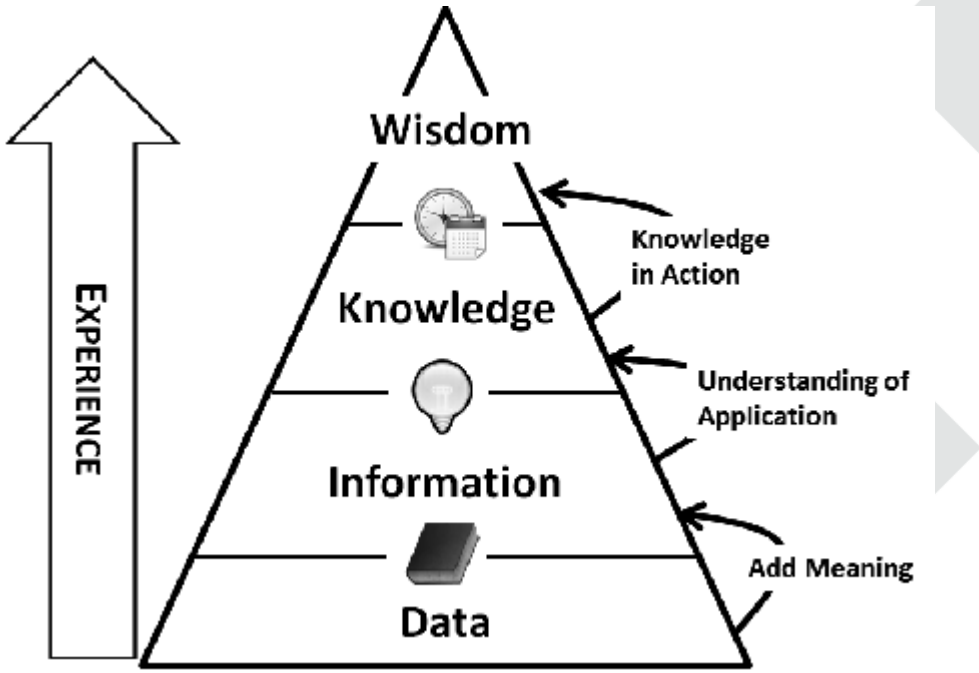
Data // Information // **Knowledge** // Wisdom

- Knowledge
  - When we understand relations/laws/rules
  - Information with added value
  - Allows decision-making based on:
    - Interpretation, experiences, exploring, understanding, intelligence and ability to put things into a context
  - Is broader and deeper than data or information

Data // Information // Knowledge // **Wisdom**

- Wisdom
  - Connected with individual learning with personal context
  - Information with added value
  - Set of knowledge coming from understanding of the problems essence in given context
  - Is based on:
    - Knowledge competences (intellectual and emotional), high level of human cognition, its evaluation criteria and dual relationship with the environment

Data // Information // Knowledge // Wisdom



D-I-K-W summary

- Data management (creation, organisation, manipulation, translation, exchange) is a key issue for subsequent interpretation of phenomena that data represents
- Data mgmt is the most demanding part in data analyses
  - It might take even 80 % (or more) of the time
- Example – presentation of the analysis to your boss
  - You might show „just“ few charts, maps, visualisation of data but:
    - First you have to acquire data, then
    - You choose format to work with, and also software
    - You check, adjust, filter, select data etc.; i.e. data editing
    - You perform analysis (calculations)
    - You prepare final outputs (visualisation in general), output format/form (e.g. in PDF)
    - Lastly, you do interpretation, outline relevant information, summary etc.

Origin of data and its metadata

- To acquire a comprehensive dataset, you have to think about the data first. You must distinguish between:
  - Primary data vs. secundary data
- Primary data
  - Simply, data that does not exist and you create it, i.e. completely new data
  - Reasons of primary data creation:
    - Data you need does not exist in terms of quantity (underrepresentative sample) or quality (too much bias/uncertainty, data are not reliable or trusty)
    - Lack of detail (some of the parameters are missing)
    - Data is not actual
    - Data is not geographically coherent (e.g. some regions are missing)
  - You can collect/create data yourself, or ask another subject (e.g. data provider)

Origin of data and its metadata

- Primary data
  - Ordinarily, we collect data by
    - Measurement
    - Survey (e.g. questionnaire)
    - Mass survey (e.g. census)
    - Testing
    - Interview
    - Observation
  - It is always important to choose a method that suits the analysis goal
  - Usualy, you can encounter mistakes when dealing with primary data. Most common are:
    - Systematic (easily to debug) – e.g. measurement errors (non-calibrated measurement with known deviance)
    - Random – you have to perform basic statistical check (e.g. outlier analysis) to reveal and eliminate/correct them

Origin of data and its metadata

- Secondary data
  - Represents data taken over from other parties (e.g. statistical offices)
  - Already existing data sets (free of charge, or purchased)
  - First, you should explore secondary data sources before you decide to create primary data
  - Examples of secondary data sources:
    - Statistical databases
    - Scientific databases and documents
    - Official documents (e.g. legislative docs, norms, laws, yearbooks etc.)
    - Specialised surveys (e.g. labour market performance, household expenditures, etc.)
    - Annual reports
    - Mass and social media
  - In all cases, the data validity and reliability should be checked (even in case of data sources from public institutions/local authorities etc.)

Metadata

- In order to check secondary data, use common sense
- All good-quality data sets are complemented with „metadata“:
  - Simply said – data about data
  - Usually, it is a plain document describing all relevant aspects about the secondary data sets, e.g.:
    - Provider/author/owner
    - Date of acquisition/creation (data validity in terms of time)
    - Data updates
    - Attribute and geographical scale/coverage
    - Description of indicators
    - Data resolution
    - Method of acquisition
    - Licenses and restrictions for further use
    - Data format, coding etc.
  - Commonly, metadata is in XML file, or in txt, or directly e.g. in Excel sheet

Q&A

- What is the difference between information and data?
- What is the difference between primary and secondary data?
- What you can/should find in metadata?

Open Data Concept

&

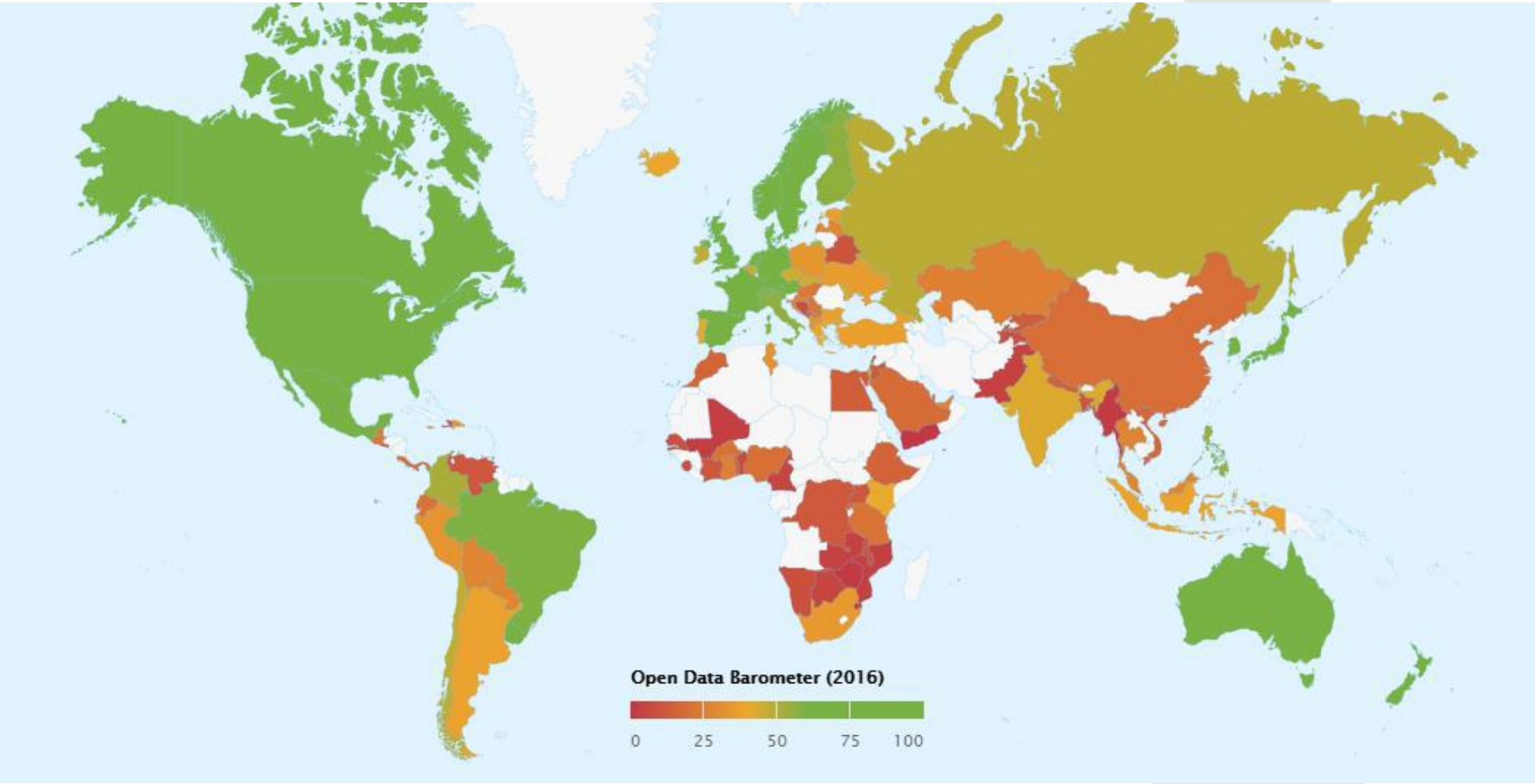
Data Formats

Open data principles

- A lot of data produced by national agencies or science
- Data we are „paying for“ and are about „us“
- Availability for everybody without any restrictions
- Great potential for building an applications upon it
- Data requirements:
  - Openness (technical & legal)
  - Accessibility and originality (native data)
  - Clarity (catalogue/metadata)

Open data principles

- Open Data Barometer

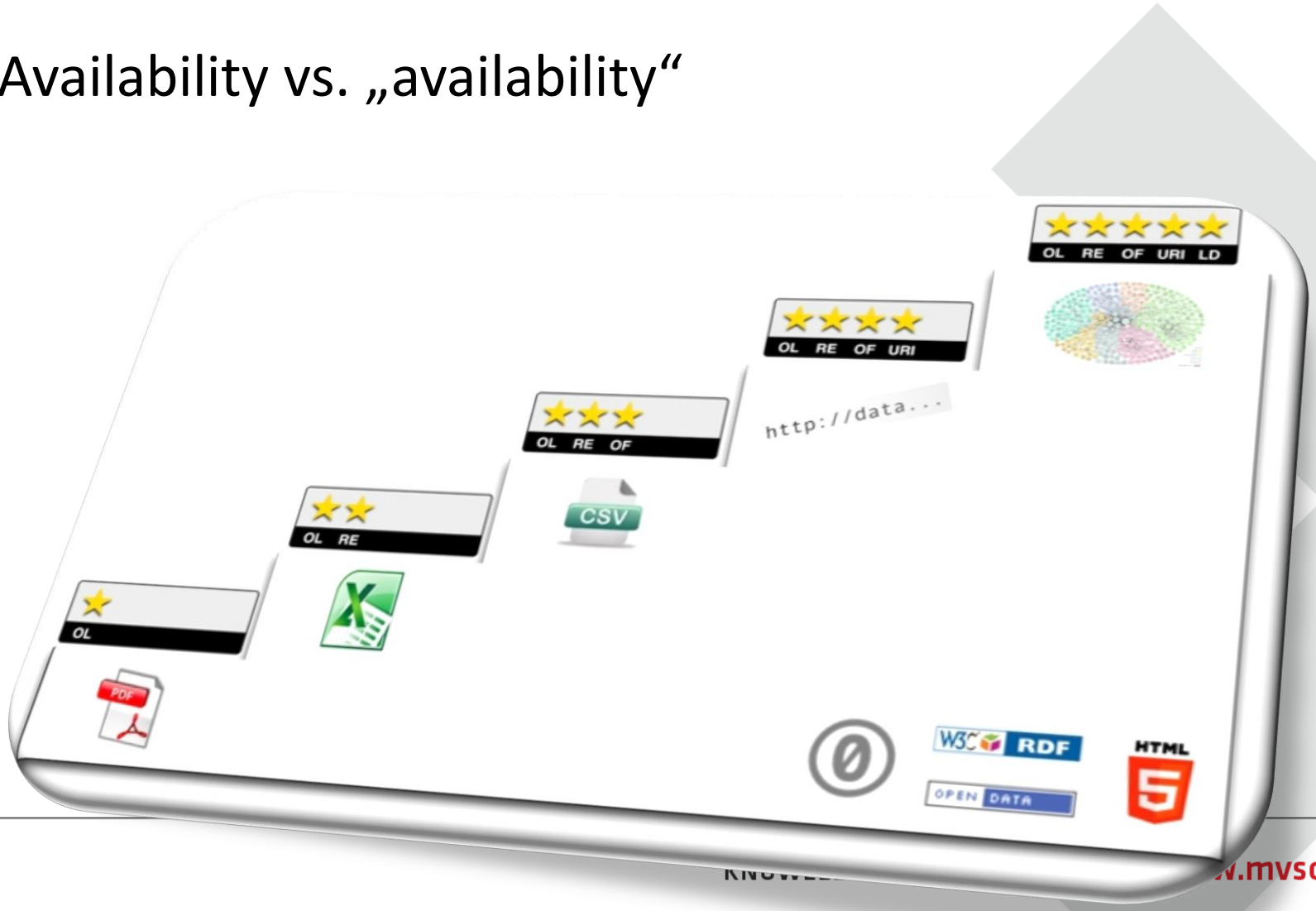


Open data principles

- Open Data Barometer
- All good-quality data sets are complemented with „metadata“:
  - Simply said – data about data
  - Usually, it is a plain document describing all relevant aspects about the secondary data sets, e.g.:
    - Provider/author/owner
    - Date of acquisition/creation (data validity in terms of time)
    - Data updates
    - Attribute and geographical scale/coverage
    - Description of indicators
    - Data resolution
    - Method of acquisition
    - Licenses and restrictions for further use
    - Data format, coding etc.
  - Commonly, metadata is in XML file, or in txt, or directly e.g. in Excel sheet

Open data principles

- Availability vs. „availability“



Open data principles

- Some of the fundamental requirements (Kitchin, Open Definition):
  - Access
  - Redistribution
  - Reuse
  - Absence of technological restriction
  - attribution
  - Integrity
  - No discrimination against persons or groups
  - No discrimination against fields or endeavour
  - Distribution

Open data principles

- Some of the fundamental requirements (Open Government Data):
  - Complete
  - Primary
  - Actual
  - Accessible
  - Readable by computer
  - With no restriction of use
  - Not proprietary
  - No copyrights
  - Open (in terms of contact to the author)

Data Formats

- Here is the list of most common data formats used:
  - .txt
  - .csv
  - .xls/xlsx
  - .ods/.odt
  - .xml/ for geographical data - .gml/.kml/.gpx
  - .pdf
- Statistical sw formats
  - IBM SPSS - .sav
  - Statistica - .sta
  - Stata - .dta
  - R Project - .R/.Rdata
  - MATLAB - .M/.MAT
  - Mathematica - .NB

„Open data“ Phenomenon

- http://data.gov.uk
- https://www.data.gov/

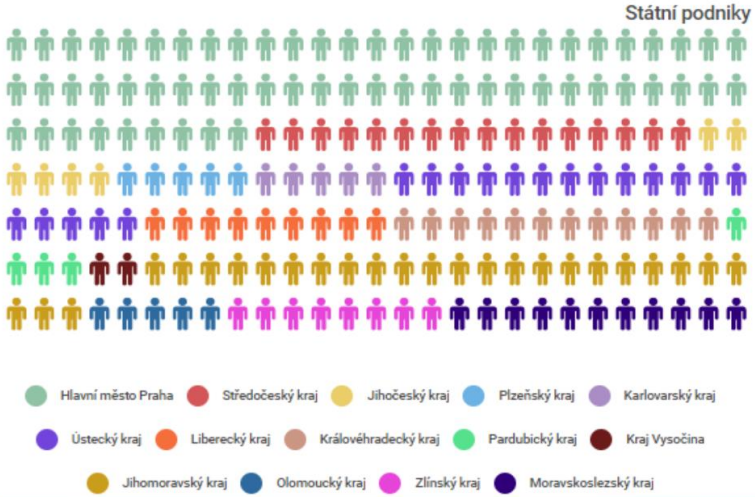
- Austria?

- Task no. 1 – look up for your countries‘ open data

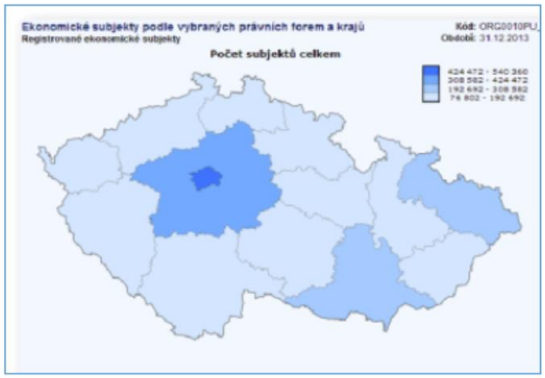
Why it is useful to visualize?

As of 31 December 2013, there were a total of two million six hundred and ninety-four thousand seven hundred and thirty-seven registered economic entities in the Czech Republic, of which 399,571 were commercial companies, of which a total of 25,255 entities had the status of a joint-stock company. In total, there were also 15,216 cooperatives and 241 state-owned enterprises. Most of the total number of registered economic entities existed by private entrepreneurs doing business according to the Trade Licensing Act (1,749,865). Natural persons and agricultural entrepreneurs were represented in the number of 34,290 entities. Finally, there were 229,235 private entrepreneurs doing business under laws other than the Trade Licensing Act.

Registrované ekonomické subjekty



Registrované ekonomické subjekty							Období: 31.12.2013	
	Počet subjektů celkem	Obchodní společnosti		Družstva	Státní podniky	Fyzické osoby		
		celkem	z toho akciové společnosti			soukromí podnikatelé podnikající dle živnostenského zákona	zemědělští podnikatelé	soukromí podnikatelé podnikající dle jiných zákonů než živnostenského
Česká republika	2 694 737	399 571	25 255	15 216	241	1 749 865	34 290	229 235
Hlavní město Praha	540 360	170 707	12 483	6 039	81	272 613	673	33 877
Středočeský kraj	314 688	31 368	1 457	987	21	223 152	4 806	24 968
Jihočeský kraj	159 363	14 869	763	655	8	107 282	3 797	16 075
Plzeňský kraj	141 202	14 707	705	442	6	93 677	2 520	13 814
Karlovarský kraj	76 802	9 275	292	158	6	51 096	570	6 380
Ústecký kraj	172 030	17 883	890	478	23	117 892	2 011	15 828
Liberecký kraj	114 472	10 856	487	395	12	82 647	1 357	9 363
Královéhradecký kraj	133 970	12 329	763	535	15	93 320	2 454	12 302
Pardubický kraj	115 116	10 430	617	423	5	78 892	1 888	11 585
Kraj Vysočina	107 395	8 019	452	489	2	73 148	3 508	10 635
Jihomoravský kraj	295 523	45 308	2 817	2 056	32	189 938	4 426	25 778
Olomoucký kraj	137 119	12 524	781	596	6	95 682	1 963	12 912
Zlínský kraj	138 197	14 049	738	287	10	97 535	1 909	12 647
Moravskoslezský kraj	248 503	27 247	1 990	1 696	14	172 991	2 408	23 063



Visualization matters

showcase 1 (anscombe)

Visualization online tools

Visualization online tools

- selection

. Infogr.am

. Create.ly

. Datawrapper.de

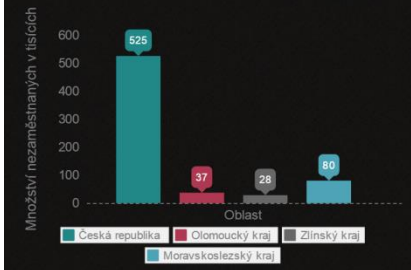
. Easel.ly

. Plotly

Nezaměstnanost 2014

Nezaměstnanost v krajích

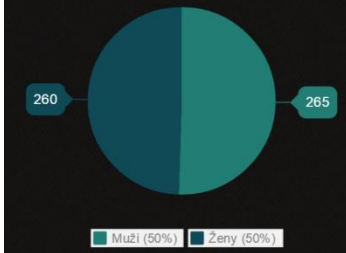
k 31. 12. 2014



Ke konci roku 2014 tvořil celkový počet nezaměstnaných ve pouze ve třech vybraných regionech asi 28% celkové nezaměstnanosti v ČR. Počet nezaměstnaných v Moravskoslezkém kraji byl největší v celé České republice.

Nezaměstanost můžů a žen

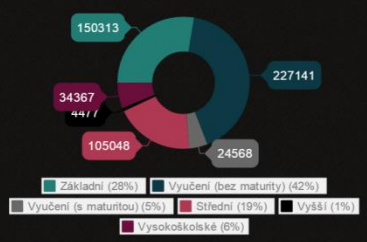
k 31. 12. 2014



Poměr mezi nezaměstnanými muži a ženami se pohybuje kolem 1:1. V celé České republice je pouze o 5 tisíc víc nezaměstnaných mužů. V uvažovaných krajích bylo možné pozorovat stejné tendence a největší rozdíl (téměr o 4 tisíce méně žen) byl v Moravskoslezkém kraji.

Nezaměstanost a vzdělání

k 31. 12. 2014



Největší procento nezaměstnaných je pouze vyučeno a nemá maturitu (42%).
Nejmenší procento zastávají absolventi vyšších odborných škol (1%).
U středního a vyššího odborného vzdělání převyšuje počet nezaměstaných žen nezaměstané muže.

Zdroj dat: Český statistický úřad (http://www.vdb.czsu.cz).

ALWA, a. s.

Information&visualization tool

Wolfram alpha

Map Storytelling

. Story Maps ArcGIS

. Odyssey.js

. StoryMap.js

. Google Tour Builder

. Google My Maps

Data journalism

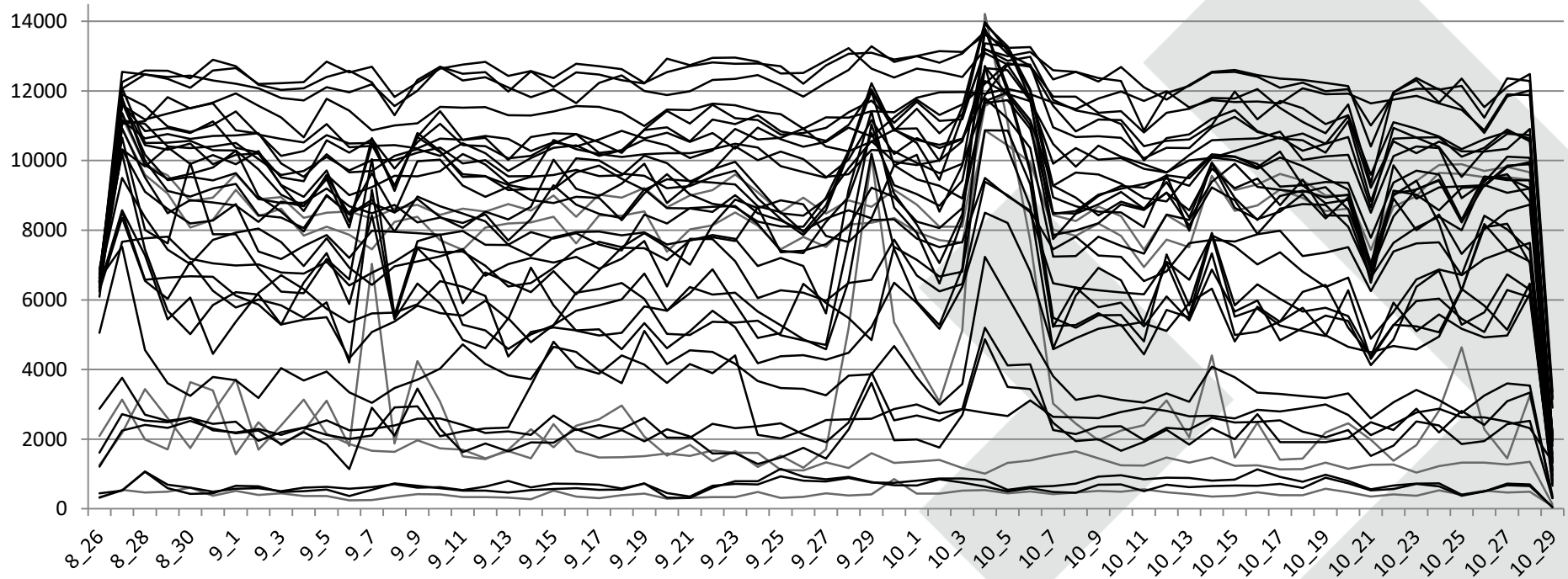
. Český rozhlas / data

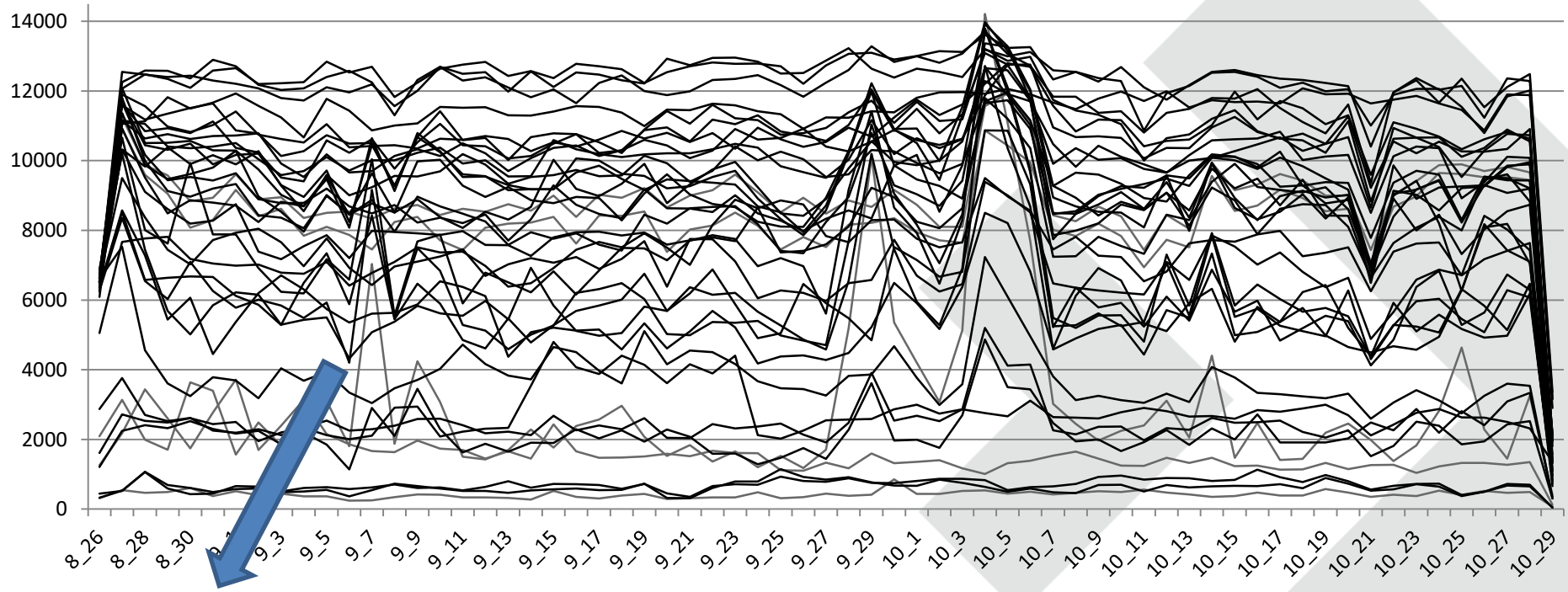
. NY Times / Upshot

. BBC / handbook

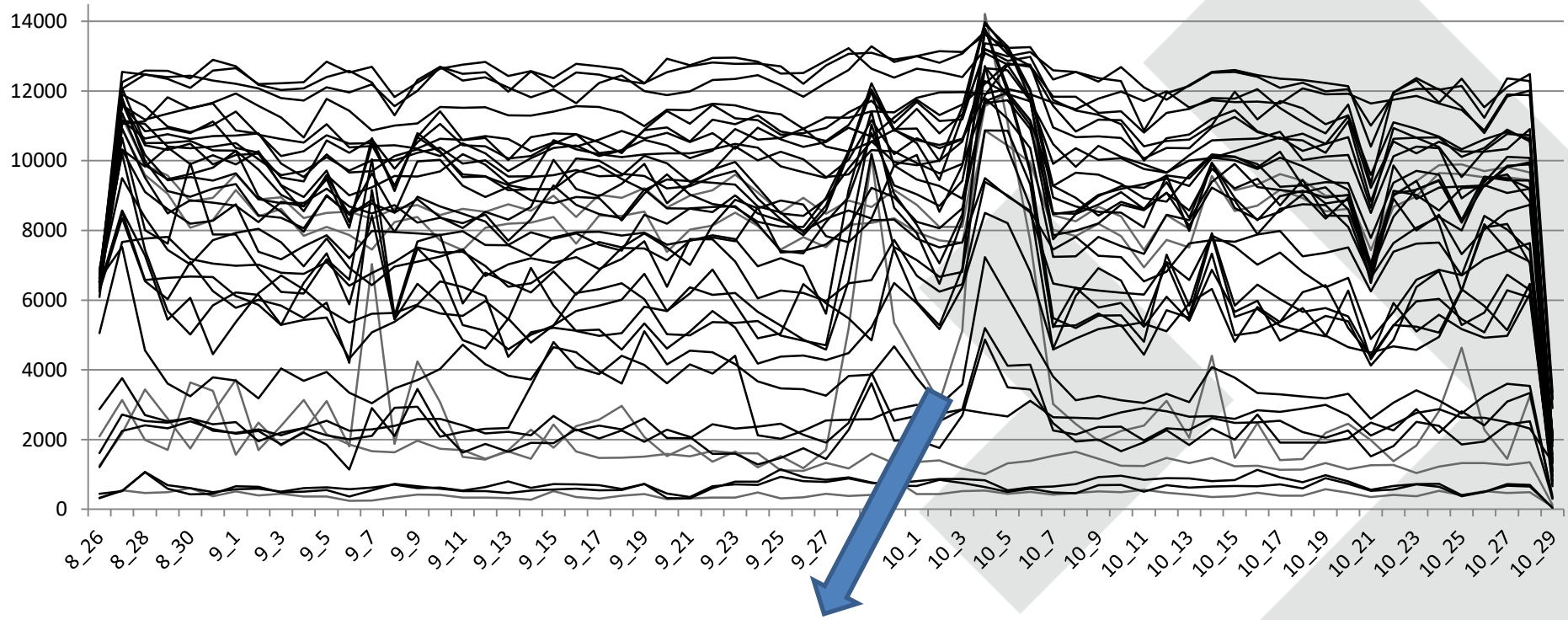
. Guardian / data

Big data a visualization

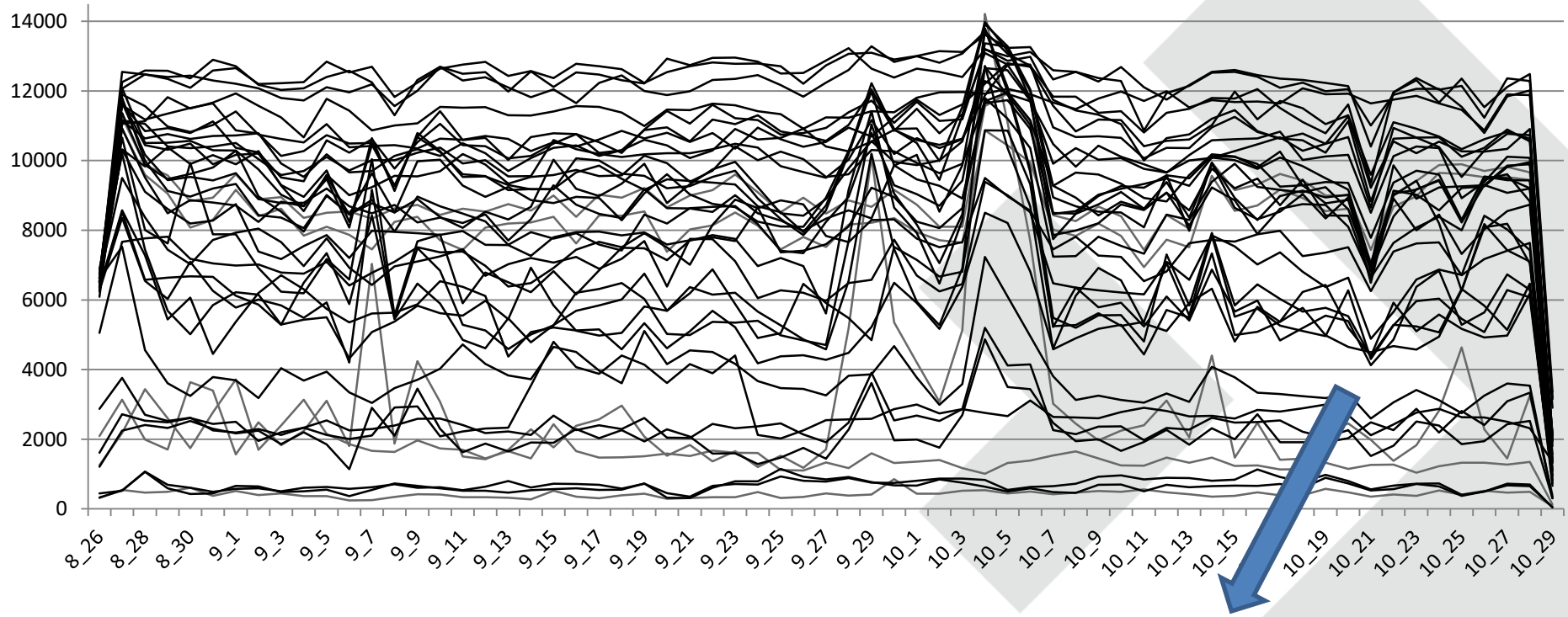

14000
12000
10000
8000
6000
4000
2000
0
8_26
8_28
8_30
9_1
9_3
9_5
9_7
9_9
9_11
9_13
9_15
9_17
9_19
9_21
9_23
9_25
9_27
9_29
10_1
10_3
10_5
10_7
10_9
10_11
10_13
10_15
10_17
10_19
10_21
10_23
10_25
10_27
10_29



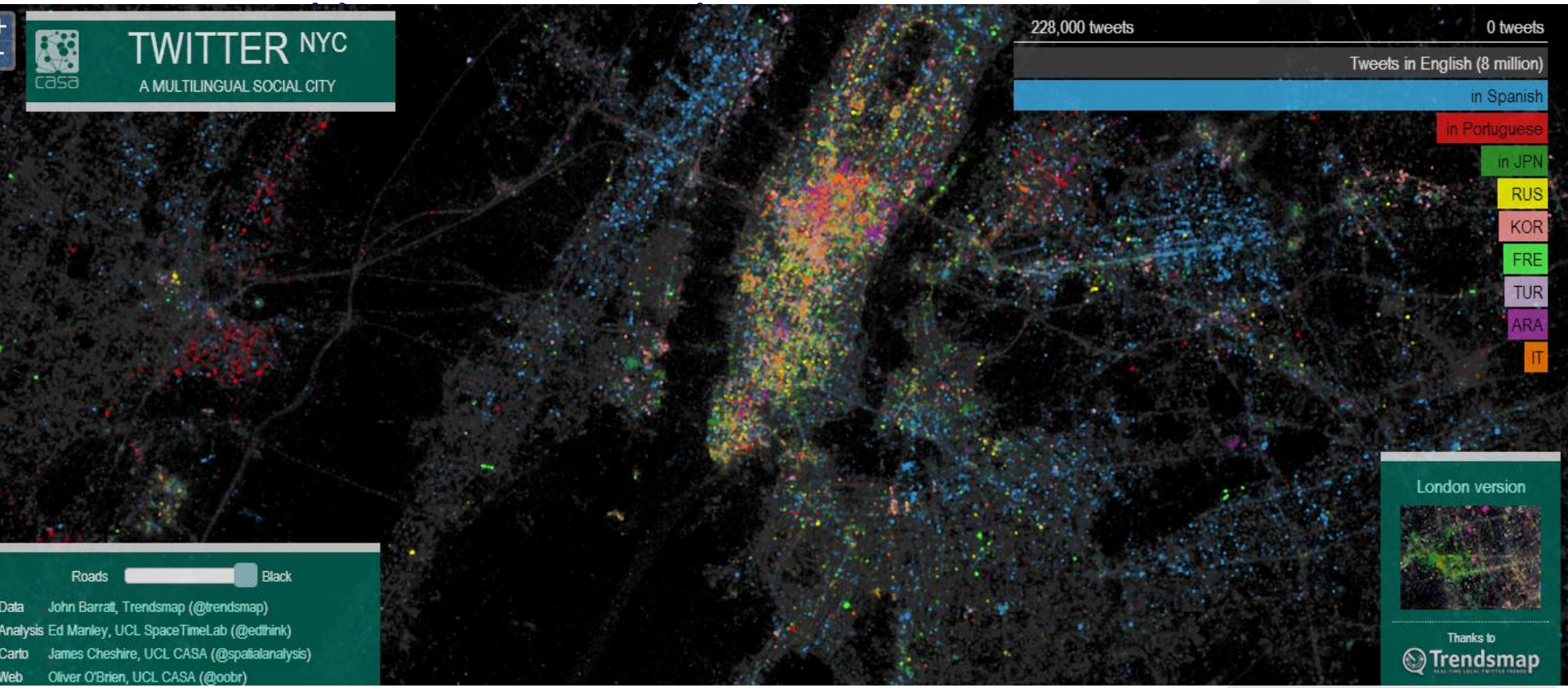
5th Sept.: Cease-fire Announcement; **7th Sept.**: shelling near the Donetsk airport

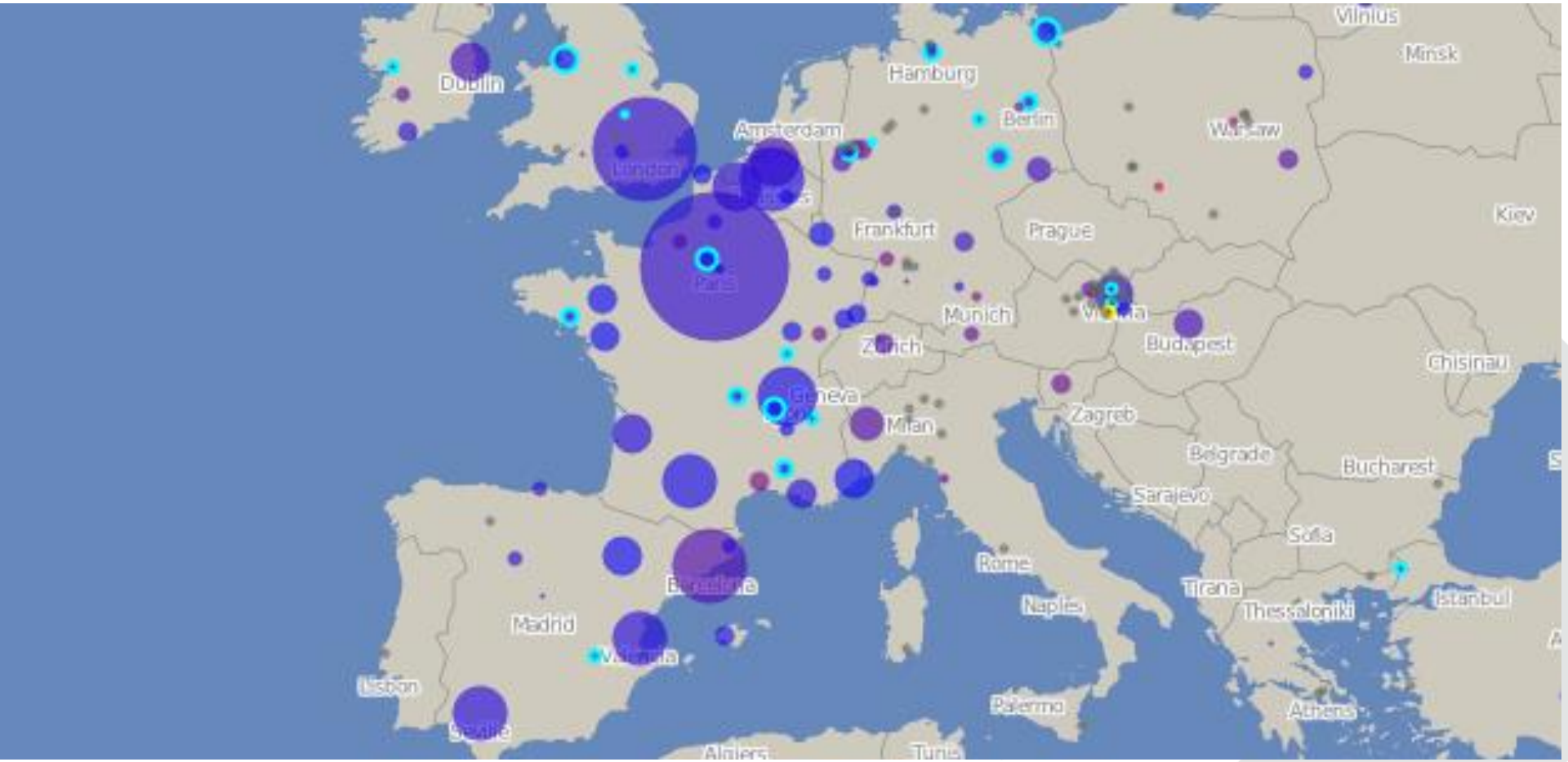


Since 3rd Oct.: Fighting for control of Donetsk airport intensifies – 12 separatists killed

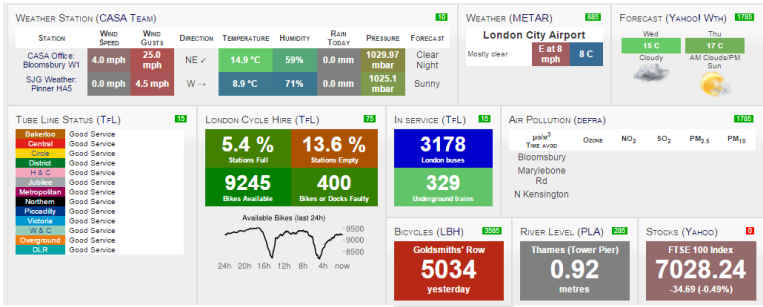


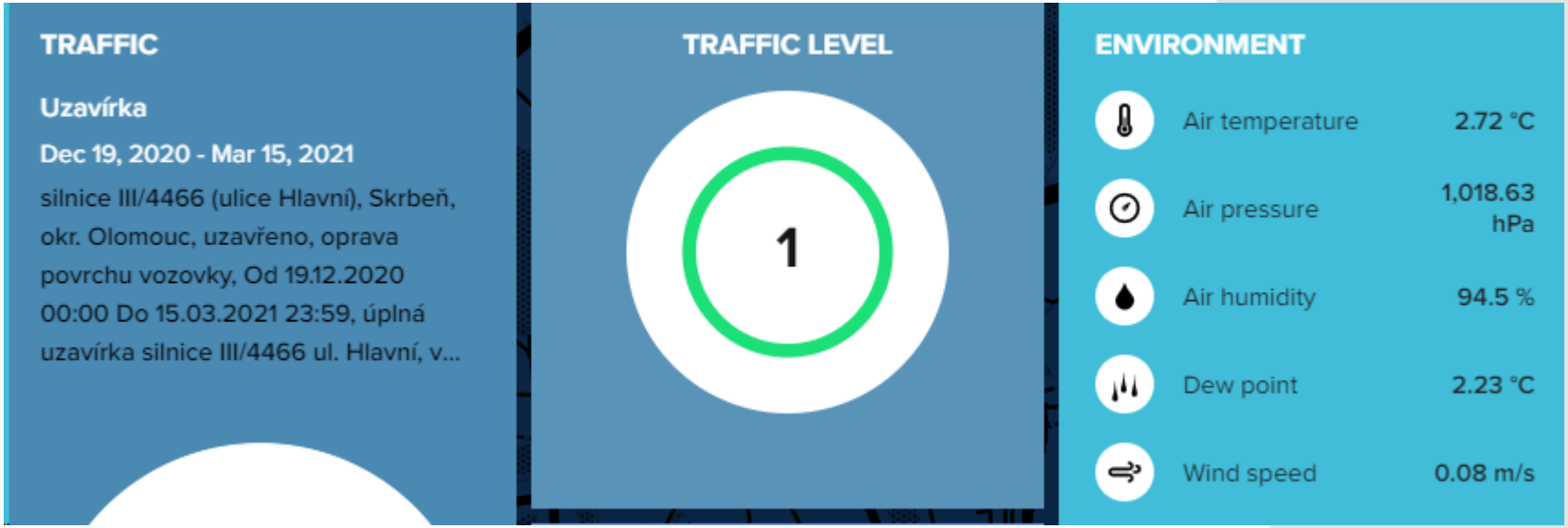
21st Oct.: UEFA Champions League – Bate Borisov vs. Shakhtar Donetsk… **0:7** ☺


TWITTER NYC
A MULTILINGUAL SOCIAL CITY
casa
228,000 tweets
0 tweets
Tweets in English (8 million)
in Spanish
in Portuguese
in JPN
RUS
KOR
FRE
TUR
ARA
IT
Roads
Black
Data John Barratt, Trendsmap (@trendsmap)
Analysis Ed Manley, UCL SpaceTimeLab (@edthink)
Carto James Cheshire, UCL CASA (@spatialanalysis)
Web Oliver O'Brien, UCL CASA (@oobr)
London version
Thanks to
Trendsmap


Vilnius
Minsk
Dublin
Hamburg
Amsterdam
Berlin
Kiev
Frankfurt
Prague
Munich
Budapest
Chisinau
Zagreb
Belgrade
Bucharest
Sarajevo
Sofia
Rome
Tirana
Naples
Thessaloniki
Istanbul
Madrid
Lisbon
Palermo
Athens


oyster


Weather Station (CASA Team)
Station
Wind Speed
Wind Gusts
Direction
Temperature
Humidity
Rain Today
Pressure
Forecast
CASA Office: Bloomsbury W1
4.0 mph
25.0 mph
NE
14.9 °C
59%
0.0 mm
1029.97 mbar
Clear Night
SJG Weather: Pinner HA5
0.0 mph
4.5 mph
W
8.9 °C
71%
0.0 mm
1025.1 mbar
Sunny
Weather (METAR)
London City Airport
Mostly clear
E at 8 mph
8 C
Forecast (Yahoo! Wth)
Wed
15 C
Cloudy
Thu
17 C
AM Clouds/PM Sun
Tube Line Status (TfL)
Bakerloo Good Service
Central Good Service
Circle Good Service
District Good Service
H & C Good Service
Jubilee Good Service
Metropolitan Good Service
Northern Good Service
Piccadilly Good Service
Victoria Good Service
W & C Good Service
Overground Good Service
DLR Good Service
London Cycle Hire (TfL)
5.4 %
Stations Full
13.6 %
Stations Empty
9245
Bikes Available
400
Bikes or Docks Faulty
Available Bikes (last 24h)
9500
9000
8500
24h 20h 16h 12h 8h 4h now
In service (TfL)
3178
London buses
329
Underground trains
Air Pollution (DEFRA)
Ozone
NO2
SO2
PM2.5
PM10
Bloomsbury
Marylebone Rd
N Kensington
Bicycles (LBH)
Goldsmiths' Row
5034
yesterday
River Level (PLA)
Thames (Tower Pier)
0.92
metres
Stocks (Yahoo!)
FTSE 100 Index
7028.24
-34.69 (-0.49%)


TRAFFIC
Uzavírka
Dec 19, 2020 - Mar 15, 2021
silnice III/4466 (ulice Hlavní), Skrbeň, okr. Olomouc, uzavřeno, oprava povrchu vozovky, Od 19.12.2020 00:00 Do 15.03.2021 23:59, úplná uzavírka silnice III/4466 ul. Hlavní, v...
TRAFFIC LEVEL
1
ENVIRONMENT
Air temperature
2.72 °C
Air pressure
1,018.63 hPa
Air humidity
94.5 %
Dew point
2.23 °C
Wind speed
0.08 m/s

„Big data“ Phenomenon

- Volume up to 1000 TB (10^{15} bytes)
- Every day $2{,}5 \times 10^{18}$ of data
- Becoming a problem for relation DB
- př. Hadoop, HP Vertica

- sources:
  - sensor networks
  - social media
  - web-logs
  - indexes
  - call-data
  - transport data


facebook

„Big data“ Phenomenon