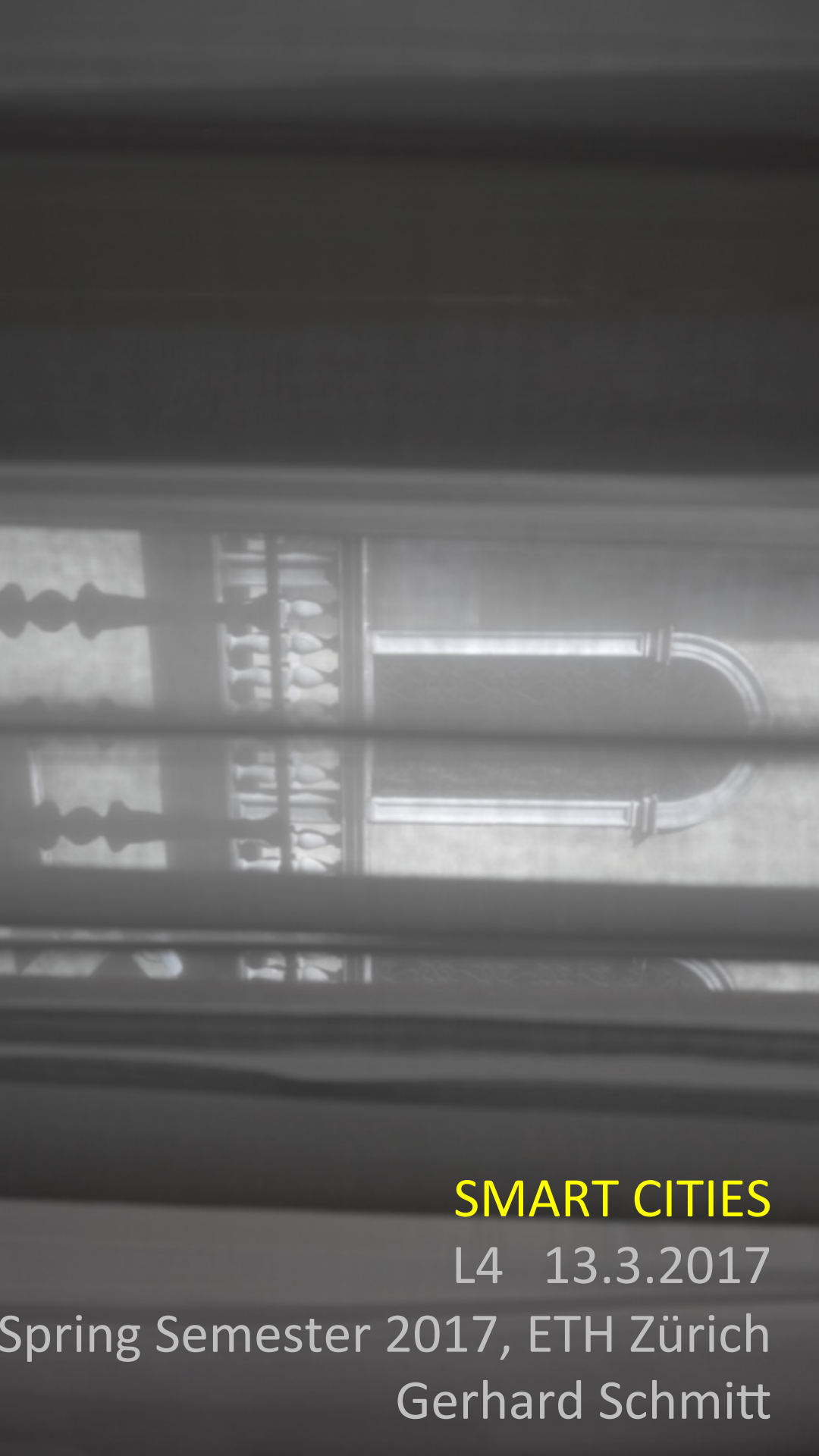

SMART CITIES

L4 13.3.2017

Spring Semester 2017, ETH Zürich

Gerhard Schmitt

Smart Cities

1 GS ET: Introduction	Definitions Context	3 GS: Urban Big Data	4 GS ET: Urban Measurement	5 GS: Urban Science	6 GS: Complexity Science	7 GS: Smart Governance	8 GS: Smart Livability	10 GS: From smart cities to responsive cities
Objectives, Definition, MOOC	Smart Objects, Smart Buildings, Smart Cities	Stocks and Flows in Urban Systems	Measurement and Simulation	Citizen Design Science	Complexity Science	Participatory Design and Management	City Livability Rankings	From smart cities to responsive cities
Exercise 1: QUA-KIT			Exercise 2: Urban Measurement	Exercise 3: QUA-KIT				Final presentation on MOOC discussion topics

The story so far:

- 13.3.2017 Can you improve what you do not measure?
- 6.3.2017 Big Data as new urban raw material, made useful with Information Architecture and with the Stocks and Flows concept
- 27.2.2017 From smart houses to smart cities – emerging criteria for smart cities as urban systems
- 20.2.2017 Cities are complex systems. Ideally, they are sustainable, resilient, livable, smart, and finally responsive – from production machines to human habitat

Quote from „The Responsive City“

“I have a rule of thumb: if you can’t measure it, you can’t manage it”

June 2014, Michael Bloomberg, Former Mayor of New York City

Open Knowledge for the digital society

The Open Knowledge Foundation Germany is a nonprofit organization that advocates open knowledge, open data, transparency, and civil participation.

Learn more about our **organisation**, our **goals**, and our **projects**.

25
OK Labs
develop tools for **digital cities** all over Germany.

20,000+
requests
have been made by citizens at **FragDenStaat.de**.

300
young coders
experimenting with code and friendship at **Jugend hackt**.

1.2 million
Euros
for open source projects through the **Protoype Fund**.

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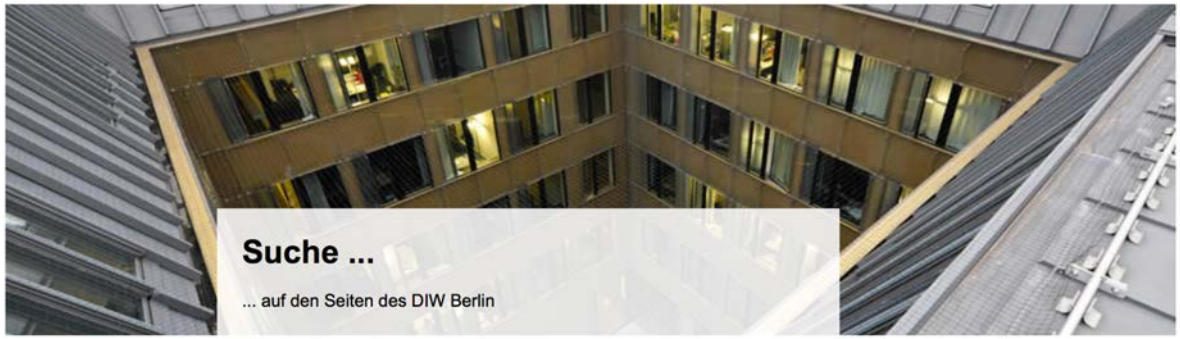

Suche ...

... auf den Seiten des DIW Berlin

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Ungefähr 4.360 Ergebnisse (0,60 Sekunden)

DIW Berlin: Angst und Ärger: Dimensionen sozialer Ungleichheit
Kurzum: Wir untersuchen, ob das Erleben von Emotionen - vor allem der Gefühle Angst und Ärger - eine Dimension sozialer **Ungleichheit** ist und gehen der ...
https://www.diw.de/de/diw_01.../schupp_j_rgen.html?...

DIW Berlin: „Der Konsum wird durch die gestiegene
vor 4 Tagen ... Tatsächlich wäre das Wachstum in Deutschland etwas höher gewesen, wenn die **Ungleichheit** zwischen 1991 und 2015 nicht so deutlich ...
www.diw.de/sixcms/detail.php?id=diw_01.c.554120.de

Die Folgen der Ungleichheit: Ein neues Maß der menschlichen ...
Dateiformat: PDF/Adobe Acrobat
24. Nov. 2010 ... Die Folgen der **Ungleichheit**: Ein neues Maß der menschlichen Entwicklung. Zum 20. Jubiläum des Human Development Index. (HDI) haben ...
https://www.diw.de/documents/publikationen/73/.../10-47-4.pdf

Countries agree to curb powerful greenhouse gases in largest climate breakthrough since Paris

Sat, Oct 15, 2016

- Reducing emissions of hydrofluorocarbons (HFCs) under the Kigali Amendment can prevent up to 0.5°C of global warming, while continuing to protect the ozone layer
- HFCs consumption to be reduced in 2019 in developed countries and frozen in 2024 and 2028 in developing countries

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President of the 28th Meeting of the Parties to Montreal Protocol in Kigali, Vincent Biruta of Rwanda, brings thee gavel down marking the adoption of the Kigali Amendment

Kigali, 15 October 2016 - Nearly 200 countries struck a landmark deal today to reduce the emissions of powerful greenhouse gases, hydrofluorocarbons (HFCs), in a move that could prevent up to 0.5 degrees Celsius of global warming by the end of this century.

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UNEA

At UN Environment Assembly Convening in NairobiGovernments Agree to 25 Landmark Resolutions to Drive Sustainability Agenda and Paris Climate Agreement

Environment "cannot be an afterthought", says Kenya's President at opening of high-level environment assembly in Nairobi

Backed by Stars, Unprecedented UN Campaign Seeks to Mobilize Millions to End Illegal Trade in Wildlife

Top 12 Ways World Can End Hunger, Stem Environmental Damage from Food Systems

Coral reefs face bleak future - but "lifeboats" may help them survive

Datum: 09.03.2017

Der Landbote

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www.landbote.ch

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Medientyp: Tages- und Wochenpresse
Auflage: 26'656
Erscheinungsweise: 6x wöchentlich

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Themen-Nr.: 999.051
Abo-Nr.: 1086740
Seite: 23
Fläche: 10'262 mm²

ETH Zürich ist Weltspitze

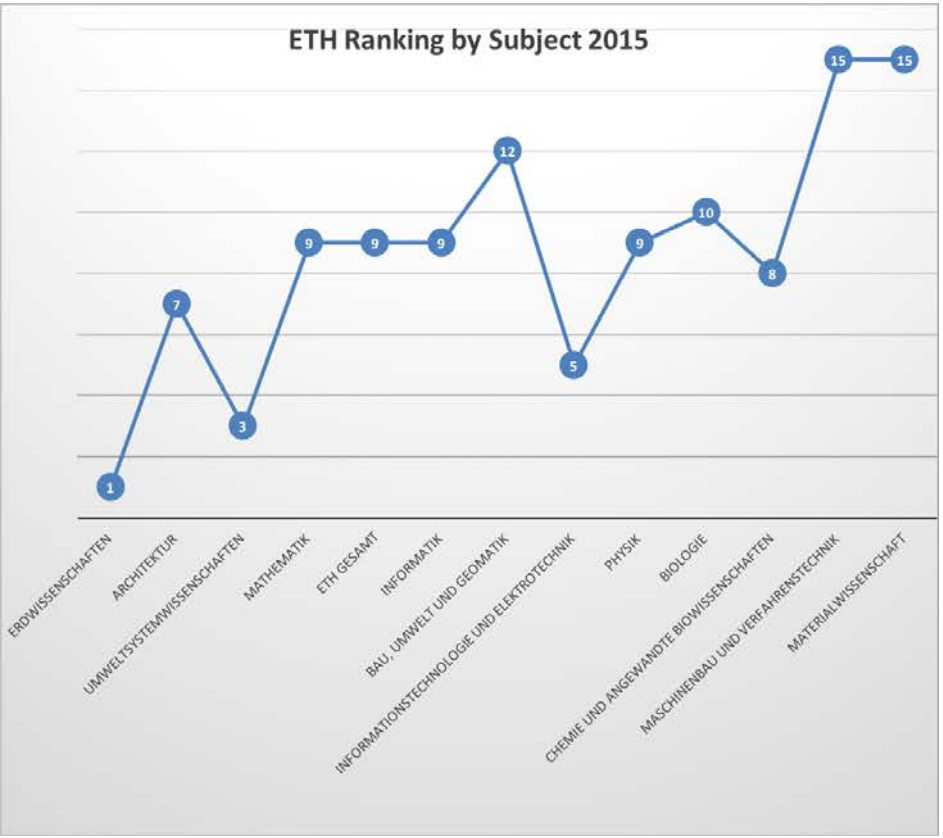
RANKING In einer Rangliste der weltbesten Universitäten in 46 Fächern belegt die ETH Zürich zum dritten Mal in Folge den ersten Platz bei den Erdwissenschaften.

Das Quacquarelli Symonds (QS) Ranking listet die Eidgenössisch-Technische Hochschule Zürich (ETH) in insgesamt zehn Fächern unter den Top 10. Verbessern konnte sich die ETH insbesondere im Fach Architektur, in dem sie zwei Plätze gutmachte und nun Rang 5 belegt. Auch in Umweltwissenschaften, Mathematik, Informatik und dem Fächerkomplex Physik und Astronomie rangiert die Hochschule unter den besten zehn Institutionen weltweit, wie QS gestern mitteilte.

Auch die ETH Lausanne konnte sich in drei Fächern unter den Top 20 platzieren, namentlich in Materialwissenschaft, Physik und Astronomie sowie in Elektrotechnik.

Die Universität Zürich schaffte es in dem erstmals bewerteten Fach Anatomie und Physiologie auf Platz 20 weltweit.

Insbesondere die Hotelfachschulen in der Schweiz können sich über Spitzenplätze freuen: Gleich drei landen in ihrem Fach unter den Top 10: Ecole Hôtelière de Lausanne (Rang 2), Les Roches International School of Hotel Management (Rang 4) und die Swiss Hotel Management School (Rang 8). Nur die USA sind mit vier Plätzen häufiger unter den weltbesten zehn im Hotelfach vertreten. *sda*


ETH Ranking by Subject 2015
1
7
3
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12
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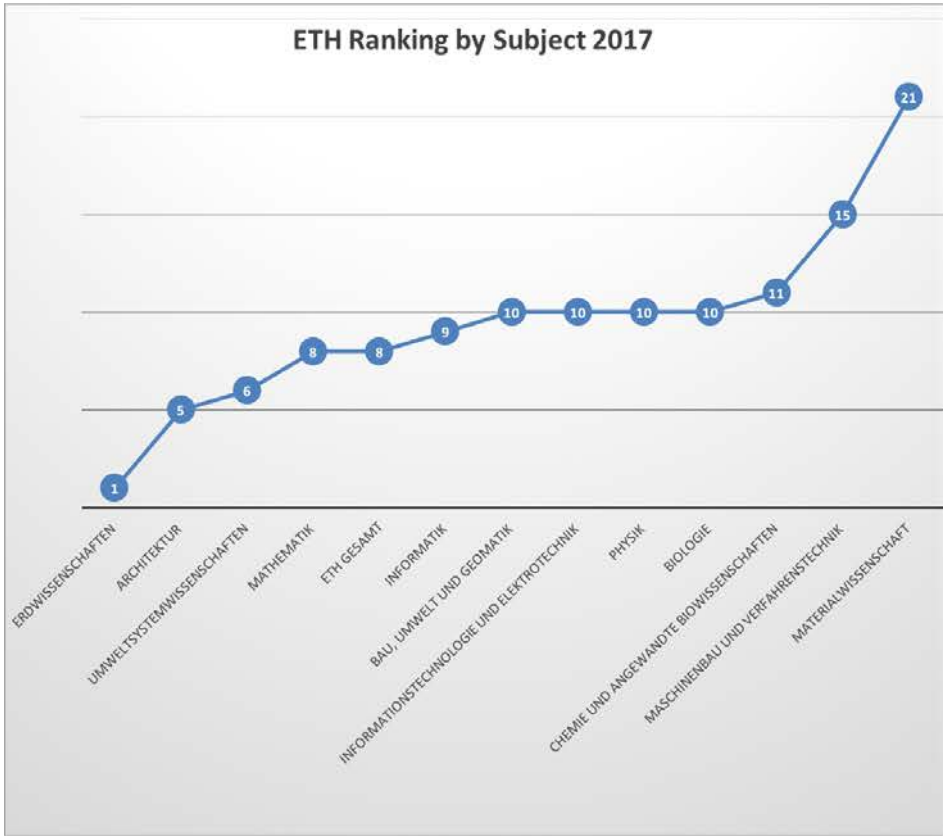
15
ERDWISSENSCHAFTEN
ARCHITEKTUR
UMWELTSYSTEMWISSENSCHAFTEN
MATHEMATIK
ETH GESAMT
INFORMATIK
BAU, UMWELT UND GEOMATIK
INFORMATIONSTECHNOLOGIE UND ELEKTROTECHNIK
PHYSIK
BIOLOGIE
CHEMIE UND ANGEWANDTE BIOWISSENSCHAFTEN
MASCHINENBAU UND VERFAHRENSTECHNIK
MATERIALWISSENSCHAFT


ETH Ranking by Subject 2017
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PHYSIK
BIOLOGIE
CHEMIE UND ANGEWANDTE BIOWISSENSCHAFTEN
MASCHINENBAU UND VERFAHRENSTECHNIK
MATERIALWISSENSCHAFT

Habitat Research

Based on science → measurement and simulation

Influenced by people → behaviour

- Building Research: Understanding Buildings and their interaction with people, cities, stocks and flows
- Urban Research: Understanding Cities and their interaction with people, territories, stocks and flows → Complex Systems
- Territorial Research: Understanding regions, countries, and their interaction with stocks and flows → Complex Systems

Smart Cities Criteria India - Europe

- Indian Ministry of Urban Development

1. adequate water supply
2. assured electricity supply
3. sanitation, including solid waste management
4. efficient urban mobility and public transport
5. affordable housing, especially for the poor
6. robust IT connectivity and digitalization
7. good governance, especially e-Governance and citizen participation
8. sustainable environment
9. safety and security of citizens, particularly women, children and the elderly
10. health and education

- European Innovation Partnership on Smart Cities and Communities

1. Sustainable Urban Mobility
2. Districts and Built Environment
3. Integrated Infrastructures
4. Citizen Focus
5. Policy and Regulation
6. Integrated Planning and Management
7. Knowledge Sharing
8. Baseline, Performance Indicators and Metrics
9. Open Data
10. Standards
11. Business Models, Finance and Procurement
12. General Implementation Modes

Know the criteria for selecting Smart Cities

News18.com

First published: January 28, 2016, 4:01 PM IST | **Updated:** January 28, 2016

In the approach of the Smart Cities Mission, the objective of the government is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.

The focus of the mission is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities.

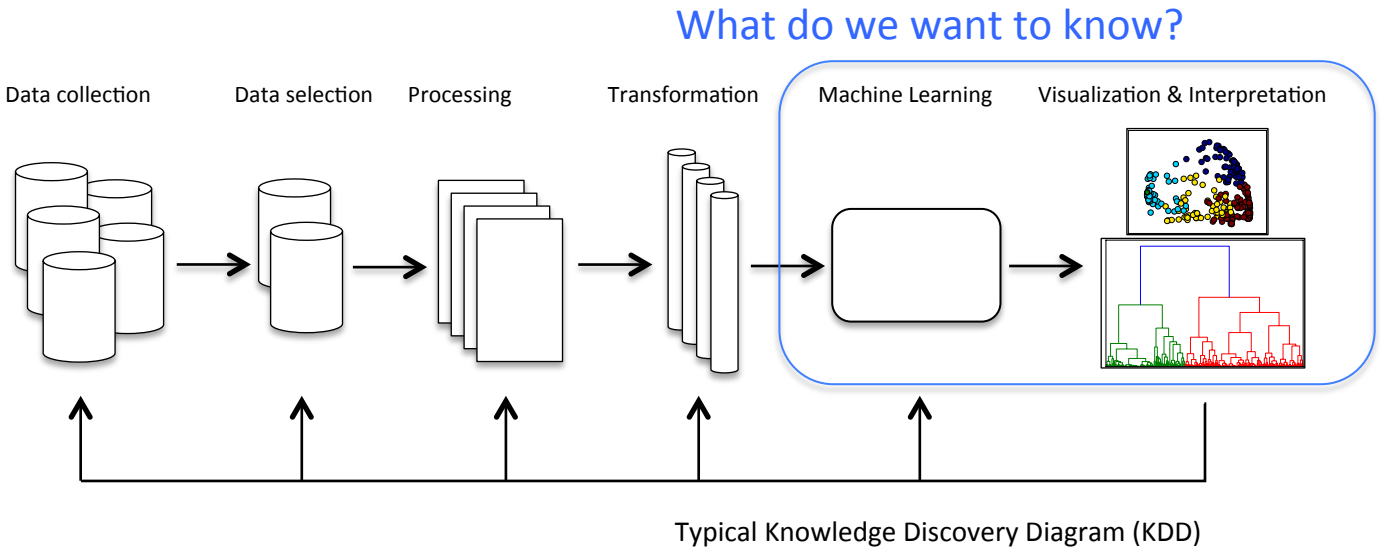
http://www.news18.com/news/india/know-the-criteria-for-selecting-smart-cities-1195936.html

Measurements for the Smart City:

Danielle Griego

Approach

Data analysis

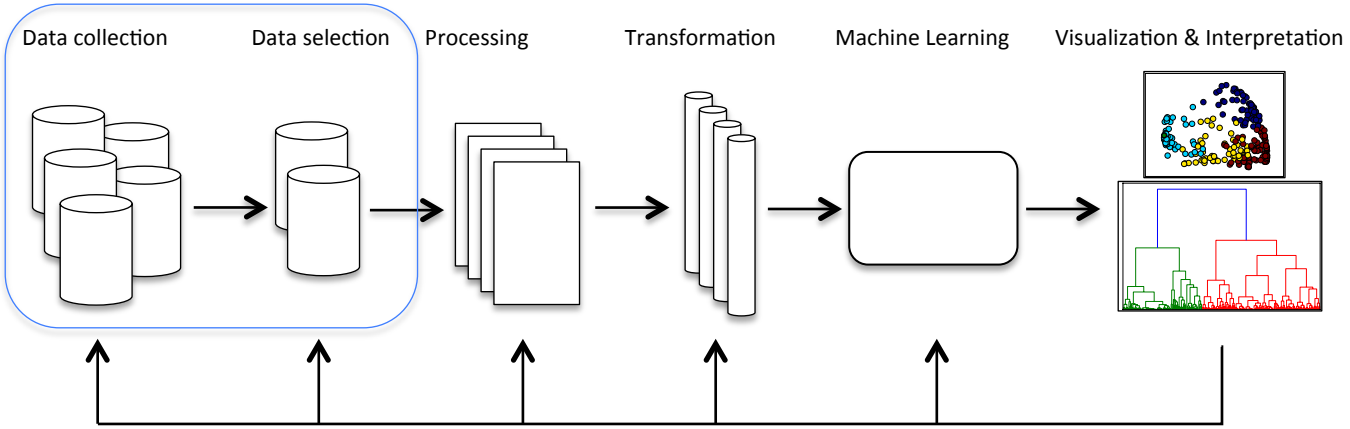


Typical Knowledge Discovery Diagram (KDD)

Approach

Data collection/Selection

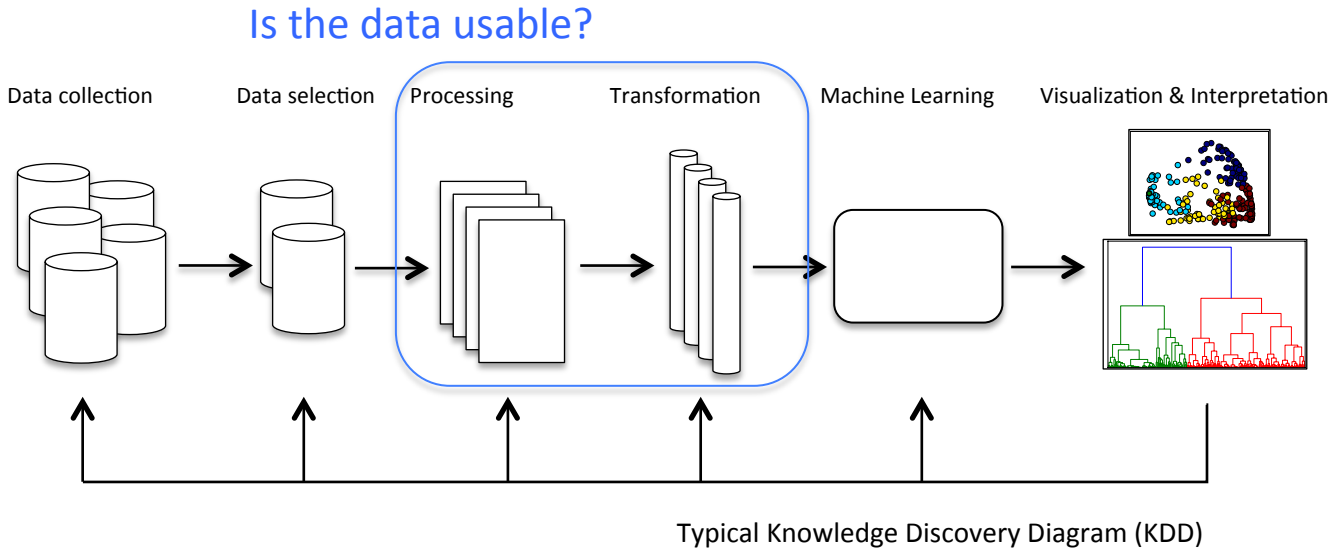
Domain specific data source(s)



Typical Knowledge Discovery Diagram (KDD)

Approach

The time consuming, but essential part of data analysis

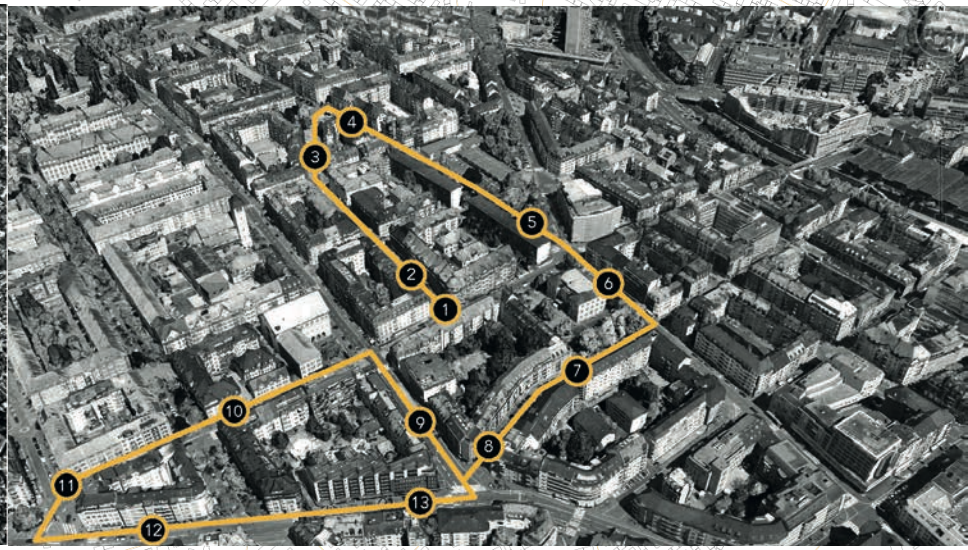


Typical Knowledge Discovery Diagram (KDD)

Case study

ESUM- Analyzing trade-offs between Energy and Social performance of Urban Morphologies

Location Wiedikon Zürich



14 survey checkpoints along experimental path

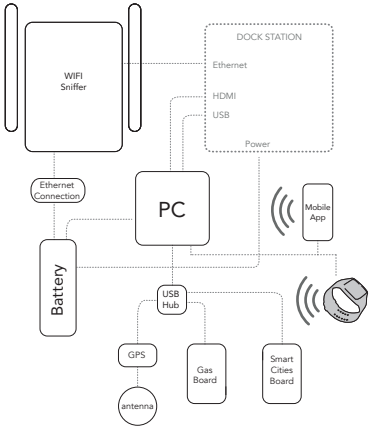
Case study

ESUM- Analyzing trade-offs between Energy and Social performance of Urban Morphologies

Data from 37 participants in Zurich to:

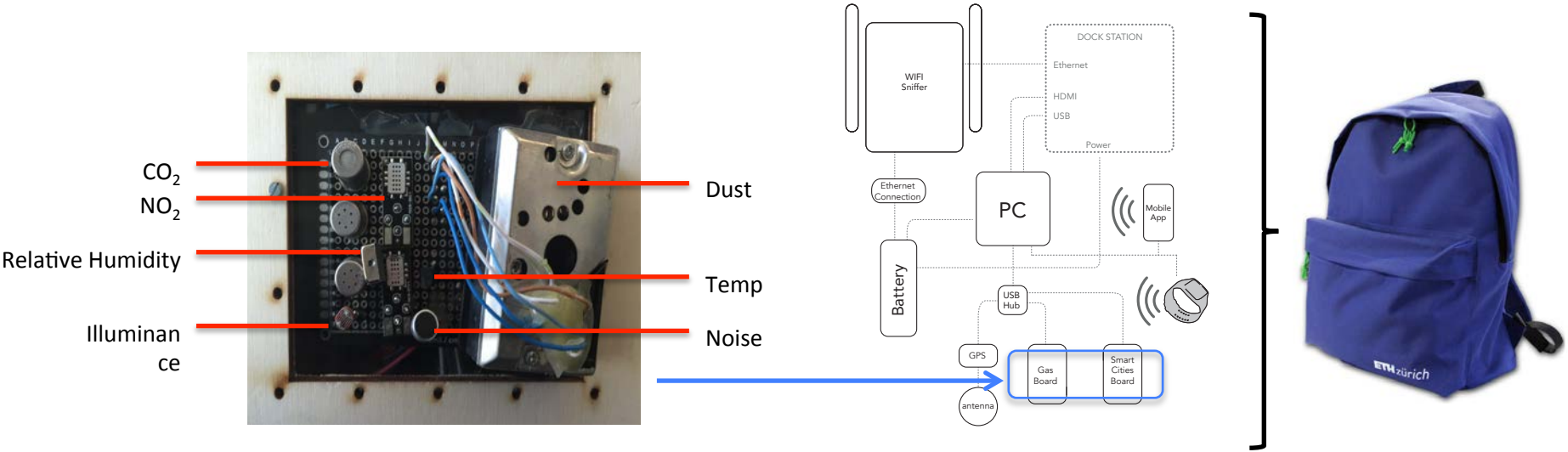
- Investigate impact of constant (urban morphology) and dynamic features (environmental sensors) of the built environment on perception (using surveys and biofeedback data)

Fig. 2. Four instances of narrow-spacious spatial configurations and their corresponding pathpoints along the select path.



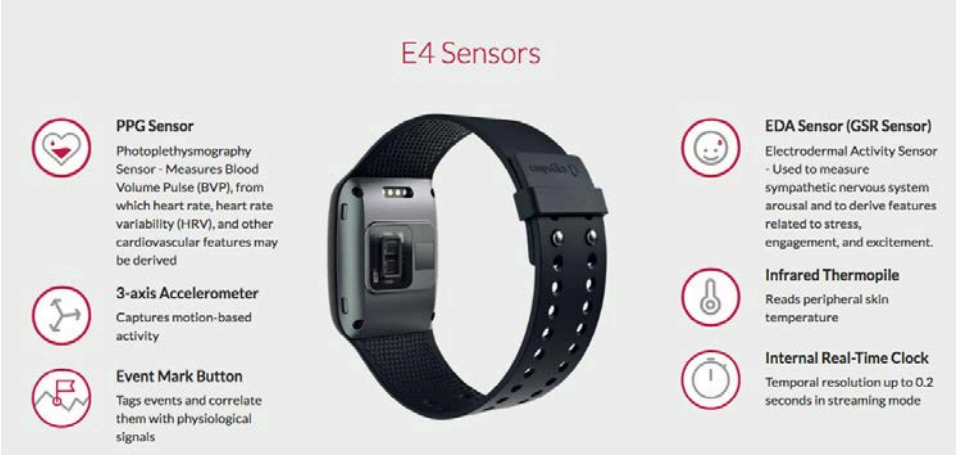
Mobile sensor equipment

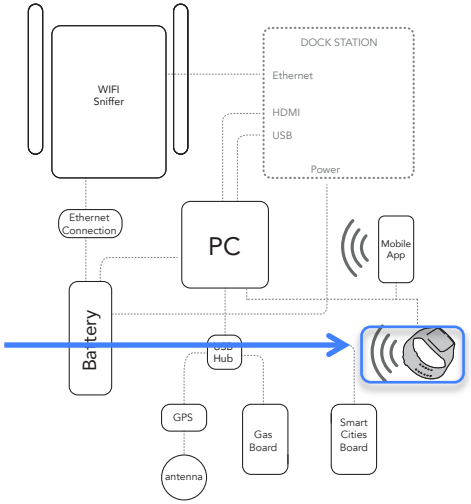
Sensor-backpack with environmental and position sensors



Mobile Sensor equipment

Biofeedback wristband

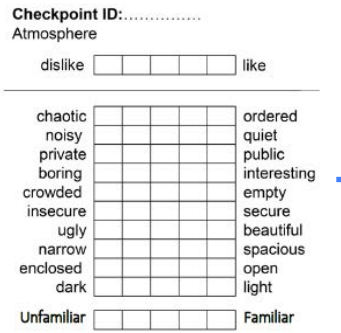


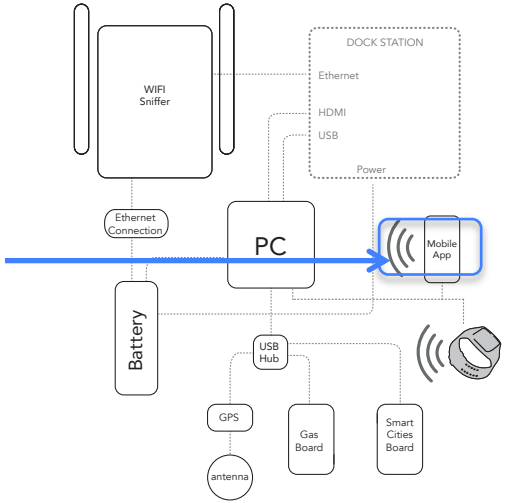


https://www.empatica.com/e4-wristband

Mobile Sensor equipment

Biofeedback wristband





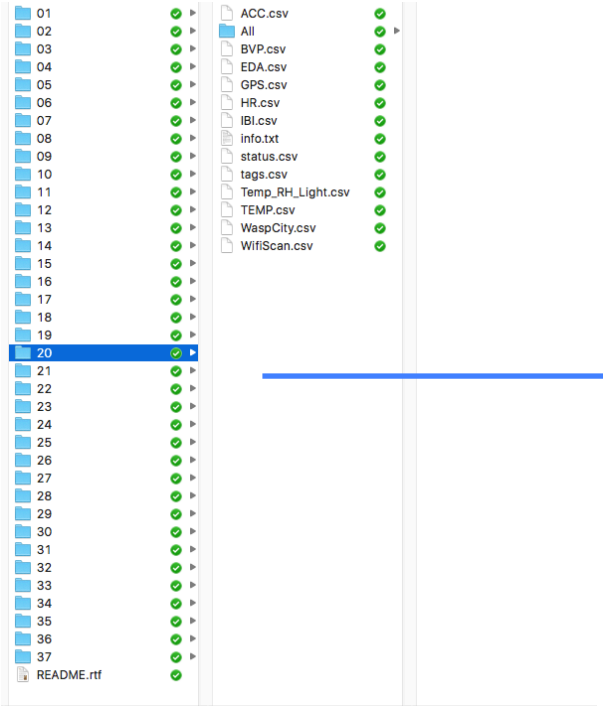
Experimental data-set

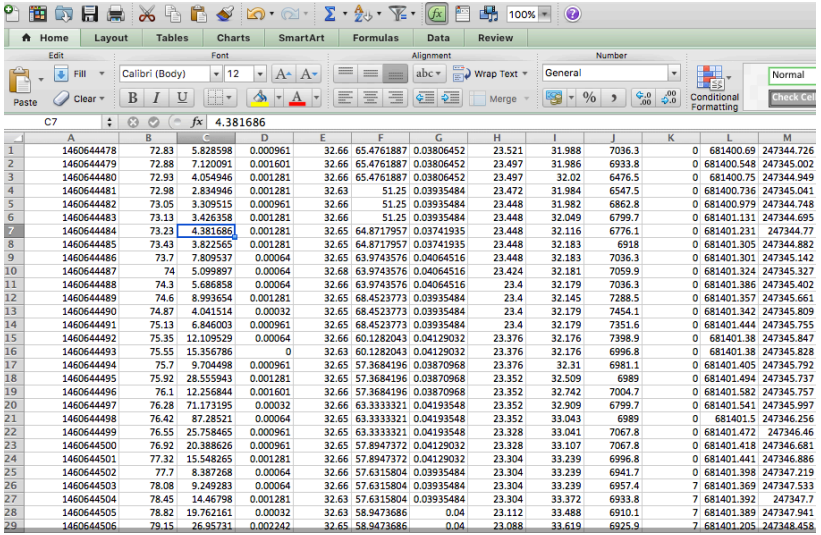
ESUM- Analyzing trade-offs between Energy and Social performance of Urban Morphologies

Device	*Sensor/ Measurement*	*units*	*Measurement range*	*Measurement frequency*	*Accuracy*	*Response time*
WaspCity	Sound Pressure	dB	50-100 dB	0.4 Hz	±2.5 dB	Not Given
	Luminosity	%	0-100% (400- 700 nm)	0.4 Hz	Resistive sensor 20MOhm (Darkness) 5-20 kOhm(Light)	Not Given
	Dust	mg/m3	Typical 0.5V/(0.1mg/m3)	0.4 Hz	Operating supply voltage 5±0.5V	10±1ms
WaspGas	Temperature	C	-40 ~ 125 C	0.25 Hz	±2 C(0-70 C), ±4 C(<0 C, >70C)	1.65 seconds
	Atmospheric Pressure	kPa	15 - 115 kPa	0.25 Hz	<±1.5% V	20 ms
	Humidity	%RH	0-100% RH	0.25 Hz	<±4% RH (a 25C, range 30-80%), ±6 %RH(range 0-100)	<15 seconds
Meshlium Scanner AP	Wifi Scanner	MAC address	Wifi Scanner (50-200m) Bluetooth Scanner (20-30m)	push values @ 0.016 Hz	Measurement range depends on he antenna and line of sight to the device	60 seconds
	Wifi Scanner	AP		push values @ 0.016 Hz		
	Wifi Scanner	RSSI (Received Signal Strenght Indicator)	-40 dBm (nearest node) to -90 dBm (marthes nodes)	push values @ 0.016 Hz	distance of 10m ~=(50dBm), 50m ~=(75dBm)	
Mobile Device	GPS	Lat/Long	outdoor only	variable, dependent on device satellite connection		
	Survey	12 questions, scale -2 to 2	NA	At checkpoint		
GPS	GPS	Lat/Long	outdoor only	1 Hz		
Biofeedback Wristband	PPG (Photoplethysmography)	Sensor output: Blood Volume Pulse (BPV)		64 Hz	0.9 nW/Digit	
	EDA (Electrodermal Activity)		0.01 mSiements -100 mSiemens	4 Hz		
	Skin Temperature Infrared thermopile	C	-40-115 C	4 Hz	±0.2 C within 36-39 C	
	3 Axis accelerometer	x, y, z		32 Hz		

Data Processing: ESUM Experiment

Data cleaning: unified date/time, convert WGS84 spherical coordinates to CH1903 planar coordinates





	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1460644478	72.83	5.828598	0.000961	32.66	65.4761887	0.03806452	23.521	31.988	7036.3	0	681400.69	247344.726
2	1460644479	72.88	7.120091	0.001601	32.66	65.4761887	0.03806452	23.497	31.986	6933.8	0	681400.548	247345.002
3	1460644480	72.93	4.054946	0.001281	32.66	65.4761887	0.03806452	23.497	32.02	6476.5	0	681400.75	247344.949
4	1460644481	72.98	2.834946	0.001281	32.63	51.25	0.03935484	23.472	31.984	6547.5	0	681400.736	247345.041
5	1460644482	73.05	3.309515	0.000961	32.66	51.25	0.03935484	23.448	31.982	6862.8	0	681400.979	247344.748
6	1460644483	73.13	3.426358	0.001281	32.66	51.25	0.03935484	23.448	32.049	6799.7	0	681401.131	247344.695
7	1460644484	73.23	4.381686	0.001281	32.65	64.8717957	0.03741935	23.448	32.116	6776.1	0	681401.231	247344.77
8	1460644485	73.43	3.822565	0.001281	32.65	64.8717957	0.03741935	23.448	32.183	6918	0	681401.305	247344.882
9	1460644486	73.7	7.809537	0.00064	32.65	63.9743576	0.04064516	23.448	32.183	7036.3	0	681401.301	247345.142
10	1460644487	74	5.099897	0.00064	32.68	63.9743576	0.04064516	23.424	32.181	7059.9	0	681401.324	247345.327
11	1460644488	74.3	5.686858	0.00064	32.66	63.9743576	0.04064516	23.4	32.179	7036.3	0	681401.386	247345.402
12	1460644489	74.6	8.993654	0.001281	32.65	68.4523773	0.03935484	23.4	32.145	7288.5	0	681401.357	247345.661
13	1460644490	74.87	4.041514	0.00032	32.65	68.4523773	0.03935484	23.4	32.179	7454.1	0	681401.342	247345.809
14	1460644491	75.13	6.846003	0.000961	32.65	68.4523773	0.03935484	23.4	32.179	7351.6	0	681401.444	247345.755
15	1460644492	75.35	12.109529	0.00064	32.66	60.1282043	0.04129032	23.376	32.176	7398.9	0	681401.38	247345.847
16	1460644493	75.55	15.356786	0	32.63	60.1282043	0.04129032	23.376	32.176	6996.8	0	681401.38	247345.828
17	1460644494	75.7	9.704498	0.000961	32.65	57.3684196	0.03870968	23.376	32.31	6981.1	0	681401.405	247345.792
18	1460644495	75.92	28.555943	0.001281	32.65	57.3684196	0.03870968	23.352	32.509	6989	0	681401.494	247345.737
19	1460644496	76.1	12.256844	0.001601	32.66	57.3684196	0.03870968	23.352	32.742	7004.7	0	681401.582	247345.757
20	1460644497	76.28	71.173195	0.00032	32.66	63.3333321	0.04193548	23.352	32.909	6799.7	0	681401.541	247345.997
21	1460644498	76.42	87.28521	0.00064	32.65	63.3333321	0.04193548	23.352	33.043	6989	0	681401.5	247346.256
22	1460644499	76.55	25.758465	0.000961	32.65	63.3333321	0.04193548	23.328	33.041	7067.8	0	681401.472	247346.46
23	1460644500	76.92	20.388626	0.000961	32.65	57.8947372	0.04129032	23.328	33.107	7067.8	0	681401.418	247346.681
24	1460644501	77.32	15.548265	0.001281	32.66	57.8947372	0.04129032	23.304	33.239	6996.8	0	681401.441	247346.886
25	1460644502	77.7	8.387268	0.00064	32.66	57.6315804	0.03935484	23.304	33.239	6941.7	0	681401.398	247347.219
26	1460644503	78.08	9.249283	0.00064	32.66	57.6315804	0.03935484	23.304	33.239	6957.4	7	681401.369	247347.533
27	1460644504	78.45	14.46798	0.001281	32.63	57.6315804	0.03935484	23.304	33.372	6933.8	7	681401.392	247347.7
28	1460644505	78.82	19.762161	0.00032	32.63	58.9473686	0.04	23.112	33.488	6910.1	7	681401.389	247347.941
29	1460644506	79.15	26.95731	0.002242	32.65	58.9473686	0.04	23.088	33.619	6925.9	7	681401.205	247348.458

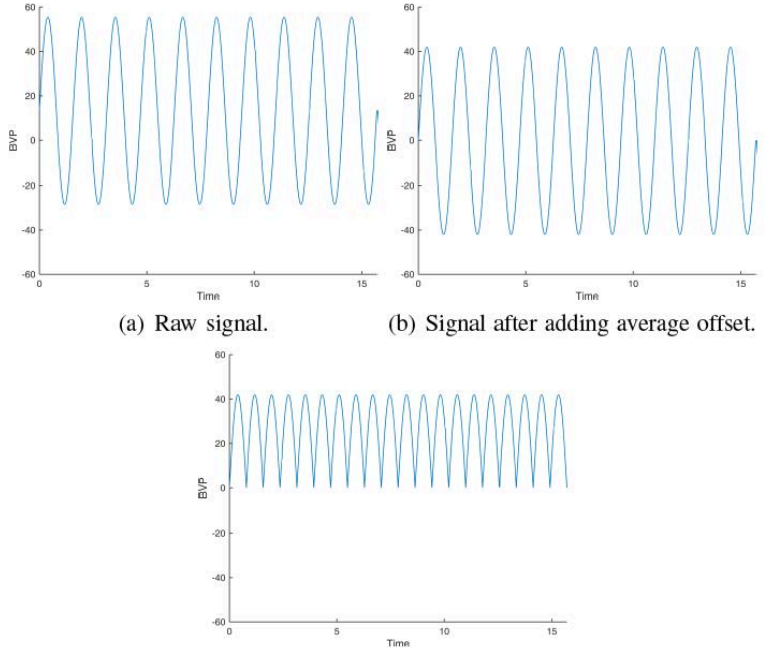
D. Griego, V. Buff, E. Hayos, I. Moise, E. Pournaras (2017), Sensing and mining urban qualities in smart cities, proceedings in AINA IEEE 31st Conference

Data Processing: ESUM Experiment

Frequency reduction to integrate data from multiple sources

TABLE III. DATA COLLECTION FREQUENCIES.

Sensor description	Frequency [Hz]
Heart rate (HR)	1
Blood volume pressure (BVP)	64
Electrodermal activity (EDA)	4
Biofeedback temperature (T-BF)	1
Sound level (S)	0.3
Dust (D)	0.3
Environment temperature (T-EN)	1
Relative humidity (RH)	1
Illuminance (IL)	1
People density (PD)	1 (if many), 0.024 (if few)
Longitude (LON)	1
Latitude (LAT)	1
Survey answers	In each of the 14 checkpoints



(a) Raw signal. (b) Signal after adding average offset.

(c) Absolute positive signal.

Fig. 4. Frequency reduction applied to the bloom volume pressure measurements.

D. Griego, V. Buff, E. Hayos, I. Moise, E. Pournaras (2017), Sensing and mining urban qualities in smart cities, proceedings in AINA IEEE 31st Conference

Data processing: ESUM Experiment

Geo-referencing data to specific locations

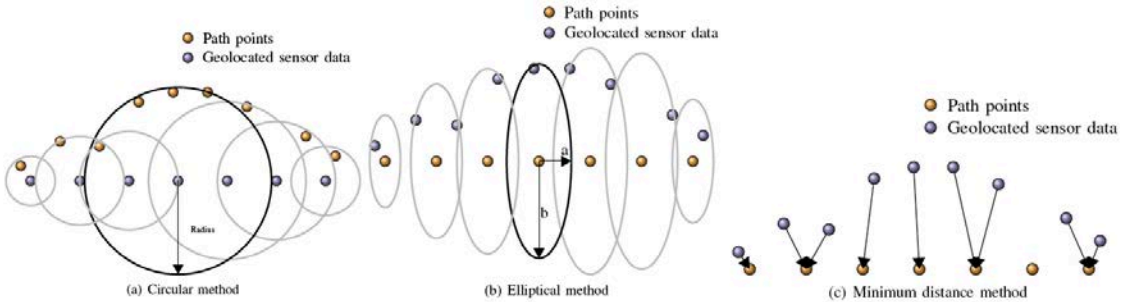
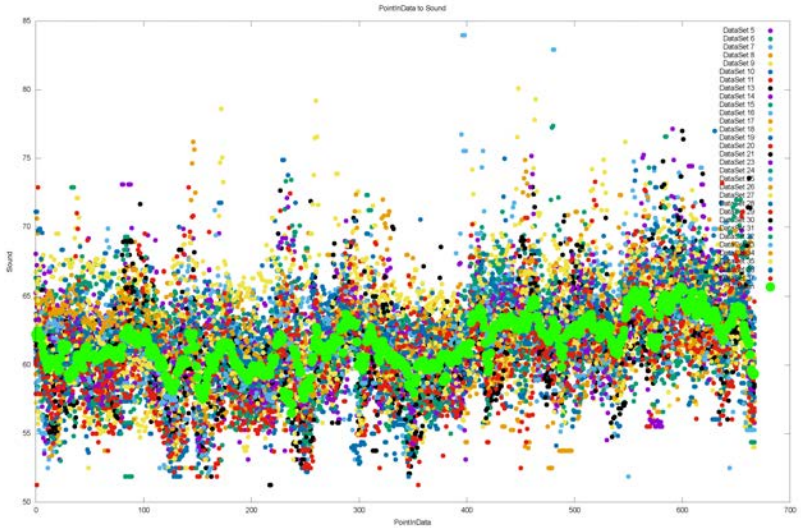


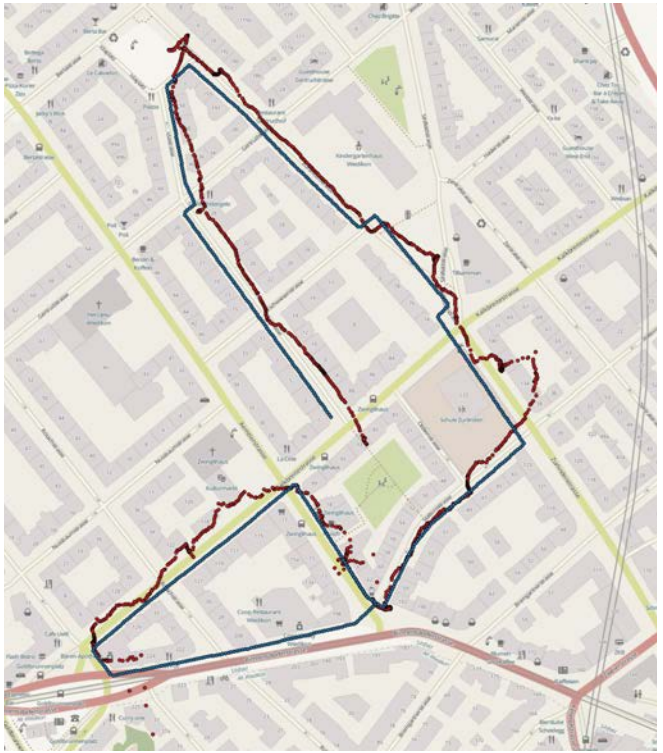
Fig. 5. Three data localization methods.

D. Griego, V. Buff, E. Hayos, I. Moise, E. Pournaras (2017), Sensing and mining urban qualities in smart cities, proceedings in AINA IEEE 31st Conference

Data analysis: ESUM Experiment

Time-series sensor visualization: sound



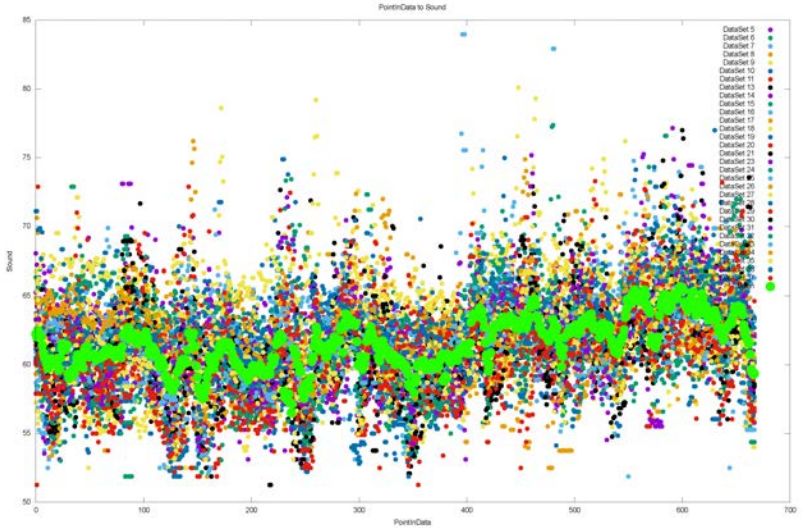


D. Griego, V. Buff, E. Hayos, I. Moise, E. Pournaras (2017), Sensing and mining urban qualities in smart cities, proceedings in AINA IEEE 31st Conference

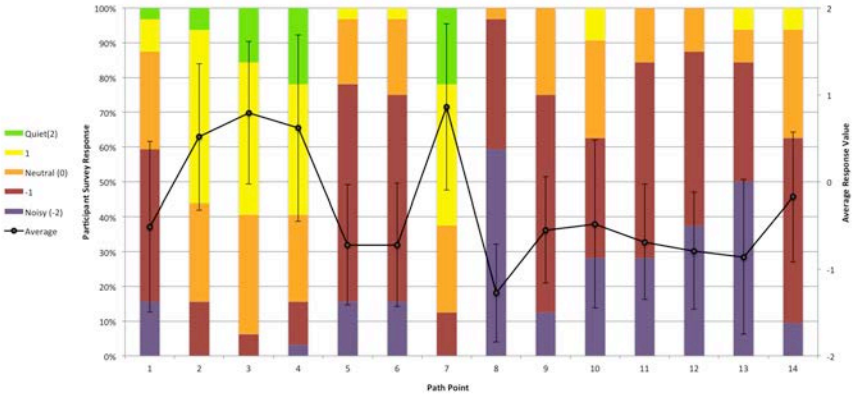
Data analysis: ESUM Experiment

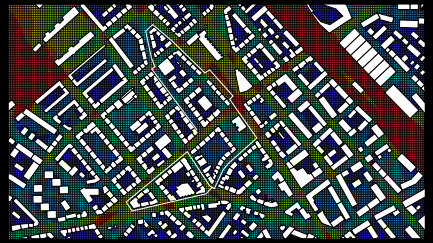
Comparing data sources: Measured and perceived noise

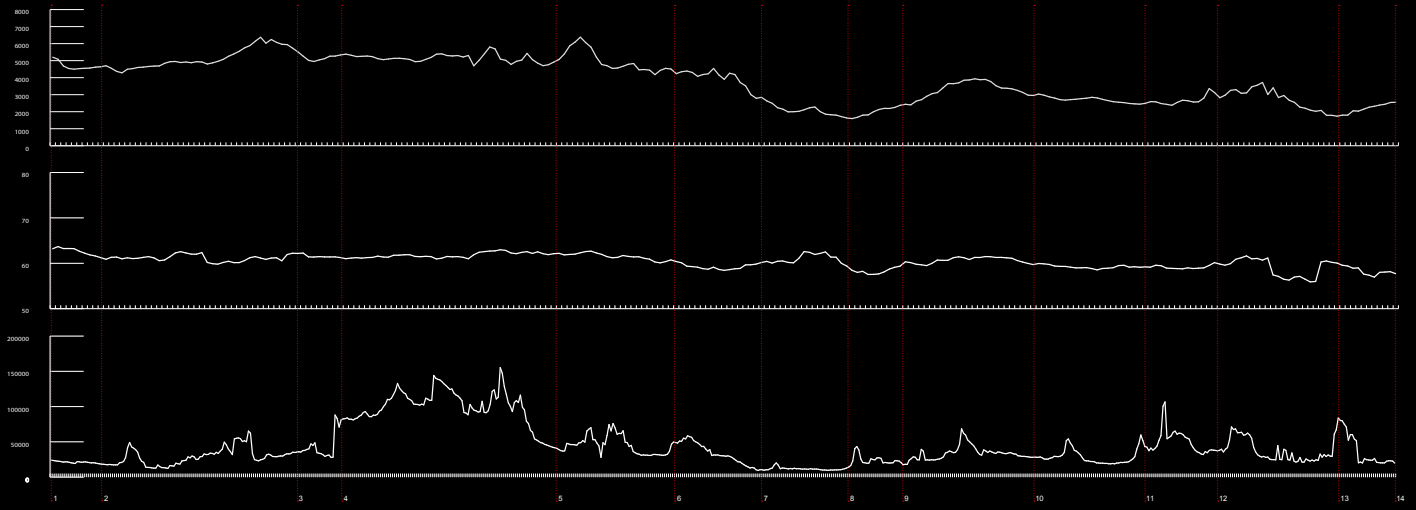
Measured Ambient Noise

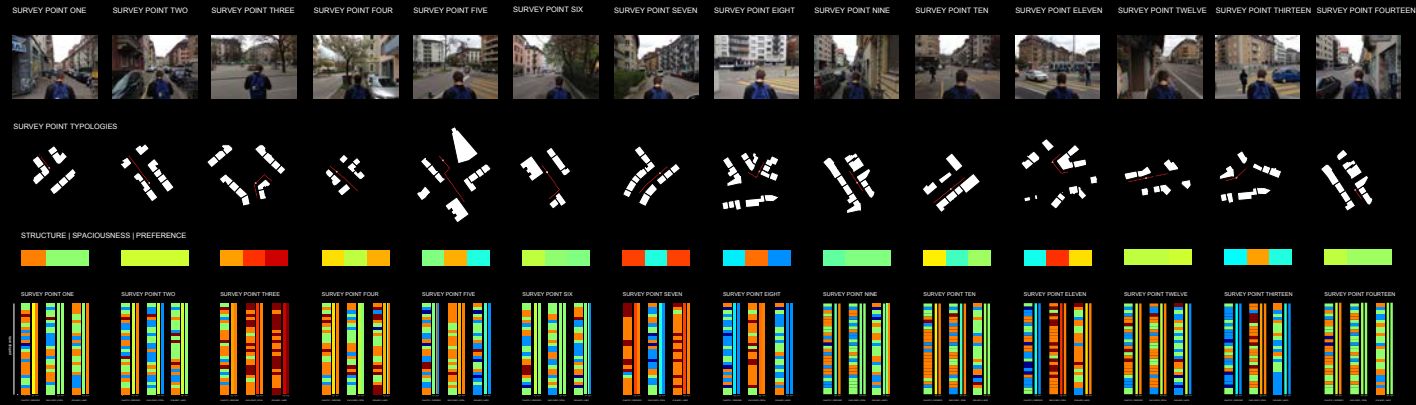


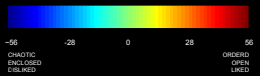
Perceived Noise











DARCH

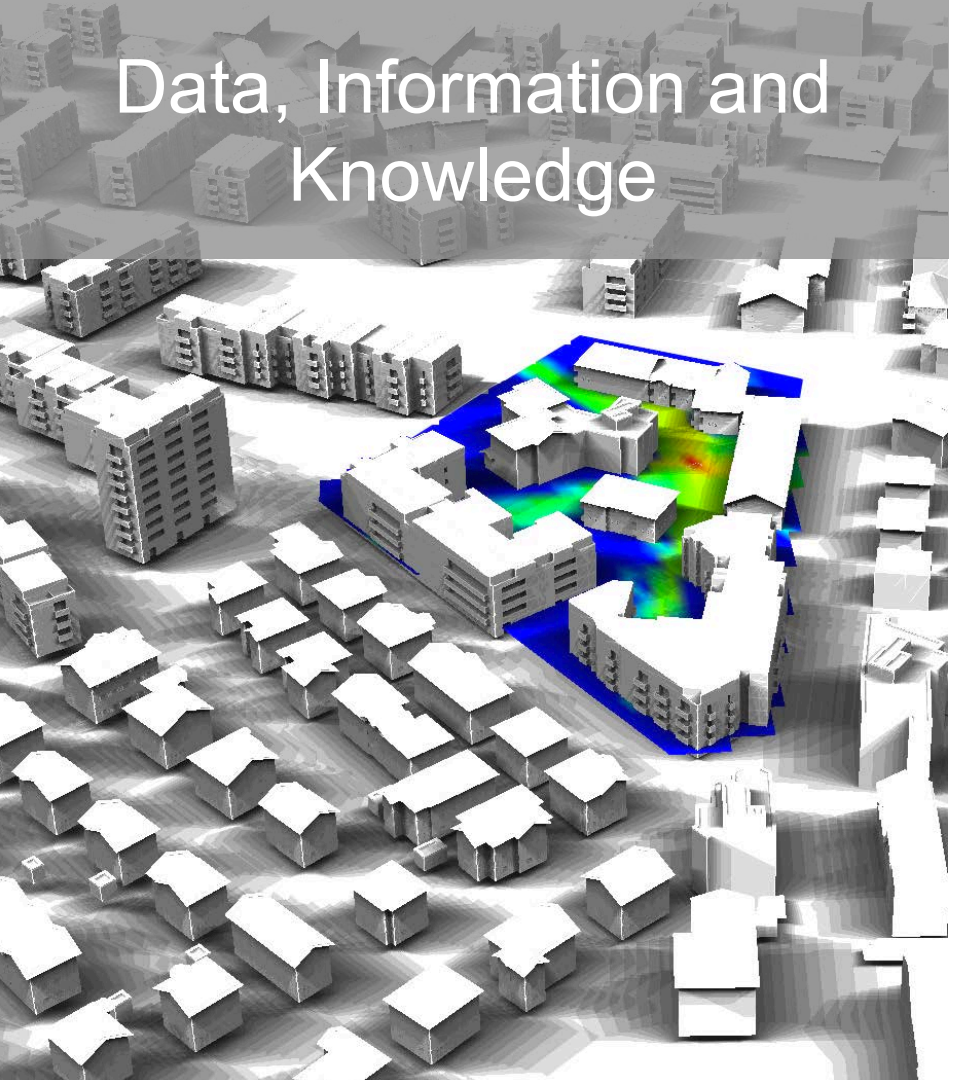
iA Chair of Information Architecture

Creative Data Mining FS2016 Final project from Jochen Aarts and Stéphane de Weck

Measurements for the Smart City:

Estefania Tapias

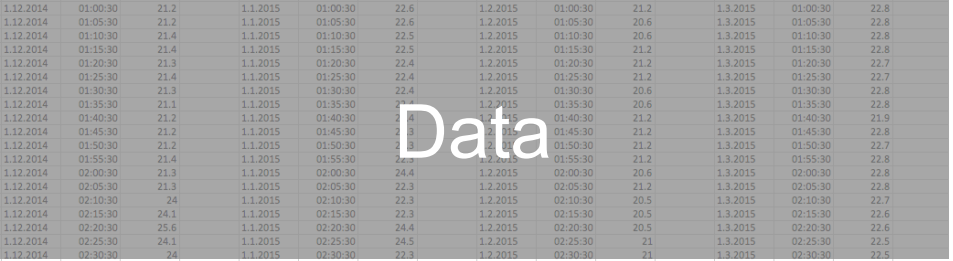
Data, Information and Knowledge



The transformation from data to information and knowledge is one of the most important activities in every society and are the elements that structure the Information Architecture concept.

Tapias, E. 2013. Shadow rage simulation and visibility analysis. Residential area in Altstetten, Zurich

Data



“We refer to data as the smallest entities of information, as values given to objects, expressions, functions or properties. Data becomes information by interpretation.”

Gerhard Schmitt, Information City

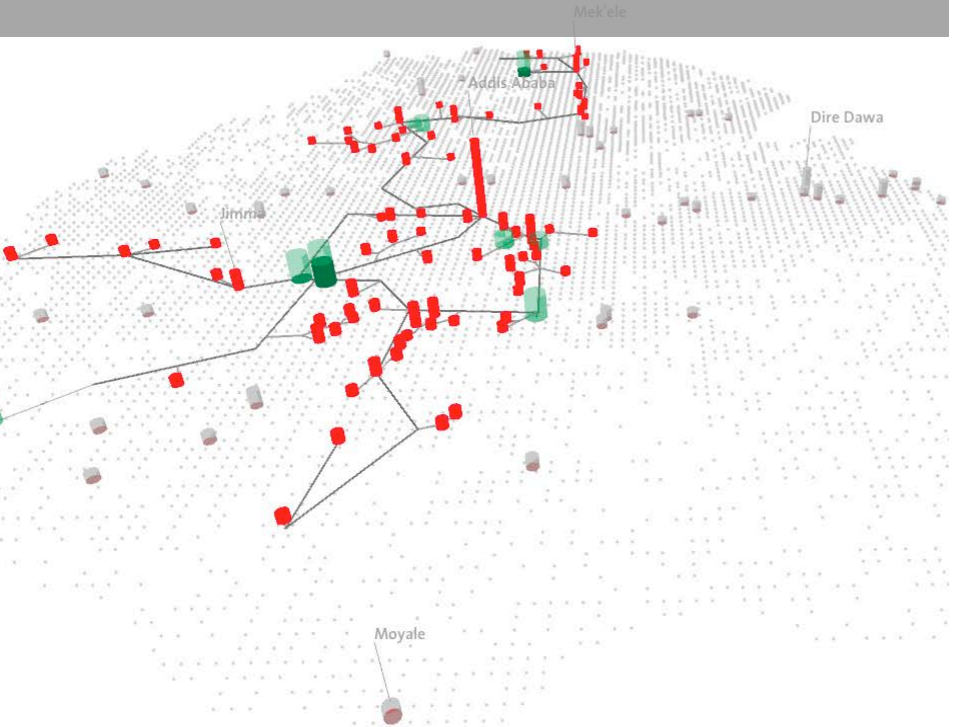
Tapias, E. 2016. Weather data from mini portable weather stations.

Information

Connections or relations of data results in information.

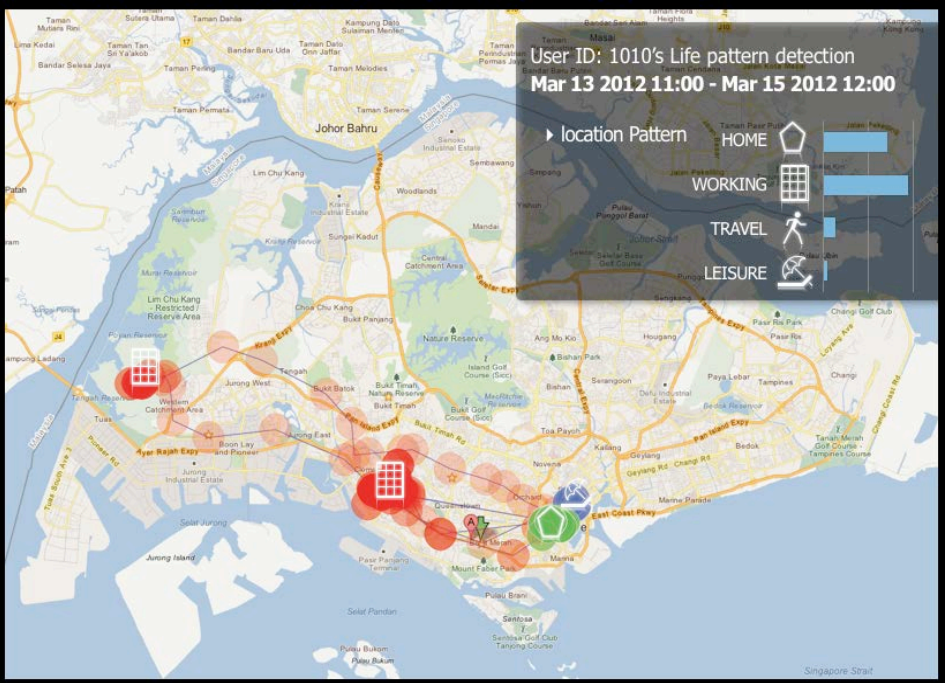
Readings from a weather station console showing weather parameters.

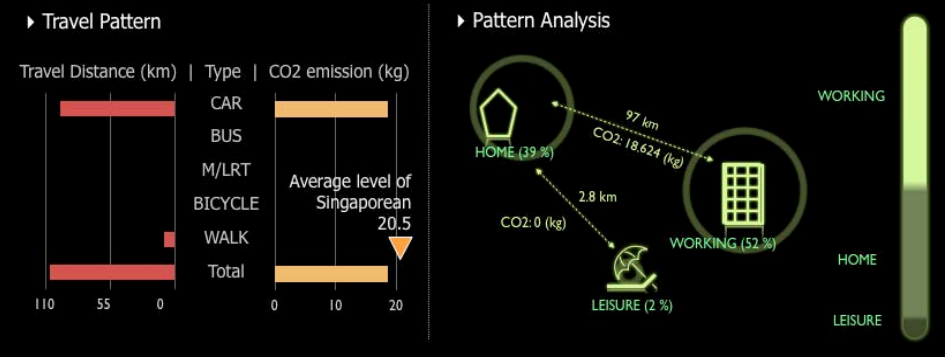
Data collection



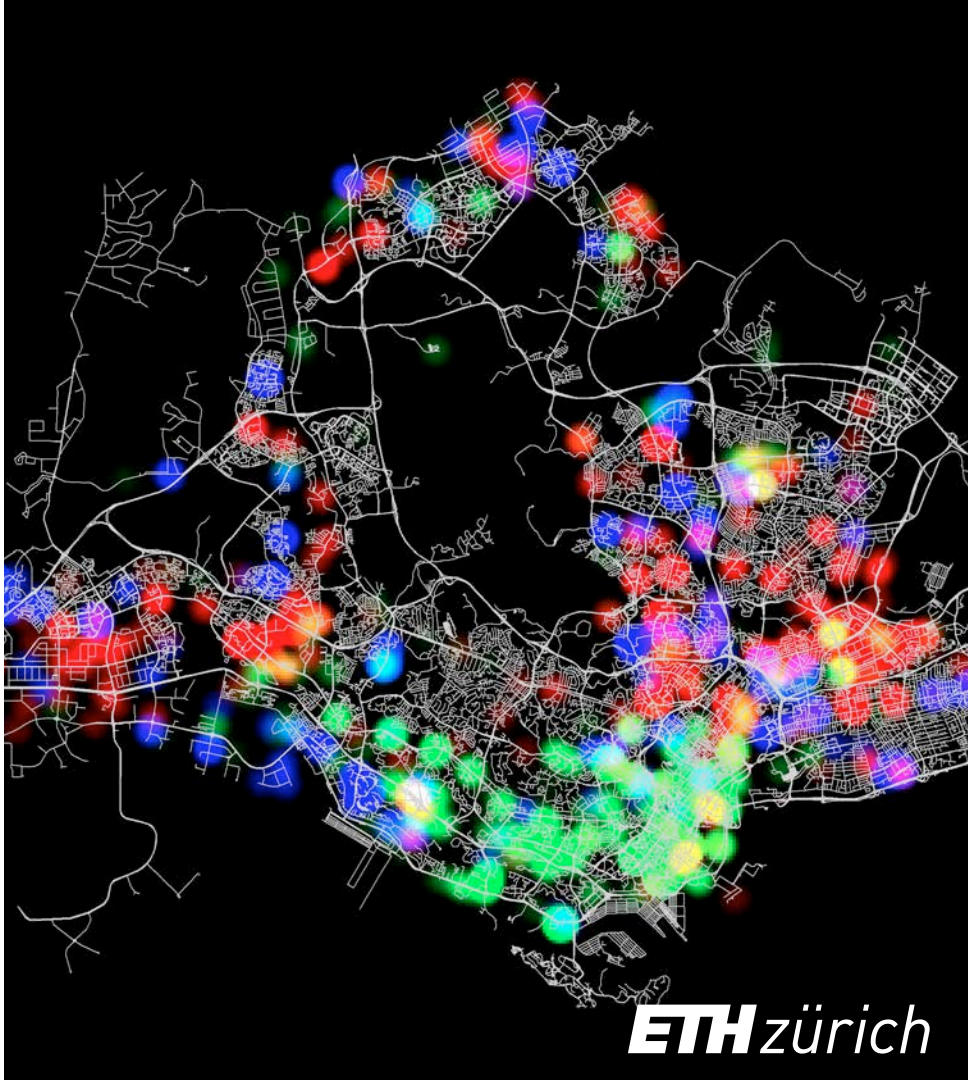
The basic assumption here is that we can only improve the performance of a system, such as a city, if we know its present performance.

Friedrich, E. 2013. An interactive tool for modelling Ethiopia's energy future.


User ID: 1010's Life pattern detection
Mar 13 2012 11:00 - Mar 15 2012 12:00
location Pattern
HOME
WORKING
TRAVEL
LEISURE
Johor Bahru
Singapore Strait

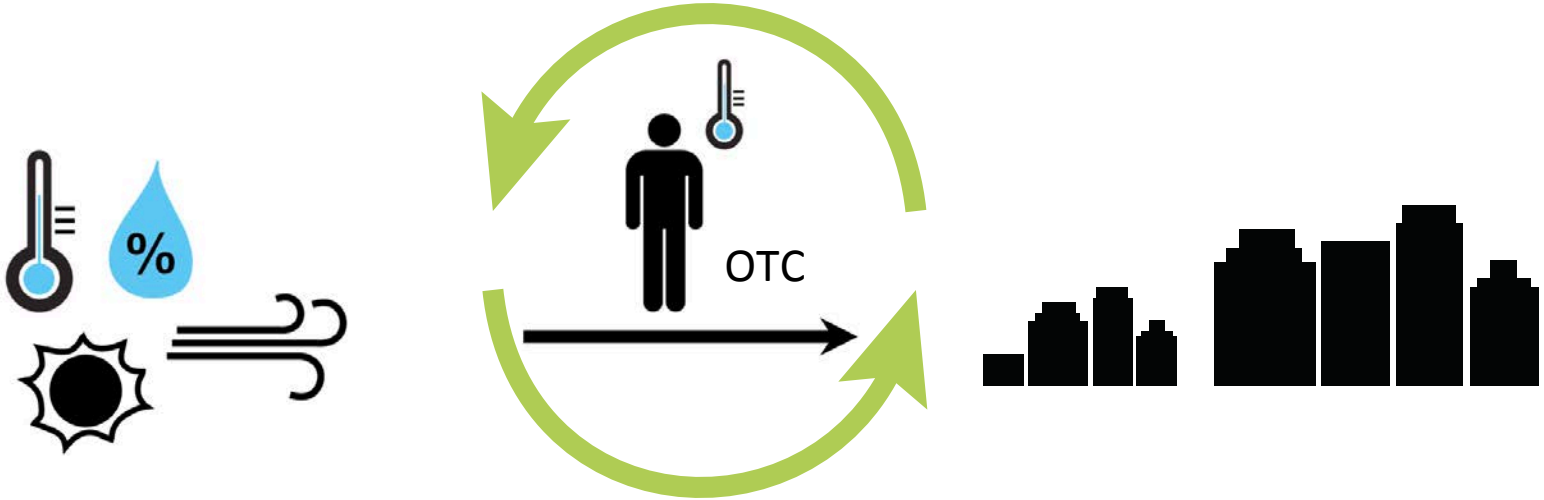

Travel Pattern
Travel Distance (km) | Type | CO2 emission (kg)
CAR
BUS
M/LRT
BICYCLE
WALK
Total
Average level of Singaporean 20.5
110
55
0
0
10
20

Pattern Analysis
97 km
CO2: 18.624 (kg)
HOME (39 %)
2.8 km
CO2: 0 (kg)
WORKING (52 %)
LEISURE (2 %)
WORKING
HOME
LEISURE


ETH zürich

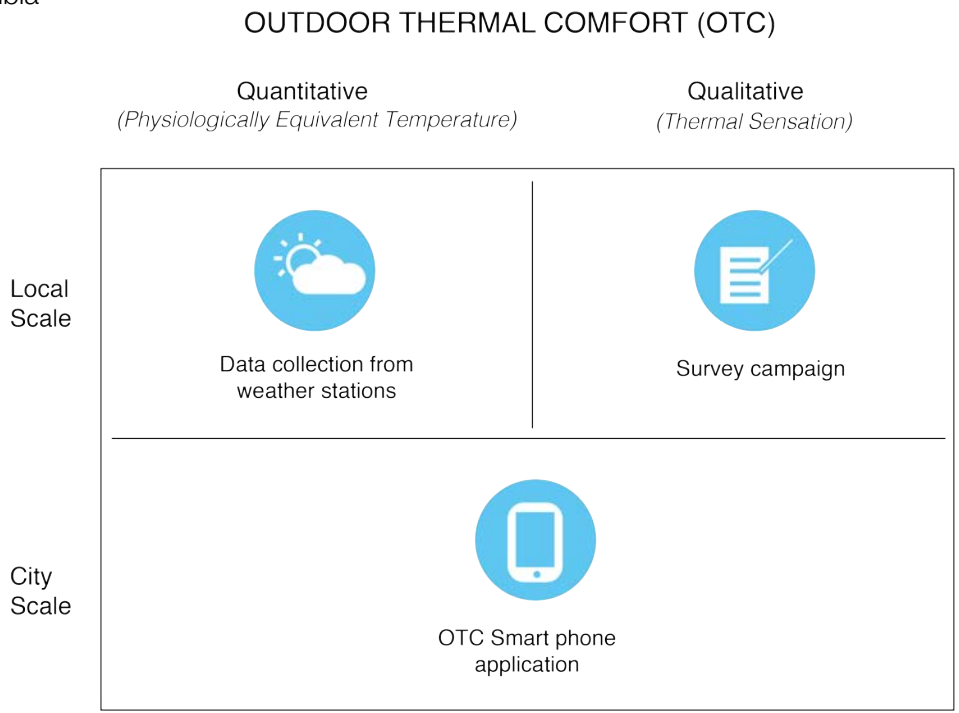
Climate-sensitive Urban Adaptation

Measurement Network – Barranquilla Colombia



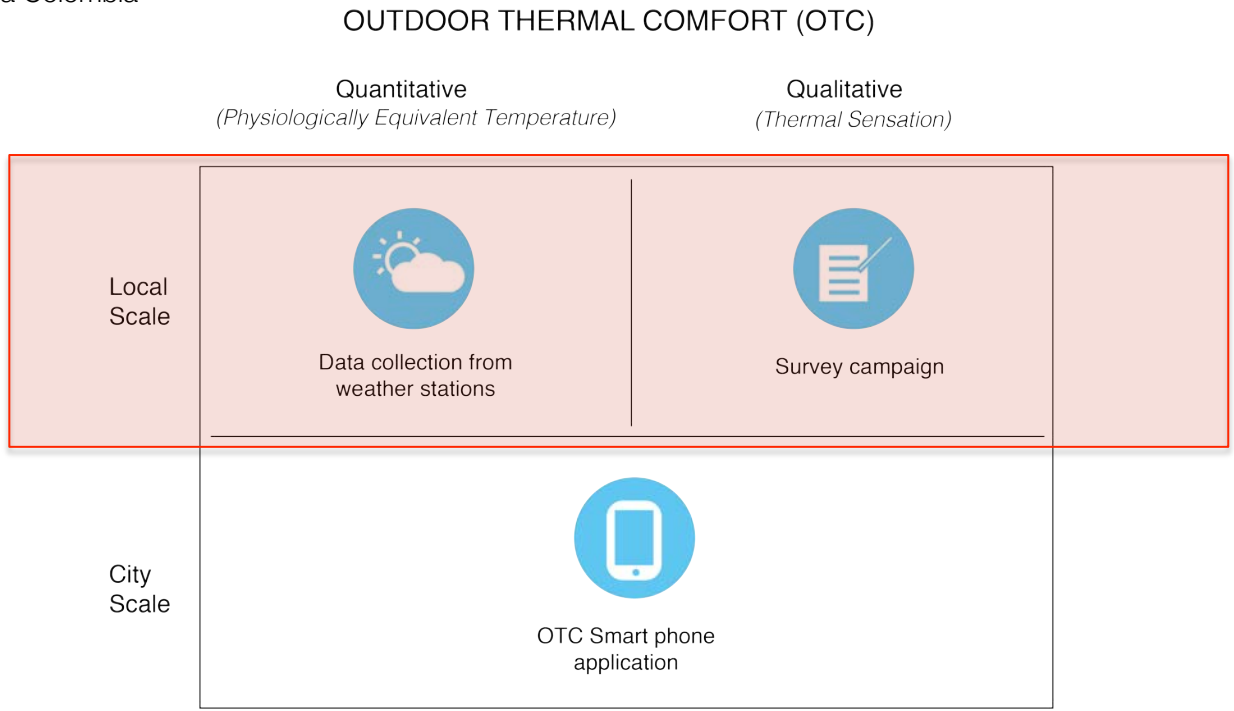
Climate-sensitive Urban Adaptation

Measurement Network – Barranquilla Colombia



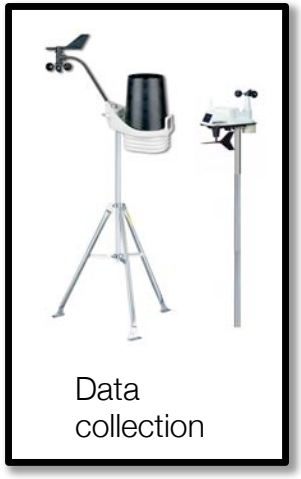
Climate-sensitive Urban Adaptation

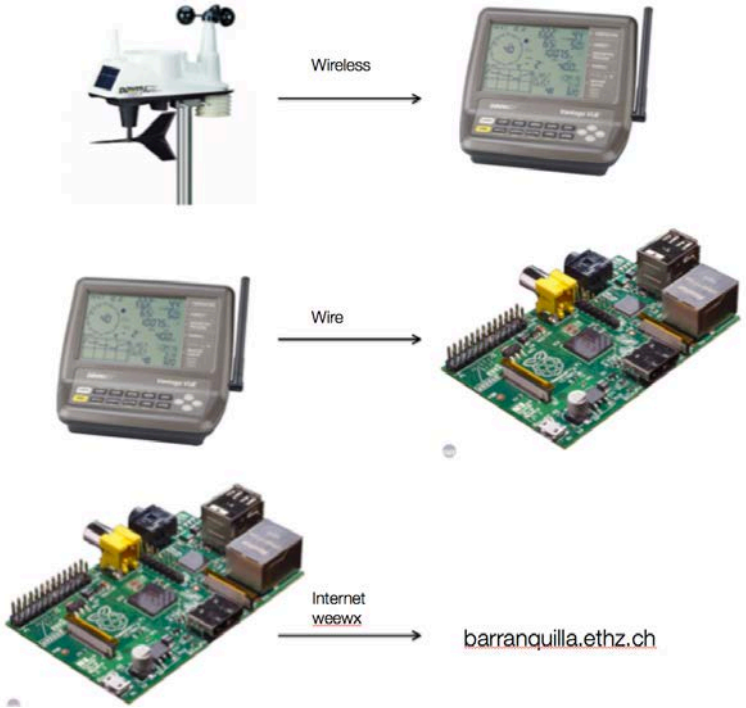
Measurement Network – Barranquilla Colombia



Climate-sensitive Urban Adaptation

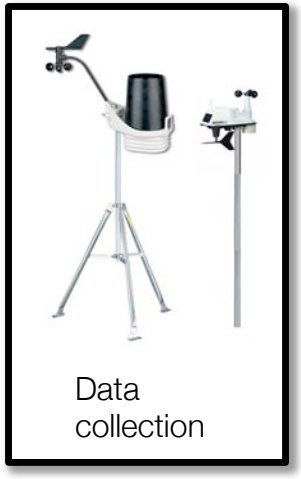
Measurement Network – Barranquilla Colombia





Climate-sensitive Urban Growth

Measurement Network – Barranquilla Colombia



Data collection

Outdoor

Indoor

Wireless

Wire

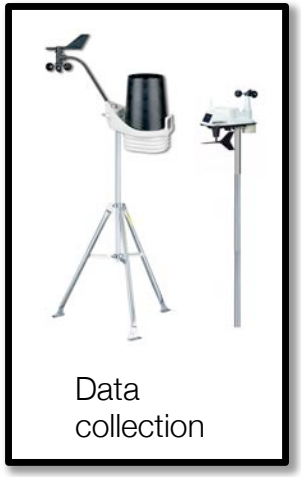
Internet
weewx

Server

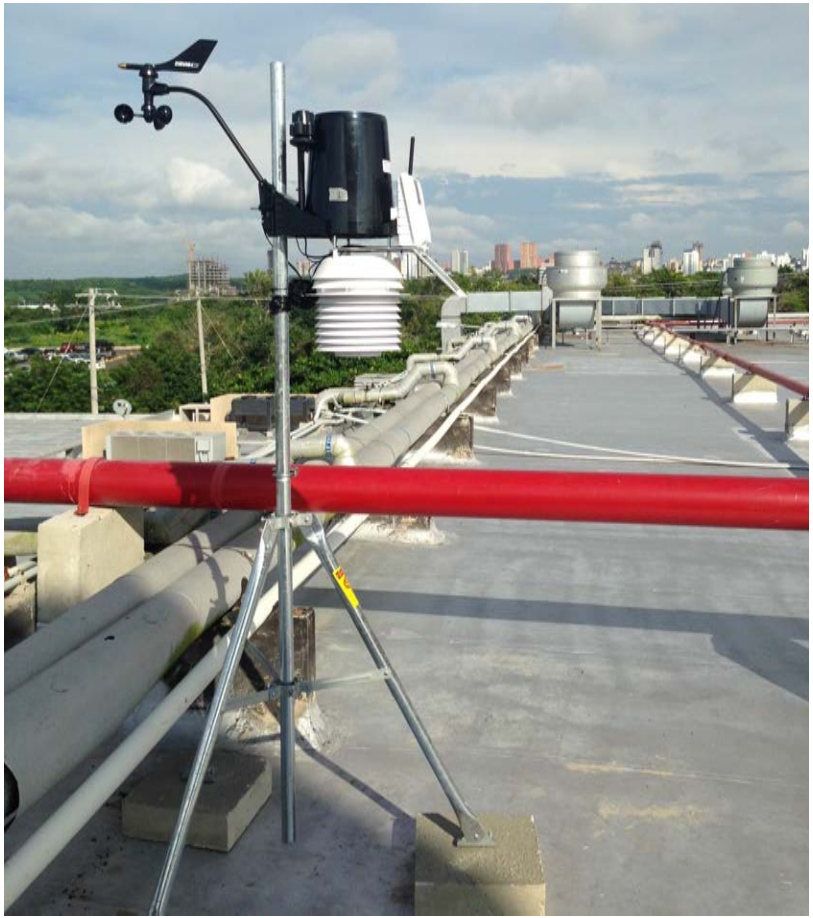
barranquilla.ethz.ch

Climate-sensitive Urban Growth

Measurement Network – Barranquilla Colombia

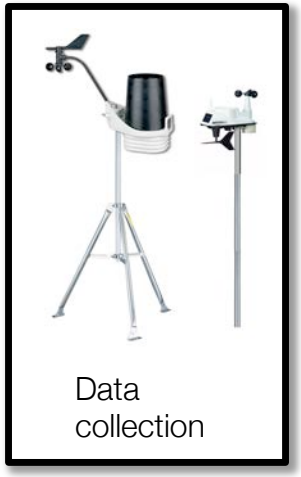


Data collection

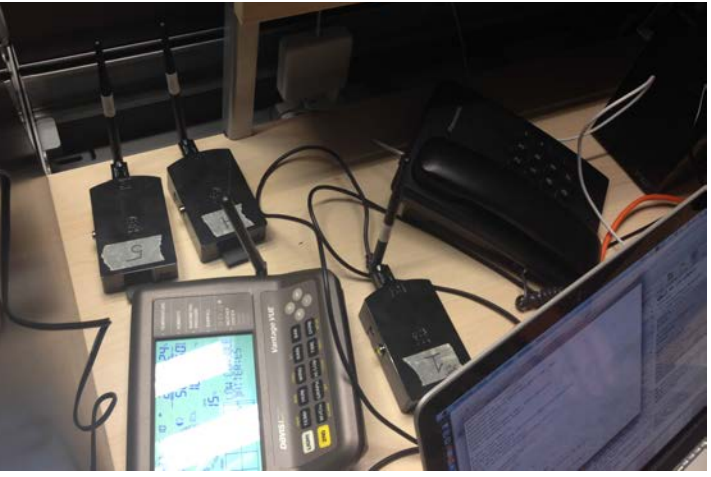


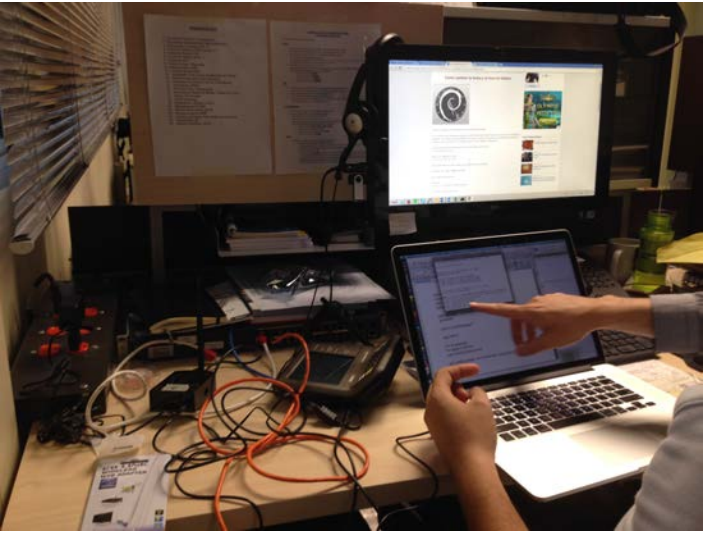
Climate-sensitive Urban Growth

Measurement Network – Barranquilla Colombia



Data collection





Barranquilla, Colombia

barranquilla.arch.ethz.ch/station1/year.html

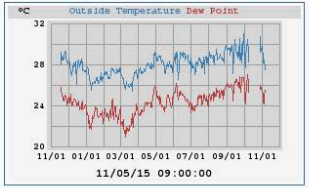
Barranquilla, Colombia

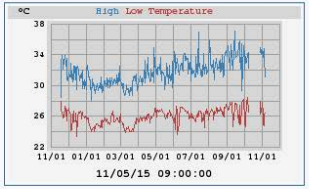
Yearly Weather Summary

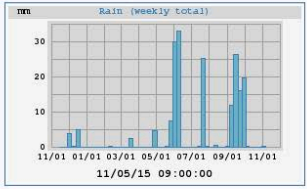
11/05/15 09:00:00

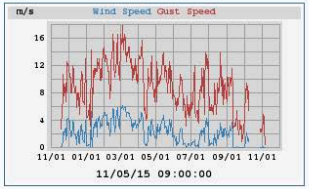
Calendar Year	
High Temperature Low Temperature	37.1°C at 09/13/15 14:09:07 23.6°C at 06/07/15 19:38:52
High Heat Index	51.4°C at 09/13/15 14:06:23
Low Wind Chill	23.6°C at 06/07/15 19:38:52
High Humidity Low Humidity	96% 06/03/15 06:16:15 52% 07/13/15 12:06:31
High Dewpoint Low Dewpoint	28.6°C 09/23/15 10:48:52 18.2°C 03/07/15 01:34:13
High Barometer Low Barometer	1013.2 hPa at 03/20/15 09:41:02 1001.5 hPa at 07/03/15 16:45:02
Rain Total	179.2 mm
High Rain Rate	137.2 mm/hr at 10/02/15 13:35:00
High Wind Speed	17.9 m/s from 61° at 03/04/15 00:19:28
Average Wind	2.3 m/s
RMS Wind	3.0 m/s
Vector Average Speed Vector Average Direction	2.6 m/s 35°
High Inside Temperature Low Inside Temperature	32.7°C at 06/29/15 13:29:02 21.8°C at 03/19/15 07:15:00
High UV Low UV	10.7 at 10/02/15 11:30:00 0.0 at 01/01/15 00:00:01
High ET Low ET	0.8 mm at 02/22/15 13:00:00 0.0 mm at 01/01/15 00:05:00
High Radiation Low Radiation	1225 W/m² at 08/18/15 11:21:52 0 W/m² at 01/08/15 00:03:26

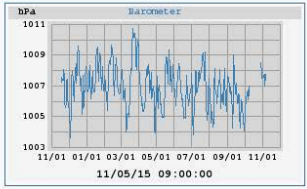
Yearly Statistics and Plots

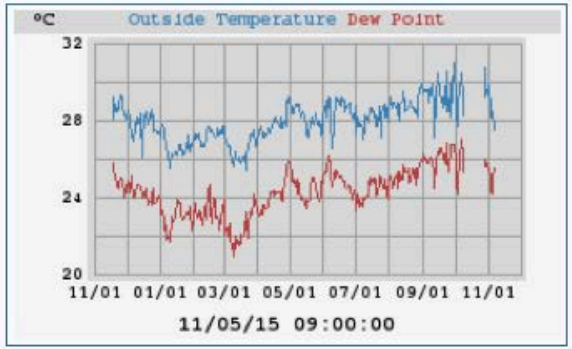


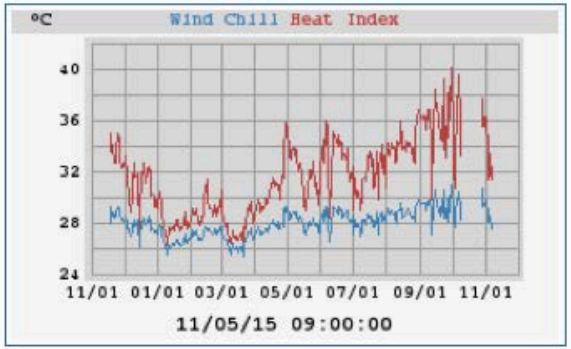


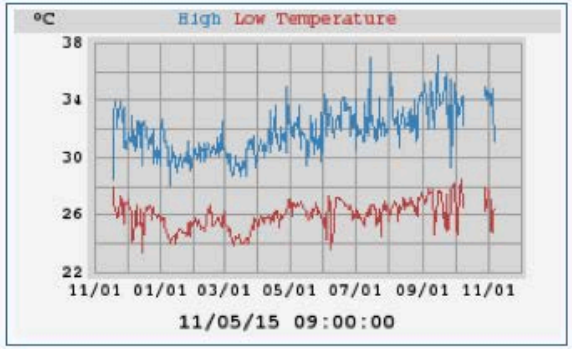


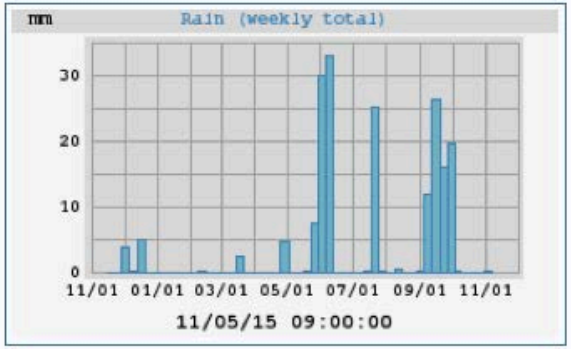


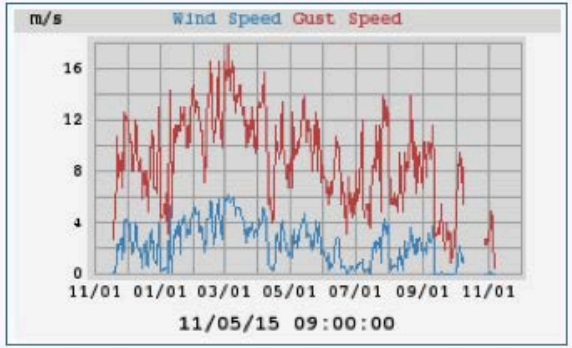


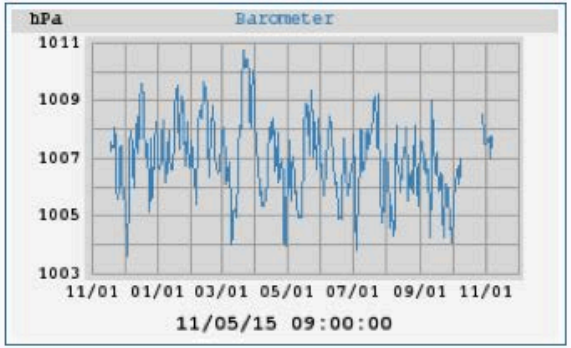

°C
Outside Temperature Dew Point
32
28
24
20
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00


°C
Wind Chill Heat Index
40
36
32
28
24
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00


°C
High Low Temperature
38
34
30
26
22
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00


mm
Rain (weekly total)
30
20
10
0
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00

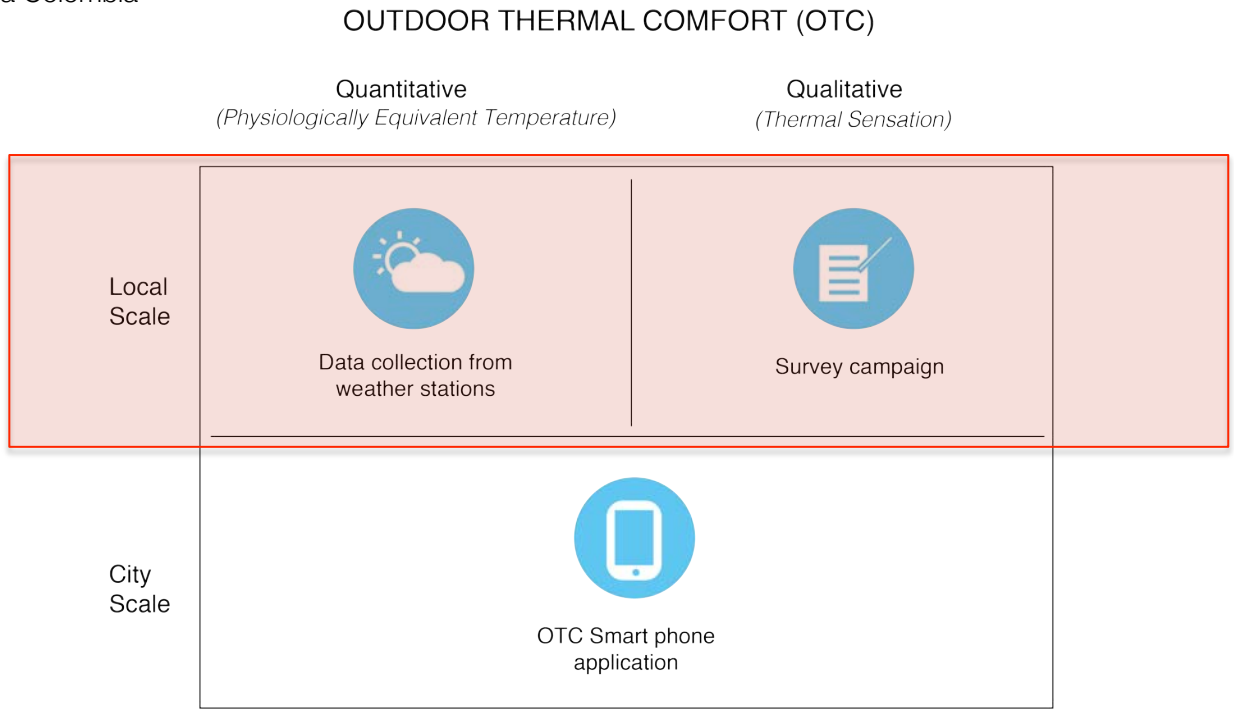

m/s
Wind Speed Gust Speed
16
12
8
4
0
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00


hPa
Barometer
1011
1009
1007
1005
1003
11/01 01/01 03/01 05/01 07/01 09/01 11/01
11/05/15 09:00:00

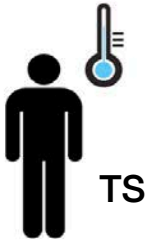
DAVIS

Climate-sensitive Urban Adaptation

Measurement Network – Barranquilla Colombia



Thermal sensation



Calculations & Correlations

Confort térmico en espacios exteriores en Barranquilla, Colombia: Correlación entre la respuesta humana de percepción térmica y los resultados del cálculo de índices de confort.

Investigadores Participantes : Dr. Kattia Villadiego - CUC
Msc. Estefanía Tapias - ETH

1. Datos de Control

Folio:	Fecha:		Hora Inicial	Emplazamiento	
Encuestador(a)			Hora Final	☐ Sol	☐ Sombra

2. Percepción del confort térmico

-3	-2	-1	0	1	2	3
2.1 Sensación Térmica		***¿Que siente usted en este momento con respecto a la temperatura?***				
☐ Mucho frio	☐ Frio	☐ Un poco de frio	☐ Ni frio/Ni calor	☐ Un poco de calor	☐ Calor	Mucho Calor
2.2 Grado de Satisfacción		***¿Cuál es su grado de satisfacción respecto a la temperatura en este momento?***				
☐ Satisfecho		☐ Neutro		☐ Insatisfecho		
2.3 Preferencia Térmica		***¿Que preferiría sentir en este momento con respecto a la temperatura?***				
☐ Mas fresco		☐ Igual, sin cambios			☐ Mas Calor	
2.4 Percepción de la humedad		***¿Que siente usted en este momento con respecto a la humedad?***				
☐ Muy húmedo	☐ Húmedo	☐ Un poco húmedo	☐ Normal	☐ Un poco seco	☐ Seco	☐ Muy Seco
2.5 Grado de Satisfacción		***¿Cuál es su grado de satisfacción respecto a la humedad en este momento?***				
☐ Satisfecho		☐ Neutro		☐ Insatisfecho		
2.6 Preferencia		***¿Cómo preferiría sentir la humedad en este momento?***				
☐ Más Húmedo		☐ Igual, sin cambios			☐ Más seco	
2.7 Percepción del viento		***¿Cómo siente el viento en este momento?***				
☐ Ningún Viento	☐ Poco viento	☐ Viento moderado		☐ Viento muy fuerte		
2.8 Grado de Satisfacción		***¿Cuál es su grado de satisfacción respecto al viento en este momento?***				
☐ Satisfecho		☐ Neutro		☐ Insatisfecho		
2.9 Preferencia		***¿Cómo preferiría sentir el viento en este momento?***				
☐ Preferiría mas viento		☐ Igual sin cambios		☐ Preferiría menos viento		
2.10 Percepción del asoleamiento		***¿Cómo siente el sol en este momento?***				
☐ Sin Sol	☐ Poco Sol	☐ Sol un poco fuerte		☐ Sol muy fuerte		
2.11 Grado de Satisfacción		***¿Cuál es su grado de satisfacción respecto al sol en este momento?***				
☐ Satisfecho		☐ Neutro		☐ Insatisfecho		
2.12 Preferencia sobre el tema		***¿Cómo preferiría sentir el sol en este momento?***				
☐ Preferiría mas sol		☐ Igual, sin cambios		☐ Preferiría menos sol		
2.13 Percepción del confort térmico			***En general usted se siente con respecto al clima:***			
☐ Confortable				☐ Inconfortable		

3. Datos del individuo

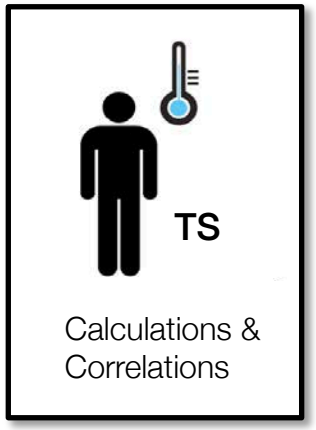
3.1 Sexo	☐ Hombre	☐ Mujer	
3.2 Estatura (m):	**3.3 Peso (Kg):**	**3.4 Edad:**	
3.5 ¿Ha vivido siempre en Barranquilla?	☐ Si	☐ No	
3.6 Si NO, Con respecto a Barranquilla su lugar de procedencia es:	☐ Mas frio	☐ Igual	☐ Mas caliente
3.7 ¿Desde cuando está en Barranquilla?	☐ 1 semana	☐ > 1 mes	☐ 1 - 6 Meses ☐ > 6 Meses
3.8 Con respecto a otros usted generalmente siente:	☐ Mas frio	☐ Igual	☐ Mas caliente

4. Datos por observación

4.1 Vestimenta	Observación en caso de otro tipo de vestimenta:	☐ Gorra
☐ Ligera ropa de verano		☐ Sombrilla
☐ Cubierta ropa de invierno		☐ Gafas
4.2 Actividad *(En el momento)*	☐ Pasiva (Sentado/de pie inmóvil)	☐ Moderada (Marcha/de pie en movimiento) ☐ Intensa (Trote/Marcha rapida)
Observaciones:		

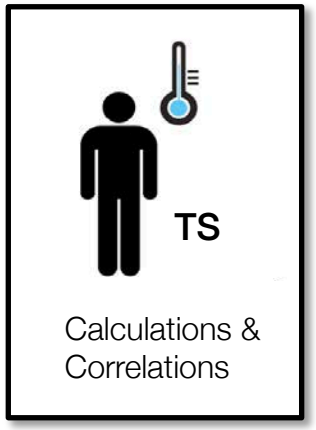
Location: UniNorte – stations

Thermal sensation



Calculations &
Correlations

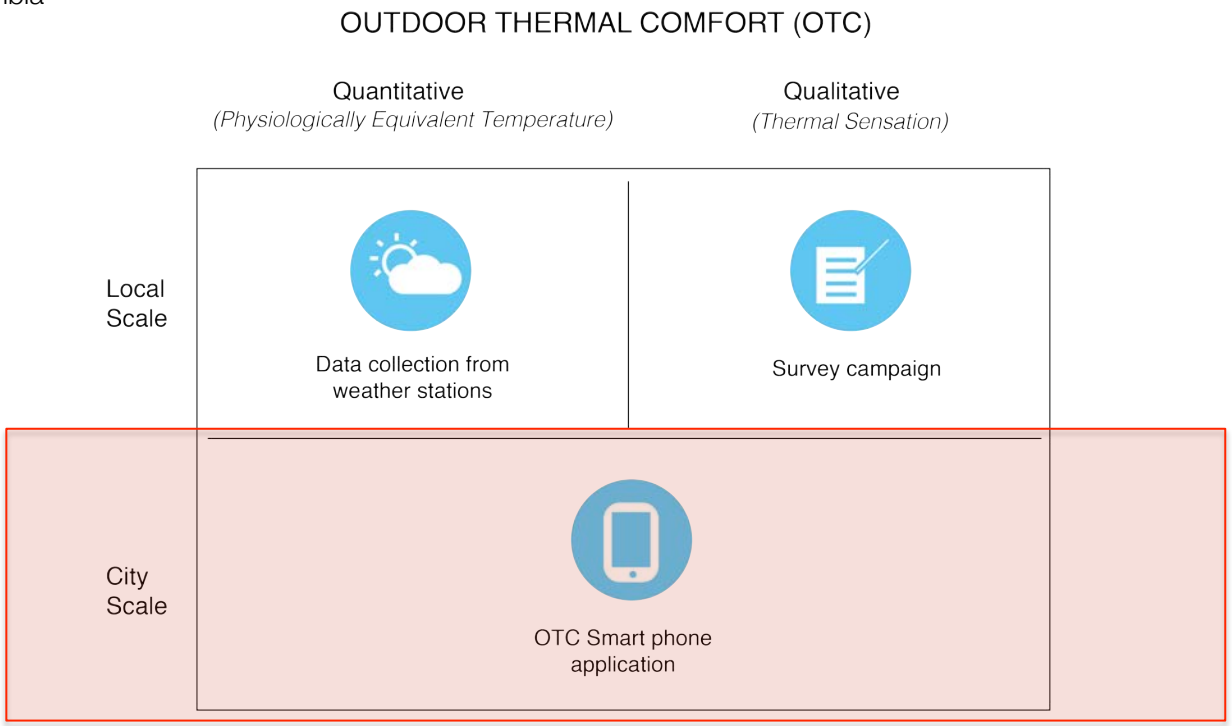
Thermal sensation



Calculations &
Correlations

Climate-sensitive Urban Adaptation

Crowdsourcing – Barranquilla Colombia



Proyecto Confort

www.proyectoconfort.co

Español English

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Proyecto Confort
Urban Climate
Information Cities

The Comfort Project is an initiative for the city of Barranquilla seeking to collect thermal comfort data from citizens. The project was born in the framework of a research project driven by the ETH Zurich.

Download the app

Citizen entries

Team

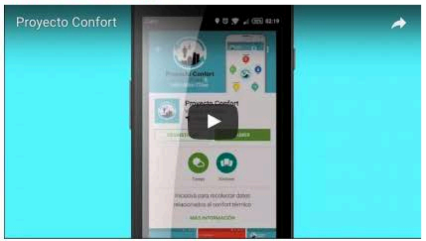
What participants says

"The purpose of this research proposal is to bring together two research projects focusing on the human outdoor thermal comfort in the City of Barranquilla. The goal is to correlate the outdoor thermal comfort perception from the people and the outdoor thermal comfort index calculations"

Descripcion

The purpose of this research proposal is to bring together two research projects focusing on the human outdoor thermal comfort in the City of Barranquilla. The goal is to correlate the outdoor thermal comfort perception from the people and the outdoor thermal comfort index calculations

How to use the app:



Contact:
taplas@arch.ethz.ch

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Urban Climate
Information Cities

ETH zurich

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Proyecto Confort
Urban Climate &
Information Cities

El Proyecto Confort es una iniciativa para la ciudad de barranquilla que busca recolectar datos con relación al confort térmico de los ciudadanos. El proyecto nació en el marco de un proyecto de investigación científica impulsado por la ETH Zurich.

Descargue el app

Respuestas

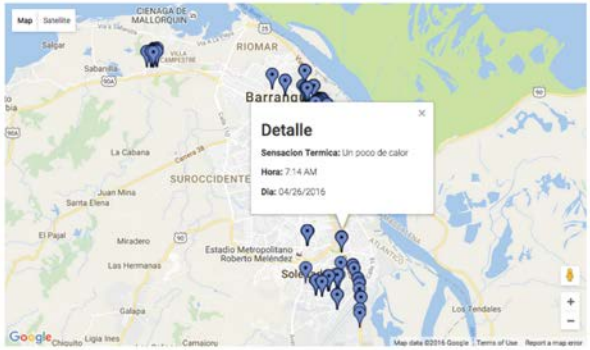
Miembros del proyecto

Testimonios de participantes

"El proyecto busca motivar a los estudiantes de tres universidades de la ciudad de Barranquilla a contestar una serie de preguntas relacionadas con la sensación termina en espacios abiertos de la ciudad. La maratón dura dos meses y busca recolectar la mayor cantidad de datos."

Información por:

Ultimas entradas
Fecha
Mañana
Tarde
Noche
Opciones mas seleccionadas



Testimonios de participantes

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Proyecto Confort
Urban Climate &
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iA ETH zürich

INFORMATION ARCHITECTURE OF CITIES

MOOC exercises
Data collection

MOOC & ETH iA course

	DATE												
COURSE	13.02.2017	20.02.2017	27.02.2017	06.03.2017	13.03.2017	20.03.2017	27.03.2017	03.04.2017	10.04.2017	17.04.2017	24.04.2017	01.05.2017	08.05.2017	15.05.2017
MOOC EDX	**Week 1** Warm-up week	**Week 2** Introduction to the course	**Week 3** Smart cities	**Week 4** Big data and stocks and flows of information	**Week 5** Measurements and simulations in the city	**Week 6** Citizen-design science	**Week 7** Complexity science	**Week 8** Smart Governance	**Week 9** Smart Livability	**Week 10** From smart cities to responsive cities	**No MOOC**	**No MOOC**	**No MOOC**	**No MOOC**
iA COURSE	**No lecture**	**Lecture 1** Introduction to the course	**Lecture 2** Smart cities	**Lecture 3** Big data and stocks and flows of information	**Lecture 4** Measurements and simulations in the city	**Seminar week**	**Lecture 5** Citizen-design science	**Lecture 6** Complexity science	**Lecture 7** Smart Governance	**No lecture**	**No lecture**	**No lecture**	**Lecture 8** Smart Livability	**Lecture 9** From smart cities to responsive cities
*Excercises MOOC**		**Week 2** QUA-KIT Online design tool			**Week 5** Data collection app	**Week 6** QUA-KIT Online design tool			**Week 9** QUA-KIT Online design tool		**No MOOC**	**No MOOC**	**No MOOC**	**No MOOC**
Excercises iA course	**No lecture**	**Lecture 1** Introduction to the course **Exercise:** QUA-KIT Online design tool	No exercise	No exercise	**Lecture 4** Measurements and simulations in the city **Exercise:** Data collection app	**Seminar week**	No exercise	No exercise	**Lecture 7** Smart Governance **Exercise:** QUA-KIT Online design tool	No exercise	No exercise	No exercise	No exercise	**Lecture 9** From smart cities to responsive cities **Final presentation**

ETH zürich

https://www.edx.org/

Week 2 (19/09/16 - 25/09/16): Introduction

Week 3 (26/09/16 - 02/10/16): Smart Cities

Week 4 (03/10/16 - 09/10/16): Big data and stocks and flows of information

Week 5 (10/10/16 - 16/10/16): Measurements and Simulations in the City

5.1 Information City

5.2 Data Collection

5.3 Smarter, resilient, interactive and participatory cities

5.4 Additional Material

5.5 Review Questions
Review Question due Nov 28, 2016 at 00:00 UTC

5.6 Compulsory Exercise 2
Compulsory Exercise due Nov 28, 2016 at 00:00 UTC

Week 6 (17/10/16 - 23/10/16): Citizen-Design Science

Week 7 (24/10/16 - 30/10/16): Urban Complexity Science

Week 8 (31/10/16 - 6/11/16): Smart Governance

Week 9 (7/11/16 - 13/11/16): Smart Liveability

Week 10 (14/11/16 - 20/11/16): From Smart Cities to Responsive Cities

Online data collection and visualisation tool

VIEW UNIT IN STUDIO

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Exercise:

This week you learned about data collection in the city. In this exercise, you can put into action what you learned and collect qualitative and quantitative data in your city. Select one urban area in your city and collect data from the following variables:

1. **Temperature (in degrees Celsius, °C)**

(you can use a simple tool like a thermometer or download a smart phone application)

2. **Thermal perception**

(from 1 to 10 – 1 being "very cold" and 10 "very warm")

3. **Noise (in decibel, dB)**

(you can use a sound/decibel meter with a smart phone application)

4. **Noise perception**

(from 1 to 10 - 1 being "no noise" and 10 being "a lot of noise" -)

5. **General satisfaction**

(Do you like the place you selected? from 1 to 10 – 1 being "not at all" and 10 "yes, very much" -)

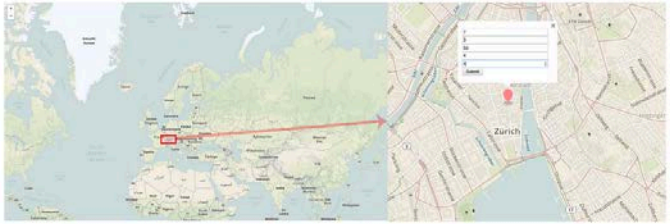
(Note: Please make sure you are in an outdoor space.)

If you do not own a smartphone please skip variables 1 and 3.

When you finish, please enter your data together with the date and time of your recording in our online data collection tool using the following link;

The World Data Map

http://ia.arch.ethz.ch/datamap/



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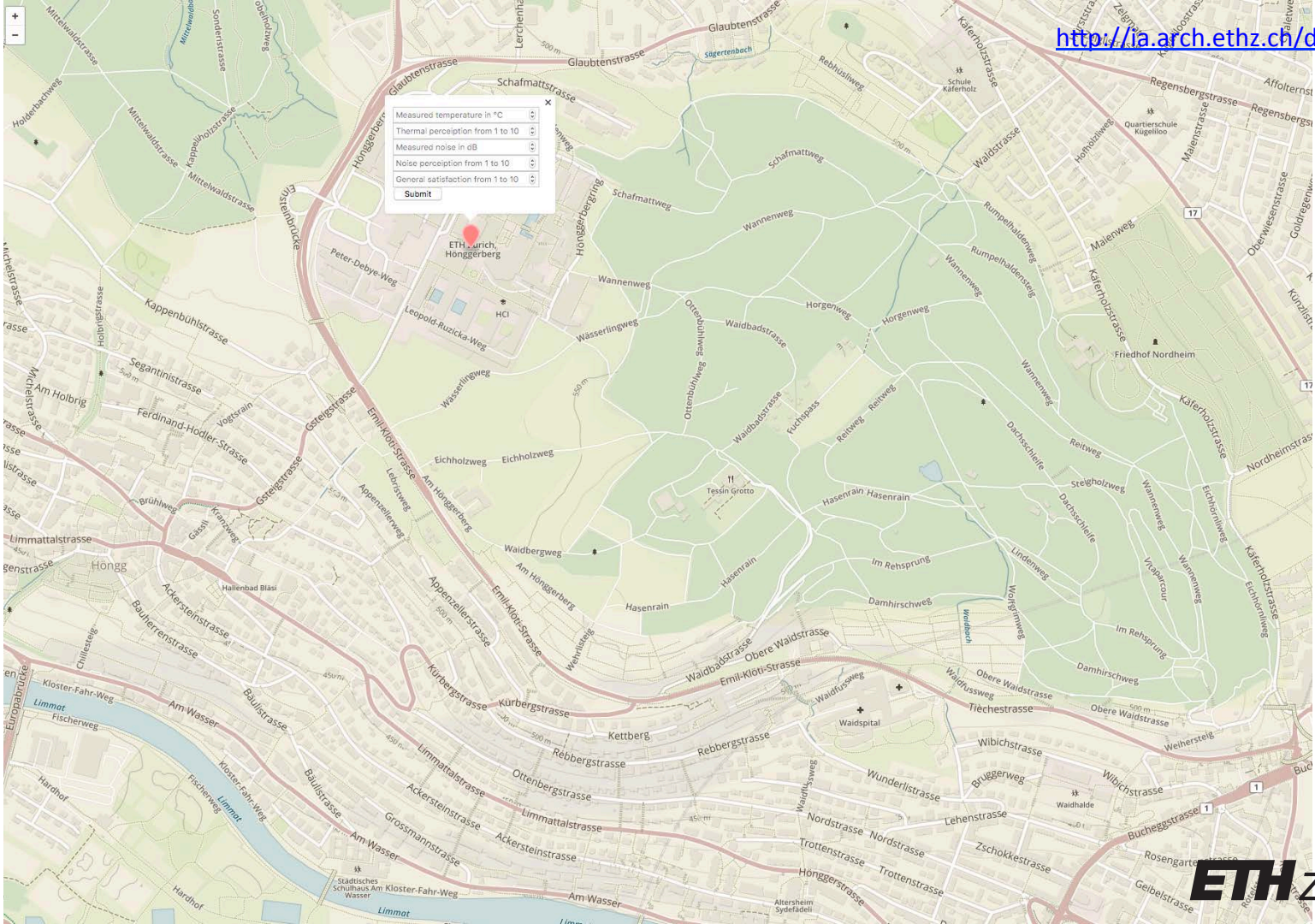
Measured temperature in °C
Thermal perception from 1 to 10
Measured noise in dB
Noise perception from 1 to 10
General satisfaction from 1 to 10
Submit
ETH Zürich, Hönggerberg
HCI
Peter-Debye-Weg
Leopold-Ruzicka-Weg
Honggerbergring
Schafmattstrasse
Schafmattweg
Wannenweg
Wasserlingweg
Ottenbühlweg
Waldbadstrasse
Horgenweg
Rumpelhaldenweg
Rumpelhaldensteig
Maienweg
Kappenbühlstrasse
Segantinistrasse
Ferdinand-Hodler-Strasse
Vogtsrain
Am Holbrig
Holbrigstrasse
Gstelgstrasse
Emil-Klöti-Strasse
Am Hönggerberg
Eichholzweg
Fuchspass
Reitweg
Dachsschleife
Steigholzweg
Hasenrain
Im Rehsprung
Damhirschweg
Lindenweg
Wolfgrimweg
Vrenelirain
Eichhörnliweg
Tessin Grotto
Friedhof Nordheim
Käferholzstrasse
Nordheimstrasse
Glaubtenstrasse
Sägertenbach
Rebhüslweg
Schule Käferholz
Regensbergstrasse
Affolternstrasse
Quartierschule Kügeliloo
Waldstrasse
Hofholzweg
Maienstrasse
Oberwiesenstrasse
Goldregenweg
Mittelwaldstrasse
Mittelwaldweg
Sonderstrasse
Kappelholzstrasse
Holderbachweg
Lerchenhaldenweg
Eichensteinbrücke
Honggerbergstrasse
Chilestieg
Limmattalstrasse
Grubweg
Gasselweg
Kranzweg
Appenzellerweg
Lebrisweg
Appenzellerstrasse
Hallenbad Bläsi
Waldbergweg
Weinbergsteig
Ackersteinstrasse
Baufferrenstrasse
Baullistrasse
Kloster-Fahr-Weg
Fischerweg
Limmat
Am Wasser
Europabrücke
Hardhof
Kurbergstrasse
Kettberg
Rebbergstrasse
Ottenbergstrasse
Grossmannstrasse
Städtisches Schulhaus Am Wasser
Altersheim Sydefädeli
Obere Waldstrasse
Waldfussweg
Waidspital
Tiechestrasse
Wibichstrasse
Bruggerweg
Wunderlistrasse
Lehenstrasse
Waidhalde
Buchegstrasse
Nordstrasse
Zschokkestrasse
Trottenstrasse
Honggerstrasse
Geibelstrasse
Rosengartenstrasse
Weiherstieg
Wolfbach
Hönggg
Hönggerberg
Hasenrain
Eichholzweg
Waldbadstrasse
Emil-Klöti-Strasse
Obere Waldstrasse
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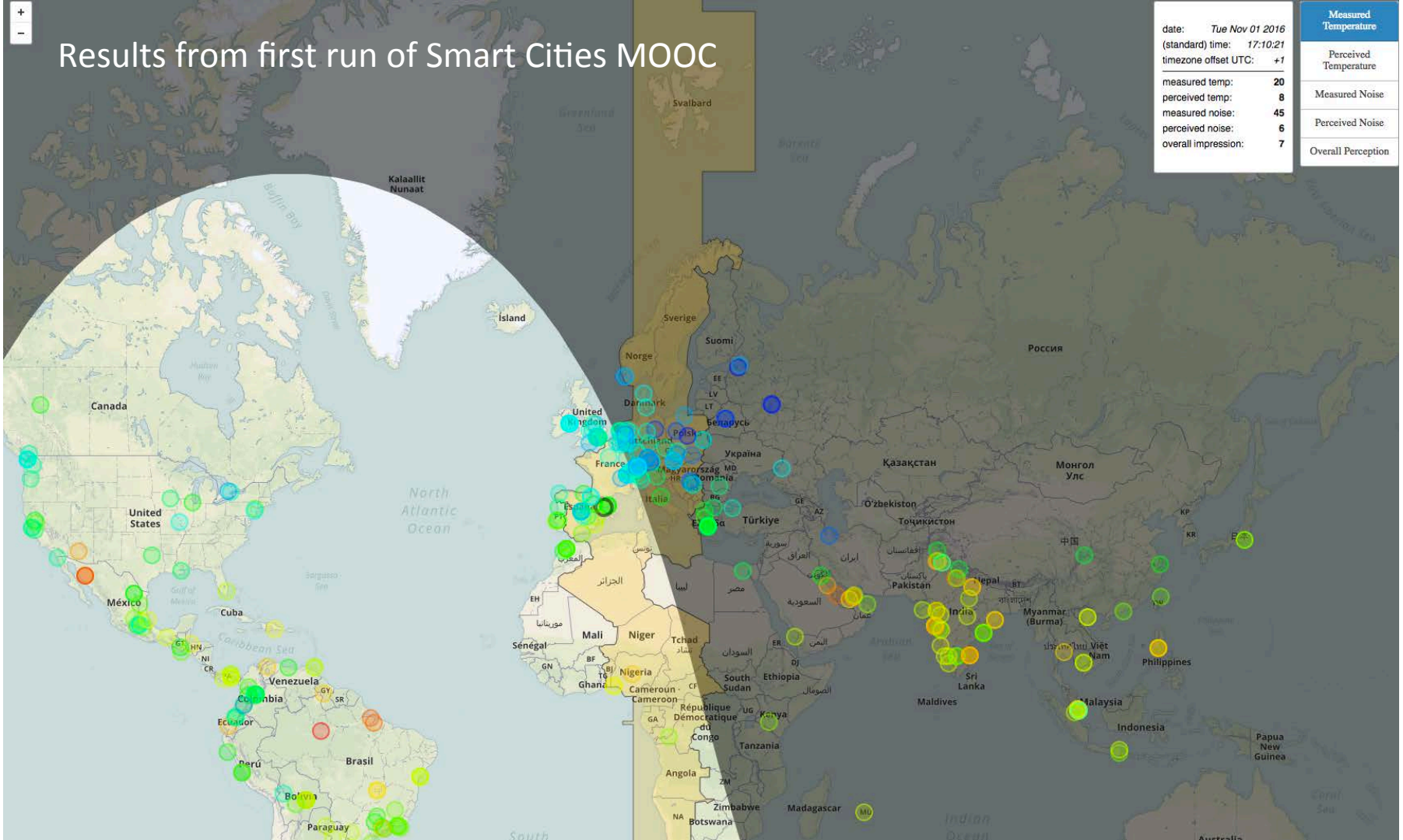
Maienweg
Käferholzstrasse
Friedhof Nordheim
Tessin Grotto
Eichholzweg
Eichhörnliweg
Vrenelirain
Wolfgrimweg
Lindenweg

Results from first run of Smart Cities MOOC



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Big data and stocks and flows of information
Measurements and simulations in the city
Citizen-design science
Complexity science
Smart governance
Smart livability
From smart cities to responsive cities
My courses

Upload the document here in moodle by 27.02.2017

MOOC discussion panel: This first week you will be ask to make groups of 3 to 4 people and start looking at the discussion developing in the discussion panel of the MOOC. After seminar week (27.03.2017) each group has to choose one interesting discussion and start participating by writting comments about the topic beign discussed. The last lecture (15.05.2017) each group will have a 7 minutes presentation about the discussion they followed and how they contributed.

Lecture 1

Smart cities

Lecture 2

Big data and stocks and flows of information

Lecture 3

Measurements and simulations in the city

Compulsory Exercise 2

(BASED ON THE EXERCISE ON THE SMART CITIES MOOC)

Instructions for Exercise 2:

This week you learned about data collection in the city. In this exercise, you can put into action what you learned and collect qualitative and quantitative data in your city. Select one urban area in your city and collect data from the following variables:

1. **Temperature (in degrees Celsius, °C)**

(you can use a simple tool like a thermometer or download a smart phone application)

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(from 1 to 10 – 1 being "very cold" and 10 "very warm")

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(from 1 to 10 - 1 being "no noise" and 10 being "a lot of noise" -)

5. **General satisfaction**

(Do you like the place you selected? from 1 to 10 – 1 being "not at all" and 10 "yes, very much" -)

(Note: Please make sure you are in an outdoor space.)

If you do not own a smartphone please skip variables 1 and 3.

When you submit your data you don't need to mention your date and time as it will be recorded by app. You can access online data collection tool using the following link:

http://ia.arch.ethz.ch/datamap/

Additional part for ETH course:

1. Different from the MOOC exercise, for the course you most select two places, one that you like and another one that you dislike. Make the two data entries for each location in the web map and make a screen shot of both. Create a word document and add the screen shot together with a description of the two places you selected. Describe also the aspects you like or dislike about each of the places.
2. Using this world map (http://www.ia.arch.ethz.ch/datamap/show.html) with the results from last semester, select two places in the world where participants added data. Look at the data measured and the perceive data (qualitative and quantitative data) and try to analyze how people perceive the place in relation to the measured data. For instance, you can see that in one place the difference between the measured and perceived is not that different while in another place it is extremely different, or you can also analyze the data collected with the overall perception. Please make screen shot of the data from both places and create a word document with the analysis.

Please use the same document for both parts of the exercise.

Upload the document here in moodle by 27.03.2017

Additional part for ETH course:

1. Select two places, one that you like and another one that you dislike. Make the two data entries for each location in the web map and make a screen shot of both. Describe the two places you selected including the aspects you like or dislike about each of the places.

2. Using this world map with the results from last semester, select two places in the world where participants added data. Look at the data measured and the perceive data (qualitative and quantitative data) and try to analyze how people perceive the place in relation to the measured data. Please make screen shot of the data from both places and create a word document with the analysis.

Please use the same document for both parts of the exercise.

Upload the document here in moodle by 27.03.2017

Summary

- Urban research requires measurements, resulting in data. If data are combined, they turn into information. If information is combined, it turns into knowledge
- Information and knowledge, combined with observation and compliance, are needed to improve a city
- To understand urban systems, measurements are important on all scales: buildings and neighbourhoods, districts and cities, regions and territories
- Measurements are a necessary (but not sufficient) activity for quantitative and qualitative urban improvements
- Ignoring information and knowledge, or not having access to it, can be deadly → transportation → Pompei