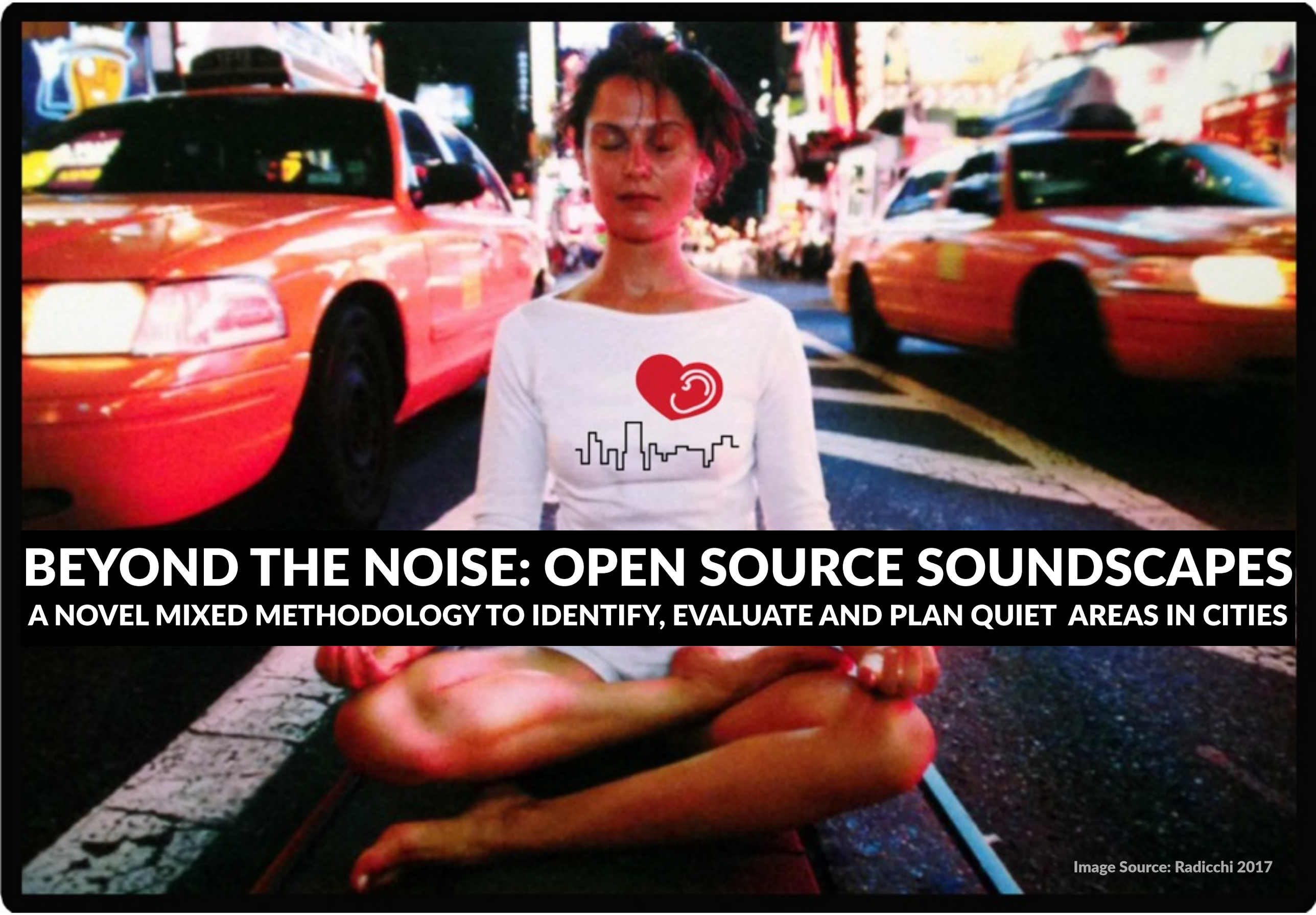


BEYOND THE NOISE: OPEN SOURCE SOUNDSCAPES

A NOVEL MIXED METHODOLOGY TO IDENTIFY, EVALUATE AND PLAN QUIET AREAS IN CITIES

Image Source: Radicchi 2017

Dr. Antonella Radicchi, IPODI-Marie Curie Fellow, Technical University Berlin

Acoustics17 | Boston, June 26 2017

Marie Curie Actions

Berlin

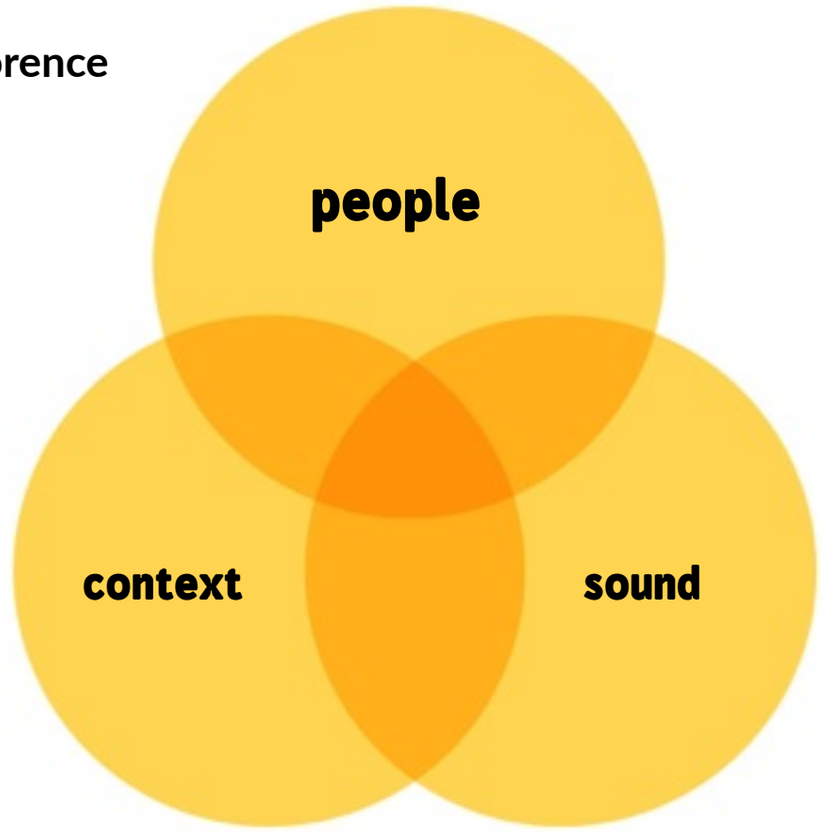
Technische Universität Berlin

2016-on Hush City mobile app

2016-2018 Beyond the Noise: Open Source Soundscapes

2016 Soundscapes and Lighscapes of the night. Berlin/Florence

BEYOND THE VISUAL PARADIGM: THE SOUNDSCAPE APPROACH TO CITY SENSE AND CITY DESIGN



2015 Toscana Sound Map

2012, Book
2010, Ph.D.) "On the Sonic Image of the City. Soundscape Mapping and Design in the contemporary city"

2009-on Firenze Sound Map

2007 MIT Digital City Design Workshop: "Soundscapes Oltrarno"

QUIETNESS

Today, 123 million Europeans are affected by noise pollution from traffic.
Data Source: European Environment Agency 2014

By 2030, the no. of vehicles will increase from 287 to 298 millions.
Data source: ICCT Global Transportation Roadmap Model

By 2030, the world is projected to have 41 mega-cities with more than 10 million inhabitants
Data Source: 2014 UN World Urbanization Prospects

STATE OF ART

QUANTITATIVE

- Acoustical criteria, such as “noise indicators” set up by EU Member States (END 49/2002)
- Distance-based criteria
- Mixed criteria: e.g. size, land use, noise indicators, accessibility, visual quality, SLOPE, TRAPT/TR, QUAs etc.

(European Environment Agency, 2014)

QUALITATIVE

- “Outer experiences & inner sensations” (Petersen 2016)
- “Immaterial qualities” (Nielsen et al. 2016)
- Soundscape: perceived sonic quality

“there is still the need for in-depth research in the field”, by experimenting with mixed methodologies”

(European Environment Agency, 2014)

QUIET AREAS

BEYOND THE NOISE: OPEN SOURCE SOUNDSCAPES

THEORETICAL FRAMEWORK

SOUNDSCAPE THEORY

The soundscape is rather a “resource” (Schulte-Fortkamp 2013)

&

THEORY ON THE COMMONS

Commons are “cultural and natural resources accessible to all members of a society which should be “co-governed by its user community“ (Bauwens et al. 2017)

&

CITY PLANNING THEORY

Human scale concept & “sensuous criteria” (Lynch 1971)
“The Practice of Everyday Life” (De Certeau 1980, 1984)

>

HYPOTHESES

1) QUIETNESS AS A COMMONS as “a natural and cultural resource, accessible to all members of society and co-governed by its user community”

2) criteria:
- people’s preferences
- accessibility
- small size < 1ha
- neighborhood scale <30 ha (Berlin)
- walking distance grid

3) “everyday quiet area”

BEYOND THE NOISE: OPEN SOURCE SOUNDSCAPES

METHODS AND TOOLS

SOUNDSCAPE THEORY

The soundscape paradigm has become an important tool in facilitating people's involvement in soundscape evaluations and decision processes (Brooks and Schulte-Fortkamp 2016)

CITIZEN SCIENCE PRACTICE

There is a trend in citizen science towards the use of GPS-equipped smartphones as sensors in data collection in the field of environmental noise (Theunis et al. 2017)

CITY PLANNING THEORY

Urban acupuncture (Bohigas 1992)
"Performance dimensions", especially "the sense" (Lynch 1984)

ANALYSES

1. open interviews
3. group soundwalks
5. the Hush City mobile app

>

PLANNING

1. "sonic acupuncture"
2. Open source digital multi-layers map

1 PILOT STUDY
&
4 PHASES

WORK PLAN
OUTPUTS
IMPACT

PEOPLE

ANALYZE

THE HUSH CITY APP, SURVEYS, SOUNDWALKS

MAP

THE EVERYDAY QUIET AREAS MAP

ASSESS

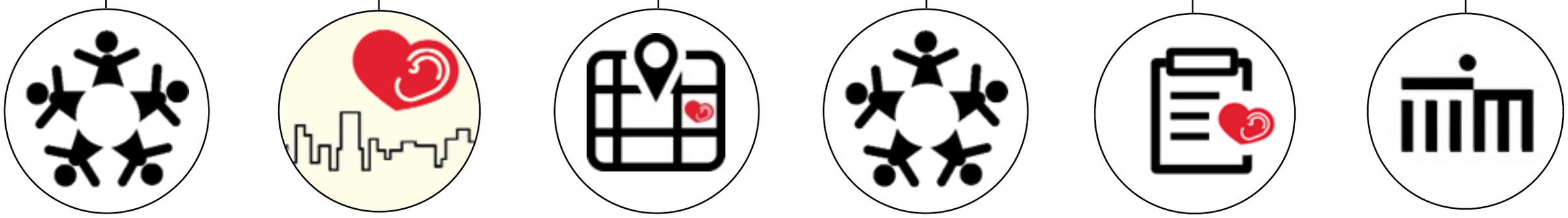
PEOPLE

PLAN

THE EVERYDAY QUIET AREAS MASTER PLAN

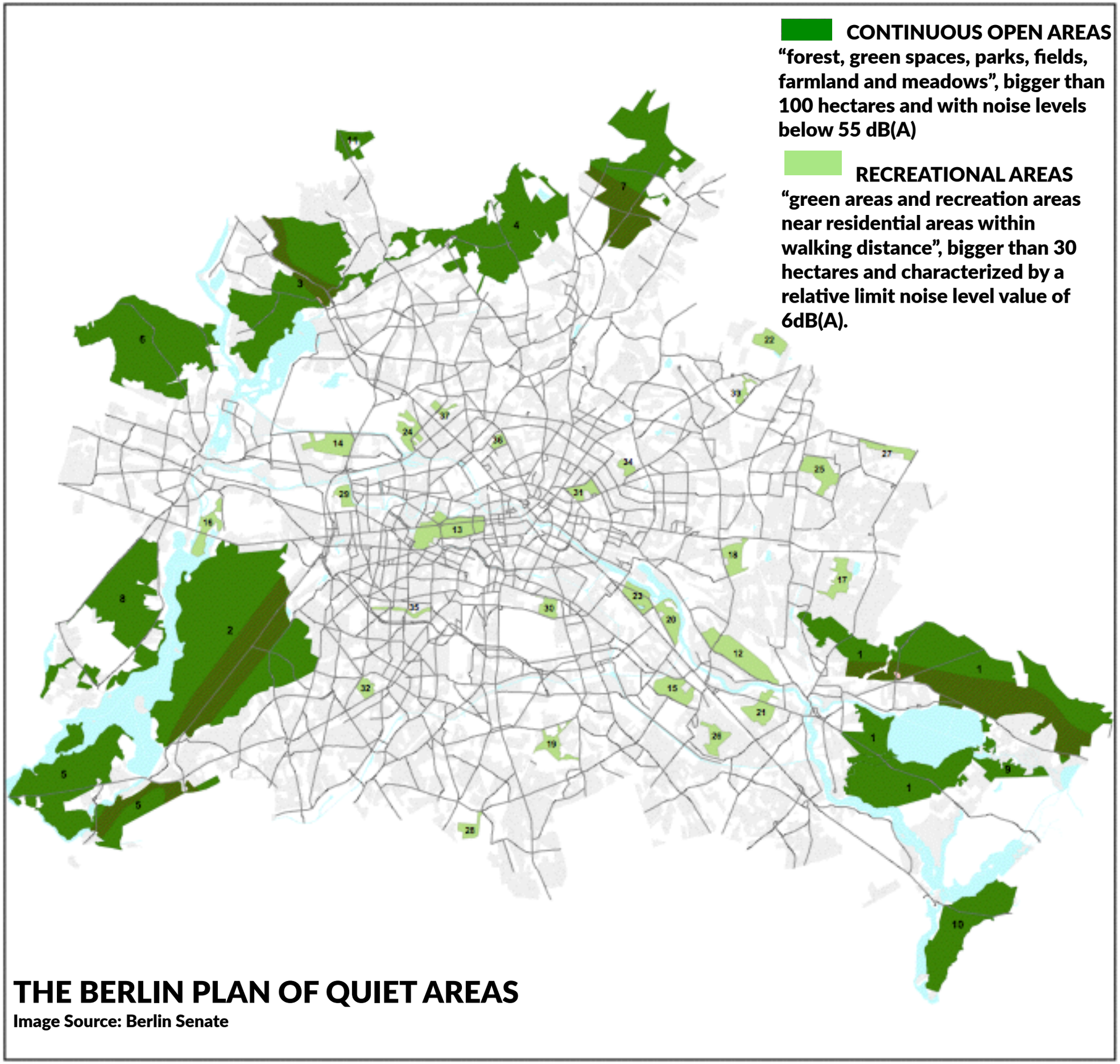
IMPACT

POLICIES AND PARTICIPATORY PROCESSES



source: Internet

IN BERLIN APPROXIMATELY 200.000 INHABITANTS
ARE AFFECTED BY NOISE POLLUTION FROM ROAD TRAFFIC



THE BERLIN PLAN OF QUIET AREAS

Image Source: Berlin Senate

Radicchi_2017_BTN:OSS (C)

1 Km

Walking grid to access to destinations (WRI 2015)

BERLIN

The S-Bahn Ring

Existing Quiet Areas

Radicchi_2017_BTN:OSS (C)

1 Km

Walking grid to access to destinations (WRI 2015)

BERLIN

- The S-Bahn Ring
- Existing Quiet Areas
- Future Quiet Areas

Radicchi_2017_BTN:OSS (C)

THE PILOT STUDY

CHOICE OF THE AREA | 8 CRITERIA APPLIED

1) **environmental justice index: noise+ air pollution, thermal load, accessibility to green areas, social issues (Berlin Environmental Justice Atlas, ed. 2015)**
2) position
3) size
4) morphology
5) land use
6) social diversity
7) proximity to quiet areas (Berlin Plan of Quiet Areas)
8) soundscape quality

The Reuterkiez AKA Kreuzkölln

> Let's move to Kreuzkölln, Berlin
>
> It's the epicentre of cool

Heading source: The Guardian, March 19 2011

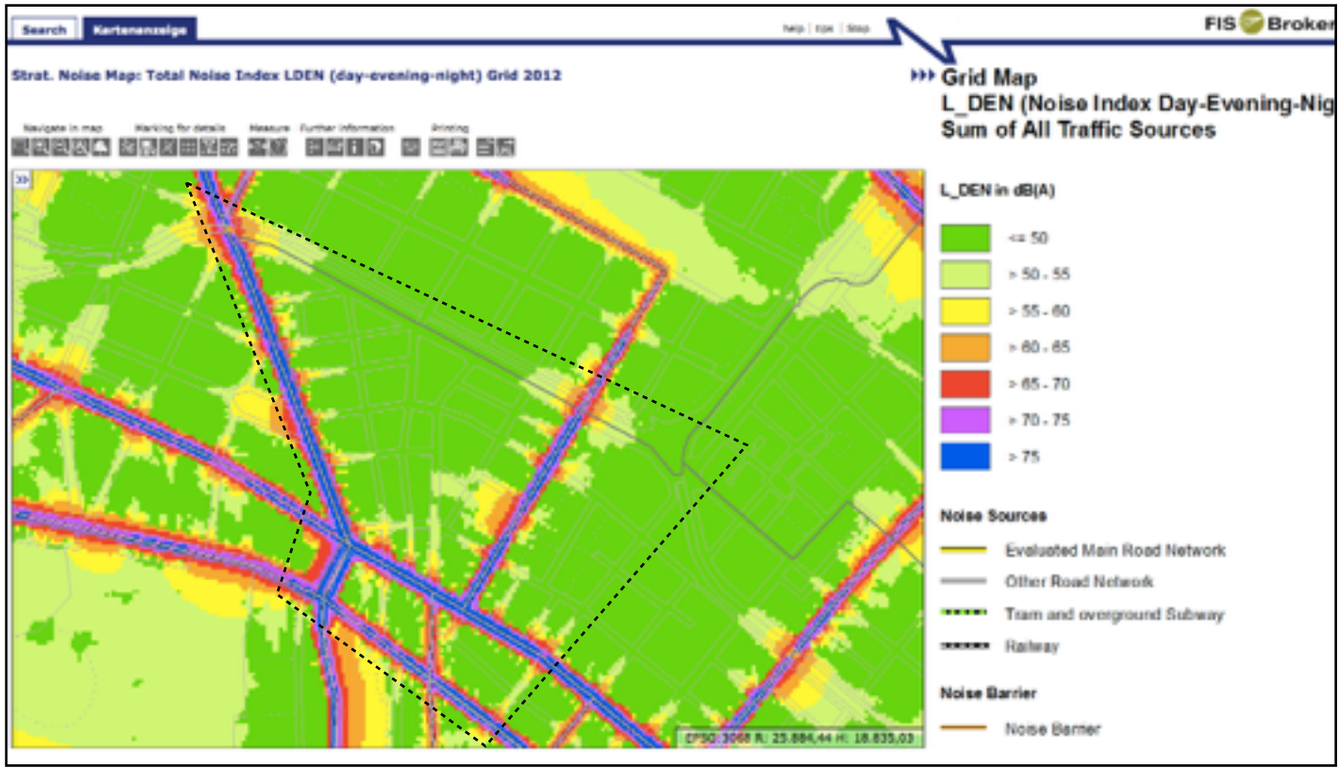
TOURISTIFICATION IN PROGRESS

Radicchi_2017_BTN:OSS (C)

YOUNGSTERS & HIPSTER GROUPS

THE TURKISH COMMUNITY & THE BERLINERS

KNOWLEDGE PRODUCTION?



- - - - - - - - - LIMITS OF THE REUTERKIEZ ON THE TOP OF THE BERLIN NOISE MAP

FLYER POINTING OUT NOISE ISSUES IN THE REUTERKIEZ

PUBLIC PARTICIPATION

RECRUITMENT CRITERIA

1. people living in the neighborhood
2. people working in the neighborhood
3. visitors

w/ StadtteilBüro Reuterkiez

IN THE ANALYSES PHASE:

1. INFORMAL INTERVIEWS (10/30)
2. GROUP SOUNDWALKS (2/3)
3. SURVEYS BY USING **HUSH CITY APP**

MOBILE APPS 4 CROWDSOURCED NOISE- & SOUND MAPS

SOUND RECORDER

STATE of the ART

NOISE METER

LEGEND

NOT (yet) AVAILABLE

NOT (more) AVAILABLE

OFF-THE-SHELF

NoiseSPY
CITI-SENSE
EAR-PHONE
SOUNDSLIKE
NOISE WATCH
BRAINBEBOX
THE QUIET WALK
NoiseDroid
NOiseTube
WIDE NOISE
noTOURS
Soundscape Characterisation Tool
SOUNDS AROUND YOU
RADIO APOREE
STEREOPUBLIC
Noisemap
AirCasting
Ambiciti
CART-ASUR
Geluidenjager
ECHO
RECORD THE EARTH
SOUND CITY
Stadtklang
THE NOISE APP
AUDIO SPOOK
THINK about SOUND
City Soundscape
MotART

MAP & EVALUATE

People can map and evaluate “everyday quiet areas” by collecting mixed data:
- audio recordings
- sound pressure levels
- pictures
- date & time
- address
- user feedback.

FIND QUIET AREAS

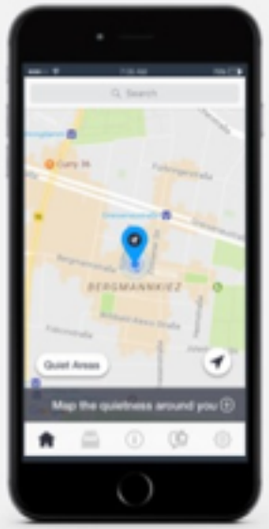
People can use the app also to identify “everyday quiet spots” nearby mapped by other members of the community.

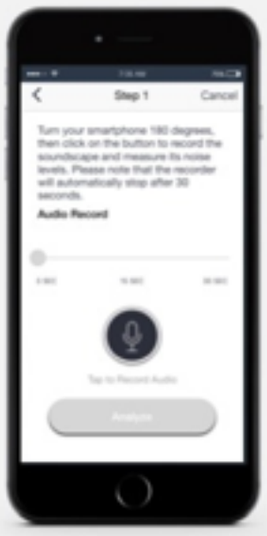
HUSH CITY APP

TECHNOLOGY
- both iOS and Android operating systems
- Code languages: Swift 3, Java and Android SDK
- Framework: a Titanium platform
- Repository: LAMP stack
- Audio data: sampled at 44.100Hz, with a resolution of 16bit
- Sound pressure levels: calculated as numeric scale values and A-weighted (see Noise Tube libraries)
- Pictures are collected at a maximum resolution of 6MP and 24bit color

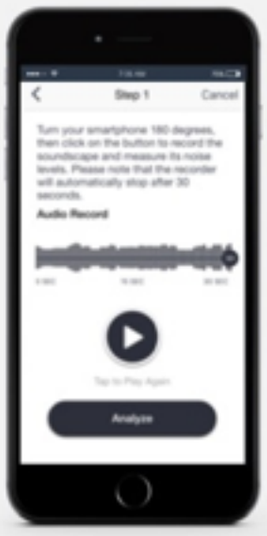
CREDITS
- Inventor: Dr. Arch. Antonella Radicchi
- Software Development: QUERTEX GmbH (GER) with EdgeWorks Software, Ltd.
- Acoustic consultants: Dipl. Ing. M. Jäcker-Cüppers (DEGA), Dipl. Ing. M. Frost (Berlin Senate), Dipl. Ing. M.Cobianchi (Bowers & Wilkins, UK).

1/ MAP THE QUIETNESS AROUND YOU!





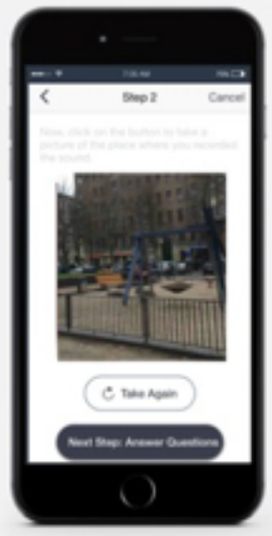
RECORD THE SOUND



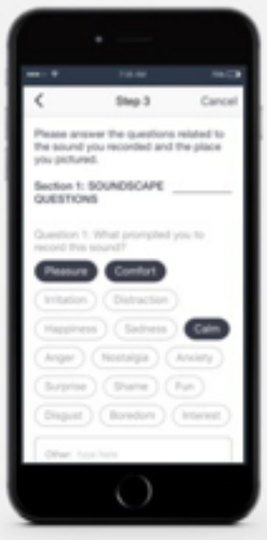
ANALYZE THE SOUND

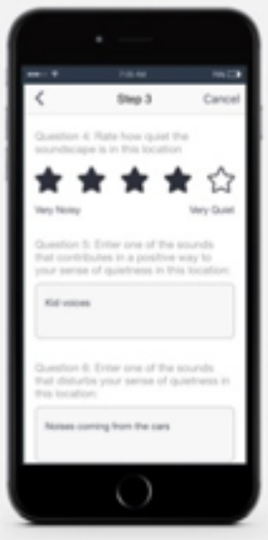
DISPLAY SOUND PRESSURE

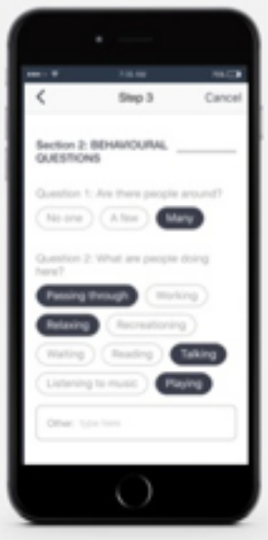
TAKE A PICTURE

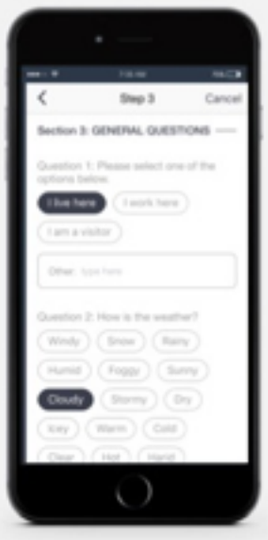


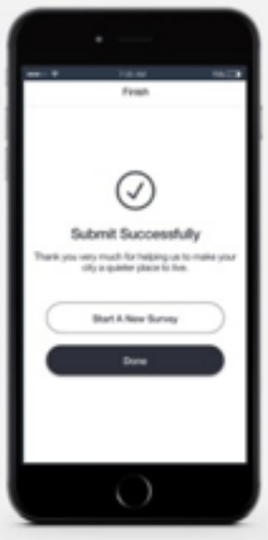
TAKE IT AGAIN or GO ON





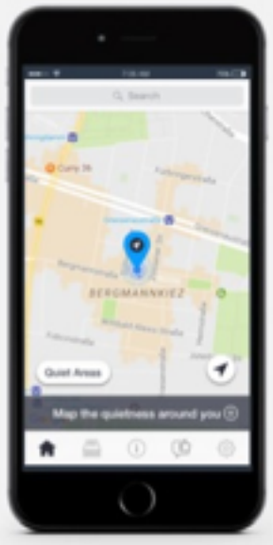


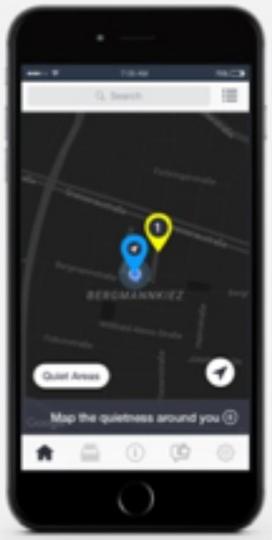




REPLY TO THE QUESTIONNAIRE: SECTION 1, 2, 3 AND ..... SUBMIT YOUR SURVEY!

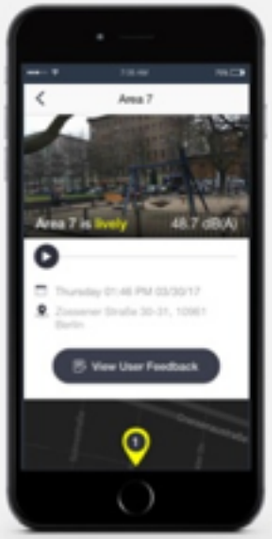
2/ EXPLORE QUIET SPOTS NEARBY!



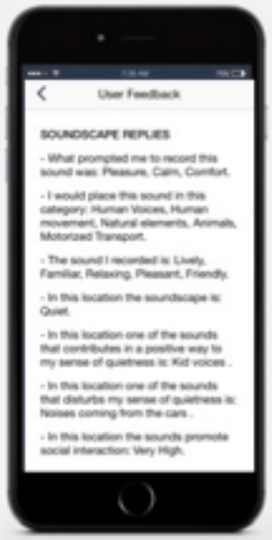


MAP VIEW MODE

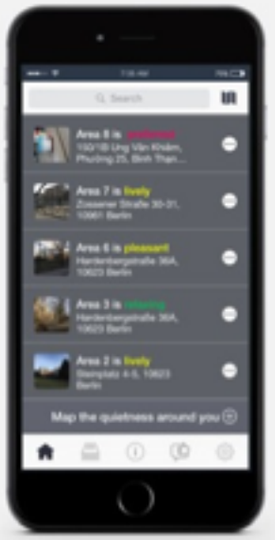
CLICK ON THE MARKER



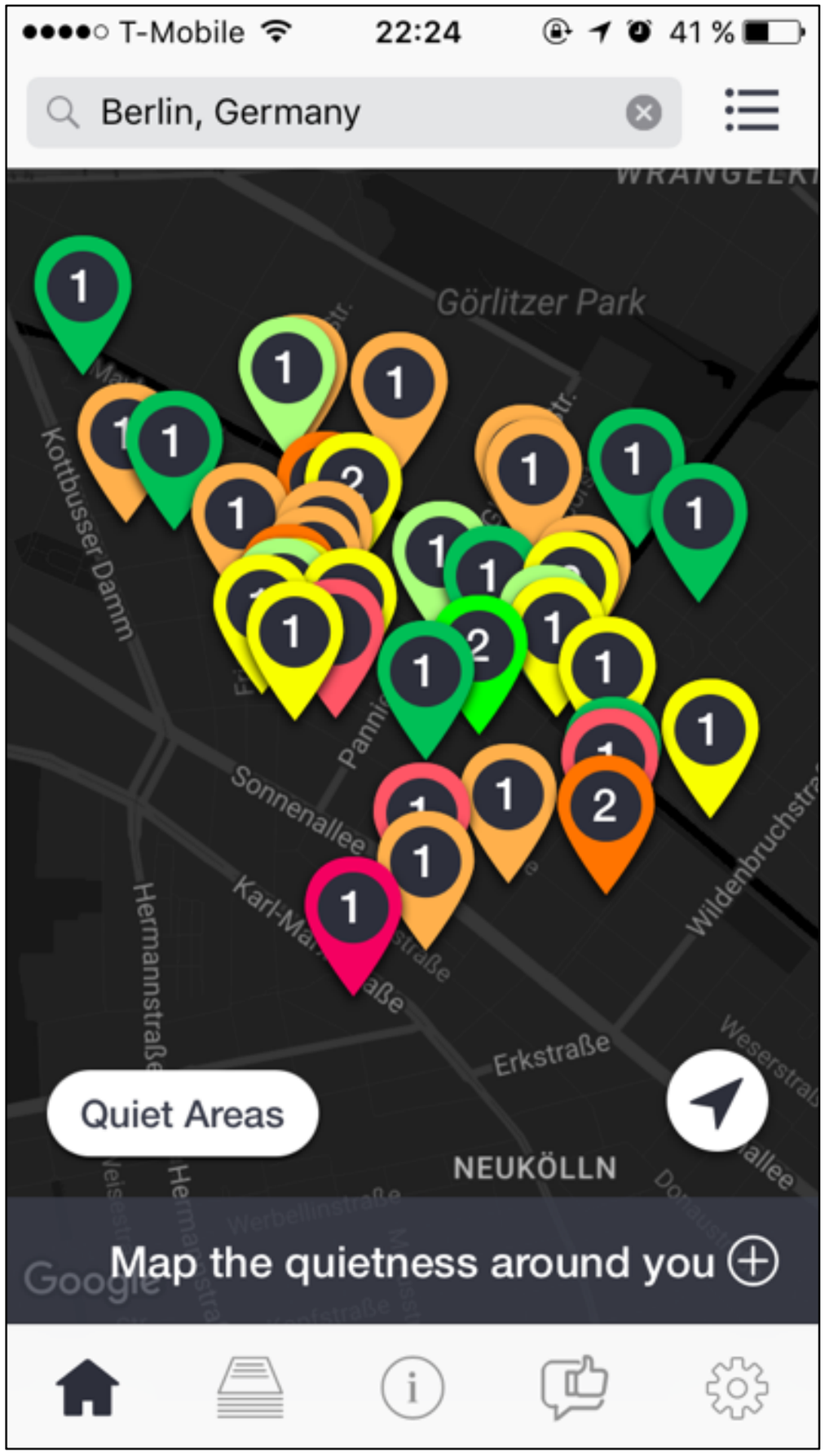
EXPLORE THE QUIET SPOT



READ THE USER FEEDBACK



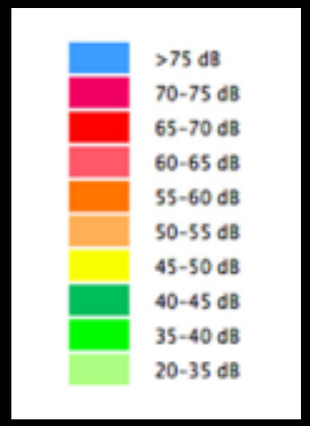
LIST VIEW MODE



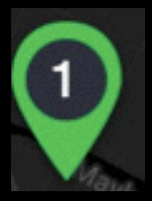
HUSH CITY APP

< screenshot of 45 datasets collected by people in the Reuterkiez (as of June 20 2017)

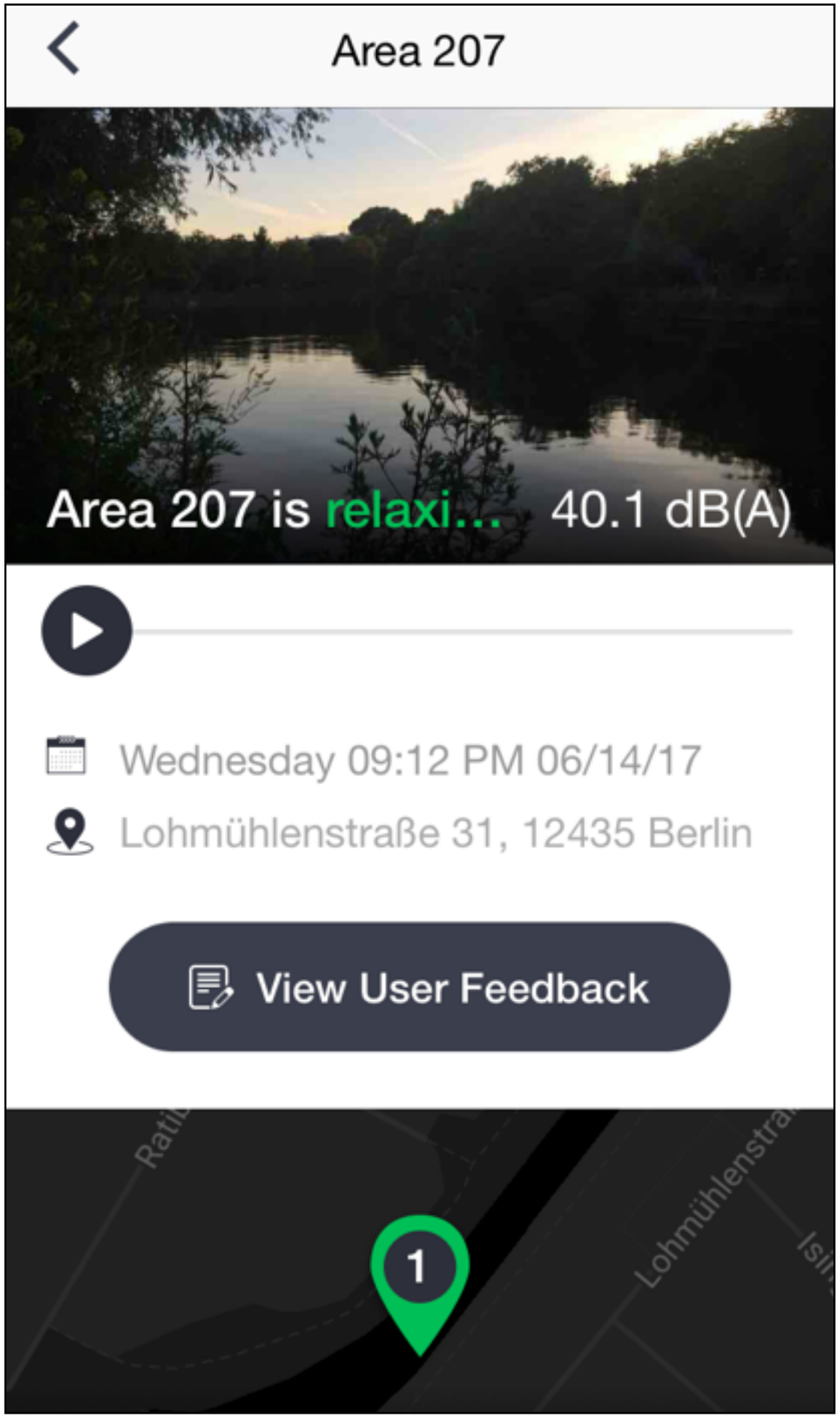
45 DATASETS IN REUTERKIEZ



LEGEND:
The colour scale reference is taken from the strategic Noise Map of Florence



The number on the markers indicates the number of surveys made on the spot



REUTERKIEZ/BERLIN

< SCREENSHOT OF DATASET NO. 207

EACH DATASET IS COMPOSED OF :

+ 1 AUDIO RECORDING
+ 1 SOUND PRESSURE LEVELS
+ 1 PICTURE
+ DATE & TIME
+ ADDRESS
+ USER FEEDBACK

USER FEEDBACK

The questionnaire is composed of 24 questions, articulated in 3 parts:

1) SOUNDSCAPE ISSUES
2) BEHAVIORAL ISSUES
3) GENERAL ISSUES

Replies can be given by means of: multiple choice, linear scale and free text rating methods.
(Lavandier 2016, QUADMAP Guidelines 2016)

HUSH CITY APP | QUESTIONNAIRE - PART 1

SOUNDSCAPE QUESTIONS

1. What prompted you to record this sound?

☐ Pleasure	☐ Calm	☐ Fun
☐ Comfort	☐ Anger	☐ Disgust
☐ Irritation	☐ Nostalgia	☐ Boredom
☐ Distraction	☐ Anxiety	☐ Interest
☐ Happiness	☐ Surprise	☐ Other _____
☐ Sadness	☐ Shame	

2. In which category would you place this sound?

☐ Human Voices	☐ Human movement	☐ Natural elements
☐ Animals	☐ Vegetation	☐ Construction
☐ Ventilation	☐ Motorized Transport	☐ Non-motorized transport
☐ Social/Signals	☐ Music	☐ Other _____

3. Using the words given below, please describe the sound you recorded. Select all that apply!

☐ Lively	☐ Meaningless	☐ Natural
☐ Boring	☐ Pleasant	☐ Artificial
☐ Familiar	☐ Unpleasant	☐ Friendly
☐ Unfamiliar	☐ Informative	☐ Unfriendly
☐ Stressing	☐ Uninformative	☐ Beautiful
☐ Relaxing	☐ Preferred	☐ Ugly
☐ Meaningful	☐ Unpreferred	☐ Other _____

4. Rate how quiet the soundscape is in this location

Very Noisy o o o o o Very Quiet

5. Enter one of the sounds that contributes in a positive way to your sense of quietness in this location:

_____

6. Enter one of the sounds that disturbs your sense of quietness in this location:

_____

7. To what extent do the sounds in this location promote social interaction?

Very Low o o o o o Very High

8. To what extent do the sounds in this location encourage you to have conversations here?

Very Low o o o o o Very High

9. Can you hear other people's conversations around you?

Yes / No

10. Enter one of the sounds that contributes to the identity of this place:

_____

HUSH CITY APP | QUESTIONNAIRE - PART 2, 3

BEHAVIOURAL QUESTIONS

11. Are there people around

- ☐ No one
- ☐ A few
- ☐ Many
- ☐ Other _____

12. What are people doing here?

- ☐ Passing through
- ☐ Working
- ☐ Relaxing
- ☐ Recreationing
- ☐ Waiting
- ☐ Reading
- ☐ Talking
- ☐ Playing
- ☐ Playing
- ☐ Other _____

GENERAL QUESTIONS

13. Please select one of the options below

- ☐ I live here
- ☐ I work here
- ☐ I am a visitor
- ☐ Other _____

14. How is the weather?

- ☐ Windy
- ☐ Snow
- ☐ Rainy
- ☐ Humid
- ☐ Foggy
- ☐ Calm
- ☐ Sunny
- ☐ Cloudy
- ☐ Stormy
- ☐ Dry
- ☐ Icey
- ☐ Warm
- ☐ Cold
- ☐ Clear
- ☐ Hot
- ☐ Harid
- ☐ Other _____

15. Rate the overall quality of this location

Very Bad o o o o o Very Good

16. Rate the overall cleanliness of this location

Very Bad o o o o o Very Good

17. Rate the overall maintenance of this location

Very Bad o o o o o Very Good

18. Rate the feeling of security in this location

Very Bad o o o o o Very Good

19. Rate the overall accessibility to this location

Very Bad o o o o o Very Good

20. Please add your additional comments and thoughts in the blank space below.

_____

HUSH CITY APP | INTERMEDIATE DATA EVALUATION (I)

		Evaluation Status														
		Lively	Relaxing	Pleasant	Familiar	Meaningful	stressing	boring	Meaningless	Unpleasant	Natural	Artificial	informative	Beautiful	preferred	Unfriendly	Total
City	Abu Al Feda	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Barcelona	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	BC Groningen	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Berlin	23	12	5	10	1	0	1	0	0	1	0	1	1	0	0	55
	Brighton	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Brooklyn	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
	București	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Cambridge	8	11	2	5	0	18	0	0	3	2	1	0	0	0	1	51
	Castel Maggiore BO	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Chicago	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	DK Rijnsburg	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	DM Rijnsburg	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Ferrara FE	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	Firenze	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	3
	Forte dei Marmi LU	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	Gent	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Highgate	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	Hingham	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Hull	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	JK Groningen	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	KA Katwijk aan Zee	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Legnano MI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	Lisboa	0	3	2	1	0	0	0	1	1	1	0	0	0	0	0	9
	MA Rijnsburg	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Magnano BI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Marina di Massa MS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Massa MS	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
	Mid-Cambridge	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
	Montréal	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	New York	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
	Paris	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Ragusa RG	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Rochester	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	Roma	0	2	0	0	0	0	1	0	0	0	0	0	1	0	0	4
	Somerville	2	3	0	1	0	1	0	0	0	1	0	0	0	0	0	8
	Venezia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	WV Rijnsburg	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Total	43	36	12	26	1	23	4	2	4	6	2	1	4	1	1	166
% Values	Berlin	*42%*	*22%*	*9%*	*18%*	*2%*	*0%*	*2%*	*0%*	*0%*	*2%*	*0%*	*2%*	*2%*	*0%*	*0%*	*% of the Total x City*
	Cambridge	*16%*	*22%*	*4%*	*10%*	*0%*	*35%*	*0%*	*0%*	*6%*	*4%*	*2%*	*0%*	*0%*	*0%*	*2%*	

HUSH CITY APP | INTERMEDIATE DATA EVALUATION (II)

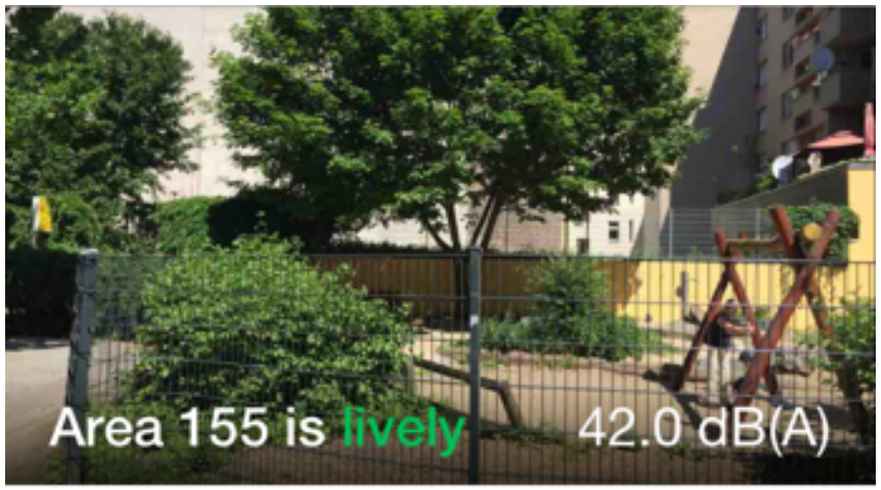
City: BERLIN

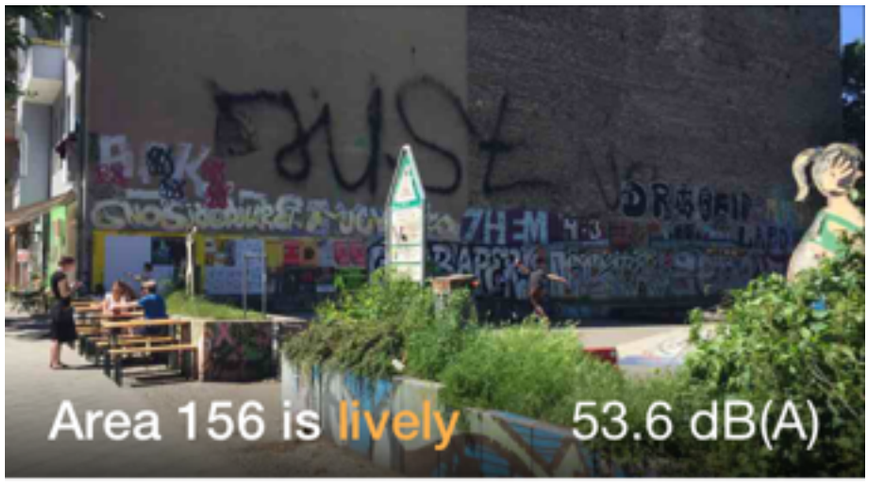
		Evaluation Status															
		Lively	Relaxing	Pleasant	Familiar	Meaningful	Stressing	Boring	Meaningless	Unpleasant	Natural	Artificial	Informative	Beautiful	Preferred	Unfriendly	**Total**
Quietness	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	3	10	3	0	5	0	0	0	0	0	0	0	0	0	0	0	18
	4	9	7	4	3	1	0	1	0	0	1	0	1	1	0	0	28
	5	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	5
	Total	23	12	5	10	1	0	1	0	0	1	0	1	1	0	0	**55**

City: CAMBRIDGE

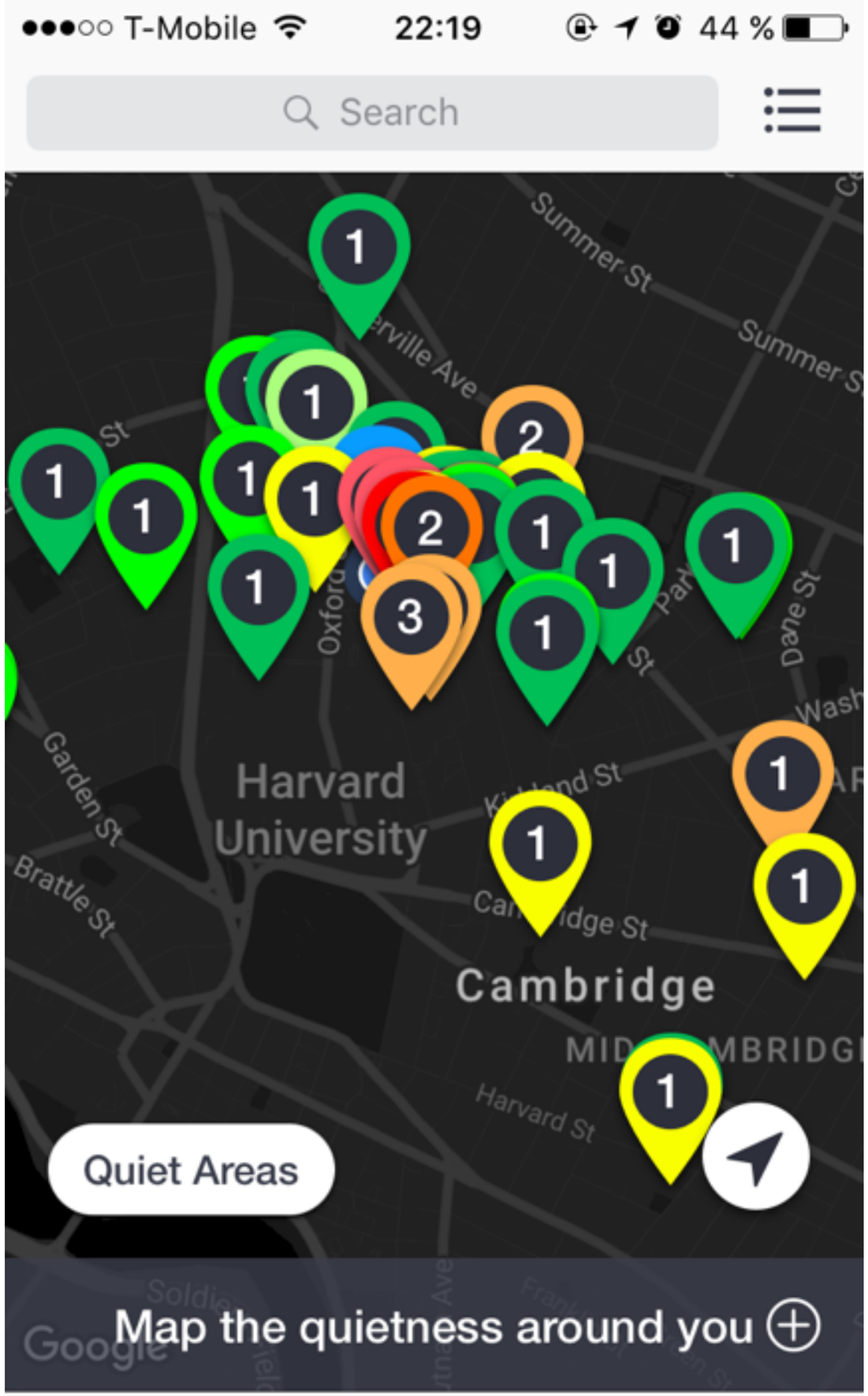
		Evaluation Status															
		Lively	Relaxing	Pleasant	Familiar	Meaningful	Stressing	Boring	Meaningless	Unpleasant	Natural	Artificial	Informative	Beautiful	Preferred	Unfriendly	**Total**
Quietness	1	0	0	0	1	0	7	0	0	1	0	0	0	0	0	1	10
	2	2	0	0	0	0	2	0	0	1	0	0	0	0	0	0	5
	3	3	3	1	3	0	8	0	0	1	1	1	0	0	0	0	21
	4	3	8	1	1	0	1	0	0	0	1	0	0	0	0	0	15
	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	8	11	2	5	0	18	0	0	3	2	1	0	0	0	1	**51**

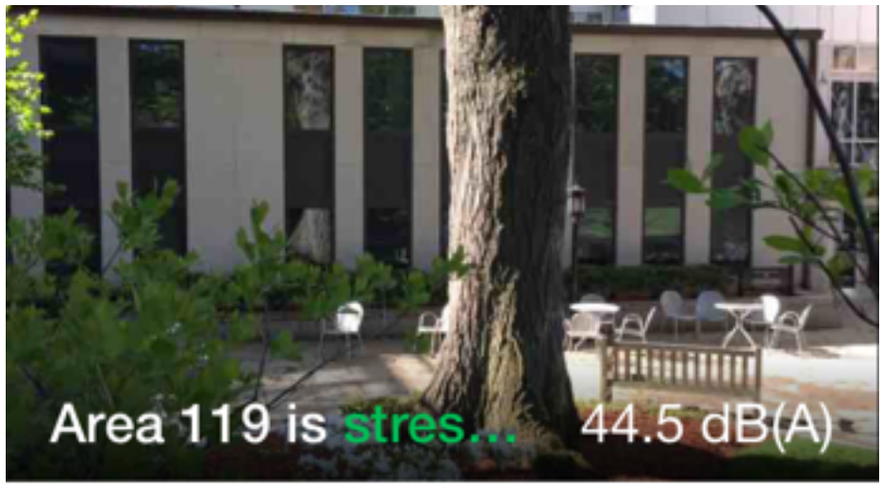
REUTERKIEZ /BERLIN



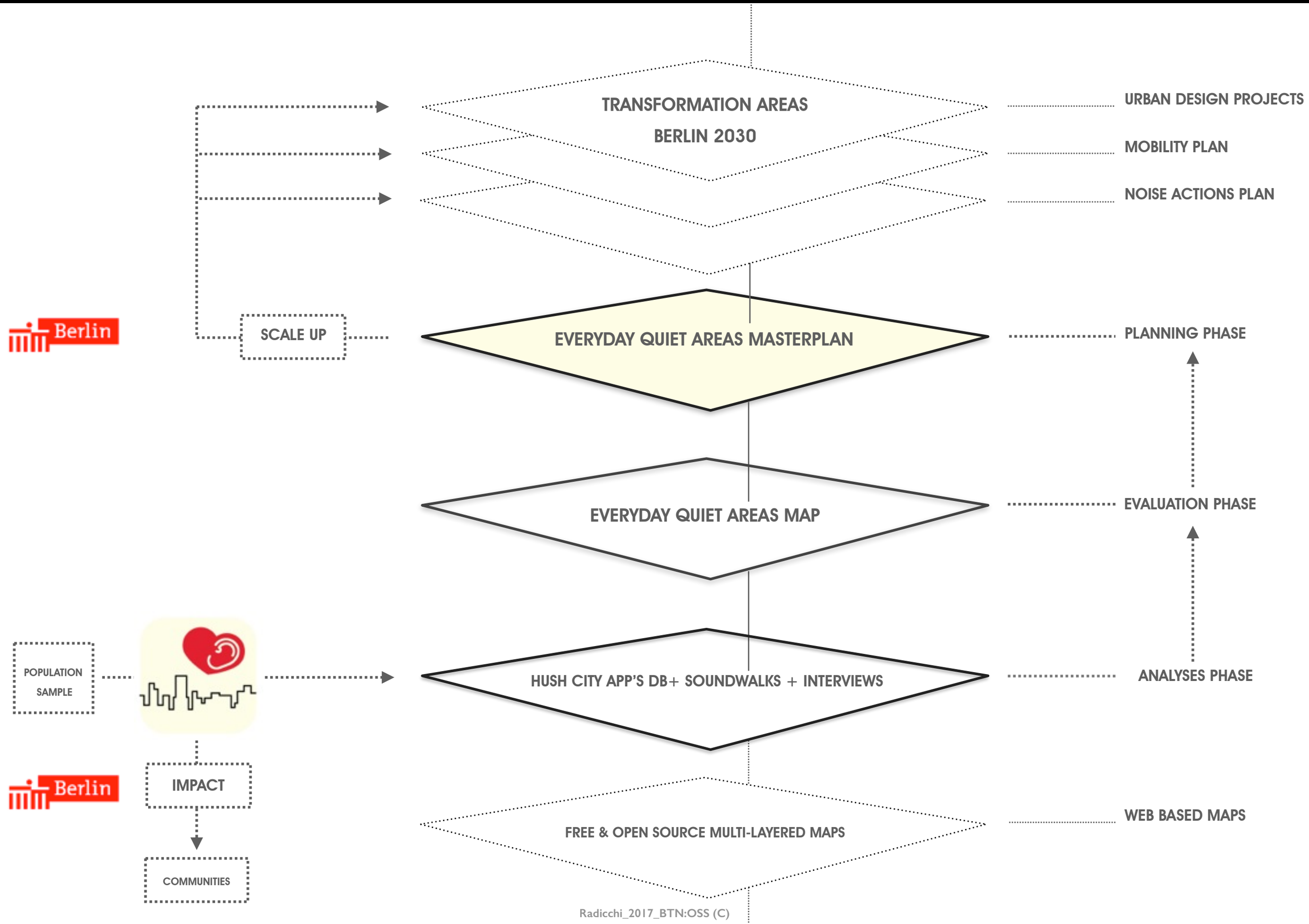


Radicchi_2017_BTN:OSS (C)





THE EVERYDAY QUIET AREAS ATLAS: IMPLEMENTATION & IMPACT

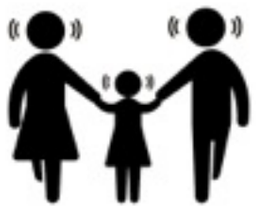


Radicchi_2017_BTN:OSS (C)

IMPACT ON THE COMMUNITY

#1 THE “COMMUNITY EXPERT ON SOUNDSCAPE"

One-day long workshop to traine committed citizens in order to transfer to them the knowledge necessary to keep on the project after its end and to actively contribute in the participatory planning processes.



#2 THE “SOUNDWALKING IN THE KIEZ” PROGRAM

A soundwalk program which was launched in the frame of the 2017 International Noise Awareness Day. In the next years, on INADs, the soundwalk will be guided by the “community experts on soundscape”.

DISCUSSION

- Data quality (Murphy and King 2016)
- Knowledge production processes (Theunis et al. 2017)
- Civic awareness and bottom up participatory processes (Haklay 2017)

FUTURE WORK

- Implementation of new features: e.g. diverse languages; automatic calibration processes
- Psychoacoustic analyses: to further investigate quiet spots identified by the participants
- Comparative studies: e.g. with USA cities, such as Cambridge

From an urban planning perspective, the paradigm of “quietness as a commons” has the potential to achieve integrated urban planning processes for the environmental just and human scale city.

THANK YOU FOR LISTENING

STAY IN TOUCH!

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