Educating Climate – A Guide for Climate-adaptive Urban Planning

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Introduction

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Identify the problem

Turn it into plans → realise them!

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Urban climate researches

- Considerably high amount of **researches** conducted in the field of urban climate.
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- Active urban designers and architects were ***not educated to cope with climate issues***.
- Climate-conscious principles are not implemented in urban planning.
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- BUT: There seems to be **a lively interest among architects** towards climate-adaptive planning.

PROBLEM: lack of communication between climate experts and urban planners.

BUT there is a need, as in the new programming period of the European Union (2014-2020), ***the novel system of planning and funding requires a climate conscious approach*** in urban reconstruction.

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- **W. Klemm et al**:

developing design guidelines for climate-responsive green infrastructure, ICUC9, 2015

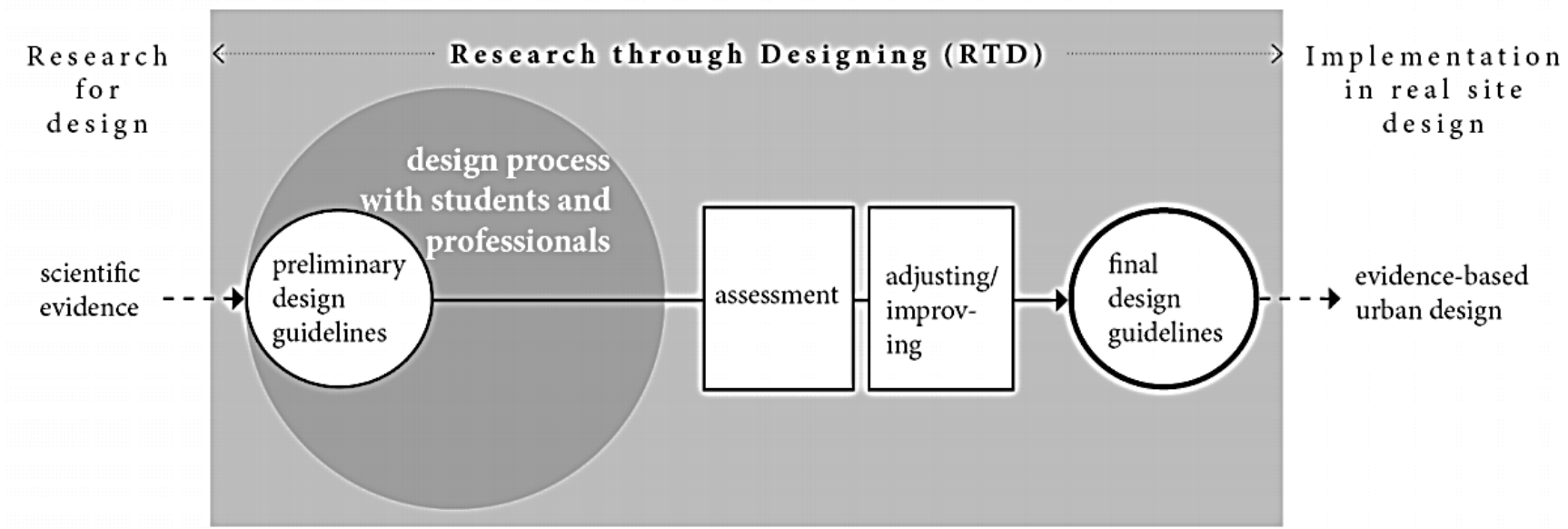

Fig. 1: RTD approach to derive evidence-based design guidelines

What is to be done?

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•Providing **understandable and easy-to-use tools** to architects to enable adapting climate-conscious principles in everyday planning routine.

•Improve the methodology of **climate-adaptive planning**

•Help to **fulfil EU requirements** regarding climate-conscious planning and developing green infrastructure

•Create **liveable urban environment**

•**Additionally:**

•Helping introduce ***RES*** in urban areas

•Improve ***energy-efficiency***, water-management, air quality

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  - Literature available

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3. Step: Simplifying the presentation of data collected.

Why do we need to present results in a simplified way?

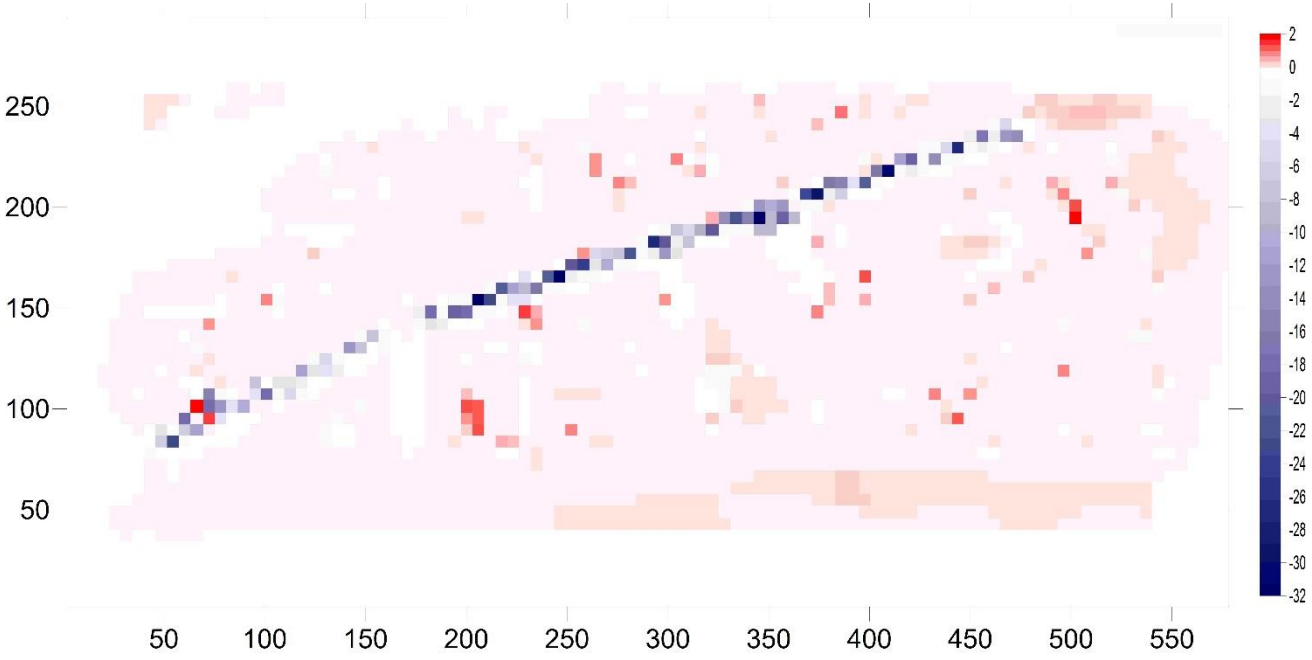

Fig.2: Map showing the difference in MRT due to plantation of a single alley

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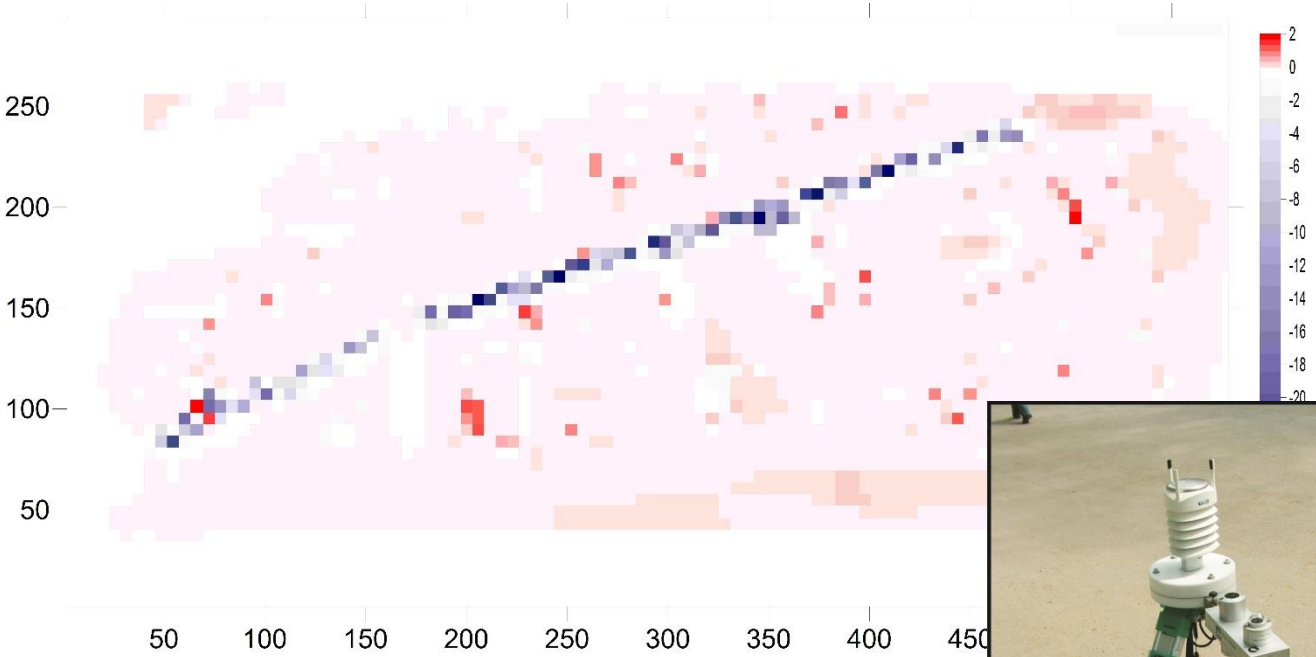

Fig.2: Map showing the difference in MRT due to plantation of a single alley

Fig.3: Device used for our on-site microclimate investigations

Results 1.

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	BENEFITS	mitigation of air temperature	mitigation of Mean Radiant Temperature	change of wind speed	Human comfort
	ELEMENT OF GREEN INFRASTRUCTURE	**ΔT_a** *[°C]*	**ΔMRT** *[°C]*	**Δv** *[m/s]*	**ΔPET** *[°C]*
1	alley	min: -1 max: +0.1	min: -34 max: +2	min: 2-2,5 max: -0,25-1	min: -2,5 max: 0,5 *[PMV]*
2	green space	min: -1.8 max: 1.5	min: -32.6 max: 0.5	min: -9.2 max: 0.2	min: - 16.1 max: 3.1
3	covering / paving				
	medium dark pave stone	min: -1.6 max: 3.7	min: -17.3 max: 24.6	min: -5.0 max: 1.7	min: -9.8 max: 13.5
	light-coloured gravel	min: -0.7 max: 3.2	min: -13.1 max: 19.5	min: -9.1 max: -0.7	min: -3.3 max: 14.6

Results 2.

	BENEFITS	change of air temperature	change of Mean Radiant Temperature	change of wind speed	Human comfort?
	ELEMENT OF GREEN INFRASTRUCTURE	**ΔT_a** *[°C]*	**ΔMRT** *[°C]*	**Δv** *[m/s]*	**ΔPET** *[°C]*
1	alley	-1	-34	-65% - +10%	-2.5 - +0.5 PMV
2	green space	-2.4	-36.3	-10.8	-16.1
3	covering / paving	+3.7	+31.3	-	+20.1
4	water surface	-0.006	No precise data available		
5	green façade	-0.3			
6	green roof	0			

Results 3.

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	BENEFITS	Summer energy use	Winter energy use	Human Comfort	Stormwater runoff regulation	air pollution removal	carbon sequestration
1	**alley**	+++	+		+++	+++	+++
2	**green space** (lawn with trees)	+	+	++++	+++++	+++++	+++++
	covering / paving		0		-	-	-
	lawn	+		+			
	asphalt	-		- - - -			
	concrete			- -			
	pave stone			- -			
3	gravel			- - -			
4	**water surface**	0	0	+	+++++	-	-
5	**green façade**	+	+	+	+	++	+
6	**green roof**	++	+	+	+	+	+

Future plans

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- **We have numerous projects to be started in the following year, an addtitional output should be a Guide for Climate-adaptive Urban Planning**
- **Harmonise and refine data** (e.g.: validate modelling results with measurements)
- Introduce planning criteria in **education (university, trainings)**
- Present result to urban planners and architects, get **feedback** through practice
- **Improving methodology** – if needed
- Introduce **planning criteria on national scale**

Thank you for your attention!

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