I-SURF - Instruments for Sustainable Urban Riverfronts

Final project report

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# Introduction

Urban open space has a huge impact on human health, well-being and urban ecosystems. One of the open spaces where the environmental and ecological challenges of cities manifest the most is the urban riverfront, often characterised by fragmented land use, lack of accessibility, heavy riverside vehicular traffic, and extreme degradation of river hydrology and ecology. More often than not, the current spatial design of the riverfront hinders rather than supports the delivery of ecosystem services and, in consequence, its potential to improve the health and well-being of urban inhabitants is diminished. Hence, the design of riverside open spaces is crucial. Urban and landscape design in those spaces requires instruments that can aid designers, planners, decision-makers and stakeholders in devising spatial interventions that integrate complex environmental and ecological goals in high quality public space design.

By recognising the multiple environmental and ecological benefits of green space and water in the city, the **I-SURF** project applies a set of four design instruments, namely *the Connector*, *the Sponge*, *the Integrator*, and *the Scaler*. **I-SURF** is a three-phased project that tests, validates and updates these instruments through a design-driven research methodology involving two design workshops and expert meetings addressing three different riverside urban spaces in Amsterdam: in the Ij waterfront, along River Amstel, and on a site located on the canal network. The project concludes with an updated and transferrable instrument set available for urban and landscape design applications in Amsterdam and in other Dutch cities crossed by rivers.

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Figure 1 Overall diagram of the four design instruments (see legend in the bottom right), representing procedures that applies the transdisciplinary knowledge on urban rivers in the design process. Source: Forgaci, 2018.

The project “Instruments for sustainable urban riverfronts” (I-SURF) builds on a set of spatial design instruments developed previously by Claudiu Forgaci (2018) through a transdisciplinary literature review covering environmental-ecological, social-economic, planning-governance and spatial-morphological knowledge on urban rivers, and a research methodology involving design explorations through real-world urban river design projects and design testing through an international design workshop on the river corridors of Bucharest, Romania. The instrument set, comprising the Connector, the Sponge, the Integrator, and the Scaler (Figure 1), represents practical procedures that urban and landscape designers can apply in the design process, as follows:

* **The Connector** is used to reveal and reconfigure the elements of the traffic network (e.g. downgraded riverside traffic), water network (e.g. restored meanders) and ecological network (e.g. restored green corridor) so that the accessibility and ecological connectivity of the riverfront is improved.
* **The Sponge** is used to create an inventory of riverside open spaces and amenities and, based on that inventory, to identify potentials of increased spatial capacity and attractiveness in the elements of public space (e.g. riverside pedestrian spaces), green space (e.g. renaturalised riverbanks) and water space (e.g. floodable riverbanks).
* **The Integrator** is used to identify spatial conflicts and synergies between the elements identified with the Connector and the Sponge.
* **The Scaler** is used to reflect on the scales of the design and to reveal interdependencies across spatial scales and dependencies across temporal scales.

# Objectives and research questions

The performance of the insturment set lies in a number of performance targets:

1. **Usability** of the instruments;
2. **Effectiveness** in achieving the design goals; and
3. **Usefulness** for practice -
4. **Level of engagement** - how engaging are the instruments?
5. **Ease of learning** - how easy it is to understand what the instruments do and how they can be used
6. **Efficiency** - how quickly can the design goals be achieved?
7. **Efficacy** - do the instruments produce the intended results or are there any other confounding variables involved?
8. **Ethics** - ethical issues?

Correspondingly, the I-SURF project set out to address the following research questions:

RQ1. How usable are the instruments?

RQ2. To what extent do the instruments aid the designer in achieving the design goal?

RQ3. How useful are the instrument sets for the practice of urban design?

MRQ: Do the design instruments introduced in the workshop

1. Did the instruments introduced in the workshop improve the ability of the participants to design in a social-ecologically integrated way?

* Internal evaluation (QUAL): To what extent do the participants *feel* that they are better equipped to design social-ecologically integrated urban riverfronts?
* External evaluation (QUAN): Is there *a significant difference* between the sketches drawn before the workshop and the projects developed with the instruments introduced in the workshop?

1. Does the use of the instruments produce *results that are significant for the design practice*?

# Methods

## Research design

### Design workshop methodology

At the core of the I-SURF methodology is a design workshop.

#### Sites

#### Selection of participants

The design workshop had `r nrow(part)` participants consisting of master and post-master students, PhD candidates and young professionals (Table #), selected from a total of 72 applications.[[1]](#footnote-1) The selection process ensured a high level of knowledge and engagement with the topic of riverfront urban transformations. The number of participants was determined by the target of 4 groups of 3 participants for each of the 3 sites.

```{r participants-frequency}

```

divided into 4 groups of 3 for each of the 3 sites.

## Data collection

### Phase 1: Workshop data

The design workshop was set up as an environment in which both qualitative and quantitative data could be collected.

|  |  |  |
| --- | --- | --- |
| Data | Type of information | Data collection instrument |
| Pre-workshop sketches | QUAL | A4 sketch |
| Design projects | QUAL | 2 x A1 posters |
| Daily evaluation | QUAL/QUAN | Paper-based questionnaire |
| Post-workshop evaluation | QUAL/QUAN | Online questionnaire |

The pre-workshop sketches, made by the workshop participants before the start of the workshop, were meant to give an indication of the participant’s understanding of the design assignment before learning about the instruments tested in the workshop.

Participants shared their experiences

With the daily evaluation forms, participants

### Phase 2: Web survey

Part of the workshop data was evaluated by experts through a web survey distributed in June 2020.

Measures taken to improve response rate:

* + Each respondent received a personalized cover letter stating the purpose and importance of the survey, why they were selected, details about funding, and guarantees of confidentiality;
  + Follow-up invitations were sent out
  + The survey was tested and optimized for a better user experience before distribution
  + The length of the survey was reduced as much as possible, clear instructions were given, the layout was made attractive
  + The number of open-ended questions was minimized

To be considered for analysis, responses needed to fulfill a number of criteria:

* + Familiarity with the site evaluated was a pre-requisite. If the respondent indicated no familiarity with the sit
  + The questions were timed and if the average time spent on a comparison was less than 30 seconds, the response was considered to be of insufficient quality and was excluded from the analysis.

Quality of responses:

* + The order of the 16 pairwise comparisons was randomized to avoid poorer responses on later comparisons due to respondent fatigue.
  + The order of the items in each comparison was randomized to avoid that respondents identify the pattern of difference between items on the left and items on the right, or any other pattern that might have occurred due to the prearrangement of the pairs in the set-up of the questionnaire.
  + Response time was recorded for each page to check if respondents tended to spend considerably less attention to later questions in the comparison block.

#### Expert sampling

An initial set of respondents was selected through expert sampling. After snowball sampling.

## Data analysis

### Survey analysis

## Quality criteria

# Results

## User instructions

*SRQ: How clear were the instructions for the use of instruments? How can those instructions be improved?*

The participants found the Connector to be difficult to understand from the introduction and uncomfortable to use initially. Once they started to apply it, they found it easier to use in retrospect. Suggestions for improved instructions were: more theoretical background, relevance, a clearer explanation of how the instrument works on different scales, a better illustration of the three elements of the instrument, and a critical view on what needs and what does not need to be connected.

The Sponge was mostly appreciated as easy to understand and clear in its objectives. It was considered more clear than the Connector. The participants pointed out that examples were useful, but that they did not cover the social component of the instrument. They also mentioned the importance of adding more theoretical background and making the multifunctionality principle clearer in the instructions.

The purpose of the Integrator, the way it stands on its own in relation to the other instruments, as well as its meaning as a concept, was not entirely clear to the workshop participants. One participant also mentioned the lack of non-spatial integrations. More contextual elements and more examples, according to some participants, could improve the instuctions for this insturment. Examples should be given for all different types of conflicts and synergies mentioned in the instructions. It was also felt that it should be introduced together with other methods addressing integration (e.g. stakeholder analysis).

The Scaler and the instructions given were considered to be clear and easy to understand to most participants.

All in all, more background, examples, and scales can make the instructions more understandable to the users.

## Usability / Ease of use

*SRQ: How easy were the instruments to use according to the workshop participants?*

|  |  |
| --- | --- |
| Input data | Variables |
| eval\_day1.csv | instrument\_easeOfUse |
| eval\_day2.csv |
| eval\_day3.csv |
| eval\_day4.csv |
| eval\_pw.csv | Q3\_1, Q10\_1, Q17\_1, Q24\_1 |

![Chart, histogram

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Figure

According to the daily evaluation forms, The Connector was the least easy to use, followed by the Integrator. The instrument considered to be the easiest to use was the Scaler, followed by the Sponge.

The instrument that was considered

Overall, the instruments were…

The instrument set as a whole…

## Usefulness

SRQ: How useful were the instruments according to the workshop participants?

![Chart

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## Effectiveness

SRQ: To what extent did the instruments improve the ability of the workshop participants to design sustainable urban riverfronts?

|  |  |
| --- | --- |
| Input data | Variables |
| expert survey data from Qualtrics | percentage of standardised maps |

![Chart, bar chart

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## Efficiency

SRQ:

## Efficacy

SRQ: Were there any confounding variables that could have influenced the ability of the participants to better design sustainable urban riverfronts?

* + Expert input during the workshop
  + Group work

## Improvements

### Instructions

A general introduction of the instruments at the beginning of the workshop would have made the process clearer to the participants.

### The instrument set

The order of the instruments…

### Consideration of other design targets

The social component…

# Discussion

* + Ethical issues

# Notes

# References

1. The call for participation was published on the website of AMS Institute: <https://www.ams-institute.org/events/sustainable-urban-riverfronts-design-workshop/> [↑](#footnote-ref-1)