KU Leuven
Faculty of Architecture
Sint-Lucas Brussels Campus

Impact by Designing

Proceedings of the 3rd ARENA Annual Conference, 6th-7th April 2017
at KU Leuven, Faculty of Architecture, Campus Sint-Lucas, Brussels

KU LEUVEN ARENA

A publication of:
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The 3rd ARENA conference 'Impact by Designing' was organised by KU Leuven's Faculty of Architecture Sint-Lucas Campus, Brussels.

Cover picture:
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© An online publication by KU Leuven, November 2018

ISBN 9789492780003
D/2017/13.576/6

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In memory of Johan Verbeke (1962 – 2017)

The circumstances of the 'Impact by Designing' conference

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The organisational setting of this conference is exceptional. It represents the first in the series of related events, chaired and organized by Johan Verbeke from the Faculty of Architecture Sint-Lucas Campus of the KU Leuven:

- Impact by Designing' (6-7 April 2017; see figure 1),
- CA^{2}RE, the Conference for Artistic and Architectural (Doctoral) Research (8-9 April 2017) and
- Incubators: Urban Living Labs for public space. A new generation of planning? (10-11 April 2017).



Figure 1
Impressions from the Impact by Designing conference (credit Rob Stevens - KU Leuven - Belgium)

The overlapping research audiences in such a setting represent a high impact potential of the events themselves. Furthermore, the relational knowledge creation deriving from these events contributes to the complementary views on architectural design research and its impact: the first one through designing in general; the second at the doctoral level, and the third through the living labs, a specific form of the direct societal impact making through designing.

The 'Impact by Designing' is the Third ARENA (Architectural Research European Network Association) Annual Conference. ARENA is one of the major organizations focusing on architectural research and its development. As stated at the official network page, it is 'an open, inclusive and comprehensive network for architectural researchers across Europe. ARENA offers a shared platform that aims to promote, support, develop and disseminate high-quality research in all fields of architecture in the widest sense, including its links to building technology, environmental design, sustainable development, interior design, landscape architecture and urban design/urbanism, operating in domains from science and technology to arts and humanities. To do so it works alongside all existing bodies to promote the quality, breadth and significance of architectural research to the key institutions involved.'

ARENA is involved in the CA^{2}RE (the Conference for Artistic and Architectural (Doctoral) Research) development as well. The CA^{2}RE conferences are organized in association with ARENA, EAAE and ELIA. The April 2017 CA^{2}RE is the first of the newly established biannual series of collective PhD review and supervision, building on the tradition of the previous ARENA (the symposia called ARM - Architecture Research Moments) and other European and regional attempts (PRS - Practice Research Symposia, for instance, within the ADAPT-r - Architecture, Design and Art Practice Training-research - ITN project context).

The 'Impact by Designing' conference continues the cycle from 'The Unthinkable Doctorate' in 2005 through the 'Communicating (by) Design' in 2009 and 'Knowing (by) Designing' in 2013, all of them hosted at the Sint-Lucas School of Architecture in Brussels. As stated in the conference call: 'The 2017 conference aims to take a further step in developing research in those disciplines where creative practice plays an important role, and hence to make a substantial impact within the field.' And: ' The concept of 'impact' is becoming more and more important in society, not least in relation to research. But what do we understand by impact? Everything seems to impact on everything else, and so if something cannot be seen to have made an impact, then it is considered of less value. This raises important challenges and questions. Why does research have to impact? Can we demonstrate that our research efforts, whether in academia or in creative professional practice, make a difference? Does our research genuinely impact more widely upon society, architecture and the arts? If our endeavours do have an impact, then in what way? What can we learn from our experiences for the future? Does it help to change our perspectives about the nature and purpose of research?'

The proceedings of the 'Impact by Designing' conference had been in the middle of the external reviewing process, when we were shocked by a sudden loss of the protagonist, Johan Verbeke. During our fifteen years of collaboration he convinced me it is worth starting and restarting a 'mission impossible' in research. He demonstrated how to shift it into the 'possible': through respectful listening to people, workoholic life-style, fighting for the freedom of thought - together. Impact by designing is so obvious for the designers, on the other hand it becomes a 'mission impossible' when the designers try to explicate the actual impact of their research and make impact to other research fields. Because it is difficult to produce evidence of impact. Because the design impact is a long-term impact, and the research communities are searching for the immediate evidence of the impact (potential).

The contribution to the new knowledge creation and to the new methodological developments in architectural design/research, presented in this publication, can be found at many levels. The research presented addresses all the questions from the conference call and 'investigate ways in which research, education, industry/practice and society all impact upon each other':

- 'In what ways are research, education, industry/practice and society influencing each other, that is, if they do at all?
- Is the increased focus on research impacting on education? And on society?
- In return, is education impacting on research? And on society?
- Does professional practice impact on education?
- Does research change creative professional practice
- Is society impacting on our research endeavors? And if so, how?
- Do industry and creative professional practice impact on innovation in the field/discipline?

In short, what are the mutual interactions and relationships between research, education, practice and society? With this in mind, which experiences or ideas about impact would you like to share at the conference? What is there of value for us to discuss, analyse and project into the future?'

The 'Impact by Design' conference gathered researchers from academia as well as from professional practice, that address the abovementioned questions from across the fields of architecture, design, arts and music. Many of them combine academic life and their processional practice.

The conference offered a brainstorm reflection between the participants - both the presenters and the scientific committee members. The discussion about the research impact uncovered the ethical issues associated with design research. The report from this session is published as the concluding chapter of this publication.

Enjoy your own reflection!

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Conference Papers

Impacting through a design based action research

COLab as imaginative outcome of an urban architectural design practice grounded in research

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Abstract. This paper looks into the (potential) impact of a design-based action research in the field of urban architectural design.The architect-researcher is grounded in community initiatives on and around the Josaphat site in Brussels that engage with urban architectural design. The preliminary results of this doctoral research and design practice have been brought up in a "souvenir box". This box -as midterm report of the doctoral research- gives an account of the key concepts that have been brought up by implementing methods inspired on those of constructivist grounded theory; coding and categorizing. The outcomes take form as a map which offers a graphical and schematic summary of the emerging key concepts and codes, and a series of letters -complemented with polaroid photos.In this paper the discussion will focus on two letters that are part of this souvenir box and which make explicit four of the key concepts that are emerging in the research and design practice. Looking into the notions of belonging, the performative, the commons and participatory design the letters address different publics. Together they build up to the imagination of a COlab design proposal. COlab is a performative manifestation that aims to act through its articulation. At this -early stage- it is an open concept that brings together some of the key concepts of the research and design project. The paper concludes by proposing several ways in which the (potential) impact of COlab can be enforced.

Keywords. Design-based action research; urban architectural design & participatory design; commons; belonging; performative.

THE STARTING POINT // introduction

In this paper the doctoral research and related urban architectural design practice will be described and discussed focusing on its (potential) impact. In the fnext chapter a background will be provided of the research methods; describing the context of the research, the case on which it evolves through design-based action research. Further on the role of the architect-researcher will be described and a brief overview will be given of the community initiatives in which both the research and design practice at Josaphat are embedded. The method of design-based action research will be positioned in the broader field of design research, after which this background part will highlight the outcome of the "souvenir box" as midterm report of the doctoral research, achieved through the implementation of methods inspired on those of constructivist grounded

theory. As theoretical positioning four key concepts that emerged from this design-based action research -and which were brought up via the souvenir box- will be discussed: belonging, the performative, commons and participatory design.

Subsequently in the second part results of this research and design practice at its state of affairs (February 2017) will be brought up by fragments of two letters from the souvenir box. These discuss some of the key concepts and bring together the practical underpinnings and theoretical positions. The letters build up to the proposal for a COlab; a performative imagination to develop / build / create a commons-based building block, bringing in a hardcore architectural and long-term approach grounded in the work and experience of the currently running community initiatives. To conclude a brief discussion will highlight the (potential) impact of the COlab imagination. Still being in an early phase it is argued the proposal already impacts through its performative nature. An outcome that can be enforced and for which some proposals of continuation are shortly formulated.

Where we are coming from // background

The paper is based on the outcomes of a doctoral research and the urban architectural design practice that emerged from it. It builds on the state of affairs of this work at is halfway stage (February 2017). The doctoral research has been linked to a JPI Urban Europe project named "Incubators of Public Spaces" for which the Department of Architecture of the KU Leuven, campus Sint-Lucas Brussels was responsible for the fieldwork on and around the Brussels living lab that is situated at the Josaphat site which is in a planning process to be developed as a new and sustainable neighbourhood.

The Josaphat (Old Railway) site in Brussels is **the case** around which both the research and practice are built. This area is:

- a Zone of Regional Interest that is about to be developed into a whole sustainable neighbourhood,
- a running living lab of the 'Incubators of Publics Spaces' JPI Urban Europe research project,

a playground for several (activist) citizen initiatives that develop commons-based projects (practice) and proposals (theory),

- the breading ground of the here discussed urban architectural design practice and
- also a place of belonging for locals and other fauna.

The main method conducted within the doctoral research is a **design-based action research**. Building up on the method of action research as established in the social sciences, this research is inspired -in a designerly way- on the research based engagement in the field through a spiralling set of actions (De Smet & Van Reusel, 2017; Dick, 2000; Kember & Kelly, 1993; Lewin, 1946;

Swann, 2002; Waterman, Tillen, Dickson, & de Koning, 2001). Although a design based adaptation questions the rigorous break down between planning, action, observation and reflection, the applied method respects the main principles of action research defined by Kember & Kelly (1993) as (1) following a cyclic process that engages in action and reflection, (2) setting up a research partnership in which actors on the field are participating in the research process as the researcher is taking part in the field work, and (3) setting up a practice with the goal to make desirable changes in an existing situation.

In conducting the **design-based action research**, the architect and researcher has been engaging with divers community initiatives that emerged on and around the Josaphat site before and throughout the doctoral research. Taking part in their socio-spatial activities the architect-research dived into the researching and the collective creation of urban interventions concerning the temporary use of the field and the interventions concerning the long term planning process of its future. As an active participant the architect-researcher build up the design-based action research; active involvement, the cocreation of interventions on site, lobbying, loose interviews, joining in or setting up collective visioning exercises, imagination workshops, permanencies and many more activities that fit in the frame of participatory urban architectural design have been the means of working in order to collect (and become part of) the data. A rich cloud of reflections, experiences, tacit knowledge, explicit insights, open questions, banal outcomes, imaginations and collective convictions has been building up in the past two years (February 2017).

The design-based action research resulted in / took part in / studied several **community initiatives that evolved around and on the Josaphat site** in Brussels. In the context of the paper a couple of them will be discussed.

The civic political platform of "Commons Josaphat" brings together experts -in many ways- of the commons in different fields such as water governance, ICT and housing. In a collaborative process this horizontally and openly organised group of citizens worked toward a proposal for the planned future development of the Josaphat site as a commons (Commons Josaphat, 2015). Their work extended in a supporting presence in the unasked for temporary use of the site as well as in the development of transversal model for a building block, based on the ideas as formulated in their proposal.

The "Jardin Latinis" is a nomadic garden, self-organized by locals living nearby Josaphat. Focussing on the relation with nature and social cohesion this community created and cares for a collective garden with some private boxes. Open for experimentation the gardeners engage in permaculture and other activities nurturing the flourishing natural environment at Josaphat.

"Recup'Kitchen" is a crowdfunded kitchen in which food surpluses are collectively prepared to become healthy (and often biological) dishes that are shared at a free donation price. After a good meal the dishes are cleaned collectively. Recup'Kitchen stands for food sustainability, social cohesion, caring, a solidarity economy and debate in and on public space.

The "Maison des Possibles" is a -under construction- house that aims to facilitate encounter between commoners, presentations and debate on the potential of the commons for Brussels. Through its construction it wants to be an incubator for the already existing activities on-site as well as for other potential commoning activities in Brussels. Furthermore its construction process -based on recuperated materials, voluntary work and lowtech- tools is performative experimentation of how citizens can build their own structures (and housing) with the ambition to free them from the necessary workload that is needed to be able to afford housing in the city.

The conducted research and emerging practice -embedded in the just described community initiatives- come together in a flu zone touching between science -with its recognized and rather rigid approach toward the production of knowledge- and design practice -which embraces abductive reasoning and creative interpretations. In the light of this paper the design-based action research can be positioned in what by Johan Verbeke has been defined as **"Research by Design"** (Verbeke, 2013) and what Nigel Cross outlines as **"Designerly Ways of Knowing, Thinking and Acting"** (Cross, 2001).

The entangled result of tacit knowledge inherent in the activity of (collectively) designing, the socio-spatial outcomes of the urban architectural interventions and performative proposals, the reflections on ways of designing and the many intuitive and artistic processes that come with it, are studied through **methods inspired on Constructivist Grounded Theory** (CGT) (Charmaz, 2014). The design-based implementation of coding and categorizing of the rich amount of (subjective) data triggered insights and new questions. These preliminary results have been brought together in the midterm report of the doctoral research (February 2017) that came in the form of a "souvenir box".

Building on a metaphor of an "exploratory design journey" the **souvenir box** resulted in a mapping of the surfacing concepts and preliminary findings achieved through the on-going coding (in the souvenir box referred to as "tagging") and categorizing process. This map (see Figure 1) functions as a graphical outline and schematic visualisation of the current state of affairs of the research and practice. The base of the map is a graphical representation of the Josaphat site with illustrations of the core projects that are at stake in the research and practice. In bold characters it brings out key concepts that start to gain form and that assemble a red wire throughout the overall work. In overlap -on top of the key concepts that are draw on the map- grid lines are traced. These function as the backbone for the codes that were derived from running through the notebooks kept by the architect-research and which rigorously document the research and practice (see Figure 2). The codes are positioned -on the grid lines- in relation to the key concepts. Codes get grouped and positioned according to the visually articulated key concepts on the map and form categories of accumulated concepts and codes, bringing out the insights. Coordinates and an index help to connect the emerging concepts and codes on the map to the additional documents added in the souvenir box.

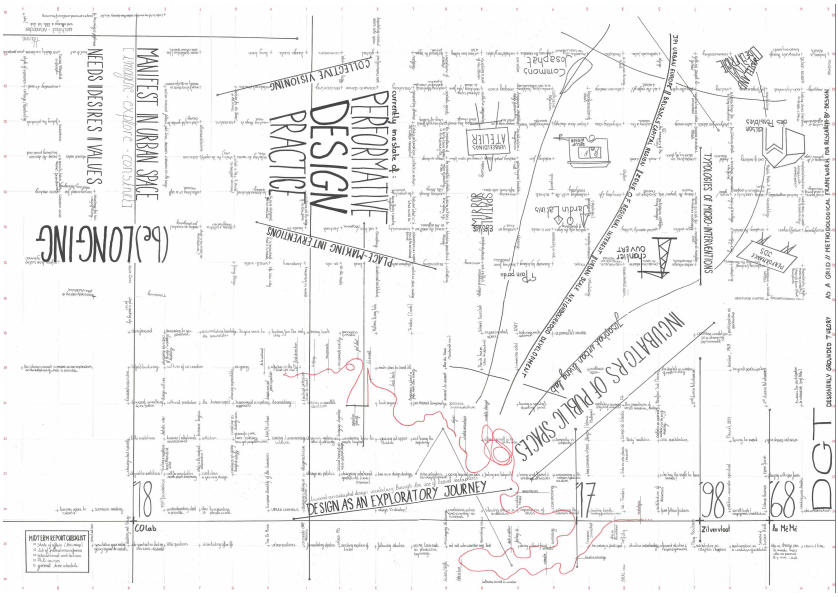


Figure 1
The mapping of the state of affairs of the doctoral research.

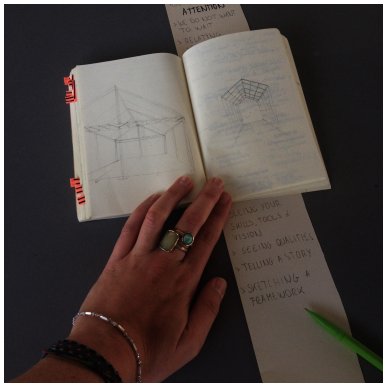


Figure 2
Key concepts are brought up during coding (tagging) exercises that reconsider the data that has been collected in notebooks.

The mapping of key concepts can be related to what in CGT is defined as categorizing and triggered the writing of a series of letters -reporting from the journey- that more explicitly elaborate on some of at that time most performant key concepts. By addressing different audiences, these letters allow to articulate in words what has been mapped (drawn and assembled) on the map. The letters are complemented with polaroid images on which hand-written notes aim to make the relation with the field explicit in line with this visual material (see Figure 3). All elements drawn on the map are linked through the use of the coordination system. Furthermore - but in the light of this paper not further discussed- the souvenir box contains a "dictionary addendum", a logbook of dissemination activities and a timeline (see Figure 4).



Figure 3
The polaroids are ordered in relation to categories that have been made explicit in the map.



Figure 4
The souvernir box contains a map, enveloppes with letters and photos, a travel logbook, a dictionary addendum...

Some of the key concepts that are brought up through this on CGT inspired coding and categorizing -that came in the form of a souvenir box- bring out theoretical positions in relation to the urban architectural design practice of the architect-researcher. Some of the emerging concepts in the field of urban architectural design are:

- belonging
- performative
- commons
- participatory design in architecture

The drive to look for a place of **"belonging"** is a recurring theme that can be in the various community initiatives in which the architect-researcher is engaged. This is most strongly present in the collective of Commons Josaphat that explicitly mentions their drive to bring (back) the focus of urban development back on "bien-être" or quality of life (Commons Josaphat, 2015). But also the local community garden, Jardin Latinis, or the mobile kitchen project, Recup'Kitchen focus on wellbeing, conviviality and togetherness. In literature Christopher Alexander's longing for the "Quality Without a Name" (Alexander, Ishikawa, & Silverstein, 1977), has been picked up by David Bollier and Silke Hellfrich (2015) framing the search for "Enlivenment" in commons initiatives.

The notion of the **"performative"** originates from speech act theory and give expression to the power words can act in, just by the statement they are making (J. Austin, 2013; J. L. Austin, 1961; Cambridge Dictionary, 2017). A similar line of thought can be configured for the urban architectural design practice (Gadanho, 2007, 2011; Herrero Delicado & José Marcos, 2011; Samson, 2010; Signore, 2012; Wolfrum & Brandis, 2015). Similarly this performative characteristic can be attributed to various community initiatives on and around Josaphat. The Recup'Kitchen project demonstrates -although in a very small scale- that a different and solidarity economy is possible just by making the socio-spatial statement of working with a free donation -but not for free- price. Similarly the "Maison des Possibles" is in its building process, by using recuperated materials and voluntary energy as main resources, showcasing that different ways of building are possible. By making their statements these urban interventions change the perception of what is possible in the future development of the city.

The **"commons"** is wide concept, defined as a (1) a shared resource, that is (2) taking care of and governed -commoning- by (3) a community (Bollier & Helfrich, 2012, 2015; De Angelis & Stavrides, 2010; Kip, Bieniok, Dellenbaugh, Müller, & Schwegmann, 2015; Ostrom, 1990; Vicinia, 2018). At the same time the concept entails a movement, a transition that offers (or rather re-establishes) a third party that challenges the public-private dichotomy (Bollier & Helfrich, 2012; Dellenbaugh, Kip, Bieniok, Müller, & Schwegmann, 2015; P2P Foundation & Transnational Institute, 2017). The commons are a historically wide established way of governing natural resources that came under pressure during the industrialization process. Today the ideas and theory as well as the practice of the commons are being explored in an urban context (Borch & Kornberger, 2015; Dellenbaugh et al., 2015; IASC, 2015; Kip et al., 2015; Pak & Scheerlinck, 2015). The potential of the commons and the goal to bring the creation (or protection) of them in the urban context has been explicitly advocate by the citizen initiative of Commons Josaphat (Commons Josaphat, 2015; De Pauw, Lenna, & Napals, 2013). But also the Jardin Latinis, the Maison des Possibles and other projects embrace a similar philosophy that see public land, food production and consumption, the natural environment

and housing -to name a few- as a common good that has to be taken care of.

From the perspective of the field of architecture and urbanism the notion of **"Participatory Design"** (PD) has -both in theory and in the practice- been studied (Erling Björgvinsson, Ehn, & Hillgren, 2012; E Björgvinsson, Ehn, & Hillgren, 2010; Eriksen, Seravalli, Hillgren, & Emilson, 2016; Saad-Sulonen et al., 2015; Smith, Kanstrup, & Bossen, 2016). The historical contextualization of PD goes back to the late '60's but has gone under different phases since then. Three main waves -practice turns- can be defined; (1) a counter movement starting in the late '60 in which citizens come to the street to protest against threatening development plans, (2) a revival of PD in urban architectural design incented by the top-down through European or local funding programs and (3) the contemporary shift which thrives on a rather constructive and can-do approach originating from the grassroots (BRAL vzw, 2016; Doucet, 2015; Levy, 2013; Mela, 2016; Moritz, 2009; Van Reusel, Descheemaeker, Verbeke, & De Brant, 2017)

Where we are heading at // results and discussion

In this paper two letters of the souvenir box -being the midterm report of the doctoral research and linked urban architectural design practice- are looked into. These have been selected based on the focus of this paper to discuss the results that triggered an impact of the design-based action research through an imaginative outcome; the COlab proposal.

The first letter addresses "those who wonder" as public and discusses the design-based research in her different identities to reveal the performative nature of the practice -embedded in the Josaphat community initiatives- as well as the research. The second letter builds on the in the previous chapter discussed historical contextualization of Participatory Design (PD) in the field of urban architectural design. Fragments of these letters have been selected and adapted for this paper.

Letter to those who wonder

4th of February 2017
In-between places, while travelling from home to home

To those who wonder what (this) research-by-design is about,

First of all thank you for the interest. It is a though question... Every time the answer is different. It depends on who is asking and what their interests are. It depends on what is at play at the moment.

In an academic context:
The research-by-design is linked to the JPI Urban Europe research project 'Incubators of Public Spaces' for which we aim to develop a digital tool that could support participation in urbanism. As researchers from the Faculty of Architecture of the KU Leuven our work

focusses on the Josaphat site as urban living lab. There, a practice of performative design relates to various commons-oriented collectives that work on and around this Zone of Regional Interest.

During an event at the Josaphat site:
Each of us has community-oriented values we anchor on this place; some by everyday practices here and now, others orient more to the future, bring on a longterm perspective. It is important to see how all of them, through local place-making or by collective visioning processes, can strengthen each other and create impact to make our city a place of bien-être / belonging.

To close friends and family:
To be honest, it is not entirely clear. There are so many facets... It is easiest to explain Recup'Kitchen as a concrete illustration; a collective process of intervening in public space, grounded in certain ambitions (create social bounds, develop a solidary economy, discuss about what public space / our city can be). These kind of actions help to see how our city could be different. Design as a statement to explore how we can bring on a transition and to bring out what it is we value in this. It is about learning (by doing) what we want for our city and how we can get there.
Could it be that we intuitively know damn-well what our actions our about? There is a drive. A longing for. The research is going in a certain direction. There is a proliferation of research questions. It is just not entirely clear yet what exactly is the goal.

In an intuitive way, there have been made notes, drawings, actions, debates, assemblages, reports, design proposals ... More conscious now, all these 'taggings' (Van Reusel, et al., sd) are ran through again. Studied, re-structured, filtered, redrawn ... Concepts and reflections are surfacing.

How do we - and more specific I as architect & researcher - create a place of belonging? How can we transform to a city that corresponds to our values of equality, wellbeing, commoning ...

We long for a different world; what are we imagining? How can we fulfil our aspirations? [...] It is our belief to value the process - the incremental growth - of a 'place' (Augé, 1995). From a temporary structure we can grow to the development of a building block, from there we can grow to ...

We do not have the money, nor the power. But we have energy, ideals, believes... We have each other and our collective eagerness. We each have our particular skills, including those that relate to the architectural profession.

So we imagine, wildly what we see as possibilities right now and in 20 years. We visualize, dream, envision, discuss, agree upon, question...

So we explore how we can make things happen. We lobby, we rebel, we wonder, we re-imagine ...

So we construct, whatever we manage to set up within the time that is given to us (the temporary in-between).

This temporary place (loaded with all its gained identity, friendship, creativity, values and longings) has entered our daily lives. In all its smallness it represents the city we see ourselves living in. Our ambitions reach further than where we are now. They drive us to look for all possible means to transit, to stretch beyond. So how can we upscale this little 'everyday paradise', how to make it sustain? Isn't that the 'architectural level'?

Every act has been a statement. It is a performance "manifesting our desires in the reality " (Herrero Delicado & José Marcos, 2011). The participatory aspect is only a layer of this multifaceted perfomances. By acting on our imaginations, by illustrating the possibilities we see, we make them happen. It impacts as we 'speak'.

Performative (Cambridge Dictionary, 2017)

- involving an artistic or acting performance
- specialized (language) having the effect of performing an action

A mobile kitchen that is installed in public space to bring people together around the table for a healthy and sustainable meal at a free-to-chose prize is an act of food sustainability, solidary economy, community-building and recuperation of public space.

A structure to house collective imaginations that is collectively built, used and managed is a pilot for the transition of co-governance and commoning in the development of a new neighbourhood.

By making things real - no matter how small - we are impacting. At the same time we are still experiencing what we want and especially how to get there. This is an exploratory journey. It is a way of designing we are not so familiar within the architectural scene. There is no clear brief to start from. We just dive in and hit the road. Our co-travellers, intuition and perseverance will bring us where we are orienting toward.

The metaphor of exploring and travelling will help to bring out the obtained insights. A performative design practice (Wolfrum & Brandis, 2015) is uncertain, messy. We wander and get lost. We manoeuvre our way through. There is no predefined map. We can only offer some abstracted hints of how such a design process functions. It is an extension to the architectural vocabulary enriching the contemporary architectural lexicon of participation, urgency and sustainability that shows to have become insufficient or even unreliable.

We've only just begun this journey. At this point we can only imagine and explore what the destination / long term result may be. A proposition for a COlab: the CIMBY -Commons in my back yard- research proposal we recently submitted (co-create 2017, urban resilience). We imagine / design

some possibilities of what could be and how we could get there. Ambitions to keep us dreaming, because only from there we can move on. A speculation, a performative gesture of 'imaging'. A vague direction to orient our map.



Figure 5
Polaroid of an imagination.

July '15
Imagine...



Figure 6
Polaroid of a path.

August'16
Jardin Latinis. Image by Paula Bouffioux.



Figure 7
Polaroid of our shared values.

February '16
Values for the transitory use of Josaphat.

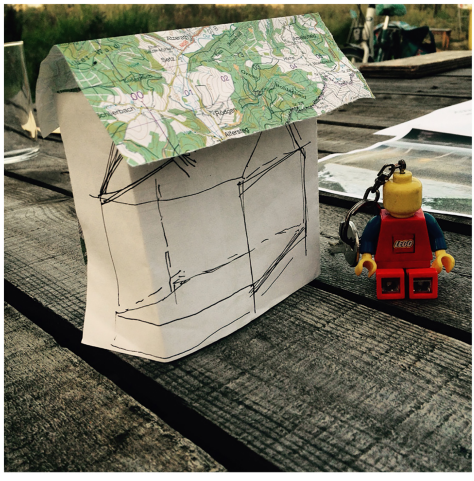


Figure 8
Polaroid of the imagined house.

September '16
Launch of the 'Huis van de commons' /
'Maisons des possibles' project.

Letter to the colleague-architects

10th of February 2017
In Brussels, at home

To our colleague-architects.

[Historical contextualisation of participatory design in urbanism and architecture leading towards a discussion on COlab:]

At this point it is not more (nor less) than an image / imagination. It is an idea / concept / utopia / ambition / reality that grew out of an engaging conversation (Van Reusel & Boutsen, forthcoming). It takes into account a criticism on the current state of the art of participatory design in architecture. It aims to reach beyond the cute small and often messy interventions that proliferate in the edge of our city (Pakhuis de Zwijger, 2016; Pakhuis de Zwijger, 2016; BRAL vzw, 2016). It grows out of the ambition to bring the richness of these DIY urban actions to an architectural level. It goes beyond the temporary nature and aims for a long-term system-oriented impact. It is an ambition to achieve a 'hardcore architectural' performance / an iconic statement.

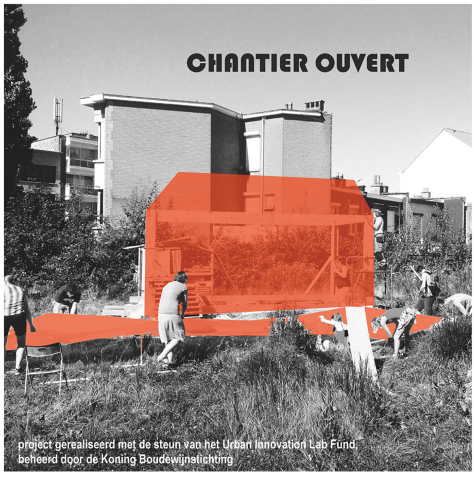
[...]

This imagination has merged with the ambitions of the Commons Josaphat collective (Commons Josaphat, 2015). We see the potential to realize a commons-based building block within the planned development of the Josaphat site. Currently this 'verbeelding' is getting shape through a research proposal in reply to the CO-create 2017 call for research projects on Urban Resilience (Innoviris.Brussels, 2017). This CIMBY - Commons In My Back Yard - proposal is not the solution for our needs and desires, but it brings out a possibility.

Fragment from the CIMBY project outline:
The project initiates from Brussels collectives, organisations and individuals that are already creating urban commons. This collaboration will form the base to develop an integrated model for developing a building block. Through a practice-oriented example the partners want to underpin how the city can be developed and managed through a collaborative and human-oriented approach. An innovative building block will function as prototype for a neighbourhood with a resilient network and a good quality of life.

It would be a performative gesture on urban scale, an implementation of what our city could be like.

Your fellow-architects



October '16
Chantier ouvert.

Figure 9
Polaroid of an open construction site.



February '16
Spatial mirror.

Figure 10
Polaroid of a spatial mirror.



November '16
COlab. An open concept in collaboration with Dag Boutsen.

Figure 11
Polaroid of the imagined COlab.



July '16
The storage shed. Image by Nicholas Jacobs.
Spatial mirror elective course.

Figure 12
Polaroid questioning architecture.

The design-based action research resulted in a shared ambition to imagine - and maybe one they create- an up scaled community initiative in urban development. The practical underpinnings and theoretical positions merged and surfaced through the creation of the souvenir box. Although - in this midterm stage of the research- it is too early to see what the effective results could be like, the proposal for a COlab, as a performative imagination, can already impact by its mere articulation and visualization.

Building up on the historical contextualization of participatory design in the field of urban architecture design, the map of the souvenir box illustrates a timeline. In the near future, but yet uncertain, the COlab (Van Reusel, H. & Boutsen, D., forthcoming) is positioned. It puts up front a potential realistic-utopian continuation of the iconic legacy.It jumps on from the 1st and 2nd turn in PD to a nearby -already present- 3rd wave. It is an imagination of what this current generation of PD in urban architectural design could develop into. It is an utopia with real ambitions.

COlab is driven by the architect-researcher's and her fellow-practitioner's desire for a place of belonging. Building on what is being realised in the temporary right now extending it to a long term vision. COlab is the iconic realisation of the commons proposal formulated by Commons Josaphat, embedding its aspired direction on the methods that are explored in the small-scale commoning practices at Josaphat today. Like the urban architectural design practice within this research, the imagination of this COlab is a performative manifestation that aims to act through its articulation.

COlab has various potential futures / impacts. As mentioned in the previous chapter, it could become the driving motor for a living lab based research project aiming for urban resilience. It could result in a collage or other type of imaginative visualization that acts through its imaginary potential. It could develop into a program for a design studio at an architecture faculty, it could be the base for a civic driven development project with real world developers and public stakeholders. On Josaphat or somewhere else.

The impact of the design-based action research is still in an early phase - yet already there- and can still develop in many directions. So far the research and urban architectural design practice that are balancing between science and design established a performative imagination as outcome (impact) that heavily draws on research by design and designerly ways of knowing, thinking and acting. COlab is an:

- an imaginative gesture that holds the promise of upscaling the entangled research and urban architectural design practice on and around Josaphat,
- a statement of what could be,
- a design proposal that impacts by its articulation.

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Practice to education. The role of the project?

Making, making with and debate.

Chantal Dugave

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Abstract. This paper will reflect the manner in which a practice of artistic projects and pedagogy is able of producing some knowledge. More precisely, it will explain how the act of making can develop critical reflections in particular contexts. More deeply, I will discuss prison hospitals and memories of wars. The passage to the act is specific to the artist and architect, and when inquiring about meaning, it can become a subject for debate, help decision-making and open up other fields of thinking. In fact, the subject matter will consist in showing concrete examples and then analyse them, in order to understand the relationship between action and debate. Furthermore, my PhD proect, being a research creation, will allow me to present methods and tools.

Keywords. Research creation; Making; Debate; Art; Pedagogy.

Research creation

After my Master degree in Architecture at the Polytechnic School of Lausanne, I received a Post-Master in the School of Fine Arts, Lyon. In turn my architectural background, fusing with visual arts became the cornerstone of my professional approach. One permits me to understand the construction of the space and the other induces me to go through the representation and meaning that relates to it. My work is blurring identities, creating unforeseen situations that baffle certain thoughts thus giving a different view of reality. The goal and the result are not answers to all the questions but rather to encourage dialogue and questioning. By borrowing the concept of Paul Ricœur on *narrative identity*, my works play a role of adjustment between the mental universe and reality, they are *revealing* and *transforming*. This practice along with the contained questions motivated me to begin a research creation. It is a matter of analysing the creative process of a project in a continuous flow of ideas between theory and practice, and how *making* can promote *creative thinking* (Passeron 1995).

Practice

To present my artistic approach, the most characteristic example is the *Gentiane* work; it began around a true story. After a bombardment, the Gaza Zoo was hit and the zebra disappeared. It was not possible to bring in another. The Palestinians then chose an original solution: after few strokes of paint, donkeys became zebras. When everyday life is dominated by war, solutions, escapes go

through fantastic crafts. This slip is interesting and led me to transform the donkey *Gentiane* into an ephemeral zebra. But it was not a question of simply repeating this subtle anecdote. This transformation was to create mystery and doubt. The video, shot at night in a forest, shows an experience where we discover, step by step, between fascination and fear, the traces of a strange animal. In the zoom of the camera, the video insists that the animal is painted with food paint, of which we can clearly discern the mixed matter with the hairs. This intention emphasizes that there was no question of making a zebra and forgetting the bombardment that annihilated the zoo. The trace of this peeling painting is a link with the past act and the life that is being reconstructed.

Our focus will be on the process of conception which can last several years. And during this time, it can become an occasion of reflection, especially when the subject is complex. One of my artwork was realized in 2010, on the wall of the psychiatric hospital for prisoners of Lyon. The building is located in the wooded park of Vinatier among various houses, at the same time available to local patients and residents. The sponsor wished that the new building is integrated into the hospital center, in spite of the prison wall (6 meters high and 360 meters long). The idea was to create a series of polished stainless steel trees. Its gives a vertical rhythm, reflecting the park with its light, giving bits of blue sky. It brings a profound deepness, building a landscape. The wall is no longer a lifeless mass but living matter which takes colours tones different throughout the day and the seasons. Are we in front of a prison hospital wall or a landscape? This work produced many discussions during the realisation, concerning the representation of the psychiatry and the penitentiary in our society. Inside, I wanted to put a migratory bird flight in polished stainless, a positive image by knowing the relational problems in psychiatry. Some decision-makers told me that it was a bad idea, that I gave the taste of freedom to prisoners. A psychiatrist replied that it's important for their mental health, to want to escape. So, I was able to do it. Another anecdote was a meeting with the members of GIGN (National Gendarmerie Intervention Group). The building is designed to treat patients in detention. Before it opened, a GIGN team had to test its safety. It took them two and a half minutes to get out of the building. They then questioned the fact that I had removed the anti-grapple, concrete puddle located at the top of the surrounding wall. I replied that putting it back would have destroyed the artistic idea that the stainless-steel trees tore the wall. The intention was to transform the representation of psychiatry and penitentiary. Then, GIGN have changed their narrative, blaming the presence of luminaries to which it is easy to climb. And the wall-sky could became reality.

This description presents the process of my artistic work. At first I try to understand the subject in its complexity by analyzing it. Here we fasted several difficulties: between the medical care and the prison, with the representation of this kind of building in our society, plus the condition of confinement for those who are either behind inside or outside the barres. After, I try to develop various proposals, which are not only esthetics but also questions the sense and

the meaning. The project then engenders controversies and debates.



Figure 1
Chantal Dugave, Gentiane, Food painting on donkey, 2012.



Figure 2
Chantal Dugave, UHSA, Unité hospitalière spécialement aménagée, Polished stainless steel, Lyon, 2010.

Education

My approach to the educational projects in the same manner as the professional one. Teaching in the Graduate School of Architecture in Lyon, I develop situations where the students are going to work on real problem. Through meetings and exhibitions, we foster a space of reflection to create other points of view, thus encouraging controversies, and eventually leading to debates.

In my Master's Degree that I organized in 2015 and 2016, I gave the students as a subject the extension of University Lyon 3 in the Memorial Prison of Montluc. This place was built in 1921 and then has included different historic events, notably the Second World War and the French-Algerian War. Afterwards it became a detention center for women, closed in 2009. Open to the public in 2010 ; part of the site becomes the Memorial of the prison Montluc. This site is more of an historical than an architectural heritage. The buildings constructed in clinker are in bad condition. So, one of the reasons of this proposal was economic. The possible presence of this new program raises the problem of the proximities. The questions I asked the students was : how to take into account the uses of both programs? What kind of relationship can we build between education and memory? To design their architectural proposals, the students approached the site with visits and they met the institutional actors. So they have been able to understand the complexity of the memory. This studio research has permitted the development of 37 different projects, which were discussed and shown in exhibitions, especially during the European Heritage Days, in 2015 and 2016. To expose all the projects has permitted to show the different approaches, summary tables making easier to understand and compare the proposals. This work has allowed to rethink the space of the Memorial. The different partners understood that the ring road (no man's land) of the prison was a memory space, as important as prisoners cells. Or still, a problem of sound atmosphere was going to arise, how can we have the silence of the memorial within the activities of the university. The work done by the students have open doors for new discussions. The different actors, understanding that this eventual project will change completely the significance of the Memorial. Indeed, today it is no longer question to build the extension of the university near Montluc; the decision-makers understood the difficulties.

Projects and exhibitions attempt to articulate the complexity of reality around memory. When Edgar Morin speaks of *complexity*, he refers to the elementary Latin meaning of the word *complexus*, *that which is woven together* (Morin 2014). This approach leads him to the concept of *reliance* the *stem cell* of complex thought. The studio-research worked on the articulation between a place of memory and a place of pedagogy. It was followed by several partners from different disciplinary fields. If the act of reliance is *to articulate what is separated and to connect what is disjointed* (Morin 1977). Then it developed here according two scales, one physical (between the two buildings) and the other

political, through the proposal of the 37 projects, bringing debates together the various players.

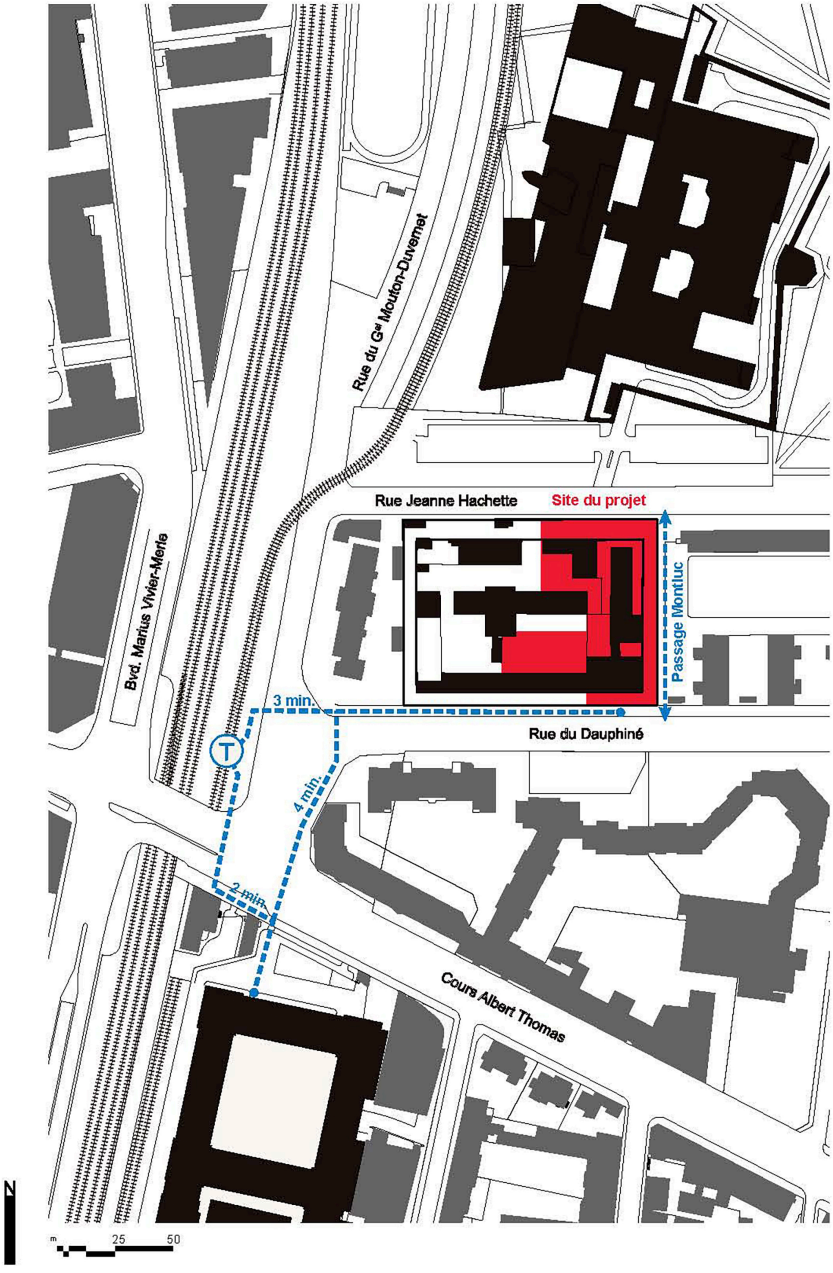

Figure 3
Location of the University Lyon 3 extension in the Memorial Prison of Montluc, 2016.

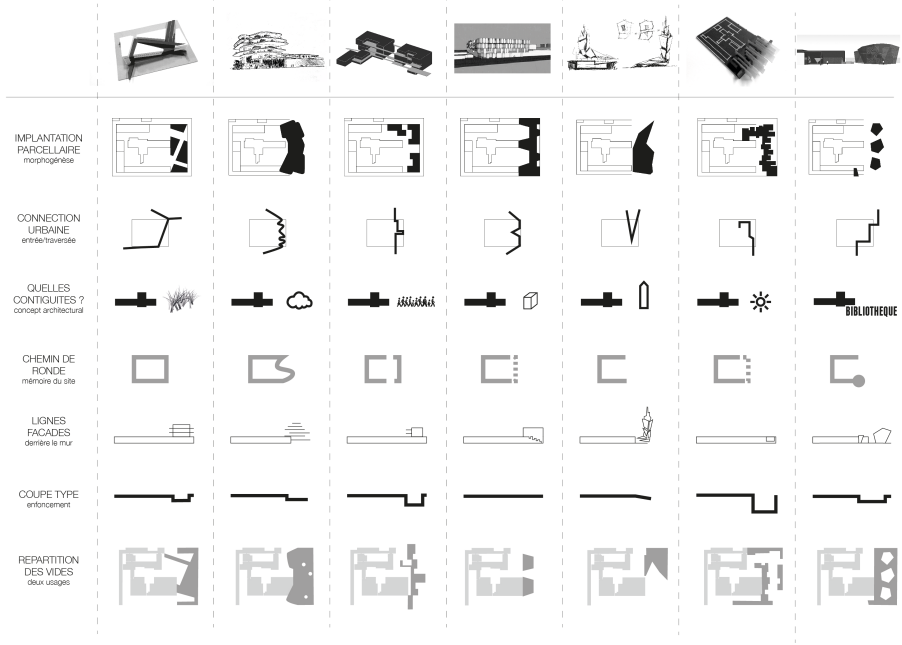

Figure 4
Analysis of the University Lyon 3 extension in the Memorial Prison of Montluc, 2016.

Impact and debate

The presentation of these various cases explains the interest of the project process. More exactly, it is the action of making which produces space of debates. The environment in which the artistic or educational projects intervene themselves are complex. It is so particular that we are sometimes facing the *blank page syndrome*. A feeling of powerlessness can appear. Is the project going to solve the raised questions? Does it bring adapted answers? Is the action overestimated?

At first, it is a question of understanding the context in its entirety and thus of being attentive to what is said, in what is already there. Then, it is important to search what is invisible. As Gilles Deleuze's said, the creation consists to *see something that others do not see* (Deleuze 1995). And for this, it's essential to deconstruct the basic data. To deconstruct consists in laying bare, in defusing implicit oppositions, to question the visible order. But, to undo a system is not to destroy it. To move the oppositions is not to annihilate them. When Derrida speaks about the process of *deconstruction of texts* (Derrida 2002), he rereads, peels, pushes texts to the limit. Bringing to light what they repress. Avoiding the wrong conception of the real meaning. To undo it is to update the unnoticed, to re-question the presuppositions and to open new perspectives.

After this tendency in entropy, comes the necessity to organize. The knowl-

edge operates by selection of significant data, it identifies, associates, ranks. It is a question of finding a new layout of thought to approach the reality differently. In final, we can say that the process making, with its aspect to create and to undo, is always in movement, it is a *making growing* (Ingol 2013). It builds itself according to the experience. We cannot quite anticipate, the thought of *making* is to develop by *making*.

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Two versions of a walled house

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Abstract. This paper emphasizes on an architectural artefact: the Walled House project. More precisely, it emphasizes on the difference between two versions of it: the version as designed and the version as constructed into reality. Both versions assume certain kinds of architectural agency. The difference between both though foregrounds a decreasing potential and impact with regard to architecture's socio-spatial agency, resulting from the erasure of certain architectural articulations in the process of construction. The erasure here is conceived as symptomatic of how architecture is often conceived of in constructing the urban. From a political creative practice, carving up spaces with an ambiguous potential inviting for a difference of interpretations and appropriations, it all too easily slips into a policing practice, preemptively erasing such a leaving space for interpretation empowering those encountering -through- architecture.

Keywords. Urban poesis; politics of aesthetics; aesthetics of politics; architectural agency.

Introduction

In our architectural practice we venture from a fascination for impacting in accupuncture-like ways the urban through the method of deploying in it particular architectural artefacts, crafting subtle and provocative corrections into their official programs. Such corrections we conceive as able of provoking poetic constructing activities themselves in those encountering architecture: acts of an 'urban poesis' (Sassen 2006) expressed alongside acts of using, ab-using, interpreting, appropriating and occupying architecture. As Jeremy Till has stressed, architecture is about making space but even more it is about leaving space for interpretation (Till 2009). Given the difference of interpretations invited for, it follows that we conceive of the architectural artefact inscribed in the urban essentialy as an agonistic stage (Mouffe 2013) and of architecture as a productive conflictual practice (Miessen 2010). In a pragmatist way working through provoking, poetic and probing architectural artefacts on the urban we explore the urban, each time aiming at a relevant impact and agency. It follows that this paper will be centered also around the notion of architectural (spatial) agency, situating the latter close to the account given by Schneider and Till (Schneider & Till 2009).



Figure 1
The Walled House that was designed. model: Johan Liekens

One version of the Walled House: the house that was designed

One such artefact, the *Walled House* project, takes the stage in this paper. Specifically the emphasis will be on the radical difference emerging between two versions of it: the version designed and the version constructed into reality. The *Walled House* came into being as an entry to an architectural competition launched by *sogent*, entrusted with envisioning the urban development of Ghent. One of *sogent*'s initiatives launched from 2007 on is the program *Stedelijke Kavels / Urban Allotments*. In it, problematic urban sites situated in decaying neighborhoods are dealt with. The hope being to initiate change by injecting the urban tissue locally with acupuncture-like architectural interventions. In the program, there is a specific interest in problematic corner allotments that due to their higher visibility are conceived as rigged with the potential to further stimulate private initiatives in a wider local urban reappraising. It is clear that

already in how the program is thought, a clear notion of architectural agency is present: the agency of a built architectural artefact to induce change within the socio-spatial constellation in which it is inscribed.

The architectural offices partaking in the competition were proposed a corner allotment in the Ghent borough Ledeberg. An elaborated design project for a private house had to be crafted, radiating somehow the kind of agency mentioned above. In first instance, a professional jury selected six entry's. Then the future occupants of the house made a further selection based on a series of conversations. It was our proposition, the *Walled House*, a collaboration between our architectural office *STUDIOLOarchitectuur* and *Koen Matthijs* that became selected. We would thus move from the house as designed to the house as built. In our project, different notions of agency are fostered, to which I will come back. Before going into a description of the project though, it is necessary to make apparent the site on which we would build. In the phase of the competition, there was only a general idea about the city's preferred client in counteracting the withdrawal of young families from the city. When visiting the site, that vagueness was paired though with the intense and concrete reality of the site where a house would have to be inscribed. A bustling urban site. A sky of overhead power lines and tensioning cables hanging from houses and poles, electrifying the air. A grinding racket rising from the tracks as trams wrenched their way through curves, becoming mingled with a multitude of sounds underscored by the rustle flooding from the nearby viaducts. Zebra crossings, shark teeth, serial and parallel lines, all of them desperately trying to constrain all kinds of movements by a variety of actors at various speeds and directions, their bright wet materiality not even granted the shortest time of drying, as can be witnessed in the photograph added. The dazzling of all these simultaneous sounds and movements added to the confusion of the site, and yet at the same time it constituted its vitality and specificity (see figure 2).



Figure 2
The Walled House's hectic urban surroundings. photograph Johan Liekens.

In deploying the private house, the (dis)placement of a brickwork wall would prove to be essential. A brickwork wall that enables a private inhabitation on

the site but as important a brickwork wall enabling other kinds of urban poesis; other inhabitations, appropriations and occupations to occur and gain foothold on the site. Arguably, the house we proposed develops from the intimate, unfolding from the interior while increasingly engaging with aspects of the urban. As is suggested by Graham Harman, in urbanism and architecture it is not so much relationality that is creating space, but non-relationality. According to Harman architecture is mainly about making borders (Harman 2013). Adhering to this statement, we wanted the house to foster a strong passion for its bustling urban surroundings though. From the outset, the house in our minds was as 'complex' construct with a 'complex' border, contracting the relational and non-relational. The inscription of a private inhabitation was subtly balanced with a passionate partaking in the phenomenon city. In laying out the borders of the *Walled House* we imagined intriguing forms of agency becoming active.

In our design there first is a house as a core. Then around it another house is materialized through the (dis)placement of a largely freestanding wall: a brickwork scale with a sculptural presence. The brickwork scale is held in place by means of a landscape of terraces evolving spatially around the core house. I will emphasize largely on the house's outer brickwork scale here, making a complex edge to the house and to the public sphere surrounding it. As hinted at, in our design we became fascinated by performing an act of displacement. Traditionally, cavity walls consist of two linear skins of masonry separated by a linear hollow space. Each slab of masonry has its specific performance, as does the cavity. Venturing from this traditional cavity scheme, we experimented on the walls latitudinal stretching. The cavity became developed in the design from a mere technical ingenuity, a thermic and acoustic buffer, into a typological one. Beyond the cavity itself is developed as a habitable space extending the core house, functioning as a buffer affording all kinds of activities, including those activities for which in urban houses a space is usually lacked. It allows the city to seep in and the core house to extend. We thought of that space as a winter garden, a space for a temporary sojourn and possibly some urban gardening, but we imagined it to be moreover a place for doodling and messing around, a space characterized by a certain time of play, of gaiety and experiment (see figure 3).

Picking up the intensifying debate in Belgium investigating a possible halt to the devouring consumption of the scarce open space in the Belgian landscape, the so-called *betonstop*, in a recent article the architecture critic Koen Van Synghel referred to the *Walled House* as visionary. Van Synghel enumerates a variety of reasons why people prefer a life away from the city, such as the possibility of a garden, a connection with the earth, the seasons and animals, some space to wander, tinker and doodle. All of these activities are, according to Van Synghel, in no way nostalgic reflexes. Rather, they constitute the naturalness of dwelling that urban housing typologies often lack (Van Synghel 2016). The Walled House's lay-out enabling a free space thus is seen as smug-



Figure 3
The wintergarden as a buffer and a free space. photograph: Stijn Bollaert

gling a certain naturalness back into the urban dwelling type. In a conversation with the critic, the occupants mentioned that the house as designed had convinced them to move from the countryside to the city. To Van Synghel, the *Walled House* proves that the city is still makeable in an era where the rem-

nant and scarce open space is to be no more colonized, this without depriving the citizen from the naturalness of dwelling. The house thus has functioned as a model touching a variety of audiences, their thoughts on and habits with regard to urban dwelling. It has as an artefact encouraged to think differently. Arguably, this aligns us with the idea of the presence of specific kinds of architectural agency in the project. The functioning of the *Walled House* as an innovating model as hinted at by Van Synghel can be broadened by showing how the building is materialized and articulated and how these materializations and articulations enable a complex and dimensional construct to come into being, offering a multitude of different experiences, uses and occupations. In what follows, the different composing elements of the house, their working and atmosphere will be discussed separately, while in reality they are inextricably intertwined. From the intimate core house we venture through the playful winter garden and free space into the hectic public sphere.

–the intimate core house–

The intimate core house is a modest, compact and logical volume. It establishes the most essential inner membrane in which intimate life can unfold. It is construed by means of elementary techniques, making it cheap to build. There is a strong ecological focus. The sections of the house destined for daytime living follow the natural progression of the sun. The winter garden captures warmth through its strategically positioned window openings, using it in winter to ventilate the core, while in summer its chimney-like form affords some cooling. The core volume is materialized as a background, a canvas that grants life to assume itself a central role. Due to the quasi freestanding brickwork scale outlining the winter garden its walls are discharged from requirements normally imposed on exterior walls such as rain tightness. This enables the core to be a basic construction from large insulating bricks. At the same time, the enrobing brickwork scale is discharged from other requirements enabling it to be an impressive slab of brickwork with another kind of buffering, to which I will come back. A bright white volume materializes, protruded only by heavy wooden window openings opening up onto the winter garden. In the initial design, the positions of these openings related to the positions in a grid, of which the opening or closing corresponds to different functional schemes being possible. The windowframes are different depending on their position in the core. The generous garden windows scooped out of the brickwork scale enrobing the winter garden contain slender aluminum frames and glazing used in greenhouse technology. In the act of taking advantage of affordable greenhouse techniques, connotations are suggested with aspects of urban gardening. Again a series of atmospheres is articulated, to be separated or combined. There is the quietude of the core; the time of play unraveling in the winter garden in which one can hear the city echoing; the anxiety of the urban surroundings. And there are the numerous combinations of all of these. Contemplating the city from the core

house, one's gaze is continuously framed by a combination of window openings. The deduplication of windows hampers an all too direct glance into the house (see figure 4).



Figure 4
The wintergarden as a mediator between intimacy and the bustling urban. photograph: Stijn Bollaert.

-the enrobing brickwork scale, on cliff and foe-

One of the particularities of the design brief stipulated that the design encompassed both a private house and a public square. On the scheme of the brief a thin red line separated a house from a remnant public space. The designers were urged to think about that public space, and about the concrete position of the red dividing line. Giving sense to, or better allowing one to give sense to that public space and especially positioning and dimensioning the dividing line in-between became itself a leitmotiv. During the designing of the *Walled House*, several schemes guided our thoughts. One in particular is figured here because in its simplicity it makes visible the spatial negotiation on the terrain that marked the design process (see figure 5). There was a long period in which the enrobing brickwork scale negotiated its position and dimension on the overall site, a prefigurement of the spatial negotiation that would effectively take place on site once the house would have been built, we then believed. The scheme shows the stretching, cutting and folding of the house's borders, and the coming into being of a complex walled construct of adjacent spaces and atmospheres: the intimate core, the inner half-a-wall, an interior square we denominated as a winter garden, the outer half-a-wall, the public square, and folding back into the winter garden a series of public niches or alcoves. The outer brickwork scale of the house, represented by the thick outer elastic in the scheme, hence negotiates its position with regard to the terrain and to both what is situated on its inside -an intimate dwelling- as to what is situated on its outside -a passionate urban life-. The construct in its complexity and through its being folded and cutted started breathing a certain porosity.

While the house we envisioned would be materialized from firm and solid materials, with a passion for brickwork walls, we started to think about the lay-out more organically. As a set of resonating membranes, able to contain, to combine and separate, able to deform also, to swell and to dwindle. Essential in the design is the fact that the brickwork scale described above as a quasi-freestanding vertical construct is in fact only a part of a larger continuous and all-encompassing architectural body. In it, vertical sections are continued with something that is best described as these sections' horizontal shadow projected onto the public square. In fact, what emerges is one massive slab of masonry, like a grabbing hand oriented outwards, combining in its materialization a strong vertical presence -a brickwork cliff so to speak- and a strong horizontal presence -a brickwork foe materializing the public square at the base of the cliff-. In what follows I will talk about the cliff when referring to the vertical sections and of the foe when talking about the public square that intended to be an intrinsic part of the all-encompassing brickwork scale.

Due to considerations on wind stiffness, the cliff evolves at a rhythm of vertical lines from a flat brickwork slab into brickwork abutments, protruding into the winter garden. This materialization is paired with the angular development of the cliff's wall sections. Some of the winter garden windows are stretched

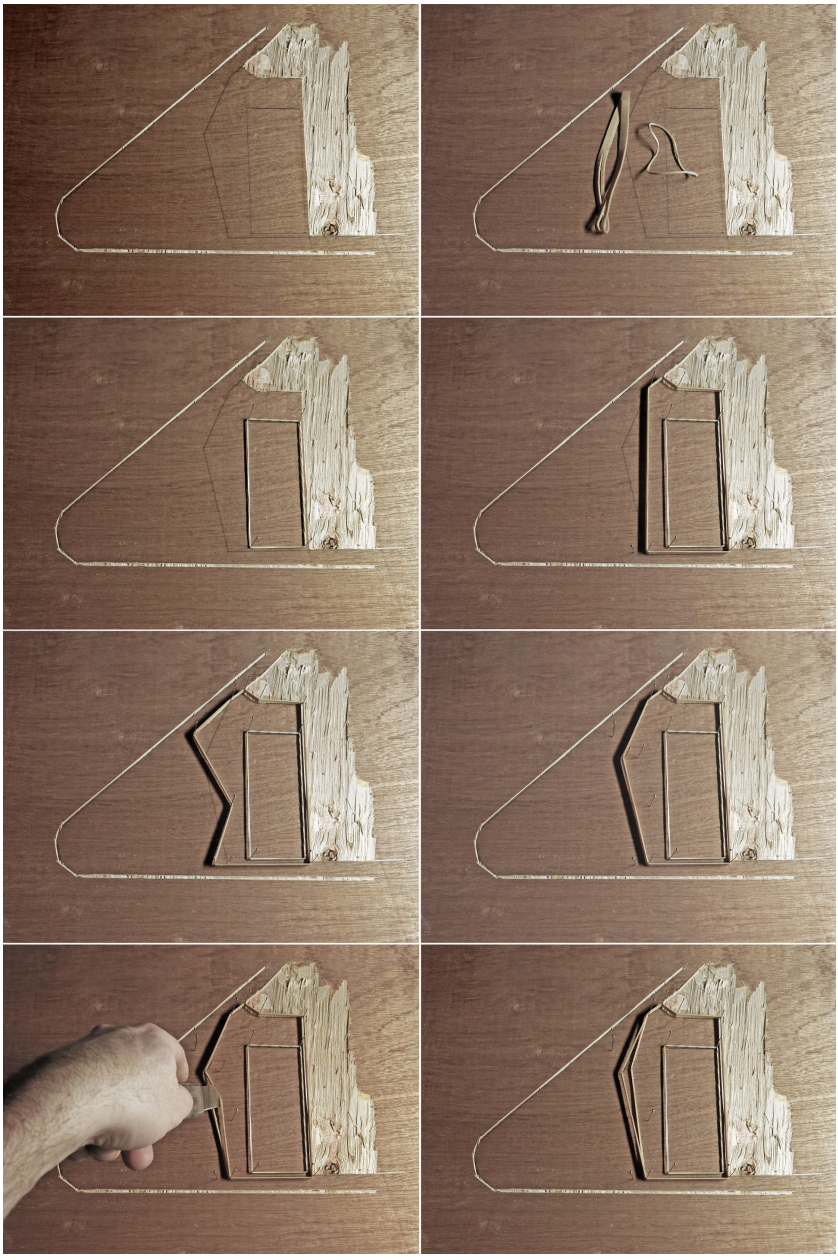

Figure 5
Negotiating the Walled House over the overall terrain. model: Johan Liekens.

across the angles to augment the reception of natural light at certain places, while augmenting at the same time the overall sculptural expression of the wall. The angles and protruding abutments provide the cliff with an overall depth, which is a necessary technical feature giving stability. In parallel the created

depth suggests that the cliff is ready to be lived, occupied by uses and people. It affords for bodies to become contained, on one side or the other. Through their materiality and articulation, the abutments, angles, slabs and beams afford the play of light onto and into the scale of the brickwork cliff. They cast shadows into the public niches or accumulate the sun's warmth, attracting the heated or chilled body of their passer-by to its surfaces and articulations, to the niches encompassed. The status of the public niches is deliberately not entirely clear. It is ambiguous and leaves space for interpretation. There is a hesitation between being an evident functional asset to the public square and being the space affording a stranger set of occupations, cut off to some degree as one is from the general surveillance which usually governs public space. Overall, the brickwork cliff affords for a difference of occupations, both intended and contingent ones. In this, the cliff is imitated by the brickwork foe, severing a public space from its surroundings. Moving away from the brickwork cliff, the foe's sides are tilted slightly but increasingly, culminating in a somewhat protective mass as such establishing two natural entry zones in the fold with the brickwork cliff. One moves naturally from one street to the other in close vicinity to the house's cliff, cutting of the sharp corner of the plot. As a consequence of the square's rising, one has the impression of slightly sinking into the square when entering it. From the square's edges, oriented away from the hectic surroundings, one faces the cliff and its uses and occupations. One is invited to perform an act of urban poesis oneself. At least, this had been the idea.

In the above already some accounts of the *Walled House*'s architectural agency surfaced. An idea of it was seen in the set-up of the program *Urban Allotments*. I foregrounded an understanding of agency in Van Synghel's critique of the *Walled House* identifying it as a model able to convince people to think differently. I described the *Walled House*'s materialization and articulation as enabling a complex dimensional construct to come into being, offering a multitude of different experiences, uses and occupations. In what follows, I move from the house as it was designed to the house as it was built. As sugested I conceive of them as two radically different versions. The difference is palpable in the isometric drawings I add here of the brickwork cliff and/or foe (see figure 6), a difference relating to the very notion of architecture's agency.

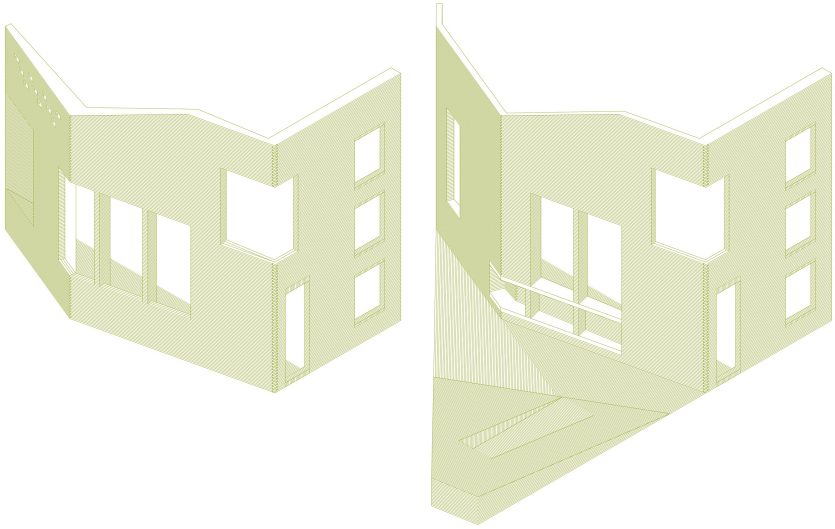

Figure 6
How the house was built and how the house was designed. drawing: Johan Liekens

Another version of the Walled House: the house that was built

As is always the case, the designed house differs from the built. Things logically are re-negotiated with the effective inhabitants and with other parties involved. The rising while building and the ultimate spatial presence and working of the house touched both the inhabitants and architects. We all enjoyed pacing through the generous construct-in-action. The project received the attention of various interested audiences, as suggested giving substance to a thinking differently about the urban and ways of dwelling there. And yet, I want to linger on one of the project's intended but unrealized potentials, which could have intensively sharpened the *Walled House*'s architectural agency. The failure here demonstrates how different views on the urban touched upon the building when moving from design to construct. Arguably, in our minds, the house was born out of certain conflicts, and the notion of conflict was conceived as being productive in the design phase as well as in the occupation phase when constructed. With regard to conflict, one can think of the spatial negotiation over terrain and territory executed by the brickwork scale; of the nestling of an intimate atmosphere in hectic urban surroundings; of the inward movement of public niches into the private sphere of the house. While we intentionally crafted handholds -corrections to the official brief- into the flesh of the archi-

tectural artefact, infecting it to become a conflictual stage awaiting poetic productions, the productive potential of these was largely erased. As if they were options to the house to be selected or not, the ambiguous niches nor the foe were realized. Hence, the poetic potential of a variety of occupations -possibly conflictual ones- afforded in the seam between cliff and foe never came about. Nor did the brickwork scale attain the intention to be lived throughout the extent of its full body; to become the primer for a multitude of expressions, projections, appropriations fueled by and giving expression to the desires present in the neighborhood. Arguably, in its movement from design to occupancy, the *Walled House* had encountered a more defensive stance towards the urban, rapidly revealing itself in conversations with the future inhabitants and the city services entrusted with the realization of the square. It still makes us wonder, thinking: what if...? .

As already hinted at, in our conception of architecture conflicts are considered to have a productive potential; a provoking, poetic and probing potential. 'Poetics' I use here in the sense of a micro-political making activity centered on the everyday practices of people in the urban (Sassen 2006). In this kind of poetics the flesh of architecture, its materialization and articulation, is co-constitutive in processes of negotiating sense; of making sense. One passes by the *Walled House*'s brickwork scale which invites to 'make' use(s) or slightly or more radically ab-uses, hence negotiating the sense of the place, the situation and the encounter in which one has become implicated. Indeed, the wall as it is executed is lived. In the higher parts of the brickwork cliff, some prefabricated concrete nests for swifts are integrated in the masonry. These fellow creatures indeed are cherished for their interaction with architecture; they indeed are the welcome guests colonizing urban cliffs. But here we regret that other kind of colonization and occupation that could have taken place and that we considered an essential component of the initial design. A design intending to probe the urban as a socio-spatial constellation.

It is remarkable how easily the house's generosity was restricted to the private owners. As it is built now, the house has become autonomous to a certain extent. It is far less a mediating construct than initially intended. What the designed house endeavored was a leap into the abyss of the unforeseen and uncontrollable, connecting hence more to the shear reality of the everyday urban. There seems though to exist a general loathing of these kinds of events, which combine both uses and so-called deviant ab-uses. In the end, the urban façade is considered as belonging to the house as a private property. The brickwork square of the *Walled House* now is a soggy lawn and in it, pending the arrival of standard street furniture, there are a pair of chestnut trees to sit on, harvested from other lanes in the city, victims of a sickness scourging the tree population. The all-encompassing mediating brickwork scale we foresaw was arguably halved in its potential, giving way to a an unarticulated and somewhat unused square too unsubtly connected to the surrounding streets and pavements. From it, an autonomous house rises (see figure 7).



Figure 7
Walled House and square as built, the house rising somewhat autonomous from its surroundings.
Photograph: Stijn Bollaert

What is at stake here is an essential aspect of architecture's agency. An aspect I refer to as architecture's political agency in the urban. What is addressed here is the question whether architecture is conceived of as a problem solving activity, formally translating prescribed programs and assigning things, bodies, functions, activities to their rightful and logical places; or whether architecture also sets and negotiates problems. The house that was built and the designed house hence are two radically different versions of the *Walled House*. They each tell a different story about the inscription of the intimate in the socio-spatial terrain that is the urban. One tells a story about smooth architecture, about risks and how to meticulously avoid them whereas the other acknowledges the urban in its full and vivid reality and tells a story of possibilities and the passionate negotiation they provoke in their colliding. The Rancièrian distinction between the policing and the political (Rancière 2010) comes to mind here. Architecture seen as a policing practice in public space avoids that conflicts are played out or even take place in public space. Contrary, architecture as a political activity exactly invites these negotiations in. Architecture as a policing activity maintains the proper in its assigned place, it guides or dictates how public space should be used in the proper way, and what the proper place and delineation of each object, each body, each action is. Architecture as a political practice then invites for the unforeseen to find expression through specific appropriations, both anticipated and unforeseen ones, and the processes of negotiation that sprout from their colliding. While architecture as a policing activity affirms the obvious, a political kind of architecture affords new socio-spatial articulations to come into being. It then reveals the construction -a re-figuring and re-partitioning in-progress- that the urban always is. The *Walled House* was deliberately designed to execute such a political agency within its surroundings.

Conclusion

Part of a pragmatist practice inscribing in the urban provoking, poetic and probing artefacts intending to instigate acts of urban poesis in those encountering, the *Walled House* took the stage of this paper. Close to its specific inscription and articulation in the urban different accounts of architectural spatial agency were foregrounded. Agencies making a contribution to urban reappraisal; to innovative models of urban dwelling and ecological material composition. However, the emphasis of this paper shifted to the potential of a 'political' architectural agency. A potential we aimed at when designing the *Walled House* that nevertheless evaporated in the movement from design to construction. The failure was identified as symptomatic of how the construction of the urban and the role of architecture in it is increasingly conceived. It was seen as giving substance to the Rancièrian distinction between creative practices operating politically in the urban -as the *Walled House* as designed intended- and those operating in policing ways -as the *Walled House* as constructed now more or less does. My argument is that in the urban we increasingly need though the de-

ployment of such a 'political' architectural agency. I also argue that architecture is uniquely equipped for such deployment and should be practiced accordingly. Architecture can visualize, or better spatialize, the slumbering, the latent and the not yet articulated. Using the words of Rancière, it can re-partition the sensible. It can, and must according to thinkers such as Mouffe, substantiate the agonistic stages needed for the constant negotiation of our common but divided urban socio-spatial reality. The *Walled House* project has been an attempt to raise and be such an agonistic stage, giving a neighborhood a breeding layer to express itself in all its variety and complexity. An ambition that as said partially failed. However, the partial failure has been nothing but a sparkle and challenge in our practice to further experiment on the deployment of a 'political' architectural agency. An area of experimentation that needs to be urgently recentered in the realm of architectural practice.

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Impact of design challenges created by the users of knowledge work environments

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Abstract. Architectural design movements, economics and organizational strategies effect work environment design. The recent changes in the ways of working have led to current typologies of knowledge work environments. Their design promotes collaboration while providing specific areas for different activities, such as silent working. Recent examples of office typologies include multi-space offices and activity-based offices with shared-desk policies. These office typologies promote communication and collaborative problem solving. However, their problematic features, such as noise and lack of privacy, are still currently relatively unresolved issues. How can designers and researchers positively affect the knowledge work environment design processes? The contemporary office typologies should be viewed as propositions concerning how to solve the complex design problematics of knowledge work environments. In our research project, we study knowledge work environments through a user-centric perspective in growth-oriented startup companies. In this paper, we aim to analyze our first case study through different work environment models that have been developed in recent decades and affected work environment design.

Keywords. Knowledge work environment; research-by-design; participatory design.

From hives and cells to cafes and shared desks

During the past centuries, knowledge work and its environments have evolved from the clerical tasks performed in the homes of the bourgeois into offices, ranging from conventional variations to virtual platforms independent of time and location (De Croon et al., 2005). Mobile information technology removed the physical boundaries of work and enabled communication through virtual technologies (Marlow et al., 2016). Regardless of the changes, knowledge work environments and the collaboration opportunities they provide are increasingly important. Face-to-face interactions promote the sharing and creation of new knowledge, making them significant to the development of competent innovations, products and business models.

Society as a whole and developing building techniques have always had a significant influence on the evolution of knowledge work environments and their design. Office management and organizational theories have also played an important role in office design (van Meel, 2000; Bodin Danielsson, 2010). The popularity of open offices originates from the beginning of the last century and the Chicago School's invention of steel-frame construction technique that promoted the high-rise building. Invention of fluorescent lighting enabled the

use of the whole floor depth for light-sensitive working. The work in the open offices was typically supervised routine work. The European building tradition followed the American way, but office buildings equipped with cell offices were also popular. *Bürolandschaft* was developed in Germany in the 1960s in the form of office landscapes as the European alternative to open offices. These offices featured low hierarchy and organic placement of workstations. The *Bürolandschaft* were designed to promote flexibility, and physical barriers in hierarchy were reduced to promote information exchange. However, the built open office landscapes initiated complaints from employees who objected to the uncomfortable features, such as temperature variations and draught, high noise levels, poor natural lighting and lack of outdoor view. Subsequently, the companies reverted to building cell offices. Interestingly, during the same era work environments that promoted the users' role in office design were developed in the Netherlands and Switzerland. The outcome created more habitable shared environments of 8-10 people and hybrid solutions combining cellular and open spaces (van Meel, 2000).

The mobile and virtual technologies shifted the time and location of work from a conventional office during office hours into time- and location-independent blended working (Van Yperen et al., 2014). Two decades ago, Francis Duffy published a book, *The New Office*, in which he divided the design logic of the offices into *hives*, *cells*, *dens* and *clubs*. These categories have distinguished features of interaction, autonomy and the ways of working. The *hives* are archetypes of large open offices dedicated to individual work consisting of routine tasks with low autonomy and low interaction. The *cells* promote autonomy, are suitable for accommodating individual and concentrated work, and support a complex variety of tasks. However, *cells* do not promote interaction. Duffy predicted that the vast number of *hives* will decrease and the number of office types supporting interaction will increase. Indeed, the *dens* and *clubs* are highly sought-after typologies in office design today (Duffy and Powell, 1997; Laign et al., 2014). The *dens* are associated with group work for users who are interactive but not necessarily highly autonomous. Rather, the users' tasks are typically short and performed in teams. The *clubs*, on the other hand, are reserved for autonomous and interactive knowledge working. The spaces consist of a wide variety of shared activity based workstations suitable for both concentration-intensive and interaction-intensive working. The workstations are occupied on an as-needed basis. By Duffy's definition, both *cells* and *clubs* are intended for work that extends the length of a working day and where the workstation can be shared (Duffy and Powell, 1997).

Contemporary knowledge work environments support knowledge sharing

As the competitive edge of organizations and enterprises often depends on the creation of new knowledge in the form of new products or services, it is important to understand the complex nature of knowledge work, its tasks and

the needs of different knowledge worker types. In this paper, we present two models describing the phases or ways of knowledge work: the SECI model (Nonaka and Konno, 1998) describes the phases of knowledge creation, and the categorization of knowledge workers (Greene and Myerson, 2011) describes different needs for knowledge work environments.

Knowledge work occurs through mental processes, and its tasks may vary from mundane tasks (e.g., storing and retrieving information) to high-level cognitive work (e.g., analyzing, developing and processing information or ideas) (Heerwagen et al., 2004). Sharing knowledge is important for problem solving and knowledge creation, thus eventually promoting the development of new products, services and business models. The SECI model (Nonaka and Konno, 1998) holds an important key in understanding knowledge work environments that support the sharing and creation of knowledge. SECI describes four phases of knowledge transformation: *Socialization*, *Externalization*, *Combination* and *Internalization*. During *Socialization*, the tacit knowledge transfers from one individual to another during face-to-face encounters; therefore, *Socialization* requires physical proximity and interaction. During the *Externalization* of knowledge, tacit knowledge is converted into explicit knowledge. Within a team, this can occur from individual to group, or between the individual or team to customers and other experts, in which situation also dialogue within the group supports externalization. *Combination* of knowledge involves communication, sharing and systemization of knowledge. In this phase, the knowledge spreads among members of the organization and with other organizations. Eventually, newly created explicit knowledge is converted into tacit knowledge in the individual and organizational levels, thus new knowledge is embodied into action and practice through *Internalization*. Even though the new knowledge is created within individual people and teams, the work environment can be perceived as a knowledge sharing medium, thus giving the significance to the architecture and atmosphere that surround the knowledge workers (Nonaka and Konno, 1998; Tyagi et al., 2015).

The forms of knowledge, knowledge conversion and emergence of new knowledge have been subsequently elaborated through different perspectives. For example, the information and communication technology (ICT) benefits from more detailed classification of knowledge: tacit knowledge, and highly-structured and less-structured explicit knowledge (Maula, 2000). Whereas highly-structured explicit knowledge is formal and classified with pre-defined rules, the less-structured explicit knowledge is informal, unclassified, and emerges during communication and discussions (Maula, 2000) in a similar fashion to *Externalization* phase in SECI process (Nonaka and Konno, 1998). This also occurs when tacit knowledge of creative practices is converted into explicit knowledge: new relational knowledge emerges through the action of discussion and communication. As a result, the researchers of creative practices are able to communicate the emerging knowledge in explicit form to the practitioners, who are able to convert it into action (Hatleskog, 2017). Simi-

larly, ICT-companies, for example, can develop and share organizational tacit knowledge and skills. Importantly, the organizational knowledge capital resources increase if the organization is able to transform the tacit skills and less-structured explicit knowledge into highly-structured explicit form (Maula, 2000).

Greene and Myerson (2011) characterized knowledge worker types into *Anchors*, *Connectors*, *Gatherers* and *Navigators*, clearly identifying different needs for the daily use of the office. *Anchors* are the iconic office workers with low mobility. Based daily at their workstations, *Anchors* interact a lot and have a vital role in organizational knowledge transformation. *Connectors* are highly mobile within their own organization. *Gatherers* and *Navigators* work regularly off-site while interacting outside their organization. Their presence in the office requires good shared-desk opportunities that support valuable face-to-face collaboration and knowledge sharing with other employees; otherwise *Gatherers* and *Navigators* rely on off-site blended working (Greene and Myerson, 2011).

Different tasks require appropriate levels of mobility, communication and autonomy at work. Therefore, office environments should be able to respond to those needs. A shared-desk policy allows for flexible and efficient use of facilities (Davis et al., 2011). Duffy suggested the desk sharing for the *cells* and *clubs*, the office types characterized by a highly autonomous way of working (Duffy and Powell, 1997). Contemporary office design supports shared environments with dedicated or non-dedicated workstations. These office types are currently known as multi-space offices, activity-based offices or flex-offices (Boutellier et al., 2008; Appel-Meulenbroek et al., 2011; Bodin Danielsson et al., 2014). They provide a variety of open, half-open and enclosed workstations that support various activities. Multi-space environments promote different ways of working, ranging from individual tasks requiring concentration to collaborative teamwork (Heerwagen et al., 2004). Also, they support the different phases of the knowledge creation process (Nonaka and Konno, 1998; Boutellier et al., 2008). Activity-based offices with desk sharing provide opportunities to switch workstations in order to meet the requirements of the task-related needs. The satisfaction with these environments is strongly dependent on the users' activity in switching workstations between tasks. Individuals who switch their workstation several times a day have significantly higher satisfaction for their work environment (Hoendervanger et al., 2016). As the number of workstations in activity-based offices are typically below the number of employees in the organizations, these office types are also economically favored solutions. For example in Finland, the new office typologies are implemented in use by initiation from organizations and designers, and by the Government via the Government Premises Strategy (Government Premises Strategy, 2020).

Research objectives

Translating the existing research information and knowledge into the design process of knowledge-intensive work environments is challenging. Knowledge work environments should support tasks that require both concentration and communication. Whereas enclosed spaces support privacy and uninterrupted workflow, they do not support conversation and sharing of tacit knowledge. Such encounters and communication events are important for collaborative knowledge production, also referred to as relational knowledge creation. Both atmospheres are needed for efficient knowledge creation that leads to creative ideas and innovations. In smaller organizations, it is not always possible to invest in facilities where different activities are separated into a multi-space or activity-based environment.

In this paper, we will discuss the design challenges that emerged from the participants of the study during the participatory design processes. The objective of our research project was to analyze the creation of work environments that support innovation and collaborative knowledge sharing in startup companies. In our opinion, the design process should take into account the users' individual needs and their ways of working. Therefore, in order to gain a holistic understanding of everyday settings and activities in the company, we applied participatory design processes in our study. The history of participatory design processes dates back to the 1970s and 1980s, when new computer-based systems were developed and workplace practices were improved to support new ways of working. The participatory method aimed to make the invisible visible, to see the social, embodied and contingent nature of everyday work practices (Robertson and Simonsen, 2013). The ethnographic approach can be applied to participatory design processes through studying phenomena in the everyday settings of participants, taking a holistic view, providing a descriptive understanding and taking the participants' perspective. This also creates a background for respect of different knowledge, opportunities for mutual learning, joint negotiation of project goals, and tools and processes to facilitate the design (Blomberg and Karasti, 2013).

Supporting the everyday settings and situations through renewed office layout

The participants of the first case study were the founders and employees (n = 10) of an ICT-startup company in Northern Finland. We used a set of qualitative and research-by-design methods to address the research aims through four research phases: *Analysis*, *Design*, *Intervention* and *Evaluation*. The results of the *Analysis* phase were used to define the goals of *Design* phase. Based on the results of the *Design* phase, the *Intervention* was carried out in the premises of the startup company. The *Evaluation* phase overlapped with the *Intervention* phase, as the participants were asked of their experiences during the pilot intervention.

Analysis

During the *Analysis* phase we used qualitative research methods to identify task-related situations and activities and describe their requirements for design goals (Bratteteig et al., 2013). The everyday settings were elucidated through semi-structured interviews (n=5) and a participatory design workshop (n=3). In the workshop, the participants were given two individual assignments and one group assignment to explore their *Favorite Place*, *Perfect Workday* and *Dream Office*, respectively, in terms of activities, experiences and feelings. We were able to distinguish 13 different situations from the analysis of the interview and participatory design workshop during the *Analysis* phase. These situations included different problem solving situations, individual and collaborative work, different situations requiring privacy and communication situations with clients. Overall, the requirements for concentration, problem solving and privacy were high.

Design

The design process was an integral part of our methodological framework to support the interventionist approach. Spatial architecture, visual and acoustic privacy, lighting, acoustics, communication landscape, furniture comfort and architectural aesthetics are important to work environments (Vischer, 2008; Vischer and Wifi, 2017). In addition to addressing the emerging design challenges, the holistic study of everyday settings generated additional design inspiration. The different user-generated sources contributing to design goals and inspiration are presented in Figure 1.

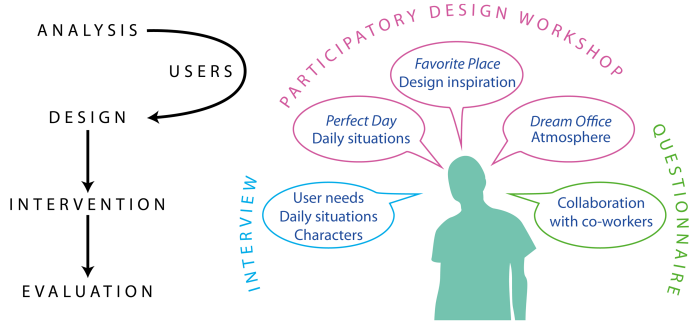

Figure 1
During the Analysis phase, the users of the upcoming pilot intervention participated in semi-structured interviews, a participatory design workshop and filled a questionnaire. Based on the results, design goals and design inspiration were defined and studied during the Design phase.

We studied the current office typologies, such as multi-space office and activity-based offices, prior to the *Design* phase. The *Analysis* phase revealed that the participants of the case study were mostly *Anchors* with some activity typical to *Connectors* and *Gatherers*. The participants strongly preferred personal worksta-

tions to shared workstations. Therefore, we applied the typology of multi-space office (Boutellier et al., 2008) to the pilot intervention. Frequent face-to-face conversations promote the creation of new knowledge and faster problem solving. Physical proximity and the grouping of workstations promote collaboration opportunities. According to the results by Zoller and Boutellier (2013), there is a significant increase in conversation frequency when employees sit next to each other or face each other in comparison to the conversation frequency between employees seated back-to-back (Boutellier et al., 2008; Zoller and Boutellier, 2013). Therefore, the workstations were positioned in the middle of the room to provide direct face-to-face connection between the employees (Figure 2, design goal 1).

The semi-structured interviews revealed differences in working behavior. We responded to this by designing one room to support collaborative work and the other room to support concentration-intensive work. The smaller office room occupied four participants and we emphasized silent work and privacy in its design (Figure 2, design goal 2). In this setup, we were unable to incorporate a true silent work area due to space restrictions. The L-shaped layout enabled the division of a larger office room into a teamwork area and an informal meeting area (Figure 2, design goal 3) to support various collaboration and brainstorming situations. Furthermore, we took into account the results from the participatory workshop when designing different atmospheres in the pilot intervention. As nature and mountains emerged as a common theme in the task *Favorite Place*, we used this idea in the design concept. Also, to avoid giving spaces task-specific names, the theme-related words were used to name different spaces, such as *Park* (smaller office room), *Forest* (larger office room) and the *Mountain Cabin* (informal meeting area). The *Analysis* phase revealed also frequent activity of distributed meetings: participants attended several phone meetings and videoconference meetings daily. Therefore, we designed and implemented additional acoustic elements, workstation screens and a single-person glass element, a phone booth, into pilot intervention (Figure 2, design goal 4).

Before the deployment of the pilot, the participants (n=10) were asked of their communication patterns with other employees in a short questionnaire. The founders of the startup had the opportunity to assign workstations for participants. An analysis of communication patterns and the provided seating chart contributed a matching outcome. Interestingly, the six participants who occupied the *Forest* were *Anchors*. This area reflects a *den*-type office. Furthermore, the *Connectors* and *Gatherers* with more autonomous and interactive role in company occupied the *Park*. This office room supports mainly concentration intensive work, but together with informal meeting area, the *Mountain Cabin*, the combination is similar with *club*.

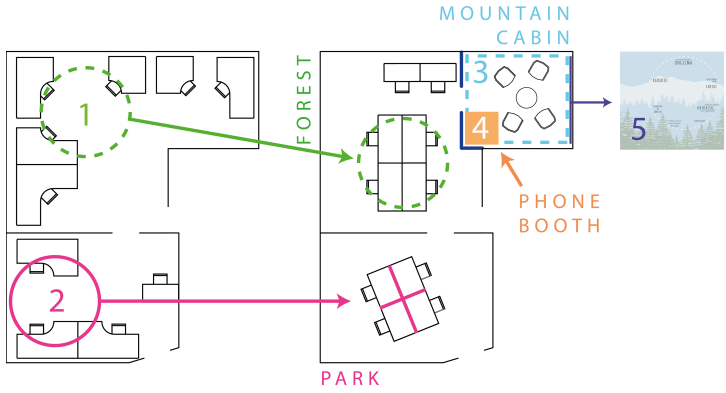

Figure 2
This diagram presents five different design concepts tested during pilot intervention: 1) To increase collaboration, new workstation layout supports face-to-face connections. 2) To increase privacy, screens were placed in between workstations. 3) To increase collaboration opportunities, an informal meeting area, Mountain Cabin, was separated from teamwork area. 4) Phone booth supports distributed meetings. 5) To support collaborative knowledge creation and atmosphere, a wall-sized drawing board with interactive script and mountain theme was designed and placed on wall.

Intervention

During the intervention phase the participants (n=10) inhabited a 65-m2 office. The pilot intervention consisted of changes described in the previous chapter. In addition to intervening in the architectural settings, the individual and group activities were guided during the pilot study to support interaction and knowledge sharing using interactive scripts (Dillenbourgh and Hong, 2008; Miller and Hadwin, 2015). During the Design phase, we designed a wall-mounted drawing board for the informal meeting area in the *Mountain Cabin* (Figure 2, design goal 5). Scripts prompt the collaborative knowledge creation by exposing the group members to different interaction processes. By dividing the work to different phases of individual, face-to-face and technologically supported knowledge creation, groups can engage in productive interactions such as elaborative questioning, mutual explaining, justifying their opinions and reasoning, or elaborating and reflecting upon their knowledge (Fischer et al., 2013; Hämäläinen, 2008). The wall-mounted board was an integral part in creating a non-informal and user-inspired thematic atmosphere in the pilot intervention.

Evaluation

The very nature of creative ideas and innovation is intangible. Even though they can be seen as the outcome of the knowledge work, their number is hard to measure. Furthermore, in addition to workplace design, the performance of knowledge workers is also affected by the management and the organization (Davenport et al., 2002). To evaluate the success and flaws of this case study requires similarly applied ethnographic measures as during the *Analysis*

phase. The results of our study will be qualitative and explorative in nature. For evaluation, we used context-aware location data, the experience sampling method and the evaluation probe method (Gaver et al., 1999; Luusua et al., 2015). Importantly, we also organized another workshop where participants and researchers discussed the outcome of the pilot intervention and participants had an opportunity to design further changes in their work environment. The evaluation methods and data of the pilot will be published separately.

Conclusions

This paper discusses user-generated design challenges in a knowledge work environment setting and their impact on the design of a pilot intervention. The design challenges were elucidated using qualitative and participatory research methods. Through careful exploration of everyday settings and user perspective, the resulting design reflected the task-related needs of the startup company while promoting the feature's previously documented elements that support knowledge creation and innovation. These features are, for example, interaction and collaboration (Boutellier et al., 2008). The implemented design was deployed into the startup's premises, thus full intervention took place to complete the pilot study. The initial response to the new environment has been positive. However, we will only be able to confirm the positive features once the analysis of the evaluation phase has taken place. Further pilots will be constructed in other startup companies with the intention of understanding how task- and communication-related needs differ in various scales of knowledge work environments.

Aknowledgements

Presented work is supported by European Regional Development Fund. Anna Luusua, Arttu Mykkänen and Henrika Pihlajaniemi are acknowledged for their valuable work in designing the methodological tools used in this research.

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Story-driven design

The tesselation of research and society

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Abstract. In recent years, the attention for social support for urban design, planning and development has noticeably gained attention. It has become important for researchers, designers, policy makers and developers to render the layered meanings of a project area readable and tangible (again). This became clear in the research 'Ruimte (ver)halen, een aanvulling op onze huidige planningspraktijk' (Braet, 2016: 'Telling and finding space, an addition to our current planning practice'), an explorative spatial research in the periphery of Bruges. Representing the different layers and meanings of the place in a scientific language such as graphic schemes and plans would never succeed in grasping the multi-layered meaning of the place. The research process is an evolving narrative documentation, that literally tells the story of the place. As a consequence, the value of the research is a lot more logical and offers the residents recognition of the place rather than understanding. The personal interpretation of the story by the users of the place also induces active citizenship. The narrative form of the research contributes to a richer look of the expert at the place as well as to the development of a stronger social support for the urban project.

The choice of the authors for story-driven design is not an obvious one. The choice is deeply rooted in the personal urge for understanding ambient space and the complex and multi-layered history embedded in it. Being aware of this richness, the authors saw it as a challenge to describe the multiple meanings and the layered history of a place, and thus stories about the place, in narratives rather than drawings. Space never exists by itself but always emerges through stories and histories. As a consequence, the research, described in this contribution, has not only gathered already known ideas and written history about a place. It has predominantly listened to the core of the meanings of this place by interacting with and talking to inhabitants, users and passers-by.

This contribution is based on explorative research project by Arno Braet, one of the authors, for his master dissertation in urbanism and planning at KU Leuven-Faculty of Architecture (Braet, 2016). The research was supervised by Hans Leinfelder, the second author. The research developed gradually as an energizing approach to urban planning and design, complementing the current rational spatial analyses of places. It soon became clear that the lack of a method to detect and register the true meanings of a place is a gap these classical analysis cannot fill in. But, metaphorically, the gap consists of actu-

ally nothing more than the vowels and consonants classical planning analyses cannot enounce. It contains diverse layers of meaning that are impossible to express in plans, schemes or drawings that only speak about the morphology of places. A different, less scientific but yet very precise language is needed to define and express these layers. The existence of such a language was already Wittgenstein's (1922) assumption when he wrote his famous line: "Of what one cannot speak, thereof one must be silent". Wittgenstein came to this conclusion after endlessly and patiently having tried to define the language of science. Indeed, there seems no scientific language for immeasurable things, not for love, not for space, not for philosophy, not for meaning. This insight drew the authors towards poetry and short prose to fill in this gap. The way in which storytelling as a method of documentation - not only on spatial features of a place but also on the ambiance and poetics that are daily part of the image of a city (Lynch, 1960) - is able to grasp considerably deeper how a place behaves, was an immediate incentive for the development of this story-driven design.

THEORETICAL FRAMEWORK

Urban and regional planning and design are not at all exact sciences. They deal with human beings, political decision making, power relations, norms and standards. As a consequence, there is no unique answer to the main ambition of planning, this is the best mutual adjustment between space and society for society's sake (Vermeersch, 1994). But, what urban and regional planning and design tries to do through persuasive storytelling is to inspire politicians, policy makers, interest groups as well as individual human beings with ideas on the potential spatial development of society. The mission of planning is, in other words, to tell future-oriented stories that help people imagine and create sustainable places. (Throgmorton, 1996 and 2003)

This approach of planning refers to broader social constructivist theories in political and public management science about the relationship between society and physical reality. Reality and space, as a part of this reality, are considered as social constructs; ideas about reality and space are being developed in a constant struggle of power relations and knowledge fields within society through space and time. As a consequence, a specific way to approach a societal or spatial problem or challenge can suddenly become much more important. It even can become dominant, while other ways of approaching the same problem or challenge can become discredited. (Hajer, 1996) Hidding (1998) calls this phenomenon the rise and fall of planning discourses, i.e. more or less coherent ensembles of ideas about the spatial organization of society that are being constructed and reconstructed in an interaction between researchers, planners, designers, policy makers, politicians and interest groups.

One of the most essential elements in the rise of a policy discourse is the creation of a story line that enables actors to combine notions, categories and

ideas from very diverse policy domains and through which meaning is given to specific physical and social phenomena. (Van Tatenhove et al., 2000) It is again Throgmorton (2002) who stresses in this context the importance of design and designers in creating story lines about the spatial development of society. Since the world itself, since space itself (Byatt, 2002), does not have the capacities to tell the story about its own past, present and future, designers have to transform this world into narratives that can be told. For this purpose, designers create 'texts' in the form of plans, analyses and documents that can be read, constructed or interpreted in diverse and often conflicting ways. Moreover, they use, for this purpose, the imagery and the rhythm of a wide range of languages (statistical models, scenarios, GIS, 3D-models, speech, argument) to express a preferred attitude and, by doing so, try to shape or at least try to turn the flow of actions in society, inquiring and addressing relevant actors, such as developers, politicians and citizens.

Today, it is generally quite known, through practical experience and academic research, how to incorporate expert knowledge of developers, politicians and interest groups of organized citizens in research by design processes for the physical environment. Methods have also been developed to involve non-organized citizens in these processes, e.g. by gathering insights in the spatial behaviour of children and youngsters in their neighbourhood with the help of drawing assignments. It is quite obvious that, depending on the methods used, certain types of knowledge emerge and others don't. This selectivity in knowledge gathering ignores the fact that there are as many stories about a certain place as there are individuals that make use of or live in that place. Indeed, every individual has a unique, proper story about a place that is the result of the interaction between several strata that compose a meaning (Throgmorton, 2003): the individual's idea about his/her role and position in the particular place; the exchanges of information the individual has with other places through activities, purchases of goods, elimination of waste, ...; the history of the place; the cohabitation of the individual with other individuals coming from or going to other places; and the fictive or virtual meanings (the dreams) the person gives to the place in the future. Especially relevant to design and planning is Herngreen's (2002) observation that the identity of individuals and of societal groups is not defined by the material object, the place itself, but by the stories in which these objects, also place, are in some way or another linked to these individuals and groups.

BUILDING THE METHOD

The first and major challenge of the research was of course to find a method for 'story-telling' about a place. The way this method has been built by Braet was very intuitive. Since the book 'Invisible Cities'of Italo Calvino (1974) was the main source of inspiration, it is very present throughout the research. In the book, Calvino makes Marco Polo tell about his endless travels to the outskirts

of the Mongolian empire, while the reader is well aware that, in fact, Marco Polo is only telling about Venice. Not only does the author succeed in bringing the atmosphere of the Italian city to life, he doesn't use a single drawing to do so. It is already striking that the method for story-telling in the research was not based on academic insights but on a fiction novel.

In a first step, a dozen of people, walking around, sitting, gardening, biking, ... in the study area, were actively approached by the researcher and were all asked the same, rather philosophical opening question on how the place expressed itself to them. Other questions were raised depending on the answers given. The interviews had the purpose to unveil as much different unwritten stories as possible. The diversity of the interviewees was of course of key importance. Some were all-time inhabitants, some were new residents, some were just recreating and others were working nearby. A qualitative survey of the words, notions and elements mentioned by these people allowed for the documentation of a range of meanings of the place. A brief desktop research on the history of the place and morphological scan of mobility aspects, land use, land marks and green elements in the study area added more (classical and objective) elements to the analysis.

Next, the interviews, historical analysis and morphological scan were brought together and written down in a 'bundle of meanings', ten stories on the current meanings of the place that have an open end and thus leave room for interpretation. This booklet of prose and poems is the interpretation of the researcher of the complex stratification of meanings of the place. It depicts the place in a sort of holistic way as it is the aggregation of how the interviewees and the researcher experience the place, but at the same time it is linked to the actual context and the history of the place. Central in the bundle of meanings is not the graphical interpretation by a designer of the important elements of a place, but are the words and notions that are daily used by locals to describe the place they are living in. The bundle of meanings which is written in the language of locals is easier to understand and more recognizable than the maps and graphic interpretations planning traditionally produces.

The second step was to develop stories about the potential future meanings of the place. The open-ending 'bundle of meanings' served of course as a starting point for this 'design through language'. Five stories and poems paint the future meanings. They build on the physical elements in the study area that were mentioned in the bundle of meanings and that seemed essential to the interviewees and the researcher for the actual meaning of the place. Simultaneously, the design through language took into account the current policy options on the number of houses that ought to be built in the study area. This down-to-earth housing program offered the researcher a welcome grip for this abstract exploration. The result was an 'extended bundle of meanings' with current and future meanings of the place combined with the quantitative housing options. Moreover, the stories and poems opened the floor for more classical and graphical design concepts that, as a consequence of the method developed,

were able to grasp better the most essential meanings of the place. The concepts are suggestions for development of the study area that respect the housing options but, at the same time, safeguard the multiple meanings of the place. In this way, this research by language and design allows for future adaptability of the place while leaving its readability intact.

CASE-STUDY: SINT-TRUDO, BRUGES

After an assessment of the planning policy documents for the City of Bruges (Flanders-Belgium), three study areas were selected, each of them showing a different aspect of Bruges' periphery. By starting off from these real policy problems, the research was embedded in reality. Instead of agreeing or disagreeing with the current state of these sites, which is most of the time the only ambition a plan or a drawing has, the bundle of meanings uncovers profound meanings, invisible at the surface. Countless hidden layers of meaning unveiled themselves as magnificent stories, troublesome songs and romantic poems. People don't speak with pencils or aerials. Instead, the meaning of space is told in tales, legends and unwritten memories.

Sint-Trudo, in the southern part of the city of Bruges, is what planners would call a place without identity (Lynch, 1960). It is an unfortunate collection of plots, the result of the residential development of the adjacent streets. As a consequence, Sint-Trudo is disconnected from the larger open space it used to be part of, such as the Assebroekse Meersen - an open and very valuable nature area - and from the canal between Bruges and Ghent in the west. Thus, at first sight, the place seems to lack an obvious meaning. Morphologically, it is desolate, monotonous, unchallenging and, functionally, maybe even useless. Project developers consider it a space waiting to be filled in with a new full-blown housing project (figure 1 and 3).

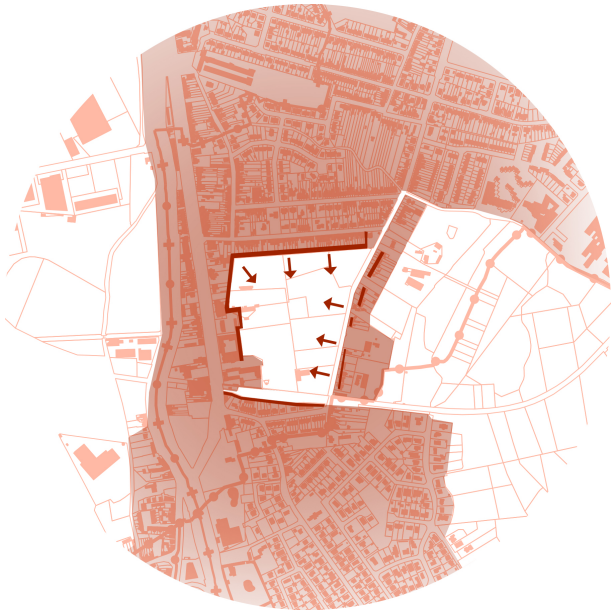

Figure 1
Waiting space. 1:20000



Figure 2
Dotted line as a sole connecting path to nature. 1: 300000

STORIES ON SINT TRUDO AS IT IS TODAY

Although there is more to Sint-Trudo than the obvious meaning of a 'waiting space', this single aspect already has a much greater depth than is noticed in familiar drawings or top-down planning approaches. The top-down approach actually condemns the place to being a waiting space, more than it detects the place to be one. The approach leaves no room for interpretation and (unwillingly) seems to flatten any deeper meaning.

The following three stories evoke an awareness of this richness that normally remains hidden behind what is merely the detectable surface of the place. The first poem tells about some defining structures on the site. There is a narrow, but frequently used bicycle and walking path that is the only remaining fragile connection to the Assebroekse Meersen (figures 2 and 4). This 'strade bianchi' exists merely of a white asphalt road which is described as the 'slim line'. The poem also tries to describe the meaning of the linear residential development along the Sint-Trudostraat. Interviews with at least two people revealed that the disconnecting effect of the linear development doesn't abolish the importance of the site for its surroundings, but proves its adaptability in time.



Figure 3
A view on the Sint-Trudo fields

PIECE 1

The slim line
that defines your figure
fits you like a glove

a thread in white tarmac
trying to connect - you
to the open space
who deserted - you
who had to make room
for the cubist dress
you wear - now
That's what is called - shifting tastes
getting used to fashion
losing touch
in detaching
to encapsulate
to dedicate a hymn
to surround yourself with residence
without debate
your slim figure gets captured
and proves her morphing shape

The second story brings forward five different typologies that seems important on the site, according to the interviewees. The poem paints a section between two historically intertwined buildings: the monastery of Sint-Trudo, former home of the monks, in the West, and a medieval farmstead/abbey where nuns live in the East. The study area is situated in the middle and has been a connecting area between the two religious communities. This section became visible to the researcher after observing the structure of the place and its details and through interviews with people from the school and a monk living next to the old belfry.

SLAM / WALTZ

From the restored gate
to where the bells' bawling awake
Boeri cuts through the layercake
through chopped down trees and rampant haws
He arranges - emotionaly precise
the details of every freckle ticking time
The view you view
when stories align
A quintet orchestra
each playing a different piece of place
[and the musicians take place]
The ouverture starts as busy Ruzettes
continues through the park of calming depths
along the action and youngsters worries

and over terrasses, designed in stories
The staccato ends with a denser saviour
the forest, the fields, the discovery
of mother nature

A third example of this story-driven design is a short story, showing that not only poetry but any form of storytelling can reveal meanings of a place. This story tells the tale of Everelm - a refugee in the Middle Ages who built an abbey where the farmstead is situated now. First, his confused statements and the surreal plot of the story try to convince the reader that the place is unreadable and poetically invisible. It is only when he meets a girl in search for an invisible place that he sees the place falling together as a puzzle. The story describes that, only by listening to people in the streets, one can define true histories and meanings.

A HERMT'S VIEW

He lives in a house, next to his house there are trees, further along the path there is a burger house. Today, however, the smell of sawdust woke him.The entire morning, branches blew against the glass. And the entire morning, Everelm looked for a way to keep the branches from doing what they did. The annoyance, the rustling, the convulsion in his index finger - everything played together and forced him into a decision. He plunged his nose against the window, the ticking branches pestering him from behind the glass and he thought, "I'll get you guys, don't worry."Everelm slid his arms in his coat, rushed off the stairs. He avoided the loose masonry tiles in his rickety hall. His determination grew stronger and tougher. He took a saw, a ladder and a rope from the storage. Seconds later he was outside.Everelmus looked around, kept silent. He walked along the facade to his window. He went right around the corner, then left along the well. He took the shortcut along the path and crossed the road. "Before you know you find yourself in the woods - lost - and you do not know where you are", he whispered to himself."Fortunately I still know where I am, I've past every side of the house. Strangely though, that I still didn't find that branch. That tree was sitting on the northern facade, the window looks over the fields next door - yes, surely I'm right."Everelm kept looking around. The school bell rang afternoon. Many children marched past him, hand in hand, in a double row, escorted to the crosswalk and then released to their homes in the neighbourhood. Everelm beheld the scene and forgot just what he was looking for. He saw a girl coming down the white road and walking towards him."Do you know where there is an invisible place? How I can recognize it? How it might smell?""An invisible place, I do not know. I am looking for the branch of the poplar swishing against my window. But I have a map of this place and I got lost into this little grove.""If it might help, I can tell you that the biggest trees show the boundary between the open fields and the youth club;

the grove where we stand now, is their playground. If you look closely, you can see the evidence on the benches, the rubber tire and the messy game residues. "Everelm was confused about how these clear facts could have escaped to his eyes. It was only now that he noticed how the land behaved as the softest satin. Yet the moment he blinked, she was gone and he was alone again - he thought, "If I concentrate on the memories I'll sure find home, and with it, that damn tree."He sat on the tractor tire and imagined the wildest things. The trees define the edges - the youth club only reveals itself when you're close by - the old farm is connected to the belfry - the trees grow so high that you cannot see the tower in summer. The ducks float on the ponds - the land drapes like a tablecloth and waits until it is set, used and rinsed again."I can't form the picture," he said to himself, "this place does not exist. There is no open space next to my house, no branch rustles against the window. And if they are, then they are written in a language I cannot read." Everelm was furious and pinched his unseeing eyes.The branch taps against the window. Everelm looks up, sees that he is standing under the tree he was looking for. His rage fades away, makes way for reassurance, and he turns to you."This is an invisible place, you know. The girl was right. All senses are present along the edges. None in the core. The window through which you look and the improvements you dare to make from a distance will appear invisible until you wander into the place. Until you too get lost - until then - this land will always hover between reality and experience. Until then the significance of these fields will remain obscure. Unreadable as a text by Apollinaire. In motion as a dancer by Degas.



Figure 4
A view on the white tarmac path

Together with seven other very different pieces, these poems and stories make 'the bundle of meanings'on Sint-Trudo'as it is known today'. They define the different layers - and their depths - in the meanings of the place. This can be classified as narrative analysis, but is not yet (research by) design.

STORIES FOR THE FUTURE

In the next step, the researcher takes all the detected meaning from the stories on Sint-Trudo 'as it is known today' as a starting point and describes potential and positive future meanings. Next two pieces show two sides in dealing with the passing of time: resisting it or adapting to it (Urhahn & Bobic, 1994).

The tenth piece of the 'extended bundle of meanings' shows the potential of Sint-Trudo to become an inspiring and peculiar place, a place that bears more than one visible layer and awakes curiosity for the site. This piece elaborates on the philosophy - the concept - in the first verse and shows the experience in the second verse. The reference to two renaissance architects shows how planning for Sint-Trudo might use historical references to make this curiosity and excitement ignite. It is a place that opens after the revelation of its inside, hidden behind for instance an inviting facade and luring people inside, by its form but also through its ambience. The design by language uses what time has already installed and makes it readable again.

PIECE 10

Do you know / what curiosity looks like
which color it emits / what form it takes
you blush, but I'll show you a place
that'll make clear / what curiosity looks like
I'll show you the closest walls / the narrowest streets
compelling as a laidback beat
Curiosity takes place in the unexpected / in the around-the-corner
a burning case of contrast / a feeling everything at once
We are here / Sesame opens with the password
and you become / curious for what's behind these white white walls /
behind these or those bushes
imagine this story as history / all is open is explored
well, this is what curiosity looks like / how Vasari wrestles Michelangelo
about the extension of / and not just yet
the addition, building a'top what was already there /
brisking up your inner Alice
revealing a place - repairs the palace / in / with
a place intolerant to ending /
constantly curious for future planning

Where the previous poem mainly explains the importance of resisting

time in a way that it shouldn't be thrown away easily for the sake of new, the next poem tells a different and complementary way to cope with time and, even stronger, with the future of Sint-Trudo. It shows the possibility of transforming the 'waiting space', laying in between, into a central area by defining the site as meeting and activity hot spot.

PIECE 15

The road curls her hair around the corner
comes - closer
and cuddles
under your sweater
The front door opens up
the garden - lures you along
and shows that
what is gone
Ideas fill the air
summerflowers - with
a cocktail of
now and then
bits together link the chain
a readable glue
of lines, planes, nodes
and in the middle of it all - you

CONCEPTS AND ASSESSMENT

The 'extended bundle of meanings' was translated into four more familiar and graphical concepts, dealing with the revealed and projected meanings of the place. Thus, the concepts for Sint-Trudo focus on the holy relationship between the school and the old abbey, now the farmstead; the connecting path; the invisible waiting space; and the need for a reintroduction of curiosity. These concepts are designed to approach the multiple meanings of the place that were detected in the interviews and synthesized in the stories. In this contribution, only the concepts 'Peter and Trudo' and 'The Faraday cage' are highlighted to show their layered structure (figure 5 and 6).

The two historic religious buildings, the Sint-Pieter school and the Sint-Trudo farmstead, have always been connected to each other as 'Peter and Trudo', functionally as well as visually. The school building has already been renovated and the school is still active. In contrast, the old farmstead is in poor condition, but might be restored for a public function. The restoration is not intended to impose unfitting features or functions. This can be done once the elderly farmers voluntarily leave the Sint-Trudo farm. The future connec-

tion between both buildings will result in a larger awareness of the presence of the farmstead, a logical path to the majestic medieval gate, and a cleared vista on the campanile of the school. By doing so, the school and the farm will once more be visually and physically connected to each other. This combination should ensure the reactivation of the farm as functional heritage and as an active passage, resting spot and gate towards the Sint-Trudo site.

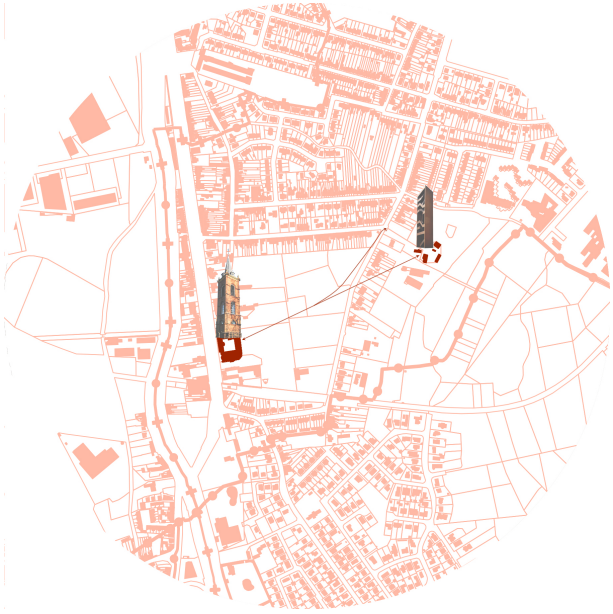

Figure 5
Peter and Trudo planning concept. 1:20000

The currently unreadable fields along the Sint-Trudostraat will be partially developed as residential area. The highest residential density will be situated on the eastern edge of the site in order to create a facade to the built structure. Further housing units will be arranged along the backyards of the houses in the Benedictijnenstraat on the northern edge of the site. This development will provide room for 220 housing units. The terraces of these units are oriented to the South, creating and looking into a safe and shielded courtyard. The architecture will be adapted to the surroundings and at the same time interact with the vistas from and to the farmstead and the school. The facade along the Sint-Trudostraat has plenty of entrances to the courtyard. These entrances create a safe but accessible and inviting threshold - a 'Faraday cage'.

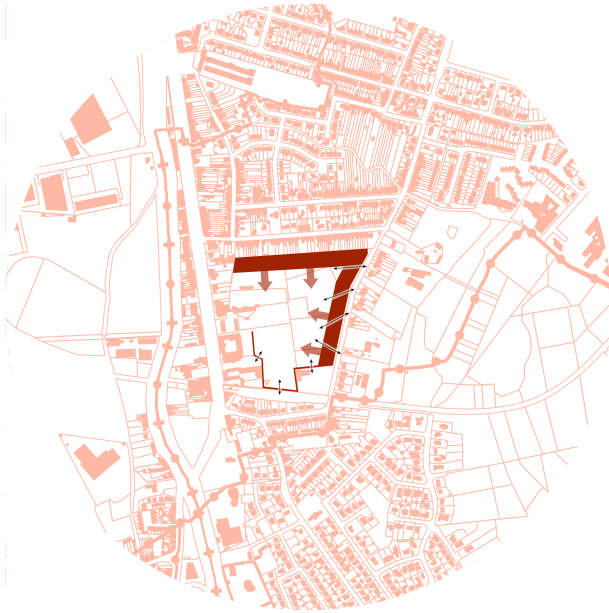

Figure 6
Faraday cage planning concept. 1:20000

In the final step, the concepts were compared with the current plans for the development of the site (figure 7), designed by the urban developer WVI in cooperation with the City of Bruges. At the time of the research, these plans weren't finished yet, but nevertheless offered a good insight in the future transformation of the site into a residential zone. The plans provide in 39 social housing units, 77 allotment parcels and 32 apartments. What is clear is that the plans don't interact with any of the detected meanings of the place. The quantitative housing program at a low density was clearly the main driving force. The architecture is unattractive with a traditional design confirming the cliché of poor quality social apartment buildings. The common/public space is situated in a corner of the site where absolutely no one can participate in any street life or ambience. This development threatens to render the existing meanings of the place even less readable. Sint-Trudo appears to become saturated with low-rise housing, while hiding complex and compelling layers of meaning.



Figure 7
Provisionary development plan for the Sint-Trudo site, source: WVI

The design provided by the concepts of the own research proposes a much higher density, while creating more public space and yet safeguarding the meanings of the place. Furthermore, by proposing a qualitative architecture for social and private residential units, the research design creates a much stronger and fairer identity of the place.

REFLECTIONS

The story-driven design method, developed and applied in the research of Braet, is promising. It asks for further research on design by language. Nevertheless, it still shows two main shortcomings.

The most important one is the friction, at the end, when the story-driven design is translated back to traditional planning media such as drawings, schemes and images. The research hasn't provided a clear method for this operation yet.

Another difficulty in the research, due to its character as a master dissertation research, was the condition of the singular writer. Though foreseen, the lack of multiple writers caused difficulties in inspiration, writing style and overall interpretation of the different layers of meaning. A team of writers, combining writers from different backgrounds and disciplines, would undoubtedly mitigate this shortcoming.

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The architect as policy whisperer

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Abstract. This paper argues for the active practice of policy whispering as a potential and critical re-focus of the architectural design discipline vis-à-vis policy making and political decision strategies. Architectural policy whispering aims at positively and structurally influencing future policy making. The mandate for policy whispering can't be given or granted, it is a self-proclaimed exacting position defined by the practitioner - architect - himself. It consists of positive risk taking for the sake of a visionary baukultur and the public good. Three design attitudes are discussed as insurgent - positively resistant - architectural positions towards ruling political authorities: the Unsolicited Practice, the Reset Practice and the Arrested Practice. Each practice is discussed and evaluated through a late 20th century exemplary and internationally valued architectural design project and process. Finally this paper argues for a deeper understanding of the potential impact and ethos of these policy whispering methodologies onto architectural teaching.

Keywords. Policy whispering; unsolicited project; political; agenda setting.

The architect as policy whisperer - three insurgent design attitudes

Architecture - built or unbuilt, utopian or mainstream - but exists through its inherent capacity for deal making vis-à-vis ruling political authorities. Various inclinations of deal making are at the architect's disposal: pro-activity, reactivity, resistance as well as a broad spectrum of subtle and less subtle compliances to authoritarian ruling. These positions are exhaustive nor exclusive in their present enumeration.

The pervasive ubiquity of ruling political authority can be considered as an ongoing provocation for architecture to act politically. However, in a world that has no true practical need for architects (Wigley, 2011), how can these dramatis personae continue to develop and offer a visionary propensity through intellectual, sensuous, and ethical urgency? And how to augment these brittle capacities towards any real-time political impact; through any real-time policy whispering?

A speculative resolution for this conundrum might be found in the question: 'WHEN should architecture come into the political play that shapes society?'. Is architecture's final role to reactively answer a brief or can it actually prefigure the brief, the client or politics for that matter? How unsolicited can architecture act without being thwarted into solipsist fallacy?

The operation of policy whispering is not a new acumen, neither to the architectural discipline or the political field. It nevertheless lacks serious theorizing and a clear phylogenesis of sorts. In short: it shortfalls clear and convincing

samples as well as process analysis. In an ex absurdo manner this paper wishes to assemble a limited range of cases and explore whether they could be further substantiated towards a political praxis of architectural policy whispering.

Policy whispering can be understood as a critical reconsideration of the architecture discipline - specifically as a profession and teaching environment - to positively and structurally influence future policy making. An ascertainable level of insurgency will unavoidably be linked to this kind of practice. Equally, the players involved in and with policy whispering should be willing to engage at all times into an agonistic sphere of production (Mouffe, 2013) and exchange, teasing out the commonalities between themselves through paroxysms of architectural design output and political contingencies.

The mandate for policy whispering cannot be given or granted, it is a self-proclaimed exacting position defined by the architect himself. It consists of positive risk taking for the sake of a visionary baukultur. Only very few architects practice the 'art' of policy whispering with this precise demeanor in mind.

This paper will put three design practices to the test, each with their own take on insurgent design strategies. These explicit and/or implicit policy whispering examples are chosen from recent to extremely recent architectural history. Each chosen trajectory is incited by a project denomination: the Unsolicited Project, the Reset Project and the Arrested Project. These designations draw up a starting entity of a much larger taxonomy that is to be further developed. The proposed cases are:

The Unsolicited Project T.O.P. office Luc Deleu (B) / Gare Europe Centrale, Brussels (1986)

The Reset Project Fernand Pouillon (F) / Vieux Port, Marseille (1953)

The Arrested Project Lacaton & Vassal (F) / Place Léon Aucoc, Bordeaux (1996)

THE UNSOLICITED PROJECT

In 2007 VOLUME editor Arjen Oosterman advocated the notion of Unsolicited Architecture as a fundamental potential for architects to redefine their role within society. Oosterman stipulates: "How to transform from competent executors of assignments into entrepreneurs and producers, in order to actively grapple with the questions and challenges this age presents?" (pp. 3). The author admits that this is not a new practice, however this potential current needs "further argumentation, explanation and active publicity, simply because there is an ocean of problems and possibilities to discover and chart which know no natural responsible parties." Hence, the practice of unsolicited architecture implies a serious level of courage, daring to "leave behind the safe and trusted logic of the assignment in order to tread the field of venture development." The finale of Oostermans editorial suggests the ominous challenge ahead: "Unsolicited architecture: who dares?"

Society is in dire need of uncalled for practices, pioneering in architectural 'unsought goods'. Three key conditions are however paramount to be taken into account by the creator of such a practice: a fundamental capacity to abstract reality, renouncing the all too literal expectations that such a project should result in a real-time construction and the willingness to set aside the idea of exclusive authorship. Instigating public debate and scrutinizing the very foundations of the architectural discipline itself should amply suffice as rationale for this type of practice.

A cogent example of such unsolicited practice can be ascribed to the Belgian firm T.O.P. office (Turn-On-Planning). This studio established in 1970 by Luc Deleu and Laurette Gillemot has since its inception been an active and insurgent provocation towards ruling authorities in its own right. Over the past five decades T.O.P. office has un-relentlessly aspired at boiling down architecture to its most crucial and social pertinence. In his 1991 text "A driving force for Orbanism" Deleu succinctly draws up the office's main focus: "Not architecture but infrastructure is the most important spatial feature on the planet"' Deleu states: "Nevertheless, architects apparently fail to appreciate that they have any role to play in this area." In order to clearly underscore this paradigm shift T.O.P. office did bring uncalled for evidence material to the discipline's table, time and time again. In hindsight an important part of T.O.P. office's projects has proven to be relatively prophetic, e.g. much of the Proposals 1972-1980 were implicitly adopted by public power, however without T.O.P. office being the final author or even seeing to their effective execution. They remain notwithstanding a potent example of indirect policy whispering through an unsolicited attitude towards social space. Some of the most direct proposals read as follows: Proposal for complete disuse of the public lighting, Proposal to plant fruit avenues, Proposal for urban wood production, Proposal for car-free noons, Proposal for non-programmed TV-broadcasts, Proposal for an irrigation system using rain water, Proposal for city beehives, Proposal for roof horticulture, Proposal to switch to biological power, Proposal for urban agriculture, ...

Other exemplifications in the work of T.O.P. office inclining towards an inherent policy whispering attitude are the large scale infrastructural designs produced between 1986-1990, with its main protagonists 'De Hef' in Rotterdam, 'Gare Europe Centrale' in Brussels, 'Antwerp Your Next Cruise Stop' and the 'Barcelona Towers'. All projects bare witness of an architect that either dismisses the original brief or puts forward a brief where no assignment by the government or other public bodies was formulated. Both 'De Hef' and 'Gare Europe Centrale' are examples of the latter. 'Antwerp Your Next Cruise Stop' and the 'Barcelona Towers' were extremely free interpretations of the set competition brief, resulting in near-disqualification of the office. Most of T.O.P. office's ruling principles can be brought back to the project 'Gare Europe Centrale', a prime example of a highly unsolicited and infrastructural-driven spatial strategy. In 1986 Luc Deleu wanted to address the (Belgian) controversy sur-

rounding the high-speed rail network (T.G.V.). He deemed that this debate had to be carried out not only at a political level but also at a creative level, with spatial drawings and models alongside the traditional words and maps (Deleu, 1991)

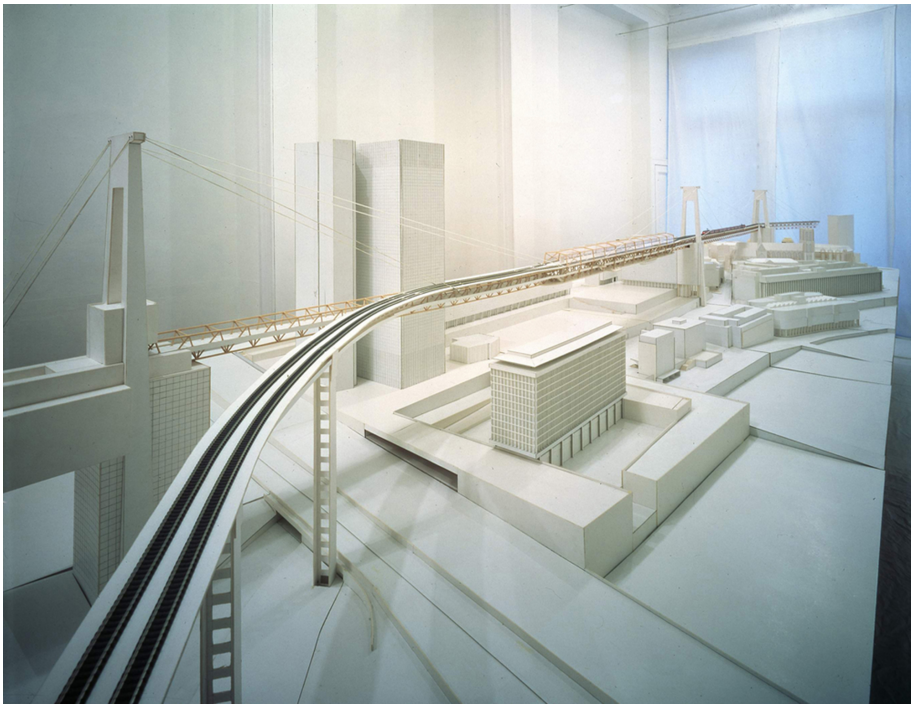

Figure 1
Gare Europe Centrale, T.O.P. Office / Luc Deleu (1986-89)

For the Brussels T.G.V. trajectory T.O.P. office opted for a high line setting above the city scape "since tunnels would not appear to be the appropriate solution if the aim is to raise the esteem of public transport!" This canonical project, as well as many other affiliated spatial experiments, meant serious political 'business' for T.O.P office, despite their seemingly utopian character. As a closure for "A driving force for Orbanism" Deleu even wages into the idea that "Although it appears at present that the active architects' office is obliged to foreswear any social reality, to swallow a vision of the future which differs from the prevailing thinking and to compromise itself ethically, I remain convinced that the time will yet come when T.O.P. office will be able to put its ideas into practice." Three decades later the consequential scale jump at T.O.P. office - from architecture to infrastructure - never truly happened in built reality. Conversely it can be equally deplored that the 'big infrastructural projects' as well as numerous other policy whispering projects by T.O.P office were immediately killed off by their cultural classification into 'art projects', confining

them to various museums' collections. A stigmatization that did silence the T.O.P office output prematurely.

Hence the crucial question regarding T.O.P. office's production as well as many other unsolicited practices remains: how to truly activate conceptual and creative insights and implement them strategically and graciously into a political and commercial reality? How to refrain from an all too absolute dependency on private capital investment? How to overcome that such vital projects are (culturally) cuddled to death even before they ever graced any real-time political stage?

THE RESET PROJECT

On a more reactive note the practice of the Reset Project can be seen as a solid complement to the unsolicited project. The big difference can be found in the momentum of instrumentalization within the project's process. Whereas the Unsolicited Project clearly precedes a brief or a social commission the Reset Project succeeds a first concrete but 'insufficient' answer to an official abstract.

It takes a very specific kind of architectural profile to successfully implement a reset strategy. Ethical ambivalence is however never far off. A prime example of a 'reset architect' can be found in the persona of Fernand Pouillon (1912-1986), a larger than life figure who was extremely active on the national French and French colonial building scene. One of Pouillon's infamous aphorisms was that he could build faster, cheaper and offer more comfort than any other architect (Pouillon, 1968). An aggressive commercial principle that necessitated an 'other', against which he could rebel, compete or whose work he could literally reset. The very first time Pouillon engaged in a countering Reset Project was for the Vieux Port of Marseille. Annihilated during WWII this historical core began its reconstruction in 1946 under the auspices of architect and urbanist Eugène Beaudouin. Pouillon, still a very young architect, was granted to build La Tourette, an important ensemble next to the Vieux Port for which he deployed new synthetic method, imbricating the professional logics of contractor, engineer and architect into a singular highly powerful economical scheme (Pouillon, 1968). By cutting out several middle men Pouillon was able to drop prices by almost 50%, something that politically didn't go unnoticed. In addition Pouillon used fairly straightforward building techniques and design principles, meaning that he could equally accelerate the building process in an unseen manner. The architectural and planning composition was defined by principles of repetition and regularity, and innovation was not, in Pouillon's opinion, the goal of the architect (Lucan, 2015). The true resetting however happened in the slipstream of the La Tourette project. In addition to his Marseille Harbour commissions Pouillon started - in a brutally undemanded for manner - to reclaim projects by other fellow architects, shortcutting the ongoing processes and procedures. Over a period of only three years Fernand Pouillon managed to filter his way into the core development of the Vieux Port,

developing in parallel a seemingly unbreakable political liaison with the French ruling authorities, using architecture to stow near-future political guidelines on post-war mass housing. Pouillon's strategy to increase his impact on the harbor process was to focus on but one main element: the façade. When approached by what he called a confrère paresseux, who held a 100m long project on the quays of Le Vieux Port, Pouillon proposed to design the facades for free and - at first - anonymously. The overall harbor development covered some 1.300 m, with the remaining 1.200 m being part of André Leconte's project. Leconte, the urbanist-in-charge for the Vieux Port redevelopment was enchanted by the 'lazy architect's' drawings, though immediately recognized the architectural signature of Pouillon. From there on Pouillon manoeuvers were unstoppable, gradually taking over the full Leconte project.



Figure 2
Le Vieux Port de Marseille, Fernand Pouillon (1946-1955)

One can of course raise serious ethical questions about Pouillon's counter tactics, in the case of Le Vieux Port as in many other cases that would follow. Though objectively it must be stated that he managed to offer a new architectural mechanism - a new social balance - to society and policy makers. Pouillon's 'divine economies' were such that at Marseille alone he managed to offer an extra 50.000m2 of generous housing facilities for the same financial envelope, a benefit that went straight to the war duped inhabitants of the former Vieux Port.

Independently of the specific Marseille case the strategy of the Reset Project, when applied with clear ethics and aiming for a maximized public

interest, could be considered a method worth renewing and actualizing in this day and age. At the same time, the Reset Project can perhaps only fully blossom in dire and urgent economical spheres such as post WWII reconstruction.

THE ARRESTED PROJECT

A third method - or perhaps anti-method - to whisper policy through architectural design is the arrested project. More accurately put this method entails projects of non-architecture i.e. consciously and ethically resisting to perform any superfluous architectural design deeds. The act of thoroughly reconsidering and even rejecting a brief or a commission is of course not a self-evident daily practice. Not in the least because it might be misunderstood as a potential professional death wish. And still, the arrested project, just as the unsolicited project and the countering reset project remains an obscure form of practice in today's architectural discipline.

The arrested project rises from the ascertainment that it might be in the discipline's social and ethical advantage to sometimes temper the authorities' 'wish for architecture'. Today's inflationary tendency for quick architectural expression and display is incrementally hollowing out architecture's social urgency and complexity.



Figure 3
Place Léon Aucoc, Lacaton & Vassal (1996)

A cunning example of such precise resistance and 'reversed' policy whispering is the Place Léon Aucoc in Bordeaux by the French architects Lacaton & Vassal (see figure 3). This project fits within the larger framework of an 'em-

bellishment' plan for numerous town squares instigated by the Bordeaux City Council in 1996. For the Place Léon Aucoc the architects weighed the initial brief to the actual condition of the context. They found an almost prototypical village square, bordered by trees, with benches and a space for playing pétanque. Around it, the houses with their sober but well-designed facades form an excellent example of estate architecture and of collective public housing.

The architects declared that upon their first visit they felt that the square was authentic, 'lacking in sophistication' and all in all rather beautiful. "It possessed the beauty of what is obvious, necessary and right. What does the idea of embellishment boil down to? Does it involve replacing one groundcover for another? A wooden bench with a more up-to-date design in stone? Or a lamp standard with another, more fashionable, one? Nothing calls for too great a set of changes. Embellishment has no place here." (Lacaton Vassal, 1996) When analyzing the 'end result', which looks indeed strangely familiar to any small-scale provincial plaza, a sigh of relief seems to radiate from the project. Luckily the architects were on board early enough to stop the 'architecturizing' urge uttered by the local authorities. Lacaton & Vassal managed to convince the public client to skip the seemingly obligatory architectural intervention and to do 'almost nothing', apart from some simple and rapid maintenance works - replacing the gravel, cleaning the square more often, treating the lime trees, slightly modifying the traffic - of a kind to improve use of the square and to satisfy the locals.

This retroactive lesson in architectural and political humility - as a soft insurgency - deserves a more substantiated exemplary status. As an arrested project it redefines the sensitive balance between effective economics, social contentment and true sustainability. However, avoiding such public prodigality is clearly not the easiest path ahead, since architects' fees are still calculated on what is actually spent on construction, not on what is 'not built'. The fact that this precise and specific kind of architectural practice remains - up to this date - an exception and even peripheral phenomenon is baffling, to say the least. It unveils architecture's reluctance to truly take risks for the public interest, and to keep on building and producing 'the new' at all cost.

The abovementioned series of insurgent policy whispering positions - the Unsolicited Project, the Reset Project and the Arrested Project - provide in their own alternative manner particular DNA samples for future design methodologies. In order for these embryonic methods to become an effective part of an economically viable and socially sustainable practice ethos the very roots of the architecture discipline need to be further sanitized and amplified. This equally implies tackling the hot issue of architectural education.

A renewed engagement whereby the architectural field links itself to the possibilities of policy making and political agenda setting could be a clear signal for any future educational ambition in architecture. The attitude required here hints at architectural design as a pro-active tool for the public interest, rather than a glorified end product in itself. The core objective of the architectural

discipline remains a public profession representing not the interest of the client, but representing the public interest (Vanstiphout, 2014), an attitude whereby the architect is a producer rather than an ultimate creator.

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The laboratory of theory-practice induction meta-circle

On approaches to architectural design process

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Abstract. The paper reflects on design of specific methodology for design-research circle connecting practical implementation with theory-driven laboratory in which architectural problem is addressed in a purposefully designed, extended mode in an attempt to manage semiologic, cultural, formal, structural, and functional aspects of architecture. It explores the unification of methodological analysis and ability to test the efficiency of methodology in particular case study. The focus is on the elaboration of open, dynamically changing design process and exhibits how these theoretical contributions produced by architect and by other participants of the process alter thinking on design. Three conceptual frameworks: complexity, triple-loop organization (knowledge generation within practice), and meta-design, jointly expose the true goals of architecture and fundamental response to architectural principles, which in Meta Design methodology are formulated as Theory-Practice Meta-Circle (TPMC). The problems of case study are confronted with academic approach to theoretical background of design in the making, using the concept of architectural identity to unveil mechanisms more important than physical definition of space - social responsiveness and cultural vividness as exemplary emergent results of design process.

Keywords. Architectural design; knowledge management; design methodology, architectural complexity, Meta-Design.

Introduction: Architecture as applied science

Architectural design and urban design are so profoundly anchored in reality and everyday life despite various experimentations conducted on the verge of the discipline or even substantially immersed in abstract considerations. However, the majority of architectural problems are still very much related to observed reality and, to put it in simple words, to solving problems of built environment. The status of applied science justifies relatively large amount of interference and exchange between the theory and the practice, and therefore approach to combine the two in practical applications seen as laboratory for testing theoretical assumptions through practical implementations forming the core of architectural research. It is valid particularly in cases, in which social responsibility or environmental improvement (including social improvement) has to produce measurable results.

The built environment is very complex, representing both implicit, cultural manifestation of civilization, and physical embodiment of social organization patterns responding to particular conditions of a place, a context, and a set of multitude of environmental properties. The field of architecture, and in par-

ticular the topic of design and design process, must acknowledge this richness and multifaceted nature of spatial problems. Subsequently, architectural design problems are conceptual reflections of real problems, and this tendency to tackle variety of issues, to attempt to grasp complexity and transform an excerpt of complex environment in order to acquire an improvement is, even if completely implicit, a prerequisite of an architect's mission. Therefore, any research conducted within the field of architecture must also reflect on this phenomenon and attempt to understand and determine the driving forces behind making (virtually) the environment. Fundamental distinction between the reality and the real, as Antoine Picon describes the conflict between individual architect's perception of architecture and true impact it has on our lives with all its various colors and meanings appears, after all, the main field of theoretical discourse contemporarily, and this discourse has ultimate significance for what architecture, and subsequently, what architectural design is and should be (C. f. Picon, 2010: 149-150).

Thus specific research process has been established for architects (and designers) in order to overtake the problem of technical rationality as described by Donald Schön in his prolific work on reflective practice. To put it in other words one may say that architectural problems are singular problems, with particular "wicked" features, as Horst Rittel and Melvin Webber (1984; entire chapter 2.3) once suggested, and therefore usually do not fit into typical scientific standards and hence require alternative approach in order to contribute to the theory as usually expected from scientific contribution, as recently readdressed by Raymond McCall and Janet Burge (2016: 201-202). As Schön (1984: 49-50) writes, technical rationality fails in any complex case - at least this is how his concept of "problem setting" compulsory preceding problem solving emerges as opposed to problem solving alone. While Schön considered primarily the practice, including design, architecture or town planning applications among others, it is worth pointing out that it significantly contributes to the understanding of scientific approach to discipline of architecture. These concerns have been raised by Grant (1979: 46-47), who has seen design as non-scientific activity, however allowed for the extension of the scientific approach to the discipline of architecture. Similarly Witold Dorosinski, Wojciech Gasparski and Stefan Wrona (1981: 65-67) claimed that due to excessive content of subjective elements inherent in design, an independent research apparatus must be applied and that only this disciplined way of gathering information on design may be seen as scientific activity. It was also at that time, when Gasparski (1974: 14-16) suggested possibility to introduce scientific approach into architectural activities by reflection-based and purposefully constructing the design process, which obviously is design methodology, implicitly exposing the super-layer of organization which can be completely compatible with scientific standards.

This paper is not intended to be a usual academic contribution - it instead presents the construction of methodology which is devised, driven by, and gen-

erating the practice within planned, yet unpredictable connection, which, if designed to be an experiment touching real practice, cannot be subordinated to typical thesis, planned results, and in which these scientific contents are replaced with others, more undefined. Since Meta-Design approach to architectural design assumed the use of reflective practice elements and submitting a superstructure of the process by more elaborate acknowledgment of immaterial, abstract issues present in architect's efforts (Barelkowski, 2007a: 23; Barelkowski, 2007b: 76-79), Meta-Design has been implemented into real life practice multiple times. It gave the opportunity to observe the methodological construct, usually in partial application, while reality of development of contractual objects too often presented limits, which disabled complete and thorough performance. It has been used in Museum of First Piasts project, in Bydgoszcz Railway Station project, Port Wine Pier as well as Digital Arts Museum in Madrid competition entries to allow for improvements, but more important, to allow to observe diverse reactions, feedbacks, alterations. Thus, this paper is more a reflection on the process of methodology getting mature and still revealing areas of significant imperfection or instability, but the one that induces conviction among researchers involved in the project, that this direction is an attempt to touch the holistic approach of architectural design, and to respond to the core problems of architecture in design process.

Meta-design revisited and extended

No scientific problem related to architecture may be seen as the one having constant constraints. These change dynamically, affecting the research even while any research activities are still going on. In this, the research is indistinguishable from the design, with primary difference determined by the expectation of the former to deliver generic conclusions, beneficial outside of its prototypic application case.

This means a risk, dangerous balancing on the edge of immersing and in result contaminating science with professional subjectivisms, but in case of architectural "science" it is unavoidable, as rightfully Christopher Alexander (2003: 3-4) puts it stating that axiological issues are inseparable and contextuality are inherent to architecture. Alexander (ibid.: 6-7) says there's more to it - he postulates ecology and emergence of architecture as environment, and the necessity to acknowledge them and reflect in an approach to the discipline. Furthermore, he exposes the connection between complexity of the real world and complexity of architecture as environment in which people live, but also in which architects design and collect their knowledge.

Can architect deal with complexity in an intuitive manner? Can he understand, even part of it, the multilayered relations, programmatic, socio-political, aesthetic, to name the few? The multitude of opinions, concepts, and expectations are, after all, important stimuli within the design process, and elimination of these intersubjective elements makes the process remote, detached from real-

ity at best, unproductive and rejected in worse cases. One can clearly determine that required methodology must tackle the issue of complexity - design process environment is the one to consider not only the timeline or the lifecycle of the object, not only indeterministic changes affecting the process and in result, the object as well. The difference between understanding creation of architecture as creation of space tends towards creation of environment, with all associated consequences of rich meanings of this word. Architecture as substance hardly follows the patterns of complexity, at least those gathered and presented by George Rzevski. However, architecture as environment clearly fits within the image Rzevski (Rzevski and Skobelev, 2014: 7-9) gives when describing seven attributes of complexity so characteristic for systems, whether natural, already purposefully established by the civilization, or emergent. Therefore, if the understanding of the design process, specifically for the case to be described herein, enters the field of complexity theory, one should reflect this in both project and in research on design.

Also "Meta" aspect of the research has evolved and grew absorbing more profound understanding of knowledge generation process within designing effort and research on design. As once described by Robert Barelkowski, Meta-Design (M-D) was meant to organize design process in a way to combine strengths of practical design in-acting, the source of derived data for reflective practitioner, but at the same time to construct programmatic use of values and criteria, hierarchy and subjective preferences treated as elements of presetting. It offers parallel continuous control threads of design itself (the main processing course) supported by meta-procedure which, in turn, is intended as not only a reflective (analytic) platform, but active, organizing, value and hierarchy-setting, ultimately decision-managing platform. It also integrates visual and verbal means supporting design (C.f. Barelkowski, 2010:135-136).

M-D methodology already recognized multiple sources of knowledge, as in architecture and its context given by Halina Dunin-Woyseth and Jan Michl (2001: 6), after Matthias Kaiser. The inclusive character of architectural knowledge is an important requirement related to the fact that this discipline is clearly an applied science, and therefore non-scientific sources are valid as references and, as Paul Feyerabend once suggested, have great adjusting value for researchers. But knowledge management within design process, and in particular within M-D course of designing, should be seen as self-organizing system of third grade, or, as more often this structure is referred to, as third-loop organization or third-loop learning system. It is not only the issue of interdisciplinarity, but of the flow of knowledge and knowledge generation, as seen in Paul Tosey et al. work (Tosey et al., 2012: 301-302), who point out that while typical reflective methodologies often include second layer processing of data management (instead of processing data within design process), triple-loop organization introduces recombinations of methodological presets, in which data management is organized in a different way under different super-criteria relevant to the entire process. The concept of learning from knowledge produced

during the course of design is reinforced by the ability to use this knowledge right away in the process. As one can see, there is a call for dynamically changing methodological framework, responsive in regards of the task at hand, so necessary due to the fact that architecture deals rarely with inanimated matter, most often with human lives, human comfort, and social organization in the end. Even during the course of design, constraints are changing, recipients of the project may also change, set of expectations and criteria can be altered, and there is usually an enormous amount of direct involvement of an architect into the course of design, what from scientific point could be called the environment for an experiment, which scientists would tend to control, and in which they would rather eliminate unpredictable contents to assure clarity of research.

TPMC: organizing processes in Meta-Design

In conclusion to these methodological considerations, the above mentioned M-D implementation cases have been altered and adjusted to incorporate said elements of triple-loop organization which so well go with complexity and its key attributes, like non-linearity, self-organization, or non-equilibrium. Therefore the structure of M-D has been altered and theory-practice meta-circle (TPMC) established in order to accommodate the principle of architecture, which is successful only if appropriately serving or fulfilling its social role, so sensitive and dependent on multitude of non-scientific stimuli and conditions. The background of this problem is well reflected in paper written by Larry Leifer and Martin Steinert (2011: 152), who emphasize the importance and influence of human behavior, and there, in human responses, lies the success or failure of architectural solution as of any other design solution. However, their proposal of loops within design process as well as in the curriculum seems to be too simplified and limited, particularly, when coming to the third loop which follows the principles of methodological flexibility only in declarative, non-descriptive way (ibid.: 165-169).

TPMC allowed for clarification of M-D methodology, specifically when it comes to the distinction of role of meta-layer which is twofold and encompasses both additional knowledge processing loops within design. As a result, there are three levels of organization: design level, meta 1 - management level, and meta 2 - conceptual level, in which "conceptual" refers to abstract ideas, their transposition into design process, and their evaluation. In a simplified scheme, within the design process there is designing, learning from designing, and learning from learning which delineates connection upward the chain of knowledge generation, and there is conceptualizing, managing, and acting, which delineates connection downward the chain of knowledge usage. This matrix of levels and processes is induced by external, yet connected sources of multitude of stimuli, which are social and cultural backgrounds.

The significance of basic process of in-design knowledge processing is per-

petuated through the course of entire design. As M-D methodology implies, there are four main steps in design, which relate to establishing the task, planning and designing, extraction of a solution, and implementation of a solution. Each of these steps corresponds to specific level of design organization, yet they are aligned in a non-linear way within the structure. The structure is given in fig. 1.

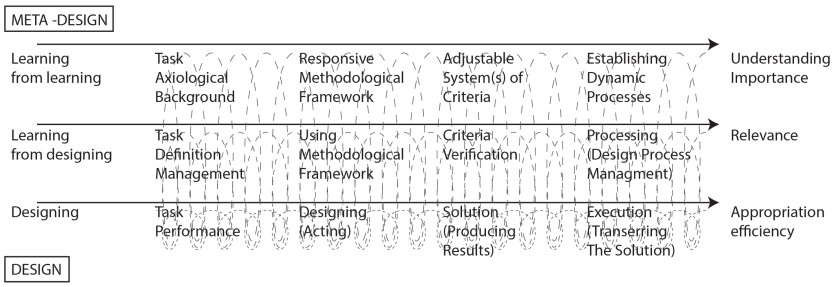

Figure 1
Three levels of Meta-Design - TPMC.

Proposed scheme is meant to be treated not as linear, successive, and closed - on the contrary, it works only if taken as an open structure, in which connections between levels of organization may be explicit or implicit, some elements may be idle, inactive through the course of design due to specific constraints or limitations, but in other cases they are becoming the most significant in the process. This approach is driven by the 3rd level primarily, but obviously affects the entire scheme. What's more, social and cultural external contents may influence reorganization of the scheme in a profound manner. Thus below given description must be seen only as comment on the contents, not the embodiment of its structure, with 2nd and 3rd level activating theory more influentially than in usual case of architectural process.

TPMC operates on 3 levels - architectural designing, learning from designing, and learning from learning. It describes architect's performance, but acknowledges external contributions, hence enabling crucial external stimuli as rightful drivers of architectural design process. Designing is represented by the basic level, which is constituted by task performance, designing (acting), solution (producing results), and execution (transferring the solution). Second level, learning from designing, opens field for basic participatory design components, in which recipients of the architectural process may influence proposed solutions. However, external contributors influence decisions, but not necessarily have say in establishing design framework itself. Second level is composed of task definition (task management), use of methodological framework, verification of criteria, and processing or design process management. Third level,

learning from learning, brings more thorough participation of non-designers, and this postulates the elevation of their status to encourage participants to reflect on design process, hence improving the quality of architect's learning from learning by the ability of them to become much more conscious actors in the procedure. Third level assumes task axiology, responsive methodological framework, planned to allow changes in its structure, adjustable system of criteria, and establishing dynamic processes that fill the course of design. Similar progress may be observed in the transformation of status of external forces, social and cultural components. It starts from social principles and cultural aims - the abstract nature of these terms calling for mentioned three levels, as these according to many researchers like Stan Allen are the most significant and signature problems defining the discipline of architecture (Nilsson, 2013: 130-132). Then, social participation and cultural transposition must be established, and assume social evaluation (as a systemic content) and cultural effects, which preferably should allow measurable gains. Finally, social integration, understood as both appropriation of architecture, and using the architecture as vessel of integration for members of community, whether local or global, is connected with cultural improvement as an ultimate goal. To summarize theoretical considerations, paraphrased synthesis of general concepts behind triple-loop organization may be determined - level 1 produces efficiency (appropriation), level 2 gives relevance, and level 3 brings understanding and importance (C.f. Asproth et al., 2011: 2-3. Particularly the meaning of questions asked on different levels of organization, which are "how?", "what?", and "why?", with the latter signifying the purposefulness of the design and at the same time the research).

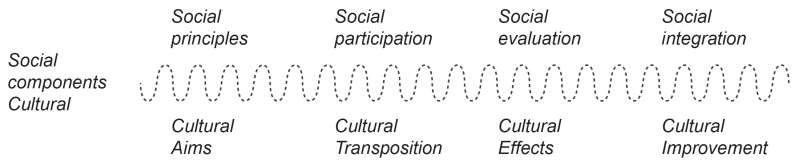

Figure 2
Social and cultural drivers in Meta-Design - primary source of complexity.

Mechanisms of complexity are incorporated within dynamic relationships between various activities. Self-organization is reflected in whole methodology, in its ability to adjust itself contextually regarding the profile of the task. Autonomy lies in independence of particular components, which often implicitly present in architectural design, are purposefully split and may be retained even if connected components or assumptions are rejected or do not play any role in the process. Non-linearity of the process is maintained as a result of autono-

mization and at the same time in ability to process data and decision-making in parallel or in altered order between levels and phases. Emergence is becoming, paradoxically, partially controllable - due to increased probability being the result of planning for social effects, for the role of architecture as catalytic social or cultural force. Non-equilibrium is embraced by the ability to respond to sudden fundamental changes. Elements of such type of design are usually seen in more technical approaches related to man-building interaction, in which unpredictability is limited to the main phenomenon under research, like in case described by Fabio Ponziani et al. (2016: 543-544) in their analysis of crowd reaction for various sudden events in airport terminals. However, this paper focuses not on technical aspects of complexity applied, but on principles of architecture which are value-oriented solutions, social performance, integration, and dynamic, yet permanent cultural responsiveness, similar to another project proposal for dense urban substandard areas, as described by Barelkowski et al. (2016: 526-529). All these elements jointly produce theory-practice complex connectivity network, in which meta-layers play decisive role as "theory" component, with theoretical elements otherwise potentially reduced or eliminated. To counter argument, that this refers only to some architectural projects, one may quote general remarks made by Fathi Bashier (2014: 425) on architecture and, consequently, design studio practice and academia, who exposes the inadequacy of implicit design methodology as well as the risk of rejecting the difficulty, but rewarding process of design development.

Let us ponder on the potential application of proposed framework within the design process. While the three learning layers are organized as progressive, developing along the course of design, the integration and systematization of knowledge acquired or produced during this course, instead of being intuitive is postulated to be planned and organized. If designing and parallel learning from designing and learning from learning are advancing according to the progress of design, the complexity-based approach provides recurrent filters for this advancement (hence graphic representation of a spiral passing through all layers of design/learning axes).

Imagine the project of housing estate for multiple users (e.g. 2000 inhabitants), in which apart from stakeholders (different parties related to diverse areas) there are interested parties and organized social groups with potentially contradictory goals, there is also estimated timeline of project. On top of that there are many constraints and factors co-shaping the conditions in which project is executed. Naturally, the architectural task may be here seen as expanding beyond the boundaries of discipline of architecture, but in fact this broad approach is inherent and necessary to make architectural solution viable - architects cope with social, cultural and economical problems all the time, on any level, and at every task. Thus self-organization of the project must assume the appearance of events or influencing forces which may affect the course of design and reconfigure even the most fundamental of preliminary guidelines must be considered as variables. This includes reactive parts of the design - in

stipulated example neighboring developments' actions happening in the vicinity within the timeline of the project which alter preliminary conditions (and related management of information), fluctuations in social responses and preferences, coordination with expanding development plans (community-scale infrastructure). Self-organization cannot assure prediction of sudden events, but can contain measures to manage these events, connecting to emergent inputs.

Autonomy is a way to manage multiple threads of the design. Permanent coordination is hardly possible, particularly on early stages of design or in key, interruptive events, when crucial constraints are altered. Again, referring to stipulated situation, required working with multiple alternative solutions inherently produces very varied results and implies decisions on multiple levels to be variant-dependent, sometimes contradictory, sometimes simply independent to parallel decision-threads. This autonomy, however, is often challenged by disruptive events exposed when instead of equilibrium, dynamic forces reshape the framework of design. Again, let us consider valuable participatory content, on the one hand unpredictable, on the other hand necessary to be acknowledged. Housing estate requires establishing public spaces which enable containment of basic community activities (especially considering large estates with numerous inhabitants). While spatial definition of those spaces is limited by physical structures derived from land ownership structure, self-contained concepts of composition and architectural aesthetics in which public has say limited to none, the function and the potential to accommodate public events and social activities cannot be constrained to inhabitants of the estate only. In result, the impact non-inhabitants have can alter not only the program and patterns of use, but physical delimitations and aesthetics, too. While there are situations in which design drives authoritatively the course of the project, the majority of procedures, particularly those socially sensitive, have to expand designer's mind beyond restraints of singular (or team) mind.

Design elements attempt to progress through socio-cultural tissue, which is there, present at all times, yet also dynamic, permanently changing, thus affecting the design itself. Relationship between theory and practice herein is that usually architectural theory and its implementation remains either restricted to purposeful use exclusively within design team or even in a more limited way, selectively and subjectively applied at will by leading architects, without any direct connection offered to recipients of the design. The requirements for quality of architectural solutions (or urban design solutions) encourage the enhancement in the area of transparency of the design process, its relevance (so that design is consumed beyond its premiere, fancy photographs in journals and critical acclaim ignoring public response which may be only measured and assessed after some years of occupancy - see the case of Spitelau Viaducts in Vienna, Aquatic Centre in London or Biomuseo in Panama). Theoretical component is treated as an activating input, informative content serving for the purpose of engaging other participants of the design process to increase the amount of information provided for architects, increase the efficiency of

feedback, justifying and rationalizing social preferences. However, at the same time theoretical aspects objectivize the process, reinstate purposeful (not implicit, intuition-driven) connections to culture. In detail this connection has been covered in reference to Meta-Design methodology (Barelkowski, 2007a: 7-10) and also in discussion of participatory design (Barelkowski, 2014: 40-41).

Exemplifying case

It is relevant to introduce particular case study, which is one of primary experiments conducted in order to assess the conceptual framework of the methodology and its validity. The case described here is focused on the improvement of existing, yet vastly unsatisfactory cultural infrastructure in community of Oborniki, located within the boundaries of Poznan agglomeration. The cultural center - OOK - potentially requires intervention, however the architectural problem cannot be easily defined as typical design task, while it encompasses programmatic, socio-political, cultural landscape related issues, to name the few. On the one hand there is multitude of opinions, concepts, and expectations related to the center which clearly point towards the connection between architecture and society, which must be anchored in the process from the very beginning. There are several problems which form a background for decision-making process in that task. The first is the need for supplementing the cultural infrastructure, which although may sound simple, has to reflect present and future status of societies who animate cultural life in town of Oborniki and in the region. OOK should provide, gradually due to budgeting constraints, stable and universal seat for multiple local cultural institutions, accommodating distinct modes of use. The second problem is related to spatial structure of Oborniki, the main urban center and all major municipal institutions, but this one object which is south of Warta river, located on northern river bank, and further to the north. OOK is potentially well connected, through main street, with the main market square and principal street, but the project will never go that far to tackle anything beyond land parcels currently attributed to the center. So, any attempt to integrate northern and southern parts of the town are limited to restricted area, and disable any large scale intervention. The third problem is the deficit of social identity and identity of significant municipal location, with influence exceeding mere urban impact. This time, one could talk about how newly designed center could be absorbed by the community, how community perceives the role of the building explicitly, but what role of multifaceted nature of space attributed by the limiting objects, or parts of OOK, implicitly can play or will play in life of Oborniki. Isn't it standard, that in many architectural tasks such are the fundamental issues to be addressed, not the fancy form, or maybe even the best functional solution?

Described case is referential, analyzed retrospectively as a procedure which, even in its current phase, in which concept design has been already finished,

but the technical phase is ahead. It provided valuable insight into mechanisms designed for this specific research, emphasizing the necessity of acknowledging social appropriation or at least acceptance of architecture, and dynamics of socio-cultural conditions.

It is in methodological frameworks that architect may seek an improvement in design process and in its results. It is the theory, supporting the practice, which leads to the implementation of well-defined and well-oriented structure. Nadia Anderson (2014: 8-12) proposes engagement and design process improvement as two main remedies, who also sees the role of an architect as being a manager for the catalytic process, and the issue of active participatory design has already been mentioned in previous paragraphs. Participatory forms have been strongly diversified: traditional and electronic inquiries, consultations, workshops, public discussions, among others. Not these forms were new, instead the invention within the process was in various problems included in participation, and in particular, fundamental abstract ideas, which were determined with wide contribution from members of community of Oborniki administrative area (over 33000 inhabitants, with over 2% of respondents, ca. 3,3% from amongst adult members of the community).

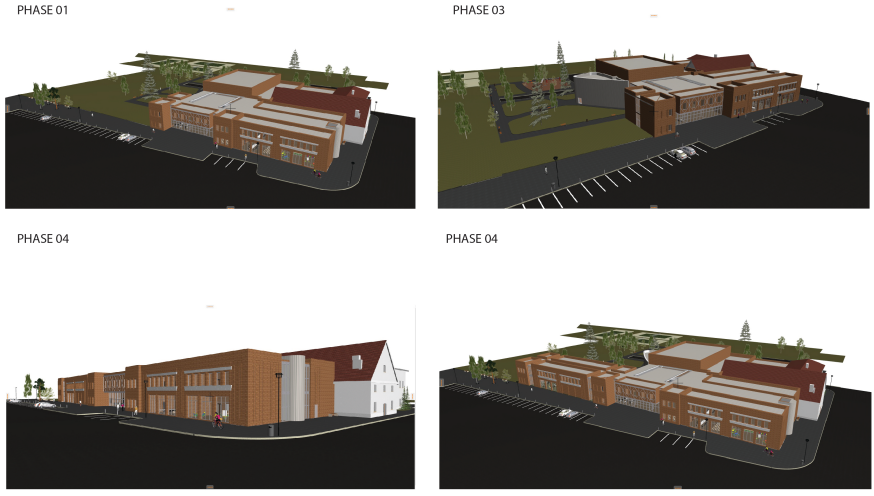

Figure 3
Design for phases with establishing future obscured facades - OOK design process.

One of significant threads of the design process, at early stages, participants were asked for several key notions behind the extension along with questions related to program. Simultaneously both sets of data were gathered and confronted, and strongly influenced the course of M-D procedure, furthermore adjusting TPMC. The aim behind this part is to establish common comprehensible language for information exchange between various participants of

the process, with references to definitions and their interpretation having specific and multi-party agreed connotations. While cultural center will be, in part, significant burden for community budget, it was imperative to assure, that community will be not only prone to accepting the project, but in fact will actively support it. It is worth noticing that notions tend, at least in some situations, to alter their meaning or subdue to different interpretation. Therefore the process, changes done to initial proposals, the evolution of general and detailed, fragmentary solutions, are subject to constant negotiations. Theoretical framework allows to maintain focus on principles of design and at the same time to facilitate non-architects' contributions to design, whether by explanation of requirements (of local community), by discussion on practical aspects of design, hierarchization of criteria, and translation of notions (i.e. "spatial identity") into particular architectural forms. Abstract notions were therefore constantly present during the exchange with inhabitants and representatives of administration of Oborniki area. Also, this framework of notions formed active reference reminding of previous decisions and making the process disciplined, consequent, and reliable, yet still open to criticism challenges and alteration requests even related to primary set of ideas and values.

Another exemplary thread, executed at the same time, was to incorporate changing budgeting conditions within design, reflecting altered limits in determining stages of the development with the program alike - due to the fact that depending on the level of funding different scale of commercialization of part of the resultant structure could be allowed (e.g. the restaurant). Budgeting in concept design, divided into many subsets, was controlled and coordinated contextually with conceptual and programmatic decisions, ultimately to change number of phases from 2 to 3, and finally 4, to include in the program additional specialized cinema, which for some time within the process has been removed, also to design totemic element for the main hall - meeting room clad with recycled metal elements, becoming the work of local artists and other members of the community and simultaneously identification and appropriation vessel. Selected order of four stages reflects established organization concept for the institution. Currently, the institution resides in the existing part, which, also due to TPMC mechanisms - was preserved and formed in volume, material, and color as contrasting component of the complex - thus assuring temporary availability of built substance to contain various musical or theatrical bands, provide space for few painting and sculpture groups. Selected as stage 2, the existing part remains untouched during the execution of first phase, and the first phase focuses on establishing fundamental programmatic elements as well as connecting points to old buildings. The multipurpose hall and main workshops come as primary goal, while specialized cinema hall is thought to supplement the complex in future, to enable the ability to manage the repertoire in an appropriate manner (a substitute for multiplex). TPMC helps in organizing relationship between conceptual aspects of design, technical requirements necessary to allow smooth connection between phases, and

also formal, aesthetic distinction and compatibility, approved preliminarily by members of community. These changes or decisions are but few examples of the influence and dynamic flow of the process moderated in TPMC.

The above mentioned excerpt from design course allows to look behind the curtain of design workshop and see the TPMC as a consciously organized process of building theoretical construct within cooperative part of the process. Usually procedures exclusively performed by architects due to the implementation of learning loops became open, participatory, and increased amount of data used for the purpose of architectural elaborations as well as quality and objectivity of decisions (one can assume that some decisions in fact could not be objective, however instead of usual intuitive or self-contained exclusive architect's decisions directives for the project were pre-accepted by theoretical definitions and then compatible formal solutions). Defining local culture, interpreting it in a way that may be absorbed by community within the process (not ex post)

Moderated asymmetry

TPMC as an extension to M-D methodology cannot justify, in author's opinion, thesis-based paper, in which clear assumptions lead to clear results. After all, architects are dealing with complex reality, and little in design process goes exactly as planned. The scientific description and conditions for any research immersed into reality, therefore, must be discipline specific, and at the same time attempt to find means to generate creative and productive results - productive not only for the field or for academic community, but ultimately for the society, in large schemes, and in those modest ones.

For OOK - Oborniki cultural center, it was rewarding to have previous, failed project as a reference. It was not the point to get things better than in previous attempt, but to get things right - and response from the community was immensely satisfying, with Town Council approving the concept for execution. This acceptance was the result of local community being the part of the project - but not as consultants or those indicating selected version of volumes or facades, rather those participating in the entire process, from abstract ideas and key identity signs, to active decisions on location and order of execution for particular sections, i.e. commercial restaurant, or type and amount of glazing.

There is, obviously, fundamental difference between social realization of the architectural problem and resultant consciousness, including distilled, objectivized support for design contrary to socially undefined concept of people's requirements and expectations supported superficially by participatory procedures. Filtering multiple biases, unwanted or contaminating factors without hampering the validity of research (e.g. contradictory expectations of social opinions) was crucial to understand the asymmetrical, but highly complementary relationship between theory and practice and knowledge production flows going both ways.

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Design studio: Understanding users' experiences

Case Study of the University of Northumbria

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Abstract. The design studio is a huge part of the life of architecture students. Non-design disciplines have started to appreciate the studio model and the notion of collaboration embedded within it (Perkins & Will, 2011). Many research studies have focused on pedagogical issues related to design education (Taylor, 2008; Ledewitz, 1985; Crowther, 2013). However, there is a lack of detailed empirical studies that connect the three sides of the triangle: the physical learning environment, the teaching processes, and students' experiences of such a unique space. Results from an ongoing PhD study at the University of Sheffield have shown that the physical studio space has an impact on students. The investigation of these relationships required ethnographic qualitative methods that could capture students' experiences. These insights were gathered from groups of students using observation and customer journey mapping, as well as interpretations of drawings. The design studio itself as a spatial physical medium has influenced them both, first by shaping students' behaviour and second by the rules which are implemented inside the space. The design studio itself as a space contributes to forming the design studio culture.

Keywords. Design Studio; Architectural Education.

Context

In the design of educational buildings and learning spaces, numerous physical aspects have been linked to students' experiences within the institution where such a space exists (Nasar et al., 2007). Studies focusing on this phenomenon have mainly been limited to the early stages of learning, and do not seem to have focused more broadly on spaces in higher education. However, many researchers have focused on defining the design studio culture. In the report made by the AIAS Studio Culture Task Force, (Koch et al., 2002:3) defined the studio culture by

'Those who have studied architecture undoubtedly have vivid memories that characterize their design studio experience. Late nights, exciting projects, extreme dedication, lasting friendships, long hours, punishing critiques, unpredictable events, a sense of community, and personal sacrifice all come to mind. Those aspects are not usually written into the curriculum or even the design assignments, but they are likely the most memorable and influential. The experiences, habits, and patterns found within the architecture design studio make up what we have termed "studio culture".'

Although these experiences as seen by Koch et al. (2002) are not related to the curriculum of the design studio, but Dutton (1991) states that the "consequences" of the curriculum and the tutors are seen to be an essential part of

what makes the design studio culture. By which Thomas Dutton called this the "Hidden Curriculum". The curriculum and the students' experiences are taking place in the educational design studio. The goal is acknowledging the richness of the spatial organization that allows such interaction between students and curriculum to take place (Abdullah et al., 2011). Studio culture can be seen and defined by the researcher as three sides of a triangle, the teaching processes, the students' experiences, and the studio as a physical space. the intersection between this three sides of the triangle captures the true culture of the design studio, based on the background of the researcher, as an interior designer, tutor and service designer. This background informed this definition, thus this research.

In order to investigate the immateriality of the students' experiences, a definition of what is experience should be set. In the context of design studio, the good experience can be measured by how successful, authentic and creative the student can become at the end of the project time 'performance'. But in the context of this research, experiences are measured by encounters that shape the students behaviours inside the design studio. Abdullah et al. (2011) have stated that those encounters are in fact incidental. In many cases, the habits and patterns exhibited in this culture are not the intentional product, but a byproduct.' Yet these encounters were preconceptualised in the mind of students by 'myths' around the design studio culture.

'There's this romantic notion that staying up all night needs to be part of a architecture student's life; a 100 percent dedication and sacrifice to design. Or the best students are those who spend the most number of hours at studio. This is a serious flaw of a studio system; flaws that are actually considered sound teaching practice and the right attitude. How can we expect future architects to design our built environment when they themselves are train to live a dysfunctional life. More worrying, it is the actions of the students to promote such culture.' (Abdullah et al., 2011:2)

University Profile and Existing Design Studios

The University of Northumbria is one of two universities in Newcastle. It has two main campuses in Newcastle and many in London and around the world. City Campus West, specifically the Ellison Building, is home to the School of Built and Natural Environment, focusing on architecture and the built environment. The main teaching and learning spaces are the architectural studios, which are open to all year groups to encourage peer learning ("Architecture and Built Environment at Northumbria University," n.d.), and are available to unsupervised students from 8:00 am to 10:00 pm. There are many facilities that complement the main teaching and learning spaces (studios); these spaces include "The Zone", which is a space open 24/7 for the students, a Modelling Workshop, and the Rapid Prototyping room.

The existing Year 1 design studio is located at the corner of the ground floor, which makes it accessible from two directions: 1) the design studio entrance

is not far from a fire door exit that is used to enter the building; and 2) the main entrance is relatively far away and not as straightforward to access as the fire door exit. The studio is shared between first-year architecture students and interior design students. The masters design studio is a different setting to the Year 1 design studio. It looks remarkably like an office environment (Fig. 1).



Figure 1
Masters design Studio

The Study

The study is based on a pilot study that was conducted at the University of Sheffield; the Northumbria University was the first university of four to be examined as case studies in this ongoing research. The initial plan was to focus on the masters' design studio and the masters' students. The reason for this was because masters' students have experienced many diverse design spaces, and different teaching and learning approaches, and have formed their own knowledge of what it is that forms a design studio culture. The researchers' observation of the masters' design studio at this university showed that it did not look as if the students were working in a normal design studio. It was more of a workspace environment, which maybe was due to the timing of my observation just before the Easter break, close to a submission deadline. The students were focusing on their screens and isolated themselves from their colleagues through the use of headphones. On the other hand, I was offered the chance to call into the first-year studio, which was the opposite to what I had observed with the masters' students. This studio was very busy, with people sketching,

modelling, and having conversations with other students. As this is one part of the ongoing PhD, there are other case studies that look at other design studios in other universities, some that look at the master design studios and the others at the first year design studio. This investigation and conclusion are based as stated on the observation of the master design studio, but more focused on the extensive study of first design studio.

The Study Design and Methods

The research question for the PhD study is "How do the physical characteristics of the design studio influence certain behaviours of the studio users (students), and how are these characteristics relevant to collaborative learning?" The aim of this study is to understand the framework that creates the design studio culture in the perceived triangle: the physical learning environment, the teaching processes and students' experiences.

Objective	Method	Remarks
To clarify the link between the physical learning environment, the teaching processes, and students' experiences and their contribution to forming the design studio culture.	Ethnography (focused observation)	Describing the phenomena of the design studio (the link between all the factors).
To help understand the relationship between the users' perceptions and the physical attributes of the design studio. In doing so, the aim is to explain why certain behaviours are found in design studios.	Focus group (customer journey mapping) Students' drawings of their ultimate design studio	Collecting the data from the users, allowing them to tell their stories within the design studio, and the users sharing their experiences.
To help understand the point of view of the tutors and the policy of the university.	Interviews	Semi-structured interviews about how the design studio is run by the tutors and what is their pedagogical strategy.

Table 1
Objectives influenced the methods

Data Collected

Four data sources have contributed to this study (namely: Focus group including the customer journey map and the students' sketching, interviews, observation and photo documentation) , with the focus on collecting data to inform the three aspects of the main research: space, students' experiences, and the teaching and learning process. Which forms the triangle of factors that formulate the design studio culture from the point view of the researcher. As an observer

and participant, these three angles contributes - among others - to the experience of the users of the space, as they are the most influential in the definition of the researcher. The data regarding space and spatial features was generated by visiting and photographing the space, and students produced drawings illustrating the design studio. The students' experiences were recorded through a focus group with the use of a Customer Journey Map (CJM) (Fig. 2), a method borrowed and adapted from Business and Service Design, where users can discuss their experiences of a particular service. The teaching and learning processes were discussed with the contextual interview that have been carried out with tutors of the design studio.

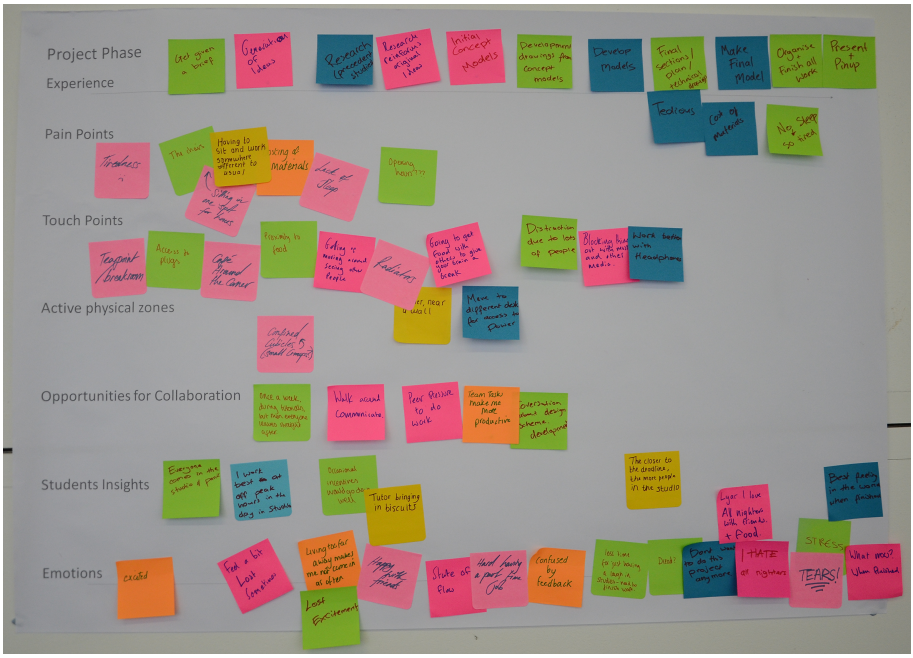

Figure 2
Customer Journey Map, Northumbria first-year students

During the visit to Northumbria University, the observation and the spatial mapping were done on both studios, but the focus group was conducted only with students from the first-year studio. This is because the masters' studio was very busy, with students working towards a submission deadline. (Fig. 3)

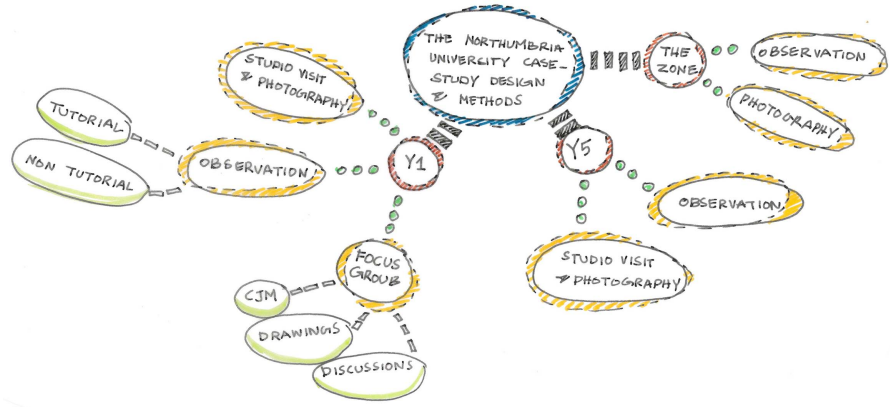

Figure 3
Methods that have been used in order to collect the data for the University of Northumbria case study

Data Analysis

The CJM generated with the students in a focus group session was tape recorded and transcribed; in addition, the actual map was filled in and a photo was taken of it. Observations were hand noted (drawing). In addition, the illustrations produced by students were scanned and kept digitally. The data were organized and thematically coded both manually and by using NVivo. The data analysis process was carried out during and after collecting the data. The categories that emerged from the data were relevant to the literature examined and reviewed, and more themes appeared while doing the thematic analysis. Thematic analysis was the approach used for categorizing and grouping the data. The confidentiality of participants was maintained. Informed consent was obtained from the students in accordance with the guidelines of the ethics committee at the University of Sheffield.

Findings

The two studios at the one university have significant differences on many levels: the atmosphere of the studio, the level of energy, the activities and curriculum of the users, and the physical characteristics of the studio. However, this is not a comparison study. It is merely an investigation into how variation in the studio variables under investigation can alter the physical appearance of a space and its culture.

Collaboration

Students (in Year 1) identified collaboration as a feature of the design studio. One type of collaboration that came up in the focus group conversation was

Instructed Collaboration; in this type of collaboration is where the tutors asked the teams of students to work towards a common goal. The main insight into this collaboration from one of the students was that "Team tasks make me more productive". However, in the same context, the students who acknowledged collaboration as a term only did so with emphasis on their own view of what the space for collaboration would look like. Many students in their illustrations (Fig. 4 and 5) suggested types of tables; one of the students suggested something that is temporary and can be used for the times when collaboration is needed: "Table for collaboration that can be folded away". This again relates to the notion of instructed collaboration, as this was connected with the presence of the tutor.

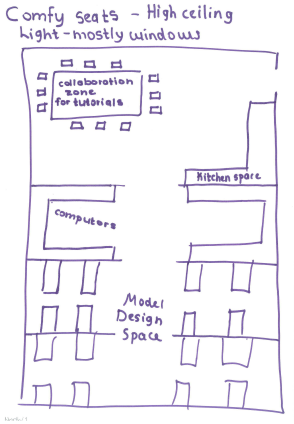

Figure 4
Student illustration focusing on collaboration zone for tutorials

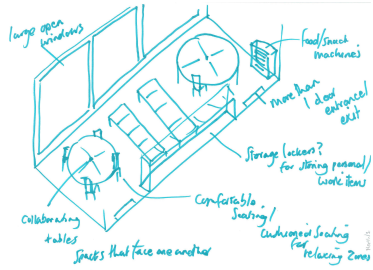

Figure 5
Student illustration suggests a collaboration table with comfortable seats

Themes Related to Physical Characteristics

From the data, themes emerged that related to the design of the design studio and the adjacent spaces needed. These themes revolved around the interaction between the physical space and the users; in this particular case study, these

themes include movement, complementary spaces, furniture and spatial features, and environmental control aspects.

Movement

The studio space is locked and can only be accessed by students swiping their ID; however, the students were very unsure about it being monitored. Many claimed that the studio tends to have people that mill around and it tends to be crowded and noisy, so headphones have become an essential part of the studio rituals. The fact that the studio is not open 24/7 forced the students to have their own routine of leaving the studio and heading towards The Zone after a set time. A volunteer would stop the design studio door from closing until everyone was out so that they would not each have to swipe in and out to head towards The Zone. In addition, because this is a shared studio, and they can only use it every fourth day, they lack storage space, so have to take their models and drawings with them; this makes it more difficult to move in and out of the design studio and the university. (Fig. 6)

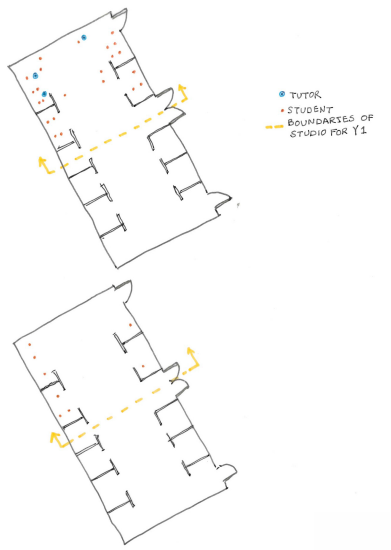

Figure 6
The occupation of the design studio on a tutorial day and non-tutorial day

Complementary Spaces (Functions)

Through the methods that were used to obtain insights from the students, many students suggested that the studio lacks the space to accommodate some facilities which are very important for the process of design or more importantly for the users of the space. Research stations consist of computers and a

small reference library. Much of the data collected suggested the need for cafes and vending machines in close proximity; others made it clear that a kitchen or a food station is needed within the proximity of the design studio (Fig. 7). However, one of the students thought that being away from food sources was actually an opportunity to clear his mind: "Going to get food with others to give your brain a break".

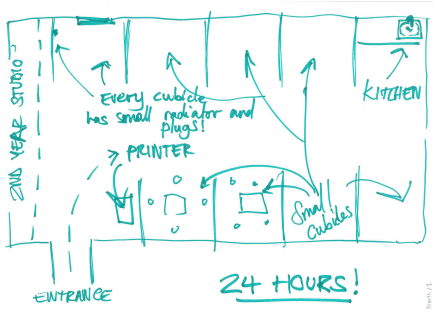

Figure 7
Kitchen is as big as a cubicle

The other required function within the boundaries of the design studio or within close proximity was printing facilities. A modelling station and photo booth constantly reoccurred in the data.

Furniture and Spatial Features

The students identified zones within their drawings and illustrations of design studios; these zones consisted of a central collaborating area; a kitchen area or coffee/tea making facilities; partitioned cubicle working spaces; modelling, printing and storage spaces; and photo-taking spaces. They also suggested relaxing zones and comfortable seats and areas for brainstorming. The word "comfortable" reoccured in the data, and was used to describe furniture and areas. Another frequently occurring term was "power"; the students wanted power sockets and electricity points where they could plug in their electrical items. Their preferred location for workspaces tended to be on walls with sockets. This is how they chose their workspace location at the beginning of the year. Some students suggested that other people were the main factor when it came to choosing their workspace location at the beginning of the year, but then they tended to relocate to be next to power sockets. The space lacked areas for personal storage or material storage. In fact, the students lacked space to work due to the accumulation of models from previous projects and drawings from either the previous year or previous projects. However, there was no intention to move these models in order to utilize the space. Some of these models even blocked the view of the outside area.

Environmental Control Aspects

The double height ceiling and the use of inadequate materials made the studio very echoey. As a result, in the tutorial sessions, some instructors and the students find it very hard to hear or concentrate due to the limited space, poor acoustics and lack of comfortable seats; this made some of the tutors hold their tutorials in The Zone instead.

Most of the students emphasized the radiators, the acoustics and the lighting in their illustrations of their design studio designs. Natural lighting was the reason behind asking for larger windows. Although the studio space does not lack large windows or artificial lighting, it seems that the materials blocking the edges of the windows make it very hard to benefit from the natural light. In addition, the double height of the ceiling and the types of florescent lighting used are not sufficient for the light beams to illuminate the whole space.

Social Aspect of the Design Studio

The students referred to a broad spectrum of emotions they have experienced during the time they have spent inside the design studio. Most of these emotions were tied to the phase of their study and their own progress, and that is applicable to most learning and teaching spaces. Stress was present mostly before reviews, excitement was associated with briefing, and with tutorials came reassuring. There is another layer to these emotions caused by the fact that students sit in the space for a long time, which gives them a sense of being a community. This resulted in some social interactions between the students. The feeling of peer pressure is at its peak when in the design studio. Students tend to go and work there at certain intervals in order to feel the pressure and the motivation to work, even though they block any other interaction through the use of headphones and computers. This dimension of privacy has been tackled on many occasions. Every student defined privacy differently in his or her drawing. For some, privacy involves having their own desk; for others, the studio should be isolated from other students or members of staff. The feeling of safety in being around other students made them progress and develop more. There are lots of emotions that the students reported feeling in the design studio, again associated with the stages of their design study, but other emotions were associated with the mental state of the students and their own restraints and limits that confine their emotions inside the design studio.

Conclusion

Many of the themes that emerged from the data showed what it is important to have in a design studio from the students' perspective. The actual case of Northumbria University was particularly interesting. The building where the design studios are located is also home to The Zone, which has comfortable seating, plotters and printers, a computer suite, and technical drawing and

modelling facilities; and on top of that it is open 24/7 and can be accessed only by students of architecture and the built environment. However, the students want all of these features to be available in their own design studio.

Asking for large windows was one of the key findings from the students' illustrations; most of them wanted a view of green spaces, and all thought of the natural lighting these windows would provide. Their request for proper acoustic design for the studios relates to the fact that the students are finding it difficult to concentrate and work properly, and they said that this is why they are using headphones. But in The Zone, where the space does not have such an issue, the students are still distracted compared to when they are using headphones. Therefore, while the poor acoustics might be a reason for the students' use of headphones, the fact is that students tend to prefer to be able to separate their mind and thought process from their physical surroundings.

The Findings Illustrated

Gathering the ideas of the students and the findings from the data would make more sense in an illustration form; the illustrations of students have been analysed and have been used as a design brief in order to come up with one drawing that represents the findings of the data. First, several identified activities and zones needed to be present in the collective design studio (Fig, 8): a centralized collaborative zone, individual private working stations, storage spaces, comfortable seats, kitchen facilities, and a workshop area. These were placed on a zoning diagram and attention was paid to the adjacency of the zones and the accessibility, centrality and the places that needed to be visible according to the students' illustrations. How heavily the zones will be used was identified in order to accommodate the highest number of private work stations units for such an activity to take place and to cater for as many students as possible.

The layouts of the design studios drawn by the students were mostly in rectangle form. There was more than one opening in each design studio layout, and the workstations were gathered in small groups (cubicles) but with an individual desk for each student. There were several openings with views of the outside area. A central focused meeting table was present in most of the drawings, which students described as either a collaborative space or a collaborative group study area. As a result, a sketch design of the openings, furniture and partitions was produced (Fig. 9).

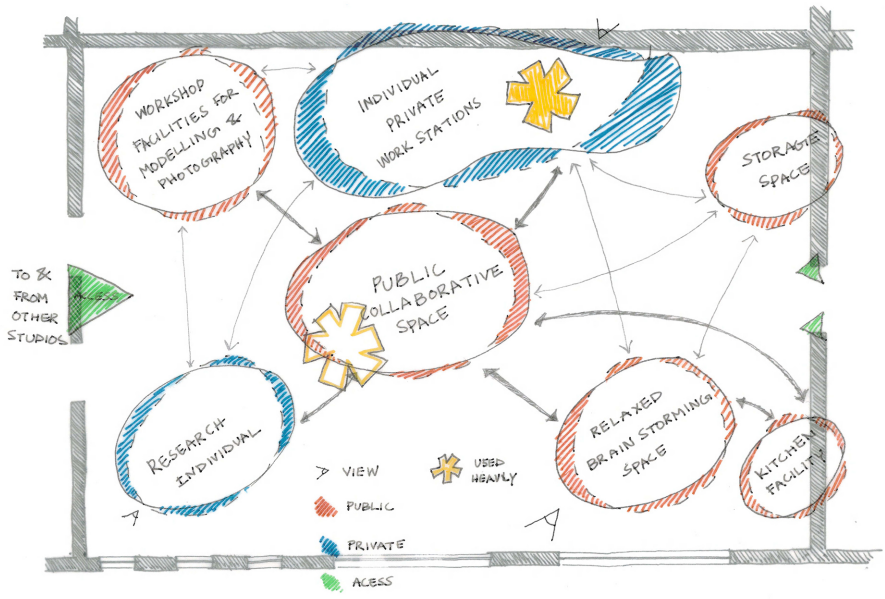

Figure 8
Zoning of the collective design studio

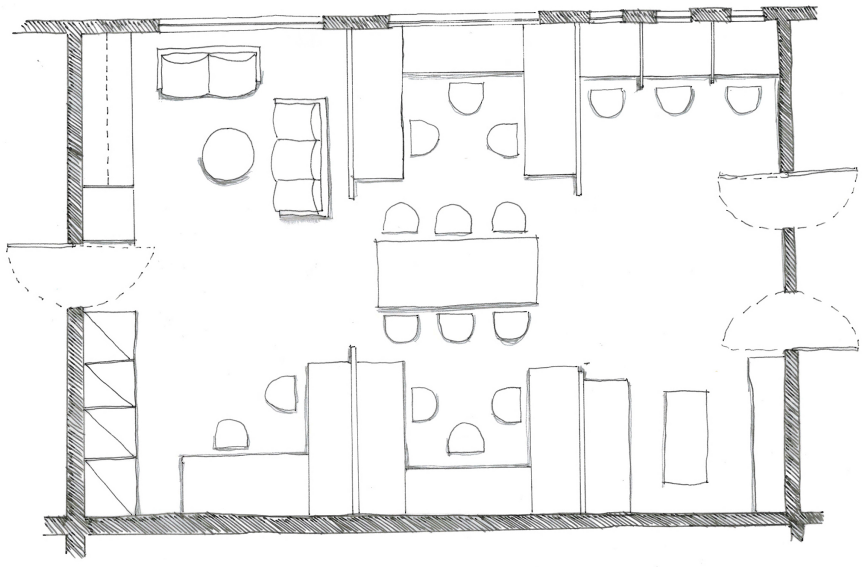

Figure 9
The collective design studio – Northumbria case study

Reflection

Reflecting on the data and their findings will begin by examining the design process stages, as each stage is associated with a particular spatial requirement. The students filled in the CJM, working chronologically according to the stage of the project and the activities that they were to perform, and their emotions at that particular stage or phase of the design. Then they started to associate their design with space and spatial requirements, where most of the pain points and touch points were identified. It might be how I structured the CJM or merely because the students' emotions were tied to how the space was not working as they wanted it to work, leading to frustration, yet surprisingly, the students felt very connected to the space. Even though in this case the university had provided them with The Zone, it simply could not take the place of the studio space. My design of the collective design studio is very similar in its zoning to that of The Zone, but The Zone lacks layers of familiarity, ownership and privacy. The familiarity of the spatial context of the design studio was based on students sharing the same project, tasks and emotions, even if there was minimal interaction at times of submission and reviews. The fact that other students are there doing the same thing takes the burden off students, which is the benefit of peer pressure, but with the added notion of "we are in the same boat".

There is a sense of ownership in the form of the students being able to work from the same desk every time, separating the workplace from home by having an actual space to store work and not having to carry it around. I believe that the students were looking for a place they could inhabit and make their own. A safe place, where they can perform their tasks without being judged by strangers. The safe place is very familiar in terms of its rules, because these rules would be put in place by the students populating this space.

When I asked the students to draw their ideas of the studio, many specified its 24/7 availability. I think that is alluding to the fact that the window of time that is made available by the university does not necessarily suit all the students. Some of them prefer working in the mornings around the other students and staff, while some of the students stated that their ideas and willingness to work could occur at different times of the day and are not limited to the 7 am to 10 pm timeframe. I think that creativity cannot be framed within a defined timeframe and that this timeframe shifts from one person to another depending on their ways of thinking, background and even personal preferences. However, it is very understandable that the university could not cater for such a broad spectrum of preferences. Perhaps with the huge inflation in student tuition fees, the university could be more sensitive in terms of accommodating the students' needs. This in turn would mitigate most of the students' disatisfaction regarding their working space.

Acknowledgment

I wish to thanks my supervisors Dr Krzysztof Nawratek, and Dr Tatjana Schneider for their continuous guidance and support. And I wish to thanks Northumbria University and the students of first year to enabling me carry out the case study.

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A nexus of social life, design research and technology

Space and investigation of its occupation

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Abstract. A conspicuous amount of social life takes place in public space. Designing those spaces presents a unique challenge due to the multiple dynamic factors interacting. Insights into the mechanisms of those interactions could yield useful information and possibly lead to imaginative conceptualizations in designing those spaces, but describing them could also be a challenging task–partially due to the conceptual effort required to grasp multiple dimensions of the mechanisms which lend materiality as well as life to those spaces. Explorations can be significantly aided by drawing upon facilitation of computing technology. In the current project, we partially illustrate such an exploration, conceptualizing behaviour as an effect of reinforcement.

Keywords. Technology; modelling; public space.

Introduction

One of the enduring problems of design is the problem of creating spaces for human inhabitation. In this instance, we take particular interest in public spaces which form part of the urban fabric. Within those spaces, humans do such things as walk, sit, hold conversation, perform tasks for which some of the spaces are designed specially and participate in planned collective celebrations. People, however, also carry out behaviours that can only be described as playful, spontaneous, unplanned or uncharted. Often, those behaviours take place in spaces designed primarily for other functions.

We do not oppose these *random* behaviours. Indeed, we believe that such ways of behaving lend vigour or vivacity and pleasure to life in the metropolis. The challenge for the designer of space is, however, escalated. It is likely impossible to fully know the vast range of behaviours possible in public spaces to be designed. A designer is favoured, however, by pursuing *richer* understanding of mechanisms which favour those spaces through exploration of models which describe them. Models exploring ontological and operational structure endow a designer with a perspective commanding greater penetration into phenomena which mass around the spaces of inhabitation which she is designing.

In the current paper, we present one such model. We present a case where technology (computation) offers a means of *describing* [this term used loosely, for now] and probing phenomenal and rational possibilities of occupation. The model is based on a premise that behaviour can be seen as a reinforcement-driven phenomenon.

A view of description. We make a note of Runciman's (in McLennan, 2002) articulation of the enterprise of social science, that it entails "an effort to identify the crucial antecedent(s) that bring about a social event" (p. 635). In the vital project of bringing social-scientific data to the service of design, we have to engage in the assiduous process of identifying crucial antecedents which bring about behaviours in space. Drawing on Simmel, McLennan reminds us that, while we need "major social formations" of society to provide us with a picture of social life, we also need "interspersed effects of countless minor syntheses"–including such things as "interchanges amongst people"–the latter being a call to grow "an account...of the innumerable 'tissues' of the social body" (pp. 637-638). Design researchers' efforts to articulate constitutive elements of social-behaviour are efforts directed at rendering accounts of the tissues of the social body.

It ought to be noted that, in Runciman's model, description is essentially deeper than explanation. The former is particular to situation, post-explanatory and, as such, meta-explanation (See McLennan, 2002).

A word of caution is imperative for the reader. In the *science* of social science, perfection in isolation of factors and their interactions (particularly, when articulated as causal) is, sensibly, not to be promised. Regardless of one's epistemological stance or articulation of it (explanation as elucidation; explanation as a statement of causal relationships; description as "deeper," closer to the particulars of social life; etc.), "ideal types" (abstractions) have to be employed in fulfilling the project (of explanation or description–or additional projects, such as reportage and evaluation) and so outcomes, though rigorously driven towards validity and authenticity, could be described in a way as "creative" or "fictional." There is to be promised, no "isomorphic resemblance between account and phenomenon" (McLennan, 2002, p. 642). The foregoing does not render our strictly-delineated projects useless or ineffective. As just noted above, rigorous drive towards ideals such as validity and authenticity remains and, as such, models exhibiting those procedural and intentional efforts are generally useful. A well-held point of view is that it might suffice that social theories are "weak but adequate" (p. 636). [For a more elaborate reading of this section, see McLennan, 2002.]

Thick description as archetype. Designers of spaces inhabited by humans have a treasure trove of immensely useful reference resources containing data surrounding anthropological and space utility needs. (Two well-recognized examples: Neufert, 2012; Watson & Crosbie, 2005 [*Time-saver standards* is a multi-subject, multi-volume set].) An intractable challenge that designers of such spaces will always face is the challenge of behavioural data. Humans occupying space engage in actions and, given that there is arguably an uncountable number of actions, additional data which can assist designers in shaping their solutions cannot but help. "Behaviour must be attended to," wrote anthropologist, Geertz (1973), "because it is through the flow of behaviour–or, more

precisely, social action–that cultural forms find articulation" (p. 17). [*We may consider designed human-occupied spaces as "cultural forms." Visual ethnography supports this: Among its various applications, it includes investigation of "spatial aspects of behaviour and interaction" (Kharel, 2015, p. 148). Also see, of interest, Bray's (2015) homogenization of anthropology, painting (a visual practice as is, in part, design of space) and "thick description."*]

As anthropologists (as well as sociologists and psychologists) have suggested to us, behaviour is underpinned by mechanisms which it will benefit us to possess a grasp of to some extent. Aspiring towards that state of *being-informed* involves a "thicker" form of description of phenomena. *Thick description*, simply sketched by Curtin and Fossey (2007), "involves providing a detailed description of the context and circumstances surrounding the phenomena being studied" (p. 88). In its more replete embodiment, it signifies more. Clifford Geertz (1973), exponent of thick description, described the practice of it in anthropology as a probing into "a multiplicity of complex conceptual structures, many of them superimposed upon or knotted into one another [even if] at once strange, irregular, and inexplicit" (p. 9). Thick description calls for, beyond cursory or thin outlines, interrogations of underlying structures of phenomena and/or mechanisms involved.

It might be possible that thick description uniquely affords insight into phenomena of interest. Presenting processes and outcome of a study he conducted, Scheff (1986) argued that data (recordings, in the particular instance) coupled with availability of rigorous description (previous authors' "very extensive description and analysis" [p. 409]) afforded a distinctively deeper engagement of the phenomenon being examined when it came time for him to investigate it. Based on Scheff's observation of his own "state" after a rigorous analysis, it might be possible to tender the argument that thick description offers the possibility of a more far-reaching, perhaps even profound, understanding of a phenomenon. We quote Scheff: "After finishing my reanalysis...I felt that I understood the interactants better than they did themselves" (p. 409).

In doing thick description, one must prepare, to quote Geertz (1973), for "analysis [which] penetrates into the very body of the object" (p. 15). Penetration involves peeling open layers of the "tissue" of the phenomenon–identifying its units and learning about its constitutive biology and chemistry, so to speak. As researchers all, a resolute sense of detail about our preoccupations is encapsulated in Geertz's (1973) allusion to "exceedingly extended acquaintances with extremely small matters" (p. 21). Acquaintance can be both corporeal and cognitive (perceptive). In both cases, we become better informed about the phenomenon in which we have bedded interest.

When "description" is embedded in a more expansive model of "explanation". We have introduced explanation and description in foregoing discussions as two ideals, but highly interconnected. For Runciman, as stated above, description is post-explanatory (See McLennan, 2002). For others, "description is expla-

nation" (Marr, on Catania, in Marr, 2003, p. 183; also see Tonneau, 2008 for a discussion of convergence of explanation and description). Marr, moreover, went on to argue that Ernst Mach's use of *description* "corresponds to what even today in most sciences would be called explanation" (p. 191).

In Walsh's (2015) articulation, the particularistic, grounding role of description can be discovered within the elucidative function/dimension of explanation. Explanation, observed Walsh (2015), serves two functions, one metaphysical, the other cognitive. Ultimately, it is the cognitive function which more directly enhances our understanding. In order for that cognitive function to be served, however, the metaphysical plays a grounding role. The latter identifies "a set of conditions in the world" (Walsh, 2015, p. 471) which serve as essential "explanans conditions." Wrote Walsh:

[Inset} "This dual role of explanation is brought nicely into focus in an intuitively appealing, and increasingly prominent, recent account of explanation–the new mechanism. According to this revived version of mechanism, *to explain the occurrence of a phenomenon we must identify the mechanism that caused it* [emphasis added]." (p. 471)

These mechanisms indicate/render "change-relating invariances" (consistent, observable co-variations) between themselves and their [presumed] effects–or provide a rendering of their constituent elements. With identifications in hand, the cognitive dimension of explanation can be carried out as a description which renders an "elucidative relation between ...explanans ["the invariance relation"] and...explanandum" (Machamer in Walsh, 2015, p. 472).

The lessons in the foregoing are clear. Regardless of what information we currently have, phenomena tend to be more complex than they appear. We must make continued effort to identify antecedents (of behaviour in space), we must continue to grow an account of "innumerable 'tissues' of the social body" (see above), we must continue to attempt to discover "effects of countless minor syntheses" of phenomena (see above), we must understand that it is through behavioral flows/social action that cultural forms (e.g. space) find articulation (Geertz, 1973). We learn anew from describing "thickly," from pursuing the elucidative benefit of probing phenomena. When a theorist and a designer have insight into the nature of emergent encounters in space, their practice in programming of space is augmented.

Our current explorations are symbolic of a laborious trek through the "vastlands" of concept/construct esses, the kind of journey of identification of mechanisms which might describe any phenomenon, but more crucially, complex, intricate, tangled or elaborate ones. It should be critically noted that our search for description, at this stage, is not yet in the cognitive state, but in the state of identification of potential constitutive mechanisms–an operation, if you will, in its metaphysical state.

Behaviour and reinforcement. Elsewhere, we have described two mathematical forms of the reinforcement-response model (Stephen, 2016): Herrnstein's

matching law and Killeen's mathematical principles of reinforcement (MPR). Both models are presented, respectively, as follows:

(1) B = kR / (R + Re)

(2) B = (ζ*R) / (δR+1/a)

In equation 1, *B* is observed behaviour or response, *R* is known reinforcement, *Re* represents all other forms of reinforcement not captured by measurement system used and *k* is an estimate which serves as indicator of sum of all on-task and off-task behaviours (see Reed & Kaplan, 2011). In equation 2, "*a*" is specific activation, ζ is coupling coefficient and δ represents a temporal constraint (see below).

Killeen's (1994) MPR introduced three principles into modeling reinforcement: specific activation (a) indicates number of responses of duration δ supported by a particular incentive, δ is "time required to complete a response" (Killeen & Sitomer, 2003, p. 54) and coupling represents establishment in memory of a connection between behaviour and incentive (Killeen, 1994; Killeen & Sitomer, 2003).

Elsewhere we have displayed plots which show potential behaviour in public space to follow the classic form of these models: a hyperbola tending towards an asymptote, k, the ceiling of response/behaviour (see Stephen, 2017).

Given limited space and shunning redundancy, we do not present past details of our working model here. The interested reader is directed to see Stephen (2016 & 2017b). Simply, we note the following: We have employed a variable-interval model and employed the MPR model in constructing and optimizing an equation for behaviour. In Stephen (2017), behaviours we explored include reading, dancing and skateboarding. In order to contain exploration, the current paper advances with only the *reading* exploration. We have employed the same conditions/constraints in the current paper: we used arousal indicator, A, in calculating activation (a); re-specified temporal constraint (δ), used re-specified δ in deriving particular coupling (C*); and generated a new VI schedule with delimited time-space at period of one day. Details may be found in the noted reference.

In the current case, we take the investigation further. We present an exploration of human occupation of public space using agent-based modelling. Agents (or context) are invested with dynamic and mathematical parameters which enable the former to simulate human behaviour. The behavioural frame is–as might be said of real life–characterized by multivariateness and stochasticity and that renders it challenging for the human mind to monitor independently. Technology (mathematics, computation) brought to service of research extends the human mind in exploration of such creative problems.

Methods: The current model

Using *Netlogo* (Netlogo, n.d.; Railsback & Grimm, 2012), we set up a modelling world. Space does not permit extensive details. We modelled on such

conditions as block size; patch size; piazze density on a random gamma distribution; population density; agent assignment to schedule; reinforcement form; weighting of reinforcement types (unitary parameter distributed on the 6th root); etc.

For current purposes, it is sufficient to know that reinforcement *types* (see Stephen, 2016) employed are as follows: Explicit reinforcement (plain acknowledgement); absence of reproval; agency in autonomy-granting society; vicarious reinforcement; self-evaluative processes; and associative reinforcement.

Composites of these reinforcement types used are interpreted as follows: r_U_1 is an indicator which marks agent in full response capacity, r_U_3 is immediate post-response capacity (some reinforcement value has been depleted) and r_U_2 is a pre-full capacity state, where agent has begun to recover its capacity towards full response.

Three metaphysical indications / identifications

Behavioural and social scientific information render, for the designer, useful insights into the problem at hand. As has been argued previously, the environment of public space is deep, layered and complicated; it is *thick*. It is exceedingly difficult for the unaided human mind to unravel all the intricacies of active public space. It is at this point that convergence of design research, social life and technology offers a key. Design research, employing technology, can facilitate richer insights into behavioural or social mechanisms.

In the next few pages, we present instances of such an exploration framed within the context of the reinforcement-behaviour model. The reader should be reminded that these exemplifications are fit to certain parameters (the weak sense of the word) for which they were run. A different set of circumstances would take different parameters and would likely yield different outcomes.

Some of the conditions for the exemplifications arrayed in this section are as follows: density of 1600 people per sq. ml.; 13 targeted agents; multiple simulated 1-day model runs (22.4hrs.) ; baseline structure of 13 variable-interval schedules, based on past data on reading in public space; random movements of agents across the model world; piazze/parks allowed to overlap streets; continuous movement all model-day; agent response at any point-in-place (rather than exclusively in piazze or streets); response allowed more than once a day.

The reader should be advised that there will be no theoretical assertions at the end of the data below. For that to be a sensible consideration, it is essential to have amassed a large amount of data. These explorations here are in their early stages. What we set forth are exemplifications.

Meeting other people

What is comparative likelihood of people meeting in twos, threes, fours, etc.? We are able to explore the chances targeted agents (or groups) are likely to come in close contact with another person. This has central implication when considering *manifest reinforcement* as inducement for behaviour.

Table 1, for instance, shows some data from five runs over a single day with 13 targeted agents in a 1600 people-per-square-mile environment.

	Number of agents in close contact				
	1 (just self)	2	3	4	5
Run 1	Trial run only				
Run 2	93.63 (0.93629)	6.14 (0.06142)	0.22 (0.00224)	0.005 (4.86375E-05)	0
Run 3	93.98 (0.93982)	5.84 (0.05842)	0.17 (0.00171)	0.005 (4.86375E-05)	0
Run 4	93.96 (0.93964)	5.85 (0.05849)	0.19 (0.00185)	0.003 (2.47956E-05)	0
Run 5	93.83 (0.93831)	5.99 (0.05993)	0.17 (0.00171)	0.005 (4.95912E-05)	0
Run 6	93.96 (0.93961)	5.83 (0.05830)	0.20 (0.00202)	0.007 (7.43867E-05)	0

Table 1
Proportion of occasions (%) targeted agents (or groups) may be found to be in close contact with any other agent

The model plot below (figure 1) shows count of encounters in time.

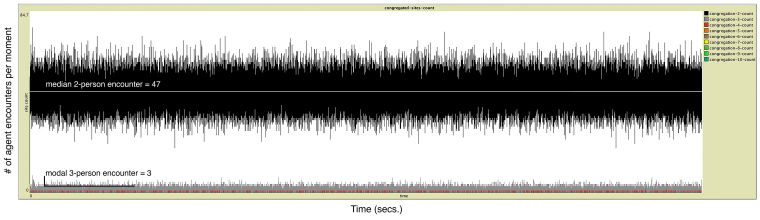

Figure 1
Encounters in time

Moreover, we are able to explore how frequently targeted agents are likely to come into close contact with other targeted agents, as seen in Table 2. All of these inform us about the dynamics of interaction among people in the city. Chances of encounter are not only useful for working out space needs, they are also useful for planning events which involve interaction among people.

	Number of agents interacting			
	1	2	3	
Run 2	0.99476	0.00525	0	99.48% of time, a targeted agent does not encounter other targeted agents
Run 3	0.99975	0.00025	0	99.98% of time, a targeted agent does not encounter other targeted agents
Run 4	0.99969	0.00031	0	99.97% of time, a targeted agent does not encounter other targeted agents
Run 5	0.99950	0.00050	0	99.95% of time, a targeted agent does not encounter other targeted agents
Run 6	0.99972	0.00028	0	99.97% of time, a targeted agent does not encounter other targeted agents

Table 2
Proportion of occasions (%) targeted agents (or groups) may be found to be in close contact with other targeted agents

Which piazze did a targeted agent visit? Which targeted agents visited the same

piazza? How many agents end up visiting the same piazza in one day?

It is possible for us to examine all these types of data. Figure 2 below displays a chart with such data.

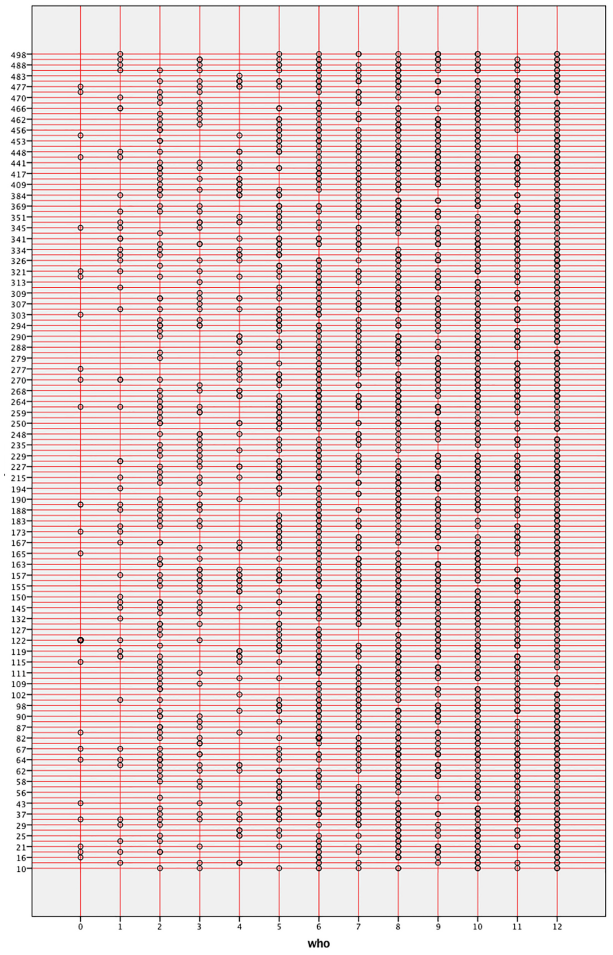

Figure 2
Piazza visitation by targeted agents

One could also derive auxiliary data such as these: Which piazze were most visited? Was there a piazza never occupied? Such data are obviously valuable for design of spaces (e.g. space needs, designing for experience).

Distance of encounter

The model, under its conditions, suggested that if the threshold of recognition of approbation (*explicit reinforcement*) by another person/agent (for convenience, let us call it *distance-of-encounter/contact* [*d.o.e.*]) were varied between a distance of immediate physical contact (say, soft speech distance; call it *zero-point*) and greater (we have illustrated about 33ft. below), a shift occurs in

chances of response from barely-occurrent (the former) to near-assured (the latter). This condition held through four separate runs with varying *d.o.e.*s. We illustrate all this in the plot comparison below (figures 3 and 4). The ordinate represents responses across agents. Remember that r_U_1 represents a committed state of response and r_U_3 is immediate post-response capacity– which means some reinforcement value has been depleted. The key indicator for comparison in both plots is r_U_1 (red line). It has to be interpreted in context of *d.o.e*. When *d.o.e.* is significantly restrictive (zero-point condition for explicit reinforcement to be effective), response is minimal (figure 3). When the condition of d.o.e. is relaxed, response picks up (figure 4).

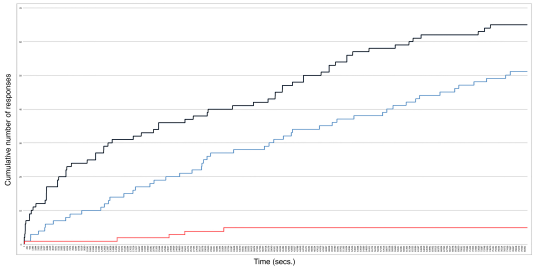

Figure 3
Cumulative increase in response among 10 agents over period of 1 day (density = 1,600 people per sq. ml.). Response activity is indicated by red line. Distance = zero-point.

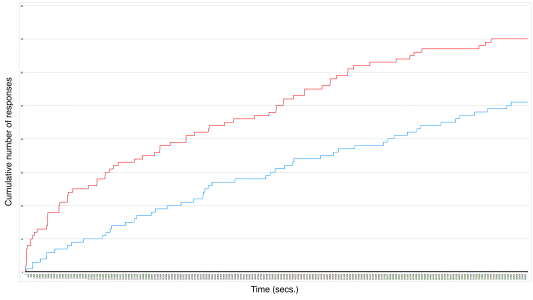

Figure 4
Cumulative increase in response among 10 agents over period of 1 day (density = 1,600 people per sq. ml.). Response activity is indicated by red line. Distance = 33 ft.

Conclusion

We have illustrated potential benefits of technology in conducting design research about human behavior. Research illuminates structures of phenomena to an extent that access to further understanding of the phenomena is yielded, more revolutionary conceptualizations of potential configurations of said phenomena are triggered or initiated, fluency in working with or shaping the phenomena is augmented and human interaction with the phenomena is generally enhanced. Essentially, research provides a necessary discipline through institution of structure, problem reconfiguration and bestowal of a functional level

of virtuosity with which one could manage design problems. Research is a metaphorical key which unlocks the doors of capability and discovery. In the current paper, we have presented a case where technology has served as a tool for richer description of certain phenomenal and rational possibilities of space occupation. Designers cannot assume that they already possess every bit of knowledge/insight into a design problem simply because instances of designing for such problems have occurred in the past. An attitude of satiated repose, which assumes there is no more to learn, demonstrates complacency and is short-sighted. Phenomena are often more complicated than they appear to be. Computation is a technological intervention which can suggest, for those who are not smug, new pathways for development of the design problem.

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The problem of categorization in design research

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Abstract. This paper problematizes the issue of "categorization" in design research by studying two categorizations that are proposed by Christopher Frayling (1993) and Nigel Cross (1999). While Frayling offers a tripartite division of research in art and design as for, into and through; Cross defines the goal of research as knowledge, and proposes that design knowledge resides in people, processes and products, which correspond to three design knowledge domains: design epistemology, design praxeology and design phenomenology. The common denominator for these two classifications is their assumption that design disciplines should establish their own research traditions that differ from the particular type of research that is mainly associated with "science". This study will argue that while aiming at advancing different positions within the design field, these categorizations result in delimiting the perspectives about the nature and purpose of design research. This paper will question the "impact" of these categorizations within the design field and will try to find out if design research needs yet another "categorization" or a new position that can open up new directions in design research could be proposed.

Keywords. Design research; categorization; cognitive science.

"We categorize events, actions, emotions, spatial relationships, social relationships, and abstract entities of an enormous range: governments, illnesses, and entities in both scientific and folk theories, like electrons and colds. Any adequate account of human thought must provide an accurate theory for all our categories, both concrete and abstract." (Lakoff 1987)

This study problematizes the issue of "categorization" in design research by studying two categorizations that were proposed by Christopher Frayling in 1993, and Nigel Cross in 1999 in light of the recent reconceptualizations of the "categorization" in cognitive science. (Rosch and Lloyd 1978; Lakoff 1987; Bowker and Star 2008) It is the claim of this paper that recognizing the notion of "categorization" as a field of study by itself might offer a new perspective to design research. Since categorizations are inherent to our thinking, we tend to conceive them as natural and neutral, rather than as constructed entities. It is the assumption of this paper that although seemingly invisible, these categorizations direct researchers about how design research should be executed while remaining unquestioned.

"Categorization" is of interest here because it is very much concerned with human cognition like design. As George Lakoff states, "[t]here is nothing more basic than categorization to our thought, perception, action, and speech" (Lakoff 1987) and "to change the very concept of a category is to change not only our concept of the mind, but also our understanding of the world." (ibid.)

Therefore a discussion of any concept that is concerned with human thought is relevant to an inquiry of design research.

This paper tries to answer the question whether these categorizations result in plurality in research types, research outcomes etc., or they result in delimiting the perspectives about the nature and purpose of design research. The "impact" of these categorizations within the design field will be questioned in order to find out if design research needs yet another "categorization" or a new position that can open up new directions in which design research could be proposed.

Prototype Theory: A New Understanding of Categories

In this paper, I will refer to two kinds of theory on "categorization": the first one is the traditional view, which holds the idea that categories are only defined by "common properties" of their members. (Lakoff 1987) The second one is the "prototype theory" -as termed by Eleanor Rosch- that has recently replaced the traditional view. This new theory suggests, that "categorization is based on principles that extend far beyond those envisioned in the classical theory."(ibid.) Rosch basically claims that "categories" are not invisible, neutral, objective cognitive tools but rather they are socially, culturally, historically situated devices that direct our understanding of the world. (Rosch and Lloyd 1978) Prior to the work of Rosch, the complexities of the way people really categorize were largely unknown.

Rosch proposes two basic principles for the formation of categories: "cognitive economy" and "perceived world structure." (Rosch and Lloyd 1978) Cognitive economy refers to using one's cognitive sources economically that helps "to gain from one's categories [] a great deal of information about the environment while conserving finite resources as much as possible."(ibid.) These two principles combined suggest that, "maximum information with least cognitive effort is achieved if categories map the perceived world structure as closely as possible." (ibid.) Therefore it can be claimed that categorization serves as a cognitive mechanism that "simplifies" the experience of the individual about the world.

The Boundary issue in Categorization

Cognitive economy also "dictates that categories tend to be viewed as being as separate from each other and as clear-cut as possible." (ibid.) A way to "achieve separateness and clarity of actually continuous categories is by conceiving of each category in terms of its clear cases rather than its boundaries."(ibid.) "Boundary" is an important concept to understand "categories". Wittgenstein is the first philosopher to problematize the boundary issue in "categorizations" and as Rosch claims, according to him "categorical judgments become a problem only if one is concerned with boundaries." (ibid.)

"For how is the concept of a game bounded? What still counts as a game, and what no longer does? Can you say where the boundaries are? No. You

can draw some, for there are [not] any drawn yet. (But this never bothered you before when you used the word 'game'.)" (Wittgenstein 1953)

As Bowker and Star state, "[c]ategories and their boundaries are centrally important in science, and scientists are especially good at documenting and publicly arguing about the boundaries of categories." (Bowker and Star 2008) They regard "science" as "a good place to understand more about membership in communities." (ibid.) According to Bowker and Star, "scientists routinely cooperate across many communities of practice, they [] bring different naturalized categories with them into these partnerships." (ibid.) So, if categorizations in design research occurred as a result of aspiration to the established structure of scientific research or method, questioning the boundaries could be a better approach that can be borrowed from science. Because contrary to what offered in categorizations of design research, "categories do not have clear-cut boundaries." (Rosch and Lloyd 1978) If we want to achieve interdisciplinarity in design research we should be searching for it at the boundaries or intersections of these categories rather than the categories themselves. As Bowker and Star claim, "[t]he creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting communities." (Bowker and Star 2008)

Cross's and Frayling's Categorizations

The common denominator for these two classifications is their assumption that design disciplines should establish their own research traditions that differ from the the particular type of research that is mainly associated with "science". Therefore, both Frayling and Cross take the complicated relationship between science and design as their starting point. (Cross 2001; Frayling 1993) Frayling opposes the belief that artists and designers belong to the "expressive tradition" and researchers and scientists belong to the "cognitive tradition" and uses some stereotypes of artists, scientists and designers from movies, novels and real-life to prove his argument. According to Frayling, science and design are not very distinct from each other to an extent that "[d]oing science is much more like doing design." (Frayling 1993) Frayling introduces three categories of art and design research as research into, for and through art and design.(ibid.) For Frayling, research into art and design is the "most straightforward" and "by far the most common" one among the three types: it refers to "research into a variety of theoretical positions in art and design" such as social, economic, political, ethical, cultural etc. Research "for" art and design is "the thorny one" because it is the type of research where the end product is an artefact. For the third type, research "through" art and design, Frayling gives "materials research", "development work" and "action research" as examples.(ibid.)

Cross, on the other hand, analyzes the history of design research and claims that the relationship between science and design has not always been the same and identifies three periods when a change occurred in the relationship between

them that results in a shift in design research. Cross's categorization is more complicated than Frayling's because it is multilayered: first he defines the goal of research as knowledge and proposes that there are three types of knowledge which are found in people, processes and products and these three knowledge types also correspond to the three design knowledge domains: design epistemology, design praxeology and design phenomenology. He also finds these three different types of research in three periods in the history of design research. First period starts in the 1920s with efforts to "scientise" design, when researches and designers focus on the "study of the form and configuration of artefacts". In the 1960s, which is identified as "design science decade" by Buckminster Fuller, there has been change in designers' comprehension of science as they turn to the study of the "practices and processes of design". Inferring from this pattern, Cross proposes that there will be another shift in the 2000s to study of "designerly ways of knowing". (Cross 2001)

In analyzing these categorizations, I will first identify what they include or exclude according to the criteria they are based on. I will question the basis for their categorizations, then try to detect who uses these categorizations; are they still in use or not and what are their impacts to the field of design research?

Frayling does not offer a clear statement for the criteria of his categorization, however, as Wolfgang Jonas claims, the categorization "for, about, through" is essential for a "genuine designerly research paradigm"; because it "does not distinguish as to subject matter or an assumed categorization of the 'real world' as in other disciplines, but according to purpose, intentionality and attitude towards subject matters." (Jonas 2015) Cross's categorization, on the other hand, is simply based on the changing relationship between science and design from 1920s to 2000s.

It is not very easy to understand the "impact" of Cross's categorization because it is a periodization at the same time. The "time" of the two categories have been passed already and the new one just begins to emerge. Frayling, on the other hand, offers a provisional categorization, or to put it in another words, he tries to identify the current situation of design research at the time of writing. His only proposition for the future is "research for art, craft and design needs a great deal of further research." (Frayling 1993)

One way to understand how such categorizations are used in the field of design research is to look at the mediums, such as journals, where the research is spread. Since academic journals are indexed by various databases according to their respective subject matters and ranked by their "impact" factors, journals could be a convenient medium to evaluate whether these categorizations have an impact on design research or not. It is compelling to note that Frayling also justifies his categorization according to an index of research in art and design. He makes use of "Allison index of research in art and design as well as CNAA documents of the 1980s and early 1990s plus [his] own experience at the Royal College of Art." (Frayling 1993) However in that index, there are in fact seven categories and it is not clear how Frayling constructs his three categories out

of these seven categories and in addition to that he only uses the number of articles in a category to prove his point; he gives no explanation about the content.

I will use Web of Science database which is divided into three indexes as Science Citation Index Expanded, Arts and Humanities Citation Index and and Social Sciences Citation Index. However, impact factors are not calculated for journals covered solely in Arts and Humanities Citation Index, since in the Arts and Humanities, citation analysis plays a very minor role in evaluation. Most of the design journals are indexed in that category, so I will not focus on the impact factor of journals; rather through an analysis of the aims and scopes of design journals in this index, I will try to show whether or not Frayling's categorization is still valid for the field of design research.

One of the most influential journals of the field, "Design Issues" examines design history, theory, and criticism, and "provokes inquiry into the cultural and intellectual issues surrounding design". I think the content of the journal corresponds to what Frayling categorizes as "research into art and design". "Design Studies" on the other hand, focuses on "design activity across all domains of application, including engineering and product design, architectural and urban design, computer artefacts and systems design." I consider the scope of this journal as a part of what Frayling categorizes as "research through art and design". However, many journals encourage a type of research that is not limited to the knowledge produced in the design field and that cannot be found in any of Frayling's categories. For instance, the journal "Design and Culture" "probes design's relation to other academic disciplines, including marketing, management, cultural studies, anthropology, material culture, geography, visual culture and political economy." Similarly, another journal "Design Science" aims "to facilitate communication across diverse fields and serve as a bridge across several communities, publishing original research but with a strong emphasis on accessibility by scholars from a diversity of disciplines." While some of the journals still follow Frayling's framework, the scopes of an increasing number of journals do not really fit well to any of Frayling's categorizations or in other words, they fit into more than one of them.

Other Categorizations in Design Research

Although this paper only focuses on Frayling's and Cross's categorizations; they are not alone in offering categorizations for design research. In order to show how dominant these are in design research, I will refer to some of the most influential ones. Bruce Archer first lists ten areas of design research, from which "constituent sub-disciplines" emerge: design phenomenology, design praxeology, and design philosophy. (Archer 1995) In 2005, Alain Findeli offers a separation of design research into esthetics, logic, and ethics. I will not explain them in depth but for the scope of this paper it is important to recognize that they all use "categorizations" to state their viewpoints regarding the design

research. (Findeli and Bousbaci 2005)

These categorizations bear some differences, however their resemblances are much more obvious; for instance, Findeli's categorization as esthetics, logic, and ethics correspond to Cross's knowledge types that are found in people, process and products. Findeli, together with Bousbaci, claim that "the material object or product has long been the main focus of the [design] theories, all the way up to the middle of the twentieth century". (Findeli and Bousbaci 2005) After the Second World War, "design theories mainly focus upstream on the design process" and "much more recently, the focus has turned to the actors of the design process or the experiences of the user as a 'whole' human being". (ibid.) As Findeli, and Bousbaci argue "[t]hese shifts correspond to a displacement of the centre of the interest respectively from the aesthetic to the logical, to the ethical fields of philosophy". (ibid.) It could be claimed that these models are just different wordings for the same three categories that have remained unchanged for at least the last three decades. There are two possible implications regarding this situation; first, there has been no change in design research, or second these categorizations are not sufficient enough to respond to the changes in design research.

Conclusion

Categorizations in design research lately changed in form from verbal representations to graphic ones in which different categories are shown with different colors or shapes and the relations between them are indicated with arrows. They might change in appearance; but not in essence. Another immutable approach is the comprehension of design research as a distinct activity from the "scientific research"; "today's mainstream design discourse still rests on this dualism between science and design". (Grand and Jonas 2012) Neri Oxman,on the other hand, in her recent inquiry about the relationship between four domains of creative exploration "science, engineering, design and art", claims that although the research methods, outcomes or types of knowledge that is aimed to achieve differ in these four domains, when knowledge is produced in one of these fields, it is also utilized by the other fields.

"Science produces knowledge that is used by engineers. Engineering produces utility that is used by designers. Designers produce changes in behavior that are perceived by artists. Art produces new perceptions of the world, thereby granting access to new information in and about it, and inspiring new scientific inquiry." (Oxman 2016)

New categorizations are still emerging in the design research field, and also newly published books are organized in accordance with them. That is why it is essential to try to understand the reason behind the need to create categorizations. Søren Kjørup claims that we need categorizations for cultural terms like research, art or science; because it is impossible to give satisfying descriptive definitions to them. They are "too diverse to fit into standard descriptive defini-

tions enumerating necessary and sufficient conditions." (Kjørup 2001) Science is divided into categories, knowledge, research they are all defined usually by not only one but a combination of superordinate or subordinate categorizations, since "we reason not just about individual things or people but about categories of things and people." (Lakoff 1987)

Frayling, Cross and other researchers who offer categorizations for design research also do it on the basis that design research is a complex and rich field that cannot be limited to one definition, one subject, one methodology etc. However, to categorize is not a sufficient way to emphasize that diversity, because categorizations are usually functioned to emphasize the similarities between entities rather than their differences. As stated earlier, the aim of categorization is to reduce the infinite differences among stimuli to behaviorally and cognitively usable proportions. Basically, they are simplification tools that are designed to work for the organism's advantage. (Rosch and Lloyd 1978)

As Rosch claims when an entity is placed under a category, differentiations become irrelevant. (ibid.) "The task of category systems is to provide maximum information with the least cognitive effort." (ibid.) By finding patterns in categories, human beings expect that the new concepts they will encounter later to fit into those formerly established categories. Therefore, categorizations inevitably inhibit us to envision beyond them. As Ranulph Glanville proposes "[w]hen we find information that does not fit to the pattern we recognize it as error." (Glanville 1999). As a consequence, the categorization approach delimits the perspectives about design research that has the potential to become much richer and fruitful than that. Categorizations with their emphasis on boundaries obstructs the fluid, cyclic flow of knowledge. We should not ignore the fact that "a single individual or project can reside in multiple dominions." (Oxman 2016)

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Playful impact? Co-design as spatial discourse

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Abstract. The practice-based research project "Move the Neighbourhood! - with Children" is themed around children's use of public space and developed and constructed through a collaborative design process. Through co-designing, building and assessing a public site in a local community, the aim is to examine if and how co-designing urban sites in collaboration with children and a related stakeholder network, can contribute to better locally integrated playful outdoor spaces. We are exploring if the process has an impact on the neighbourhood in two ways: through the actual on site intervention development with the children, as well as on the local planning process. In this paper, we present the setup and discuss the role of the co-design project as a site-defining place-making strategy in relation to these two perspectives, based on the projects first steps of negotiations and interactions. We address the children's engagement with and understanding of the site, as well as the role of the project seen in the light of emerging development plans for the area, thus discussing the notion of 'impact' in relation to spatial design, participation and decision making.
Keywords. Co-design; public space; urban development; site understanding; design intervention.

Research design, stakeholders and context

The participatory process in 'Move the Neighbourhood! - with Children', consist of two parallel sub-projects, where designers/researchers collaborate with local children through a number of co-design methods, to design and hence build urban installations in two public green spaces. One design process took place at the local public school and included two 5th grade classes (age 11-12). The process was incorporated into their weekly craft and design class from January to May 2017. The site we worked with was a public green area bordering the schoolyard. The second design process involved a local after school club with children age 10-13, during August 2017 and the installations were built in the park adjacent to the youth club and local culture house. The co-design methods included mapping, collaging, model making, various prototyping tools and finally the actual construction. In both areas implementing the interventions as 1:1 full scale urban installations happened in collaboration between children, teachers, designers/researchers, volunteers and experienced builders. In this paper, we focus on the first sub-project conducted together with the school in the adjacent green public space and the initial phase of process and site investigation.

"Move the Neighbourhood!" is a collaboration between three Danish research institutions and a municipal areal renewal initiative in Copenhagen, Denmark. Reflecting the setup of research institutions, organisations and

across disciplines, the research project applies both quantitative and qualitative assessment methods and interpretative approaches that examine both the process and the outcome in the form of design interventions, from various angles. This combined technique offers a unique opportunity to understand public space, the making and the use of it from multiple objectives (for overall research design, see Pawlowski et al., 2017). Our sub-research team negotiates agreements, conducts the co-design process and facilitates the full scale built implementations, as well as the hand over of the installations to the local stakeholders and transfer of knowledge to the local planning authority.

The qualitative part of the research project has multiple approaches. We explore both the co-design methods and processes, as well as how the interventions affect and interact with the neighbourhood in different ways in a realisation that also the process (visible on site) renders the communal understanding of how the site is becoming a place. We investigate the actual intervention development with the children and their use of the interventions. We also research the broader scale by looking at if and how the project influence local planning and policy by following the development before, during and post-intervention. Furthermore, our partner university executes before and after assessments through GPS tracking and SOPARC observations (System for Observing Play and Recreation in Communities) to monitor and evaluate the use of the green spaces in question.

The qualitative approaches are highly inclusive through involving and adapting the multiple local voices into its researchable repertoire, defining site and project. Here we consider the site as something that emerges by increasingly becoming a defined field of action and mutual narrative (e.g. Burns & Kahn 2005).

The different approaches interact with and respond to the complexities and natural 'disturbances' that the context provides. In the qualitative research approach the site, the co-design process and the intervention outcomes along with the following use is our laboratory, but so is the contextual situation of the site through the many different stakeholders, local agendas, planning authorities and architectural setting that emerges when processes are set in motion. Hence, the approach draws on the potentials of recognizing design of urban landscapes as being part of multiple contextual socio-material practices (Tonkiss, 2013) that together shape the environment. To follow these developments the research team is in ongoing dialogue with the Area Renewal, with other stakeholders and take part in local project-related working groups.

Co-designing spaces with the children is the primary objective in the research project. However, when working in a real life situation, the social and physical environment with its multitude of cultures and stakeholders influences the design process and outcome significantly. These contextual conditions become a significant part of the co-design process. The research project is navigating these while creating stewardship for the children's voice into the planning process. We will unfold some of the contextual complexities, which have

emerged that are influencing the co-design process as well as the transfer of ideas into future visions about the site and neighbourhood. We will display early phases of the co-design process, the contextual conditions and reflections based on the development in 2016 and beginning of 2017.

Sydhavnen context

Move the Neighbourhood takes place in Copenhagen's Sydhavnen district and ties into the area's past and future green space strategies and morphologies. The neighbourhood has 10,276 inhabitants, spans an area of 1.2 km2 and is framed by high-traffic corridors. The district was planned and built between 1908 and 1950 in line with the welfare planning ideologies of that time and in an effort to provide healthier and better living conditions for the growing work force moving into Copenhagen. With reference to the English garden city, the neighbourhood consists of homogenous 2-3 story brick buildings arranged in geometrical structures punctuated by green boulevards, parks and public squares. Demographically the area is today one of Copenhagen most disadvantaged neighbourhoods, but also a place that holds potential for prospering through a rethinking of the existing conditions and new dynamics.

Consequently, the area is selected to undergo large changes in the coming years through a municipal areal renewal initiative that for five years (2015-2020) will insert major investments and changes to the urban fabric of the area (Copenhagen Municipality 2012). The Copenhagen Municipality will focus their investments in the neighbourhood on renewing urban green spaces, preparing the opening a Metro line in 2022, and a large park restoration focusing on storm water management. The public open space interventions planned in this study tie into this development, which allows for a close linkage between our intervention study and the municipal urban renewal strategies.

Thus the Areal Renewal Office is a major stakeholder for the "Move the neighbourhood" research project. We have collaborated with them on selecting two public sites for the interventions. Both sites are embedded in accessible green spaces with existing spatial qualities that serve as physical frames for the interventions and they both have an immediate proximity to child-oriented cultural public institutions. Furthermore, both sites ties into future strategies on green space development- one being the vision for an open school park and the other being a planned proposal for the restructuring of one of the larger green corridors in the area, anchored around the local cultural centre.

Negotiating with stakeholders

Doing research into a site that is charged with existing spatial layers, cultures and intentions along with many stakeholders provide the research project with a both interesting and complex context. Many stakeholders have to be engaged and multiple agendas are at stake - from teachers and parent representatives, to neighbours and authorities. Both sites and conditions for conducting re-

search interventions had to be negotiated and renegotiated multiple times. The research projects embeddedness into a real world situation through full scale design experiments makes it a significant impact in the neighbourhood.

Since the study aims at integrating an active-living and social inclusive approach in urban development, the project tests how the interventions are related to the ongoing neighbourhood development and urban renewal and planning context. What is the impact of the development process on the existing planning setup, what discourses, priorities and networks does it entail? The collaboration with the Areal Renewal Office and local stakeholders enables insight into possible potentials and pitfalls in terms of embedding new environments tested through co-designed short-term physical interventions into ongoing planning endeavours.

The initial phase of settling expectations, creating a local network and establishing agreements to carry out the co-design process proved highly important to create the right base for the physical design process. This pre-stage of setting the stage for action can be considered a pre-step belonging to the 'fuzzy front end' (Sanders & Stappers 2008: 7) of defining and initiating the project. This phase was however of great importance in terms of possibilities for the following co-design process and the actual construction on a site that due to its location, spatial layout and large trees had potentials but however had no clear identity as a public space.

Since 2016 we have been part of a process negotiating aims and conditions of the co-design process with the Areal Renewal Initiative, and the local public school. This process has been an investigation of what we have in common to pursue - what is the common interests rather than contradictions, the most beneficial development platform for the public realm and the best conditions for the design process. A discussion of the potentials of the co-design process included finding common ground through meetings discussing user engagement, citizenship processes, involvement of citizens, local visions for the area, obvious pitfalls etc. It also implied the simple clarification of ownership and areas of responsibility in terms of the site and the different departments in the municipality.

Through the early stages the process included curating the right setup and co-design platform: inviting the right stakeholders, establishing good working conditions with the Areal Renewal Office; a stakeholder that to a great extent also uses the design project as a public strategy. In Future Making (2014) Ehn, Nilson & Topgaard argue that images of innovation serve as a bases for decision makers and policy makers when they formulate standards, regulate directions, define boundaries and set the scene for possible futures, and question what stories are being told and by whom (Ehn, Nilson & Topgaard 2014: 2-3). In the collaboration with the Areal Renewal Office, negotiating boundaries and future narratives has been main themes: the negotiation of what stories around redevelopment are being told plays an important role. What stories and images about the collaboration between the research project and the Areal

Renewal Plan, public school and the site etc. serve as the strongest basis for decision makers in the municipality and policy-makers within for example the Department of Children and Youth in the Municipality of Copenhagen is thus an important decision. When formulating the common ground of the collaboration, the vision of a planned 'open school park project' proved to be a way to tie in the research project, since the interventions could test some of the ideas for such a reorganisation of the school area and set out directions for the possible futures of the local (school). It gave the small site of intervention a specific role as a prototypical setting for a larger vision plan.

The process can be considered a collective impact process: some of the local challenges are too complex to be resolved by only one stakeholder or organisation. Mutual challenges can thus be resolved or folded out on common ground between interests and stakeholders. Initially, we thought it was enough to negotiate with the local public school and the Areal Renewal Office. However, the process changed and we became an 'infiltrated' stakeholder ourselves, together with further organisations and institutions such as the Department of Children and Youth, local parental organisations, interest boards etc.

When doing design-based research it is not (only) the public and user-centred aim of the project which dictates the design program - establishing organisational local common ground is as much a part of this co-design process of making things possible. The research aim of co-designing temporal interventions and investigating how they affect the everyday life was incorporated into the Areal Renewal Office's goals about involvement of citizens and testing visions of local green areas. For the local children institutions and public schools it is in particular the learning outcome and empowerment potentially embedded in the design process that ties the practice-based research into their agendas, but also the possibility of an actual improvement of their outdoor areas. As co-designers and researchers, we very much become the stewards for the children's voice into the areal renewal process and general context of the development of the neighbourhood.

As both researchers and designers, it is delicate and complex to navigate in a project of such a complex character, where divisions between roles and agendas are slippery. While the collaborative contextual situation is complex, the aim has been to create a clear structure around the co-design process with children. In the book *To be taken seriously, examples of children's participation* (2012), Eliason discusses if we take children and their views seriously enough. The author refers to the UN Convention on the Rights of Children when stating that in order to understand the children's perspective, we have to listen to what children have to say and invite them into different activities (Eliason 2012: 10). The iterative co-design process of 'Move the Neighbourhood! - with Children' is defined from this position by investigating how children have active influence based on their needs and experience as children, supported through the skills of co-producing teachers, designers, architects, planners and carpenters - adults with professional experience. As Eliason concludes, 'children are peo-

ple, same as adults, but their lack of experience that adults have. As adults it is our tasks to share our knowledge and to guide children through their early experiences'(ibid.).

The first site explorations

The site was chosen as it is a public space adjacent to the schoolyard. It had very limited use and identity but it had some good spatial qualities with its green lawn surrounded by large lush trees. It was furnished with a few simple benches and the area connects directly to the green schoolyard. From a community perspective, the site offers unfolded potentials as local meeting place and as gateway to the school. The Areal Renewal Office aim is to connect and merge the school ground and the public site into a future public community park - an open school park. The local pulic school is interested in testing the idea and together with the Areal Renewal Office and our research project they see a potential to start prototyping at 'Pios Lawn' (the name the site was given in the project) through the process of the 'Move the Neighbourhood' project.

In 2016 'Move the Neighbourhood!' negotiated which areas would benefit the most from our project, and 'Pios Lawn' was chosen as a good potential urban green area, that the Areal Renewal Office could support as an intervention area for the research project. After that the area was approved the SOPARC measurements could start. In September 2016 our partner university did baseline SOPARC measurements at the urban green area 'Pios Lawn'. From the data we learned that the green area is not used much for recreational purposes in the everyday life, it is mainly used for trespassing or a walk with the dog.

The first workshop we did at the local public school was a mapping of the local area (see figure 1). The mapping showed us - what we knew from data - that the children did not have a daily use of the space.

Holding up the SOPARC data and the mapping gave us the opportunity to qualify the data collection with a participatory approach engaging dialogue with the children.
We asked them:

- Why don't you use this space?
- How do you feel about the space?
- Can you tell us about the space?
- Can you draw the space and the everyday life here?

By holding up SOPARC and mapping, we received some nuanced understandings: for the children the urban green area was a non-place, a place for transit with no identity. They liked walking through the area because of the beautiful trees, but in general they did not spend any time there because it was 'boring' , 'you can't do nothing there' and it is 'full of mud' etc. (field notes L. Winge, 2017).

The mapping showed that most children did not recognize the space as an urban green area with a quality at all. They were not aware of it as a space, they did not see any potential nor did they feel anything particular for it: 'What space - is there a space?' (Field notes L. Winge, 2017).



Figure 1
First workshop with school children: Mapping the school area (Photo: Laura Winge).

During the next co-design workshop, we tried to cultivate a sense of ownership and bring the children in bodily contact with the physical site by measuring and playing with the dimensions of the site with coloured ribbons (see figure 2). We began to recognize a change among the children: during the mapping workshop none of the children had a relationship to the area, now it was a situation where the children became aware of the existence of the urban green area, and identified with it, as 'our space' and a green space with qualities.

Working with and at the specific urban space 'Pios Lawn', introduced physical play and discovery into the understandings of the green area as a specific site. The children engaged in the real world, not only prototyping the future urban space, but also having a 'here and now' experience of what the place could be in the present moment, through playful activities, exploring in-between spaces, making territories, use and negotiations of making private versus common spaces in the area. The site shifted from being a green anonymous non-place to a 'this is our lawn - feeling' and a 'we are going to decide what will happen here'.



Figure 2
Workshop with children on site: Using ribbons and bodily movement to investigate the area (Photo: Laura Winge).

Co-design as a multifacetted discourse

This change of ownership and discussions about visions for the place and understandings of the site, could in broader perspective be seen as a parallel to the negotiations going on with 'the grown up' stakeholders, which in all respect for both children and the Areal Renewal Office, had similar agendas, and developed on their ideas and different experiences.

The two narratives can be seen as two threads in the same braid, merging as part of the same local sitebut from two quite different contexts, a strategic urban planning context and a children and user experience context.

Both in the children context and in the relation to the urban development, we see negotiations of the specific territory - the site - in the initial approach: What is a private/public space? Who and what should be considered? In the

first workshop carried out, a child suggested that we could enhance the area of the school, so that the public urban green area could be a part of the schools official area - where much align with the overall future vision from official side. In workshop number 2 a child tried to prevent another child to go into "his" space, since "this space belongs to my group; you are not allowed to play here" (L. Winge, field notes 2017). We explained that this was a public area - belonging to the city - every citizen had the right to use this urban green area, and the child suggested that all the children made one big common space. It was obvious that this encounter, and the way of talking about the urban space was a negotiation of boundaries and a common understanding of the area.

Defining the ownership and decision on who is doing an intervention in the urban green space, who should not make a process there, who has an ownership to the area and who is having the mandate to decide if we, as researchers could be there or not, is an important role. During the process, we found out that the Areal Renewal Office had many visions for the specific urban green area, but they did not have any official responsibility of the area, which belonged to KEJD another Copenhagen Municipal Department. (Copenhagen Property and Supplies). Agendas and ownership in the municipal system can be complex and understadnings of teritory and site differs depending on the specific agency's logics. The idea of an open school park however developed rapidly parallel with the interventions on the 'Pios Lawn' and created a sense of decision unity for the site.

Overall the Areal Renewal Office and the local children are both, as two very different groups, with different approaches, experiences and understanding of the public sphere local stakeholders in the co-design process. As stakeholders, the children are very open for the definition of investigating the best public beneficial and use of the urban green area. Off course with another approach to the local process - designing and thinking this new common area from other positions than the Areal Renewal Office.

The co-design process gave a specific user-group, the children taking part in the process, a voice - but it has also unlocked diverse agendas, relationships and site-understandings in the neighbourhood concerning the future use of the area - it formed a spatial discourse. By insisting on the design process with the children being a design-driven and partly open-ended iterative process, we had to see what would happen and use our professional approach to understand and translate the ideas of the children in relation to the site conditions and local network.

This approach aligns with a conception of designers as actors that work to enable platforms to affect future ways of understanding and using the urban green areas. Hence, designers act as facilitators, support initiatives and develop and execute design proposals - using their professional skills in the design process by exploring the future design of the area, but also by negotiating the right platform for the co-design process.

Actual work and activity with and on the site and stepwise changing it by

appropriation, use and new construction was the most important place making activity in relation to the children group. While the site's development was addressed verbally ongoing in the workshops from day one (mapping etc.) the site as a mutual concern and field of action became even more explicit when occupation of the site began. Also concerning the local planning context, the increasing site activity and physicality of change spurred discussion and made change more tangible.

As a research method, the co-design and site interventions hold the potential of unlocking, revealing and negotiating the potentials and conflicts in relation to site development, user groups and stakeholders - provoking reactions and feedback. According to Halse & Boffi (2016), design interventions can be considered a type of inquiry that is particular useful to make directions or propositions tangible, due to their relation to the known, the existent and concrete as well as their tentative suggestive notions. Hence a design intervention "stages qualitative empirical dialogues about possibility, and deploys evocative probes, props and prompts to inquire into people's concerns, aspirations and imaginative horizons" (Halse and Boffi 2017: 101). The hands-on discussion that is happening through step-wise occupation of the territory, in this case the undefined and underused green public area is what is creating the site as a mutual discussion and interaction field.

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Improvisation as an alternative paradigm for inquiry

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Abstract. What does it mean to learn when a practice continuously transforms itself? When clear formulas cease to work? When the context, working models, tools, techniques and even actors can no longer be considered as homogeneous. In my contribution I want to explore the theoretical and practical frameworks of improvisation as an alternative paradigm for research. Improvisation is generally connected to playing music, drama and other instantaneous performative disciplines. In architecture (and even society) improvisation is generally attributed to erroneous situations which have to be repaired, more specifically when the repair has to carried out with the materials and conditions at hand. Based on different experiences and research I would like to put improvisation forward as a valuable method to explore new knowledge and understanding.

Keywords. Improvisation; design; research.

Introducing a concept such as improvisation in architecture, design and research, is a tricky thing. While there is substantial literature, references and examples which relate improvisation to architecture, design and research, most of those publications fail to cut to the core of the concept of improvisation (see amongst others: Jencks, and Silver 1972-2013; Brown 2006; Kleidonas, 2009).

Improvisation challenges the traditional idea of creativity and learning as a teleological progression towards a final work underpinned by labour and revision (Smith and Dean 1997). Its practice is directed towards the analysis of experiences and constantly mediates between event and transcription. The fact that improvisation, as authors Gunther Kress and Theo Van Leeuwen (2001) observe, operates in between design and production, in between mode and medium, questions the conventional idea that there exists a gap between design and production. In architecture this gap can be traced to the Renaissance era where architectural practice was separated out in different roles: architects design while the other parties execute what has been designed. But in reality architectural production (as well as its research and design processes) is ruled by several, sometimes complementary, sometimes conflicting activities in predominantly collaborative processes. This urges us, designers and practice-based researchers alike, to look for different paradigms of inquiry.

My contribution does not intend to illustrate practical applications or strategies of improvisation in design, research and other processes but, rather, will try to frame some of the implications of considering improvisation as a method of progressing. Consider the following as a work in progress. "*If you have to ask, you will never know*", Louis Armstrong famously responded when asked what

the rhythmical concept of swing was (Szwed, 2000). The same goes for improvisation, any attempt to it pin it down will inevitably fail. Because improvisation refuses to be bound to singular definitions, makes it a rich but somewhat confusing concept to implement in research or even design contexts. It is important, from the onset, that we agree that improvisation is not just something you merely do - more than a (collection of) methods it is a conscious objective - an ideal which requires practicing and (hard) work.

Context

Things changed. Our practice changed, our tools changed and consequently our schools are changing. In their book '*Multimodal Discourse*' authors Gunther Kress and Theo Van Leeuwen (2001) observe that previously secure 'scripts' are becoming or have become unstable. As a result new practices for which no scripts as yet exist are coming into being:

'*Previously distinct practices, the domains of distinct professions, the clear boundaries, all of these have begun to unravel. New domains of practice are in the process of being constituted, and new sets of practices are emerging or will undoubtedly emerge in time; and with these new practices will emerge new, not yet consolidated professions. The practitioner in this new domain now has to take a multiplicity of decisions, in relation to a multiplicity of modes and areas of representation which were previously the domain of discrete professions and their practices*.' (Kress and Van Leeuwen, 2001)

In practice, inquiring change presupposes paradigms which enable practitioners to explore consequences beyond existing ones. On top of that it no longer seems possible to individually inquire change. On-going specialisation has redistributed - even isolated a lot of the expertise. Collaboration has become a necessity. Because distinct expertises have to communicate on equal grounds there is a need for a paradigm which enables all participants to enter the conversation beyond disciplinary confines.

Improvisation, especially group improvisation, seems to provide inclusive, open and performative environments to explore and even transgress the critical boundaries of an activity or conversation. Improvisation, as Wallace (2015) observes, '*actively inquires change within a structure of rules which is itself constantly changing*'; so embarking on an improvised process implies being able to question your own foundations - to embrace difference. Change is something which one encounters, sometimes for the good, sometimes for the bad... When dealing with change one discovers opportunities for 'repair' by continuously looking for critical moments where (collaborative) action can make a difference - can add value. The result of the action, or series of actions, will present itself as a possible or provisional answer to a shifting question.

A Way of Making

Improvisation is generally misconceived as the ability to deal with unforeseen factors and generally those factors are the ones distorting one's process or

progress. While failure or error is certainly an aspect of improvisation, it does not constitute the essence of improvised practices (Smith and Dean, 1997). Entering an improvised process comes with a great deal of uncertainty, acknowledging that *there are simply too many intangible factors that cannot be known until the performance begins* (Sawyer 2015). This involves a great deal of risk taking because, from the onset, it will not be clear what will be gained or lost. Sawyer (2015) stresses that engaging in improvised group processes will invariably result in emergent, unpredictable outcomes.

Engaging in improvisational processes requires a so-called hyper-awareness for '*the happening*' - what happens, what already happened and what could happen within the developing material (Smith and Dean 1997). According to Smith and Dean this state of hyper-awareness forces the improviser to balance procedural formulae and pre-existent material to create new material, new combinations of materials or procedures (Smith and Dean 1997). They also point out that the newness of such an inquiry depends on how wide a range of personal *cliches* the improvisers can resort to, and the extent the participants are able to recombine and transform them during the course of performance (or inquiry).

This quality resembles to what Luigi Pareyson (1954) refers to as 'Formativity': '*a way of making such that while one makes, one invents the way of making*'. Inside this formative principle, there are no fixed rules, each time one starts exploring standards for the 'making' it becomes an 'attempt' a 'construction' which generates the necessary rules to take action' (Pareyson 1954). In order to arrive at Pareyson's Formativity, a balance has to be sought between the exploration of the tools, techniques and formulas and ways of manipulating those elements to discover new '*ways of making*' during performance. This can be done either by extending a technique, bricolage, tinkering, hacking and so on.

(Indeterminate) Progress

In its absolute state improvisation departs from a void. The concept of the void is a necessary one to create an inclusive and equal demarcation point for every participant involved. All participants must agree that there is no clear starting point nor end-product. It also means acknowledging the utopian character of this void as no-one enters conversations as an empty vessel. What is important here is that all those involved agree upon, or get acquainted with the limits of both the group and the conversation. It is a necessary prerequisite to allow *every* participant to invent and design ideas as the structure and performance (design) evolves and develops itself.

When improvisation revolves around progress we should distinguish between two different, yet intertwined, views - or even philosophies - concerning progress: *idiomatic progress* and *non-idiomatic progress*. *Idiomatic progress* relates to established styles, methodologies, *idioms*, and perhaps even disciplines. It is directed at gaining proficiency to interpret and compose (or design) within a

known framework (Peters 2009, Prevost 1995, Bailey 1993, Smith and Dean 1997, Berkowitz 2010).

Idiomatic progress departs from what Kress and Van Leeuwen (2001) refer to as *'scripts'*. In idiomatic progress the result is evaluated according to agreed or accepted boundaries of such a *'script'*. There is, for example, a moment where a Baroque Improvisation ceases to comply to the rules of Baroque Music and becomes something entirely different. Thus enters *Non-idiomatic* progress. Here stylistic - or idiomatic boundaries are continuously under scrutiny in a quest for innovative points of departure. While the former provides a more or less structured framework to adhere to, the latter should be the ultimate aim of any improvisation: *finding new material or ways of progressing*.

The previous distinction is key to understanding Gary Peters' (2009) demarcation of the (philosophical) essence of improvisation. Peters draws a distinction between method, methodology and position. He discerns between the determinate logic of a *methodology* that always carries its têlos within it and a *method* that does not. According to Peters both allow a degree of improvisation but they remain structurally different. The difference, Peters argues, lies within the status and nature of error in each case.

Methodology (or staying within the idiom) might be understood as the 'straight line' that will eventually lead us to a goal by alerting us to the fact that we are always in danger of going astray. While methodologies and idiomatic improvisation allow for the possibility of error and even encourage risk taking, such improvisatory skill, as Peters (2009)observes, *'is always performed in the knowledge that such a curvature of thought will be measured against the teleological straightness that the methodology or idiom provides*'.

Adhering to a certain methodology runs the risk of focussing upon temporary, short-term, strictly limited, and delimited deviations of that methodology or idiom. Remaining with an idiom tends to conform to - and strengthen - the horizons between one position and with that, the perceived boundary between truth and error. Peters (2009) claims that a method directed at progress refrains from that kind of 'positioning' and when a method is directed at progress exact positions tend to blur. Since idiomatic progress already has its ultimate goal secreted within it, it excludes the finding of radically new material. Peters proposes to conceive of a mode of progression that is *non-têleological*. A method where progress in the act or activation of thinking, and the production of work actually *depends upon* error and the failure to reach a goal.

It is important to realise that the absence of a clear methodology does not mean that anything goes. As such a method (of progressing) becomes the description of the *multiplicitous* figurative orders that play on each and every improvisation and the degrees to which the improviser can be aware of this overdetermination (Peters 2009, my italics). The consciousness of such orders - gestures, clichés, formulas, repetitions - demands a different kind of rigour, one that is *methodical* rather than *methodological*.

Groupmind

As indicated above the collapse and specialisation of the disciplines calls for new ways of interaction. Conversation in improvisation, as Sawyer (2015) observes, depends on all of the participants knowing their 'language' (or specialisation) extremely well. But, in order to engage in an improvised conversation, it is equally important to be able to put one's specialisation(s) into dialogue with other ones. Improvisation requires that during the act, while performing, all participants will have to continuously negotiate the terms as well as the direction of the conversation; if only to broaden collective expertise or to find new forms of expertise.

Many studies regarding improvisation, as Sawyer (2015) observes, have concentrated on the individual, greatly ignoring the group dynamics which are equally important. Sawyer detects a cultural misunderstanding as most of us, when faced with an example of an emergent group phenomenon, almost subconsciously assume there is a single leader or organiser. In analysing group behaviour we tend to adhere to a centralised kind of mindset which almost invariably leads us to assume that complex group behaviour results from a central controller. Sawyer replaces this centralised mindset with the concept of group flow, or *groupmind*, which is related to Csikszenthihalyi's (1990) Flow Theory but with a critical difference.

While, as Sawyer argues, Csikszenthihalyi (1990) regards flow as a state of consciousness within the individual performer, group flow is a property of the entire group as a collective unit (Sawyer 2015). Group flow, according to Sawyer, can inspire participants to do things that they would not have been able to come up with alone, or that they would not have thought of without the inspiration of the group. Group flow, according to Sawyer, helps the individual performers to attain their own flow state and is an emergent group property which differs from the psychological state of flow because it depends on the interaction among participants and it emerges from this process.

If we follow Sawyer's argument that improvisation concerns the active negotiation of the boundaries of a conversation - about negotiating criticality in action - all those involved have to enable each other to discover individual and collective critical measures to respond to. This process forces the participants to continuously redefine these measures, habits or clichés vis à vis other ones. '*It is a state of unselfconscious awareness in which every individual action seems to be the right one and the group works without apparent perfect synchronicity*' (Seham 2001).

Reflections

Improvised processes, following Peters (2009), strive for indeterminacy. Indeterminacy requires of all participants to open - and even reveal - their critical boundaries otherwise the improvisation cannot work. By imposing critical boundaries on other participants one re-enters the realm of composition and design, thus moving outside improvisation. There is a degree of overlap - out-

lining structures for improvisation provide the improvisers with a framework or markers to check their distance from the initial structure or ambition - but such structures should allow a degree of freedom, otherwise spontaneity - or the opportunities to find something new - will be lost. Improvisation departs from - and uses - whatever is there to wander towards the possibility of an answer.

In inquiring new '*ways of making*' the improviser draws from different areas to create and react to new situations. So called '*self-generation*' attributed to improvisers is based upon a misconception as most improvisers have extensively internalised a set of personal preferences or even *clichés* to which they can resort during performance (Smith and Dean 1997). Acknowledging - or becoming aware of - these cliches is a necessary first step in education as well as in practice. Improvisers continuously have to detect and balance these preferences (as a quality or as a limitation) in order to be able to further the exploration within one direction or the other.

When creating creative communities one should keep in mind that learners need more structure than experts (Sawyer 2015). We should not confuse the idea of freedom with '*doing whatever one feels like*'. Wallace (2015) argues that although the explorative processes strive for new and less restricted avenues of expression than the current set of rules can accommodate, they still require skill and training. Berkowitz (2010) has observed that the ability to create novel material appears to be only possible with extensive training: highly physical skills are necessary as well as cognitive skills to apply the knowledge in practice. Generative capacity appears to exist in everyone, however, if the means for expression are not cultivated, the potential for spontaneous production cannot be realised or developed (Berkowitz 2010).

Improvisation is a social practice where collaboration enhances the sum of the individuals' knowledge. An effective group activity, from the community of practice perspective, allows all those involved to participate meaningfully regardless of their level or expertise. According to Sawyer (2015) group activity should be structured so that each level of participation naturally propels all those involved to increasing appropriation, mastery and central participation. We should also keep in mind that group creativity isn't at all improvised anew in each performance; there are common elements that are repeated across many performances (Sawyer 2015).

So, yes, improvisation can be learned, but it can also fail horribly, precisely *because* there are tacit rules within the community of improvisers or, as Wallace (2015) observes, the freer the form, the greater must be the underpinnings of discipline. Engaging in an improvised activity is a collective and conscious choice. It is not about making or proving one's point but about moulding a set of collective points towards *a work*. Work as the most convenient way to express the moment of interaction which can result in a piece of music, theatre, text, drawing, business model, learning experience and so on.

Improvisation can be understood as '*the art of letting go*' (Peters 2009). But

this '*letting go*' has serious implications for the activities as it implies for all those involved to be prepared to question and even leave the comfort zone of one's hard earned mastery, or expertise. This requires a different kind of interaction where all participants have to be continuously aware of their personal preferences which, by being shared, inform and broaden collective understanding. It also implies acknowledging how characters, cultures and other practices can add to this collective understanding, to find, reveal or explore multiple and complementary ways of progressing.

Improvisation is should be regarded as a viable method for discovery. During its process tools, techniques, formulas, cognitive activities, ways of making, crafts and even disciplines merge into new ways of making and thinking. Group improvisation is a way to explore merges and juxtapositions of previously separate - and even irreconcilable - areas of making and thinking. The primary focus of improvised activities does not reside in its immediate performance or goal achievement; it does not aim for fixed goals but aims at the '*excitement of being in the process of potentialities being born*' (Kolb and Kolb 2009) - because it is there that discovery happens.

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Movement notations

Their relevance and impact on the architectural design process

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Abstract. Human movement is continuously present in our built environment and as a result inherently attached to the practice of architecture. However the phenomenon is rarely present in the architectural design process and the tools that are deployed by architects. In this paper we examine in which extend movement notation systems can have an impact on the design process. We review pre-existing movement notations in the context of architecture and look to their relevance and their current status within field. Furthermore we explore through practice-based experiments how existing movement notation systems can be deployed during a design process and additionally how they can be adjusted to respond on our contemporary demands.

Keywords. Movement notation; design process; Labanotation; Halprin motation.

Context

The architectural design process is usually a static, top-down process where the architect designs from behind a drawing table. This fact influences the relation between the design of a given space and the experience of this space by human beings moving in it, a connection that is mainly the result of the architect's imagination and viewpoint according to which plans and sections represent an imagined state of being in a specific space. Although this static approach may well result in a functional and aesthetical pleasing architecture, the fact remains that the human beings for whom the architecture is intended will mostly be in motion. As Fitch (1994) stated: "To be truly satisfactory, the building must meet all the body's requirements, for it is not just upon the eye but on the whole person that its impact falls". This research project seeks for an approach to respond on the embodied experience through incorporation of human movement into design process. The research is conducted in two main tracks: one is to find a way to visualize movement in relation to spatial elements through which it can be incorporated into the architectural design process; secondly there is searched for design strategies that may provoke certain human movements and corresponding embodied experience of space. These two tracks are examined simultaneously, however in the context of this paper there will only focused on the first track. Besides the development of a human movement visualisation system in relation to space, we additionally explore how existing movement notations can be optimized.

At the time of the Modern Movement in Architecture, there was a great interest to engage with physical experience and kinetics in relation to architec-

tural space. Researchers in several fields and disciplines, as well as visual and performance artists, architects and designers investigated this phenomenon. The sustained interest in body movement, right up to the present, with state-of-the-art digital motion capture systems attests to the validity for the study of movement in relation to spaces. Though the notion of movement in space is evidently pertinent to architectural space, developments in the former field were rarely taken on board in architectural processes or applied to the built environment.

Even more essential within the context of this project is the idea that movement is a valuable form of communication, which emphasizes other aspects than language. As Sheets-Johnstone (2011) states: " Corporal concepts in each case derive from experience and in no way require language for their formulation. [...] If anything, language is post-kinetic. Fundamental spatio-temporal-energic concepts come from experiences of movement [...]" . We believe that by capturing movement in relation to architecture other aspects than just the movement and the space itself can be revealed. In particular we are looking for a form of communication which tells something more about the impact of architectural elements on the embodied experience of space. We assume that by understanding the influence of specific spatial elements on our experience of space, architects can deploy certain spatial concepts more consciously and rather design an architectural choreography instead of an empty space.

Human movement can in a certain extend be compared with music. Both phenomena can only be observed when they occur and can be experienced trough all our body senses. In contrast to human movement, there is a conventional symbolization system for music, by which a piece of music can easily be communicated to others. While movement is put on paper by means of different kinds of movement notation systems developed through history. In the context of this paper we focus on two notation systems, which seem to be relevant in the context of this research, namely Labanotation and Halprin Motation system. Laban was pioneer in notating movement in relation to space and thus laid the main foundations for this type of movement notation, while Halprin's developed his notation with the focus on landscape design.

The significance of the subject of this research was testified by Talwar (1972). He made an evaluation of several existing movement notation systems that were developed in the field architecture at that time, with the goal to examine their relative usefulness. He argued that: "Numerous descriptive and representational systems, particularly in the field of urban design and analysis, have concentrated upon ways of showing the properties of the environmental elements with which a designer must deal. None of the traditional methods for environmental representation show human movement in time." Up until today there are no significant breakthroughs yet that cover this lac in architectural representation methods. Although there was a common interest in movement notation since 1960. Several architects and urban designer, began reinterpreting architecture and questioned how new techniques of representa-

tion would allow the expression of new architectural information such as Kevin Lynch, Philippe Thiel and Stuart Rose (Talwar 1972).

Pre-existing movement notation systems

In general there can be made a division between movement notations systems that were specifically developed in the field of architecture and others that were developed for a broader field such as Labanotation and Eshkol-Wachmann movement notation. These two notation systems were originally created in the field of dance, different from other dance movement notations they tried to capture every kind of movement. Eshkol-Wachmann movement notation represents the human body as a stick figure that is divided by the joints of the body. Every joint of the body forms an end or starting point for another stick. This system is up until today used for movement analysis in several fields and is also incorporated in motion capture software. In contrast to the Labanotation and Halprin's motation system this notation system only relates to space in the form of exact coordinate positions of the joints and is therefore currently perceived as less relevant in the context of this research.

Underneath there is made an overview of these two last mentioned movement notation systems and their significance within the field of architecture. We evaluate the impact that these systems have had on the architectural design process over the last decades. Both systems makes use of their own symbolisation language. Due to their complexity only the basic principles and the differences in approach between both of these system will be discussed. Subsequently their application in the field of architecture will be reviewed.

Labanotation

Labanotation was developed by Rudolph Von Laban, a Hungarian choreographer and dance theorist in 1927. Different from preceding dance notation systems, his system was unique due its possibility to record any body movement and positional information for various body parts (Wilke et al. 2005). He was the first to put movement notation in a vertical track that should be read from bottom to top of a paper. The notation exists of eight columns in which the middle line represent the spine of the moving body. The symbols are placed on the left and the right side of the centreline, corresponding to the right and the left body limbs (fig. 1). The basic symbols describe the direction, the level and the duration in time of the movements (fig. 2). The duration is indicated through the length of the symbol. Symbols on the same horizontal line movements occurred simultaneously.

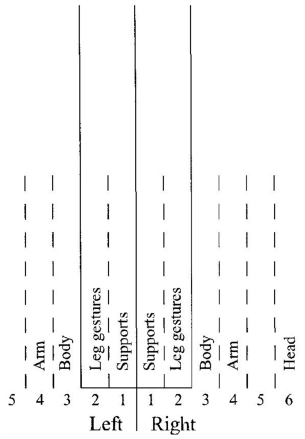

Figure 1
Basic track (Hutchinson, 1977)

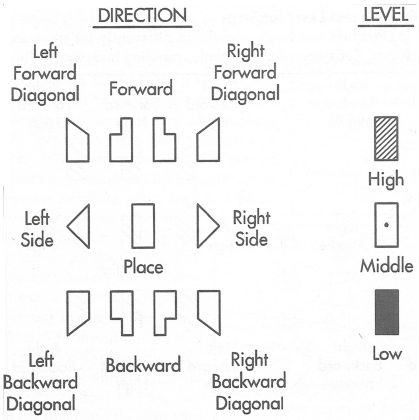

Figure 2
Basic symbols and indications of levels (Hutchinson, 1977)

The system is generally used in dance as a means for the preservation of choreography for future reference. Although it can be applied in any field that needs to compare different movements due to the wide variety and flexibility. (Hutchinson, 1977)

In the field of architecture Labanotation is mainly deployed as movement mapping and analysing tool. Besides it also formed inspiration and foundation for numerous insights and developments within the field, e.g. Halprin's motation. In a previous discourse of this research, Laban's concepts of body movement relating to space, where deployed to develop series of explorative spatial visualisations from body movement in space (Vroman et.al, 2011). Labanotation especially had an impact on the theoretical part of architecture, while the impact on the architectural design process is not very noticeable in architecture history.

Halprin motation system

The Halprin motation system was developed by landscape architect Lawrence Halprin in 1965 (Talwar 1972). His movement notation uses an entirely different typology of symbols than the ones used in the Labanotation. While space remains quite undefined in Labanotation, it is especially present in Halprin's motation, where movement is reduced to the trajectory and the visual experience. Although both movement notations are very different, they do have their vertical format in common.

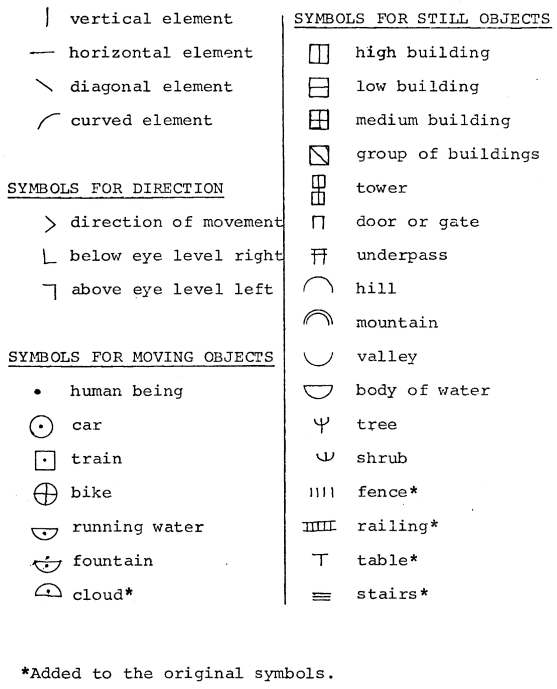

Figure 3
Symbols of Halprin notation (Talwar, 1972)

Halprin's motation system exists of three basic symbols: the dot, the arc and the straight line, which are combined with each other. The combination of these symbols forms a representation of an object, an element or an indication of direction (Fig. 3). Halprin made a major division between still and moving objects. Moving objects are displayed by a dot in addition with another graphical symbols, while still objects consist of a combination of straight lines and arcs. Similar to Labanotation these symbols are placed in a standard table (Fig. 4). There is also made a division between a horizontal track and a vertical track. In the horizontal track the larger image is included in which the whole trajectory fits. While in the vertical track there is zoomed in on the visual experience of the movement trajectory, which only runs until the horizon line.

The center line in the vertical track refers to the position taken by the participant. On right side of the vertical track there is also made an indication of time. According to Halprin his motation system enables the reader to perceive the three-dimensional qualities of the movement in relation to space.

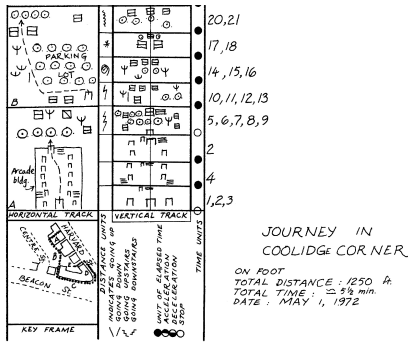

Figure 4
Motation extract of "Journey in Coolidge Corner" (Talwar, 1972)

Halprin believed his notations could serve as a tool for choreographing urban space. But by the fact that his motation system can be reduced to a plan and a path, this is still very different from a choreography in which almost every single movement is determined by the choreographer. As a matter of fact the movement of dancers remains very different to document comparing to the movement of people who are moving in an urban environment (Harris, 2014). Overall we can say that movement notations as Labanotation and Halprin's motation were up until today very inspiring for the architectural design process, but did not tremendously change the everyday architectural practice.

According to Tschumi (1996) the desire to map body movement in relation to architectural space is not necessarily related to these movements, but rather to the idea of movement as a form of notation in order to remember that architecture is also about movement of bodies which are complementary to the space where in they move. He considers movement notation in architecture rather as an attempt to introduce new codes into the architectural drawing and by extension in perception; layering; juxtaposition and superposition of images, plans and graphic conventions.

Methodology

The methodology that is used to conduct the study is based on the principle experiential learning, in which experience forms the base for learning and understanding. The learning process is conceived as a four-stage cycle : "Immediate concrete experience forms the basis for observation and reflection. These observations are assimilated into a "theory" from which new implications for action can be deduced. These implications or hypotheses then serve as guides

in acting to create new experiences "(Kolb 1984)

Within this research this methodology is projected on three levels, which are continuously in interaction with each other. As indicated previously, the aim is to focus on two main tracks: the distillation of design strategies and the development of a new movement notation system that can be integrated into the design process. These two tracks mainly play at the level "the self", which can divided in the role of the architect as well as the role as a researcher. A third level, on which the learning process is situated, is the level of the participant (fig. 5). Due the practice-based character of the research these three "learning cycles" are undividable.

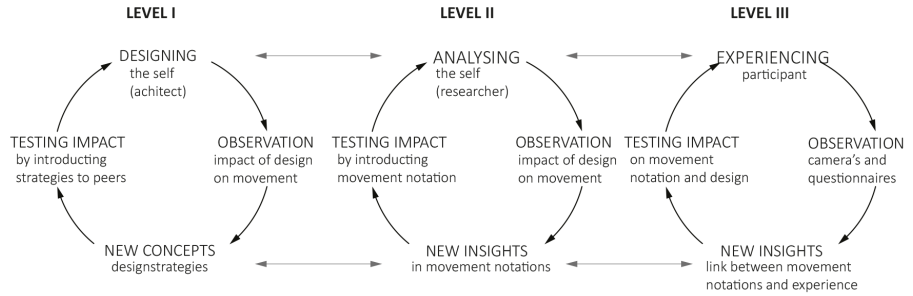

Figure 5
Interaction of three learning cycles (author)

Explorative setups

In this stage of the research project there was searched for temporal interventions that could generate a specific moving pattern, enhance the quality of the movement and the experience of space. The first design interventions were done in the courtyard of the Faculty as a first trial. The courtyard is mainly used as transition area between the entrance, the administration building and the main building of the school. As most of the people are only passing in this area and move directly from one door to the other, there was searched for interventions that could make people to slow down and rest or to change trajectory, speed, pace and rhythm.

Since this paper primarily focuses on the aspect of movement notation, there is especially looked at the second level of the above mentioned methodology where analysing movement forms the core concept of the learning cycle. This analysing exists of immediate registration of human movement, on the one hand with the aid of a camera and on the other hand by looking at it in person. The act of looking at the movement forms the immediate experience for further reflection on the impact of the spatial designs on the body movement and on the trajectory people prefer. The reflection currently happens through observing the video's, in which there is searched for more detailed information about movement gestures. This reflection should interact with the

third learning cycle, namely the experience of the participant who was moving in the designed space.

As already mentioned, conventional representation techniques within the field of architecture did not succeed yet in incorporating the quality of human movement in the design process or in the final visualization of the created architecture. Halprin stated that designers cannot design any space without having the right tools to do so (Talwar 1972). Halprin's motations were an attempt to provide an answer to this problem, but were not fully successful due to the fact that his system remained unused by other designers . In this first explorative phase we seek to enrich Halprin's motations not only by focusing the sequences of frames but also the global movement experience. Halprin's motations are on the one hand simplified by using less different symbols and on the other hand enriched with symbols and concepts borrowed of Labanotation. During this first attempt to visualize movement, we found out that Halprin's way of movement notations rather worked as an analysing tool than as a design tool.

It is also important to mention that the Halprin motations were developed on the scale of landscape, while this research rather focus on a small urban scale in which distances are smaller. Consequently it is desirable to replace a number of Halprin' symbols by other graphs. The symbol that represents a group of buildings for example is eliminated. Besides it seems necessary to add more precision to the symbols that represent low and high buildings, therefore there was added an indication of height in the legend to these symbols. Furthermore some additional symbols are included to get a better comprehension of certain architectural features. Next to Halprin's keyframe including a map of the taken trajectory, there is added a stop-motion image of the sequences that covers the full range of the trajectory in one image.

In order to test a first optimization of existing movement notations, there is one specified trajectory and setup included in this paper (Fig. 6 & 7). This movement notation works as followed: the two columns on the left side refer to the Halprin's movement notation. The first column is a top view of the taken trajectory and the second column is the elevation of the person who is moving through the space. The third column shows the body movements with Labanotation (in this case only the feet are shown), which enable us to perceive the movement more detailed next to the trajectory. The length of the direction symbols provide us more information on the duration of the individual movements. The person in figure 6 for instance had a continuous pass of 2 steps/sec, while the two persons in figure 7 had a continous pass of approximately 1,5 steps/sec.

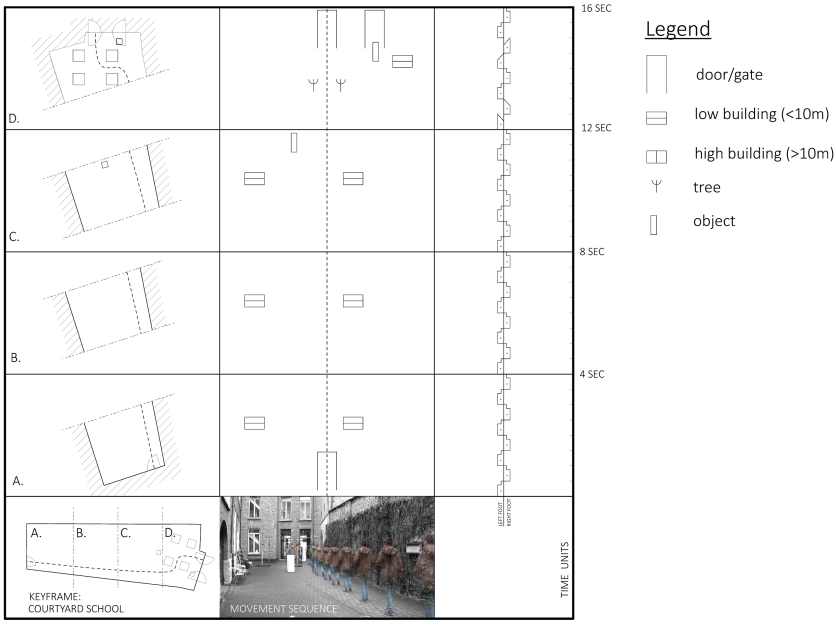

Figure 6
Optimized movement notation (author)

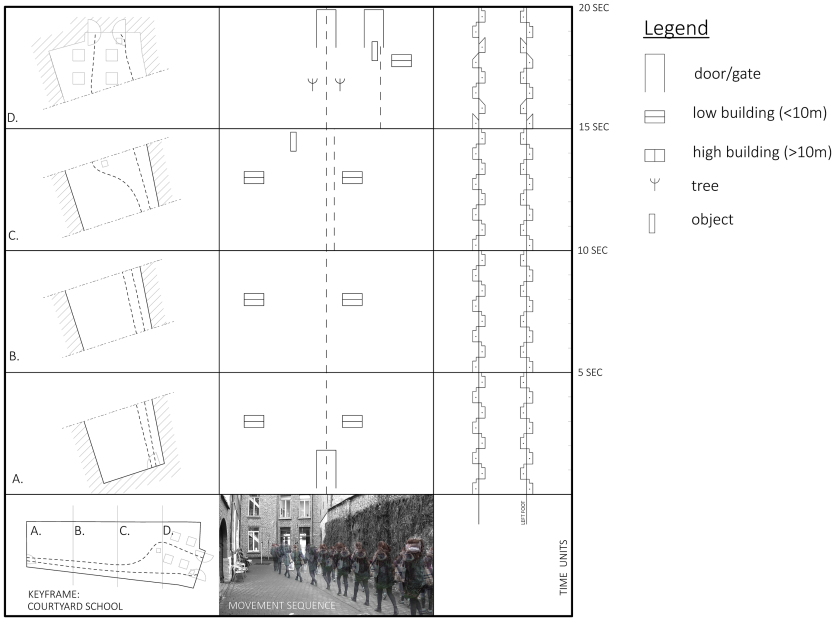

Figure 7
Optimized movement notation (author)

Discussion

As the results of this study relate to an intermediate stage of an ongoing research project, they are incomplete and should therefore rather be perceived as part of a process than as a final result. However a few concerns about the impact of architectural elements on the movement and in addition the impact of movement notation on the design process came up.

It remains very difficult and challenging to bring architecture and human movement in relation to each other on paper. Although movement notation demonstrated its usefulness in understanding movement in an architectural context through the possibility to look at it on different levels comparing to moving images for example. Moving images expose a range of movement from a fixed position, while by means of movement notation it is the possible to look at plan view, spatial elements on the trajectory and rhythm of the movement.

The addition of a sequence image next to Halprin's keyframe, including a map with the trajectory, gives some extra information to Halprin's motation such as exact heights and materials of the built environment. Furthermore through the addition of symbols of labanotation, we are able to understand the relation between the rhythm of the movement and Halprin's visual and embodied experience.

Despite these improvements there remains one very important challenge, which also manifested in Halprin's motations, namely the choice of the trajectory. Halprin always illustrated one chosen route while there are many other possibilities. Consequently it remains difficult to read and interpret the impact of the architectural elements on the trajectory, the speed and the resulting embodied experience. This remark also applies to the impact of this notation on the design process. In this stage the movement notation was primarily used as analysing tool rather than as a design tool. A next step in this research project is applying the notation in a design. Subsequently the actual impact of movement notation on the architectural design process can only be evaluated in a later stage of the research project.

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The impact of architectural experimentation on exploratory research

Reflections from the "apartment building" case study

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Abstract. This paper aims at building a critical reflection on the valuation of the prospective features of design experimentation in architectural research and its impact on knowledge production. The study draws on a post hoc examination of an investigative experience exploring the transformative potentials of the real estate post-war apartment buildings in Liège, Belgium. In a theoretical perspective, we first raise the issue of harnessing the forward-looking dimensions of design activity for the benefit of architectural research. Secondly we report on the investigation observed, its context and approach, and its investigative processes. The resulting insights and the particular implication of the act of designing are highlighted, among other steps of the investigation, putting forward new questionings.

Keywords. Design empiricism; research by design; reflective practice; exploratory research processes; real estate architecture.

1. The prospective features of design experimentation in architectural research

In the collective imaginary of the architectural discipline, each project should be a unique, tailor-made and non-repeatable answer to some problematic situation. Design education generally puts forth the idea that an architect should be able to develop schemes that depend on some specific spatial, social and economical contexts in order to generate a relevant architectural contribution. Beyond their evaluation as a more or less adequate solution, design proposals may also open new perspectives, and trigger a large range of exchange of views and societal questionings. Indeed, architectural propositions potentially conceal many prospective qualities that suggest an alternative reality or project means to envisage unexpected possibilities.

1.1. Design empiricism

In the last few decades, the act of designing has been more and more considered in academia as involving specific modalities of knowledge production. A better consideration for designer's own intellectual culture has been explicitly claimed by Nigel Cross in 1982 in its paper "Designerly ways of knowing". Based on a synthesis of 20 years of work of the emerging Design Research and Design Methods movements, he notably described designer's particular modes of reasoning and "designerly enquiry modes": designing not only mobilizes specific ways of tackling design issues, but also means of "knowing the world" - as semantically wide as the word "knowing" could be. By putting forth the impor-

tance of *knowing by designing*, Cross contributed to elucidating for academia what we could call the "design empiricism", that many other researchers are still gradually characterizing by following on its premises.

However, more recently, the institutionalization of research in architecture education has forced scholars to clarify the potential links between this "design empiricism" and the traditional "scientific empiricism" widely used in research. Some researchers tried to evaluate the conditions of integration for design practice as a research tool (Biggs and Büchler 2007, 2008), some proposed a hybridization of inquiry modes integrating design activities (Doucet and Janssens 2011), some analysed feedbacks from several practice-led research projects in arts and architecture (Rust et al. 2007), some discussed the implication of research-by-design on doctoral education (Findeli et Al. 2008, Verbeke 2013, Atalay Franck 2016), not to mention publications gathering and confronting these different concerns (see for example Weidinger 2015).

1.2. Design as a prospective tool for research

As a matter of fact, design empiricism generates forms of knowledge drawing on the projection of a potential reality. This particularity is often compared (or opposed) to a more traditional empirical approach based on the analysis of a tangible and existing situation. As mentioned by van Cleempoel and Pint (2015, p. 10): "Research, commonly associated with reliable, explicit knowledge, repeatability, aims to define how things are. Design, on the other hand, looks at how things could be, through a rather chaotic process not easily repeatable because of its particular and context-related conditions, built upon tacit knowledge.". This contrast is also depicted by Johan Verbeke (2013, p. 145): "unlike other research that is chiefly analytical and seeks to understand current realities, architecture and design try to project into the future, and thus change things".

Therefore, as a form of intelligence, the prospective dimensions of designing potentially have a sound complementary role to play in research, the latter being according to Helga Nowotny (2010, p. XIX), " (...) the curiosity-driven production of new knowledge. It is the process oriented toward the realm of possibilities that is to be explored, manipulated, controlled, given shape and form, and transformed. Research is inherently beset by uncertainties, since the results or outcomes are by definition unknown. But this inherent uncertainty proves to be equally seductive: it promises new discoveries, the opening of new pathways, and new ways of problem-solving and coming up with novel ways of 'doing things,' designing and transforming them".

Within this theoretical framework, we propose to critically examine a concrete case study consisting in a prospective research experience mobilizing several architectural design proposals. The ambition of the description of this particular investigative process is to contribute to understanding the impact of design activities on the research conduct and the challenges and constraints to

observe and qualify it.

2. Case study: revisiting the apartment building

2.1. Context

Developed in 2015-2016 at the University of Liège, "Real Estate Architecture: Revisiting the apartment building" (REA1) is the first part of a threefold thematic research project seeking to reconsider the architecture of the private developers in post-war Belgium in the housing, service and retail sectors. Focusing on the typology of the apartment buildings in Liège, built during the real estate boom of the 1960s and 1970s, REA1 aims at unveiling the transformative potentials of this "minor architecture", disregarded by architectural discourse and criticized for its banality. Most of these architectures are coming to a turning point of their life cycle, and the REA1 investigation tries to explores their inherent qualities and propose new reconversion scenarios for the fifty years to come. Another primary objective is to provide them with new meanings and imaginaries, and look ahead how they can accommodate new forms of urban life. Therefore, architectural interventions play a pivotal part in the research process to explore the multiple issues of the reconversion rather than be limited to bringing solutions to technical problems. A one-week international design studio gathering more than forty participants structures the investigation process. In order to release external perspectives, foreign architects are entrusted with design tasks, including the production of architectural proposals.

2.2. Observation framework

The REA1 project is observed *post hoc* by the author, which was one the co-organizer of the investigation studied. Consequently the study is approached with an *emic* viewpoint (Lucas 2016, p. 10), produced within the particular culture and the human activity observed, and witnessing a form of engagement with the plurality of actors involved in the case study. Moreover, no specific observation protocol was set a priori of the case study. The consequential interpretations appear thus limited to an experience feedback.The observations draw exclusively on the collation of physical materials produced during the project, photographs and notes taken during collective discussions. However, as the investigation was conceived for providing design tasks - feasible in the relatively short time frame of an intensive design studio - and result in architectural propositions. The procedures observed are mostly narrowed down to visual and graphical investigative techniques and exclude other discursive enquiry modes producing textual evidence (interviews, on-site observations, questionnaires etc.).

3. Process Observed

Over a year, the research went through several work phases, which mobilized various inquiry modes (archive research, literature review, field investigation, mapping and research-by-design studio work) and different actors (researchers, urban stakeholders, architects, artists, external participants). The particularity of this collective project is the structuring of the investigation in three distinct processes: the preliminary research, the design phases, and the discussions.

3.1. Preliminary research

In order to generate design proposals casting light on the widest range of this housing typology, the first steps of investigation aimed at better understand the very design of the apartment building and the common and particular questions raised by their relationships with their close context. Upstream of the design phases, the preliminary research was thus threefold:

1. - Draw a mapping of the typology distribution and its urban impact,
2. - Characterize the main dimensions of the architectural and urban issues,
3. - Select relevant study cases for the research-by-design phases

3.1.1. Mapping. The apartment building is a geographically dispersed typology in Liège that mainly appeared through demolition-reconstruction operations. Opportunistically, promoters seized the occasion in various neighbourhoods to buy an affordable existing house in a narrow plot and replace it with a high-rise building. Thus, the geographical distribution of these architectures in the city fabric had to be identified and characterized in order to measure the overall housing stock and figure out the scope of the research. Evidences were collected to objectify the field of inquiry and inventory a set of selected data, ranging from literature review to building permit census, statistical records and field observation surveys. In a series of field-driven iterations, the materials collected were progressively selected according to what the field revealed and the match/mismatch with the knowledge being created.

A first mapping of the localization of the apartment buildings built between 1950 and 1980 in Liège (see fig. 1) gave a synoptic view of the places affected by the real estate boom and further in-depth examinations revealed new issues about their urban peculiarities. First, although the buildings are mainly concentrated among the quays and large boulevards, their uneven spatial distribution disrupted what seemed at first sight to be the sheer repetition of the same model. Some diversity in the integration and the morphological structure of the architecture could be observed. Secondly, the emergence of distinct allotment scenarios within the urban block appears. The sum of individual "opportunistic" operations within a close area had a strong impact on the shape and the functioning of the whole urban block. Thirdly, within the block, the ground floor configurations (mostly dedicated to automotive mobility) es-

tablish new types of thresholds and boundaries between the public realm, the collective spaces and the individual domestic spaces.



Figure 1
Apartment buildings built in the city centre of Liège between 1950 and 1980 (source : Qgis)

3.1.2. Characterisation. Consequently, during a second step, we focused on spatial concerns and released overlying themes structuring the research field around three levels of questionings:

1. - At the apartment scale: how could we provide diversity in the internal layouts of the apartment and renew the limited repertoire of typical plans?
2. - At the building scale: how could we leverage the spatial organisation of the building within the plot to propose new ways of living together?
3. - At the urban scale: how could these high-rise developments provide more urban added value and impact positively on their immediate context?

3.1.3. Case selection. The field of inquiry being defined with these criteria and overlying themes, site-specific situations were selected as case studies for the research-by-design investigation. The case selection strategy was based on a *maximum variation cases selection* up to "(...) obtain information about the sig-

nificance of various circumstances for case process and outcome; eg. three to four cases which are very different on one dimension" (Flyvbjerg 2006, p. 34). The sampling of critical situations resulted in the selection of four distinct urban blocks with varying morphologies and distribution of apartment buildings (see fig. 2), for purposes of their explicative power: the proposals developed in such radical cases would potentially bring knowledge on a wide panel of apartment buildings.

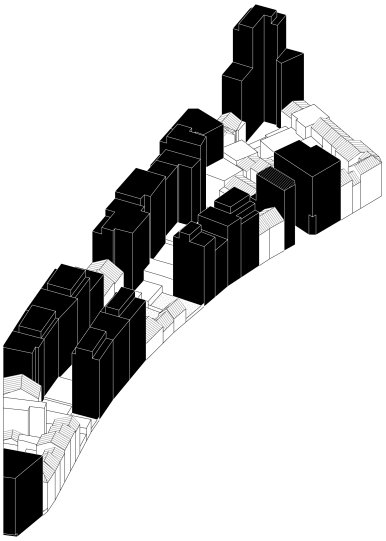

Figure 2
The Churchill block, one the four sites selected as a case-study. The distribution of the apartment buildings in this narrow XIXth Century urban fabric generated in an almost canyon-like spatial situation and a striking contrast between three stories mansions and ten stories buildings.

The preliminary research is pivotal to delineate the field of inquiry and set its scope, but also to fuel the later design research operations. It is an "input" phase for architectural research (Verbeke 2002), that supplies a following research step but "may also compromise some of the starting ideas and thoughts of the researcher who interested in the design process (...)" (ibid. p. 161).

3.2. Design phases

Each case study was assigned to a team of architects composed of 9 young designers (students in architecture or graduated architects) led by one senior designer (a tutor), whose professional practice illustrates preoccupation on the topic. Each tutor previously defined a statement assimilating the overlying themes, shaping new working hypothesis and providing orientations and expectations on the design task. The outsourcing of the design phase provided therefore four distinct and radical approaches, with particular design research methods applied to the field of inquiry. The teams worked in parallel, developing their own appropriation of the general research questions with regard to a specific site, specific buildings and design techniques (fig. 3).



Figure 3
Collage techniques used as a research means for clearing the private parking lot spaces and defining a new landscape inside the block (documents: Juliette Gilson ; photo: Guillaume Joachim)

Original design proposals were then developed during a week, with the aim of revealing the transformative potentials and propose reconversion strategies for the apartment buildings. The knowledge produced during the preliminary research was closely examined, questioned and recombined. Practically the architects participating to this research phase become then leading actors: they internalize the statements, and develop personal stances and attitudes by the means of design proposals and design experimentations.

3.3. Discussions

The teams of designer worked in parallel in open workshops, their work in progress being constantly pined up. This set up enabled the cross-examination of the results and the different design methods, and triggered a shared awakening on the common issues at stake. Informal interactions were encouraged in order to confront the point of views.



Figure 4
Twofold presentation of the proposal of a group advocating for a "new model of ownership". The slideshow presentation (left) of the narratives and arguments is complementary to the setup of four different spatial schemes (right). photo : Guillaume Joachim

A couple of formal reviews (mid-term and final critique) with the whole research group and external guests were organised. These collective discussions forced all researchers to select their more representative documents and present their output in a coherent setup (fig. 4). With four groups working in parallel, the debates phases brought many crossing comparisons, new insights and fruitful discussions. Unfortunately, none of these debates had been recorded for research purposes.

4. Insights and impacts

Results of the design process

The resulting projects could be grouped in four categories, proposing respectively:



Figure 5
Four alternative scenarios from the same typical floor plan (document : team Filipe Magalhaes)

- A new floor plans repertoire. By exclusively focusing on the floor plan of the apartment, this series of proposals challenged the repeatability of the same typical plan within the same building (fig. 5). Drawing on compositional variations, these schemes open the perspective of a great variety of spatial partitions and a new range of internal uses.
- New ways of living together. Questioning the existing physical barriers between private and collective spaces, these projects put forward new or-

ganisations of the whole building and push the boundaries of the domestic activities one could completely share in wide open spaces (fig. 6).

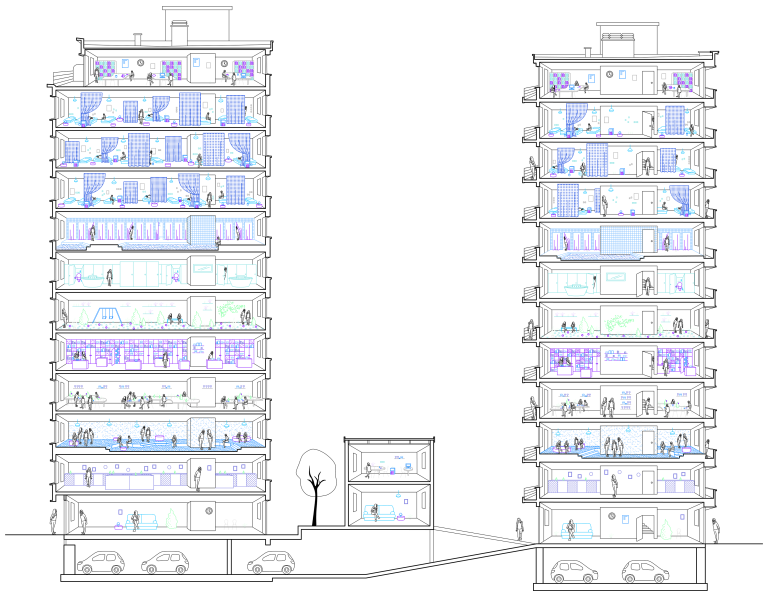

Figure 6
New vertical partition of the housing functions involving fully shared spaces on each floor for each activity (document : Sophie Costa and Jack Huang)

- A new collective status for the groundfloor space. Considering that the base of the building should be a passage rather than a hurdle in the city landscape, these proposals developed a public program getting across the ground level and connecting the public domain with the inside of the urban block.
- A new socio-economical and temporal use of the building. Challenging the concept of individual ownership, these projects proposed a new business model for the condominium and different spatial schemes according to the duration of residence (hours, days, weeks or months).

Developing their own narratives and using different investigative and representational techniques, each proposal thus re-framed the initial research questions and defined their own scope of scrutiny according to their prioritisation of the architectural issues they wanted to tackle. Some proposals were driven by a site-specific approach and the urban specificities of their case study, while others have not. Some new paths cleared by the design proposals relied on generic models little or no related to the urban configurations of Liège but more likely to open a debate on the model of the apartment building. The discussions around the proposals finally raised new issues and critiques on the repeatability

and transferability of the design approaches.

5. Lessons and new questionings

Path cleared

The co-occurrence of all these different appropriations of a common architectural research topic confront the researchers with the complexity and diversity of research-by-design outputs. Indeed, the REA1 project integrates the designing phases in an exploratory inquiry built on a continuous and iterative problematization process, as conceived for instance in the Grounded Theory Methodology (Glaser and Strauss 2009). The research is also characterized with a distribution of this problematization between different actors. Yet a common frame is defined and specific issues are highlighted, designers seized these issues and need to claim a part of the field of inquiry in order to develop their own prospective design proposals. This "distribution" of the design research reinforces the duality of research-by-design: it opens to unexpected perspectives, but yet affords the risk to loose the delineation of the research field, and thus limits the cross-comparison between solutions. Continued efforts to contain the scope of the investigation during the design phases should be envisaged.

Limits of the field of inquiry

The personal involvement and interpretation of the issues by external designers brought to the research an expected fresh look, new perspectives and interesting working methods, nevertheless the meandering paths designing involve could also lead to displacement of the issues (ex : questioning a generic model more than a specific building and site), which forces the research team either to re-frame the design operations with local concerns or even to question their own initial statement.

Anyhow working with parallel design teams brings emulation and great richness of exchange of views, on the condition that the choices and working methods are regularly elucidated. In order to better use design as a research tool in this kind of project, a great attention should be given to regularly explicit the procedures and design moves driving the process. Otherwise the design artefact product at the end of the process remains only built upon tacit knowledge and the research is no longer able to relate the context-related conditions and contingencies of the design proposals. Aside form the stimulation of sharing and presenting design results, an observation protocol should be developed to implement displays for keeping record of the design reflection construction.

A difficult valuation of the outcomes

Sharing a common reference frame and developing new propositions within four distinct case studies is a research strategic bias that relies on complementarity and pluralism. Yet the challenge is to find a way to valorise a series of

heterogeneous outputs, product of distinct perspectives and modus operandi. The strict comparison of the different prospective strategies isn't relevant because of the strong identity developed by each design and the radical position taken as starting point. Better than trying to identify convergences in order to generalize solutions, it appeared in this case that strengthening the particularities of each proposal within its own frame of inquiry could contribute to the characterization of one dimension (or one set of dimensions) of a broader problem. The comparative reading reveals the richness of each new perspective, though without any "common reading grid" the difficulty remains to link some individual frame of inquiry with the overall scope of research.

6. Conclusion

This paper related to an exploratory research project combining the analysis of an existing situation and a set of architectural design experimentations of prospective scenarios. The distributed inquiry setting created a critical distance between the researchers and the field of inquiry they delineated. The distribution of the design work, and its appropriation by different research teams, revealed the importance of the balance between a clear case-selection strategy and an issue-based tactic to put through the disparity of outcomes.

In architecture practice, the prospective dimension of design is generally used in specific projects highly depending on social and spatial contingencies. As such, architects often build knowledge on *case-studies* one after the other, without any frame of reference connecting these cases. An important issue for architectural research would be to elucidate the prospective qualities of the design skills, while at the same time maintaining its sensitive and poetic dimensions. On the one hand to value design within highly speculative studies and projects, and on the other hand to enable discussions based on these designs that push forward the "constituent effect" (Schurk 2015) of the architectural research field.

7. Acknowledgements

This essay has been written thanks to the generosity and advice of the author's partners in the Real Estate Architecture project, Martin Dumont and Benoît Burquel. The author would like to thank both of them for letting him share some personal thoughts based on this common experience. All the 2016 REA1 Summer School participants who provided inputs and illustrations of their production for this paper are also thanked.

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Impact by creative practice research

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Abstract. This paper reflects thoughts and questions triggered by the Impact by Designing conference 'call'. Within the multifarious context of architectural design, "creative practice" is considered a frame of reflection starting with general questions about the relationship between research, education, industry/practice and society; furthermore it focuses on the specific correlations between the impact of research on education and the role of research in creative practice. It offers evidence and the research perspective provided by the University of Ljubljana Faculty of Architecture, the partner within the finished EU ITN project ADAPTr-Architecture, Design and Art Practice Training-research.

Keywords. Creative practice research; research by design; architectural design; impact.

Creative Practice Research in Architecture

Research in architecture (RinA) embraces a variety of research approaches and knowledge creation modes: from a focused theory understood via a general perspective as basic (Frascati Manual, 2015), to practice investigations, interpreted as applied and developmental research. RinA creates implicit (experiential), explicit and relational knowledge modes (Zupancic and Pedersen (eds.), 2017).

Looking into the disciplinary agreement that defines research in architecture (EAAE Charter on Architectural Research, 2012; AJAR contributions from the ARENA network, since 2016), it is possible to broadly define creative practice research in architecture *as research for and through a variety of creative practices*: professional, experimental/artistic, and pedagogical as well as theoretical practices in architecture (Ceferin, 2016). However, if one looks into discussions about art and design practices and their role in research (Niedderer and Rowoth-Stokes, 2007), the definition of a creative practice stays within and focuses upon the area of artistic investigations and design.

Common characteristics of creative practice research are: the existence of the creative practice itself as a body of work that is examined, driven and triggered by research; research focused on doing; a view to the past, the present and the future of the practice(s) investigated. Research focused on and through doing is not exclusive: it includes investigations into design thinking and the behavior of creative practitioners and, it requires contextualization.

'Not all creative practice is research. Venturesome practitioners are identified as those investigating beyond commercial success and who's essential input and output knowledge is capable of developing a relational knowledge base

('knowledge in action', positioned between competence and innovation, 'produced through communication'). Their conscious decision to explicate some implicit/experiential knowledge from their creative practice through relational knowledge development makes the difference, and the decision to develop a discipline of research training contributes to that difference. The new tacit/explicit knowledge is a consequence made recognizable through relational knowledge creation. This consequential relation knowledge is embedded within the communities of creative practice research and (potentially) recognized by the communities of research relevance (wider research communities that find the research relevant).' (Del Vecchio and Zupancic, 2017: 228; for the definitions of knowledge modes see also Verbeke, 2013, Hatleskog et al, 2016, Zupancic and Hatleskog, 2016, Amin and Cohendet, 2004, Amin and Roberts, 2008)

Critical reflections of creative practice research may refer to an individual or a collective practice; they may also embrace the view from within and/or from outside the singularities discussed. The meta-level investigation into a single practice and research across a selected constellation of creative practices are conducted in parallel or through the practices themselves, moving in and out, zooming deeper and wider, shifting from one mode to another in a wide variety of research rhythms. The initial premise of a reflective practitioner (Schön, 1983) is thus developed into its collective state and requires not only reflection but also contextualization that-at least in architecture, due to its social responsibility-needs to reach far beyond the characteristic self-referentiality for (other) artistic practices. The difficulty of reaching out (making research results shareable to other disciplines) derives from the fact that there are research questions that cannot be answered otherwise than through design. And it is difficult to make those processes widely shareable. On the other hand, it is possible to consider designing itself as a discussion platform for knowledge sharing. What needs to be agreed upon within the architectural research community is the relevance and potential impact of creative practice research e.g.: *what are relevant research questions in creative practice research?* Relevance concerns closeness and distance: the conditions close enough and far enough that others are interested in.

Interactions of Research, Education, Industry-Practice and Society

How does research, education, industry-practice and society influence each other, that is - do they interact with one another at all? This is the first question from the *ARENA 2017* conference call. The second part of the question seems to be rhetorical at least to those working in academia. On the other hand the aforementioned factors interact in multiple ways and represent parallel realities we may not even be aware of. This problem becomes more obvious when designers are asked to demonstrate evidence concerning the impact of design on society in general. The first evidence of impact that comes to mind is a set of design awards and design critiques. As creative practice researchers we can

make the claim that research is an integral element of the design process: that process is a wholeness of research-design, that is, 'practice-based' and 'practice-led' (Niedderer and Rowoth-Stokes, 2007). Creative practice research provides an opportunity to investigate the impact of creative practitioner's actions, including the impact of his/her research on creative practice.

How does one collect the evidence of research impact within the design process and beyond it, and how does one identify the indirect impact of design/research? Both collections, the first concerning the direct and the second concerning the indirect impact of design/research, require monitoring, and in short-additional time. The evidence of direct research impact on designing is the long-term changes in process. Direct impact can be traced, for instance, by the main actor through the comparison between the commercially driven design processes from an architectural office and the process of exploratory-hypothetical investigations-in the design studio coordinated by the same architect (group). It can be found in design thinking, in the spatial traces, and in the social behaviors of different audiences. This means the knowledge needed for direct impact investigations comes not only from humanities but also from social sciences. The time frame for collecting and interpreting the evidence of the indirect impact of research on designing extends through and looks beyond the whole opus of a single research/design individual or group.

By being aware of impact while researching/designing we can decide about impact-making through conscious actions where specific impact is predictable; not only through building, writing and exhibiting, but also by contributing to legislative changes through political action. The most important pre-condition for this decision is our ethical position towards society. Some researchers/designers imagine they teach society, others simply respond to societal and/or social needs through our research/design actions. The role of education is nowadays seen as a life-long learning opportunity for all involved. Co-designing and research collaboration are strongly integrated in the contemporary design education that, through public participation, extends to a life-long mode and requires a very high level of research/design impact.

Impact of Increased Research Focus on Education and on Society

Research has an impact on education as well as society, however, the impact of different research modes on education, and hence society, is different. Design oriented (interdisciplinary) research can be very specific; it may scatter the already dispersed knowledge field even over a wider scope. On the other hand design-based research-design research through practice-can be observed through their potential for knowledge integration.

By nature artistic design research is integrative, it generates new modes of knowledge integration at both individual and collective societal levels. Furthermore, it is directed toward the future and as such influences society, shifting the views from the historic, contemporary and future planning to visionary

ways of thinking. 'Visionary' in this context is integrated with time. It is less important when something happens than where it is leading to - its trajectory. The focus is in the projected future, the desired future, not the future as such and is rooted in the past and the present, integrated in the desired future projected now... The difference between a focus on the past and the future can be illustrated by the misunderstandings between art historians, with their focus to the past, and architects...

The impact of design research on society includes better knowledge transference between disciplines. Creative practice research also provides multiple opportunities for the transfer of knowledge from implicit to explicit and relational modes. Design-based research redefines education and society within design thinking itself with the ability to constantly shift knowledge production modes, with the hybridization of knowledge, and with view beyond explicit knowledge creation. Looking beyond the explicit knowledge transfer, it expresses the desire of potential artistic recognition/satisfaction within specific socio-cultural settings through experiential and relational knowledge and artistic sensitivity transfers. The integrative power of creative practice research originates from the relational knowledge creation between creative practice/industry and academia at all educational levels. It redefines research, as it triggers a shift from society driven research towards a research driven society. To identify the communities of research relevance and the potential impact we need to investigate the community of practice and the community of practice research. Now questions arise regarding how to identify the contribution of creative practice research to the wider research communities and how to show the evidence of that impact. The feeling of closeness and distance can be used as an indicator of the relevance of research, which can be sought through local and regional perspectives. Mapping of the trajectories/constellations involved in creative practice research suggests where and how to identify the impact of creative practice research. Looking beyond creative practice research and identifying its contribution to the wider research community is another step. Discussions concerning the sharing of relational knowledge development may help in that step. Many creative-practice research cases are focused on the singularities of creative practitioners and the general nature of explained/developed knowledge. This reflection tends to redirect the discussion to the diversity of contextualization and levels of relevance. A wide variety of knowledge-flows, including the flow from within the creative practice and back again is acknowledged in creative practice research communities. This position is far from individualistic notions of relevance (some creative practitioners are not recognized as creative practice researchers because of not being aware of the need to go beyond this individualistic notion of relevance) and far from the idea, predominant in the currently globally leading research communities (for example those promoting impact factors of research journals), that all excellent creative practice research results need to become globally relevant. This contribution offers insight into how we can identify and trigger intermediate levels of relevance. One level

is trans-disciplinary, and the other is trans-regional; and a third level can be found in the freedom of creative/design thinking itself.

A single research-led design studio run by an Early Stage Researcher within the ADAPT-r project framework (ADAPT-r, 2017; Verbeke and Zupancic, 2014) may contribute to the discussion about the relevance and impact of potential levels of applicable design and research endeavors. The results indicate the power of creative practice singularity to trigger a wide variety of potentials even through a single activity. The investigations of public behaviors as triggers to creative practice research (Zupancic, Hatleskog and Juul, 2017) are shifted here into a reflection on creative practice as a trigger of public behaviors. This is the example of Gitte Juul's urban design studio for second year students of architecture in the summer semester 2015/16 in Ljubljana. Gitte Juul (Juul, 2015) is a proactive architectural practitioner dealing with places of multiple exchanges. Juul is able to adapt to local circumstances rapidly, which is a result of her learned understanding of the socio-spatial mechanisms through creating something 4 in collaboration with local populations. The motivation for such actions is found in the conditions of sensitive places difficult to adapt to socio-spatial situations of contemporary society. An explicit example of such a place is Plecnik's Stadium in Ljubljana, that due to its uniqueness was designated a cultural heritage site of historic importance. In collaboration with the architecture students of the introductory urban design course at the University of Ljubljana Faculty of Architecture, she initiated not only a public debate about an architectural issue but also about collective behavior and rationales and ideals of society. The ADAPT-r days in June 2015 in Ljubljana-the activity organized for the local dissemination of the ADAPt-r project-provided a connective opportunity to address and potentially impact multiple public layers and scales of relevance. The students made several installations called 'houses', representing the issues discovered through their investigation of the place-related problems and their historic roots. The religious and military history, the conflict situations, the contemporary structure transforming itself into nature, the commercialization, etc. were first presented to the ADAPT-r audience, the architecture research team, the students and the staff at the faculty roundtable and the "moving exhibition" (Figures 1 and 2). The "houses" that were the results of the research process were disseminated to the general public when the students walked through the city of Ljubljana carrying their structures (Figure 3). They stopped at timeless places designed by Plecnik. The last stop of the moving exhibition addressed the professional public and the politicians at MAO (The Museum of Architecture and Design). Lastly the activity was contextualized by Gitte Juul by integrating the studio and its production into her research meta-level thinking during the ADAPT-r conference in September, 2015 in Aarhus.



Figure 1
A creative practitioner addresses the students, researchers, architectural potilitians (Gitte Juul at ADAPT-r days in Ljubljana)



Figure 2
A creative practitioner addresses the general public (Gitte Juul with students and their installations at ADAPT-r days in Ljubljana)



Figure 3
A creative practitioner addresses researchers and research polititians (Gitte Juul with ADAPT-r and local people at ADAPT-r days in Ljubljana)

The potential-global-impact of this particular case study includes local, regional and interregional areas and addresses issues of architectural heritage and the transformations of sports facilities to architectural spectacle. It also includes the supra-disciplinary field of research across a range of arts and design disciplines, the social investigations of politicality, environmental psychological research, etc.

To identify the evidence of the actual impact of such an action requires a critical distance and a time frame for monitoring. The most evident direct impact of this particular action can be traced in the educational context of the involved faculty. The positive students' response challenged the organization to another research-led introductory urban studio within the ADAPT-r context in 2015/16, with Karli Luik, another early stage researcher. After the project is finished, the didactical setting is maintained and managed by the local faculty staff. The workshop context is not new; what is new is that it is offered as an examination option for the most active and passionate students of a compulsory course - for those who know what to do when given the freedom of investigation. What is also new for our students is the experience that they don't always need to propose a spatial solution. They can show the problem while designing; by challenging others to search for solutions they can show the actual site-specific potentials of places to people, and to place-sensitive investors

they can expose and open the opportunities that are sensed in selected places instead of passively responding to the requirements of the globalized market.

After the finalization of the EU ADAPT-r project, the conditions for PhD supervisors at the University of Ljubljana have dramatically changed. The experts doing artistic research don't need to hide behind articles and books as primary evidence of their research activity any more (although they still favored the impact factors of bibliographic databases that now seem anachronistic).

This is the result of several parallel endeavors, not only due to the ADAPT-r partnership but also due to the wider contextualization of the local conditions that helped the local research community identify our research flows more clearly. Feeling close to the research flow of the ADAPTr partnership triggered reinvestigation of our own integral research tradition and its impact (Zupancic, 2005, 2009, 2012, 2013, 2014), which had already included creative practice research and the research by design before the ADAPT-r project implementation. The ADAPT-r project brought these approaches out of the research tradition mentioned without losing the desire for strong theoretical research contextualization. On the other hand there are some researchers who feel distanced from this tradition because of its focus to knowledge creation and to the explication of its tacit dimensions. They are developing a new doctoral program where the final result of the doctoral training is not focused on the creation of knowledge but to artistic creation itself, as a result and a dissemination interface of the new insights. The changed conditions for PhD supervision fit both local research flows and the potential impact on the involvement of new types of PhD researchers.

Impact of Education on Research and on Society

There are many didactical questions emerging from creative practice research, especially where education is the main area of the research investigation relevant for all creative practitioners involved in any form of teaching. When a creative practitioner is involved in research training, the rhythm itself influences the research flow directly. The question is how to behave as a supervisor of a creative practitioner to trigger the flow when needed - how to define such moments? Research training can be seen as an educational opportunity for all participants: a creative practitioner, the community of practice (including the teaching practice) and the community of practice research (including the supervisory community). Local or regional general public can be seen as a part of the community of practice while trans-regional supervisors, reviewers and peers can be referred to as a part of the community of creative practice research. This is the personal infrastructure through which society in general is affected by a singularity of a creative practice.

Research as a Transformer of a Creative Professional Practice

The conscious decision to develop a discipline of research training releases creative practitioners from the everydayness of practice-focused design modes. Research becomes the new everydayness, i.e. the constant force questioning the relevance rote rountine. This is the main emphasis of the research occurring during a predominately professional career. The role of practice integration during the academy-focused career seems to move in the opposite direction but has similar results; integrated, balanced careers become possible in both cases. Academic and non-academic divisions shift to the duality of exploratory and routine practices - the exploratory practice can predominate step by step. The creative practice researcher is able to accustom his/her professional roles and types of actions to continuously changing design and research conditions: from 'pure' designing to management/leadership, evaluation, consultancy, policy making... all through designing. Design research maturity means having a critical distance and the ability of individual and collective meta-level design thinking development.

Impact of Society on our Research Endeavours

Research is a social construct. Research excellence is socially defined and depends on the research policy-related power of identifiable social groups; this can be similarly construed regarding design and its quality. The social shift to the practical, for instance, shifts our awareness of what we can identify as leading to that direction.

Society impacts our research behavior directly and indirectly: directly through the priorities of the research-calls and the economic stimulation of specific research flows (EUA, 2017), through the academic evaluation systems and indirectly through the notions of established research excellence or fashionable behaviors. The title of one of the actual public policy events is "Maximizing the Contribution of Culture towards Social and Economic Development" (2017); the question being: How can culturally rooted research shift this attitude to 'Maximizing the Socioeconomic Contribution towards Culture-driven Development of a new Civilization?'

Impact of Industry and Creative Professional Practice on Innovation in the Discipline

This is where innovation is born - parallel or directly integrated with academia.

Mutual Interactions and Relationships between Research, Education, Practice and Society

Research contributes long-term thinking to practice; its feeds from and is fed by education, practice and society. Research education, education research, society research, practice (oriented) research, practice based research and research

through practice (through design in our case) are all intertwined in a new global research wholeness of the practice-turn in research.

Impact of Creative Practice Research in Architecture

It can be argued that the research focus in architectural creative practices offers a high potential of improvement to the ethical position of creative practitioners in architecture towards education and society, at least through the raised awareness of their professional responsibility in specific socio-spatial contexts. It contextualizes architectural research into various socio-spatial contexts directly. The research impact can be traced not only within the communities of creative practices but also within the variety of socio-spatial contexts mentioned.

Creative practice research places architecture within the domain of research, offering a powerful model of vitalized insights embedded within integrative creative flows. Creative practice research can be seen as a contemporary driver of contextualized architectural endeavors. It questions any categorization of architectural research into, for example, 'scientific' ('explanatory'), 'by design' ('exploring') and 'artistic' ('questioning'; R. Foque, 2010). It adds the social dimension into the discourse and integrates the research endeavors into an unified but multifaceted future oriented research flow.

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Understanding impact in creative practice research

Exploring the effectiveness of the practice-based doctoral training on industry and pedagogical approaches

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Abstract. The purpose of this paper is to disseminate the first insights of the research undertaken within DAP_r - Design and Architecture Practice research - a project funded by the Australian Office for Learning and Teaching and led by RMIT University (Melbourne, AU). The research focuses on the impact and contribution that doctoral training has on professional practice and pedagogical approaches in Creative Practice Research. The research work starts from surveying and evaluating the effectiveness of doctoral training on the two realms, moving from the assumption of the interaction and mutual nourishment between practice, research and teaching. The paper firstly identifies the need for a comprehension of the complex and multi-layered nature of the concept of impact, showing an overview of meanings within different contexts. An exploration of the sense that impact has in Creative Practice Research is then presented with the aim to contextualise the concept, exploring its specificities and perspectives within the field. The paper finally shows initial insights, purposes and expectations for the research work recently started within the DAP_r project.

Keywords. Creative Practice Research; Practice-based PhD; Impact; Pedagogy.

Introduction: the DAP_r model

The purpose of this paper is to address the impact and contribution of doctoral training on professional practice and pedagogical approaches in Creative Practice Research and to disseminate the first insights of the research work recently started within DAP_r - Design and Architecture Practice research - a two-year research project funded by the Australian Government - Office for Learning and Teaching.

DAP_r is a collaboration of 14 Australian universities, led by RMIT University (Melbourne, AU), aiming to share and disseminate the model of the practice-based PhD across Australia and to develop stronger connections between industry and academia.

The project looks at the immediate impact and contribution of doctoral training both to the professional and academic realms, considering pedagogy as a core element of such a training for future academics.

The program aims to provide a review of industry and teaching effectiveness of the PhD training, to increase research capability and quality in both industry and academia by connecting practice, research and teaching, and finally

to develop a community of studio-teachers who are simultaneously industry embedded and PhD trained for teaching in architecture and design academic programs. The findings of the projects will be used to inform further refinements of the doctoral program.

DAP_r builds on the knowledge and experience produced through ADAPT-r - Architecture, Design, Art, Practice Training-research - an Initial Training Network funded by the European Union 7th Framework Programme. The three-year project recently concluded, aimed to disseminate the practice-based PhD model in Europe, investigating the main features of Creative Practice Research and its doctoral training and the effects of connecting practice with academia.

Two interwoven research directions: evaluating the impact of the practice-based doctoral training on professional practice and studio teaching

The research conducted within DAP-r moves towards two main directions: on one hand surveying the immediate impact of doctoral training on the context of professional practices, on the other providing a review of the effectiveness on pedagogical approaches to studio teaching in design disciplines.

The evaluation takes its first steps considering the value of the connection, interaction, and mutual nourishment between practice, research, and teaching, as shown by the ADAPT-r research findings (Buoli, De Marinis, Ottaviani, 2016).

The first research direction focused on the impact and contribution of the PhD program to industry, as stated in the DAP_r Grant Document (DAP_r, 2015): *"Specifically the survey will look at the ways in which the development of "researcherly" ways of working by practitioners/PhD candidates impact on professional practice and the way in which engagement with the impact of the venturous practice on academic research*". The survey involves observation of and interaction with creative practitioners. A series of practitioners coming from different disciplines, such as architecture, landscape architecture, product design, interior design, and fashion design, will be involved in a process of individual interviews and collective workshops. This evaluation specifically builds on the research findings produced within the ADAPT-r program, which demonstrates how doctoral training allows creative practitioners to surface their tacit knowledge, to understand the urges that move their practice, to be able to articulate that knowledge and to finally improve their ability to communicate their knowledge in the discourse with their clients and Communities of Practice (Buoli, De Marinis, Ottaviani, 2016a). The DAP_r research draws on the ADAPT_-r findings aiming to move a step forward in understanding the potential of undertaking a practice-based PhD for creative practitioners.

The second direction of the research starts from considering the evidence that many PhD candidates have mentioned the productive ways in which studio teaching has interfaced with their research, provided by the existing body

of work produced at RMIT University and the ADAPT-r findings (Buoli, De Marinis, Ottaviani, 2016). Moving from this assumption, the DAP_r research reflects on the nature of studio teaching and explores the impact and contribution that the doctoral training can have on the pedagogical practices applied by creative practitioners in studio teaching. In order to do so, creative practitioners will be interviewed in individual and collective formats, with the aim to collect evidence of improved teaching practices due to the doctoral training. The research work looks at the benefits for studio teaching environments in the academic system and potential benefits for students and their understanding of the nature of practice.

The two research topics are addressed in a parallel, observing intersections and ways in which practice, research and teaching are brought together in a mutually beneficial process.

According to the main paths of this research work, a series of triggering questions have been defined, aiming to trace possible boundaries and horizons for the research:

What does impact mean?

What does impact mean in the specific context of Creative Practice Research?

How can impact be measured and evaluated?

What are the key elements to measure/evaluate?

Where to look for impact?

Who are the beneficiaries of impact?

What is the role of time in impact?

Impact: a multi-layered concept

In undertaking the research work and reflecting on the formulated questions, an urge to explore more in depth the meaning of impact has immediately emerged.

Impact is, in fact, a complex and multi-layered concept and defining it is a crucial challenge since the way impact is defined and used has significant effects on its evaluation. It is, therefore, particularly relevant to describe and contextualise the meaning of impact this research work refers to.

As pointed out by Methods Lab, an action learning collaboration between the UK Overseas Development Institute, BetterEvaluation and the Australian Department for Foreign Affairs and Trade that has undertaken an in-depth study on research impact: *"The way in which impact is framed has a significant influence on development processes and how programmes are designed, managed and evaluated"* and suggests the urge of clarity while talking about impact: *"Given the implications of different conceptions of impact, there is a strong imperative to be very clear about what we mean when we use this term and to use it carefully"* (Hearn & Buffardi, 2016, p.8).

The term impact is defined as: *"The action of one object coming forcibly into*

contact with another; A marked effect or influence" (Oxford Dictionaries, 2017). Such statements lead to reflect upon the idea of impact as something new coming on the status quo, provoking reactions and changes on it.

A series of definitions according to different international organisations have been collected in order to provide a wide overview of the concept within different frameworks:

"Research impact is the demonstrable contribution that research makes to the economy, society, culture, national security, public policy or services, health, environment, quality of life, beyond contributions to academia." (Australian Research Council, 2015);

"Impact is defined as an effect on, change of benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia" (Higher Education Funding Council for England, 2012);

"In an impact assessment process, the term impact describes all the changes which are expected to happen due to the implementation and application of a given policy option/intervention. Such impacts may occur over different timescales, affect different actors and be relevant at different scales (local, regional, national and EU). In an evaluation context, impact refers to the changes associated with a particular intervention which occurs over the longer term" (European Commission, 2015);

"Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended" (Organisation for Economic Co-operation and Development, 2002);

"Impact implies changes in people's lives. This might include changes in knowledge, skill, behaviour, health or living conditions for children, adults, families or communities. Such changes are positive or negative long-term effects on identifiable population groups produced by a development intervention, directly or indirectly, intended or unintended. These effects can be economic, socio-cultural, institutional, environmental, technological or of other types. Positive impacts should have some relationship to the Millennium Development Goals (MDGs), internationally-agreed development goals, national development goals (as well as human rights as enshrined in constitutions), and national commitments to international conventions and treaties" (United Nations Development Group, 2011);

"Academic impact: the demonstrable contribution that excellent research makes to academic advances, across and within disciplines, including significant advances in understanding, methods, theory and application. "Economic and societal impacts: the demonstrable contribution that excellent research makes to society and the economy. Economic and societal impacts embrace all the extremely diverse ways in which research-related knowledge and skills benefit individuals, organisations and nations" (Research Councils UK, 2014);

"Improved health outcomes achieved. The overall impact of the Organization sits at the highest level of the results chain, with eight impact goals. Outcomes can combine in different ways to contribute towards one or more impacts" (World Health Organisation, 2017);

"How an intervention alters the state of the world. Impact evaluations typically

focus on the effect of the intervention on the outcome for the beneficiary population" (3ie, 2012).

The understanding of impact can be thus very diverse, broad or well framed according to the specific context of reference. A crucial issue is then to trace the boundaries of a shared understanding, within the specific context. The respect of diversity and specificity in research disciplines is a key element in addressing the concept of impact.

Impact Layers

A series of Impact layers have been identified and defined in order to better understand the concept in relation to the specific context of reference. Such layers, described through the five W's formula, suggest coordinates to orient the exploration of impact, providing a simple tool for an initial understanding of it.

What / application. What is the application of impact? This level refers to the type of impact the evaluation is looking at, whether it refers to impact expectations, ongoing effects, or after completion effects, namely to potential effects, desirable effects or observed effects (Hearn & Buffardi, 2016, p.12).

Where / context of reference. What is the referential context of impact? This level aims to define people, groups, contexts, communities, sectors, fields, institutions, organisations the evaluation of impact refers to.

Why / aim. What is the objective of looking at impact? This level addresses the variables involved in impact evaluation, identifying if there are predefined variables to evaluate or whether looking at impact from an open perspective, seeking for predetermined as well as unforeseen variables.

Who / beneficiary. Who is the beneficiary of impact? This level aims to understand who are the people, groups, contexts, communities, sectors, fields, institutions, organisations that benefit from impact, looking at primary and secondary beneficiaries.

When / time. What is the role of time in terms of distance, duration and variability in relation to impact? This level aims to define short-term and long-term effects and to understand if impact is static or variable.

Impact in the specific context of Creative Practice Research: first insights

The analysis of impact and its multiplicity suggests the need to define a shared understanding of what the concept of impact means in the field of Creative Practice Research. A series of reflections have resulted from the first research explorations:

- *Specificity*

As mentioned in the previous paragraph, importance is given to the specific context impact refers to, considering diversity and specificity. As Creative Practice Research is different from traditional academic research, evaluation methods borrowed from other research contexts does not enable to capture

the complexity of such a unique context. A specific evaluation method is required, able to measure the quality of effects. This idea follows the shared understanding that Creative Practice Research cannot borrow the traditional research methods, but rather requires a set of methods specifically built for its purpose.

It is, therefore, crucial to contextualise impact, tracing boundaries, defining implications and specificities, towards a common understanding of the concept in the field of Creative Practice Research.

One of the main aims of this research work is, in fact, to build up a specific method to evaluate impact in the specific field.

- *Embedded translation of research into practice: PhD as an "infrastructure" to impact*

Research impact refers to the translation of research in practice, as the Australian Research Council suggests: *"Knowledge transfer is deliberately embedding knowledge for use in a context beyond the researcher's own sphere"* (Australian Research Council, 2015). Translation of research from academia to industry is one of the main focuses of university strategies, this implying that research outcomes need to be transferred to a real context in order to have an impact.

In the specific context of Creative Practice Research, the dichotomy between research and industry disappears, as they actually coincide. Translation of research outcomes in practice doesn't require an a posteriori action, as it is already embedded in the nature of the doctoral training. The PhD invites creative practitioners to investigate their modes of practice, their roles as practitioners, their operational knowledge, producing new knowledge that can possibly contribute to the professional realm at large.

Unlike traditional academic research - requiring to bring research outcomes outside the "wall" of academia and look for industry partners, in order to have an impact on society - In a practice-based PhD research is already embedded in industry. Professor Leon van Schaik, referring to the work of Boyer (1990), explains this intersection, suggesting that: *"(...) practitioners do not research or teach; they engage in four closely interrelated modes of scholarship: Discovery, or the uncovering of new knowledge. Integration, or the incorporating of new knowledge into the existing knowledge base of a field; Application, or the establishing of ways in which to apply new or newly integrated knowledge into practice; and Dissemination or the communicating of knowledge through publishing, lecturing and designing learning environments"* (van Schaik & Johnson, 2012, p. 25).

The PhD works in fact as a bridge between research and practice, revealing how creative practice and research cannot be considered as separated realms. This insight suggests a further understanding of the practice-based doctoral training as an "infrastructure" to impact. As Vaughan (2017, p.13) suggests: *"The development of a framework and capacity to participate in critical reflection about practice while being engaged in the practice is one of the transferable capacities of a graduate that bridges the expectations of the university with the professional*

world".

- *"Zero distance" between impact beneficiary and impact-maker*

Whereas in traditional academic research the beneficiaries of research impact are people, groups, communities, institutions outside of academia, in Creative Practice Research the practitioner-researchers are simultaneously the ones who generate impact through their research and the ones who benefit of such an impact.

This match between impact beneficiary and impact-maker strengthens the evidence of intersection or "zero distance" between practice and research.

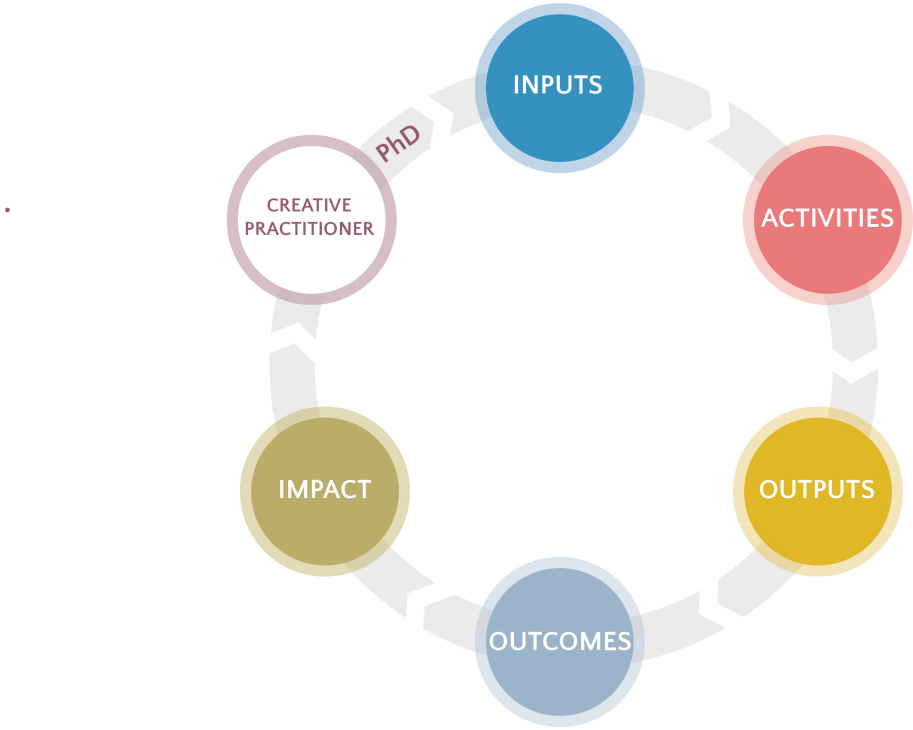

Figure 1
Impact Circular Chain describing the overlapping between impact-maker and beneficiary in a practice-based PhD

- *Multiple primary beneficiaries and the wider context*

Practitioner-researchers are hence primary beneficiaries of the impact and contribution of their research, as the PhD allows them to become more aware of the specificity of their practice, their position and role in the professional realm and within society at large. At the same time inhabitants, groups, communities who are users of the research outcomes, such as design projects or products, are primary beneficiaries too. The community of practices and the academic

communities, practitioner-researchers are part of, can be then identified as secondary beneficiaries, as the new knowledge produced through the PhD, can contribute to the collective scholarship within the field [Figure 1]

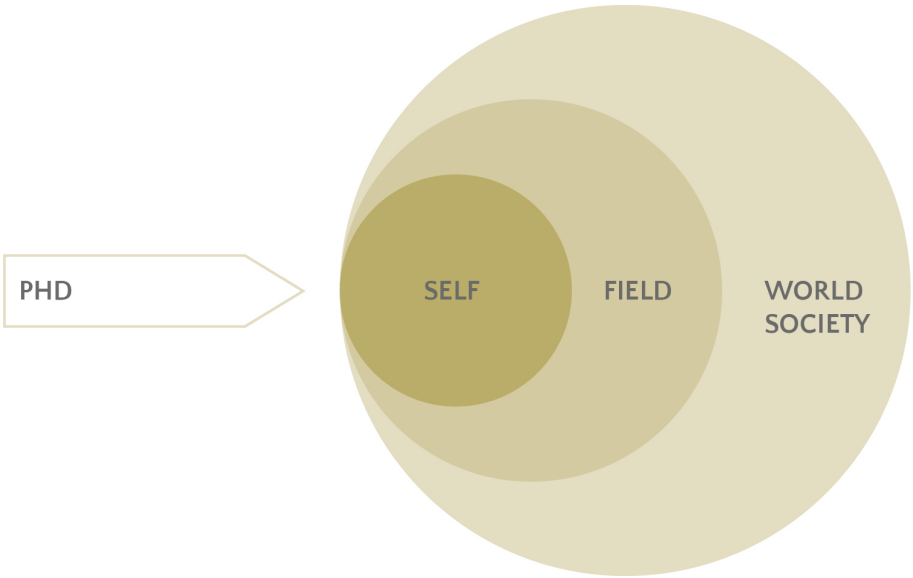

Figure 2
Ripple Diagram describing the multiple beneficiaries of a practice-based PhD

Impact perspectives in Creative Practice Research

Drawing on the data collected in the ADAPT-r project (Buoli, De Marinis & Ottaviani, 2016, 2016a) in relation to features and effects of the practice-based doctoral training, a series of aspects emerge as particularly relevant when undertaking a survey of impact in Creative Practice Research.

Such aspects can be analysed in relation to the level of the beneficiary, whether primary or secondary. Considering the level of primary beneficiary, the main impact of the PhD refers to the contribution to the personal growth of practitioners, increasing their awareness and development of their Tacit Knowledge, due to the self-reflective exploration (Schön, 1983).

This process of awareness is described by Vaughan (2017, p. 13) as a *"Transition that people experience when undertaking a PhD in design (...) they transform from being designer-practitioner to becoming designer-practitioner-researchers"*.

Such a transition has produced a variety of effects on practitioners' experiences such as a shift in the practice direction, a stronger definition of its nature, or the expansion of the practice. Furthermore, the engagement with the PhD framework and the conversation with the PhD community have generated the establishment of new collaborations for many practitioners. The doctoral training provides practitioners with the tools to better communicate their practice, producing effects on their relationship with clients. Practitioners also valued

the contribution of the PhD on their teaching activity stating that during the PhD journey they discovered a strong connection between research, practice and teaching and that their teaching ability has improved due to an increased awareness of their practice and its specificity (Buoli, DeMarinis & Ottaviani, 2016a).

The users of the projects or products that practitioners generate through their practice, can be considered as primary beneficiaries too. Thus, it is crucial to evaluate the impact on the cultural, social and political contexts. Practitioners show how the PhD training provides them with a stronger awareness of their public voice as well as with a framework to undertake new self-commissioned projects, establishing a dialogue with social, political and administrative institutions, hence transforming spaces, policies and behaviours (Buoli, DeMarinis & Ottaviani, 2016a)

Considering then the level of the secondary beneficiary, it is relevant to evaluate the contribution to knowledge in the field that practitioner-researchers can offer to their community of practices and academic communities. Creative Practice Research leads to interdisciplinary collaborations as it offers to academic contexts a new specific method for investigation and collaboration, beyond disciplinary boundaries. Therefore, the impact that the practice-based PhD can have on other disciplines and fields creating new collaborations and dialogues, needs to be evaluated too: *"(...) doctoral design education is a crucial part of building research capacity for a critical design material culture that extends beyond design classrooms and connects with wider interdisciplinary inquiry, one that increasingly looks to design for innovative and situated knowledge production*" (Vaughan & Morrison, 2014).

Such initial reflections will guide this research work through the collection and interpretation of data, with an open view towards unexpected and unforeseen perspectives.

Research methodology: how to evaluate impact in Creative Practice Research

The research moves with a heuristic approach, undertaking a study and analysis of a group of creative practitioners that already completed their PhD, exploring their works and words. The research is addressed from a meta-level perspective aiming to provide evidence of the impact of doctoral training in both professional practice and academic studio teaching.

The "Case Studies" for the research will be selected among creative practitioners that completed a practice-based PhD in the last 10 years, in one of the universities involved in the research project. The analysis draws on the meta-research methodology developed within the ADAPT-r project (Buoli, DeMarinis & Ottaviani, 2016, 2016a), which makes reference to qualitative research methods, using different tools in order to collect information from different perspectives.

The selection will be addressed seeking for a diverse range of completed PhDs, coming from different fields, having different practice sizes, and being at different distance in time from the PhD completion, with the aim to collect a wide overview of the understanding of impact and its implications in Creative Practice Research.

The main activities of this research work will include individual interviews with completed PhDs, which will provide data for a compared analysis aiming to surface similarities and distances, and workshops focused on both evidence and expectations of impact. The workshops will involve completed and ongoing PhDs, with the aim to trigger a discussion on the topic and to produce new collective knowledge through conversation.

Expected outcomes

The research work is at its very beginning and a series of expected results have been identified. A foreseen result concerns the delivery of a clear sense of the specific meaning of impact in Creative Practice Research, then a consequent result relates to the collection of evidence of such an impact from the experience of a series of completed PhDs, showing common trends, similarities and differences. The research then expects to deliver a clear understanding of the nature of studio teaching and its connections and interactions with doctoral training.

More broadly this work aims to contribute to the debate over Creative Practice Research, its legitimacy and specificity among other research fields and specifically on the debate over appropriate ways of evaluating and validating research in this specific field.

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Design practice and education as a research process

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Keywords. Architecture; Model; Drawing; Design Studio; Professional Practice.

Abstract. This paper aims to address the question into what ways are research tools in practice and education influencing each other by observing the relationship between professional practice and academic production of students. In this process, reading the permanent tools such as the drawing and the model, we support the research thematic in professional practice, from conception to construction, by exploring design process of architect Alvaro Siza and of our own office. We also address this thematic with case studies examples of design studio assignments from the 1st cycle to the 2nd cycle. This paper results largely from our teaching activities but also from the critical observation of the design tools used in professional practice inquiring a reciprocal relationship between these two learning phases.

INTRODUCTION

We aim to address the question in what ways are research tools in education and practice influencing each other. In addition, if there is any increases focus on the professional research tools affecting education and *vice-versa*.

Currently there is an intensification of the interest in new design tools, as for example the digital systems of architectural modelling, being these the most debated contemporaneously. However willing us the relationship between professional practitioners, teachers and academic production of students, this intergenerational extensive over time reading, enforces our interest to the most permanent tools in the field of architecture, as the use of the drawing and the model. It is through these two tools that we analyze the current scope of its use in professional practice, by exploring design tools process of architect Alvaro Siza and our own office, as well as in design studios teaching, from the 1st cycle to the 2nd cycle of architecture courses.

The interest in this thematic result largely from the critical observation of design tools uses in both our professional and teaching activities that inquired a reciprocal relationship between these two learning stages.

ARCHITECTURE AS SYNTHESES

As Siza notes the study of architecture is made of successive additions, where nothing is autonomous *"Architecture depends on the complexity of its transfiguration only transforming itself when the guessed or assumed syntheses reach equilibrium.*

The universality, relating all the elements that compose architecture, is a process in which are created the whole and the parts that influence each other, supporting the reflection upon architectural production". (Siza, 2009, p. 85) and it is through design practice that this synthesis in architecture is sustained.

Similar to the design practice we argue that the design studio education seeks to respond to the *"will"* to achieve the expression of a present time, its *zeitgeist*. Seeking what remains between each singular condition and the universal ambition to create a "whole" from the connection of distinct parts (the several subjects studied) and where the research tools act as support and reflection upon contemporary architectural production. In this sense, it becomes increasingly important that academic institutions seek to research upon design studio education as a promotion of knowledge, linking it to the socio-economic emerging problems and its reflection in the living space reality. This means to recognize the design and its tools as a thinking process to response to the current demands of architectural objects and urban space construction. Therefore, the creative condition of architecture and its education, cannot take place without a conviction, of the necessary up-to-date contents of its teaching that also allows the possibility of a mistake trajectory.

RELATIONSHIP BETWEEN PROFESSIONAL PRACTICE AND EDUCATION

We argue that schools are the privileged place of a critical visions and desire for transformation of the disciplinary field. Are schools reverberation centre of the architectural impulses developed in the practice of the profession assimilating them into learning methodologies? Do these methodologies subjected to critical scrutiny simultaneously returns like a medium of transformation to the professional activity?

We identify in the shortening of the educational programs the results of acceleration of times which the practice of the profession tends to instil. However, teaching means renewing the enthusiasm that, due to its own contingencies, the profession practice tends to discourage *"(...) school is generosity and aptness of utopia (...) it means learning, shelter, starting point, eclipse of the break of the will". (Siza, 2009, p. 126)*. This acceleration also reflects itself in our design studio courses progressively, shorter in time classes periods and more fragmented in their curricular program (from annual to two semesters), condition in Portugal brought by Bologna educational procedure.

We believe that the design studio and its primordial and permanent tools, drawing and model, continues to be central in the architectural education due to its inherent experimental field that encourages students to develop creativity and critical skills. *These competences allow the progressive acquisition of formal dexterity taken from a recognized didactic of incentive to individual creativity that confers the capacity to give order to "things" (Bergera, 2011, pp. 10-15)*. This didactic using the drawing and model as design tools that intend to strengthen

the acquisition of student's individual inventiveness and methodology starts in our school from the first year of design studio.

The understanding of the individuality of architecture work and recognition of the reasons underlying the personal design of a project allows (re)apprehending a method and different use of the tools that establish the "certainties" indispensable to the produced architecture. The structuring principles and the design composition tools used in the construction of an idea configure themselves as synthesis of elements that inform their content. In this way *the learning process requires a method and a project training that allows discovering the "internal order" of the formal mechanisms to (re)apprehend them and to project from the informed memory (Labarta, 2011, pp. 34-46)*.The architecture tools, *the drawing and the model, have persisted as fundamental to which new knowledge, techniques, means of representation and communication are associated in the (re)formulation of construction methodologies through the ideas of the design (Milani, 2010, pp. 1-8)*.

TOOLS OF PROFESSIONAL PRACTICE AND DESIGN STUDIO

Even though regarding the design role as the most common act of architecture, this understanding of design tools, such as the drawings and the models, is hardly subject to critical inquiries and, unfortunately, mostly limited to its communication task. Therefore, the importance of drawing as a process of design research, which contaminates and is contaminated by the education process and professional practice, is the main issue of this paper.

Observing, as professionals and educators, the compulsory creative character of the discipline and, at the same time, the multiplicity and the interdisciplinary themes and thoughts of contemporary architecture, our debate, tries to find the "solid" tools that govern the diverse reasons of professional practice. It is in response to this multifaceted context that drawings and models as tools fit either in design studio of the 1st cycle and of the 2nd cycle. If the design program in the 1st cycle emphasizes the instrumental process of drawing, the 2nd cycle presupposes an approach to the professional thinking practice tools. We present the use of the drawing and model during the two cycles of studies (1st to 3rd, 4th and 5th years) as research tools available for an instrumental process of thinking that supports the construction of ideas.

PROFESSIONAL PRACTICE

In order to correlate design tools thematic in professional practice and architectural education we address the use of these tools of design process in architect Alvaro Siza office and in our own office, naturally due to the cultural proximity and former collaboration.

In architect Siza practice the hand-drawing as a design tool is taken as thinking process from the "desire" to the real. In fact, Siza is a master of the drawing as research and drawing production focusing on relationship be-

tween the mind´s eye and the hand. We show the control by Siza of Marco de Canavezes Parochial Complex design through his instrumental procedure use of diverse hand-drawing parameters, with two overall approaches.

The first parameter approach, the "desire" drawings, is expressed through simultaneous two types of drawings, sketches and rigorous. The sketches experimental and "speculative" as significance freehand tool search the form of the desired character of space proposed. Focus is used through the perspective view (human eye) aiming to calculate the expressions and sensations of space viewed by the user. These "speculative" sketches draw since the exterior set to the inner space. From an outside view, several proposals sketches of volumes search the significance of the imposing presence of the church. This sketch searches the articulation of the morphological programmatic proposed volumes, the Church, Parish Centre and Parish House, with the site constraints, as the different buildings, scales, orientations, ground levels and uses. In the same sketch, a pedestrian perspective comprehends the Church, large city equipment, as a "monument". From an inside view, sketches of several different solutions of space, form and geometries, for the same programmatic area, are testing the correct tension also to give to the inner space. Several sketches of possible geometries for the church apses obverse, interior nave angle, inclined thick wall dimension or possible vaulted ceiling. This way, through freehand "speculative" sketches, the author achieves the intentional expressive character of the space idealized (see figure 1).

After, the model and hand-drawings (plan and sections) appear as a mean of control of the proportions, as the perfect square section of the church nave or the maxim angle for the unbalance inclined wall. Tools of dimensions that measure the accurate tension to imprint to the space or the precise alignments of the volumes proposed. Siza therefore controls the preliminary design through the instrumental use of the diverse type of drawings although its creative nature is largely prepared through his freehand sketches. These sketches reveal mainly Siza´s desire to determine the expressions and sensations of space viewed by the user (see figure 2).

The second parameter approach, the "knowledge" drawings appears during the design phase of the detail and construction process. This process uses also handmade perspectives as important tools. This materialization design sought to coherently strength the ideas that the preliminary design persuaded through the search sketch. However, hand-drawing tools now turn themselves into confirmation and communication drawings. The handmade perspectives act as clarification of the detailed design as medium of communication and support for the construction enterprise.

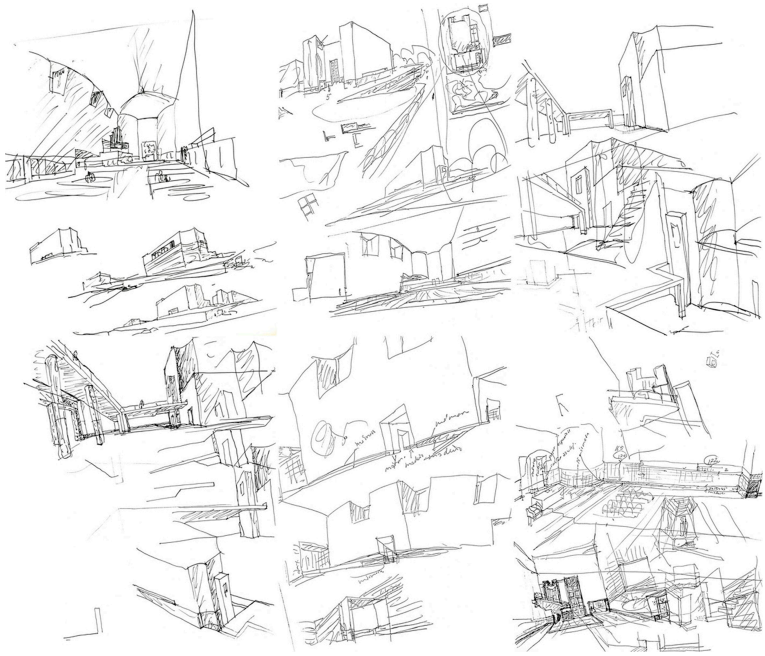

Figure 1
Siza´s sketches of Marco Canaveses Church

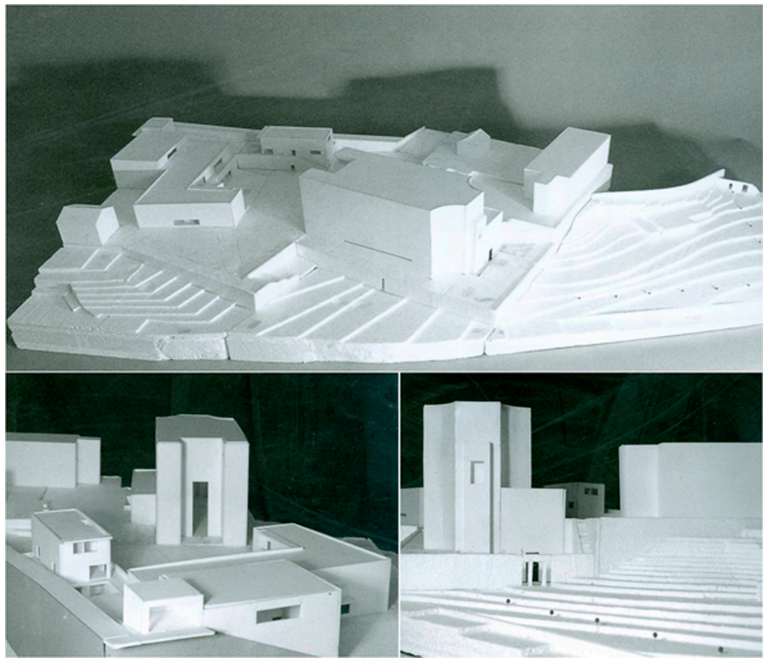

Figure 2
Model of Marco Canaveses Parish Centre

These hand-drawings, now clearly exemplify the drawing communication role, as shown in the final form perspectives of the main bells access staircase stereochromic marble. However, these hand-drawings still research upon the material, as drawn in the two possibilities of the altar, as heavy granite fixed to the ground or pure white marble block that evokes the infinite, the sacred (see figure 3).

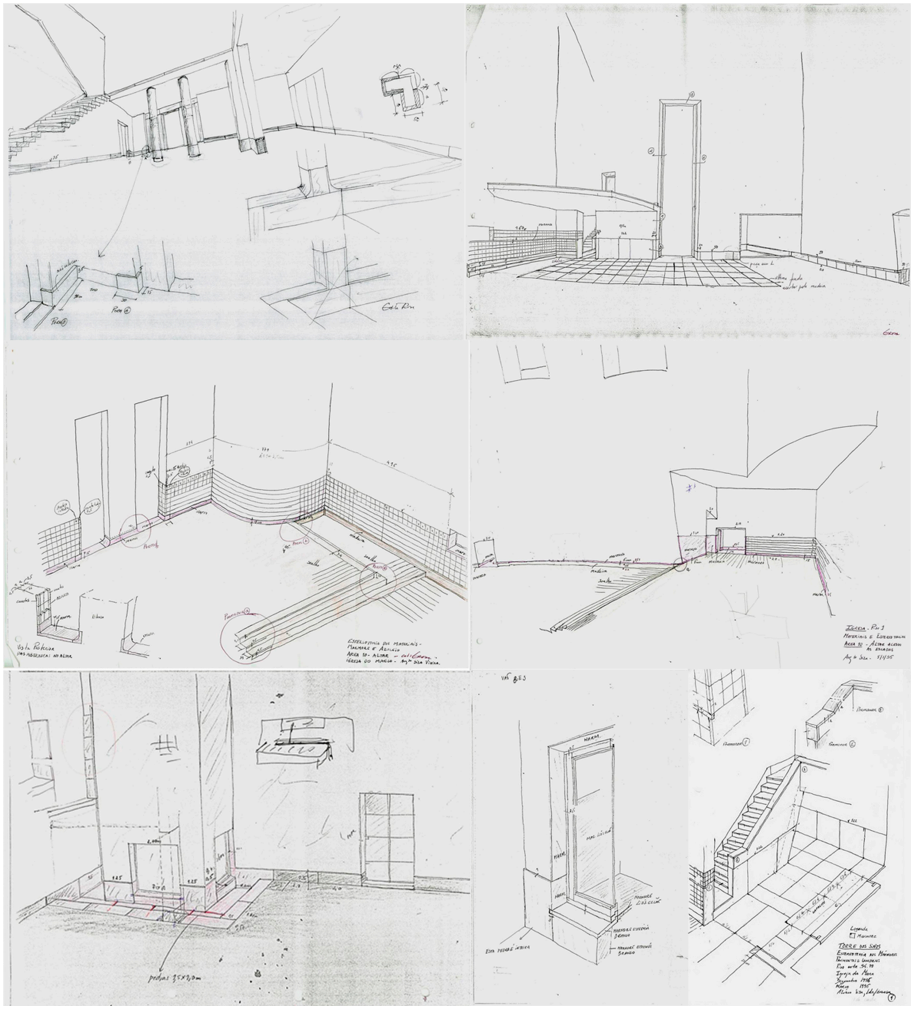

Figure 3
Final drawings of Marco Canaveses Church

Siza´s use of several hand-drawing parameters are tools of creative practice and discourse, an in-between condition of instrumentality and objectivity, from "speculative" and "desire" sketches to "knowledge" and communication drawings. The first imprecision hand-drawings "speculative" sketches, act as search

and desire of ideas and its idealization. In this phase, the model appears as elements of control and confirmation of the correct proportion and scale. The second use of hand-drawings appears with another aim, as clarification support and communication of the detail design and construction process. Siza´s "speculative" sketches curiously research what represents the real experiences but his communication drawings are the clarifying support to confirm an assumed, yet not done, reality.

Summing up Siza´s "desire" sketches are speculative research, more that images or external information, and the further "knowledge" hand-drawings, are clarification and explaining of the design.

In our own office, as the previous case-study, the hand-drawing is also a tool that supports the design idea and its productive thinking process However, the model appears as an important search tool, used since the initial intentions until the final presentation. In the specific case-study design of Gandra Parish Centre, the model allowed experimental approaches to three-dimensional "objects" and facilitated the exploration of complex geometric and formal logics. Simultaneously used as an abstract external view of the "real", helps to control the idea of external form approaching also the inner space. It allowed also experimental complex forms and actions of "movement and contemplation", established with simple matter elements. Therefore, the use of the model used as an investigation support is in the beginning a tool of speculative conception of the form and at the end is representation (see figure 4).

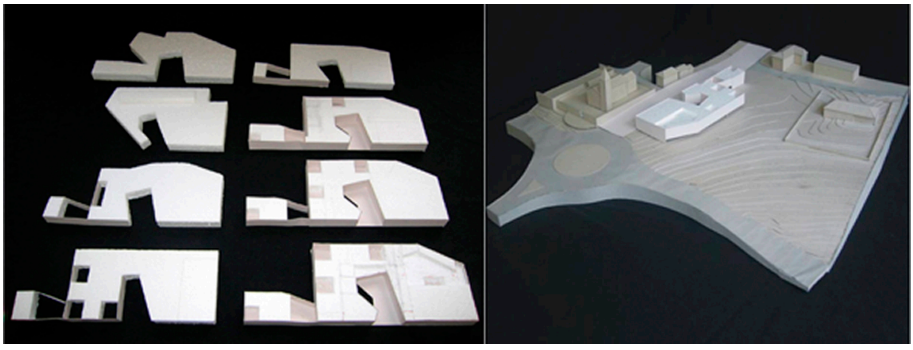

Figure 4
Essays of diferent models of Gandra Parish Centre

However, the hand-drawings are the election tool for the initial spatial approach, due to its fast use and several possibilities as an instrumental procedure. The use of hand-drawings goes through several phases as observation sketches, experimental "speculative" sketches. They work as mediator tools, structuring process of thought that overcoming the distance between creation and reality. As we explain clearer through the specific design example of Gandra Parish Centre drawings.

In a first phase, the freehand observation sketches help to identify and syn-

thesize the relevant elements of the site, volumes scale, surfaces, tensions, lines extensions, and preferential points of view of the users.

In a second phase, starting from the relevant elements of the existing site, quick sketches try to test the juxtaposition of forms. These "speculative" experimental sketches remind from the observation sketches, in order to create volumes without great impact in the territory and with identity relevance. In fact, Grandra´s sketches, initially deliberately imprecise in its search for the form and precise desired character, proposes, together with the existent church, to design an entrance of a representative intimate liturgical and social space.

Simultaneously, other sketches seek from the observer view the design character through multiple perspectives, interior and exterior, valuing the relationship space-form. These sketches aim to guide from the human scale perspective the experience of the movement as fundamental condition for the understanding of the space perception. In these sketches, the idea of the pathway links to the search for the symbolic liturgical and social space drawing an interior idea of a ramp as passage through the building. The sketches also explore the inner with an outside path, correlating space as an architectural *promenade*, linking the two entrance and the inside ramp at different ground floors levels. The user´s views sketches of the space tests the sensitive experience of the space in order to remove any generic character (see figure 5).

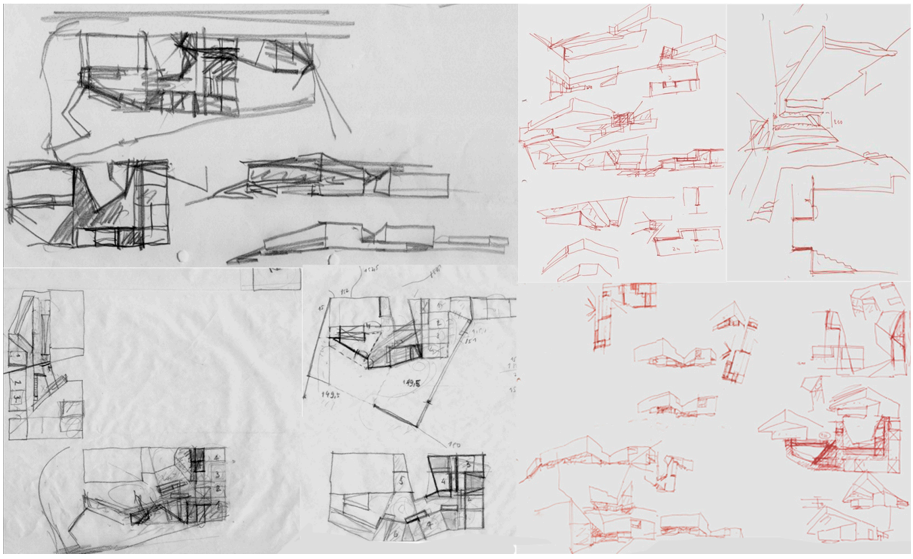

Figure 5
Sketches of project of Gandra Parish Centre

In a final phase, the last models acts as confirming tools of information. They control the imagination liberty of the design in its proportions permitting the verification and rigor of the "desire" and "speculative" sketches and experimental models (see figure 6).

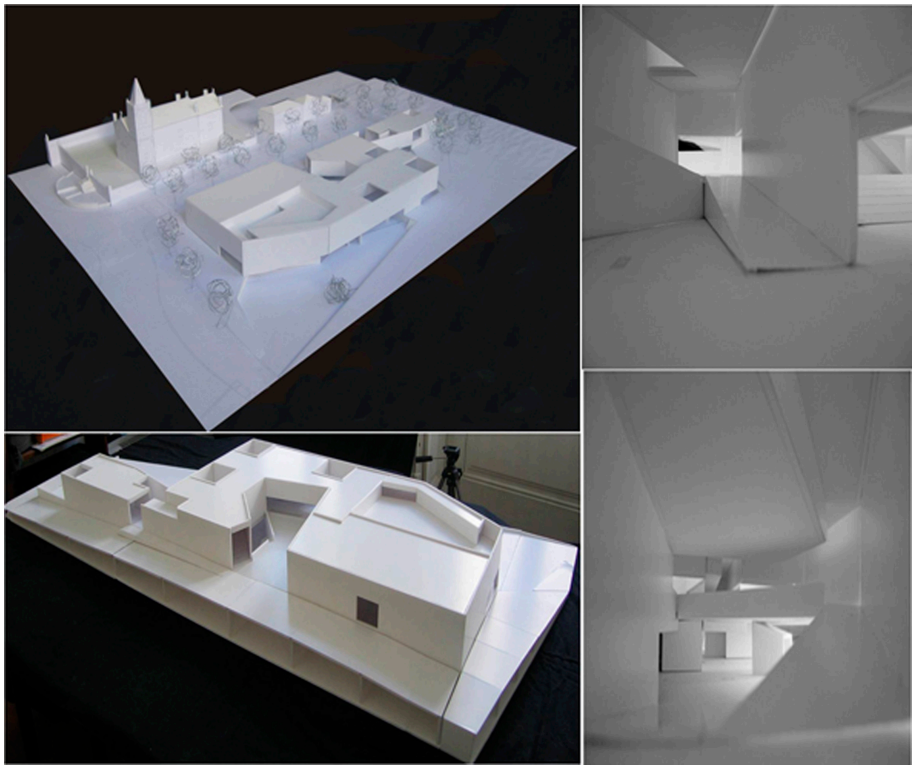

Figure 6
Final model of project of Gandra Parish Centre

The drawing sketches, as "speculative" drawing, is therefore, in our office, a research tool significance in the search of the essence and integrity of the built "object". This hand sketch and experimental model is in this way designing the integrity and acting as a guide of the rigorous drawings in all stages and scales of the design in search of the character of the desired space, form and materialization.

In the professional practice previous case-studies, the speculative drawing tool method acts as guide of the rigorous drawings in all stages and scales. This code of representation, figurative or diagrammatic, as a tool of anticipation sets the compositional qualities of space. The initial "speculative" sketches or experimental models curiously search for the invisible (the sensations) as tools of uncertainly, that represent the "real" experiences, achieving the imagined and certain expressive, intentional character of the space idealized. The "knowledge" and communication drawings or models reach the visible with tools that are a mental abstraction of the reality. They control the liberty of the imagination of the design to correct its proportions. The control of the imagination done by the representation model is a tool of the physical object domain, which supports the intellectual construction of the final form confirmation.

DESIGN STUDIO

The first year of design studio divided into four assignments, two in each semester, constitutes a coherent line strategy that initiates a process of development from the abstract to the introduction of reality.

In the first semester, the first assignment titled *"Excavation, Subtraction and Addition of Matter"* proposes to explore, an abstract design through, "speculative" and experimental drawings and models. The students test an abstract network of voids in a sequence of walking paths without a specific program through a process of excavation of the form. The aim is the introduction to the abstract concept of space using the drawings and models as means of research and thinking tools. The results are conceptual "rigorous" drawings of different layers of plans and an unconventional use of model read from below (see figure 7).

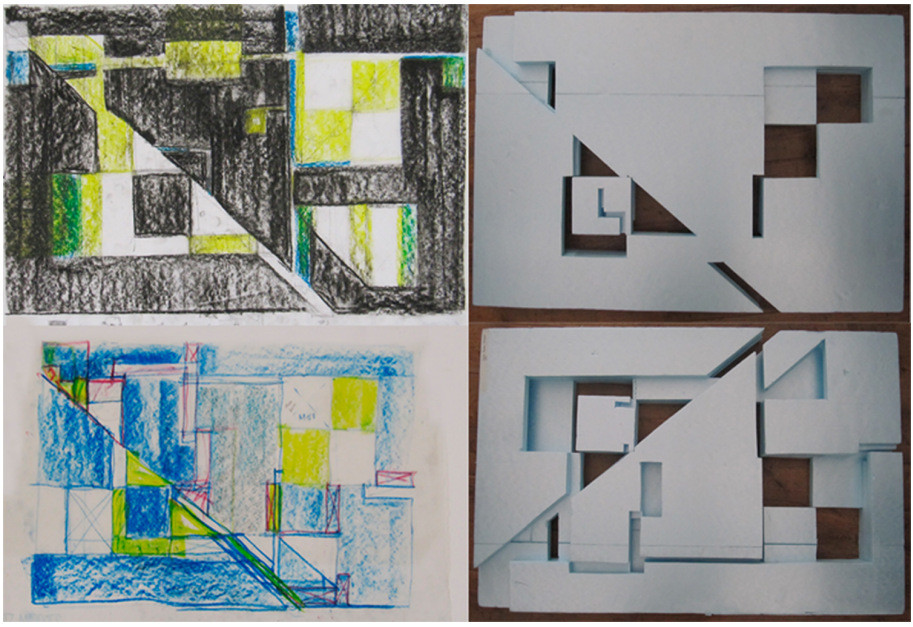

Figure 7
Drawings and models of first semester of the first year (1st cycle)

The second assignment titled *"Drawing of Contemplation and Movement"* is now with a generic program. Within the previous set, is introduced a volume, an internal expositive space of contemplation and movement, as sensorial experiences. The aims of these drawings and models, tools used now in different scales and points of views, obey a critical reformulation of the previous path systems and its new perspective (see figure 8 and 9).

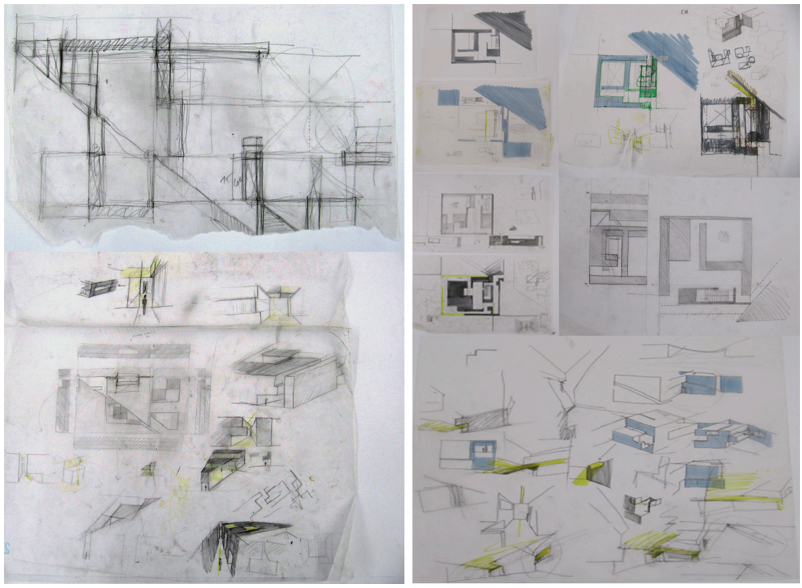

Figure 8
Sketches of the first semester of the first year (1st cycle)

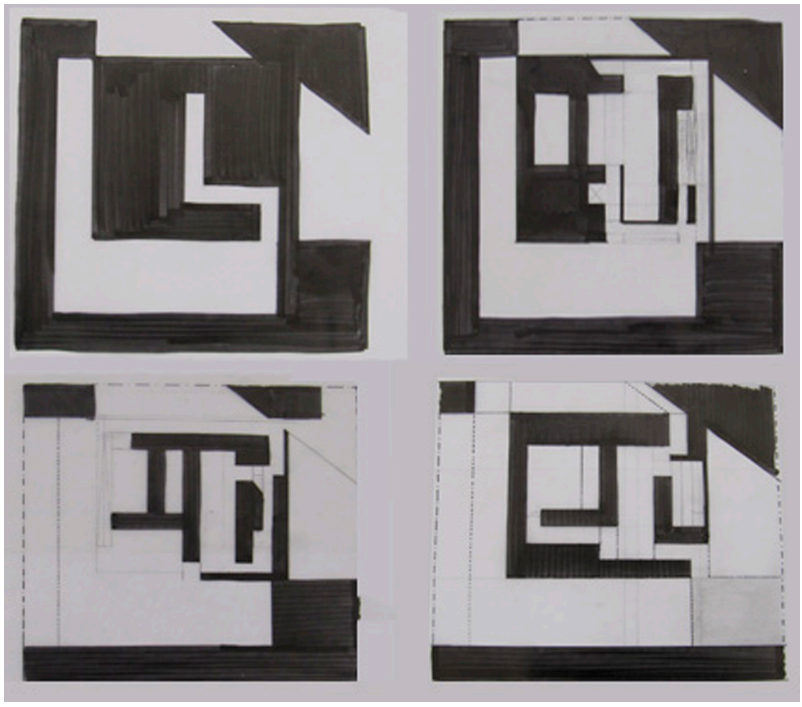

Figure 9
Final drawings of the first semester of the first year (1st cycle)

The Second semester still explores the abstract concept of space, but now in a real environment introducing the register sketches to a required reality through speculative hand-drawings and rigorous drawings and models proposal. The third assignment titled *"Movement and Topographic Form: from transformation and modelling"* invites the students to link different urban points of a real site "void terrain" by designing a leisure nature system of walking paths and platforms as a network structure that consolidates the landscape. In direct relationship, the fourth assignment titled *"Housing-form and identity*, consists of a space integrated within the previous designed system of routes and platforms with a program of a house. In this semester the observation, register and speculative sketches, act as research tool and instrumental method, searching the experiential and sensorial views to encourage creativity.

The model shows the placement suggested by terrain relief or particular shape of chosen spots and allows experimental actions of "movement and contemplation", therefore used as investigation, support and representation. The rigorous drawings control the correct dimensions of form and space proposed by the previous experimental and "speculative" drawing tools (see figure 10).



Figure 10
Sketches and models of the second semester of the first year (1st cycle)

At the end of first cycle studies (3rd year), a year in-between, these didactic tools are used as the initial approach to the professional thinking process. The intervention in a real consolidated environment, with a detailed program, relates to the urban design space debate. The aim is the articulation between notions of inhabitant module and its aggregation, in order to redefine an *"urban place"*. To solve these different scales articulations students use the model as an experimental tool for different solutions testing the proposals evolution form.

Students use experimental sketches views of the object and diagrammatic essays of hand sketches elevations. Drawings are "speculative" but simultaneous abstract and conceptual. Rigorous drawings show typology repetition, confirmation of the whole and part. The advance to the smaller domestic scale of the typology unit requires again "speculative" and experimental drawings through sensorial sketches (see figure 11).

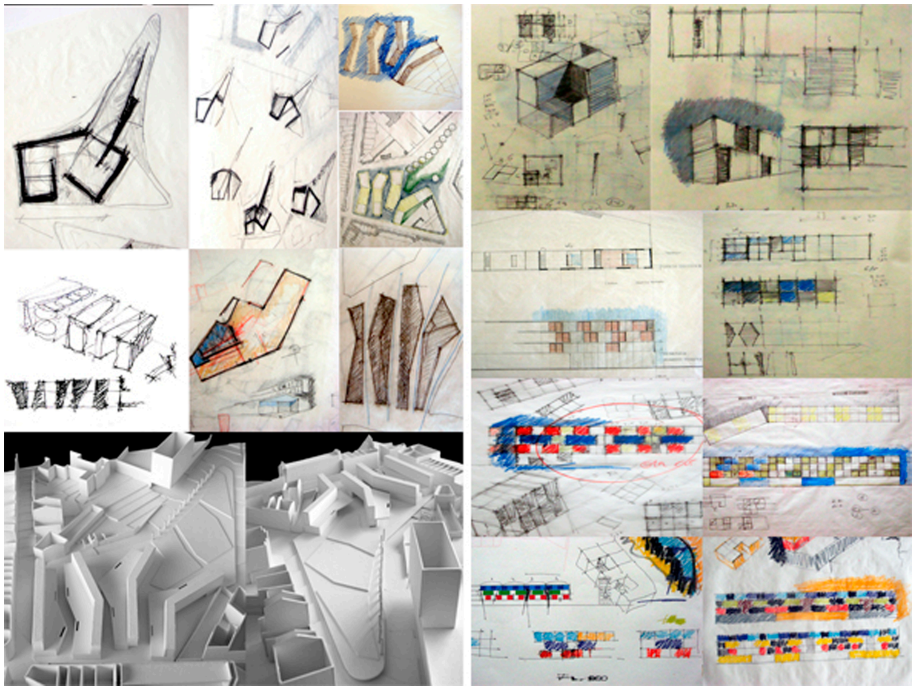

Figure 11
Skecthes and models of the third year (1st cycle)

In the second cycle (4th and 5th year), the approach is towards the technical professional thinking process, its instrumental tools and the interdisciplinary complexity with other technical knowledge fields. In these last years the program, is focuses on designing urban objects and a territory scale. Student's strategies propose enlarging relationships between experimental spaces of the city and urban scale dealing with the high-level complexities of collective spaces

and forms.

Students use the model as an experimental tool but more in a diagrammatic or analytic exposition than speculative research. Proposed solutions, schematically shown in the model as a plan area, paradoxically are more abstract than real (see figure 12).



Figure 12
Models of Design Studio of fourth and fifth year (2nd cycle)

The sketches used as observation register of memory, are instrumental diagnostic tool. Some analytic sketches, handmade or digital appear only in plan representation. Hand-drawing tools are essentially diagrammatic not "speculative" defining strategies to problematic areas more than its specific resolution. The diagrammatic drawing in plan is the common drawing design tool controlling the big scale. Drawings and models appear, as analytic support, to evidence the sediment urban spatial structures, is less speculative research tools that in the previous first cycle courses (see figure 13).

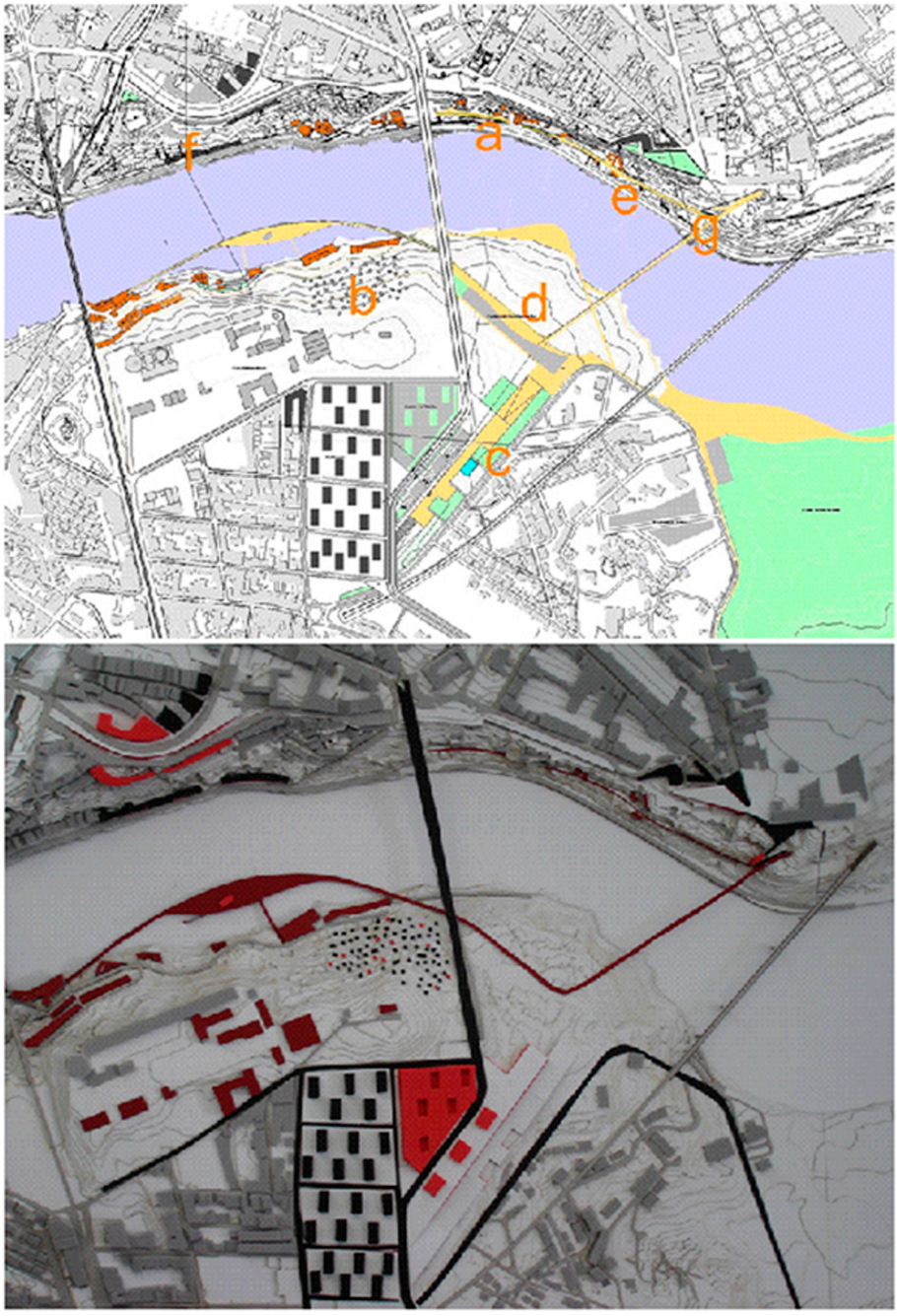

Figure 13
Drawing and model of the fifth year (2nd cycle)

In the second cycle, the model is the preferential tool of research, less speculatively more analytically, certain of the known reality. From the analytic

proposal drawings to rigorous and detailed constructive drawings, is a passage quickly concretized, that does not leave time for imprecise and doubt drawings. Predominantly in the final year, the macro scale is the protagonist and students seem lost the aim for speculative research tools and its creative intuitive testing experience.

We can see, during the two cycles of studies, the uses of the drawing and model as tools of design studio showing diverse levers of approach from the abstract to the concrete. Drawings and models act as research tools and instrumental method being experimental, "speculative", conceptual, mainly in the first cycle, diagrammatic, register, analytic and controlling in the second cycle.

DRAWING

As seen above, in the professional practice and design studio case-studies, we find the same approach in the use of drawing tools. Both use the drawing as a design research tool and instrumental method with several roles as experimental, "speculative", conceptual, diagrammatic, register, analytic and control parameter. Particularly, they are significant when relating the "desire" sketches and "knowledge" drawing in the search of the essence and integrity of the design proposed. Curiously, the "speculative" sketches as creative tools are paradoxically also figurative in their drawing process. The "knowledge" drawings specially the rigorous ones, are literal but paradoxically also abstract. In fact, these rigorous drawings are (as an instrumental process) reaching the visible by means of a mental abstraction of the reality. Literal in its rigorous meaning of representation, exact and technical but also abstract since its representations (specially the plans and the sections), are never seen as so in reality.

The relationship between sketches and thinking essential in the professional practice and learning cycles is located in the fact that both words and lines are cognitive representational tools. These aim to allow research, understand and communicate thinking constructions rather than "simply" initiate an aesthetic pleasure via a visual appreciation. Clarifying in this sense how *"Drawing as a process of design"* is a thinking tool.

The hand-drawing sketches, as described in professional practice, and mostly in first cycle of design studio acts as a mediator between thought and reality and is a preferential tool of intellectual dimension. This structuring element of thought overcomes the distance between invention and reality, used since the observation sketches to "speculative" sketches. Its code of representation and communication, figurative or diagrammatic, as a tool of anticipation sets the compositional qualities of space. *The field of drawing has been, increasingly extended and intensified to include drawing production and drawing reflection. Within the architectural discipline, precisely the understanding that drawing and theory are intrinsically related has resulted in the continuous reflection on the relationship between thinking and drawing, or, more abstractly, on how the specific means of representation relate to specific conceptions of space. (Milani, 2010, p. 1)*

The hand-drawing understood as a thinking process, raises therefore the question of how the specific means of representation relate to specific conceptions of space.

As the case-studies show, either in professional practice or in design studio courses, the drawing is understood as a personal design research tool. A personal tool for the compilation of the experience, written and graphic, as a support for the construction of memory, instrumental and analytical directed to the practice of design project. The drawing assumes the function of continuous and interconnected research register centre of individual integration and autonomous learning of architecture. It acts as tool of spatial and graphic research of interdisciplinary heuristic transference, mediating between the observation and the experimental for creative combinations of the design. The drawing is thus a valuable tool that, from the registration of the reality and dreams, stimulates the construction of an intimate "own language" of imagination and rationality. It fixes available fragments for later transformation into the Architecture of the desire and real *"(...) we apprehend excessively, what we learn reappears, dissolved in the risks we later draw." (Siza, 2009, p. 50)*

We seek to observe the epistemological dimension of drawing in the teaching of Architecture, to clarify the relations of reciprocity established between representation and thought. In the case-studies the observation of its use as research codes of representation and communication, is understood as a mental tool of anticipation that establishes the compositional qualities of the idea of form and space.

These chosen case-studies of practice and design studio, about the drawing importance as a research tool, may indicate an answer to the posed questions if schools act as reverberation centre developed in the practice of the profession assimilating them into learning methodologies transported outside and in reverse? The importance of the drawing in Siza´s work is a heritage from Beaux-Arts education (of the Porto School of Beaux-Arts) after appropriated and reformulating by Siza as a design research method. This instrumental procedure of Siza in a *vice-versa* process, returned to the education system of the actually designated Porto School, as a Siza´s legacy, to which we were as students, direct heirs, as former collaborators, professional practitioners and as teachers also.

MODEL

As shown, in the professional practice and design studio case-studies we find the same approach in the model as a research tool. It is one of the protagonist tools nowadays in the design studio teaching, due to its immediate visualization, manipulation of a specific materiality and its transformation into the form and space of a proposed architecture. However, the use of the model has actually a different role depending on the learning levels. The first cycle design studio uses the model as a tool of an abstract and even "speculative" condition

of conception. The last year of design studio uses the model as experimental but from its diagrammatic, figurative and presentation condition. In the architectural practice, the model also used, as seen in our work, as a research tool of the construction of the form, in a first approach as diagrammatic and abstract in the second as presentation.

Although Siza uses the model, it is not his preferential tool for the initiation of a design. Actually, it is mostly the younger generation that uses the model more intensely. In our professional practice, it privileges simultaneously an external view and an abstract approach to the three-dimension reality, to an idea of form or space making it a valuable tool of design research. Actually, maybe also because of the perspective sketches disuse its use is adopted from initial idealization to final presentation due to its communicating capacity of the architectural object proposed.

The model is, therefore for us, simultaneously, an effective representation tool of communicating the proposed image, close to the palpable, particularly as we expand the scale, but it also assumes the specificity of an abstract research tool, in the construction of architectural ideas. It simulates both the external instrumental abstract view and the approximation to the real. It approaches to the form and space anticipation, its external vision and internal condition reading, essential for the construction of the design project.

CONCLUSION

The use of drawings and models, as didactic and thinking tools, in professional practice and education have in common to start from the experience of the design and its arguments that define the field of architecture. These tools act as *creative prediction of instinctive experience and memory associated to be recognizable and that allow us to understand architecture as a reality with successive levels of depth, in which only a conscious and reflective preparation may distinguish its transformation, frequently unobserved. (Herrenas, 2011, pp. 46-53)*. As stated, in two moments, by Siza about the primary condition of the construction of the design ideas, *"(...) Drawing is design project, desire, liberation, registration and way of communicating, doubt and discovery, reflection and creation, contained gesture and utopia. Drawing is unconscious research and it is science, revelation of what is not revealed to the author, nor does it reveal, of what is explained in another time. Liberation, drawing leads to conscious drawing." (Siza, 2009, p. 273), "(...) the design project is for the architect as the character of a novel is for the author: he constantly surpasses it. You must not lose it. The drawing stalks him. (...) Drawing is the desire of intelligence." (Siza, 2009, p. 25).* These tools as instrument of knowledge and research may act as a double significance as an act of representation adjusting the idea to fit the object and as an act of creative construction, capable of modifying the passive perception of the real. They stand as significant available tools as low-tech resource, easy employ, quick experiment use and imperfect, uncertain, individual but creative results. So, in this sense are

still in our days permanent and important tools for the artistic design research refocusing the design within the dimension of theoretical and practical construction.

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What does it mean to make an experiment

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Abstract. Architectural practice and its methods are changing with the emergence of new approaches towards design and fabrication. Experimentation has played an important role as method for knowledge creation in practice based research. In architecture and design the experiment is a particular mode of exploring the multiple and heterogeneous intersections that emerge from social, conceptual, technological, material and cultural contexts in which it is sited. This paper proposes and reflects upon modes of experimentation in design, which emerged within a practice based design context in architectural research and are increasingly applied in the professional practice. Four distinct characteristics of experiments are suggested: as speculation, as reflection, as evaluation and as interface. This perspective is drawn from a two-year interdisciplinary research project between architecture and design investigating experimental practices.

Introduction

Architecture and Design in academia and profession increasingly finds itself in a new design context. Digital design tools and their potential for direct interface with fabrication are creating step changes in the way we conceptualise, design and materialise our buildings. The digitisation of our practice allows architects to design in response to an active design environment in which feedback resulting from simulation and the calibration of design information become integrated parts of the design process. We no longer operate in an abstracted and static design space, but rather in a networked, interfaced and connected design environment, inherently open to input from multiple disciplines. [Ramsgard Thomsen 2012].

The direct connection to fabrication also challenges the material practices of architecture. Where the architectural detail drawing traditionally acts as a notation of design intent to be 'read' by the builder, the computational model now becomes an interface to fabrication generating machine drawings that can be directly read by the tools of manufacture [Ramsgard Thomsen 2009]. This bridging between representation and fabrication has been basis for a rethinking of material systems allowing for new concepts such as mass-customisation as well as the development of bespoke materials [Kolarevic 2012, Migayrou 2003].

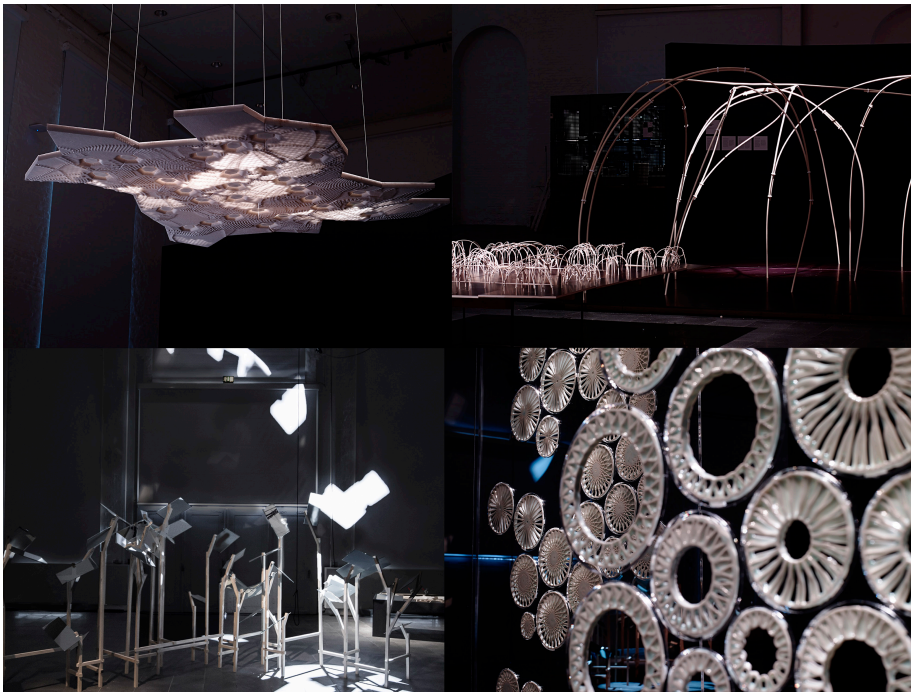

Figure 1
Overview of the four experiments from architecture and design research.

This has enabled the realisation of complex building types, as the Centre Pompidou in Metz by Shigeru Ban or the Hungerburgbahn in Innsbruck by Zaha Hadid Architects, in which the aim is to understand how these new material practices can allow new spatial expressions.

The rise of this new design context has fostered a new generation of design researchers seeking to understand the spatial, structural and material challenges [Tamke 2009, Knippers 2011, Ramsgaard Thomsen 2009]. Common to this emerging field is the resurgence of an experimental practice in which the design and realisation of installations, pavilions, prototypes and demonstrators at full scale test guiding concepts through the creation, testing and evaluation of technologies and techniques [Burry 2016]. In this practice the experiment is a central tool providing a means to shape both theoretical and operational knowledge.

This paper asks, what are the constituent understandings of this experimental practice? Reporting on a two-year research collaboration between architecture and design, the paper investigates the position, role and significance of the experiment within design led research. With a strong focus on computation, material and design, the paper reports on four central experiments undertaken as part of the collaboration. (Fig.1).

WHAT IS EXPERIMENT

We inherit a long history of experimental practice, formed around ideas of physical models, versioning and iteration. Its legacy is an inherently physical thinking at 1:1 scale, exemplified in the structural experiments of Gustav Eiffel, the material experiments of François Hennebique, and the spatial experiments of Kurt Schwitters. Within this practice, full scale experiments aim to synthesise the multiple dimensions of an architectural research question. They are often heroic in conception, challenging of our presumptions, technological and frequently at the brink of failure.

We are also surrounded by other histories of experiment, alternate conceptualisations that have been nurtured and informed through the preoccupations of other fields. In particular, scientific experimentation is seen as a primary model. From the 17th century, scientific experimentation slowly replaced opinion, citation and the unaided observation of nature with the observation of processes through instruments. The aim of this experimental practice was to intervene in nature - as Bacon says to 'twist the lion's tail'. 'Experimentation is nature under constraint and vexed... when by art and the hand of man she is forced out of her natural state, and squeezed and moulded' Bacon [Boyd 1991].

Early scientific experiments on vacuum, as the one by Otto von Guericke (November 20, 1602 - May 11, 1686) demonstrate this approach. Within his experiment Guericke pumped all the air out of two half spheres, locking them together with a vacuum seal. The air pressure outside held the halves together so tightly that horses could not pull the halves apart. The development of the experiment stimulated at the same time his invention of the first vacuum pump, and proved its function. The setup of the experiment with no less than sixteen horses, eight harnessed to each side of the globe, was clearly constructed in a way that could impress the Emperor Ferdinand III, who was among the many invited spectators. This act of public dissemination had for Otto von Guericke the positive effect that it helped him in his political career.

Experiments were employed to serve many functions: they could be a proof of concept, a driver of innovation, an object of dissemination, and not at least a spectacle, where over-exaggeration and the means for reproduction were important to convince the unbelieving. This practice became central to all research activities where instruments could extend the senses.

Instrumentation brought rigor, consensus and repeatability to the experimental practice. This practice allowed a focus on the production of measurements, by extending the senses, standardising measures, and creating the isolating conditions that made observation and the repeatable production of phenomena possible. One consequence - that the making of measures allowed the testing or proving of pre-formulated questions - became increasingly emphasised. *"The theoretician puts certain definite questions to the experimenter, and the latter, by his experiments, tries to elicit a decisive answer to these questions, and no others... the theoretician must long before have done his work, or at least what is the*

most important part of his work: he must have formulated his question as sharply as possible." (Karl Popper, 1968)

The emphasis upon theory is very different to what designers may have in mind when thinking about experiment, where the value of the experiment is often in its capacity as a process for speculation and production, rather than simply the production of proofs. The passive, observation-driven understanding of scientific experiment was challenged by Hacking, who posited that the experiment is more than its results. He argued that in looking only at the end products - the observation of results, the precise settings on the machine, the exact description of the setup - the practice of making the experiment is obscured. Instead, the construction and process of the experiment itself, including the active role of the experimenter, should be considered as much a part of the understanding of experiment as processes of observation and analysis.

In architecture and design, the relations between intervention, theory, process and product are convoluted.

Glanville tells us that scientific research is a subset - a particularly restricted - form of design (Glanville 1999). The focus on process makes the experiment a central part of the scientific discovery practice - and moves it closer to the larger field of speculative practices in architecture and design. Our interest is to understand modes of experimental practice within this large field.

FOUR CHARACTERISTICS OF EXPERIMENT IN DESIGN

We propose to understand the breadth and meaning of experimental practice through four characteristics:

1) EXPERIMENT AS SPECULATION

In design practice experiment can be a way of posing questions. Experiments can be open ended and concerned with moving away from the existing and the known, through intentional actions to arrive at an as yet unknown, but desired, outcome (Downton 2003). Understanding experiment as process means that experiment includes the heterogeneous and at times erroneous design decisions that lead to the final experimental object and that the many intermediate "props" (drawings, models, prototypes etc.) become part of the experiment's body. Experiments are therefore an active process by which the designer poses a question and develops its dimensionality and solution, and in which identified design criteria are evaluated in context of the evolving problem.

2) EXPERIMENT AS REFLECTION

Experiments are a mean to simultaneously produce and assess ideas. They can be the guide for a design process allowing an ongoing formulation and evaluation of design criteria and the design itself. In this way experiment as a means of reflection allows it to become a productive part of theory building.

3) EXPERIMENT FOR EVALUATION

Experiments act as material research inquiries by which the concepts and technologies of the research are tested and evaluated against external parameters. The emphasis on full scale implementation allows design experimentation to engage directly with external testing enabling measurement and calibration of results.

4) EXPERIMENT AS AN INTEGRATED ENQUIRY

In design experimentation the fundamental objective of the isolation of phenomena is replaced by a converse need to engender the network of enquiry that makes up the architectural design project. While experimentation does abstract the design enquiry and remove some dimensions such as programme, site or weather, it retains the fundamental composed nature of design seeking to emulate networks of enquiry and positioning the research inquiry within a similar network of expertise and practice that make up design practice.

5) EXPERIMENT AS INTERFACE

As a tool for supporting synergy, the experiment, as well as its outcomes, acts as a boundary object (Star & Griesemer 1989), an interface that provides common ground for interdisciplinary collaboration. When disciplines collaborate to create new knowledge, meanings and approaches are not necessarily shared across borders and need to be reconciled, as objects and methods mean different things to different people. The experiment resides at the interface, enabling a continual exchange and eventually merger of concepts, tools and technologies.

THE OVERARCHING PROJECT

The emergence of a new material practice presents a common problem to design and architecture. Experiments can provide a mean to create theoretical and operational knowledge in this novel field. The two year research project "What does it mean to make an experiment" investigated modes and frameworks for an experimental practice that instigates speculations about the position and friction of direct material engagement and its interfacing through digital technology (Fig 2).

In interdisciplinary collaborations a set of experiments integrated the grown fields of knowledge from crafts, design, computation, engineering and material science. Reconsidering the traditions of crafting and investigating how new processes can lead to new answers for the growing demands that contemporary architecture and design faces, the experiments were conducted on PostDoc level by researchers with background in the partaking schools. Each of the researchers has a material practice and brought existing research leads into the project.



Figure 2
View into the concluding exhibition of the two year research project "What does it mean to make an experiment"

The similarity in the setup of the experiments allows for cross-examination and identification of the role, that experiment played in the projects. The fact, that the experiments are all concerned with technology and material, focus on architectural prototypes and take place in the same academic setting is seen as positive. It provides comparability, that is else difficult to see in highly different project setups and actors, and focus on a specific and still evolving area of architectural experimentation.

The following subchapters will describe each experiment's aims and objectives and the technological and scientific setting it is embedded in, before an attempt is undertaken to identify which of the five characteristics of experiment in design is of importance in the process and project. The chapter concludes with an overall appraisal and cross-examination.

EXPERIMENT 1: TRANSMISSIVE ASSEMBLIES- BASIC MATERIAL RESEARCH INTO INTEGRATING MATERIAL BEHAVIOUR

The installation Transmissive Assemblies (Tamke and Nicolas 2014) (Fig3) concentrates upon two qualities that are particular to fibre reinforced composites: translucency in a structural element, and the ability to gain stiffness locally through forming and folding. Taking point of departure from preceding architectural experiments focused upon these qualities - exemplified by Renzo

Piano's Mobile Sulphur Extraction Facility (1965) - the project asks how a modern composite sandwich might be designed to modulate the transmission of light in a controlled manner through strategic material variation.



Figure 3
Transmissive Assemblies

Transmissive Assemblies develops a tiling, translucent and geometrically stiffened GFRP panel system. To achieve differentiated light transmission through the composite sandwich, different parts of the whole are strategically activated - either the core, which is perforated, or the skin, which folds locally to increase stiffness, or within the material, where fibre orientation follows loading trajectories. The experiment centers upon digital models for synthetic material that activate and vary these components, and the qualities associated with them (Fig4).



Figure 4
Surface of the GRP surface of Transmissive Assemblies

BACKGROUND AND RESEARCH QUESTION. A central concern of Transmissive Assemblies is to explore design processes for synthetic materials, and to use these processes to introduce variation into serial components. Synthetic materials afford opportunities not available in found materials by allowing for the precise specification of material properties and qualities, through design parameters that relate to different aspects of the structure. These parameters have often been standardized, however they could also be opened up to design. This project explores the preliminary operations for doing so - the digital and physical processes that lead up to the final materialisation - and develops a

generative design model that inter-relate structure, surface and skin to support them.

DESCRIPTION OF MATERIAL / MAKING / FABRICATION PROCESS. The physical materials used within the structure have been chosen because they are already commonly used within construction. The foam core is a highly insulative and light weight DIAB PET structural foam, and both thermoplastic and thermoset composite skins have been explored. Before their consolidation, each of these materials undergo working processes specified by the digital model, using tools that include a CNC router and an industrial robotic arm, as well as vacuum bagging.

The digital design process links together a number of different generative models, each related to one of the constituent materials within the sandwich assembly (Fig 5). Over a time-based process, these models trigger one another, and transmit information between themselves, until a stable condition is achieved that satisfies a design intention regarding light conditions as well as structural stability.

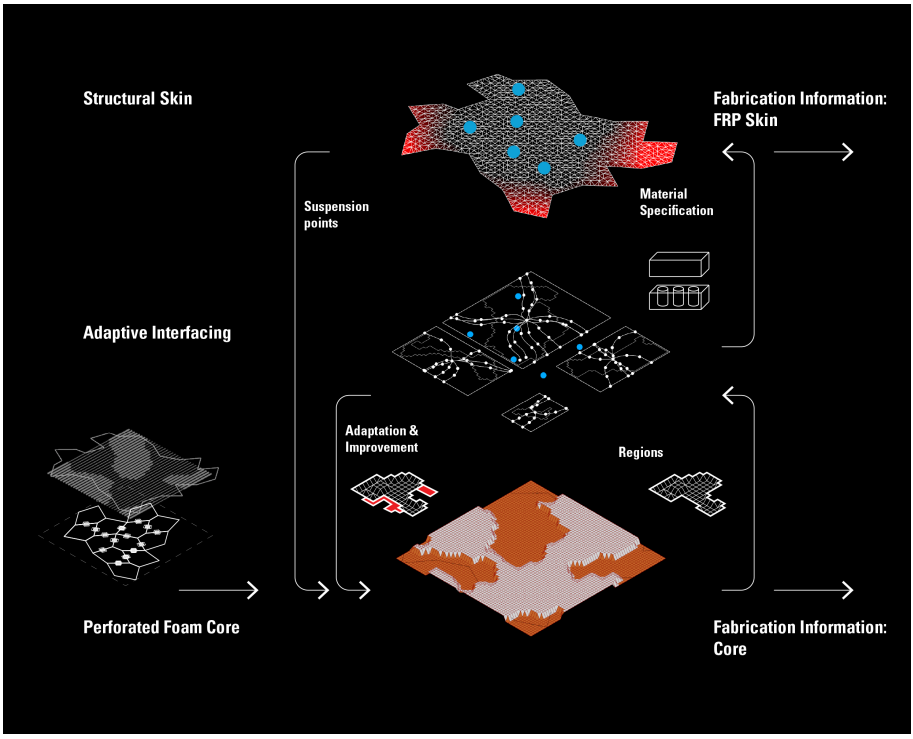

Figure 5
Feedback diagram of Transmissive Assemblies

EXPERIMENTAL APPROACH. The aim of this experiment is to test a new modelling approach for synthetic materials. Digital models for composite materials allow to synthesise the inter-related behaviour of their constituent components, but what are models for activating and varying these components, and the qualities associated with them, within design. What might these models be like?

Transmissive Assemblies employs experiment as a mean to guide the design process. The experiment serves first of all as mean for speculation and reflection. The experiment provides orientation in the vast area of composite material research. The design led approach allows to concentrate the inquiry and provides stepping stones to explore an unchartered area - speculating and reflecting after each step in the experiment. Through isolation, preparation and manipulation, experiment is here able to concentrate a particular phenomenon. This process of concentration is one aspect that distinguishes experiment from, for example, observation. In Transmissive Assemblies, concentration occurs around the idea that each constituent material within the composite might be active and variable, in both physical and digital realms.

Transmissive assemblies can as well be understood as integrated inquiry. The experiment on material and technological infrastructure is positioned in an architectural archetype - the ceiling. The understanding of what a ceiling is and how it can perform transforms throughout the course of the experiment- from a boundary to a highly performative and multi-layered building element. The experiment helps here to create new understandings.

EXPERIMENT 2: REFLECTIVE GROWTH

Experiments in design can be a mean to connect formerly unrelated concepts, tools and technologies. In the experiment Reflective Growth (Fig. 6) two systems equipped with laws from physics and from traditional craft meet and were set in relation through computational algorithms:

The course of the sun is a repeating spectacle and the modulation of sunlight a prime domain in architecture. The reflection of sunlight follows a clear rule: Incoming equals outgoing angle. This is the outset for an array of mirrors that are programmed to reflect the light to a set of targets while an artificial sun moves over it.

Traditional wood joints provide means for easy to assemble constructions with angles. The constraints of material and fabrication allow however only a limited set of these that are as well only able to branch on one geometric plane at a time.



Figure 6
Reflective Growth

BACKGROUND AND RESEARCH QUESTION. Recent advances in computation allow to re-conceptualize the term optimization in the realm of design. The identification of the best solution within an often large set of potentials is typically associated with engineering. As architectural representation is shifting to parametric and generative logics the architectural design space opens for similar approaches. At the same time the established approaches to identify good solutions are challenged as architectural design consists in nature of multiple, contradicting objectives that are as well due to change in importance and nature throughout the process. Often new objectives are as well only found within the emerging solutions and can hardly be described in numeric terms.

The limits of traditional optimization approaches can be overcome when the designer can interact with the multi-objective optimization environment and guide and amend the solution space. The absolute that accompanies the term optimal is shifting in the context of design to a temporal and project specific understanding - where fixed objectives transform to soft thresholds along the lines of Herbert Simons term of *"satisficing"* (Simon 1956)

DESCRIPTION OF MATERIAL / MAKING / FABRICATION PROCESS. Wood has however fixed properties on the material level and the achievable geometry of wooden constructions is constraint by the means of fabrication which is characterized by its own economies of time and budget.



Figure 7
Traditional wooden joint for branching in reflective growth

Wood is the oldest building material and the practice of building with wood is characterized by a high degree of offsite pre-fabrication, where the clear logic of the structural system informs the making of traditional massive wood joints. These are self-registering and immediately stable when two pieces are connected. Notations on the wooden elements guide the builder. (Fig 7)

Within the development of Reflective growth the different constraints were identified, and incorporated into the generative design system (Fig 8). Embracing good craftsmanship, rational approaches to the fabrication of the many different angled joints were developed in a collaboration of carpenter apprentices and researchers.

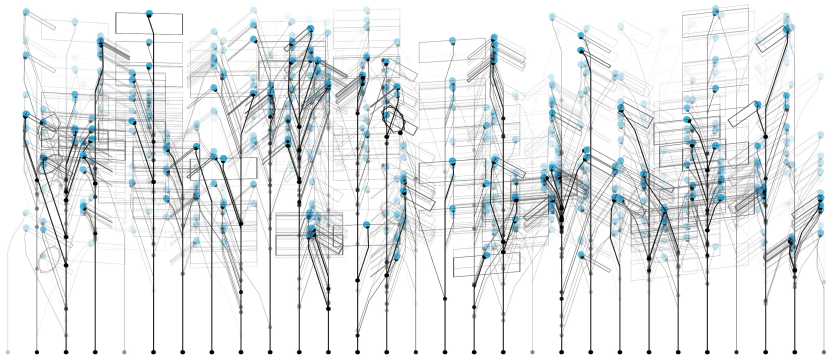

Figure 8
Overlay of the evolutionary algorithm driving the generative model of the experiment Reflective Growth

Within the project two separate generative models were developed: a systems for the growth of the wooden structure and one for the orientation of mirrors in respect to source and target of the light. The models are different in nature: where the later follows a time based parametric logic that works on the overall array of mirrors simultaneously, the growth algorithms of the wood structure operate procedural, investigating the potentials for subsequent actions based on the potential at every step. Speculative experiments on digital as well as material level accompanied the initial development of the two separate systems as well as the integration of these into a combined framework, where structural simulation, evaluation of light areas hit by the reflected beam as well as a judgment on aesthetic and construction level are constantly fed back into the design cycles.

EXPERIMENTAL APPROACH. The experiment has a theoretical outset: based on the thesis that optimization and constraint solvers can be integrated in the design process and can negotiate between several design systems with their own generative logic. The experiment serves first and foremost the evaluation of a clear, yet open ended, thesis. The experiment was as mean to explore the space that the question opened. The experiment became finally the mean to

link between currently unconnected areas of design, computation and making. The experiment provided here the boundary condition between the fields.

EXPERIMENT 3: LEARNING TO BE AN ARCH

Where parametric modelling allows designers to work in flexible ways with variable geometries, the associated problems of parameterisation and reduction are well known. Parametric models are normally limited because they necessitate a pre-configuration of their embedded variables as well as a pre-determination of model topology, meaning that the designer needs to know all defining parameters and relationships between model elements at the start of the design project. "Learning to be a Vault" (Stasiuk and Thomsen 2014) (Fig 9)operates as an experiment that tests new methodologies for the modelling of design systems that challenge this standard of configuration fixity by opening parameter spaces in both variable value and element connectivity while simultaneously embedding material behaviour within morphogenesis. The aim for the project is to establish methods for designing with open topologies in which the dependencies between parameters are emergent and open to change during the design process. To this end, multiple learning strategies - including evolutionary and unsupervised classification algorithms - are deployed in the interrogation of a broad design space.



Figure 9
Learning to be an arch

BACKGROUND AND RESEARCH QUESTION. The project takes point of departure in a series of physical models used in the development and examination of a simple system of actively bent arches that become networked together in the formation of novel vaulted configurations. These models are made of rattan, a tropical climbing plant most generally used in wicker furniture and basket-making. Rattan is light, flexible, and effective for rapid explorations of active-bending material systems. Through the exploration of these networks as morphogenetic rule-driven systems for incremental formation, a series of variables available for deployment in a multi-objective evolutionary model are developed. The set of simple goals that emerge from this process of rapid physical prototyping are related to material usage, the generation of variable spatial configurations and structural performance and capacities. (Fig 10)



Figure 10
Over 6000 digital models, led to 25 physical small scale models from Rattan and One 1:1 demonstrator.

DESCRIPTION OF MATERIAL / MAKING / FABRICATION PROCESS. A digital model is then developed based on sets of simple rules for both the generation and the performance-based analysis of each model instance - or phenotype. This modelling process relies on a spring-based simulation system for the instantiation of embedded material behaviours [Kangaroo] and processing through a multi-objective evolutionary algorithm [Octopus] for performance assessment across the established optimisation parameters. (Fig 11) The deliberately open-ended design system established allows for a range of

phenotypes to emerge and be quickly analysed for performance quality according to the established optimisation goals. This multi-objective evolutionary approach intentionally produces a high volume of phenotypes, which can become extremely varied and intractably numerous for gaining an understanding of any chief typologies that may emerge from using such a process. Yet it is exactly in this variety that valuable opportunity for design exploration is embedded, and through the classification processes enabled through unsupervised learning, the designer is empowered to gain a richer understanding of the design space.

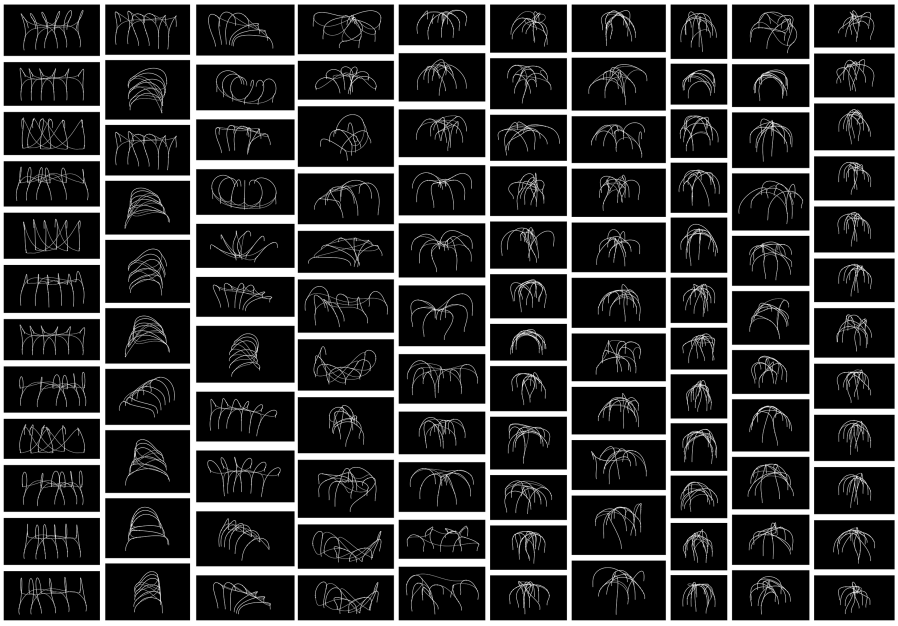

Figure 11
Generated generations of arches

As the results of the evolutionary solver have been optimised according to numerically expressed performance measures, it becomes interesting to think of classification such that the existing input variables will not provide immediately obvious means for segmenting or understanding desirable outcomes, and that alternative means of analysis instead become necessary for a more robust understanding of the results. Novel typologies not only emerge through such a process, but more importantly the designer is given new means to both understand and explore the broad design spaces that result from the deliberate application of open-ended design systems.

EXPERIMENTAL APPROACH. The project uses an experimental methodology in order to speculate and reflect how a new technology - machine learning

- can be used in architectural design. An artificial setup is created which can be investigated in both material as well as digital experiments. These are linked with each other and one experimental setup serves as a mean of evaluating and inspiring the other. Where the digital model allows to create vast amounts of possible design solutions, which a human designer would reach due to fatigue, it is the physical model, which is used for the initial creative process of designing the material system and determine the underlying rules and limits.

"Learning to be a vault" shows, that an experiment is not bound to one medium. In contrary the mutual use of different media enables and empowers the speculative experimentation. The project demonstrates as well, that an experiment can benefit, when executed in different social settings. "Learning to be a vault" took both place in workshops with students, where the breadth of design options was explored through physical models, as in targeted exploration and reflection of the individual researcher.

EXPERIMENT 4: SENSITIVE CERAMICS

Sensitive Ceramics (Hansen et al. 2014) (Fig 12) experiments with processes of how 3d printing of clay could inform a generative model that incorporates as well traditional craft knowledge based on skills and experience in making of three dimensional earthen objects. The observation of the filigranity of the extruded ceramic thread inspired to look at references from Gothic and Arabic windows, whose filigree patterns fulfill functional - the subdivision of a larger wall opening into batches of available glass sizes - performative aspects - to provide shadow - and aesthetic purposes - create local shadow.

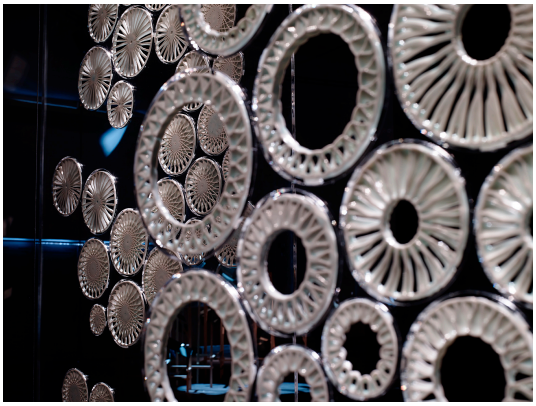

Figure 12
Sensitive Ceramics

The experiment is working on two levels. One operates with the design of compositions and patterns in a virtual 3d environment. Here a dynamic digital system responds to the movement of the hands. Users are able to interact and model a responding pattern. The second level has to do with the realisation

of the modules in ceramics by 3d printing directly in porcelain . A RapMan printer coils up the 3d shape in layers. The fired ceramic modules are finally mounted in a laser cut board that reflects the captured composition of the movement of the hands.

BACKGROUND AND RESEARCH QUESTION. The experiment takes its outset in the changing relationship between the crafting of material and its digital representation. It asked how traditional intuitive craft knowledge, based on skills and experience in making three dimensional objects, transforms and can be utilized through digital technologies.

In this framework the digital creation of materiality was understood in a twofold way, as being the result of matter; here clay, as well as the process; here interventions by the designer, 3d printing, firing and glazing. (Fig 13)

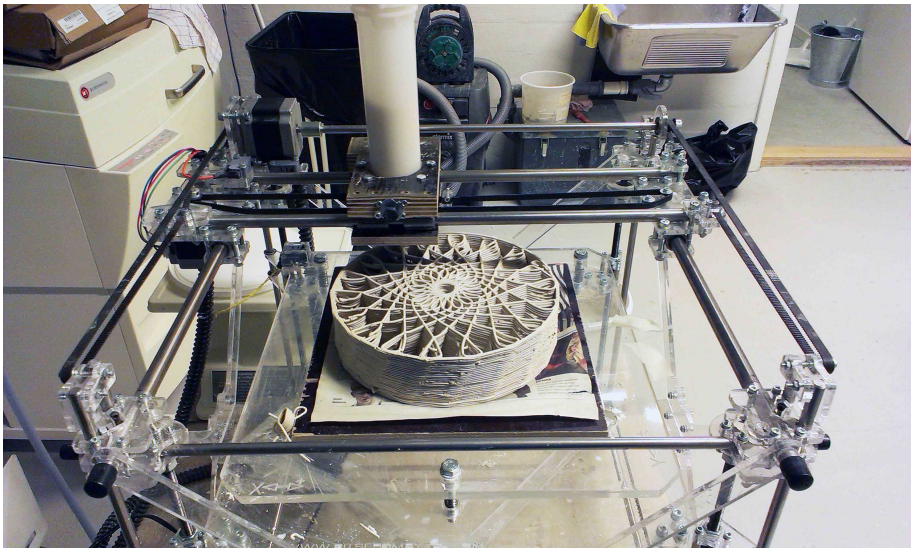

Figure 13
Testing of the 3d printing setup in Sensitive Ceramics

Throughout the course of the experiment the constituting material process of coiling a thin line of clay found its design counterpart in the digital drawing of endless curves. Both become integral part of the design genesis. The experimentation provided insights how craftbased concepts can be evolve in a digital practice.

DESCRIPTION OF MATERIAL / MAKING / FABRICATION PROCESS. The movement of hands is recorded by a Kinect 3d scanner and directly input to an interactive 3d system developed in Rhino with the plugin Grasshopper. Here the captured movement is transformed into circular 3d patterns that reflect the position and speed of the hands. Subsequently each

of the 3d modular patterns is translated into G-code, which is layer by layer printed into porcelain with a 3d. Thereafter the porcelain is glazed and fired to 1280 degrees. Finally the ceramic modules are mounted in a laser cut board that reflects the captured composition of the movement.

EXPERIMENTAL APPROACH. "Sensitive Ceramics" is based on speculative material and technological experiments. These take on different roles. Where the project is overall speculative in nature, sub experiments are used in a strategic way to evaluate material mixes, technological developments and processes. Series of parallel and interdependent introductory experiments with digital technology and ceramic material formed the starting point into the research. The experiments have acted as inquiries by which the initial concepts, technologies and materials could be tested and further developed (Fig 14). In a process of constant evaluation selected 3d printing experiments grew larger and larger in scale over time. The speculation was directed by the overall narrative of the experiment, which provided focus on the use of ceramics as light dispersing elements in a façade like setup. This narrative was shared by participants from the partaking disciplines, where the experimental work provided the interface between them.



Figure 14
Material probes of Sensitive Ceramics

CONCLUSION

While architectural experiments are not the same as scientific experiments, shifting focus towards the process, and away from the results, moves both fields closer to one another. In exploring the constituent understandings of experimental architectural practice, we find that there are different productive modes of experiment: Experiment as speculation, Experiment as reflection, Experiment for evaluation, Experiment as an integrated enquiry, and Experiment as interface.

The experiments we report on demonstrate that these are not exclusive, but can be foregrounded at different periods within the same experimental process. A single architectural experiment might include different characteristics. We find, that architectural experiments are not singular inquires, but rather sets of interconnected sub-experiments, tied together by the narrative and question of the overall experimental framework. This has in most of the investigated cases an architectural outset, which is evolving and transforming in the process.

Understanding experiment as process means that the experiment includes the varied design decisions, materialisations, and frameworks that lead up to the final experimental object. It is through this extended experimental apparatus that different concepts and technologies can be connected. In reflecting on the value of the experiment within an architectural design process, we find that experiments are therefore particularly well suited to enabling the synthesis of different concepts and technologies, and can be a key method for conducting an increasingly interdisciplinary design research practice.

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Brainstorm Session

'Brainstorm Session' Impact by Designing

ARENA Conference Report, 7th April 2017

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Introduction

One of the positive achievements of the KU Leuven Impact by Designing conference is that participants as well as members of the scientific committee were asked actively to share their thoughts on research impact and the ethical issues that are associated with it. To help the discussion, Johan Verbeke came up with the idea of organizing a 'brainstorm session' in two parts, which was held on the morning of Friday, 7th April 2017. The set-up consisted of a preparatory workshop followed by a short feedback presentation by three sub-groups, which was then in turn shared with the entire audience of the Impact by Designing conference.

In terms of the 'brainstorm session, after Johan Verbeke's initial statement, all of those present began to discuss the matter in three separate sub-groups of around ten people. As well as presenting their ideas and experiences in the plenary meeting, the three sub-groups also produced some useful visual presentation material - ranging from sketches to cardboard models - in order to underline their interest in the topic.

Following this 'brainstorm session', Johan asked Roberto Cavallo and Murray Fraser to collaborate with him in writing up a report on the proceedings, sadly curtailed by his untimely death. What follows here would not have been possible without the kind help of Johan's colleagues at KU Leuven's Faculty of Architecture in Brussels.

Presentation by Sub-Group 1

Roberto Cavallo, Faculty of Architecture & the Built Environment, Delft University of Technology, The Netherlands:

The discussion about ethics and impact in this sub-group has been quite lively. The participants agreed about the necessity of giving more attention to these matters. In order to do so, there is a strong need of embedding ethics and impact into the education and research agendas of our institutions. Several topics came to the fore, along with some interesting ideas that may be useful

for further elaborations on these issues.

The whole sub-group found very interesting the matter of stressing 'awareness' throughout our education activities. We should put forward in a much better and explicit way the questions of 'what do we actually do?' and 'for whom are we doing that?'. These questions should in the first place be addressed on the level of whole educational programs. Thereafter, each particular course should be inquired on this beyond the extent of its content. The sub-group discussed about the awareness point connecting it with the offer of design exercises. As eye-opener towards changing conditions, course assignments should not only reflect upon but should actually involve more actively stakeholders, external actors and other disciplines. In addition, we are naming or asking very often to consider flexibility, adaptability and different possibilities when designing. While doing that, we should include the question 'for whom?'. This will almost automatically imply the consideration and most probably the inclusion of ethical dilemmas. In most cases this is happening in a tacit way; our task is to explicitly mention and debate on these subjects.

When talking about impact, this sub-group started the discussion mentioning the issue of perception. There is a degree of impact that can be named as general or objective, and another degree that is more specific or subjective. Above all, as far as we know, there is not an all encompassing codification of impact. It is very difficult to monitor it, measure it and assess it. Perhaps a timeline of impact could help in measuring it through time. Yet, here the group felt the urgency of coming forward with new approaches towards impact.

Also the impact and the influence of 'mastery work', done by academics or professionals, has been part of the discussion. How is this type of work influencing and impacting development and thoughts of our students? We find this question quite important as using 'mastery work' is an often recurring practice in teaching and researching. Obviously this point connects also with ethical dilemmas.

Presentation by Sub-Group 2

Alan Jones, Queen's University Belfast, UK:

This sub-group talked about the various labels and kinds of expertise that may be involved in the issue of research impact, and its implications for research ethics. Everybody agreed that the most interesting impact happens not in the middle of the discipline but in between its branches, whenever genuinely collaborative work takes place. The discussion pointed to the example of a complex project that has been brought to realization, such as a theatre or a hospital, in which a range of expertise will bring most probably a reduction in risks, an opportunity to delve deep into some specific matter, and probably also financial savings.

Our conversation however came back to the different implications of impact as an individual researcher or as part of a team. Within universities, we are

very often assessed as individuals, and are asked questions such as: what did you achieve this year, and what impact did you have? The sub-group however preferred to talk about the tactics needed to work as a research team, one of the benefits of which is the ability to play to people strength. Somebody in the team might be very good in terms of producing research outputs, but not really interested in communicating or disseminating them. We therefore have to recognize what we are good at, what our colleagues are good at, and then play to those strengths.

Furthermore, the sub-group talked about the timeline of creating research impact, and of being able to produce evidence of impact. In this respect, the group expressed the preference of doing things slowly. Yet for many government departments and universities, doing things slowly is not accepted as they have such short institutional memories: instead they want to see rapid impact. Thus there is a pressure to produce impact for impact's sake, and to do so quickly, whether as an individual, as an institution and so on.

Another point that was touched during the discussion was about the fact that governments and funders are generally not financing 'blue sky' thinking, where the research impact may take longer or may never have an impact. The group talked also about the idea of 'failure', about the possible negative proofs of research - something relatively common if we consider adjacent disciplines like structural engineering.

Johan Verbeke, Sint-Lucas/KU Leuven, Belgium:

The incumbent rector of KU Leuven, when he got elected, spoke in favour of 'slow science' instead of just following all the latest trends: unfortunately, such an intention disappeared from the university's agenda after that moment.

Murray Fraser, Bartlett School of Architecture, UCL, UK:

For the British official approach to assessing research impact, the underpinning research that one could claim for the 2014 nation-wide assessment allowed one to go back 26 years, to 1988. This was open acknowledgement that it clearly takes a lot of time to have any impact. It is also a crucial point regarding the question of whether one is working as an individual or part of a team. Nowadays is extremely difficult, if not near impossible, to win major research funding as an individual scholar in the UK. Research in most subjects is supposed to be team-based, and this is a reality that is applying increasingly to Built Environment disciplines too. One hence needs to construct a broad research team before one applies for funding.

I agree also that we need to utilise different scholar's research strengths. In a broad faculty like the Bartlett, we only need to demonstrate that a certain number of our research projects have a proven impact: hence not all of our researchers have to claim impact. This is all to the good. The idea of standardization or stereotyping in research, whether in regard to impact or other matters, would be the worse possible course for anyone to follow. Instead, we ought simply to be aware that there are certain types of investigation and research that clearly meet impact criteria, yet that there are others that do not.

It shouldn't be seen as at all problematic to treat impact as but one part of the whole research spectrum of a typical university faculty. So, in terms of impact, we cannot possibly say that one size fits all, or that research impact has to mean carrying out this type of research work and no other. It is vital for us to keep stressing this point.

It is equally vital, as noted, to respect the intellectual space that sits in between the various Built Environment disciplines whenever we are assessing or measuring research impact. Within a single, established subject it is likely that everybody will be claiming more or less the same kind of impact, and as an obvious result, the actual impact will become less and less. In contrast, the intellectual space 'in between' where most likely new research possibilities can be found, and the same must be true in regard to impact. Where indeed can we have our main impact: within the dominant subject area, or else as an interdisciplinary encounter?

Alan Jones, Queen's University Belfast, UK:

Another issue is to find ways to avoiding confrontation among research teams, which is best done by always having at least three options to consider - meaning that the team is never confronted only with a conflict between two different points of view. In this sense, one can rely on having a far more balanced judgement when taking a decision.

Presentation by Sub-Group 3

Robert Barelkowski, West Pomeranian University of Technology, Szczecin, PL:

Despite the fact that research impact has multiple possible interpretations, we tried to focus on those interpretations of the word 'impact' that relate to some kind of conscious act, whether consciously impacting on or being impacted upon. Our sub-group tried to produce a diagram to interpret the relationships that came out during our discussion. These include those of environment, ethics and participation, as fundamental words related to the term 'impact'. Regarding collaboration and integration, we have shown a circle surrounding a research impact, something that is aside from it, like the eye of the beholder that watches over the process and how we compute these new pieces of information.

Murray Fraser, Bartlett School of Architecture, UCL, UK:

Does the concept of ethics change the picture? It is fair to say that, to date, ethics has probably not been a huge subject within architecture research. This is different for instance to a discipline like anthropology, or other subjects that have been holding ethical debates for a long time. Would the incorporation of ethical issues actually change what we do as architectural researchers?

Kate O'Connor, School of Architecture, Marywood University, US:

I personally think it does. As architects have started to design for those who are in real need, the act of research becomes more ethically enhanced since one

also has a responsibility to those who cannot influence the process.

Murray Fraser, Bartlett School of Architecture, UCL, UK:

That is a really interesting point, since it touches upon the prevailing power structures, and associated aspects that are clearly important but difficult to deal with. I am thinking of questions in any society such as: Who controls power? Who exerts power? Who is able to get access to power?

Robert Barelkowski, West Pomeranian University of Technology, Szczecin, PL:

I suppose that ethics are important because of our group's affinity to scientific standards that are closely related to ethics. For instance, whenever you carry out some kind of biological experiment or medical experiment, you need to rely on ethical judgements. In architecture, we are touching upon individual or societal issues in ways that affects human comfort, and even human lives. Therefore the ethical perspective seems to be very relevant in terms of discussing the impact of the research we do.

Hanne Van Reusel, Sint Lucas/KU Leuven, Belgium:

In addition, we discussed that you can impact also in ways that you do not intend to or want to; in this sense, it may be negative. In such case, even being aware of ethical issues may not be enough. Our group did not have clear ideas on how to deal with such situations.

Roberto Cavallo, Faculty of Architecture & the Built Environment, Delft University of Technology, The Netherlands:

The presentation by Bostjan Vuga yesterday about the processes of designing and making raised the issue of what happens when you follow the realization of a design project. Thus when we are thinking about ethics, it is extremely interesting to observe buildings after they have been delivered and used. We need to keep observing them for a number of years to see what kind of impact they are having on users, as distinct from one's subjective intentions involved in the act of being the designer. This also touches upon the question of perception in relation to the specific experience. Are we trying to understand the perception that somebody else, the building user, might have, and how do we do that?

Another issue, probably complementary, is that, although our educational programs are full of different matters, and people understand the necessity of integrating ethical perspectives, there are no experts yet working on a general codification or understanding of what the impact of the research we are doing might be. In terms of building performance, one can measure such aspects in many ways, but there are not any straightforward ways of measuring research impact. How can we explain such issues to students? Is it about the impact that a particular project addresses, or is it about a much broader field that we should be exploring? We simply don't have the expertise to be able to tackle with this dilemma. Most of the time we have to rely instead on our intuition, or on the fact that some of us have had more research experience, and thus have been faced already by a similar situation. Therefore more research is needed

to put this topic more prominently on the agenda. We need to agree on a general palette, a general framework for understanding different situations and positions, and how to learn from them.

Kate O'Connor, School of Architecture, Marywood University, US:

One of the things that we actually have achieved as a school in the USA, having just been given accreditation, is that ethics is now one of the student's performance criteria. So the key question is: how do you actually teach ethically, and how do the students actually demonstrate that they have assimilated that teaching? So it is perhaps just another roof to jump from, I guess.

Murray Fraser, Bartlett School of Architecture, UCL, UK:

My colleague in the Bartlett Faculty, Jane Rendell, is running a project for all our Built Environment courses about research ethics, with the idea of coming up with a scheme specifically for our subject. This has never been done in Britain before. Ethics at UCL has till now tended to mean medicine, essentially, in that around 95% of the ethical cases discussed are medically related. But we have to realize that many of the criteria in that kind of field are simply not relevant to Built Environment disciplines, hence we need to come up with our own reading of research ethics that is not in any sense negative, nor about damage limitation. Instead, our view in the Bartlett Faculty is that the whole issue of ethics ought to be something that helps us to think reflectively while doing research. Thus we are trying to ask all our PhD students to think about whether there are ethical implications in what they do. Their most common answer is: no, it is not relevant to me, as I am not dealing with personal data or similar matters. But, as has been pointed out in the discussion here, this is a limited research viewpoint, and we need to realise that research ethics is actually a much broader and more complex topic.

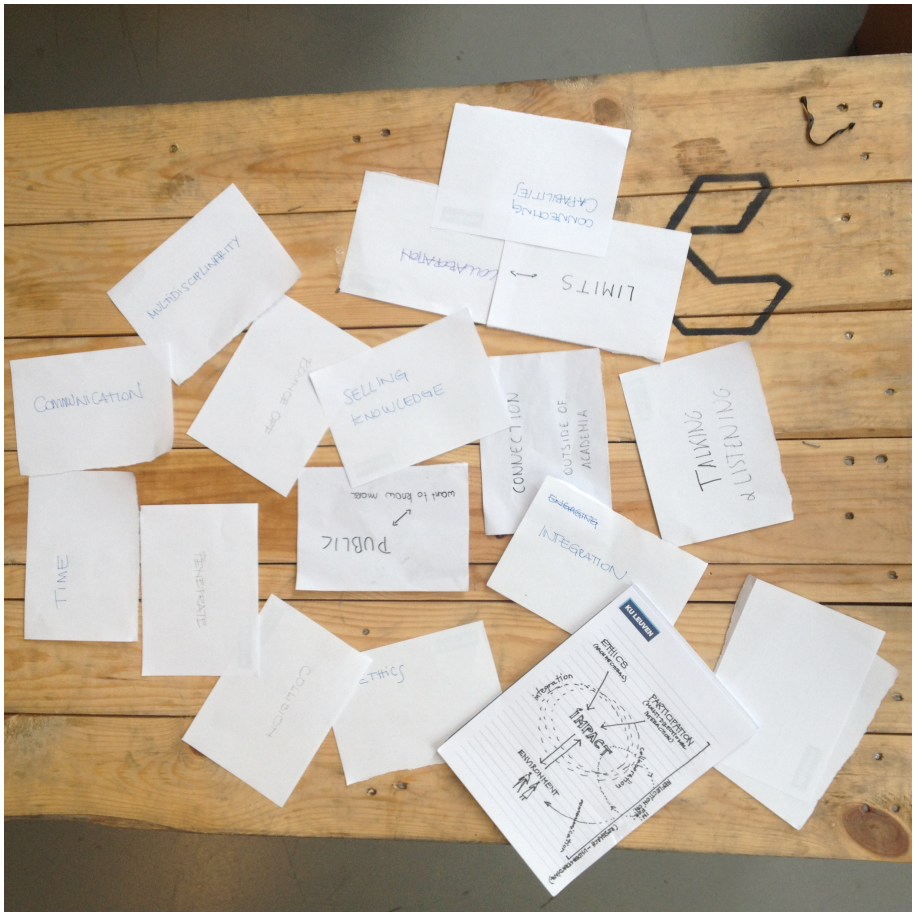

Figure 1
credit Hanne Van Reusel- KU Leuven – Belgium



Figure 2
credit Hanne Van Reusel- KU Leuven – Belgium

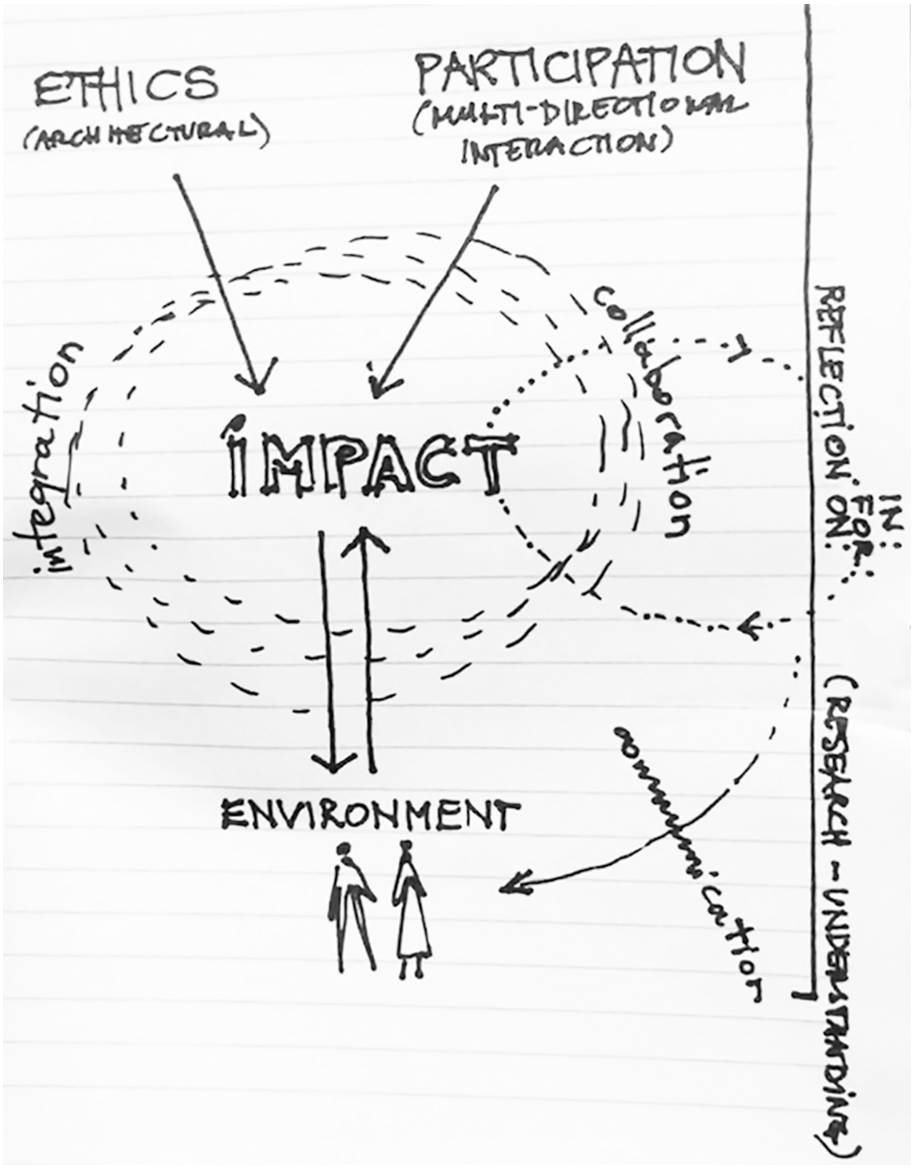

Figure 3
credit Robert Barelkowski – West Pomeranian University of Technology – Szczecin – Poland

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