Computing Place

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Introduction

The intention to evoke a sense of place and respect the spirit of a place through design has long been a driving motivation for landscape architects. Weller (2016) asks us to consider whether landscape architecture has grasped this sense of place yet. The question remains unanswered and, so, we can assume that for the foreseeable future the goal remains unchanged and the quest will go on. What is changing, however, are the methods used to tackle this design intention. Walliss and Rahmann (2016) recently published Landscape Architecture and Digital Technologies : Re-conceptualising Design and Making, thereby bringing digital computational methods to Australian landscape architecture.

There is great complexity and an abundance of jostling concepts associated with place-thinking. I seek to extract the ideas emerging from research and consider how they might inform landscape design. What are the key drivers for the process of place conceptualisation and how successfully are landscape architects using digital approaches to engage with these drivers?

Place

Our brains have a dedicated area for spatial memory and, even, a subsection of that region reserved for our favourite places (Coghlan 2016). We organise our memories according to where the events occurred and we exploit this process to achieve seemingly superhuman 'method of loci' feats of

memory (Wikipedia 2018). The fundamental nature of our three dimensionality pervades our experience of existence: our "human identity is … tied to location"(Malpas 1999). So what are the connections between people and the spaces they inhabit?

While disciplines vary in how to categorise the world, there is, however, a common understanding that the label 'place' has a very different meaning to any variations on space/region/location/area. Authors from all fields struggle to establish a succinct definition of place but there is a definite consensus that the word 'place' is what we use to refer to somewhere that holds reasons for conceptual existence beyond or (often) without bona fide lines drawn in the sand (Smith and Varzi 2000). Places "can be psychical as well as physical, and doubtless also cultural and historical and social" (Casey 1996). Simple, huh?

Tuan's thinking around topophilia – the affective bond between people and place - has been very influential. He was amongst the first to make explicit the multitude of relationships between spaces and places. He suggests that "what begins as undifferentiated space becomes place when we endow it with value" (Tuan 1977). Casey (1996) notes that the perceived relationships between the two concepts have differed throughout history and between cultures. In the modern Western tradition, place was "disempowered" as Newton, Descartes and Galileo relegated places to merely positioned portions of space. He suggests that to get back to the meaning of places one needs to look to pre- or post-modern thinking, or traditional non-Western societies. Here he finds embodied places that are loaded with meaning that is intrinsically linked to people. He says "places belong to lived bodies…lived bodies belong to places…bodies and places are connatural terms", places keep both "experiencing bodies" and "such unbodylike entities as thoughts and memories" (Casey 1996). As we experience places they appear more like events than things. This view is one shared by Ryden (1993) who states that ''a place . . .takes in the meanings which people assign [it] through the process of living in it.'' By this process any given space can take on layers of meaning ascribed by many different people. Greider and Garkovich (1994) describe how "any physical place has the potential to

embody multiple landscapes, each of which is grounded in the cultural definitions of those who encounter that place."

Jackson (1995) suggests that place formation is about the rhythms of repeated shared times spent somewhere - "a sense of fellowship based on a shared experience". These repeated rituals of place creation give us an "indefinable sense of well-being … which we want to return to, time and again." This is perhaps the strongest ascription of the importance of time to place creation. The words used in descriptions of place creation imply process and action over time; places are created by endowing, experiencing, living, encountering, returning, sharing.

You will notice that these descriptions of place bear no mention of the physical qualities of the space occupied. While places are no longer seen as only portions of space, they are still spatial. What part then does the physical world play, beyond its mere existence? Stedman (2003) questions the absolute attribution of place-creation to the cultural and social, suggesting that there is reason to consider the salient physical landscape as an influence in our conceptualisation of place. Malpas also reiterates that the connections between people and their environments are not one-way interactions. People do not simply apply their world view or tally up numbers of interactions then attribute meaning and place labels accordingly. Rather, "our relation[ship] to landscape … is indeed one of our own *affectivity* as much as of our ability to *effect*" (Malpas 1999). That is, the physical world we experience and the salient components we perceive affect reactions in us, contribute to our formations of meaning which we then place back into the world in the form of a place.

Assuming our physical environment does influence our place conception, it is important to consider the way people perceive it. Our senses inform our first subconscious reactions to a space before we evoke the influences of familiarity, memory or association. Nijhuis (2011) states that "We can only experience landscape architectonic space by movement" because of the cognitive processes of vision which require a series of views to form a stitched-together perception of what is around us. Another description of action associated with the processes of place-events.

At first look there appear to be contradictions in requirement for movement in place formation. There are active verbs associated with our conceptual transition from place to space and there is physical movement required to allow us to sense. Yet, Tuan (1977) claims that it is "space [that] allows movement" and that "each pause in movement makes it possible for location to be transformed into place". He calls for pause amidst the processes of an event. I make sense of the contradiction by suggesting that motion is required for our perception of the world yet there are, necessarily, changes of pace. It is not contradictory to say that we pause at locations that have meaning or, vice versa, at locations where we pause value the processes of meaning take the momentum. There's a reciprocal flow of attention and motion between our physical and abstract selves.

I have purposefully not spoken of the 'sense of place'. This is because I would like to deviate from the common use of the phrase and intention within landscape architecture. Since Alexander Pope referred to the "genius of the place" (Pope 1731) and evoked the ancient Greek understanding of genius loci – the spirits of place – landscape architects have taken a 'sense of place' to refer to a spirit of place that already exists, which they must conjure in their design. As an alternative, I suggest understanding a 'sense of place' as something experienced having arrived at 'a sense of this being a place as opposed to a space' would be a more useful design motivation. Perhaps we can do better by aiming to facilitate an individual's movement towards place creation via the myriad of complex pathways, of which a perceived spirit of the space is only one.

Empirical studies

Beyond definitions and theoretical descriptions, it is useful for landscape architects to consider the empirical experiments aiming to observe and identify the processes of place formation using actual people and places. I will present the research from three different studies: the first using a specific

lake as a study site and people connected to that place; the second covering unconnected and connected people and places, and the third using unconnected participants in at the city scale.

Stedman (2003) posited that the experience of place is made up of three factors: "meanings, attachment, and satisfaction." He aims to isolate the contribution of the physical world to the conceptual formation of attachment ("how strong do I perceive my linkage to the setting to be" and satisfaction ("degree of like or dislike for the setting"). He assesses three modes by which these contributions could be made - evolutionarily derived direct perceptions and preferences, learnt symbolic associations, or via experiential associations. He asks: "(1) How strong is the relationship between characteristics of the physical environment and sense of place and (2) What model provides the best explanation of the process by which the effect occurs?"

His study uses data on development density changes in Wisconsin lake-side communities and residents' encoded written questionnaire responses about attachment and satisfaction, analysed used structural equation modelling. His key findings are that place attachment of residents did not change due to development overall, however the reasons for their attachment did change, and that place satisfaction reduced due to the increased development. He also notes that the experiential drivers appear to compete with the symbolic as we form our ideas of place. His overall conclusion is that, yes, the physical environment does impact our perceptions of a sense of place. Within that there is great complexity and dynamic meanings with competing drivers of formation. It is important for landscape architects to know that there is such complexity at play and that the physical environment is certainly a part of the mix.

Cross (2015) reiterates the need for broad empirical exploration of place attachment processes. While she does not consider the influence of the physical environment, her focus on processes and how they evolve through time is relevant to landscape architectural design. Cross analyses oral interviews, newspaper columns, letters and essays. Her key interview questions ask participants where they consider home to be, and what sort of place they consider an ideal place. She uses

qualitative data coding and analysis software to interrogate her material. She applies concepts to her results and concludes that there are seven processes by which people form place attachment: "(1) sensory, (2) narrative, (3) historical, (4) spiritual, (5) ideological, (6) commodifying, and (7) material dependence" (Cross 2015). The sensory experience via sight, temperature, smell, sound is certainly a mechanism landscape architects can engage with. Cross suggests that the sensorial experiences contribute most strongly to place attachment formation in natural environments. She does not elaborate on her definition of 'nature' but does quote her participants who mention grass, ocean waves, seasons, forests, ponds and spectacular views. This supports Stedman's finding that the physical environment does influence our conceptualisation of place.

Interestingly, Cross considers the narrative process – the story-telling and communicating about place – to be one of the most significant contributors to place attachment. This connection of space to place via language emerges as a key finding in many other areas of place research (Weibel 2009), and I suggest it a mechanism that is highly relevant to landscape architects. Tuan notes that a "sketch map, done quickly on sand, clay, or snow, is by far the simplest and clearest way to show" something spatial while "language is better suited to the narration of events" (Tuan 1977). I think place-creation requires both.

The commodifying attachment and material dependence mechanisms describe the way we compare places to our ideal imagined places and the potential for a given place (or people in them) to best satisfy our needs. This material dependence is similar to the notion that we perceive places according to what they can afford or offer us (Gibson 1986). And both, together, present a more detailed description of what Stedman calls place satisfaction. I would suggest that these are the more elusive and individually variable of the processes, and hence most difficult for landscape architects to engage with.

Jorgenson and Stedman (2011) investigate the changes in place conception at different spatial scales. They aim draw on many different methods of meaning, cognitive, perception, belief and

value mapping to ascertain common scale-related processes. One of their most interesting

motivations is the idea that "the purpose with which we use place (or role) … varies according to the

scale" (Jorgensen and Stedman 2011). This describes the 'not in my back yard' effect where people

agree with something happening in a perceived large-scale place, but not if it were to happen at a

smaller place-scale.

They interviewed participants from four Australian cities, about their attitudes, behaviour and place

attachment and asked them to draw boundaries around significant places on maps, being careful not

to influence their participants' interpretation of 'significant'. They used the same structural equation

modelling as Stedman's 2003 study. They found that "on average, participants were attached to

areas comprising part or all of a suburb"(Jorgensen and Stedman 2011). They found an interesting

correlation where people who described attachment to larger regions have stronger environmental

attitudes than those who were more attached to smaller regions. This is important for landscape

architects who often work over different scales and need to be aware of the implications of spatial

extent on place formation processes and attitudes.

What are the key elements from this research that are important to the way landscape architects

work with digital technologies towards facilitating the conceptualisation of place? In no particular

order, architects should consider:

- people respond to all their senses,

- positive association is central to place,

- people need to move through a space to perceive it,

- people respond to spaces that give them something they need,

- spaces people like (for whatever reason) become places,

- spaces of restoration (particularly natural spaces) become places,

- places are formed out of languaging and shared narration,

- places are formed out of repetition,

- conceptualisations of places are dynamic,

- places can exist with overlapping extents and have different scale-related meanings, and,

- there is great complexity in place creation and many influences are not on this list.

Digital technologies in landscape architecture

That list of driving place-creation processes does not neatly translate into a landscape design manual for landscape architects. Firstly, we have before us this collective desire for people to create place out of space in response to our designs, and, secondly, we have a huge pile of complex people-place interactions and relationships crossing all ontological boundaries. We come then to the question of how landscape architects are attempting to connect the two and, in particular, how they are using digital technologies to do so.

The ideas emphasising the processual and event-like nature of place, and recognition of two-directional interactions between people and space, are most significant. Therein lies movement and progression and potential for iterative feedback loops. Conceptually the hermeneutic process – one of "oscillation between subject and object" (Weller 2001) – is a good theoretical fit, towards a description of landscapes where "humanity [is] inextricably woven into the synthetic environment of its own conceptual creation" (Weller 2001). The landscape becoming simultaneously "both an idea and artifact" (Corner 2014). In practice landscape architects, urban designers and planners are working with participatory and interactive approaches, with complexity, simulation, visualisation and artificial learning.

Participatory and interactive

Cantrell and Holtzman (2015) note that the "architectural profession remains relatively steadfast in a distinction that divides designers from users, even though technology increasingly provides grounds for diminishing that distinction." Carpo considers some reasons for this reluctance. He describes how the success of Wikipedia-style collaborative editing cannot be repeated for collaborative design using the same model. This is because the iterative design process which – theoretically – will lead to an averaged inclusive design will have to be stopped so as to build the project. Necessarily and arbitrarily ending the collaboration reduces its value. Secondly, he suggests for design, perhaps optimal is not synonymous to average. Having many collaborators – a committee, Carpo suggests – is more likely to result in a generic design, not a brilliant one (Carpo 2017).

Despite the logic in these arguments there are, however, designers who are successfully using participatory methods. Enriqueta Llabres-Valls, Eduardo Rico and their team have developed an integrative approach to design using relational urban models (RUMs). I will discuss the significance of the computational elements of their approach in the next section, but it is the community engagement and participatory aspects of their methods that are important here. Their aim is to respond to people's values and to capture the tacit dimension which is "characterised by knowledge that can be conceptualised and transmitted before it can be explicitly rationalised." (Llabres and Rico 2016). In one example Llabres-Valls (2017) describes their return to the sand boxes of the pre-digital 3D landscape design era and how they engaged children to design their skate park. The sand box designs were captured live with a 3D scanner and the digitised topographies used to form the design (Figure 1). Here the engagement facilitated community attachment to the project, the act of making began the process of attributing meaning to that place, and the contribution to the physical design potentially raised the children's satisfaction with the final shape of the ramp. All important factors in place-creation. The final design is in Figure 2.

Perhaps through the skilful integration of participation, digital technology (3D scanners in this case) and designer agency, community participation in design can be successful. The key difference between these methods and the traditional community consultation method of presenting drawings, is the event, the engaging of the senses, the building of narratives and positive association with the space – all noted before as place-creating processes.
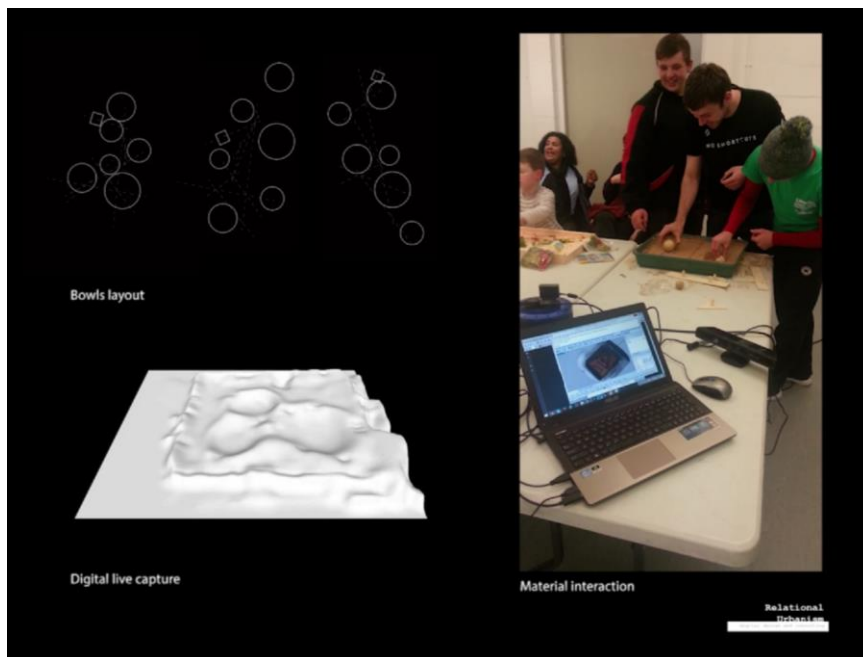

Figure 1: Sandbox models with live 3D scanning (https://vimeo.com/153850895).

Figure 2: Final skate park design (https://www.98fm.com/First-Look-At-New-500000-Park-For-Ballyfermot).

Complex

There have been attempts to computationally build parametric rule-based models of the complex interactions between people and place. Complex adaptive systems (CAS) using cellular automata (and other) models have been tackled by urban model researchers. Their models included more and more variables in attempts to mimic real-world complexity, to the point where "data requirements exploded … it became impossible to even calibrate, never mind validate, such models"(Batty 2009). They reached the limits of prescriptive rule-base urban modelling.

There is a group who are taking the ideas of these complexity modelling attempts and speculating about real-world empirically driven "actualized" interpretations. As somewhat of a challenge to Corpo's perceived need for there to be an endpoint to the design process once it enters construction, Wohl proposes designing urban spaces via a series of physical interventions placed in order to "change the nature of space and relations on the ground" (Wohl 2017). Wohl's 'tactical' approach posits that there should be a move from "*understanding* relational forces, toward *activating* relational forces". The designers propose a methodology of: initiating a series of temporary events or programmes which simulate a potentially permanent intention for a space, observing people interacting with the temporary intervention and assessing its merit "with successes or failures evaluated based on *actual* scenarios unfolding, not *forecasted* scenarios being deliberated" (Wohl 2017). They propose to use matrices of location, timing and intervention type to guide their progression through many possible combinations, with direction decisions guided by their observations (see Figure 3). Wohl suggests things like painting in bike paths to create a temporary version, holding events at places which might become outdoor cinemas, say, or running high frequency buses along a potential train route.

This approach touches on many elements of place creation. The use of events to connect people to spaces, the recognition of our senses and perceptions engaged only through tactile interactions, the acknowledgement of many possible meanings coexisting at a location. While Wohl's approach

engages with the programmatic and topological components of a design, Llabres and Rico's worked with the form and texture of a given element - complementary approaches to participation and both potentially useful for landscape architects. Interestingly, a common theme emerges - of digital methods enabling or inspiring practitioners to incorporate physicality interaction with the user into their design process. Perhaps a signifier of change in purpose from sense of place provision to place-creation.

Figure 3: 7 × 7 × 7 matrix of relational possibilities (Wohl 2017).

Simulated

Let us recall for a moment the long-standing parametric deterministic planning support or spatial decision support systems of urban planning. These are much simpler than complex adaptive systems

– they are Envision, Community Viz, What If?, for example – and consider linear relationships between components such as numbers of people, numbers of houses, numbers of cars (Pettit et al. 2018). These provide indicative simulations for urban growth forecasting via easy-to-use scenario-producing sliders but they bear no consideration of, or application to, place-creation and people-place interactions.

In contrast we can consider the impressively advanced leap forward in parametric modelling, that is Llabres-Valls and Rico's relational urban models. As hinted earlier, Llabres-Valls and Rico's relational urban models are much more than laser scans of sandboxes. They are combining a parametric modelling engine with participatory proxi modelling, integrated built form design and powerful visualisations throughout. See their setup in Figure 4.

Their modelling approach is based on the recognition that "a parameter constitutes a form of knowledge that is explicit and codified, while values hold a tacit dimension" and that that tacit dimension must be captured because in "urban design, space, time and value are intimately intertwined" (Llabres and Rico 2016). Their motivation is to incorporate the values of many different stakeholders and work through design scenarios which explicitly address those values.

Llabres and Rico's take on scenario production is a less physically enacted than Wohl's proposal but they do, where relevant, use proxi models – simulations of natural processes – as the scenario generating tool with which they engage stakeholder groups. They have used this process for projects in Shenzhen and São Paulo, for example (Figure 5). In other situations (in Wuhan, for example) they add an extra layer of interaction by using physical scaled models of sediment and water, not just geomorphology computational simulations (Figure 6). In the same way that they engaged children in skate park design they can use the physicality of such a model to elicit the values and tacit knowledge of their participants that is "rooted in action" (Llabres and Rico 2014).

This relational urban modelling approach engages with many of the identified place-creation processes: the narrative forming participatory mechanisms, the recognition of multiple meanings

coexisting, the use of simulations over time to visualise the place-event, the engagement of senses through physical touch and movement, and via the different simulation methods the ability to engage with spaces as different scales. And here the best example of digital approaches allowing for the connection of so many different types of inputs via, scanners, parametric models, visualisation models and proxi simulation models. A technologically intensive process made to look simple through their effective communication methods.

Llabres and Rico's design methods are interacting the same factors of place-satisfaction and place-connection as Stedman did, only instead of assessing how much can a space be changed before it is no longer satisfying or before the connection is broken, they are asking the opposite – how can changes in a space build place-satisfaction and connection. Their time-scale is into the future, not the past and so they have access to the power of the present tense verbs that are core to place-creation.
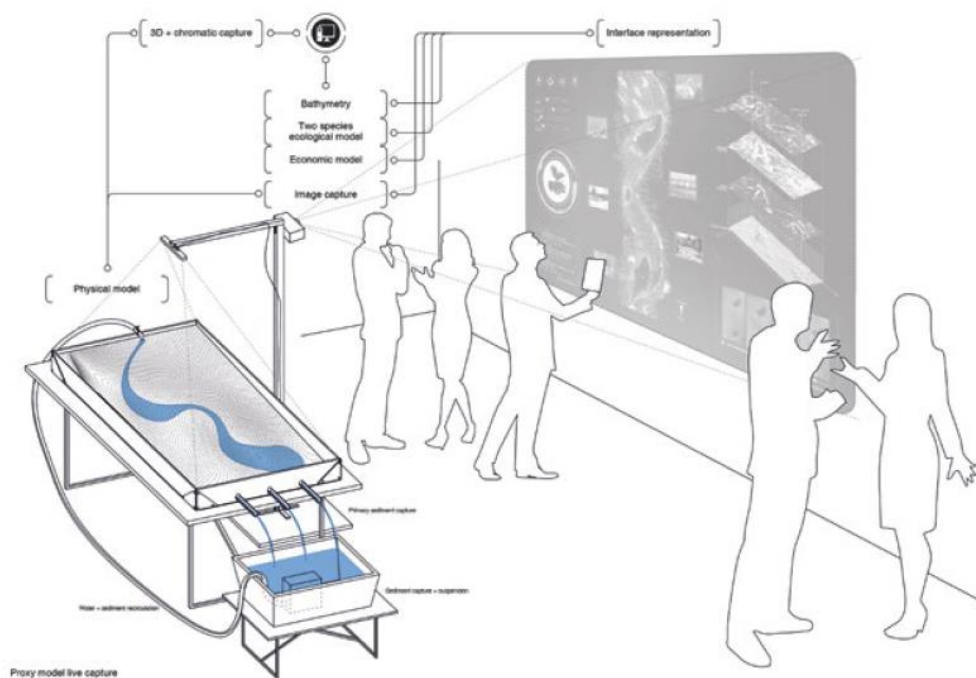

Figure 4: Proxi modelling setup to generate inputs for a relational urban model (Llabres and Rico 2016).
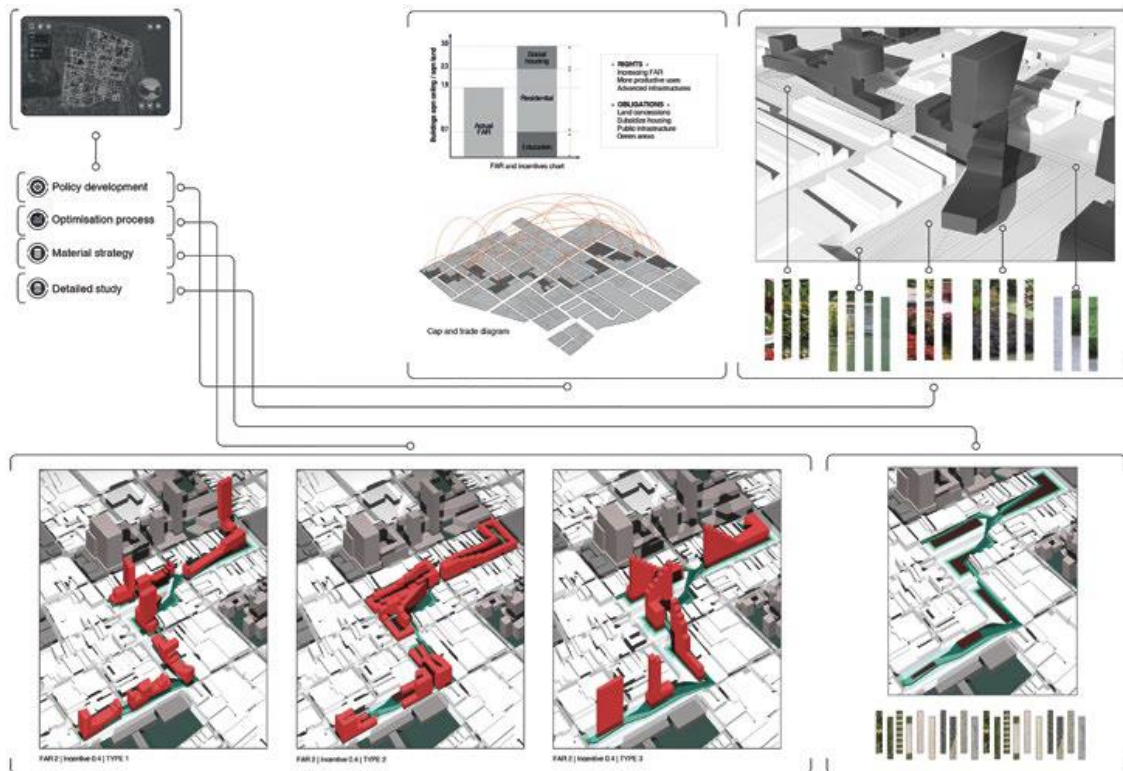
Figure 5: Sao Paulo relational urban model (Llabres and Rico 2016)

Figure 6: Sediment modelling setup (Llabres and Rico 2016).

Visualised

I would argue that part of the success of Llabres and Rico's participatory work lies in the visualisation component of their methodology. The Chora Lab in Berlin has developed a similarly visually impressive stakeholder engagement and planning support tool with their Conscious City Lab. They have taken a very different approach to that of the relational urban model, but with an equal emphasis on interaction. They have developed a space where they present a "range of artistic strategies such as performances, visualizations, and Scenario Games to give a glimpse on how smart, low-carbon cities could be planned in the future" (Chora Lab 2018). They use large touch screens to invite participants to interact with real-time data from city sensors (see Figure 7).

Their mention of the word game raises questions about the possible promotion of participation via gamified scenario planning as a method of value capturing, and virtual and augmented reality visualisations to spark the process of place-creation. Equally, virtual reality could be a method by which communities can extract and represent the salient features of their perceived landscapes to designers, in a similar way to how indigenous groups are producing informative presentations of their place meanings (Virtual Songlines, Carriberri movie).

Nijhuis (2011) reminds us that we experience vision via movement through spaces, so it makes sense that static drawings offer us only a very limited sensorial experience of a space. There are photogrammetric and laser scanning tools which allow for capturing high resolution point cloud data. While I generally agree with Girot's statement that "point-cloud models are unwieldy and the information they deliver—although highly precise topographically— remains partial, virtual, and superficial" (Girot 2014), I do consider that their application in creating virtual and augmented reality spaces for designers and users to move through could be an incredibly powerful design tool

Figure 7: Conscious city lab participatory touch screen (http://www.chora.tu-berlin.de/Conscious-City-Lab/).

Artificial

All this talk of technology, participation and urban planning inevitably leads us to the idea of smart cities.

In their discussions of the implications of a sensed world, Cantrell and Holzmann touch on the feedbacks between biological and artificial systems. Included within those biological systems are us – humans. Human computer interaction is an area of study that is likely to become important for landscape architects as a "device for shaping and mediating physical environments" a way to create "site specificity through behaviors or outputs rather than solely through metaphor, morphology, or aesthetics"(Cantrell and Holzman 2015). What does this mean practically, now? Does it mean that only the 'quantified self' will be able to connect and respond to places? Will we interact with places not via meaning and memory but via data – inputs and outputs mediated by algorithmic responses?

These are the questions posed for landscape architects now, as explorations into the sensed landscape are only beginning.

What is already clear, however, is that mass data collection is rife with ethical challenges which designers will have to negotiate. Within this context we consider let us consider the data collected by likes of Google, Amazon, Facebook and every ITC provider who has access to the GPSes in our pockets. The public are outraged when the data from these sources ends up in the hands of politicians. The interesting part is that the outrage comes not at the time the data is collected (we all knowingly sign in to online accounts all day) but at the point that it is used for something that we (individually) do not agree with.

Could this disconnect be avoided if we're shown the connection between our datafied selves and the world around us? What if we feel the powerful sense of participation we have observed in leading approaches to design? Projects like the Human Project in New York are embarking on large scale, transparent, minute-detail data collection from 10 000 paid participants and their surroundings (Mattern 2018). The only substantial difference between this and Facebook being the greater breadth of the types of data collected, the fact that the participants are paid and – the crux of it - that they are working with the aim of informing "evidence-based public policies that improve lives". Participants are in it because "together, we can reveal the big picture to creating a better world"(The Human Project 2018). The project leaders are aiming to use the power of positive participation to capture data for use in planning large scale city systems. Making the connection between data collection and place creation and well-being at national scales. The page of their website introducing team members is currently returning a 404 error, so perhaps their project is not as well received as their propaganda would imply.

With petabytes worth of data on hand we "stop looking for models. We can analyse the data without hypotheses about what it might show. We can throw the numbers into the biggest computing clusters…and let statistical algorithms find patterns (Anderson 2008)". From the

perspective of a designer, Mattern questions whether a "blind faith" in machine learning will actually lead to results that benefit everyone (as the Human Project suggest). She points out huge potential to magnify systematic biases if there is no critical eye caste over the machine controlled mix and match of datasets. Instead of computing place, we could be automating inequality.

There appears a clash of scale. There is the need for big scale thinking yet the computational approaches at that scale are fraught with danger. There will be a challenge for designers to retain agency over our quantified landscapes and our quantified selves. We know how to operate at the neighbourhood scale, so perhaps this is the place to get back to the empirical testing. Kontokosta (2016) explicitly calls for the paring of instrumentation and sensors with engagement. It is not sufficient that people offer their data, they must also participate in "diverse, intensive, and persistent real-time data collection" Perhaps this 'live lab' at a neighbourhood scale can inform our understanding of how best to ethically sense the complex systems of human behaviour and natural processes at the city, state, country, global scale. Although we must recall the findings of Jorgenson and Stedman (2011) when they showed that our attachment to place can vary with spatial scales. Perhaps our learning from the neighbourhood scale will not translate to bigger areas? So the tackling of smart cities remains an exciting unknown future.

Conclusion

Place, in all its complexity should stay at the heart of landscape architectural practice. It should be less about providing a sense of place and more about creating place through "design … making sense (of things)" (Llabres and Rico 2016). The complexity of place in the smart city is a challenge at all scales but perhaps taking the success of the relational urban model approaches and retaining the neighbourhood scale participatory approach, is the beginning of experiments in machine learning. What is clear is that the benefit of experiencing, communicating, sharing is central to place creation, and must somehow be retained.

On a different tangent to artificial intelligence I wonder if we can expand our use of proxi models.

Can we search for natural processes which behave as humans behaviour? Like fluid mechanics

models are used as scaled proxi models for crowd modelling. Could we take something from Tuan's

(1977) evocative expression that "place can acquire deep meaning … through the steady accretion of

sentiment over the years"? Can we learn to read the sediment and our sentiment in parallel?

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